



Evaluation of Integrated Document Management System (IDMS) Options for the Arizona Department of Transportation (ADOT)

Final Report 517

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FEBRUARY 2003

Prepared for:

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U.S. Department of Transportation
Federal Highway Administration

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1. Report No. FHWA-AZ-03-517		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Evaluation of Integrated Document Management System (IDMS) Options for ADOT				5. Report Date February 2003	
				6. Performing	Organization
7. Authors Deborah Trinchieri Alastair Ramsay Thomas Delaney Michael Gilliland Greg Pic'l Laurel Grove				8. Performing Organization Report No.	
9. Performing Organization Name and Address Covansys 535 N Brand Blvd Suite 1000 Glendale, CA 91203				10. Work Unit No.	
				11. Contract or Grant No. SPR-PL-1-(59) 517	
12. Sponsoring Agency Name and Address ARIZONA DEPARTMENT OF TRANSPORTATION 206 S. 17TH AVENUE PHOENIX, ARIZONA 85007 Project Manager: John Semmens				13. Type of Report & Period Covered	
				14. Sponsoring Agency Code	
15. Supplementary Notes Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration					
16. Abstract This report presents the comprehensive findings of Covansys relative to the Arizona Department of Transportation IDMS engagement. The overriding sense is that ADOT, while running with a significant level of efficiency and productivity, can still further optimize operations and client service through strategic implementation of IDMS technologies. Sound implementation of IDMS technologies will flatten the business process and raise service levels both internally and to the drivers and highway users of the State of Arizona. This report outlines the options and opportunities that exist for further deployments of IDMS and the appropriate design approach and steps towards acquiring and implementing IDMS related technologies, to increase the competitive advantage and service levels within ADOT. The report also presents a number of sample IDMS procurement scenarios, which will describe the expenditures required to implement IDMS solutions within specific target areas of ADOT. These scenarios are presented as generic templates, which can be used across sections within ADOT, and also as a basis for future budget allocation processes by ADOT.					
17. Key Words document management, document imaging, electronic document filing		18. Distribution Statement		23. Registrant's Seal	
19. Security Classification Unclassified	20. Security Classification Unclassified	21. No. of Pages 273	22. Price		

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
In	inches	2.54	centimeters	cm
ft	feet	0.3048	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	6.452	centimeters squared	cm ²
ft ²	square feet	0.0929	meters squared	m ²
yd ²	square yards	0.836	meters squared	m ²
mi ²	square miles	2.59	kilometers squared	km ²
ac	acres	0.395	hectares	ha
MASS (weight)				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
VOLUME				
fl oz	fluid ounces	29.57	millimeters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.0328	meters cubed	m ³
yd ³	cubic yards	0.765	meters cubed	m ³

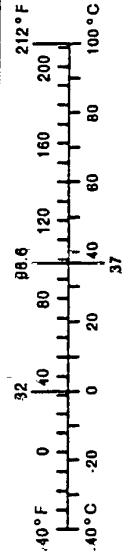
Note: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
yd	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	millimeters squared	0.0016	square inches	in ²
m ²	meters squared	10,764	square feet	ft ²
yd ²	kilometers squared	0.39	square miles	mi ²
ha	hectares (10,000 m ²)	2.53	acres	ac
MASS (weight)				
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1000 kg)	1.103	short tons	T
VOLUME				
mL	millimeters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	meters cubed	35.315	cubic feet	ft ³
m ³	meters cubed	1.308	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



These factors conform to the requirement of FHWA Order 5190.1A

*SI is the symbol for the International System of Measurements

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Glossary

21CFR11	Code of Federal Regulations governing electronic records & electronic signature
2D	Two Dimension
3D	Three Dimension
4i	Documentum Web Content Management package
ADM+	ADOT Timekeeping System (Discontinued 6/02)
ADOA	Arizona Department of Administration
ADOT	Arizona Department of Transportation
ADOT-ITG	Arizona Department of Transportation Information Technology Group
ADVANTAGE	Computerized Purchasing System
AEC	Architectural, Engineering, Construction
AFS	ADOT's Financial System
AIFS	ADOT's Payroll System
AIX	IBM RS/6000 UNIX Operating System
ALJ	Administrative Law Judge
AP	Accounts Payable
API	Application Program Interface
APS	Arizona Public Service
AR	Accounts Receivable
ARCinfo	Geographic Information System Package
ARPS	Advanced Routing and Permitting System
ASCII	American Standard Code for Information Interchange
ATA	Advanced Technology Attachment
ATG	Commercial Developer of On Line CRM Applications
ATM	Asynchronous Transfer Mode
ATMS	Bentley Systems Inc. Advanced Transportation Management System
AT&T	American Telephone and Telegraph
AZ	Arizona
AzSPO	Arizona State Procurement Office
B2B	E-commerce Business To Business Transaction
BaseT	Ethernet Cabling Standard
BASIC	Beginner's All-purpose Symbolic Instruction Code (Program Development Language)
BEA	Commercial Developer of Web Logic Solutions
BG	Bridge Group
BOMS	Bill of Materials
BPR	Business Process Reengineering
C/C++	Program Development Language
CA	California
C.A.	Construction Administration
CACI	Workflow Simulation Company

CAD	Computer Aided Design
CADD	Computer Aided Design and Drafting
CALS	Continuous Acquisition and Life Cycle Support Format Standard
CATIA	Integrated suite of software applications from IBM/ Dassault Systems covering all aspects of product design: Computer Aided Design (CAD), Computer Aided Engineering (CAE) and Computer Aided Manufacturing (CAM),
CBT	Computer Based Training
CD	Compact Disk
CDL	Commercial Driver License
CD ROM	Compact Disk Read Only Memory
CE	Microsoft operating system designed for portable and handheld computers
CIR	Committed Information Rate
CIT	Hybrid Engineering File Format (Intergraph)
CLIX	Intergraph Computer System
CM	Content Management
CMMS	Computerized Maintenance Management System
COG/MPO	Counsel of Governments/Metropolitan Planning Organization
COLD	Computer Output to Laser Disk
COM	Common Object Model
COTS	Commercial Off The Shelf
CR	Cash Receipts
CRM	Customer Relationship Management
CSX	Railroad Corporation
CTI	Computer Telephony Integration
CVL	Controlled Vocabulary Lists
CVO142425	Sample Drawing Index
DB	Database
DB2	IBM Mainframe Database
DDE	Dynamic Data Exchange
DGN	Bentley MicroStation File Extension
DHCP	Dynamic Host Configuration Protocol
DHTML	Dynamic Hypertext Markup Language
DIB	Device-independent bitmap, the bit-mapped graphics format used by Windows. Graphics stored in DIB format generally end with a .bmp extension
D/L	Driver License
DL380	HP Proliant Server
DLL	Dynamic Link Library
DM	Document Management
DMS	Document Management System
DMV	Department Motor Vehicles

DNS	Domain Name System or Service
DOA	Department of Administration
DOC	Microsoft Word File Extension
DOS	Disk Operating System
DOT	Department of Transportation
DPENS	HP/Compaq Workstation
DPS	Department of Public Safety
DS3	Dedicated, private line service designed for point-to-point communications. This 45 Mbps digital service transmits data over fiber optic cable.
DSL	Digital Subscriber Line
DW	Data Warehouse
DWG	AutoCAD File Extension
DXF	Interchange format to convert engineering documents
E	Engineering Drawing Size Electronic
EAI	Enterprise Application Integration
EA	Environmental Assessment
ECN	Engineering Change Notice
ECO	Engineering Change Order
eContent	Documentum Electronic Content Package
ECS	Engineering Consulting Services
EDAT	Engineering Data Access Technology
EDI	Electronic Data Interchange
EDM	Electronic Document Management Engineering Data Management
EDMS	Electronic Document Management System
EDS	Electronic Data Systems (Information Services Company) Environmental Determination Statement
EHO	Executive Hearing Office
EIS	Environmental Impact Statement
E-Mail	Electronic Mail
EMS	Extended Memory Specification Emergency Medical Services
EPS	Extended Purchasing System
ERP	Enterprise Resource Planning
ESPS	RFP Generation Company
ETG	Enterprise Technology Group
F&A	Finance and Administration
FAST	Construction Reporting Enterprise Application
FBI	Federal Bureau of Investigation
FDA	Food & Drug Administration
FHWA	Federal Highway Administration
FM	Financial Management
FR	Frame Relay

FTE	Full Time Equivalent
FTP	File Transfer Protocol
FY	Fiscal Year
G4	Group IV Compression Standard
GB	Gigabytes (1 Billion Characters) Gigabits per second
GEOPAK	Bentley MicroStation Package
GHz	Giga Hertz (1 billion cycles per second)
GIS	Geographic Information Systems
GL	General Ledger Bentley MicroStation QuickVision/GL package
GMP	Good Manufacturing Practices
GPS	Green Pasture Software
GUI	Graphical User Interface
HD	Hard Disk
HDLC / PPP	High Level Data Link Control / Point to Point Protocol
HEAT	Help Desk application name - Propriety
HELP	Heavy-vehicle Electronic License Plate
HP	Hewlett Packard
HPGL	Hewlett Packard Graphics Language
HP-UX	Hewlett Packard UNIX for the HP9000
HR	Per Hour
HRDC	Human Resource Development Center
HSM	Hierarchical Storage Management
HTML	HyperText Markup Language
HVAC	Heating, Ventilating, Air Conditioning
HWY	Highway
IBM	International Business Machines Corporation
ID	Identifier
IDE	Integrated Drive Electronics
IDF	Intermediate Distribution Frame
IDM	Integrated Document Management
IDMCS	Integrated Document Management Content Services
IDMDS	Integrated Document Management Document Services
IDMS	Integrated Document Management System
IE	Internet Explorer
IFTA	International Fuel Tax Agreement
IGES	Initial Graphics Exchange Specification
IIS	Internet Information Server
IN	Invoices
IP	Internet Protocol
IPLOT	Intergraph Pen Plotting Software
I/RAS	MicroStation Raster Editor
IRP	International Registration Plan
IS	Imaging Services

ISO	International Organization for Standardization
IT	Information Technology
ITD	Intermodal Transportation Division
ITG	Information Systems Specialist (Globe District)
IVR	Interactive Voice Recognition
JMDL	Java MicroStation Dialog Manager
JPG	Joint Photographic Expert Group (Color Image Format)
JV	Journal Voucher
JVue	Cimmetry Java Based Markup and Viewing Product
KB	Kilobyte (1,000 Characters)
LAN	Local Area Network
L/ISO	Bentley MicroStation Design Product
LLC	Limited Liability Company
LOB	Line of Business
MAPI	Messaging Application Programming Interface
MB	Megabyte (1 million characters)
Mbs	Mega Bits (1 million binary elements) per second
MCO	Manufacturer Certificate of Origin
MCS	Motor Carrier Safety
MDF	Main Distribution Frame
MDI	Multiple Document Interface
MDL	MicroStation Dialog Manager
MGT-9.09	Records Retention and Disposition Schedule
MHz	Mega Hertz (1 million cycles per second)
MIME	Multipurpose Internet Mail Extensions
MIS	Management Information Systems
MS	Microsoft
MSIE	Microsoft Internet Explorer
MV808	Motor Vehicle Report (Driver Tax & Licensing Fees)
MV650-658	Motor Vehicle Report (Driver Statistical Analysis)
MVD	Motor Vehicle Division
MVR	Motor Vehicle Records
N	North
N/A	Not Applicable
NOS	Network Operating System
NT	Microsoft New Technology Operating System
NT-SP6	Microsoft New Technology Service Pack 6
OCR	Optical Character Recognition
ODBC	Open Database Connectivity
OLE	Object Link and Embedding
ORG	Section of ADOT's budget which will be assessed for a specific expenditure
OS	Operating System
OSHA	Occupational Safety and Health Administration
OSI	Open Systems Interconnection

OSPF	Open Shortest Path First
P2	Pentium II Microprocessor
P3	Pentium III Microprocessor
PAFS	Portable Additional Formats Specification
P&ID	MicroStation Piping and Instrumentation Diagram Software
PC	Purchase orders for \$1000 or greater
PCI	Peripheral Component Interconnect
PC LAN	Personal Computer Local Area Network
PD	Purchase orders for < \$1000
PDA	Personal Digital Assistance
PDF	Portable Document Format
PDH	Professional Development Hours
PDM	Product Data Management
PDS	Piping Design Software
PDU	Protocol Data Unit
PECOS	Maintenance Reporting Enterprise Application
PG	Purchase orders for established contracts, contract release orders
PKI	Public Key Infrastructure
PIJ	Project Investment Justification
PLC	Private Limited Company
POE	Port of Entry
PP	Point to Point
PPM	Principal Period of Maintenance
PPT	Microsoft Powerpoint Extension
PS&E	Plans, Specifications and Estimate
PTP	Point to Point
PVC	Permanent Virtual Circuit
Q/A	Quality Assurance
QA	Quality Assurance
R&D	Research and Design
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
RDBMS	Relational Database Management System
REF	Hybrid Engineering File Format used by GTX package
RFP	Request for Proposal
RLC	Raster Based Engineering Format
RMD	Records Management Division
SAP	Enterprise Resource Planning Package (ie. SAP R/3)
SCSI	Small Computer Systems Interface
SELECT	Bentley MicroStation GeoEngineering Tool
SEO	State Engineer's Office
SI	Systems Integration
SI&A	Structure, Inventory, and Appraisal Report
SMS	Systems Management Server

SMTP	Simple Mail Transfer Protocol
SMTP / POP3	Simple Mail Transfer Protocol / Post Office Protocol v.3
SNA	Systems Network Architecture
SOAP	Simple Object Access Protocol
SOP	Standard Operating Procedure
SPC101	Sample Document Classification Code
SPMG	Statewide Project Management Group
SQL	Structured Query Language
SRP	Salt River Project
STEP	Standard for the Exchange of Product Model Data, is a comprehensive ISO standard (ISO 10303)
STL	Standard Template Library
SUN	Sun Microsystems
T1	Telecommunication line consisting of 24 individual channels, each of which supports 64Kbits per second.
T3	High-speed telecommunications connection capable of transmitting data at rates up to 45 Mbps
TARGET(S)	Revenue Accounting Mainframe System
T&R	Title & Registration
TCP/IP	Transmission Control Protocol / Internet Protocol
TIFF	Tag Image File Format
TPX	Terminal Production Executive
TR114+P4L	4 Port Fax Gateway Controller
TRACS	Accounting system predecessor to ADVANTAGE
TRC	Tucson Regional Center
TWAIN**	Generic Scanner / PC Interface Standard
TX	Texas
TxDOT	Texas Department of Transportation
UDE	User Defined Entity within Cimmetry AutoVue
UNIX	Distributed open client/server operating system
UPS	United Parcel Service Uninterruptible Power Supply
URL	Uniform Resource Locator
US	United States
VBA	Visual Basic for Applications
VC	Virtual Circuit
VCET	Viewing and Conversion Enabling Technology
VISTA	Electronic program that is used for Motor Carrier transactions, specifically, allocated vehicles.
VLAN	Virtual Local Area Network
VRML	Virtual Reality Modeling Language
WAN	Wide Area Network
WAN FR	Wide Area Network Frame Relay
WCM	Web Content Management
W/EDGE	Green Pastures Software Engineering Drawing Package

WFX/WMX	Eastman (eiStream) WorkFolder for MS Exchange / Work Manager for MS Exchange products
WIP	Work In Progress
WML	Web Site Meta Language Wireless Markup Language
WMS	Work Management System (eg. eiStream WMS)
WORM	Write Once, Read Many (eg. WORM Optical Disk)
X	Tool used by Microsoft Visual Studio Developers (eg. Active X)
X-Section	Cross Section
XLS	Microsoft Excel Spreadsheet Extension
XML	Extensible Markup Language
XP	Microsoft Advanced Desktop Operating System
Y	Yes

1. EXECUTIVE SUMMARY

1.1 Background

The ADOT IDMS engagement began in February 2001 and initiated a program of understanding and analyzing the current document management practices and standards with ADOT. During the course of the 18 month engagement, the IDMS Research Team used surveys and interviews to analyze and document the core business practices and document handling procedures within ADOT. The primary mission was to listen to individual user groups and stakeholders within ADOT and allow them to articulate their specific business requirements, needs, and expectations with respect to IDMS solutions.

The Research Team specifically found a range of business cultures, technology aptitudes and backgrounds, and expectations towards the benefits, which would result from IDMS solutions. Staff Engineers, for example, within the Intermodal Transportation Division would have a singular approach to IDMS solutions based on the use of engineering graphics, integration to Computer Aided Design (CAD) systems and related issues, while staff within the Transportation Support Group would have an entirely view of IDMS solutions based on the capture and retrieval of basic office support documents, such as financial audits and human resource information. The result was a fragmented view of document management within ADOT, with each business area implementing what they consider to be a best practices approach to the records and documents management, while not having a view at an enterprise level of the discipline.

The basic challenge of the study team, hence, was to reconcile the needs of a broad number of business cultures and competing work approaches within ADOT and formulate a single, workable strategy based on the survey inputs from a number of senior stakeholders across the organization. By accomplishing this step, ADOT could then proceed to acquire and deploy IDMS solutions and obtain optimal leverage over its document resources, while solving basic logistical issues facing the organization such as document storage, backup, and ability to share information effectively between decision makers and stakeholders.

1.2 Approach

The approach and methodology employed during the engagement focused on the gathering and analysis of specific needs and concerns within each of the respective areas of operation within ADOT. The study team employed a focused, concentrated approach to collect and gather the range of requirements from individual contributors and stakeholders. The study objective was to collect this information, analyze and determine patterns of need and commonalities, and present the research information back to ADOT, without disrupting normal day-to-day work activities of staff or contributors at ADOT.

Findings

The IDMS study commissioned by ADOT determined a significant case for electronic document management exists within the organization. The research and analysis conducted by the study team allowed all key stakeholders and participants to ‘freeze the action’, evaluate the core business processes and document flows, and reexamine ADOT’s document handling procedures and approach. The research resulted in a series of key conclusions:

- Physical documents remain the preponderant media of choice within the organization for the storage, retention, and dissemination of information, in comparison to other information forms. The vast majority of information, both from an office and engineering perspective, still resides in paper format, managed in document archives, folders, and filing areas.
- Current document handling procedures and techniques within the organization can be significantly reengineered and enhanced through the strategic use of IDMS technologies. By converting information to electronic format, ADOT will gain quantum increases in the organizational efficiency and ability to coordinate and share mission critical documents across the organization, while also enhancing security and access to sensitive files managed within the secure IDMS information framework.
- Any future IDMS deployment must have substance and depth to cross departmental boundaries and effectively share information between stakeholders within a secure access framework.
- The factors which could impede application of IDMS are primarily cultural in nature, and related to the human factors within the organization, and not related to a specific technology model.
- Legal issues with respect to the storage and management of digital records are not fully resolved within the State of Arizona.
- Legal issues notwithstanding, the end user community will make significant strides and gains in productivity, efficiency, and ease of access to on-line IDMS information through the use of industry standard IDMS systems such as FileNET Panagon or Documentum.
- The infrastructure exists today to deploy the propagate IDMS technologies as a mainstay technology within ADOT. Successful IDMS deployment has already occurred within the Bridge Group. It is simply a question of replicating the approach and methodology used.
- FileNET Panagon is the recommended IDMS platform of choice, based on analysis of the available market offerings, including eiStream, Documentum, Spicer, Green Pastures Software, Cimmetry, and other current office and engineering IDMS products.

- Because the IDMS market is dynamic and evolving, in terms of higher capabilities and performance at a lower overall purchase price, we recommend that ADOT continue to research the market and stay informed of current IDMS capabilities and features, either through direct contact with supplier groups such as FileNET and Documentum, or via interface to the appropriate product suppliers.
- Involvement with the respective IDMS industry trade groups such as the Association for Information and Image Management (AIIM) and the Association of Records Management Administrators (ARMA) is also recommended. Direct involvement with the local chapters of these organizations will allow ADOT participants to hear first hand accounts of other implementation success stories and IDMS application scenarios, both within the public sector and in commercial operations.

The IDMS Study was the first step towards normalizing the organization's approach to IDMS technologies, and establishing a baseline in terms of the specific benefits which could be achieved at a departmental level, through the use of a consistent, standardized IDMS vision and approach. The recommendation of the Study Team is to continue to explore the use of IDMS technologies, target 1-2 specific new high value areas where immediate results and efficiencies can be generated from IDMS, and invoke the necessary acquisition and procurement guidelines and strategy to go forward with IDMS. The implementation of IDMS within a consistent enterprise strategy and framework will then reinforce ADOT's position as a pacesetter with respect to new technologies and a leader in innovation and staff productivity within the State of Arizona.

In addition to these results and conclusions, which may be leveraged internally within ADOT, a significant number of lessons and information from the IDMS study engagement can be leveraged by external, peer DOT organizations, who may themselves be at an early evaluation of IDMS solutions. These lessons can be extended to peer DOT organizations in other states and locations within the country, so as to better position and align them appropriately with respect to IDMS technologies. Specific lessons and opportunities for other state DOTs include the following:

- It is critical to establish consensus and gather requirements across the organization. Therefore the use of an initial research and recommendations report prepared by a 3rd party consulting organization is advised.
- IDMS technologies should not be positioned and leveraged as a driver of reduced costs through headcount or FTE reduction. Instead, the key mission and goal of IDMS implementations is to reinforce best practices methodology and increase productivity and efficiency within the organization, so that significantly more work and production is accomplished by the existing headcount
- IDMS technologies should be positioned where they have the most visible impact on customer and client service.

- Recruit the end user community early and often into the IDMS planning and design process. Of all the major technology groups, IDMS technologies are largely driven at a grass roots level by end users who are frustrated with the lack of access and control over mission critical files.
- A properly planned and implemented IDMS system has the effect of unifying people and stakeholders within the organization.
- New IDMS systems rarely cost justify themselves based on fixed dollar savings. The final justification for the systems is through enhanced productivity and ability to better leverage staff and knowledge workers to perform higher value work within a flatter, more efficiency service organization.

Based on our analysis and research into the IDMS deployments at ADOT, we recommend IDMS implementations proceed in the application areas with highest impact, visibility, and need for the IDMS solutions.

Based on our research and observations, high potential IDMS target opportunities consist of the following areas:

- Transportation Support Group
 - ✓ Cost Accounting
 - ✓ Procurement
- Intermodal Transportation Division
 - ✓ Bridge Group
 - ✓ Roadway Engineering
 - ✓ Computer Aided Engineering
- Motor Vehicles Division
 - ✓ Competitive Government Partnerships
 - ✓ Executive Hearing Office
 - ✓ MVD Records & Training

Deployments in each of these areas will have maximum impact in terms of file integrity, reduction of filing space, reduction in production backlogs, and increased ability to share information between multiple users.

These areas also represent a cross section of the office/administrative/clerical and engineering user communities, which will further help consolidate and unify the IDMS approach within ADOT.

Finally, by targeting these areas initially, ADOT will build on the current level of success and experience in areas such as Bridge Group where the FileNET / GPS W/EDGE solution is currently underway.

2. INTRODUCTION

2.1 OBJECTIVE

This report will present the comprehensive findings of Covansys relative to the Arizona Department of Transportation (ADOT) integrated document management system (IDMS) engagement. Specifically, we will present the conclusions and findings based on our survey results, interviews, and analyses of individual department operations. The overriding sense is that ADOT, while running with a significant level of efficiency and productivity, can still further optimize operations and client service through strategic implementation of IDMS technologies. Sound implementation of IDMS technologies will flatten the business process and raise service levels both internally and to the drivers and highway users of the State of Arizona.

This report will outline the options and opportunities that exist for further deployments of IDMS and outline the appropriate design approach and steps towards acquiring and implementing IDMS related technologies, to increase the competitive advantage and service levels within ADOT.

The IDMS Report will also present a number of sample IDMS procurement scenarios, which will describe the expenditures required to implement IDMS solutions within specific target areas of ADOT. These scenarios are presented as generic templates, which can be used across sections within ADOT, and also as a basis for future budget allocation processes by ADOT.

2.2 ENGAGEMENT OVERVIEW

The ADOT IDMS engagement began in February 2001 and initiated a program of understanding and analyzing the current document management practices and standards with ADOT. During the course of the 18 month engagement, the IDMS Research Team used surveys and interviews to analyze and document the core business practices and document handling procedures within ADOT. The primary mission was to listen to individual user groups and stakeholders within ADOT and allow them to articulate their specific business requirements, needs, and expectations with respect to IDMS solutions.

The Research Team specifically found a range of business cultures, technology aptitudes and backgrounds, and expectations towards the benefits, which would result from IDMS solutions. Staff Engineers, for example, within the Intermodal Transportation Division would have a singular approach to IDMS solutions based on the use of engineering graphics, integration to Computer Aided Design (CAD) systems and related issues, while staff within the Transportation Support Group would have an entirely view of IDMS solutions based on the capture and retrieval of

basic office support documents, such as financial audits and human resource information. The result was a fragmented view of document management within ADOT, with each business area implementing what they consider to be a best practices approach to the records and documents management, while not having a view at an enterprise level of the discipline.

The basic challenge of the study team, hence, was to reconcile the needs of a broad number of business cultures and competing work approaches within ADOT and formulate a single, workable strategy based on the survey inputs from a number of senior stakeholders across the organization. By accomplishing this step, ADOT could then proceed to acquire and deploy IDMS solutions and obtain optimal leverage over its document resources, while solving basic logistical issues facing the organization such as document storage, backup, and ability to share information effectively between decision makers and stakeholders.

2.3 CURRENT ISSUES AND CHALLENGES

During the course of the IDMS study, the Research Team found a range of issues and challenges facing ADOT as an organization, in terms of document management and handling procedures. These issues impact productivity and client service and are effectively remedied through the deployment of IDMS systems.

Example issues include:

Inefficiencies and delays in retrieval response time, which constrain the business process and impede the ability to create rapid, informed decisions on a day-to-day basis.

Absence of a comprehensive file recovery plan and ability to address unexpected loss of document information currently contained in filing cabinets, microfilm banks and other analog media. A comprehensive file recovery plan would complement the current use of the State Archives to store and file documents on a permanent basis, and provide an automated retrieval and recovery path should a human-made or natural disaster to occur and impact the security of ADOT records.

Limited filing space and the ability to house mission critical documents and make these available on demand to the appropriate user groups or stakeholders.

Ability to share and coordinate resources on a single document, without the need to photocopy, duplicate, or fax the original, or the need to distribute multiple physical copies concurrently between requesting users.

Ability to assign security on an individual document basis and ability to protect a single unjacketed document from unauthorized viewing or manipulation.

Check-in / check-out control and the ability to manage versions on documents, especially road construction and as built diagrams, to reflect the current status of road work and the work in progress occurring on specific sections of Arizona roadways.

Ability to perform redlining, edits, and annotations on office documents, personalize document content, and ensure that specific documents are current and up to date with new information and parameters, similar to the current application of annotations to engineering documents through Bentley Systems MicroStation.

Ability to leverage and integrate new technologies such as Web access, Web authoring and publishing, eCommerce, fax gateways, and optical character recognition.

2.4 REPORT SCOPE & COVERAGE

Our primary mission was to cover the major application areas of ADOT and treat each area as a separate business unit with individual, unique requirements and objectives in the IDMS sector. We specifically wanted to cover and analyze the IDMS application areas shown in Table 2-1 below, which lists the key functional areas of ADOT.

Table 2-1 IDMS Application Areas

1. TRANSPORTATION SUPPORT GROUP	3. INTERMODAL TRANSPORTATION DIVISION
• Technical Information Resources	• Partnering
❖ PC LAN	• Transportation Technology Group
❖ WAN	• Office of Mgmt., Budget & Training
❖ Systems Architecture	• Operations
❖ Special Projects	• Development
❖ Administrative Services	• Valley Transportation
❖ System Development & Support Services	
❖ Infrastructure	• Materials
• General Operations	• Maintenance
• Facilities Design	• Construction
• Audit & Analysis	• Bridge Group
• Legislative Services	• Traffic Engineering
• Civil Rights Office	• Roadway Engineering
• Financial Mgmt. Services	• Engineering Technical
• Organization & Employee Dev.	• Right of Way
• Technical Training	• Statewide Project Management
• Arizona Highways Magazine	• Arizona/Sonora Liaison
• Human Resources	• Environmental Planning
• Community Relations	• Phoenix Construction District
• Safety & Health	• Phoenix Maintenance District
• Equipment Services	• Valley Project Management
• Competitive Government	• General Consultant
• Budget/Strategic Planning	• Regional Freeway System
• Procurement	
	4. MOTOR VEHICLE DIVISION
2. TRANSPORTATION PLANNING DIVISION	• Records / Training / Operational Services
• Priority Planning	• Office of Revenue Audit
• Data Collection	• Title and Registration Partnerships
• Admin. Support Services	• Competitive Government / Partnerships
• COG'S/ MPO'S Air Quality	• Collections
• Transit	• Motor Carrier
• Advance Planning	• Revenue Administration
• Transportation Research Center	
	5. AERONAUTICS

2.5 OVERVIEW

The Project Team made significant use of interviews, surveys, presentations and other data collecting techniques. The objective of our approach was to cover as broad a cross section as possible within the agency and then ‘drill down’ within respective department groups to isolate their unique set of document management requirements.

Significant time and resources were expended in the following opportunity areas:

1) Transportation Support Group

A. Fiscal Operations

- Cost Accounting
- General Ledger
- Employee Services
- Controller
- Accounts Payable
- Payroll/Timesheets

B. Audit & Analysis

C. Procurement

2) Intermodal Transportation Division

A. Computer Aided Engineering

B. Bridge Group

C. Construction

D. Globe District

E. Materials

F. Roadway Engineering

G. Intermodal Transportation Division (ITD) Training

H. Prescott District

3) Motor Vehicle Division

A. Revenue and Audits

B. Motor Vehicle Competitive Government

- Motor Carriers
- Title & Registration Partnerships
- Dealer Licensing
- Third Party Programs

C. Office of Revenue Audit

D. Executive Hearing Office

E. Collections

F. Records & Training

2.6 IDMS Approach and Methodology

The approach and methodology employed during the engagement focused on the gathering and analysis of specific needs and concerns within each of the respective areas of operation within ADOT. The study team employed a focused, concentrated approach to collect and gather the range of requirements from individual contributors and stakeholders. The study objective was to collect this information, analyze and determine patterns of need and commonalities, and present the research information back to ADOT, without disrupting normal day-to-day work activities of staff or contributors at ADOT.

2.6.1 Data Collection, Surveys, Interviews

The use of survey forms and interviews was integral to the IDMS project approach and methodology, in terms of data collection, consolidation and analysis. Two specific types of IDMS surveys were employed during the course of the engagement:

- a) The short form IDMS Overview survey, which collected the high level requirements and needs by each functional area within ADOT and attempted to understand the vision and expectations that each business unit possessed with respect to document management, at a qualitative level.
- b) The IDMS Operational Requirements long form survey, which sought to quantify the specific IDMS needs and opportunity at a detailed, operational and procedural level within each target application area. The long form survey detailed and described current document handling and processing techniques used within ADOT at a granular level and quantified the specific document volumes, processing steps, archival storage, backup strategies and other issues which impact the IDMS approach and methodology.

The long form survey was used to reinforce and support the qualitative objectives learned from the short form survey and provide a further quantitative basis and understanding for deploying IDMS technologies within each area of operation.

The two types of survey forms are included in the Appendix.

After the survey forms were distributed, completed, and collected, actual interviews took place within each operational group to further reinforce, clarify, and confirm the findings reported back in the survey forms. In certain cases, the completion of the survey forms and the interviews occurred simultaneously and the interviewers posed the specific questions contained in the surveys verbally to each of the decision makers and contributors to the IDMS study.

In any case, a concerted effort was made to confirm and reinforce the data reported back in the surveys by holding specific one on one interviews with each of the department heads and contributors, to ensure that the study questions were adequately understood by participants, and also to afford ADOT staff to revise or clarify any of their survey responses.

Periodic meetings were also held with participating functional areas of ADOT, where the preliminary findings and analysis was presented in group sessions to study participants. This further allowed ADOT departments to reset and synchronize their requirements and expectations at a departmental level, and also reinforce the collaborative effort between the research team and ADOT.

The sequence of the survey distribution, evaluation, and interviews corresponded to and followed the organizational structure of the ADOT. In other words, the IDMS research team made a concerted effort to gather information and interview individuals corresponding to a single ADOT division or group at any one time, and not cross departmental boundaries or lines until all the surveys were completed and submitted by a single department or business entity. This allowed the IDMS research team to keep a concerted focus on that department and keep the interview process within a single span of control.

Thirty two (32) surveys were completed and submitted back to the research team, triggering further interviews and analysis by the IDMS research team.

Finally, it is important to note that the IDMS survey and interview process was kept within an appropriate user context within each of the ADOT business units. The interviews and surveys were presented to users in the context of allowing each contributor to present their thoughts, ideas, and goals for an IDMS strategy, and not as a future vehicle for reorganizing staff or reducing FTE headcount within each of the target areas of ADOT. Instead, the survey and interview process was kept in the context of how to increase staff productivity, increase operational efficiency and service levels, and better integrate information across the major document types handled by ADOT, ranging from office, clerical business documents to large format CAD type drawings used in the engineering work environment. By maintaining the interview process and context, the research team was able to obtain accurate and impartial survey results from the user community, who understood that they played a key role and stake in future IDMS technology acquisitions and strategy.

2.6.2 Best Practices Review and Analysis

The IDMS study used a dual, two-prong approach to meeting the business needs and expectations of the user community. First, the IDMS had an inward, internal focus on the operations and document management within ADOT and reviewed work processes, document handling procedures, major document types, storage

techniques, and retention schedules of ADOT across the component functional areas. This information, of course, was the foundation of the IDMS report.

Second, the IDMS research team maintained an outward, external focus and reviewed the status and operations of other department of transportation (DOT) facilities and groups across the domestic United States, to ascertain what IDMS systems other DOT groups had deployed and in which functional areas they were deployed, to leverage this information back into the IDMS strategy and business model. Therefore, the research team contacted DOT groups from states such as Texas, Kansas, Pennsylvania, and other states where IDMS had been deployed in mission critical areas of the operation.

The thrust of our questions and analysis with respect to other DOT organizations was to establish performance metrics and costs associated with IDMS deployments. The research team specifically inquired on the potential productivity increases associated with the IDMS solution, acquisition costs, and the administration and maintenance of the external DOT system. This information was then ploughed back into the IDMS analysis to create more understanding in terms of a business model and rationale for IDMS within ADOT.

The major point here is that during the survey and interview process, it was important that the research leaders could indicate where in other DOT operations around the country IDMS technologies had played a critical and successful role in the management of documents related to the transportation process. End users typically have an innate fear or concern about being the first to employ a new technology, or being on the pioneering end of change, and the intent of the IDMS research team was to allay this concern, and indicate the precedents that existed elsewhere in the country in other DOT operations for the successful usage of IDMS systems.

The best practices review and analysis also included IDMS technologies deployed within ADOT. Specific research and evaluation, for example, was conducted on the IDMS deployment in the ADOT Bridges Group and this area was investigated for its innovative use of the FileNET Panagon IDMS and ability to manage office and engineering CAD type documents.

2.6.3 Network Infrastructure Analysis

Scanned document images represent significantly large file sizes, using approximately fifty-thousand (50K) bytes per page of storage, and therefore represent a significant potential load on the ADOT network infrastructure. To minimize risk and ensure appropriate performance levels, the IDMS research team included a Network Analyst who evaluated the current telecommunications and networking infrastructure employed by ADOT. The Network Analyst identified the major telecommunication hubs and linkages used across the agency and

identified where bandwidth issues could occur with respect to the transmission of digital images from one remote ADOT site to another, on a wide area basis.

The final network analysis presented in the IDMS report also has potential extensions to the transport of multimedia, graphics, full motion video, and other rich content type IDMS files, as these new rich content technologies mature and come under the IDMS umbrella. The appropriate investment levels would be required to give ADOT staff and personnel access to this information on a transparent basis.

Finally, the network infrastructure analysis presented in this report gives ADOT a consolidated, single view of the network capacity, bandwidth, and hub and router locations within the agency. To the knowledge of the research team, there has been no other recent, comprehensive analysis of current networking and telecommunications capacities within ADOT, and the results can be used for further strategic planning and network acquisitions.

2.6.4 IDMS Software Providers

To establish the business case for IDMS technologies within ADOT, it was critical to research the current IDMS industry leaders and their respective document processing capabilities and costs. The IDMS Research Team organized and gathered information on leading vendor organizations which market and install “best of breed” IDMS solutions and presented this information in the IDMS report. IDMS vendor organizations such as FileNET, eiStream, and Documentum were analyzed in terms of their current competitive position and approach with respect to the IDMS market. Engineering IDMS systems such as Green Pasture Software, Bentley, Spicer, and Cimmetry were also analyzed on a case-by-case basis to determine the fit and suitability of their respective IDMS solution capabilities with respect to ADOT needs.

Special consideration and focus was placed on the long-term viability and longevity of each of the IDMS software providers. The IDMS market tends to be dynamic and volatile, and it is critical that any future investment in new IDMS technologies is adequately protected by a robust and solvent vendor organization. To the degree possible, the IDMS Research Team evaluated the future, long term viability of each candidate IDMS vendor, to further assist ADOT in its IDMS evaluation and procurement approach.

2.6.5 IDMS Procurement Costs

Any substantive analysis of ADOT’s IDMS requirements must include an analysis of the costs and investment levels required to purchase and deploy IDMS systems within ADOT. The IDMS Research Team organized a range of IDMS cost models covering small department, large department, and enterprise level systems, and presented the costs associated with these IDMS systems in the body of the report.

The costs are hypothetical and based on an assessment of the current procedures and numbers of workstations found within each of the IDMS target areas. Nevertheless, this information will provide ADOT with guideline costs to support future budgeting exercises and allocation of required funding to move forward with IDMS as a technology integral to the organization.

2.6.6 Consolidated Needs Assessment

The final step in the IDMS study was to organize and consolidate the IDMS requirements within ADOT and present this information as an overall needs assessment identifying IDMS requirements by Division and Department. The summary matrix addressing IDMS Needs Assessment is contained in the report and identifies the core IDMS applications within each division and department, as well as potential productivity benefits realized through IDMS solutions.

3. TRANSPORTATION SUPPORT GROUP

3.1. FISCAL OPERATIONS

3.1.1 Overview

Fiscal Operations is responsible for the overall financial oversight of ADOT and ensures that ADOT meets agency financial and fiduciary responsibilities and objectives. Fiscal Operations manages the agency budget, financial statements, payroll, and accounts payable functions. As a group, Fiscal Operations makes sizable use of documents in both hardcopy and electronic format and would derive significant benefit from IDMS technologies, in terms of generating higher productivity, quality, and level of efficiency internally.

3.1.2 Cost Accounting

Operation Details

Cost Accounting is responsible for the major accounting aspects of ADOT, including:

- Contract Accounting
- Contractor Payments
- Final Voucher Accounting
- Project Accounting

Major document files of between 200-300 pages are kept in extensive project folders, which include mainframe reports, current descriptions of individual projects and current status, and billing reports.

Cost Accounting is also responsible for the maintenance and management of “Red Book” information, which consists of federal documents that address obligation of funds, which are used primarily to address federal approval to engineering change orders.

Cost Accounting also maintains “Green Book” information. Data contained in the Green Books are used to support non-Federal related projects.

Cost Accounting covers all billing transactions for federal highway programs and development. Currently this group manages the file documents for 15,000+ projects. Each project uses 1 to 4 supporting notebooks, and each notebook contains approximately 50-100 pages.

Cost Accounting is responsible for tracking the financial status of individual projects throughout the project life cycle from project start to completion. Project planning is extensive and may require up to 5 years on a single project.

Cost Accounting oversees initial project scope analysis, feasibility studies, and estimated project cost projections. Cost Accounting also oversees the project life cycle in terms of issues related to securing right-of-way access for highway development.

Document management and retrieval impacts all major phases of the project life cycle, including Project Design, Construction, and Completion. Documentation must be maintained related to the construction bids and proposal responses, contractor payments, budgetary allocations, and correspondence with 3rd party contractors.

Documents related to project completion, sign off and acceptance are also maintained and are of interest and concern to Cost Accounting. Example documents include engineering approvals and final payments. Federal audit documents are also a concern of Cost Accounting. Federal audits are required prior to final billing to the Federal Government for project completion.

Federal regulations mandate that copies of all documents pertaining to a project be kept for 10 years, either until the project has been audited or until the final voucher has been submitted for the project. Documents include contracts, actual source bid, payments, invoices, contractor estimates, and contractor billings. All documents are currently maintained in paper format.

Documents must be maintained in proper order and must be accessible on short notice to support periodic audits by representatives of the Federal Government.

During the close of a contract, three staff members complete the final voucher. The staff members complete all records from the file, and then bill the Federal Government.

All files are stored in a centralized area within fiscal operations and no duplicate copies of the files are stored within the area. However, other areas such as Procurement and Engineering may possess their own copies of the original documents.

Many duplicates of documents in the notebooks occur within ADOT. After construction is completed, five years could potentially pass before the final voucher is cut.

Archival, Audit & Retention Standards

Project Management files are kept up to 10 years within Cost Accounting. The 10-year retention limit can pose specific challenges and issues in terms of document archival, space and file consumption, as well as the ability to locate the precise project file within a convenient and efficient timeframe. Check-in / check-out control, version support, photocopying and duplication efforts, and costs are also general issues in terms of file retention and retrieval. Finally, Cost Accounting would benefit from IDMS technologies through reduced filing space

and storage compression, as well as the comprehensive file recovery options available through IDMS.

Currently, file information is requested and retrieved from the State Archives on average once per week, to support on-going analysis and management of current highway project activities. Theoretically, this information could be retrieved electronically over a Web based solution, and eliminate the manual steps and tasks associated with physically transporting the files from State Archives.

Also currently a backlog of information and documents exists awaiting final disposition into State Archives. Approximately 30 boxes of documents related to closed projects are now awaiting final transport to and placement within State Archives.

Before the documents related to closed projects are shipped to State Archives, however, the specific documents and files related to right of way must be retrieved from the project files and verified for phase completion. Retrieval of Right of Way documents presents a significant task in terms of labor and time consumption. The issue could be remedied through the use of an IDMS solution, which would allow end users to search and retrieve Right of Way related documents directly from the IDMS solution, based on the associated indexes maintained in the IDMS relational database management system.

Audits of both closed and federal projects are executed periodically. Currently three Full Time Equivalents (FTEs) are allocated to federal project audits. The IDMS could provide appropriate background documentation related to federal project audits rapidly to the requesting end users, and minimize physical work required to acquire this audit information.

Inter Departmental Coordination

Cost Accounting often tracks the status of invoices, purchase orders, and other relevant payables and creditor documents through the Accounts Payable operation. Currently, ADOT does not possess a single, seamless system to communicate the status of a single contractor invoice or payment. This constitutes an inefficiency, which can be remedied by implementing an IDMS solution shared between Cost Accounting and Accounts Payable. The ability to share payables information stored in IDMS is especially relevant to non-federal related projects.

Implementing IDMS in Accounts Payable creates potential benefits, in terms of providing end users the ability to perform the electronic search, look-up, and retrieval of project invoices and payments. IDMS would provide Cost Accounting real-time access to file information indexed by project number, and eliminate current delays and inefficiencies associated with today's manual work process, based on recreating the payment history related to a single vendor or contractor.

Archival and retention cycle times are different between Accounts Payable (AP) and Cost Accounting (CA). This difference in cycle times leads to issues in locating AP documents related to projects over 10 years old. These documents are filed for future reference in the State Archives. IDMS would potentially make these documents immediately available on-line to the community of users within Cost Accounting.

The retrieval and reference issue is critical based on the deadlines and timeframes for recurring payments to contractors and construction groups associated with highway projects.

Generally, contractor invoices are paid the second Wednesday of every month and supporting documentation must be compiled and maintained in order to support this payment schedule.

In addition, engineers in the field will approve specific payments via distributed purchasing. These field payments are handled through the procurement system as opposed to the accounts payable system.

Cost Accounting also makes weekly requests from State Archives for other supporting information and faces the delays associated with issuing the request for documents until the request is serviced and resolved by State Archives. IDMS would provide web access to supporting images and deliver these documents directly to the workstation. IDMS would improve significantly on the current manual request approach and result in improvements in task compression, reduced information float, and increased convenience of user access to this information.

The major aspects and issues associated with Cost Accounting are shown in Table 3-1.

Table 3-1 Business Unit Profile – Cost Accounting

A. Operational Requirements

- Contract Accounting
- Contractor Payments
- Final Voucher Accounting
- Project Accounting

B. Major Document Types

- Government Red Books
- Project Reviews
- Correspondence, Notes, Memos
- Project Estimates
- Project Completion Documents

C. Document Management Issues

- Storage & Retention
- File Backup & Protection
- Comprehensive File Protection and Recovery
- Workflow & Work Management
- Task Compression / User Productivity
- Efficient Document Access & Retrieval
- Intra Departmental Coordination especially with Accounts Payable

3.1.3 General Ledger

Overview

General Ledger (GL) deals with financial status reports and reports distributed to the federal government. GL has fiscal oversight responsibility and examines, analyzes, and rectifies financial transactions conducted by other departments within ADOT.

GL generates significant volumes of paper documents and routinely produces documents for transfer, debt service, corrections, and transfers between other sections and GL.

On a daily basis, GL performs an average of 40 transfers and each transfer can require 3 or more pages of supporting documentation. While Accounts Payable can setup financial transfers, but not release them, GL is authorized to both setup and release financial transfers. This equates to more supporting documentation required by the GL group, which can potentially be stored and managed through an IDMS deployment.

For example, transfers from Motor Vehicle Division (MVD) are provided to GL as journal voucher (JV) forms. The JV forms are then sent manually to the Department of Administration (DOA), where appropriate individuals are authorized to sign the source JV forms.

Each JV form corresponding to a GL transaction contains a document number which serves as the search key for future reference and look up. The JV forms are kept on site for 3 years, after which the form is sent for storage at the Department of Administration (DOA) and retained there for 10 years. Recently, for example, a GL staff member enquired on a JV document dating back to 1994, which required the physical retrieval of the source file.

Documents received from individual sections are input into Architectural, Engineering, Construction (AEC) or ADOT's Computerized Purchasing System (ADVANTAGE) system. If the transaction is a transfer, staff members update both systems.

Transfers can be internal and external. Internal transfers are similar to debt services and are performed automatically. External transfers occur from an outside agency and are paper driven. For example, when Department of Revenue collects sales tax, a specific defined percent goes to ADOT. A GL transfer supports this transaction.

Staffing

Total staff in GL is 7, including the manager. The staff functions are given below:

1. **Accountant Tech** – Performs transfers, deposits and filing.
2. **Reconciliation Accountant I** – Corrects expenses and revenues in AFS and ADVANTAGE.
3. **Grade 17 Accountant** – Covers management reports, procedures and other duties.
4. **Grade 19 Accountant** – Performs debt service, bonds, management reports, transfers from the bank to ADOT and monitors the financials and approves them.

5. **Fiscal service specialist IV** – Performs transfer of investment interest from the treasury, transfers to the Department of Public Safety (DPS), payroll reconciliation between ADVANTAGE and AFS and approves Accountant Technician's work.
6. **Accountant Grade 20** – Acts as a backup for the manager, performs Federal Highway Administration (FHWA) reports, undergoes training on all other functions.

There are two designated contacts, which cover revenue and receipts accounting. Each contact interacts with the General Ledger (GL) group, processes the cash and receipts, and posts these against the General Ledger.

Business Process

GL performs \$20 million worth of deposits per week, from which Cash Receipts (CR) and invoice (IN) documents are automatically generated. A staff member verifies the posting documents to ensure the transactions are correct. Considerable supporting documentation is involved, which may include project documents and supporting engineering specifications.

GL staff members also generate hard copy reports from the ADVANTAGE system. The reports include expenditure reports and trial balance reports. Trial balance reports are sizable and occupy 3-4 six-drawer file cabinets. These files are kept in house for 3 years and in storage for 10 years.

Expenditure Reports are kept for 2 years. It is a legal requirement to keep the reports. Storage space associated with Expenditure Reports is currently not an issue.

Reports are generated on a monthly basis and could potentially consist of up to 1,000 pages per report. The federal government requires FHWA reports. The federal government reimburses ADOT expenses by obtaining information concerning all sections that receive federal funding.

Staff members perform up to 10 information retrievals per month, to support error correction and resolution. Retrieval is performed against an Microsoft (MS) Access database using Structured Query Language (SQL) queries. The supporting source document is required only in the event that the staff member needs to review the backup of the transaction. The backup of each specific transaction runs from 1 to 10 pages.

GL interacts with Reconciliation, Accounts Receivable, Accounts Payable, Fixed Assets, Cash Management, Project Accounting, and Budget Analysis departments. The interaction with Budget Analysis does not require substantial supporting

documentation. Typically a form or packet is required to reference the statutes for setting up the system. Accounts Receivable (AR) requires considerable documentation, as AR performs deposits daily, and the supporting documentation could consist of up to 50 pages.

The Purchasing System at ADOT is ADVANTAGE EPS (Extended Purchasing System). Users perform direct data entry into EPS. Procurement then prints the report and sends it to the vendor. Accounting in turn matches vendor invoices manually to verify whether the system entry matches with the entry in the documents.

3.1.4 Controller

The Office of Controller within ADOT is responsible for the oversight and management of operations within the major financial groups of ADOT.

These groups include:

- Project Cost Accounting
- Accounts Payable
- General Ledger
- Payroll
- Revenue Accounting

Given the major oversight and management role of the Controller's Office, the Controller and his staff will have a key ownership and stakeholder role in any new IDMS technology that is deployed within ADOT.

The Controller's concerns with respect to any future IDMS deployment within ADOT include the following:

- Cost of ownership
- Economies of scale
- Ability of the IDMS to increase productivity
- Ease of training/ease of use

Tactical goals of the Controller's Office towards IDMS deployments include:

- Elimination of unnecessary duplication
- Ability to share electronic files across multiple end users
- Document security and file integrity
- Comprehensive file recovery protection

It is envisioned that the Controller will take on a leadership role with respect to new enabling technologies such as IDMS, and leverage IDMS solutions to create higher productivity, quality, and level of service.

In addition, the Controller requires that new IDMS systems are integrated with the existing financial systems such as ADVANTAGE and provide end users the ability to move between IDMS documents, correspondence, digital images and the database information residing in existing legacy mainframe and departmental systems. Integration with mainframe and departmental financial and legacy systems therefore must be a key design element with respect to the deployment of IDMS technologies within ADOT.

The deployment priority schedule according to the Controller's office is as follows:

- 1. Payroll**
 - Time sheets
 - Expense reports
- 2. General Ledger**
 - Original transaction documents
 - Monthly accounting reports
- 3. Project Accounting**

3.1.5 Accounts Payable

Operation Details

Accounts Payable receives and processes invoices received from subcontractors and vendors, verifies approval for the invoices, and generates appropriate payment to each vendor. Specific documents handled by Accounts Payable include purchase orders, vendor payment histories, correspondence, and actual vendor invoices.

IDMS technologies would produce benefits within Accounts Payable by reducing the amount of paper traffic while increasing the productivity, quality, and service levels generated by the business unit.

Business Process

Accounts Payable receives approximately 700 invoices per day, or approximately 13-15,000 per month. Approximately one-third or 5,000 invoices are utility invoices. Invoices are received from 100-200 different locations across the state. Accounts Payable will accept invoices either as a fax or in original format by mail.

Invoices unrelated to utilities are sent directly to the user of the service. The user copies the invoices for their records, then returns the original back to Accounts Payable. The user enters a receiver on the ADVANTAGE System and verifies the amount is correct. The ADVANTAGE System matches the new invoices against the issuing Purchase Order and applies the necessary business rules to verify the dollar amounts and transaction quantities.

Utility invoices from Arizona Public Service (APS), Salt River Project (SRP), and Qwest are sent directly to Accounts Payable for processing. Individual cell phone users send their bills directly to Accounts Payable for individual payment. There are several hundred utilities, which cover gas, electric, phone service, water, garbage collection and cellular phone bills.

Multiple invoices may be grouped and consolidated, and then paid via a single check. Payment is tracked via a claim number, which is generated from the ADVANTAGE System.

Five years of invoices are maintained on file. The use of earlier document management systems was attempted but not completed due to budgetary constraints.

Currently there is a manual workflow in place and on account of this ADOT has rarely missed any vendor discounts. Leveraging discounts helps ADOT remain competitive and extract optimum price performance for supplier services.

Currently there is no comprehensive file recovery plan for on-site documentation.

Staffing

All mail is handled by a single FTE who identifies the type of invoice concerned and forwards the invoice to the correct processing location for payment.

Three accounting clerks process all service invoices. They divide the work alphabetically by individual vendors: A-F, G-R, and S-Z.

Filing

All information is of public record and open for public inspection. There is no significant need for read-only security at a document or folder level.

When invoices are completed and payment issued, the invoices are filed by fiscal year, vendor, and invoice number. Two years of information is stored on site, after which the files are sent to the State Archives, where the information is kept on file for four years, per State mandate. After four years, the invoice information can be destroyed.

Once review of invoices is completed and the corresponding payment has been issued to the contractor, activity and retrieval on the invoice is low. Approximately once a month, personnel retrieve a single invoice from the archive.

Accounts Payable attempts to capitalize on discounts whenever possible and employs an aggressive payment plan, which maximizes the ability to capture vendor, discounts. The ability to identify and recognize discount opportunities is one of the desired benefits of the IDMS system.

IDMS Recommendations

Accounts Payable represents a low-end but nevertheless significant area of opportunity for the design and deployment of IDMS technologies. All divisions within ADOT generate payable transactions. Accounts Payable will benefit from the associated IDMS workflow capabilities, such as the ability to match the images of invoices with the corresponding purchase orders, to assist and accelerate the payment process. IDMS will also significantly reduce or eliminate the occurrence of missing or stray invoice files, and provide an efficient repository for the management of vendor invoices, purchase orders and transaction histories.

Accounts Payable information will be collected and distributed efficiently as electronic images and text files under IDMS. Lead construction engineers, for example, could access the IDMS environment on a remote basis, and perform searches for a specific invoice or payment, and verify that subcontractor payments are on schedule or whether in fact a payment against a specific invoice has been generated.

In addition, the use of IDMS technologies could accelerate the payment schedule and allow ADOT to capture discounts more readily depending on their ability to review, process, and perform payment against a specific invoice.

Accounts Payable would furthermore benefit from sharing an IDMS with Cost Accounting. Each department would maintain their respective libraries within a common repository maintaining security and autonomy.

A high level profile of the Accounts Payable operation is shown in Table 3-2.

Table 3-2 Business Unit Profile – Accounts Payable

A. Operational Requirements

- Invoice Handling & Distribution
- Purchase Order Matching
- Payment Authorization
- Payment Processing

B. Major Document Types

- Services Invoices (Fax & Original)
- Utility Invoices (Fax & Original)
- Correspondence

C. Document Management Issues

- Work Process / Work Management
- Purchase Order Matching
- File Integrity
- Work Queue Balancing

3.1.6 Employee Services

Timesheets

Approximately 4,800 ADOT employees complete and submit a timesheet to Employee Services every two weeks. The timesheets are retained in the current file area for two years, and then are routed to the ADOT Record Center for storage an additional two years.

In compliance with Federal requirements, time sheets and travel vouchers containing Federally funded project numbers are retained at the State Archives for ten years after the project closes. This will be the general operating procedure until January 2003, when the Arizona Department of Administration (ADOA) has planned to implement a new payroll system, which will eliminate the current paper timesheet.

In the current file area of Employee Services, a Lektriever houses two years of time sheets, consisting of approximately 244,400 documents. Those documents are used on a daily basis, with older documents retrieved and viewed less frequently. Periodic litigation may occur which requires use of Employee Services documents that are in storage at ADOT's Record Center or at the State Archives.

There are 115 State agencies and each agency has a different type of timesheet. The current range of timesheet forms presents a potential opportunity to redesign forms and create a consistent standard for employee timesheet within ADOT under the IDMS initiative. Standardized timesheets are readily processed by optical character recognition (OCR) systems, which will capture the machine and hand printed information and reduce any amount of manual data entry associated with this task.

Payroll

Payroll collects and processes paper time sheets from 500 locations across the State of Arizona. 4,800 employees submit their respective timesheets on a biweekly basis to Employee Services.

Periodically there may be litigation that requires documents that are in storage at ADOT's Record Center or at the State Archives.

A second Lektriever in the Payroll area contains travel vouchers and payroll reports for audit purposes. These have the same two-year retention schedule as the time sheets discussed above.

ADOA's current payroll system includes the capability for handling specific project codes on time sheets for Federal reimbursement.

In addition, Payroll processes 400 travel expense reports each week. Supporting receipts are required on each expense report. Employees are required to submit airline tickets, conference brochures, lodging bills, and car rentals in original format. All are paper documents. Original signatures are also required on expense reports.

Timesheets and expense reports are logical candidates for capture within IDMS and further use by the Payroll department.

Other Operational Details

- Employee Services could potentially benefit from the comprehensive rapid file recovery capability offered by IDMS systems, using redundant sets of optical and/or magnetic Redundant Array of Independent Disks (RAID) media built into IDMS.

- ADOT's Payroll System (AIFS) is at the state level, and summary level input is provided to the ADVANTAGE system. AIFS is used for project accounting and labor reporting.
- It would be preferable to have reports on disks, but still have the option available to use printed reports for reconciliation.
- Payroll system is Web enabled.

3.2. AUDIT & ANALYSIS

3.2.1 Overview

The Audit and Analysis department oversees the financial accounting mechanisms within ADOT and compliance to the general and prescribed accounting procedures within the sections. Audit & Analysis requires timely, efficient access to supporting documentation, to ensure that proper accounting and financial ledger practices are maintained, and isolate and correct anomalies or deficiencies in the general accounting and business procedures.

3.2.2 Primary Document Types

Audit and Analysis is concerned with the following primary document types:

- Audit Universal Report
- ADOT Timekeeping System (Discontinued 6/02) (ADM+) Reports
- Budget Analysis Reports
- Performance Measurements
- Travel Reports
- Staff Meeting Reports
- Training Reports
- Personnel Registers

Between 2-12 documents are generated per month, and the average number of pages per document is 12. Documents are maintained on file according to retention schedule per ADOT Policies & Procedures (MGT-9.09). Documents are filed based on a geographical and numerical index system.

Also a significant number of documents are printed and faxed per day. Audit & Analysis receives up to 10 fax documents per day. The group performs approximately 150 print jobs per day.

Microfiche jackets are also used to support the revenue audit function based on one reader/printer.

3.3. PROCUREMENT

3.3.1 Overview

Mission

ADOT Procurement is involved in the purchase of all business services and goods for the daily operation of all divisions of ADOT under the authority of the Arizona Procurement Code. ADOT Procurement supports value-added public procurements in accordance with the Arizona Procurement Code to support the customers' needs.

Procurement is responsible for the expenditure of public monies, including federal assistance monies allocated to ADOT for the purpose of procurement of certain goods and services.

Procurement handles all contracts and purchases for highway maintenance, state vehicles, traffic control and exchange and business support services and goods. ADOT procurement staff members are considered experts in those areas. Because of this expertise, various cities, counties and other sections within ADOT confer with ADOT Procurement on purchases in those areas.

All ADOT divisions and cities, counties and government agencies within the state have the ability to purchase off ADOT Procurement contracts with the exception of Motor Vehicles Division (MVD), Arizona Highways Magazine, and two divisions which possess their own procurement office. (for example, the city of Chandler, Arizona (AZ) may purchase traffic control equipment from an existing ADOT contract).

Procurement is not responsible for the construction, reconstruction, or engineering services supporting transportation facilities or highways facilities, as exempted under the Arizona Procurement Code. This group accomplishes the task through use of and compliance with the Arizona Procurement Code. This responsibility and authority is delegated to the Director of ADOT and subsequently to this group, based upon appropriate training, expertise, knowledge, and past experience with a state government unit.

ADOT Procurement has a dotted line reporting structure to the ADOA State Procurement Office (AzSPO). AzSPO plans to implement an electronic system for state procurement offices to generate contracts, which ADOT Procurement may access without charge or via a token user fee, which will be determined at a later date.

Staffing

ADOT Procurement currently has a staff of 25 people, who are considered experts in their respective areas of procurement. Two people are stationed at Equipment Services offices where they handle the heavy equipment purchases, maintenance, and associated contracts for equipment services.

ADOT Procurement staff members perform multiple tasks, including procurements for ADOT related entities if requested and approved. ADOT Procurement for example will perform the procurement function for traffic control and exchange groups together, contingent on acquiring the necessary set of approvals and authorization.

The call volume for Procurement staff is 250 calls per day, which triggers specific retrieval of information. Seventy-five of these calls require further research and callback. Integration between the call system and the IDMS system is expected to streamline the business process and increase staff productivity.

The anticipated growth path for ADOT Procurement is to consolidate all procurement functions into one entity.

3.3.2 Procurement File Types

Contracts

Currently the entire contract review process is paper and manually driven within Procurement. The prevailing view is that the department is overly reliant on paper files and the use of hardcopy documents impedes productivity and the work process.

The filing system related to contract files is standardized. Contracts and proposals are kept in paper format and are consolidated into binders with associated data sheets, marketing brochures, and large catalogs.

The contract files are public files and are kept accessible to the public as required to meet state statutes. Typical users of these files include customers, contract administration and vendors. Vendors may request access to find out the reason for losing or disqualification on a contract bid.

There is a concern on the quality of the paper to be imaged as some of them are stapled.

Procurement employs the on-line system (ADVANTAGE – Commodity code system) to enter contract-based information. Minimal data entry is required on the part of Procurement personnel. ADVANTAGE users search for services and providers by code and delivery time frame. Users of the system can also search for goods and services by commodity code, description of goods or services, as well as potential vendors. The system provides complete access to information.

Security is a key concern to Procurement both in the manual and automated work environment. Confidential information must be protected from unauthorized viewing or editing at all times. This includes confidential financial information, manufacturing schema diagrams, and trade secrets.

Security also impacts historical transaction information kept on individual files. History information includes handwritten notes, post-it notes, and other ad hoc updates. The IDMS system must protect this information from unauthorized viewing.

Typical user concerns regarding IDMS relate to security, the need to protect files from unauthorized viewing or access, quality of the digital image versus the source original, and ability to add or modify digital notes to the recorded or scanned document. All these concerns will be addressed through IDMS planning and design stages and relate to training and cultural factors within ADOT.

Purchase Orders

Procurement maintains the original purchase order documents per State statute. Currently 10 FTEs work in Procurement and each FTE handles approximately 200 purchase order packets per year. Each packet contains 1-3 pages; therefore the IDMS system must handle 2,000-6,000 pages per year. A unique purchase order number identifies each purchase order.

All of the purchase order contracts in ADOT Procurement relate to the maintenance of the federal interstate highways. The possibility exists however of more co-operative procurement that would include counties, cities and states.

Purchases orders are segregated by amount and the classification is given below:

- PG – Already established contracts, contract release orders
- PD - Purchase orders for less than \$1000
- PC – Purchase orders for \$1000 or greater

The volume of paper handled for purchase orders:

- 500 / Week – PG
- 450 / Week – PD
- 450 / Week – PC

Paper purchase orders have four copies. All four copies are sent to the Procurement Office for distribution. Purchase Order documents must also be maintained in a paper file.

IDMS would handle both the workflow and electronic file cabinet application requirements with respect to Purchase Orders. IDMS workflow could route the purchase orders to the respective owner or processor based on dollar amount and status. Similarly IDMS could distribute original purchase orders as electronic files over the ADOT intranet or e-mail and eliminate the need to physically copy and duplicate the paper-based information. Electronic annotations such as sticky notes and text could also be added to the purchase order images as required to further impart information and knowledge about the respective purchase or procurement in question.

It is expected that the volume of Purchase Orders will reduce with the implementation of procurement cards.

ADOT Procurement prepares a quarterly report to DOA. They have 3 binders for one year.

Document Life Cycle

There is a legal requirement to keep documents active for 2 years and in archive for 5 years. Contract terms can be up to 5 years. The total life of a document is up to 12 years.

There is no current comprehensive file recovery plan in place. Comprehensive file recovery ability would be provided through the redundant optical and magnetic storage available under industry standard IDMS systems.

3.3.3 IDMS Solution

ADOT Procurement requires an IDMS solution, which will address a range of file management requirements. ADOT Procurement IDMS objectives include document imaging capabilities for the following:

- File security and integrity
- Check-in / check-out control
- Versioning
- Redaction capabilities
- Sticky notes
- Public Web viewing
- Automated workflow / predefined business routing rules
- Intranet access

Each of these objectives could be met through the sound implementation of industry standard IDMS technologies and associated training to the user and IT/Administrator communities.

In addition, Procurement prefers that bids submitted from competing suppliers be sent in electronic format versus paper format. Bids in electronic format are then readily stored, managed, and indexed in the IDMS system for future lookup and retrieval and shared across the organization as required.

3.4. TECHNICAL RESEARCH AND DESIGN

3.4.1 IDMS Stakeholders / Contributors

- System Architects (2)
- Research and Design (R&D) Analysts (2)

3.4.2 IDMS Issues

Rapid access to file information is a key requirement in Technical Research and Design. Document based information is not always readily available in the necessary timeframe required to resolve research and design issues. In addition, administrative control and oversight over document based work processes are not necessarily optimized, resulting in potential work inefficiencies.

Key issues and objectives for the IDMS technologies in Technical Research and Design include the following:

- Timely and accurate document delivery
- Accurate indexing capabilities
- Dedicated storage processes including backup procedures
- Intuitive, quick retrieval of qualifying files including images, documents and other supporting information
- Unified distribution methodology

3.4.3 Current Filing System

Paper Files

The current manual filing system is maintained in two 4-drawer filing cabinets. Access to files is reliable and the probability of missing or misfiled documents is low. In addition, end users experience relatively little contention for source file information.

There is a low (2%) probability of missing files or misfiled documents within the department.

No microfilm or other archival media is currently in use at the department.

Documents are generated at a rate of approximately 4 per day. Each document is up to 6 pages in length. Each document is kept in a corresponding folder. There are approximately 4 documents per folder.

Files are maintained and stored on an indefinite retention schedule.

Electronic Files

The end user community generates electronic files consisting of Word, Excel, Visio, E-mail, Access, and Power Point. Approximately 2 new documents are generated per day, each containing 4 pages per document.

Fax activity is relatively low and approximately 3 faxes are received per month of an average of 2 pages per fax.

Print Files

Approximately 10 documents are printed per day on 6 departmental printers, consisting of four Hewlett Packard (HP) printers and two Lexmark printers. Each document averages 5 pages.

3.4.4 Current Network Environment

There are currently 4 networked users. The network is based on NT/Windows 2000 and runs over TCP/IP (Transmission Control Protocol / Internet Protocol) using 10/100 Mega Bits per second (Mbs) Ethernet. The four servers and four client workstations are Compaq based running Pentium III microprocessors. The Compaq HP Proliant Server (DL380) servers run at 1.4 Giga Hertz (GHz) and the Compaq Armad workstations run between 500-700 Mega Hertz (MHz).

3.5. TRANSPORTATION SUPPORT GROUP IDMS SUMMARY REQUIREMENTS

Table 3-3 outlines the major requirements and objectives for each of the department areas within the Transportation Support Group.

Table 3-3 IDMS Requirements for Transportation Support Group

	<u>Cost Accounting</u>	<u>General Ledger</u>	<u>Controller</u>	<u>Accounts Payable</u>	<u>Employee Services</u>	<u>Audit & Analysis</u>	<u>Procurement</u>	<u>Technical Research & Design</u>
Document Capture	X	X	X	X	X	X	X	X
Document Indexing	X	X	X	X	X	X	X	X
Electronic File Cabinet	X	X	X	X	X	X	X	
In/Out Fax Processing						X		
Electronic Forms					X			
File Sharing / Concurrent User Access			X		X			
Existing w/s Environment	X	X	X	X	X	X	X	
Versioning / Check-in - Out					X		X	
Portable & Handheld Computers								
Digital IDs and Passes								
Mainframe Update / Data Entry			X	X	X		X	
Computer Generated Reports	X	X						
Intranet / Internet	X				X		X	
File Management / Data Warehouse								
Workflow Routing	X			X	X		X	
Comprehensive File Recovery			X				X	
Security	X	X	X				X	
Operation Monitoring & Management	X							
System Administration	X	X						
Document Conversion						X		

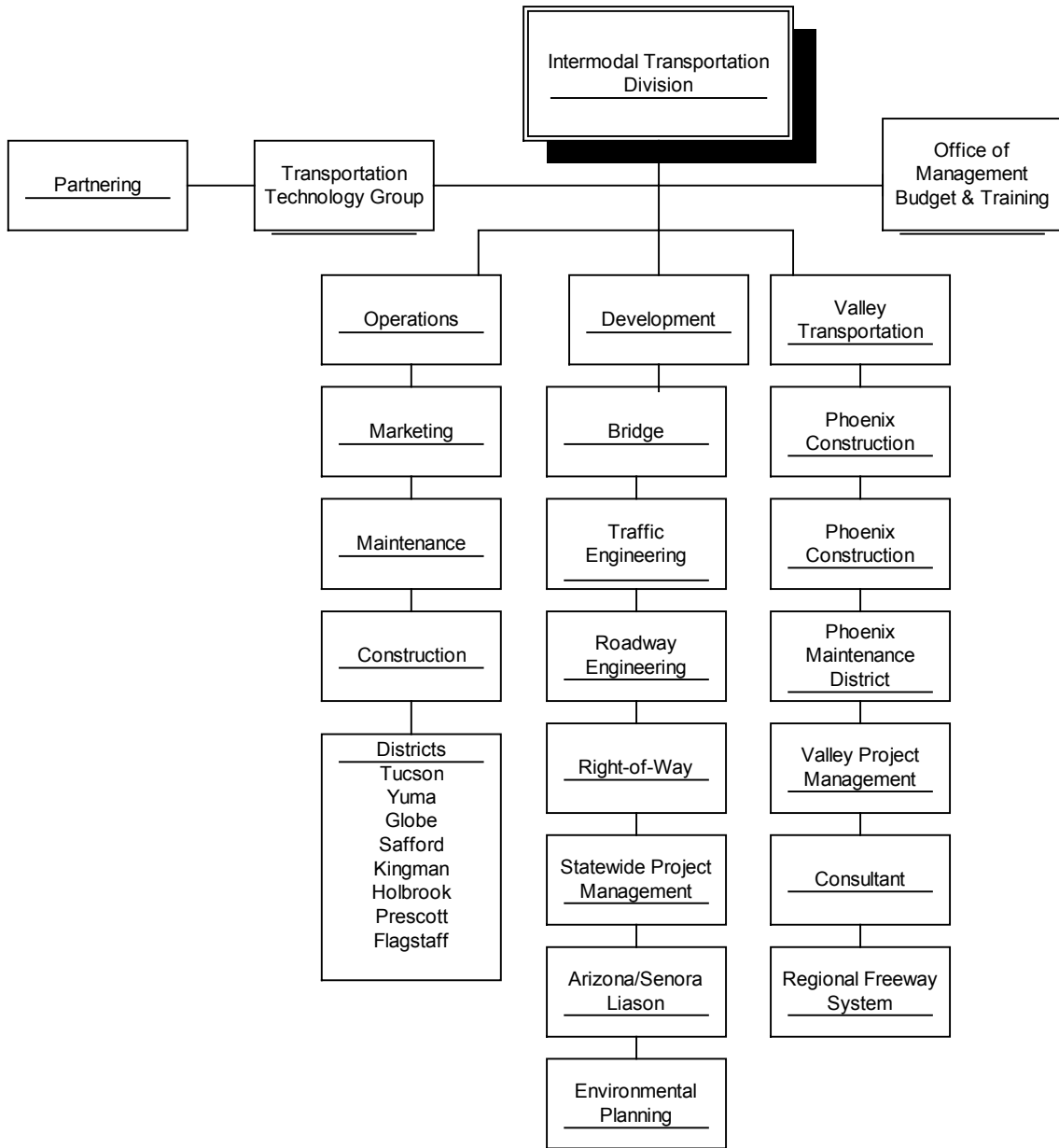
4. INTERMODAL TRANSPORTATION DIVISION

4.1 OVERVIEW

The Intermodal Transportation Division (ITD) supports the primary mission of ADOT, which is a) the construction and maintenance of all interstate and state highways in Arizona, and b) providing financial assistance to public airports for airport development projects. ITD requires an extensive public participation process and technical evaluation effort known as the priority programming process. The process culminates in the Five-Year Transportation Facilities Construction Program for Highways and Airports. This program emphasizes meeting pavement preservation needs on interstate and non-interstate highway systems and continuing funding for projects in corridors that were started in previous five-year programs.

ITD is one of the five divisions of ADOT. ITD is composed of 11 groups and 10 engineering districts (see Figure 4.1). The state engineer and three deputy state engineers direct the Division.

Figure 4-1 Intermodal Transportation Division Organizational Structure



Other aspects of ITD include the following:

- The Manager of the Development group within the Intermodal Transportation Division, commonly known as Intermodal Transportation Development (ITD), indicated a significant need for a comprehensive strategy for the deployment of IDMS systems.
- Key stakeholders in ITD and contributors toward the document management project were from the following groups:

1. Traffic
 2. Environmental
 3. Bridge
 4. Right of Way
 5. SPMG (Statewide Project Management)
 6. Engineering Technical
 7. Roadway Engineering Group
 8. Materials Group
 9. SEO (State Engineer's Office)
- For the past two years an enterprise-wide data warehouse (DW) project has been underway based on initial technology planning performed in 1993. Because data warehouse technologies are in various stages of implementation in major functional areas of ITD, ITD requests that any IDMS implementation integrate to current and future data warehouse deployments.

Data warehouse technologies are currently implemented in the following functional areas:

1. Pavement
2. Accident Counts
3. Traffic Counts
4. Central Line Highways
5. Transportation Planning Department
6. Maintenance

Specific operational reports are now being produced based on the data. The long-term plan is to distribute the data warehouse information to all district offices.

Other notes and conclusions from our IDMS research include the following:

- The Geographic Information System is based on the Geographic Information System Package (ARCInfo) product.
- Engineering records are kept and indexed for long-term archival and reference.
- Bentley Systems MicroStation is the de facto engineering workstation standard and any future IDMS technology will need to address the current use of MicroStation Computer Aided Design (CAD) solution.
- 80-90% of construction designs are done by outside consultants. ADOT provides the project managers. Each project manager handles 50-60 projects.

- PIJ – Project Investment Justification – is required to fund the majority of Information Technology (IT) projects and acquisitions that are \$25,000 or greater in development costs.
- As-built drawings are currently stored in Portable Document Format (PDF) format
- Access to remote sites is very limited, for the following reasons:
 1. No access to ADOT T1 lines (Telecommunication line)
 2. Absence of PC workstations
 3. Currently pressing Compact Disks (CDs) of documents for remote sites
- The ITD Environmental Group is responsible for environmental impact assessments. Reports and assessments cover, for example:
 1. Archeology
 2. Endangered species
 3. Reports range from 8 pages to 300 pages
 4. Produce 20-30 reports per day

Archeological information is stored in Geographic Information Systems (GIS) and can be accessed through the Arizona Museum Website.

- The Bridge Group has implemented a FileNET / Green Pasture Software (GPS) based solution. The current manager of the Bridge Group is supportive of IDMS technologies and indicates that ADOT must further embrace these technologies to increase internal productivity, quality, and level of service.
- The Right of Way group was an active participant in the IDMS study. Right-of-Ways manages all
 1. Right-of-Way Plans
 2. Deeds
 3. Real Estate Appraisals
- Attendees addressed a concern of having homegrown internal systems (each has their own unique system to manage their work) integrate to the other systems and to IDMS technologies.
- An occasional concern was raised about whether the implementation of IDMS systems will create more work by simply making document information more readily available to the user community. In addition, a concern was raised that the IDMS environment will have to be kept up to date on-line and this will require more people to input and keep the data up to date. Some stakeholders are in agreement, while others felt that even if this condition holds true, the overall benefits of the IDMS environment far outweigh the disadvantages.

- All ITD stakeholders are in agreement that the implementation of an enterprise IDMS environment would introduce substantial cultural change within ITD.

The IDMS requirements and objectives within ITD are shown by individual department in Table 4-1.

Table 4-1 IDMS Requirements for Intermodal Transportation Division

	<u>Computer Aided Engineering</u>	<u>Bridge Group</u>	<u>Construction</u>	<u>Globe District</u>	<u>Materials Group</u>	<u>Roadway Engineering</u>	<u>ITD Training</u>	<u>Prescott District</u>	<u>Environmental Planning</u>
Document Capture	X	X	X	X	X	X	X	X	X
Document Indexing	X	X	X	X	X	X	X	X	X
Electronic File Cabinet	X	X	X	X	X	X	X	X	X
In/Out Fax Processing			X	X	X		X	X	
Electronic Forms							X		
File Sharing / Concurrent User Access	X	X	X	X		X	X	X	X
Existing w/s Environment	X	X	X	X	X	X	X		
Versioning / Check-in - Out	X	X				X			X
Portable & Handheld Computers									
Engineering Documents	X	X				X			X
Mainframe Update / Data Entry									X
Computer Generated Reports									
Intranet / Internet	X	X				X	X		
File Management / Data Warehouse									
Workflow Routing	X	X					X		
Comprehensive File Recovery						X	X		
Security	X	X	X	X	X	X	X	X	
Operation Monitoring & Management	X	X							X
System Administration	X	X							
Document Conversion						X			

4.2 COMPUTER AIDED ENGINEERING

The requirements in Computer Aided Engineering, Roadway Design, and Statewide Project Management are closely linked. Specific goals and objectives in these three areas of opportunity include:

- a. Standardized format/platform from legacy/proprietary Intergraph Computer System (CLIX) UNIX (Distributed open client/server operating system) based archive system to a Windows-based solution.
- b. Scalable automated file retrieval/tracking system for Computer Aided Design and Drafting (CADD) construction plans and related information in each development stage (Stages 1-4, and Final Plans, Specifications and Estimate (PS&E)), addendums, and change orders, as well as as-bid/as-constructed stages.
- c. Minimize turn-around time for customers to access data in lieu of existing manual, resource-intensive process

Other aspects and issues faced by these groups include:

- a. A work process which is time-consuming, resource-intensive, and cumbersome and that requires much coordination and research
- b. A custom developed solution that is relatively closed and not designed to accommodate external development by ADOT engineering, mapping, survey and construction consultants
- c. Resources located in multiple locations, utilizing inconsistent methods for tracking data

The primary document types related to this area of the organization include the are shown in Table 4-2.

Table 4-2 Primary Document Types – Computer Aided Engineering

Document Type	# Pages	Document Format
Design database files	N/A	InRoadsSelectCAD Site SelectCAD Survey SelectCAD Spatial Data
Reports and Construction Drawings	Varies	Adobe Acrobat
Plotting / Reprographic	N/A	IPLOT Iparm files
Raster	N/A	Photogrammetric Mapping Solution Data
Construction Drawing and Resources	N/A	MicroStation Spatial Data

The average number of new documents created/received per day from backup/archives is a minimum of 2-3. The peak activity varies based on engineering development groups and project workload. Generally there is higher urgency and activity at the end of the fiscal year.

Typical users of the documents are internal engineering development groups and external engineering design consultants. Specific routing is based on Help Desk application (HEAT) tickets and internal project management requirements. Other business units requiring concurrent access to these documents include construction districts, traffic operations center, Valley Project Management, and Statewide Project Management.

Cultural impacts associated with the IDMS environment include varying requirements for each tier within the organization, as well as within the engineering discipline, and emphasis on raster data (*.PDF) instead of spatial based information.

Key objectives for the IDMS system include improving coordination between respective areas, including the following:

- Ability to track work in progress
- Document Check-in / Check-Out control
- Intranet Access / Enterprise Distribution
- Individual/Group Security Assignments
- Reduction in Filing Space
- Concurrent Access
- Security Backup and Redundancy
- Elimination of lost files
- Large Format Capture

4.3 BRIDGE GROUP

The ADOT Bridge Group has implemented an IDMS solution based on FileNET Panagon and Green Pasture Systems. A detailed evaluation of this system can be found in the section titled Infrastructure Technology Assessment.

The estimated number of backfile documents and specific document types and volumes in the Bridge Group are listed in Table 4-3. The estimated number of annual document additions is indicated in Table 4-4.

Table 4-3 Estimated Number of Backfile Documents for Bridge Group

Bridge Maintenance Documents			
	State Owned Structures	Non-State Owned Structures	
Report Name	Estimated # of Pages 8.5" X 11"	Estimated # of Pages 8.5" X 11"	Total Pages 8.5" X 11"
Inspection Report	110,350	41,450	151,800
Repair Report	9,800	3,070	12,870
SI & A Sheet	4,750	2,700	7,450
Profile/X-Section	48,975	15,360	64,335
Photos (4-sizes)	37,800	14,725	52,525
Scour Data Report	2,150	1,180	3,330
Correspondence	24,500	7,700	32,200
Consultant Inspection Report (Bound)	42,750	23,600	66,350
TOTAL	281,075	109,785	390,860

Bridge Drainage Documents			
Report Name	Estimated # of Pages 8.5" X 11"	Estimated # of Pages 11" X 17"	Estimated # of Pages 24" X 36"
Bridge/Culvert Drainage	13,500	350	550
Corridor Drainage	136,000	6,800	3,400
Scour Evaluation Reports	9,000	900	0
TOTAL	158,500	8,050	3,950

Table 4-4 Estimated # of Annual Document Additions for Bridge Group

Bridge Maintenance Documents			
	State Owned Structures	Non-State Owned Structures	
Report Name	Estimated # of Pages 8.5" X 11"	Estimated # of Pages 8.5" X 11"	Total Pages 8.5" X 11"
Inspection Report	5,800	3,000	8,800
Repair Report	400	200	600
SI & A Sheet	1,900	1,500	3,400
Profile/X-Section	900	700	1,600
Photos (4-sizes)	5,000	3,000	8,000
Correspondence	500	300	800
Consultant Inspection Report (Bound)	2,000	1,000	3,000
TOTAL	16,500	9,700	26,200

Bridge Drainage Documents			
Report Name	Estimated # of Pages 8.5" X 11"	Estimated # of Pages 8.5" X 11"	Total Pages 8.5" X 11"
Bridge/Culvert Drainage	3,000	80	120
Corridor Drainage	12,000	1,200	200
TOTAL	15,000	1,280	320

Bridge Design Documents		
Report Name	Estimated # of Pages 8.5" X 11"	Estimated # of Pages 11" X 17"
Minor Bridge Repair	1,500	250
Major Bridge Repair	1,800	300
New Bridge Design	4,000	500
TOTAL	7,300	1,050

4.4 CONSTRUCTION

Currently, the Construction group is at an early stage of recognizing and understanding the value and impact of IDMS technologies as well as the objective of the IDMS initiative within ADOT. The Construction team hence is a candidate for further education and training with respect to IDMS program objectives and the potential benefits this group would derive from these technologies.

The current filing system within Construction is paper based and employs manual filing cabinets indexed at a folder and document level. Files are rarely lost or

misfiled, which speaks to an effective records management control and approach. Files are retained for up to 7 years.

Document types within Construction include:

1. General Correspondence

2. Cost Accounting Reports of 3 pages in length.

- **Output:** 265 documents generated per day
- **Peak Days:** Thursdays, 25th-3rd of each month, & June
- **Average Number Pages:** 12
- **Average Document Size:** 8-1/2" X 11", 8-1/2" X 14"
- **Retention schedule:** Two years, Payroll records are kept until project is finalized, estimates are kept for one month
- **Routing requirements:** Estimates – 1 copy to Contract Accounting, 1 copy in drawer until next month. Goes to person indicated.

3. Fax Documents

- **Daily fax documents received:** 36
- **Average number of pages per fax:** 2
- **Number of faxes sent per day:** 36
- **Average number of pages per fax sent:** 8

4.5 GLOBE DISTRICT

4.5.1 IDMS Stakeholder / Contributor

- **Information Systems Specialist (ADOT – Information Technology Group (ADOT-ITG))**

4.5.2 IDMS Issues

The current document repository is maintained on paper and kept within approximately one hundred (4) drawer filing cabinets. Files are retained up to 3 years. Files are retained in alphabetical format for administration files and by highway number/milestone for construction documents.

Eleven (11) full-time clerks and one part-time clerk manage the existing file cabinets and perform retrievals and filing activities. There are approximately 2,000 folders and on average 2 folders are created per day with an average of 10

documents per folder. Each document consists on average of 10 pages. Globe District documents are kept on a retention schedule of up to 3 years.

Approximately 100 pages of information are received over fax per day. Similarly, up to 500 pages of information are spooled to print on two in-house HP Laserjet printers within Globe District.

Seventy-five users are currently accessing electronic files and folders over TCP/IP from a Compaq Proliant 1600 Server. The typical user configuration consists of a Compaq Deskpro 35c (Pentium II, 64 Megabyte (MB) Memory). The network is 16Mbs Token Ring running in the Microsoft New Technology Operating System (NT) 4.0 environment.

Microfilm and microfiche are not in use within Globe District.

4.6 MATERIALS GROUP

4.6.1 IDMS Stakeholder / Contributor

- **Pavement Design Engineer Pavement Section**

4.6.2 IDMS Issues

The overall goals and objectives of the Materials Group as related to the IDMS program include the following:

- More rapid and efficient retrieval of information and data, which will contribute to better and more reliable pavement designs
- Reduction in manual work and labor associated with the development of a pavement design which take away from time that is needed for analysis and engineering

Current information is retained in approximately twenty (5) drawer filing cabinets. Files are retained from between 10 to 20 years. Documents are filed by TRACS (Accounting system predecessor to ADVANTAGE) number. There are on average 50 documents per file folder.

MS Word, Excel, electronic photographs and other electronic content are currently managed in the client/server environment. The oldest generation file is in MS Word, dating to 1995.

Fax activity is significant. Materials Group receives up to 300 pages per day in new fax material. The group in turn sends approximately 30 pages per day via manual fax.

Similarly, approximately 300 pages per day are printed on network printers located in Materials Group on four LaserJet printers.

There is no use of microfilm or microfiche at this time within the agency.

4.7 ROADWAY ENGINEERING

4.7.1 IDMS Stakeholders / Contributors

- Assistant State Engineer Roadway Engineering Group
- Staff Engineer
- Program Manager Pre-design Program Management
- Section Manager Pre-design B
- Section Manager Pre-design A
- Section Manager Pre-design Studies
- Section Manager Design B
- Section Manager Design C
- Section Manager Design A
- Section Manager Roadway Support

4.7.2 IDMS Issues

The overall goals and objectives of Roadway Engineering as related to the IDMS program include the following:

- a. All designers / reviewers require reliable and efficient access to all data relevant to projects
- b. Increased security of the original and archived document against damage or loss.

Key document management issues and concerns currently within Roadway Engineering consist of the following:

- a. The current manual systems require considerable time and expertise to access, filter, and acquire useful data.
- b. The department requires a central access point for all documents, including as-built drawings, construction diagrams, notes, and correspondence.

- c. No clear backup or security strategy as related to document management and retention.
- d. Need for a central point of access for the latest, official design guidance and standard drawings so that designers and contractors are entrusted with the current document version and revision.

Major documents impacted by the IDMS implementation are listed in Table 4-5.

Table 4-5 Primary Document Types for Roadway Engineering

Document Name	Document Type	# Pages	Document Format
As-built Plans	Contract Record Document	Varies	Hard copy (paper or microfilm), new ones may be MicroStation
Scoping Documents	Design Documentation	Varies	Hard copy (paper or microfilm), new ones may be available in Adobe Acrobat format
Standard Drawings	Design Documentation	Varies	Hard copy (paper or microfilm), new ones are available in MicroStation Format
Design Guides	Design Documentation	Varies	Old-Hard copy, New-Word
Drainage Reports	Design Documentation	Varies	Old-Hard copy including large-format maps, New-could be in Adobe Acrobat
Design Calculations	Design Documentation	Varies	Hard copy (spreadsheets, hand calculations, photos, sketches, memos documenting decisions)

Key personnel who require access to these documents include:

- a. Designers, both within and outside of the Department.
- b. Contractors who are responsible for building the highways.
- c. District operations personnel who maintain the highways and issue permits.

Other documents required for archiving, retention and reference are listed in Table 4-6.

Table 4-6 Additional Document Types for Roadway Engineering

Document Name	Document Type	Retention Period (how Long)
As-built Plans	Contract Record Document	Permanent
Scoping Documents	Design Documentation	Permanent
Standard Drawings	Design Documentation	Permanent
Design Guides	Design Documentation	Permanent
Drainage Reports	Design Documentation	Permanent
Design Calculations	Design Documentation	Permanent

Roadway Engineering employs a limited file protection and recovery program, which involves microfilming and storing selected as-built plans, design calculations, and drainage report documents off-site. There does not exist however at this point in time a comprehensive backup strategy for the range of documents in Roadway Engineering. This presents another potential strategic target for the deployment of IDMS within ADOT.

Training and indoctrination of engineers and administrators is the key cultural hurdle or issue, which must be addressed in terms of successful adoption of IDMS technologies. Information Technology (IT) staff developers will also require training and exposure to development concepts within the IDMS environment. The establishment of a common nomenclature and terminology for addressing the IDMS program is also essential according to the survey responses received from the end user and administrator communities.

A summary of goals for the IDMS initiative within Roadway Engineering consists of the following:

- Ability to track work in progress
- Document access over the intranet
- Individual/group level security
- Elimination of microfiche
- Remote user access
- Version control and management
- Conversion of hardcopy files
- Eliminate lost or stray files
- Manage large format e size documents

4.8 ITD TRAINING

4.8.1 IDMS Stakeholders / Contributors

- Administrator Statewide Projects & Valley Project Management
- Administrator Engineering Technical Group
- Administrator Traffic Group
- Administrator Environmental Planning
- Administrator Regional Freeway
- Administrator Right of Way
- Administrator Roadway Group

4.8.2 IDMS Issues

The overall goals and objectives of ITD Training as related to the IDMS program include the following:

- a. Streamline class registration process/eliminate related inefficiencies and redundant steps. Transmit student profiles/transcripts and training reports directly to concerned individuals and sections of ADOT (ORGs) using online processes instead of hardcopies.
- b. Improve training coordinators' access to Internet training Information.
- c. Enhance online records system to capture student-training history on one document. Enhance "search" capability of training histories (classes).

Key document management issues and concerns currently within ITD Training consist of the following:

- a. Manual steps and work required to print periodic student and organization reports, which are then delivered by hand to concerned parties.
- b. Enrollment forms, which are signed by a Supervisor, are faxed to training coordinators, and then re-sent via fax to class owners for enrollment. This presents a number of redundant steps, causing delays of enrollment, additional paperwork, and phone calls in the confirmation of training requests for both class owners and training coordinators.
- c. Hard copies requested during training periods by students must be printed out and delivered in person or by mail. This reliance on the manual process causes delays in information getting to concerned parties in a timely manner.

Target document types potentially impacted by an IDMS deployment include those listed in the following Table 4-7.

Table 4-7 Primary Document Types for ITD Training

Document Name	Document Type	# Pages	Document Format
Enrollment Request	Form	1	Fax
ITD Tech Training	Form	1	Fax
Individual Profile Report	Report	2-3	Database & Paper
Professional Development Hours (PDH) profile (selected Orgs.)	Report	1-2	Database & Paper
Student Class Transcripts	Report	2	Database & Paper

The average number of new documents created or received per day is between 10-20. Peak activity days are during the quarterly ending periods where between 800-1,000 copies are printed.

Distribution on the documents includes:

- Students
- Managers
- Administrative Secretaries
- ITD Training Resources
- Human Resources Development

Long-term strategic goals for the IDMS environment include the following:

- Track Working Progress
- Automated Fax Gateway
- Enhanced File Integrity
- Secure backup and redundancy
- Intranet access
- Enhanced individual / group security

Overall ITD Training wishes to improve efficiency and timeliness in the transference of recorded information to concerned parties, as well as to reduce paperwork and reliance on manual filing systems. The expectation is that IDMS will provide rapid access to information on classes and reports, both in-house and outside sources.

4.9 PRESCOTT DISTRICT

4.9.1 IDMS Stakeholders / Contributors

- District Engineer
- District Maintenance Engineer
- District Development Technician
- District Permit Supervisor
- District Maintenance Superintendent
- Senior Resident Engineer
- Resident Engineer
- Resident Engineer
- District Administrative Service Officer
- Regional Traffic Engineer

4.9.2 IDMS Issues

Prescott District requires a secure IDMS environment, which will make mission-critical documents more readily available and minimize the amount of current paper handling and distribution.

The indexing system in the IDMS environment needs to be sufficiently flexible that it can be rapidly tailored and adapted to meet the organizational and indexing requirements of specific departments.

The current paper based information management system, while cumbersome, provides reliable access to project documents and construction files organized by TRACS index, ORG index and other salient criteria.

History information resides in approximately 20 hanging file cabinets. Prescott District also uses storage room shelves, and plans file storage (3 cabinets).

File retention schedules are maintained in accordance with ADOT MGT 9.09 specifications.

Security of open, hardcopy files is an issue, especially as related to personnel documents, which require secure file management due to the sensitivity of the contained information.

Typical document sizes range from 8.5x11, 11x17, and 24x36 inches in dimension. The IDMS solution implemented in this business unit will need to

address the varying sizes and dimensions of the documents related to the Prescott District.

Management and maintenance of electronic files are also issues. Typical electronic files are in MS Office format (i.e., MS Word, Excel, PowerPoint, Binder). The District also maintains Joint Photographic Expert Group (JPG) format digital images, CADD drawings, and other electronic source documents. Electronic project folders generally consolidate these documents.

Fax documents are also an issue. The District routinely sends and receives documents via fax, and this is another potential step, which can be reengineered and simplified via IDMS technologies.

4.10 ENVIRONMENTAL PLANNING

4.10.1 IDMS Stakeholders / Contributors

- Manager
- Program Manager
- Team Leader

4.10.2 IDMS Issues

The overall aim of Environmental Planning with respect to IDMS technologies is to meet the following objectives:

- Improve document management including filing, retrieval, and consistency.
- Reduce duplication costs and expenses associated with photocopying by leveraging IDMS technologies to retrieve and display scanned images directly on the workstation.
- Allow concurrent end user access to single documents managed in electronic format on either optical or magnetic disk and thereby provide better collaboration and coordination of data.
- Improve administrative monitoring and oversight of the work process, ensure effective workload balancing and distribution between contributors, and move project deliverables toward closure and completion.

Current IDMS issues and opportunities faced by Environmental Planning consist of the following:

- Files occasionally are misfiled after review, requiring further work by Environmental Planning staff members to locate and access the document information with resulting delays and inefficiencies in the work process. An

IDMS solution is required to preserve file integrity and allow immediate effective access to mission critical documents.

- Extra and unnecessary duplication of files occur in order to share information between multiple end users and this presents a cost issue in terms of labor, supplies, equipment, and other consumables.

Other requirements for the IDMS environment include the following:

- Track Work in Progress
- Balance Work Load
- Document Check-in / Check-Out
- Eliminate Lost Files
- Reduce Data Entry
- Remote File Access
- Enterprise Distribution
- Reduce File Space Consumption

In addition to paper documents, electronic files are also impacted and covered by the IDMS strategy. These electronic files include the following file types:

<u>File Types</u>	<u>Format</u>
• CADD drawings	MicroStation
• Text Files (Environmental Assessment (EA), Environmental Determination Statement (EDS), Environmental Impact Statement (EIS))	Word
• Graphics (Presentation)	PowerPoint
• Graphics (GIS)	ArcView

Approximately 20 new electronic documents are generated per day and are distributed between consultants, managers, and staff.

Some of the other state government offices requiring access to this information include the Office of Attorney General, Arizona Department of Environmental Quality, and Arizona Department of Water Resources. IDMS information can be supplied to other state government offices as the need arises.

5. MOTOR VEHICLE DIVISION

5.1 MVD OVERVIEW

The Motor Vehicle Division (MVD) receives documents from many sources, which the department must retain for both research and archival purposes. Per the current State's archival standard, MVD can digitize and capture these documents electronically, but the State standards also require that these records be recorded in microfilm to meet state evidentiary standards.

There are 65 field offices, the Executive Hearing Office and Abandoned Vehicles Unit that send in documents to MVD headquarters at 1801 W. Jefferson for microfilming. They are sent by United States (US) Mail, United Parcel Service (UPS) or courier.

Field offices send title and registration documents daily to MVD, which are then reviewed and archived for 10 years. The documents are double-sided and average 5 pages per transaction. A separator sheet is placed between transactions by the field offices. Each title application form from the field office contains an index at the bottom, which can be captured and used as an index within the IDMS environment. Other forms that are microfilmed include copies of mailed notices to customers. These are a single page and filmed in sequence order.

The microfilm maintenance contract is \$100,000 for basic annual support. Support coverage and maintenance on the microfilm units is an issue, as there were no competing bidders during initial requests.

The microfilming area consists of 7 cameras and 12 reader printers. While space is sufficient for now, no further room is available to add additional equipment if required. In addition, the coordination of microfilm across multiple sites and locations within MVD is also an issue, as is ensuring that microfilm archives are kept current with the latest releases of diazo microfilm. After microfilming, the original documents are destroyed.

There is an average of 400 film requests per week from all the field offices. The unit maintains a log of who requests the film. Field offices have fax machines, which is how most requests are fulfilled currently.

To complement the microfilm operation, IDMS can use scanners at the individual field offices, providing that the network capacity and bandwidth is sufficient to support remote scanning. Document retrieval is then enabled to anyone with access to the ADOT network.

The IDMS system will include an integral fax gateway to provide fax transmission services to remote sites if computer access is not available.

5.1.1 MVD Document Retrieval

All field offices should have the ability to retrieve images of documents. Retrieval requests come from 65 field offices, courts, the executive hearing office and general public. The general public pays \$3/page for non-certified and \$5/page for court certified documents. Individuals requesting documents must complete a Motor Vehicle Records (MVR) request form. Privacy laws prevent faxing requested information, as MVD needs to understand and qualify who is receiving this confidential information.

Internal retrieval requests arrive from the field offices that require information not currently stored on the database. Technical support personnel and staff members who perform research for associated areas contact MVD for record retrieval.

There are 15 FTEs who process retrievals, 8 FTEs in film research dedicated to handling calls from field offices and 7 FTEs who handle written requests from courts. The search process to fulfill individual requests could take up to 2-3 hours. If the document has not yet been filmed and assigned a box number (the process to determine the location of the document), the time consumed and spent searching for a specific file may be greater.

There is a low probability of losing any permanent record in MVD. The bottleneck instead is the time it takes staff members to locate and deliver the requested information.

If the ADOT field offices, courts and the executive hearing office could request and retrieve necessary files electronically using IDMS, then the FTE retrieval staff could be redeployed in more value adding work. For example, once unfettered from the manual retrieval work, individual FTE's could update the mandatory insurance records, which consist of approximately 17,000 required insurance record updates per week, involving new policies, cancelled insurance, and other criteria.

Once MVD arrives at the proof of concept based on efficient retrieval, IDMS services could be expanded into other areas of MVD to capture and process other documents. Driver license (D/L) applications for example are another candidate document type. These are kept in field offices for 6 months and archived for 5 years but are not microfilmed.

Fifty thousand manual citations are also processed each month. These citations are not microfilmed. The current microfilming system would require indexing, filming and additional data entry that would not be an optimal use of staff resources, as there are approximately only 10 requests and retrievals per day based

on citations. Hardcopy citation forms are retained for 10 years in the State archives, making this a significant IDMS application for long-term storage and retrieval of documents.

5.1.2 MVD Work Process

MVD receives 70,000+ pages of documents on a daily basis. These documents are then processed and microfilmed. The following identifies the processing steps associated with the work process.

Step 1 - It takes a full day to sort the work and batch the documents by type and field office. Each field office has a unique Identifier (ID) # that is concatenated with the date to create a unique ID for each batch.

Step 2 - Each batch is date stamped with the received date.

Step 3 - Batches are now microfilmed. Film is edited for error detection and re-filmed if necessary.

Step 4 – After verification, box number is assigned manually and film is collected in folders with film number and box number.

Step 5 - The film box goes to data entry for input into the Terminal Production Executive (TPX) mainframe, where this information is recorded.

The entire process takes 4-5 days. However, the majority of requests for retrieval arrive within the first 2-3 days as a result of problem with the title transfer. Scanning on the same day as receipt of the documents would be advantageous.

In addition, in January 2002, a new law went into effect, which impacts the microfilming workload. Arizonians now retain their current license plates when a car is sold or a new one purchased. This will create at least 2-3 additional pages on specific title transactions.

The highest volumes of requests come from 4 field offices (West Phoenix, South Mountain, Yuma and Tucson Regional) and the Maricopa County Attorneys office. These high volume users could be potential pilot subjects. MVD Records Unit is willing to train the field offices, court staff and executive hearing offices on the retrieval process.

The range of IDMS applications areas by department are shown in Table 5-1.

Table 5-1 - IDMS Requirements for Motor Vehicle Division

	<u>Revenue Administration</u>	<u>Competitive Government</u>	<u>Motor Carriers</u>	<u>Title & Registration</u>	<u>Revenue & Audits</u>	<u>Executive Hearing Office</u>	<u>Collections</u>	<u>Records & Training</u>
Document Capture	X	X	X	X	X	X	X	X
Document Indexing	X	X	X	X	X	X	X	X
Electronic File Cabinet	X	X	X	X	X	X	X	X
In/Out Fax Processing		X				X		X
Electronic Forms			X	X				
File Sharing / Concurrent User Access		X	X		X	X		
Existing w/s Environment	X	X	X	X	X	X		
Versioning / Check-in - Out		X						
Correspondence Management			X	X				
Mainframe Update / Data Entry	X	X	X	X	X		X	
Computer Generated Reports	X	X	X	X	X			
Intranet / Internet								X
File Management / Data Warehouse								
Workflow Routing	X			X	X			X
Comprehensive File Recovery	X	X	X	X				X
Security	X	X	X	X	X	X		X
Operation Monitoring & Management	X				X			
System Administration	X	X						
Document Conversion		X			X	X		X

5.2 REVENUE ADMINISTRATION

5.2.1 IDMS Stakeholder / Contributor

- **Administrator**

5.2.2 Department Overview

Most departments across ADOT interact with Revenue Administration. Revenue Administration is composed of two components: 1) Receipt Accounting and 2) Revenue Accounting. Approximately \$1.5 billion dollars passes through these two functional areas annually.

The following sections describe operations in both areas.

5.2.3 Receipts Accounting

Receipts Accounting is responsible for interaction with outside accounting firms and audit groups, the state treasury, and other account offices. Receipts Accounting interacts with an outside accounting system, state accounting system, TARGET (Revenue Accounting Mainframe System), 65 field offices, 66 third party agents and 120 locations. Revenue Accounting performs reconciliation for 3rd party vendors in addition to state accounting offices.

Receipts Accounting has 10 staff members.

Work activities, which potentially are impacted through IDMS deployment, include the following:

1. Receive daily report from Title And Registration system that summarizes fee activity in 120 locations
2. Receive one report from Mainframe System.
3. Communication from 65 field offices.
4. Reconciliation and creation of third party official reconciliation report.
5. Responsible for all of the deposits that are made by the field offices and third party agents.
6. 5 offices in State of Arizona receive each day's download of bank statements (they have macros that perform this function), the statements are given to a reconciliation clerk.
7. Match up the fee activity in the Title And Reporting.
8. Reconcile overages or shortages.
9. Reconcile fee category with General Ledger validated by state treasury.
10. Enter information into Mainframe Accounting System.
11. Collect mails or money.

12. Bring paper document to state treasury every day.
13. Reconcile money records both the deposits and the fee activity in TARGET.
14. Revenue Accounting proofs deposits in the TARGET system.

5.2.4 Revenue Accounting

Revenue Accounting performs the complex general ledger transactions involving the pre-assigned posting routine, driver's license, 3rd party monies, title and registration number. Revenue Accounting transfers money associated with customer transactions and interfaces transactions via transfer worksheets to an MS Access database, as well as a mainframe system called ADVANTAGE.

Revenue Accounting makes significant use of MS Excel and other MS Office tools to process and share data. In addition, Revenue Accounting wishes to explore making revenue data available on the Internet. There exists a significant publication system for Revenue Accounting information, including 100+ pages in the TARGET System, and 100 copies of mails, which are sent to cities, county offices, and the Department of Environmental Quality.

Revenue Accounting relies on MS Access databases and complex retrieval of extensive reports consisting of over 100 pages. The group currently has 8 staff members.

5.3 COMPETITIVE GOVERNMENT PARTNERSHIPS / THIRD PARTIES

5.3.1 IDMS Stakeholders / Contributors

- Administrator
- Assistant Division Director
- Deputy Assistant Division Director
- Program Managers (2)
- Administrative Services Manager
- Program Support Manager

5.3.2 Department Overview

Competitive Government Partnerships is responsible for administering Third Party Programs, Dealer Licensing, and Motor Carrier Services.

The department unit has 20 staff members and is comprised of the following business units:

- Dealer licensing section
- Wholesale/new auto/driver services (i.e. Driver's Education)
- Electronic Data Services
- Criminal Records Check Unit

The following describes each operation:

- **Dealer Licensing** is the largest section with 10 employees
- **Electronic Data Services** deals with electronic copies of motor vehicle records. Data is maintained in microfiche. Commercial customers look at the databases on a regular basis - through dial up, Electronic Data Interchange (EDI), tape to tape. Large insurance companies search through the databases, batch files, and photo radar files. There is a 3rd party IBM portal for the customers.
- **Criminal Records Check Unit** does background verification. There are 20 employees between four areas: Federal Bureau of Investigation (FBI) and DPS request personal history, finger prints, and potential finger print. If a company has fewer than 500 employees, they check for all the employees. Paper copies are collected for this purpose. The department sends report to DPS and FBI when a request comes in.
- **Driver Services** deals with traffic, commercial driver licenses, and motorcycle safety. If there had been test results, copies are kept and also input into computer.

Competitive Government is required to keep all documents active for a period of one year. At this point, there is no clear standard or guideline for the maintenance and management of files within Competitive Government.

5.3.3 Current Filing System

The current filing system is manual, paper based, and employs file cabinets, rotfiles, electronic cabinets with movable shelves, hanging file folders, and paper documents which are organized by specific color codes and tabs and maintained in numerical and alphabetical filing order.

The filing locations are at a) 1801 W. Jefferson St., b) 2739 E. Washington, Phoenix and c) 9651 N. 99th Ave., Peoria. While the occurrence of permanently lost files at these locations is infrequent, the probability of misfiled documents or

temporarily missing files at these locations is significant. This results in a specific amount of teamwork and labor to reorganize and refile documents correctly.

Specific file cabinets at these filing locations consist of the following:

- 4 Drawer Lateral 25
- 5 Drawer Lateral 18
- 6 Drawer Lateral 1
- Rotofiles 7
- Electronic Files Movable Shelves 14

In addition, there are various 4 and 5 drawer files also housing departmental document information.

File retention schedules vary from 3 years up to an indefinite retention schedule based on the document type. Specific costs associated with the filing and storage are unknown and undetermined at this point.

Two full time filing clerks and one half time clerk are involved in the maintenance and management of the file documents.

Filing security is a potential issue as the file cabinets are unlocked and potentially open for unauthorized end user viewing and review.

Specific document folders in the department files are listed in Tables 5-2 through 5-5.

Table 5-2 Document Folders in Competitive Government

Index Name	Type (<u>C</u>haracter <u>S</u>tring, <u>N</u>umeric, <u>D</u>ate)	Length	Searchable (Yes,No)
Fuel Refunds, Int'l. Registration Plan, Int'l Fuel Tax Agreement, Use Fuel, Batch	Date	Several Partitions, extensive	Yes
Contracts, Corrective Action, Correspondence, Projects, Audits, Vendors, Processors, Daily Reconciliation	Character String, Date	Extensive	Yes
Government/Non-Government Agreements, Vehicle Inspection, Motor Vehicle Dealers	Character String, Date	Extensive	Yes

The following parameters address the management of the document folders within the Competitive Government Partnership area:

Average number of new folders created/received per day: 20
Peak days/months? End of Year for Dealer License Renewals
Average number of documents per folder: 25
Retention schedule: 1-year, 4-year, 5-year, indefinite, depending on material
Routing requirements: None
Security issues: Inaccurate release of information from files.

Table 5-3 Paper Documents in Competitive Government

Index Name	Type (Character String, Numeric, Date)	Length	Searchable (Yes,No)
Letters, Complaints, Disciplinary Action	Date	Up to 10 pages	Yes
Applications	Date	6 pages	Yes
Reports, Faxes	Date	Up to 15 pages	Yes
Audits	Date	Up to 20 pages	Yes
Agreements, Contracts	Date	Up to 30 pages	Yes

The following parameters describe the management of the paper documents within the Competitive Government Partnership area, which any future IDMS deployment will need to address:

Average number of new documents created/received per day: 25
Peak days/months? End of quarter, end of month
Average number of pages per document: 15
Document page sizes: 8.5x11, 11x17, 8.5x14
Simplex or duplex? Both, mostly simplex
Condition of pages/paper type: Average; wear with use, not premium paper, recycled paper
Retention schedule: 1-year, 4-year, 5-year, indefinite, depending on type.
Routing requirements: None
Security issues: Documents checked out and not returned promptly, persons with access to documents who don't require access.

Table 5-4 Electronic Documents in Competitive Government

Index Name	Type (Character String, Numeric, Date)	Length	Searchable (Yes,No)
Documents kept on network drive: measurements, forms, transaction reconciliation	Date	Basically short	Yes with authorized drive access
Invoices	Date	Short	Yes, restricted access

The following parameters address the management of the electronic documents within the Competitive Government Partnership area:

Document characteristics (Word, Excel, Lotus, E-Mail, etc.): Outlook Mail, PowerPoint, Word, Access, Excel
Average number of new documents created/received per day: 10
Average number of pages per document: 2
Retention schedule: Indefinite
Routing requirements: None
Security issues: Unauthorized entry to electronic systems

Table 5-5 COLD Reports in Competitive Government (Greenbar, Line Data Reports)

Index Name	Type (Character String, Numeric, Date)	Length	Searchable (Yes,No)
Motor Vehicle Report (MV) 808	Numeric	400 plus pages, greenbar	Yes
MV650-658 Report	Numeric	60 pages	Yes
Third Party Batch Report	Date	70 pages	Yes
VISTA (Electronic program that is used for Motor Carrier transactions) Accounts Paid Report	Date	30 pages	Yes

The following parameters address the management of the Computer Output to Laser Disk (COLD) Reports within the Competitive Government Partnership area:

Average number of new reports created per day: Infrequent
Average number of pages per report: Unknown
Report page sizes: 8.5x11, greenbar
Retention schedule: 12 months
Routing requirements: Delivered to end user
Security issues: Need for adequate storage.

Fax Documents

The following parameters address the management of the fax documents within the Competitive Government Partnership area:

Number of faxes received per day: 15
Average number of pages per fax: 5
Number of faxes sent per day: 15
Average number of pages per fax: 3
Routing requirements: Required to reach end user.
Security issues: Misplaced or lost faxes.

Printing requirements

The following parameters address the management of the print documents within the Competitive Government Partnership area:

Average number of documents printed per day: 30
Average number of pages per document: 10
Number and type of network printers: 12, laser jet and ink jet, 2 are color printers
Number and type of local printers: 70 plus, laser jet

Backfile conversion

The following parameters address the management of the backfile documents within the Competitive Government Partnership area

Number of documents to backfile: 25
Time frame for conversion: Daily
Will backfile be done concurrently or during off hours? Off hours if daily workload does not permit otherwise.
Will temps or regular personnel be used for conversion? Regular personnel unless backfiling becomes excessive.
Will conversion be outsourced to service bureau? No
Security issues: Difficulty in finding needed files.

5.3.4 Other Operational Aspects

The Administration staff includes a selection panel that meets quarterly to select third parties.

A contract is 12-13 pages long and is the key operational document for on-going reference and decision-making including corrective action, suspensions, and termination. When Competitive Government Partnerships enters into a relationship with a new third party, the initial tendency of the third party is to make a series of mistakes and oversights requiring considerable references to the original contracts in the first months of the relationship. This underscores the needs for rapid retrieval and distribution of third party contract documents through the IDMS.

The ability to control versions and perform Check-in/Check-Out control also would add significant value to Competitive Government Partnerships, as the third party contract is a dynamic document undergoing changes and revisions. ADOT needs to track these revisions and ensure that the current generation of the contract is maintained and available upon demand by key stakeholders.

Other key operational aspects include the following:

- The department notifies third parties of policy and procedural changes by burst fax. Approximately 1-2 burst fax transmissions occur per week.
- Contracts with third party suppliers are up for renewal every five years. Contracts are renewed through the mail. The contract renewal forms and documents are candidate documents for the IDMS solution.

- Third parties are located in Prescott, Wilcox, Sierra Vista, Tucson, and Phoenix. The majority is located in the major metropolitan areas of Arizona.
- Twenty FTE's within Competitive Government Partnerships handle 69 third party companies.
- The training unit handles all third parties training. The latest is "Plate & Fee to Owner."

5.4 MOTOR CARRIERS

5.4.1 IDMS Contributor / Stakeholder

- **Administrator**

5.4.2 Overview

Motor Carriers consists of 10 permanent staff that are responsible for overseeing the allocation and support of fleet vehicles. The "Examiner" team, which is the group that gathers and verifies all the documentation regarding the licensing process, consists of eight examiners and two supervisors. "Special projects" individuals, who also may need access to documentation folders, augment this group.

Motor Carriers requires reliable and efficient access to supporting documentation, to verify status on individual fleet vehicles and ensure that licensing, titles, and registration information are current and up to date.

Legal and statutory requirements dictate heavy reliance on paper documents and stored hardcopy file information. Consequently, retrieval of reports is a significant and time-consuming activity for Motor Carriers. The department experiences multiple retrieval requests for titles, International Registration Plan (IRP) audits, and licenses.

The sensitive nature of the documents managed by the Motor Carriers section requires that appropriate security measures and procedures be applied to related internal documents.

5.4.3 Work Process

With regard to paper workflow and document management, Motor Carrier Services generally has two major "business events" which require the generation, acquisition and storage of paper documents.

These events are:

- New applications for licensure of either individual vehicles or fleet of vehicles
- Renewal applications for renewal of licensure

The following process is followed in this department:

1. Open an account with information needed to register the vehicle
2. Open folder and add vehicle
3. Perform paper work for fleet
4. On renewal, employ supporting Green Bar reports
5. Licensing, Copies of Titles, Titles, and Powers of Attorney are stored as manual documents downstairs
6. Information is entered in systems like TARGETS, VISTA, Title & Registration (T&R), International Fuel And Tax Agreement (IFTA) and IRP

The following describes the workflow process used for applications and renewals.

License Applications

The licensing application process used by Motor Carriers is based on consistent, modular workflow and is a candidate application for the IDMS environment. Motor Carriers representatives or their agents perform the application process either by obtaining and completing an application on site at MVD or by requesting and processing an application via mail.

The Motor Carriers services department receives 15 to 20 new applications per week.

After an application is received, a set of business rules dictates whether Motor Carriers will maintain documentation within one specific folder or two folders. The decision will depend on certain International Registration Plan (IRP)/International Fuel Tax Agreement (IFTA) and apportionment requirements.

A typical week involving 20 new applications could generate from 20 to 40 new documentation folders based on existing business rules.

Completing the licensing process includes gathering supporting documentation, power-of-attorney letters, and other related documentation. Individual folders of documentation for Motor Carriers can require hundreds of papers of information addressing the lifetime of a licensed carrier.

Associated with the new application process are the related updates, which will allow licensed carriers to augment or reduce fleets by removing specific vehicles from the fleet. All related correspondence, including change of address

notifications and other associated information, is stored in the specific carrier's documentation folder, which can be maintained by the IDMS environment.

Renewals

Renewals are mailed out quarterly to carriers based on licensing expiration dates. Most licenses expire at calendar year end, making the late September to early November timeframe the largest for mailing.

Renewal mailings consist of sending a summary of all vehicles to motor carriers summary miles, tag numbers and tax notifications. These renewals consist of green bar report mainframe mailings. A copy of the green bar reports are filed in a carrier's documentation folder.

A typical green bar report mailing to an individual carrier typically consists of 4 to 5 pages. In total, a quarterly mailing will typically consist of about 10,000 pages.

5.4.4 Filing & Retention

Key aspects of the filing and retention approach include the following:

- Physical documents are kept for 5 years.
- There are currently 1,700 accounts on file.
- Supporting reference documents are required during renewal.
- There is no current comprehensive file recovery program or procedure in place. Currently records could be reconstructed by retrieving associated information from multiple sources and systems.

Documents also are coordinated with the VISTA system, which is accessed by end users on a leased basis with Lockheed Martin. Motor Vehicles pays other states based on mileage in those states. Currently, the associated information cannot be accessed from VISTA due to retrieval processing constraints. The long-term plan is to modify the end user interface to employ a more friendly, intuitive graphical based menu system.

5.4.5 Summary

The Motor Carrier Services Division did indicate a significant need for an IDMS to replace the current manual system, associated with the retrieval of folders and documentation from the central filing area. Currently, the response time and support on retrieval requests is sufficient. There also are no major security concerns for the unit.

While the current manual paper based system has not presented significant production challenges or hurdles, Motor Carriers is open and receptive to the implementation of new retrieval and workflow solutions based on IDMS.

5.5 TITLE & REGISTRATION PARTNERSHIPS

5.5.1 IDMS Stakeholders / Contributors

- Administrator
- Assistant Administrator

5.5.2 Overview

There are 6-8 employees in Title and Registration (T&R) Partnerships who manage the relationships with 69 third party vendors. Third party vendors file an interest application with information about their company, business and location and a business plan and route this information to ADOT using regular mail or fax.

This communication is a one-time process. The application and the associated plan that were sent are filed and stored in the file cabinets once they are approved.

Documents are retained on file for 3 years.

Title and Registration Partnerships receives 2-3 new applications per month, which are reviewed and approved based on merit. Third party groups will communicate over a 56 kilobyte (KB) telecommunications line and via the ADOT intranet.

There is no current comprehensive file recovery plan in place.

5.5.3 Workflow

Title and Registration employs the following functional workflow steps:

- Third parties who are interested send ADOT the application form
- Once the application is approved, T&R orders the banking supplies
- T&R provides the 3rd party contracts
- The document is kept in the filing cabinet in T&R
- Any correspondence or amendments (adding activities) are kept in the file

The contract itself is 12-13 pages. An amendment constitutes 10-12 pages. The selection process currently is variable in frequency, but the plan to make the selection process semi-annual is under discussion.

The Selection Panel potentially could review up to 10 companies. While existing contracts do not currently carry an expiration date, T&R plans to include an expiration date for new contracts.

T&R sends corrective actions to 3rd party vendors. The number of corrective actions varies by vendor. Typically, numerous corrective actions need to occur when a new 3rd party relationship is started, as they become familiar with ADOT policies and procedures. During this period of time, T&R communicates frequently with the vendors via fax and the specific fax receipts and confirmations are kept as a log of the communication.

T&R has a significant need for IDMS solutions to maintain on-going contracts on file. Currently, one separate contract file is kept for each company. There are currently 3 four-drawer file cabinets. All records issued by T&R to 3rd parties must be retained on file.

On average, T&R transmits documents 5 times per week to specific suppliers. These communications include corrective actions and agreements. Future contract renewals could occur once in five years for a specific 3rd party, requiring extensive review of historical reference files during the renewal process.

T&R does not anticipate that the current economic conditions will have an impact on the companies currently aligned with ADOT. Therefore, any significant change to the existing list of vendors is improbable.

5.5.4 Quality Assurance

Quality Assurance (QA) consists of 20 staff members. QA check and verifies transactions before these are transferred to 3rd party vendors.

QA manages approximately 15,000 to 20,000 transactions in a month, each consisting of 7-8 pages of documentation.

Transactions are maintained on file for 7 years. The transactions are Title Application, Signature Application, Manufacturer Certificate of Origin (MCO), Tucson Regional Center (TRC) receipts, 3rd party Advanced Technology Attachment (ATA), and other miscellaneous documents.

After review for errors, the documents are sent for microfilming. Any error results are also maintained in spreadsheets. Each QA employee quality checks approximately 10% of the transactions.

During issuance of corrective actions, QA engages in significant inter-departmental communication. QA maintains the files and sends them to T&R partnership administration. QA generates reports every month to send to the

owner of the company about the accuracy of the data. Those companies also include Service Arizona and Auto Theft Authority.

T&R also provides procedures and manuals, and issues updates on manuals. T&R keeps a hard copy of the manuals and also has an electronic copy. The report is kept in the network drive and is given to T&R Partnerships.

5.5.5 Contract Files

IDMS is relevant for the storage and management of contract files. A contract file is maintained for each company. Currently files reside in 3 file cabinets, which represents a significant document base.

All documents issued by the department are recorded. Up to five times per week, the department will issue corrective actions, depositions, checks, and agreements.

Contract renewal occurs every 5 years. During contract renewal, personnel must review significant volumes of paper and historical information in order to process the renewal. Production bottlenecks can occur should anyone be on leave or absent for any reason during the renewal process.

5.5.6 Renew by Mail

This department handles mail registration renewals and backend processing for Service Arizona. License plates are electronically ordered and renewed by mail. License plates are sent out with tab attached. Corresponding correction letters if applicable are also sent out. This is a document and data intensive operation, and includes access to a 3rd party database data link that is shared by all parts of Competitive Government Partnerships.

This database is used to backup the company information and employee information of the company, with the goal of providing an automated letter generation system. They send out the plates with tabs attached. If correction is required, correction letters are then sent out to appropriate parties. Carbon copies of the registration renewals are kept as reference material.

5.5.7 Warehouse

The Warehouse sends forms, tabs, permits, and miscellaneous items to Authorized Third Party Providers. T&R interacts with different areas within the warehouse via e-mail and phone. T&R staff members receive faxes from the warehouse to fill information and also have face-to-face communication. They also receive documents from 3rd parties by interoffice courier.

The list of vendors is maintained in an Excel spreadsheet. Eventually a SQL database and data link will be used to accomplish this task. Currently, this is in development mode.

A weekly report is sent to the director of MVD after being reviewed by program management.

5.5.8 Other Information

The corrective letters sent to 3rd party vendors are not identical and T&R does not employ a standard boilerplate template letter.

T&R employs a correspondence tracking system to receive and log complaints. At least 15-20 mailings in response to complaints and corrective actions are sent per month. The research and analysis on specific complaint correspondence involves significant resources.

Quality Assurance receives calls on technical details of the transactions. For other issues such as reprimands, T&R receives and processes specific telephone call inputs. T&R then generates response letters to the calls to confirm the communication.

Business information is not tracked in HEAT.

5.5.9 Document Filing

Each T&R file contains the following tabs and inserts:

1. Project file
2. Contracts
3. Corrective Actions
4. Advertisement
5. Technical
6. Audit
7. Correspondence
8. Miscellaneous

The Project file has 20 different packets, each of which consists of 3-7 pages. Standard forms are included such as the business tracking form. The Project file also includes complaints.

Project files are up to 25 pages. Logs are kept by QA before the work is sent back to the vendors.

T&R has 2 file cabinets and a third cabinet will be added in the near future.

5.6 OFFICE OF REVENUE AND AUDITS

5.6.1 IDMS Stakeholder / Contributor

- Administrator

5.6.2 Overview

The department comprises of 5 individuals:

- Auditor (1)
- Managers (2)
- Director (1)
- Clerical Support Staff (1)

All tax audits are kept confidential and the IDMS strategy must address the confidential security issues surrounding the tax audit files.

The Office of Revenue and Tax Audits interacts with Revenue Accounting and Refund departments regarding tax audits.

Final audits are stored on a network drive for immediate reference and lookup, and then are subsequently archived to offline compact disk (CD).

The Director of Office of Revenue and Audits prefers to use the physical paper file as a reference as it provides faster access to historical records versus accessing records from the compact disk media.

5.6.3 Work Process

The current work process in the Office of Revenue and Audits consists of the following discrete steps:

1. Tax reports are received in paper
2. Tax reports are copied on to diskettes
3. Reports are stored in Excel. Each auditor keeps his own copy in the local disk and the copy is kept in the network drive (g:\) until it is finalized
4. The reports are reviewed by International Registration Plan (IRP)
5. Once it is finalized the clerical staff gives the copy to tax payers and copies it on to CD as well.
6. The supervisor deletes the copy on the network

The majority of reference information is kept on CD. A single audit does not require significant space on CD, and therefore multiple audit files are kept on each CD.

Typically there are 100+ audits within a calendar year. The department is also responsible for performing IRP and IFTA audits and audits of vendors who supply fuel.

A monthly report is generated using Lotus Notes that indicates the number of audits, auditor information, and the amount in dollars. The input for the report is derived from a Dbase IV system.

Physical hardcopy is kept for 4 years. The HEAT System is used for tracking the audits.

The department interacts significantly with the Collections and Hearing offices.

5.7 EXECUTIVE HEARING OFFICE

5.7.1 IDMS Stakeholders / Contributors

- Chief Administrative Law Judge
- Administrative Assistant
- Supervisor

5.7.2 Overview

The primary mission of the Executive Hearing Office (EHO) is the conduct of MVD hearings regarding discretionary actions. EHO requires a significant number of documents to support the hearing process.

The key problem faced by EHO is the retrieval of background documentation, which describes and identifies the discretionary actions of the department. When a driver license issuance office initiates an executive hearing, retrieving the relevant physical documents can take up to 4 weeks, if the documentation is available.

EHO expects to retrieve and consolidate background hearing documentation and reference information more rapidly and efficiently through the implementation of IDMS technology. An IDMS solution will reduce the amount of manual work and tasks associated with gathering background documents and files from departments within ADOT and instead allow the EHO to collect and distribute this information rapidly to the desktop as digital images and text files.

An electronic filing system would enhance customer service on all levels of the department. For example, when speaking with a customer who is contemplating a hearing action, the department's agent could retrieve the supporting documentation, explain fully to the customer what the department's records are, and resolve the issues at the point of origin. This ability to rapidly retrieve and organize information would provide significant positive impact on customer service.

5.7.3 Current Filing System

Active files are contained in 12 two-drawer file cabinets, one in each of the Administrative Law Judge's (ALJ) rooms. Cases that are not currently assigned to an ALJ are maintained in six secretary desks.

Closed files are maintained in five four-drawer file cabinets, which are located in a general area. Closed files are maintained for two months. The files are then sent to 1801 West Jefferson, Room 139, for microfilming.

Six file clerks are required to support the current filing operation.

While the probability of misfiled documents (5%) and lost files (1%) are low, the occurrence of unavailable files (50%) is significant. This speaks to the significant need to share information between multiple users and stakeholders in the hearings process, and a point where the IDMS solution could have potential favorable impact on productivity and efficiency.

IDMS will reduce or eliminate the need to physically transport files to the 1801 West Jefferson location where microfilm is generated. IDMS will eliminate the need to locate a closed, historical file at the 1801 West Jefferson location where it is currently managed and kept for long term storage.

The storage and retention issues are readily addressed through IDMS solutions, which will maintain the primary reference information in digital format on optical or magnetic RAID media for on-going access and lookup.

5.7.4 Document Types

Paper Documents

The following represents the two major paper document types currently managed by the Executive Hearing Office. The average number of folders created or received per day is 55, with approximately 9-12 documents per folder, and 1-2 pages per document. Retention schedule is 100 days, with occasional routing from the legal secretary to ALJ and then back to the legal secretary to the closed file cabinets.

No significant security issues or concerns are related to the EHO paper files.

Table 5-6 lists the major paper document types in the Executive Hearing Office.

Table 5-6 Paper Documents in Executive Hearing Office

Index Name	Type (Character String, Numeric, Date)	Length	Searchable (Yes,No)
Matter ID	Fiscal Year (FY)(Action Type)-(TPX Docket Number)	14	Yes
Matter ID	(FY)(Title,3 rd party, Motor Carrier Safety (MCS), etc)-(Department's Case Number)	14	Yes

Electronic Documents

Electronic files include MS Word, E-mail, ProLaw, Excel and PowerPoint. The average number of new electronic files generated per day is 55. The average number of pages per document is 7.

Fax Documents

Fax activity is significant and the average number of fax documents received per day is 27 and average number of pages per fax is 5. The number of faxes currently sent per day is 16 and the average number of pages per fax is 2.

Print Documents

The average number of documents printed on 26 HP Laser Jet printers located in EHO is 200, with an average number of pages per document of 3-4.

5.7.4 Network Environment

The IDMS solution implemented within EHO will need to conform and integrate with the current network and information technology infrastructure used by the department, including the server and workstation configurations used by EHO.

The details of the networking and IT infrastructure consists of the following:

- Type of Network Windows NT
- Network Topology TCP/IP (10MB Ethernet)
- Number of Users 35

- Servers (1) File/Print/email
(1) Database
- Wide Area Network T1 Lines

Table 5-7 Current Network Server Configuration

Make/Model	Processor	Memory	Drives/space available	CD-ROM	Tape backup	Modem
Compaq 1600	Pentium II Micro-processor (P2)	196	Gigabytes (GB)	Yes	24 GB	No
Compaq ML 370	Dual Pentium III Micro-processors (P3s)	1 + Gig	15 GB	Yes	35 GB	No

Table 5-8 Current Workstation Configuration

Make/Model	Processor	Memory	Drives/space available	CD-ROM	Tape backup	Modem
Compaq DPENS P-300	P2 – 300	128	3 GB	Yes	No	Yes
Compaq DPENS P-300	P2 – 300	64	3 GB	Yes	No	No
Desk Pro 4000	P2 – 300	64	3 GB	Yes	No	No
Operating system (Win 3.X, 95, 98, NT, 2000, XP): Windows NT 4.0						

Other application software running on the workstations include:

- ProLaw
- Microsoft Office
- IBM Personnel Communications
- McAfee Virus Scanner

5.8 COLLECTIONS

5.8.1 IDMS Stakeholder / Contributor

- **Administrator**

5.8.2 Overview

Collections oversees the process of collecting payments on overdue, delinquent accounts. Collections also assists customers and clients with the resolution of overdue accounts receivable items. The department requires strong communication and listening skills and the ability to track payment status and the ability to follow-up with customers to ensure that their delinquent bills are resolved.

Collections has a significant interface with both the Licensing and Revenue Audit departments. Collections also employs a significant manual workflow system in terms of information management and handoffs. Using IDMS, automated workflow would impact and accelerate the processing of bond claims and warrant based audits.

Collections information and data is required at an enterprise level throughout ADOT. The IDMS research indicated the need to share collections information with a wide number of other departments and processing areas within ADOT.

A significant base of documents currently resides in the TARGETS environment.

5.8.3 Work Process

Collections employs the combination of the following manual and computer driven work process to process any new account entering collections:

1. **Create folder new account using primary keys**
 - Driver licensing information
 - Company and related data
2. **Create subfolders**
 - Collection
 - Audit
 - Revenue Accounting
 - Refund

More than 2 people work on the same collections account. Therefore the ability to share the same collections folder across multiple end users will be a significant advantage of the IDMS environment.

When taxes are overdue and delinquent, the collection accounts are then handled by billing department and bankruptcy department.

Currently Collections uses the MVD based mainframe system, originally designed and deployed as a tracking system in 1987 by Andersen Consulting. The system manages Motor Carrier, Use Fuel, and other supplier accounts to track and record revenue. The same system is also used for subsidiary ledger to Accounts Payable.

Once the collections file information is audited, Collections accesses the information from the mainframe. The general consensus is that the mainframe system needs to be replaced due to user interface challenges. Instead, the preference is to keep track of accounts with a more efficient client/server environment, which eliminates unnecessary scrolling and search inefficiencies currently found in the mainframe system

Collections currently manages 126,000 accounts on file. Assigning semi-annual rate changes and keeping records current and updated can be challenging. The Motor Carrier department provides an internal report, which verifies and identifies records, which do not reflect current rates, and then moves these records forward to the next quarter.

Collections interfaces to other departments, which include Motor Carrier, Title & Registration, and Officers Special Investigation within MVD.

Collections receive occasional checks with insufficient funding. Tracking the checks and the payers involved would be helpful from record keeping and document management perspectives.

5.9 MVD RECORDS & TRAINING

5.9.1 IDMS Stakeholders / Contributors

- Three Administrators

5.9.2 Department Overview

MVD Records & Training views IDMS as a significant opportunity to reengineer and retool the existing manual workflow.

Potential IDMS benefits include Policies and Procedures Manuals, Web authoring and publications, and the management of manuals under the current ADOT Intranet site. The application of IDMS could have positive impact on the

distribution of information from MVD Records and Training to the 65 ADOT field offices across the state.

For example, policy and procedures are currently distributed out to dealers through burst fax. Any manual fax operations could be replaced by an automated fax gateway, allowing ADOT to rapidly distribute and fax updated policy and procedure information without resorting to manual fax operations.

Currently 85 burst fax documents are sent out on average each month. These documents could alternatively be queued and forwarded via an automated fax gateway to the appropriate recipient audience.

MVD Records is also responsible for maintaining and managing ADOT training manuals. Training manuals represent also a significant candidate for Web authoring and publications, and these would be readily published out to the ADOT Intranet Website via industry standard Web authoring and publication tools.

Currently order records received from field offices are microfilmed. Up to 15,000 pages per day in a batch undergo microfilming. The 15,000 pages cover titles, registrations, and licensing applications received from the field offices. Two FTEs are required to sort the incoming orders and documents, which are then passed to State Library and Archives for microfilming. The microfilm operation takes a minimum of two days to complete.

Driver License applications are maintained in the field offices for 6 months, and then routed to Records for further microfilming and maintained in archives for five years.

Activity and retrieval are significant on vehicle title and registration information.

The records for abandoned vehicles are maintained in the field for 5 years and then sent to library archives where they are maintained for 10 years. Physical copies of citations are kept for 10 years.

5.9.3 Other Aspects

- The burst fax volumes on an annual basis consist of 58 policy memos and 50 office memos.
- The State requires that even though records are imaged, they also must be microfilmed.
- MVD Records has 7 microfilm cameras and 12 readers/printers. Paper is destroyed once it is microfilmed.

- The maintenance contract for the current microfilm equipment, for basic support, is over \$100,000 per year. MVD had trouble obtaining maintenance contract renewal this year because the equipment is older generation. Renewal of the maintenance contract can pose a potential recurring issue.
- The field offices in batching their daily documents potentially use barcode sheets, based on document types.
- There are 65 field offices that send in documents on a daily basis. They are sent either by US Mail or UPS.

5.9.4 Workflow

The following describes the major workflow steps and activities, which currently occur within MVD Records. These steps cover the 45,000 pages of documents that come in from the 65 field offices each day.

Step 1 - It takes a full day to sort the work and batch the documents by type and field office. Each field office has a unique ID # that is concatenated with the date to create a unique ID for each batch.

Step 2 - Each batch is date stamped with the receive date.

Step 3 - Batches are now filmed

Step 4 – Film is edited for error detection and re-filmed if necessary

Step 5 – The film box goes to data entry for input. TPX is the mainframe where this information is recorded.

There is a 4-5 day backlog associated with this work process. Documents are double sided.

Since January 2002, Arizonians retain their current license plates when a car is sold or a new one purchased. This will create at least 2-3 more pages associated with the specific title transactions.

Driver license applications are kept for 6 months in the field offices and 5 years in archives. Title and registration documents are sent to records immediately.

Note that network and bandwidth will prohibit field offices from scanning and transmitting from their locations. Retrieval can be accomplished from anyone with access to the ADOT network/intranet, the only requirement being a network-

connected computer. MVD Records will leverage the internal fax gateway to distribute information to remote sites if the computer access is not available.

5.9.5 Document Retrieval

All field offices need to have the ability to retrieve images of documents. Retrieval requests are sent to MVD Records and Training from the following locations:

- Field offices (65)
- Courts
- Executive Hearing Office

Currently MVD Records and Training receives approximately 200 retrieval requests per week from these constituent groups. Requesting parties must first complete a retrieval form prior to receiving the document in question. The courts generally request packets of documents in a single written request.

Fax transmission of MVD records is limited. Privacy laws prevent faxing requested information, as the assumption is that unauthorized end users may view faxes.

There are 15 FTEs performing retrievals. Note that the bottleneck is not necessarily the amount of retrievals. Instead, the bottleneck is the time it takes to locate the information, which can range from 2-3 hours.

If retrievals were performed in Field Offices, and at Courts and the Executive Hearing Office, facilitated by IDMS, the current staff members dedicated to retrieval operations would be redeployed to more productive work, including performing the updates to mandatory insurance records.

Currently staff must process up to 17,000 required insurance record updates per week covering new policy origination, cancelled insurance, and other insurance issues.

Citations account for approximately 10 retrievals per day. There are 50,000 manual citations sent in each month. These citations are not microfilmed. Instead, the hard copies are retained for 10 years in the State archives.

MVD Records is willing to train field offices, court staff and executive hearing offices on the retrieval process.

5.9.6 IDMS Recommendations

MVD Records represents a significant candidate for the application of IDMS technologies, workflow management, and work process reengineering. Because of the large volumes of documents, records, and applications handled by MVD Records and the associated manual effort involved in sorting and distributing this information, IDMS could have a positive impact in this work environment in terms of elevating productivity, quality, and level of service.

In addition, the current transfer of documents for microfilming and the lags and delays associated with the microfilming process will be reduced through the rapid capture and distribution of documents through IDMS. Retrieval of historical documents such as titles and vehicle registrations could also be further sped up through the use of digital technologies, and would eliminate the need to locate specific reels of microfilm and output historical records to reader printers.

6. STATE LIBRARY AND ARCHIVES

6.1 OVERVIEW

The Records Management Division of the Arizona State Library, Archives and Public Records is responsible for establishing standards, procedures and techniques for effective management of the public records of Arizona state and local government, including the Arizona Department of Motor Vehicles. The Division operates from a state-of-the-art records center capable of housing over 190,000 cubic feet of state agency records.

The major functions of the Records Management Division are as follows:

- Storage of any state agency records which are approved for storage on the agency's records retention and disposition schedules.
- Supply the control forms use to expedite transfer of records to Records Management, including the instructions on the preferred or required indexing schema to be used on the records for easy retrieval.
- Pickup and physical transport of boxed records to or from the agency.
- Physically placing the archive records onto the appropriate shelf or storage area and entering index information into the bar coded, automated inventory and tracking system.
- Supply the client with updated lists of records placed into storage
- Retrieve specific files upon request using the automated system to track retrievals.
- Re-filing specific files back into the boxes from which they were originally retrieved.
- Interfiling of records that were never stored at Records Management Division (RMD) into boxes of files already in storage.
- Destroying records when the retention period has expired. Destruction is accomplished through recycling. Confidential records destruction is available for records which are confidential by statute.
- Vault storing of computer tapes, micrographics masters, imaging system backup disks and specialized media in a Halon fire-protected climate-controlled vault.
- Records management consulting provided at no cost to state and local government agencies in Arizona. RMD consultants have on average 15+ years experience in records management and provide advice and guidance regarding the storage and management of government records.

6.2 PROCEDURES

The Records Management Division of the State Library, Archives and Public Records offers 24-hour service for the retrieval of computer back-up tapes in the event of a computer crash.

RMD employs a staff of 100+ to manage the storage and retrieval of the vital records of state and local government agencies. Each agency is responsible for determining what constitutes vital records.

Records are stored on microfilm, microfiche, and/or acid-free buffered paper.

When records are ready to be archived:

1. RMD sends the agency bar-coded box labels
2. RMD picks-up the boxes when ready
3. RMD stores boxes on bar-coded shelves
4. Indexing information is recorded in index database

On average it takes RMD only four minutes to find a file. The specific requesting agency can then receive the target document(s) via fax, inter-agency mail, US Mail, or agency courier and pick-up.

Each agency of the state may implement a program for the production or reproduction by film or electronic media of records in its custody. Any agency prior to the implementation of such program is required to obtain the approval of the RMD. The agency / business unit is required to submit a REQUEST FOR IMAGING/MICROFORM UTILIZATION form to the RMD.

This form describes in detail the following items:

- Records to be imaged
- The primary reason for imaging
- Cost justification for imaging solution
- Type of hardware/software program to be utilized
- Cost of all hardware/software/services
- Where imaging will be performed
- Where back-up will be stored

RMD will evaluate the request based on the following parameters:

- Are these established state records?
- What is the retention schedule?
- Is it short or long-term retention?
- Is this an active record type? Many retrievals
- Is this a permanent record?
- Review of the total solution requested

Records that have long-term retention with an active life cycle of retrievals are the best candidates for IDMS solutions.

7. IDMS NEEDS ASSESSMENT MATRIX

7.1 OVERVIEW

In an attempt to consolidate Covansys' research and findings, the attached IDMS Needs Analysis Matrix identifies the key application areas by department, related document types, and priority for implementation of the IDMS solution, based on the feedback provided by individual stakeholders, as well as the scope of the implementation with respect to ADOT as an enterprise.

The matrix is intended as a reference tool for efficient access to the key issues and IDMS document types used by each organizational component of ADOT.

7.1.1 ADOT IDMS Needs Assessment ('1' – High, '2' – Moderate, '3' Developing)

The following Table 7-1 identifies the key IDMS applications and document types by individual department and division within ADOT.

Table 7-1 ADOT IDMS Needs Assessment Matrix

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance	
<i>A. Transportation Support Group</i>	1) Cost Accounting	<ul style="list-style-type: none"> • Electronic File Cabinet • Web Integration • Concurrent Access 					
			1) Contract Management	1) File Management	1	2	1
			2) Contractor Payments	2) File Integrity			
			3) Voucher Accounting	3) Efficient Access			
			4) Project Accounting	4) Reference & Lookup			
			5) Supporting Documentation	5) 10 Year Retention			
				6) Reduce Duplication			
				7) Interdepartmental Coordination			
		8) Web Access					
	2) General Ledger	<ul style="list-style-type: none"> • Electronic File Cabinet • Report Management • Assisted Data Entry 					
			1) Journal Vouchers	1) Document Retention	3	3	2
			2) Financial Transfers	2) Mainframe (AFS) Update			
			3) Expenditure Reports				
	3) Controller	<ul style="list-style-type: none"> • Electronic File Cabinet • Concurrent Use & Access • Enhanced Security 					
			1) Financial Document Review	1) Process Oversight	3	3	1
			2) All Finance and Administration (F&A) Documents	2) Efficient Document Retrieval			
3) Document Sharing							
			4) Eliminate /Minimize Duplication				
			5) Document Security				
	6) Cost Economies						

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance
	4) Accounts Payable	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow / Work in Progress • Electronic Archival 				
		1) Vendor Invoices	1) Rapid Retrieval	2	1	1
		2) Purchase Orders	2) Purchase Order Matching			
		3) Correspondence	3) Long Term Retention (6 yr)			
			4) Automated Workflow			
	5) Employee Services	<ul style="list-style-type: none"> • Electronic File Cabinet • Forms Processing 				
		1) Payroll Records	1) File Retention	2	1	2
		2) Travel Expense Reports	2) Forms Management			
		3) Timesheets				
	6) Audit & Analysis	<ul style="list-style-type: none"> • Electronic File Cabinet • Automated Fax Gateway 				
		1) Audit Reports	1) Rapid Retrieval	2	1	2
		2) Budget Reports	2) Comprehensive File Recovery			
		3) Staff Meeting Reports	3) Automated Fax Gateway			
		4) Training Reports				
		5) Personnel Reports				
	7) Procurement	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow • Assisted Data Entry 				
		1) Solicitations & Bids	1) Call Management	1	1	1
		2) Contracts	2) Rapid Research & Reference			
		3) Purchase Orders	3) Automated workflow distribution			
		4) Procedure Manuals	4) Public Access			
			5) On-line update (ADVANTAGE)			
			6) Secure Access & Control			
			7) Comprehensive File Recovery			
			8) Long Term Retention			
	8) Technical Research & Design	<ul style="list-style-type: none"> • Electronic File Cabinet • Electronic Distribution 				
			1) Accurate Indexing	3	2	2
			2) Security and Backup			

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance	
<i>B. Intermodal Transportation Division</i>	1) Computer Aided Engineering	<ul style="list-style-type: none"> • Electronic File Cabinet • Large Format Drawings • Version Control 					
		1) CAD Construction Plans	1) Rapid Retrieval	1	1	1	
		2) Engineering Change Orders	2) Concurrent Access				
		3) As-Bid / As-Built Diagrams	3) WAN Distribution				
		4) Design / Database Files	4) Track Work in Progress				
		5) Reports / Construction Drawings	5) Intranet Access				
		6) Plotting / Reprographic Files	6) Security & Backup				
		7) Raster Files	7) Version Control				
	2) Bridge Group	<ul style="list-style-type: none"> • Electronic File Cabinet • Large Format Drawings • Version Control 					
		1) Inspection/ Repair Reports	1) Rapid retrieval	1	1	1	
		2) Structure, Inventory, & Appraisal Report (SI & A) Sheet	2) Large Format Capture				
		3) Profile/X-Section	3) Version Control				
		4) Photos (4-sizes)	4) Culture Factors				
5) Scour Data Report							
6) Correspondence							
7) Consultant Inspection Report (Bound)							
8) Bridge/Culvert Drainage							
9) Corridor Drainage							
10) Scour Evaluation Reports							
3) Construction Administration & Policy Group	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow • Automated Fax Gateway 						
	1) Eng 1.0.0	1) Document Retention	2	2	2		
	2) Construction Administration (C.A.) Documents	2) Automated Routing					
	3) Fax Documents	3) Fax Gateway Distribution					
4) Globe District	<ul style="list-style-type: none"> • Electronic File Cabinet 						
	1) Administration files	1) Rapid Retrieval	2	2	2		
	2) Construction files	2) Remote Facility Access					
		3) Increased Security					
		4) Document Retention (3 yr)					
		5) Fax Gateway Distribution					
		6) IT Infrastructure Integration					

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance
	5) Materials Group	<ul style="list-style-type: none"> Electronic File Cabinet 				
		1) Pavement Design Documents	1) Rapid Retrieval	2	2	2
		2) Digital Photos	2) Reduction in Manual Tasks			
			3) MS Office Integration			
			4) Fax Gateway Distribution			
			5) Print Volumes			
	6) Roadway Engineering	<ul style="list-style-type: none"> Electronic File Cabinet Large Format Drawings Version Control Workflow Work Management 				
		1) As-Built Plans	1) Ability to track work in progress	1	1) Remote Districts 2) Independent Contractors	1
		2) Scoping Documents	2) Document Access over the Intranet			
		3) Standard Drawings	3) Individual/Group level security			
		4) Design Guides	4) Elimination of Microfiche			
		5) Drainage Reports	5) Remote User Access			
		6) Design Calculations	6) Version Control and Management			
			7) Conversion of Hardcopy files			
			8) Eliminate Lost or Stray Files			
			9) Manage Large Format Engineering Drawing Size (E) Size Documents			
			10) Ability to Track Work in Progress			
	7) ITD Training	<ul style="list-style-type: none"> Electronic File Cabinet Web Integration Workflow Automated Fax Gateway 				
		1) Enrollment Request	1) Streamline Class Registration	2	1	1
		2) ITD Tech Training	2) Document Access over the Intranet			
		3) Individual Profile Report	3) Flexible Search Criteria			
		4) PDH profile (selected Orgs).	4) Reduction in Manual Steps			
		5) Student Class Transcripts	5) Track Working Progress			
			6) Automated Fax Gateway			
			7) Enhanced File Integrity			
			8) Secure Backup and Redundancy			
			9) Enhanced Individual / Group Security			
	8) Prescott District	<ul style="list-style-type: none"> Electronic File Cabinet Large Format Drawing Version Control Fax Gateway 				
		1) History Information	1) Document Security	2	2	2

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance
		2) JPG Images	2) Variable Document Capture (24x36")			
		3) CAD Drawings	3) MS Office Integration (.XLS, PPT, DOC)			
			4) Fax Integration			
		•				
	9) Environmental Planning	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow Management • Assisted Data Entry 				
		1) Environmental Impact Statements	1) File Integrity / Electronic Filing	2	2	2
		2) Correspondence	2) Concurrent User Access			
		3) CADD Files	3) Reduce Photocopy / Duplication Expense			
		4) Graphics Files	4) Workflow Monitoring / Management			
C. Motor Vehicle Division	1) Revenue Administration	<ul style="list-style-type: none"> • Electronic File Cabinet • Web Integration • Report Management • Assisted Data Entry 				
		1) Receipt Accounting Files	1) Rapid Retrieval	3	2	2
		2) Revenue Accounting Files	2) MS OFFICE integration			
		3) Title & Registration Report	3) Bank Reconciliation			
		4) Reconciliation Reports	4) Mainframe Update (ADVANTAGE)			
		5) Bank Statements	5) Web Access			
			6) Report Management			
	2) Competitive Government/ Third Party Program: Dealer Licensing, Title and Registration Partnerships, Motor Carrier	<ul style="list-style-type: none"> • Electronic File Cabinet • Versions Control • Automated Fax Gateway • Web Authoring & Publications 				
		1) Third Party Contract	1) Version Control	1	2	1
		2) Fax Notifications	2) Automated Fax Gateway			
		3) Training Materials	3) Web Publications			
		4) Criminal Record Checks	4) Rapid Retrieval			
		5) Motor Vehicle Records (Electronic)	5) File Integrity			

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance
	3) Motor Carrier Services	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow • Assisted Data Entry • Report Management 				
		1) Fleet Vehicle Records	1) Efficient Retrieval	1	2	2
		2) Titles, IRP Audits, Licenses	2) Archival			
		3) License Applications	3) Mainframe Update			
		4) Power of Attorney	4) Application Work Process			
		5) Green Bar Report	5) Renewal Work Process			
		6) IFTA Agreements	6) Report Management			
	4) Title & Registration Partnerships	<ul style="list-style-type: none"> • Electronic File Cabinet • Workflow • Correspondence Management • Automated Fax Gateway • Report Management 				
		1) Applications	1) Efficient Retrieval	1	1	1
		2) Correspondence	2) Archival			
		3) Audits	3) Misfiled Documents			
		4) Inspection Reports	4) Folder Management			
		5) Invoices	5) Security & Access			
		6) Mainframe Reports	6) MS Office Integration			
		7) Fax Documents	7) COLD/Report Management			
		8) Corrective Action	8) Fax Gateway Integration			
		9) Contracts	9) Workflow Automation			
		10) Renewals	10) Quality Assurance Review			
			11) Letter Generation			
	5) Office of Revenue & Audits	<ul style="list-style-type: none"> • Electronic File Cabinet • CD Integration 				
		1) Tax Audits	1) Efficient Retrieval	3	2	2
		2) Tax Reports	2) Archival			
		3) MS Excel	3) CD Integration			
		4) CDs				
		5) Monthly Reports				

Division	Department	IDMS Applications / Document Types	IDMS Drivers	Priority	Enterprise Impact	Technology Acceptance
	7) Executive Hearing Office	<ul style="list-style-type: none"> • Electronic File Cabinet • Distribution • Fax Gateway 				
		1) Hearing Documentation	1) Documentation Research	2	1	1
		2) Word, email, ProLaw, Powerpoint, Excel	2) Hearing Compilation			
		3) Fax Documents	3) File Availability / Accessibility			
			4) File Transport			
			5) Folder Management			
			6) Fax Gateway Automation			
			7) IT Network Integration			
	8) Collections	<ul style="list-style-type: none"> • Electronic File Cabinet • Shared End User Access • Assisted Data Entry 				
		1) Collections Records	1) Folder Management	2	2	1
		2) Audits	2) Record Sharing / Concurrent Access			
		3) Revenue Accounting Records	3) Mainframe Update			
		4) Refund Records	4) Rate Changes			
	9) Records & Training	<ul style="list-style-type: none"> • Electronic File Cabinet • Secure Electronic Archival • Automated Fax Gateway • Task Compression • Workflow 				
		1) Policy & Procedure Manuals	1) Web Authoring / Publication	1	1	1
		2) Fax Documents	2) Microfilm Replacement			
		3) Training Manuals	3) Long Term Archival			
		4) Order Records	4) Automated Fax Gateway			
		5) Driver License Applications	5) Workflow			
		6) Vehicle Title / Registration	6) Enterprise Distribution			
		7) Citations	7) Microfilm Maintenance / Obsolescence			
			8) Mainframe Update (TPX)			
			9) Field Office Retrieval			
			10) Manual Retrieval Tasks			

8. IDMS SOFTWARE EVALUATION

8.1 EXECUTIVE OVERVIEW

This IDMS software evaluation reviews the three major IDMS platform software suppliers. These include: a) Documentum, b) eiStream (formerly Eastman Software), and c) FileNET. The review is focused on imaging, document management, (including engineering drawings), and workflow management platform software. Since imaging and document management are normally key components of workflow systems, the software evaluation used in this section will employ a workflow centric approach.

8.2 INTEGRATED DOCUMENT MANAGEMENT SYSTEM (IDMS) MARKETPLACE

The IDMS technology marketplace has changed dramatically over the past ten years. From its birthplace in the mid-1980s as the document imaging market, today's comprehensive content management and Web content management products are integral components of most organizations' technology infrastructure. The IDMS market based on simple conversion (imaging) of paper-based documents into digital images has evolved into a market based on comprehensive content management solutions, designed to manage compound documents (electronic and imaged documents). During this evolution, transaction processing or workflow management systems have paralleled this market.

8.2.1 Market History

Over the past 4 to 5 years, the emergence of the Internet has forced a significant shift in market dynamics whereby document imaging vendors have transformed themselves into document or content management vendors. Simply stated, these vendors have refocused themselves on the enterprise as a whole rather than retaining an "image centric" focus.

Integrated Document Management Systems (IDMS)

Understanding that organizations need to track a myriad range of documents including electronic documents, these vendors created a whole new market place loosely considered the integrated document management market. We consider this marketplace to encompass both content management (CM) and document management (DM). The document imaging market itself has become a commodity market, with much of the traditional core imaging functionality being taken over by other document processing technologies and merged into the computing infrastructure. Document imaging technology still exists in some vertical market niches such as insurance, financial services, healthcare, and the law. The terms document imaging, document management and content

management have blurred lines and contain many overlapping functionalities. For the purposes of this report we define these technologies as follows:

Document Imaging

Imaging is defined as the capture, storage and retrieval of paper documents in an electronic “image”. Traditionally this is a repository type function for retention of historical documents.

Document Management

We define Document Management (DM) as the process of capturing, storing and presenting electronic documents in a variety of formats. This market space is different from imaging in its capability to manage “compound” documents, which include images, and electronic documents like MS Word or Excel,

Content Management

This technology market separates itself from pure DM with a focus on the capture of electronic documents and their creation, revision, modification, and presentation. CM products strive to present electronic documents tailored to the client requirements.

Table 8-1 below provides some context as to the general differences between the technologies.

Table 8-1 Imaging, Document Management, Content Management and Workflow

WORKFLOW MANAGEMENT		
DOCUMENT IMAGING	DOCUMENT MANAGEMENT	CONTENT MANAGEMENT
Document Capture	Library Services	Dynamic Page Generation
Access Services	Access Services	Access Control
Quality Control	Compound Documents	Version Control
Document Import / Fax	Document Import	Site Management
Document Presentation / Markup	Collaboration	Distributed Authoring
Document Indexing	Indexing	Content Presentation
Web	Web	Multi-lingual Support

Workflow Management

The transaction processing or workflow market shares a parallel and tightly related history with the IDMS market. As IDMS and workflow vendors reached

maturity, they began to understand that the key to success lies in their ability to integrate seamlessly with other technologies and applications.

In the late 1990's, the IDMS industry began a strategy of integrating the two technologies, culminating in the merger or acquisition of smaller DM, CM and Workflow vendors into the larger IDMS vendors. This strategy allows these vendors to position workflow systems outside of the traditional transactional processing environment to a more strategic business tool.

Workflow systems are now positioned to act as a central technology in a business environment, linking infrastructure, imaging, document management and content management, and traditional line of business applications. Workflow systems now allow organizations to not only cut costs and increase efficiency, but also drive revenue and improve interaction and service levels with customers.

Workflow Integration

There are three main levels of integration that workflow vendors provide:

- ***Infrastructure:*** Most high-end workflow vendors provide links between their workflow applications and other systems, including client/server systems, e-mail or groupware systems, Web servers, and middleware or transaction servers. Typically these integrations are accomplished through Application Programming Interfaces (APIs) that facilitate communication between the workflow application and other systems. ***Electronic Document Management Systems (EDMS):*** The second level of integration is with other EDMS products such as document imaging, document management, or COLD (Computer Output to Laser Disk) systems. Many of the earliest imaging vendors - FileNET, Keyfile, and IBM – already had tight integration with such products because they provided the products themselves. Other vendors use APIs to incorporate imaging, document management, or COLD functionality from other third-party systems.
- ***LOB applications:*** The last level of integration is with LOB (Line of Business) applications such as CRM (Customer Relationship Management) or ERP (Enterprise Resource Planning) systems. Previously, workflow vendors used proprietary APIs for such integration. But now many vendors offer “packaged” interfaces to these applications (for example, packaged integration with ERP from SAP (a version of an Enterprise Resource Planning Package) or component “adapters” that can be used with multiple LOB applications.

Workflow and eBusiness

Workflow technology becomes much more strategic to a company's goals when it supports e-Business applications and automates the back-end processes on which those applications rely. Workflow is an excellent technology to support e-Business and CRM applications. Workflow can provide the process automation layer and the integration layer that ties the front office together with the disparate

back-office systems, along with the personnel that may be involved in completing a business process. E-Business, and especially CRM is primarily focused on customer retention and acquisition. Workflow technology can play a major role in meeting these e-Business goals by managing the processes of all customer interactions from start to finish, managing the flow of customer-oriented data, and integrating customer-oriented business processes with multiple front- and back-office systems. Specifically, workflow provides value to four different areas of e-Business:

- ***E-Commerce:*** Workflow can help manage e-Commerce transactions, as well as the integration between front-office and back-office systems; workflow can also provide the ability to interact with customers via multiple delivery channels, including the Web, computer telephony integration (CTI), and interactive voice recognition (IVR).
- ***E-Content Management:*** Workflow can help manage the use of documents and customer data within business processes and for presentation to the customer. Workflow can also capture and audit information related to the execution of the process itself.
- ***E-Fulfillment:*** Workflow can help manage the back-office processes required to quickly fulfill orders, whether in the creation and shipping of physical orders, or the automated delivery of electronic orders.
- ***E-Business Infrastructure:*** Workflow can provide the ability to involve a large number of geographically separated users in the same business process; it can also provide services or integration with middleware to provide scalability, reliability, and availability of applications over the Web.

8.2.2 Market Leaders

As this marketplace continues to evolve, many of the predominant document imaging vendors have established themselves as key players in the document and workflow management market. For the purposes of this report, Covansys reviews three of the top enterprise vendors in the DM, CM and workflow market. These include Documentum, eiStream (formerly Eastman Software) and FileNET.

Documentum

Documentum was founded in 1990 and is currently headquartered in Pleasanton, California. With over 900 employees and \$197 million dollars in 2000 revenue, Documentum is one of the leaders in the IDMS market. Documentum was the first to market with an enterprise-scale document management solution built from standard relational database technologies in combination with object-oriented methodologies. As the Internet evolved, Documentum set the pace in helping

companies leverage the Web to conduct business, by extending its platform to enable Web content management. Recently, Documentum expanded into digital asset management, management of rich media, such as images, animation, video, and sound.

eiStream WMS (formerly Eastman Software)

Headquartered in Dallas Texas (TX), eiStream, Inc. through its operating companies, develops and supports eBusiness management software and services. Its comprehensive eBusiness product and services portfolio addresses all aspects of information management, process management, and enterprise workflow. EiStream, Inc. companies today include EiStream, Work Management System (WMS), Inc. Keyfile, Inc., Viewstar, Spectrum Data, Inc., and various foreign affiliates. The companies are principally involved in imaging and workflow, and document management, storage, and retrieval products' sales, services, support and maintenance. EiStream WMS, Inc., provides business process management services for streamlining production and customer-facing business processes. Built upon its award-winning enterprise imaging and workflow technology, the Work Manager series provides financial, insurance and government organizations with services and solutions for integrating customer facing sales and service solutions with back-office operations and product fulfillment. EiStream WMS, Inc.'s solutions are finely tuned to the unique and rapidly evolving Web opportunity, introducing unrivaled integration of front-end Web applications with back-end production and fulfillment processes.

FileNET Corporation

FileNET's tagline is "The Substance Behind eBusiness." FileNET delivers eProcess Management software solutions by enabling organizations around the globe to increase productivity, customer satisfaction and revenue by linking customers, business partners, suppliers, and employees through efficient and flexible eBusiness processes.

Headquartered in Costa Mesa CA, FileNET markets IDMS solutions in more than 90 countries through its own global sales, professional services and support organizations. Additionally FileNET utilizes a Valuenet® Partner network of resellers, system integrators and application developers. Founded in 1982, the company currently employs more than 1,800 people.

8.3 EVALUATION APPROACH

There are numerous factors to consider when evaluating new IDMS technologies. Simple comparison of features and functions provides some insight into the capability of the IDMS systems discussed, but does not provide an overriding business reason to select one IDMS product over the other. In an economy where time to market is fairly rapid, companies with a new idea or process can burst onto the scene one day and be gone the next.

As a key component of this evaluation, Covansys evaluated the workflow vendors' positions within the marketplace, their anticipated Research and Development budgets, and their overall business position and strength. Additionally, Covansys has placed special emphasis on the integration aspects of the IDMS product offering and their ability to support eCommerce.

For the purposes of this report, we have evaluated the following products.

8.3.1 Documentum

Documentum provides a comprehensive suite of document and content management products. Documentum Web Content Management (WCM) package (4i) WCM suite is a Web-centric product base with tremendous Web publishing and content management capabilities.

a) Document Imaging

Documentum Imaging platform consists of two basic products: Documentum DocInput and DocLoader.

- ***DocInput*** provides robust functionality for automatically storing scanned documents in a Documentum repository and converting them to a range of file formats, including Tag Image File Format (TIFF), Microsoft® Word, PDF, JPEG, and the American Standard Code for Information Interchange (ASCII). Users can automatically create cabinets, folders, documents, and other object types within the repository. They can map DocInput index values such as barcodes, key-index fields, date/ time stamps, and unique document numbers directly to Documentum attributes. And they can create multiple renditions and multiple versions of a document, and place objects directly into the repository or into another user's inbox.
- **DocInput Key Features**
 - Provides a wizard to quickly and easily specify how a specific type of document is to be captured and define index or attribute information that will be associated with the captured document.
 - Supports the unique functionality of more than 140 scanners, including image enhancement and endorers.
 - Provides powerful features for image clean-up and enhancement, such as straightening crooked scans, noise removal, barcode recognition, and border and image cropping.
 - Recognizes text in 13 languages, with an automatically invoked OCR technology that saves content in Microsoft Word format.

- **DocLoader:** This product enables the rapid and controlled bulk loading of any kind of content objects from legacy and external sources into a Documentum repository. Thousands of objects can be migrated in a single batch, and Documentum attributes can be automatically populated during import. DocLoader can be used to populate the Documentum repository in an initial deployment, or to update content objects and attributes on an ongoing basis.
- **Document Imaging Integration**
Documentum products integrate efficiently inside the Documentum suite of products. For document capture Documentum also provides tight integration with Kofax Ascent Capture products for truly high-volume document imaging challenges.

b) Document Management:

Documentum uses DocControl Manager on top of the Documentum repository to permit secure management of controlled documents over the Web.

- **Document Management Description:**
Using DocControl Manager, authorized users are able to instantly access and view documents using their browser or viewer of choice. Users can create, review, revise, approve and distribute controlled documents online within an audited environment. In place of elaborate manual processes, users create a Web-driven knowledge chain that links disconnected processes for collecting, sharing, and applying knowledge to meet stringent quality goals and compliance requirements.
- **DocControl Manager Key Features**
 - Supports local language capabilities, such as French and German, to facilitate global deployments
 - Promotes compliance with current Good Manufacturing Practices (GMP), Occupational Safety and Health Administration (OSHA) regulations, International Organization for Standardization (ISO) 9000 quality guidelines, and the stringent Code of Federal Regulations governing electronic records & electronic signature (21CFR11) electronic record-keeping regulations governing Food & Drug Administration (FDA)-regulated industries
- **Document Management Integration:**
Documentum DocControl Manager integrates with current systems, including enterprise resource planning (ERP), manufacturing execution, process control, and related enterprise systems. It enables instant access to

engineering drawings from popular CAD packages such as AutoCAD and provides “eConnectors” to a variety of eBusiness solutions. These include

- Commercial Developer of On Line CRM Applications (ATG) Dynamo
- Commercial Developer of Web Logic Solutions (BEA) Web Logic
- IBM WebSphere
- SAP
- Siebel Business
- Virage VideoLogger

- **Document Management Components:**

As part of the Document 4i product suite, DocControl Manager provides the general document management functionality for Documentum.

d) Workflow Management:

Documentum 4i features sophisticated business process automation so content is easily managed over its life cycle from creation to delivery. Data integrity is maintained, content becomes reusable, and employee efficiencies are improved.

- **Workflow Management Description:**

Documentum’s workflow model allows the user to easily develop process and event-oriented applications for document management. The model supports both production and ad hoc workflows. Using process objects, you can define simple or complex task sequences (including those with dependencies) and save them for reuse. The user can define workflows for individual documents, folders, and virtual documents. Users with appropriate permissions can modify in-progress workflows. Workflow and event notifications are automatically issued through standard electronic mail systems while documents remain under secure server control. Normally, you create and manage workflows using the Workflow Manager client product, and move objects through a defined workflow using the Documentum clients. The Workflow Manager provides a graphical user interface for creating and editing workflows and workflow components.

- **Lifecycle Services:** Life cycle services are an essential component of business process automation. They provide automated management of documents from testing through staging, approval, and deployment, while enforcing the security of content with audit trails and sign-off capabilities. Life cycle services are easy to use as life cycles are configured using a graphical user interface. Documents are automatically distributed and all assigned attributes are enforced by predetermined business rules.
- **Workflow:** The second critical component of automation moves content through business processes for review, approval, and security

at each stage. Documentum 4i elevates workflow to world-class levels with an easy-to-use interface that has drag & drop elements and icons that represent typical workflow tasks such as edit, review, and approve. Predefined workflow templates are included with Documentum 4i, to get the user up and running quickly and easily. At each stage of the workflow, the system automatically applies appropriate business rules to maintain content integrity. An even higher level of security is maintained with robust version capabilities that control attributes, content, and relationships between content. The enhanced versioning feature captures all objects, documents, workflow, and procedures so a record of all document iterations is stored in the Documentum Electronic Content Package (eContent) Repository, enabling instantaneous rollback to an earlier version if needed.

- **Workflow Management Integration:**
Documentum's workflow is an integrated component of the eContent Server.
- **Workflow Management Components:**
As depicted above, Documentum workflow is provided as a component of the eContent Server.

8.3.2 eiStream

The eiStream product suite supports document imaging and workflow. While no specific document management component exists, some DM functionality can be found in the Enterprise Imaging and Enterprise Workflow solution. The document imaging and workflow management components are tightly integrated and when combined with the Web Connector software provide a robust Internet or Intranet presence.

a) Document Imaging:

eiStream's *Enterprise Imaging* product provides the platform for document imaging.

- **Document Imaging Description:**
eiStream Enterprise Imaging is a highly scalable, comprehensive document image management product that integrates into existing computing environments. Users can electronically capture, share, display, fax, print, and store vital paper-based information, including letters, forms, memos, photos, drawings, and faxes. Although current documents are usually stored locally, the catalog provides an

enterprise-wide locator for distributed documents. This capability enables authorized users to gain access to information from any networked system throughout the organization, regardless of their physical location. Documents can be captured and entered into the Enterprise Imaging environment via high-volume, mid-volume, or desktop scanners, or via fax servers or external application related indexes can be entered either manually, via an automated integration feature, or by using bar or patch codes. Once entered, documents are assembled, indexed and available for access. At the user's option, documents entered via high-volume scanners can be sent directly to the document archive.

- **Document Imaging Integration:**

Enterprise Imaging integrates with each of the other eiStream applications and has a comprehensive Application Programming Interfaces (API) Toolkit. Enterprise Imaging offers 32-bit Common Object Model (COM)-based API tools for designing tight product integrations, creating custom interfaces or customizing existing applications. Microsoft COM objects, Active X controls (Tool used by Microsoft Visual Studio Developers) and a Windows Dynamic Link Library (DLL) interface are provided. The API works in single- and multi-threaded environments and is callable from a variety of programming languages, including Visual Basic, PowerBuilder, C and C++ and technologies that will stand the test of time.

- **Document Imaging Components:**

The following components make up the Enterprise Imaging Suite by eiStream.

- ***Imaging Document Archive:*** The Imaging Document Archive consists of a controller and a jukebox or standalone optical drive. The controller is responsible for storing and retrieving documents to and from the optical disk. It also monitors which items are stored in its jukebox and their status on either mounted or unmounted optical disks. Users from multiple domains preserve data integrity through an enterprise data locking service that prohibits simultaneous modification of a document.

- ***Imaging Server:*** The core of the Enterprise Imaging system, Imaging Server, manages locally cached items and coordinates the flow of image documents to the desktop and between servers. It also enforces security at the user or group level. Imaging services run as operating system services and can be administered using

the Microsoft Management Console from either a centralized or remote location.

- **WorkDesk:** Provides a desktop interface to documents and folders; allows users to retrieve, view, modify, and store image and non-image objects, includes a Microsoft Visual Basic for Applications (VBA) integrated development environment for additional customizations, and the full-version of eiStream Imaging Professional for Windows for image viewing and image annotation.
- **Web Connector:** Provides a development environment, with sample applications, to support the Web-enablement of Enterprise Imaging. Through Microsoft Internet Information Server™ (IIS) and ActiveScripting™ technologies, the Web Connector facilitates the inclusion of Web-based users, customers, and suppliers.
- **RouteBuilder:** A graphical user interface tool that allows users to define and capture procedures for document imaging.
- **Document Management Workstation:** Provides an administration interface to configure and monitor the system; and supports the addition of a scanner for low- to mid-volume document capture.
- **Imaging Catalog and Archive:** Coordinates access to items throughout the enterprise, and supports the largest production systems with proven ability to handle over 150 million documents, which corresponds to hundreds of millions of image pages.
- **FormBuilder:** Facilitates the development of custom forms, including forms for maintaining coded data, indexing data, and retrieving indexed documents.

b) Document Management Description

eiStream provides some degree of document management within its Enterprise Imaging Platform and Enterprise Workflow; however it does not provide traditional document or content management capability.

c) Workflow Management

The Workflow Management component for eiStream is called **Enterprise Workflow:**

- **Workflow Description:**
Enterprise Workflow is a highly scaleable and robust work management product that can be used to integrate ebusiness, legacy and client/server applications; manage access to corporate data; capture business processing rules; and coordinate the flow of work throughout the organization. With Enterprise Workflow, the user can manage the flow of electronic information such as documents, forms, images, faxes, and data. By managing valuable information in a structured environment, you can improve productivity and customer service, while decreasing costs.
- **Workflow Integration:**
Integration with the Internet is accomplished via the Web Connector while a rich featured desktop client is available in WorkDesk. Enterprise Workflow is tightly integrated with Enterprise Imaging to manage all paper-based documents that need to become a part of the process as well. Enterprise Workflow electronically monitors and controls the flow of work around an organization: keeping track of where work is in a process, where it should go next, and the information and rules required to complete each step.
- **Workflow Components:**
Through the use of this software, organizations can define business procedures and processes; automatically route work through the organization; integrate all information and applications on a desktop; and monitor, track, measure, and improve business processes. The functionality of Enterprise Workflow can be extended with the implementation of two additional products:

Enterprise Workflow Connector for Microsoft Exchange: This product allows infrequent workflow users to access work items directly from their Microsoft Exchange accounts without having production workflow software installed on their desktops.

Workflow Web Connector: Using the Web Connector enables organizations to extend full workflow functionality to browser-based users, thereby easing administration and allowing employees, customers, or partners to participate in workflow processes over the Web. Enterprise Workflow for Windows also works in conjunction with Enterprise Imaging to provide a comprehensive solution that allows organizations to include electronic document images in their processes.

8.3.3 FileNET Panagon

The FileNET Panagon suite provides a robust set of products that cover document imaging, document management and workflow. Each product is tightly integrated with the other and customization is provided with a robust API set.

a) Document Imaging

The FileNET solution for imaging contains *Panagon Capture Professional and Imaging Services (IS)*:

- **Imaging Description:**
Panagon Capture Professional is a powerful and flexible eContent solution that acquires and indexes digital and paper-based content for online and traditional access across an organization. Panagon Capture Professional allows the user to capture and store information in a variety of formats including scanned paper, faxes, email, Electronic Document Interchange (EDI) documents, and documents from the Web.
- **Imaging Integration:**
Capture Professional supports most common document scanners including Bell and Howell, Fujitsu, Kodak, and Panasonic. The application is tightly integrated with FileNET eForms, Image Services (IS) and Content Services (CS), eProcess Workflow and Web Services. Capture Professional also has an API toolkit that allows custom development of capture path and indexing requirements.
- **Imaging Components:**
The Panagon Capture suite can be configured with the following components:
 - Document Processing
 - File Import
 - Fax Inbound
 - Capture Gateway
 - Capture Toolkit

b) Document Management: *Panagon Image Services (IS)*

- **Document Management Description:**
Panagon Image Services software is a comprehensive solution for storing, managing, and retrieving information of all types from many sources. Panagon Image Services stores objects on magnetic and optical disks. It includes a relational database to index and locate

objects. These objects include images, voice, engineering CAD drawings, spreadsheets, word processing, relational database, magnetic disk(s), optical disk(s), and IDMS Image Services Video. Image Services is the leading high volume image and object storage server solution for enterprise content management applications worldwide. Image Services software's unique distributed architecture allows easy expansion, providing virtually unlimited growth.

- **Document Management Integration:**

As expected, Panagon Image Services is tightly integrated with all other Panagon products including Web Services, Integrated Document Management (IDM) Desktop, Capture Professional, Print and Fax, WorkFlo Services, and Report Manager. Panagon Imaging Services (IS) contains a robust API toolkit that allows integration with legacy line of business applications and has preconfigured connections with eBusiness applications such as

- SAP
- Vignette
- ATG
- Plumtree
- Onyx
- Siebel

- **Document Management Components:** FileNET IS contains the following components.

- Object Entry Services
- Index Services
- Object Storage Services
- Workflow Queue Services
- Cache Services
- Print Services
- Security Services
- Intersystem Security Services

c) Workflow Management:

FileNET provides workflow management through their *Panagon eProcess* workflow product.

- **Workflow Description:**

Panagon eProcess Services represents FileNET's next generation of Web-based, easy-to-use, process management tools and applications. By effectively combining the high-volume transaction handling

capabilities of Panagon WorkFlo Services with the easy-to-use Panagon eProcess Services tools, the user can meet all of your eProcess needs.

- **Workflow Integration:**

All business process automation can be achieved using Panagon WorkFlo Services and Panagon eProcess Services. Panagon eProcess Services embodies the technology shift towards a Web based, unified technology platform, resulting from the fusion of both eContent and eProcess functionality. This platform provides an open architecture, facilitating the development of application infrastructure, sympathetic to the demands of Web-based deployment of business solution. eProcess Services contains a comprehensive collection of application components, thus facilitating the rapid deployment of business solutions with no need for the extensive development requirement associated with the prior generation workflow product, Visual WorkFlo.

The workflow API is built on Internet technology standards, providing a wide variety of development and deployment options. Web browser based solutions are by far the easiest of all methods to deploy workflow solutions. Solutions using browsers do not require any FileNET software to be loaded to gain access to Panagon WorkFlo services.

Some of the capabilities available “out of the box” are:

- Delegation
- Voting
- Review Cycles
- Reassignment
- Parallel Processing
- User-based
- Work Assignment
- Attachments (stored in Content Services and Image Services)

- **Workflow Integration with IS and CS:**

Workflows can be launched from the Library Explorer/Browser upon the check-in of documents, with defined processes being associated with either document classes or a specific document. Panagon eProcess Services integrates seamlessly with Content Services, which provides eContent Management functionality for both the documents associated with the automated processes and the process definitions themselves, thereby providing powerful security and version control over defined processes. eProcess Services also integrates with Image Services to

link documents/images and folders to processes. Process definitions are managed by Content Services and stored in XML (Extensible Markup Language).

- **Workflow Integration with eMail:**

Panagon WorkFlo Services provides an Simple Mail Transfer Protocol (SMTP)-based eMail Notification service, which provides user configurable notifications detailing user work assignments and status changes of workflows being tracked. These notifications, whose formats can be customized, contain Uniform Resource Locators (URLs), which can be used to process the assigned work and/or view its current status.

- **Workflow Components:**

eProcess Services is a component suite that supports Image Services, Content Services and Capture.

8.4 EVALUATION

Covansys evaluated the above three product suites using information gathered from industry analysis leaders such as Giga Information Group, Gartner Group, Forrester Research, and Doculabs Reports. Information was also obtained from vendor Web sites, public Web sites, and Covansys' intellectual capital.

8.4.1 Criteria Used

To provide a well-rounded assessment, Covansys has evaluated these product suites in accordance with the following criteria:

a) Corporate Viability and Direction

As stated in our introduction, a product is only as good as the company supporting it. Of particular concern is the long-term viability of the corporate entity that developed and supports the product. While IDMS industry leaders develop the three selected products, organizations must be sensitive to changing corporate philosophies and trends. As such, we review the stability and direction of Documentum, eiStream and FileNET.

b) Product Integration

Integrated Document Management and workflow are becoming key drivers in the business infrastructure. Therefore, Covansys assesses each product in its ability to integrate with components of the organization's infrastructure, other document management components, and line of business and eCommerce applications.

c) Technical Capability

For each vendor, we have provided a generic assessment of its products in view of ADOT's overall requirements.

8.4.2 Corporate Viability and Direction

In this section Covansys presents an overview of each vendor's viability and general direction. Our evaluation on viability is not meant to be an evaluation of stock value or market worth. Rather it is based on an insider evaluation of market share, position, reputation and product offering. The direction evaluation takes a look at current product offerings and an evaluation of their plans for future product releases.

a) Documentum

- **Corporate Viability:**

With an installed base of over 1,100 customers, Documentum has clearly established itself as a leading supplier of IDMS software and is successfully making the transition to an enterprise content management solutions provider. The firm's goal going forward is to be the leading supplier of content management solutions for e-business.

Documentum is a tangible corporation with a solid history of performance and market share. Documentum tends to drive the market with innovation and product leadership. They currently focus extensively on products that drive Web content.

- **Direction:**

Documentum, Inc., develops and markets Documentum 4i, a platform for building end-to-end content management solutions. With 4i, Documentum addresses the entire content life cycle, including content creation, content personalization, content and site management, and content delivery. Documentum also markets a series of focused product packages— known as Editions— that are built on top of the 4i eBusiness Platform and designed to address specific applications. These Editions, priced as separate applications, leverage Documentum software and services, including maintenance and training. The Editions include the Documentum 4i Web Content Management (WCM) Edition for driving Web sites; the Documentum 4i Compliance Edition for regulatory compliance applications (both general and pharmaceutical-specific compliance applications); the Documentum 4i Portal Content Management Edition, which is targeted for organizations that want to manage enterprise internal content within a portal environment; and the Documentum 4i E-commerce Business To Business Transaction (B2B) Content Management

Edition, which enables organizations to manage content and its flow among their business partners, suppliers, and system integrators.

b) eiStream WMS

- **Corporate Viability**

eiStream WMS was a business unit sold to private investors by Kodak. Through the 1997 acquisition of Wang Imaging (one of the predominant market players of the late 1990's) Kodak became an on again – off again entrée into the imaging market. Renamed as Eastman Software, they abandoned the Unix based products where Wang always enjoyed market leadership and took a disastrous foray into low cost MS Exchange based WorkFolder for MS Exchange / Work Manager for MS Exchange products (WFX, WMX) and suffered through significant financial (estimated at \$12 million per quarter), personnel and client losses. In August 2000, Eastman was bought by an investment group headed by William Oates and acquired Keyfile. After the acquisition of Viewstar, Eastman Software was re-branded as eiStream and is now re-entering the enterprise imaging market.

- **Direction**

eiStream products are fairly imaging centric. The acquisition of Keyfile and Viewstar has created a confusing product offering without much document or content management focus. To round off their imaging centric product line, eiStream has partnered with PC Docs for document and content management solutions. This approach still requires significant 3rd party integration.

c) FileNET

- **Corporate Viability:**

A pioneer in the fields of document imaging, document management, and workflow with over 3,300 installations, FileNET has announced a go-to-market strategy that takes its core integrated document management technology and drives it towards eProcess applications and Web content management.

- **Direction:**

Going forward, the Panagon software suite will be the core platform and infrastructure offering for eProcess management and content management. On top of that, FileNET will add an application layer to provide end-to-end solutions in support of e-business. FileNET's recently announced Acenza is a new line of customer-driven e-business applications that link customers, business partners, suppliers and employees. Acenza applications (Project Acenza for Insurance,

Project Acenza Payables, and Project Acenza Enterprise Application Integration (EAI) Connectors) are designed to extend business processes and their associated content across the Web.

8.4.3 Product Integration

This section focuses on the ability of the product suite to integrate with existing infrastructure, integrated document management or electronic document management systems, and with eBusiness products.

a) Documentum:

Documentum 4i is a well-conceived platform that is open and can be integrated throughout the spectrum of requirements.

- **Infrastructure**

Documentum works well within the constraints of today's modern infrastructure. They possess a high degree of platform independence, supporting both Intel and Unix based platforms including MS Windows, Solaris, IBM RS/6000 UNIX Operating System (AIX), and Hewlett Packard UNIX (HP-UX). The platform works with database management solutions such as Oracle, Sybase, Microsoft SQL, and IBM Mainframe Database (DB2). It can be accessed through MS Internet Explorer or Netscape browsers and provides a rapid application development environment supporting industry standards, techniques, languages and directories.

- **IDM or EDMS**

The Documentum 4i suite supports integration within its own product suite with tight integration between the imaging, document, content, and workflow management components.

- **eBusiness**

Documentum provides an extensive series of eConnectors to integrate with eBusiness applications like ATG Dynamo, BEA WebLogic, BroadVision One-to-One, IBM WebSphere, Sun iPlanet, and Comergent and with portals such as Plumtree, Epicentric, Verity, and Autonomy. Additionally these connectors provide connectivity to ERP engines such as SAP and PeopleSoft and for personalization engines such as Epiphany and Net Perceptions. These eConnectors, added to an open set of Application Program Interface (API), provide great integration capabilities for Documentum.

b) eiStream

eiStream is also built on an open platform environment and has significant capability for integration. However, there are some significant gaps in eiStream's integration capability.

- **Infrastructure**

eiStream is based on Intel Servers and MS Operating Systems. Previous support for Unix based platforms has been phased out and there are no new products for Unix. Database support includes MS SQL, Oracle and Sybase and, consistent with the other products in this report, eiStream is based on a Web centric architecture, which can be accessed using MS Internet Explorer or Netscape browsers. eiStream has a tight integration with groupware such as MS Exchange and provides connectors to engineering drawing viewer and software.

- **IDM or EDMS**

eiStream provides a comprehensive platform for imaging management but lacks true document or content management capabilities. To compensate for this gap in product, eiStream has provided some integration with Hummingbird (formerly PC Docs), which offers a true document management platform. Users can integrate their own 3rd party CM or DM solutions with eiStream using the platform's API toolkit.

- **eBusiness**

eiStream does not provide direct linkages to eBusiness products; however, users can integrate their products with eBusiness, ERP and portal software using the eiStream API toolkit.

c) FileNET

The Panagon suite provides a platform for integration that supports most common infrastructure requirements as well as a tightly integrated IDM / EDMS environment. FileNET also provides direct connectors to eBusiness, ERP and portal products.

- **Infrastructure**

FileNET products have a great degree of platform independence, running on MS Windows, HP-UX, Sun Microsystems (SUN) and AIX platforms and supporting MS SQL and Oracle databases. The FileNET Panagon interface can be accessed using Internet Explorer or Netscape browsers. Email support is provided via SMTP and tight integration with common office products such as MS Word is provided through the IDM Desktop or thin client Viewer.

- **IDM and EDMS**
FileNET provides the most robust product suite for imaging, document management, content management and workflow. The Panagon suite covers this functionality in a discrete product offering that is tightly integrated across the product line. Panagon Image Services and Content Services provide all of the functionality required to support IDM and the eProcess Services provides the workflow platform. Additional functionality like eForms can be implemented out of the box.
- **eBusiness**
FileNET provides an extensive collection of integration components for eBusiness platforms including Vignette, SAP, ATG, Siebel, Onyx and Plumtree.

8.4.4 Technical Capability

Each platform provides significant technical capability. A summary of each of these capabilities is discussed below with a graphical depiction of general strengths and weaknesses (see tables 8.2 through 8.5). Each table reflects a graphical representation for scoring the products strength or weakness. The graphics represent:

- Full Functionality
- Some Functionality
- X Limited or Zero Functionality

a) Document Imaging Summary

As may be expected with these relatively stable technologies, each of the products provides the majority of the functionality required to support today's enterprise wide integrations. Documentum received a slightly lower score because its document capture engine is not robust enough to handle high volume scanning without the integration of 3rd party software such as Kofax Ascent, and eiStream's ability to manage electronic documents from a capture perspective is limited.

Table 8-2 Document Imaging Summary

Vendor	Documentum	eiStream	FileNET
Document Capture	■	●	●
Access Services	●	●	●
Quality Control	●	●	●
Document Import	●	X	●
Document Presentation	●	●	●
Document Markup / Annotation	●	●	●
Document Indexing	●	●	●

b) Document Management:

This is an area where eiStream does not fare well. While Documentum and FileNET are true document management vendors, eiStream remains a more document imaging centric vendor.

Table 8-3 Document Management Summary

Vendor	Documentum	eiStream	FileNET
Library Services	●	X	●
Access Services	●	X	●
Compound Documents	●	X	●
Document Import	●	X	●
Collaboration	●	X	●
Document Indexing	●	X	●
Web Presentation	●	X	●

c) Content Management:

Again, this is not eiStream's strength, while both Documentum and FileNET score high marks. Both of their product offerings are focused on content management and they do an outstanding job at CM.

Table 8-4 Content Management Summary

Vendor	Documentum	eiStream	FileNET
Dynamic Page Generation	•	X	•
Access Control	•	X	•
Version Control	•	X	•
Site Management	•	X	•
Distributed Authoring	•	X	•
Content Presentation	•	X	•
Multilingual Support	•	X	•

d) Workflow Management:

Each vendor has several minor issues in this area. Predictably, since eiStream scored poorly on CM and DM, their ability to integrate seamlessly without significant 3rd party integration was impacted. This is also an area where Documentum loses some ground. Their workflow strategy is based on Web publishing and lacks some degree of capability for pure business transaction automation and reporting.

Table 8-5 Workflow Management Summary

Vendor	Documentum	eiStream	FileNET
Infrastructure			
Operating Systems	●	□	●
Email or Groupware Systems	●	□	●
Web Servers	●	●	●
Middleware / Transaction Servers	●	●	●
IDM / EDMS Integration			
Document Imaging	●	●	●
Document Management	●	X	●
Content Management	●	X	●
COLD	●	●	●
Line of Business Applications			
eBusiness (ATG, BEA, BroadVision One-to-One, IBM, iPlanet, & Comergent)	●	□	●
CRM or ERP (SAP & PeopleSoft)	●	□	●
Web Portal Software (Plumtree, Epicentric, Verity, Autonomy)	●	□	●
Engineering Drawing Management	●	●	●
Workflow Tools			
Workflow Design Utility	●	●	●
Rules Engine	□	●	●
Client Interface	□	●	●
Customization	●	●	●
Analysis and Reporting	□	□	●

8.4.5 Summary And Recommendations

After careful review of all of the established criteria, clearly Documentum and FileNET are significantly more advanced from a document management and/or content management perspective than eiStream. Combining that with eiStream’s questionable business viability and cloudy product direction, FileNET and Documentum are the viable choices.

There are significant similarities between Documentum and FileNET product capability. Documentum has a slight edge in content management and Web publishing and FileNET has a significant edge in workflow management. Since

both companies are market leaders with a well-defined client base, product niche and vision, Covansys believes the decision comes down to the selection of FileNET. This is based on the fact that their edge in the workflow management capability is a significant advantage over Documentum and provides ADOT with the most well rounded product suite.

8.5 ENGINEERING DOCUMENT MANAGEMENT SOFTWARE

While most organizations treat business and engineering document management as entirely separate entities and processes, the management of engineering drawings at ADOT is a vital adjunct to an IDMS strategy. Managing controlled documents effectively is essential to maintaining ADOT's efficiency, regulatory compliance, competitiveness and profitability.

We have reviewed four software packages that could be used in concert with FileNET Panagon. The four software packages reviewed are Green Pasture, Spicer, Bentley, and Cimmetry.

Package Strengths: Each of these packages has a unique approach to engineering drawing management. The Bentley product suite focuses on providing a full function product that supports drawing creation, control, archive and workflow while the Spicer product line is designed with component add-on features like viewers that can be integrated with other applications. The Cimmetry AutoVue solution contains a rich array of document presentation and annotation features. The Green Pasture suite was specifically designed to work with FileNET Panagon Image Services and as such is tightly integrated.

Evaluation Approach: While it is not the objective of this IDMS report to recommend an engineering drawing application, the review of current industry leading engineering drawing packages and their specific integration points to the IDMS environment would be valuable towards setting future goals and strategies. First, the topic of FileNET and CAD drawing support will be addressed, and then this section will explore the capabilities, features, and functions of the four candidate engineering document management software solutions.

8.5.1 FileNET Engineering Document Approach

A. CAD Drawing Support

Business Challenge: CAD files and their associated reference files are difficult to share between the CAD operators and others who require access to the documents. CAD applications are expensive to license for additional users and are complex to learn and use. In addition, customers do not always standardize on a single CAD platform, but use both AutoCAD and MicroStation. Often, one application is the internal standard, but many of the

company's contractors may use an alternative CAD offering, forcing a dual standard. While many users may need access to CAD drawings, they may not need the full functionality of the CAD application. Providing printed or plotted versions to these users is expensive, is prone to error as the drawing may be out of date, and may not link to the original drawing. The use of printed versions typically means that multiple users are making changes to the same document simultaneously, creating a great deal of confusion and error.

Business Solution: Implementing an engineering drawing solution using content management software provides the mechanism to share these critical drawings among all users, those within engineering using CAD applications and those outside this organization who need only view and annotate changes. This kind of system manages the storage, revision, access and links to additional documents automatically. All CAD drawings are maintained in a single location, regardless of the native application in which they were created. Multiple CAD standards are supported, streamlining the use of contractors and situations that may occur following mergers. Viewers are available to provide access to drawings and all its associated documentation without the need for a CAD license. Redlines and markups are supported for these users to request changes of the CAD team. Error and duplicate effort are eliminated because only one copy of the drawing – the most current version – is changed at a time. Printing costs and errors are virtually eliminated by eliminating the need for non-CAD users to reference hard copy. The change management process is significantly improved as the documents, redlined for changes, are routed through the appropriate and pre-defined list of users for change and approval.

FileNET's Solution: A FileNET engineering drawing solution provides a central repository for drawings created in AutoCAD or MicroStation. With integration from partners such as Covansys, users continue to access these drawings from their native CAD application or via viewers from companies such as Cimmetry or Spicer Corporation. Full text indexing and searching of files allows users to search for drawings by textual content and thumbnail sketches of drawings provide quick selection.

FileNET ensures access is provided to the correct version and only to authorized users. If a document is checked out for changes, the user may be provided with view capability, but is notified that the document is currently under revision. Engineering can track and maintain all changes by viewing each version in succession, but provide only the current and approved version to all other users. Associated information, in formats other than CAD drawings, includes e-mail discussions about the facility, photos, video files for education purposes. Other content can be linked to the drawing in order to deliver complete information. The FileNET solution reads and synchronizes

the native CAD reference file structure and title block information, not replacing it with a different format, and manages standard details.

FileNET Customers: Duke Energy, Dairyland Power, and Iberdrola

B. Engineering Change Management

Business Challenge: For a state Department of Transportation, highways are more than just the place where the rubber meets the road. The agency is responsible for the maintenance of state-owned highways and hundreds of bridges of all ages. Keeping track of the most recent versions of inspection and engineering reports, CAD drawings, updates, redlines, paper revisions, updated policy and procedure manuals, safety bulletins and other critical related documents is an enormous, mission-critical responsibility. This information represents a significant capital investment that must be carefully managed and protected. Engineering records and drawings must also be maintained over many years as a proof of environmental, legal, and regulatory compliance.

Business Solution: A content and process management system allows rapid access to drawings, the creation or modification of drawings, the routing of drawings through the change process and the identification of all reference files that might be affected as a result of a change to a drawing. As an example, consider the process that is required to change the supports on an aging bridge. The drawings are accessed electronically, marked up with all required changes, and then transmitted to the drafting department to be updated. Since no paper is involved in the process, all records of the transaction are maintained on the system and are subject to audit at a later date if necessary. The approval process is also sped up because electronic documents can be inspected simultaneously by multiple departments and can be routed quickly using electronic workflows.

A typical Department of Transportation (DOT) today uses the Bentley MicroStation 2000 and Geopak applications to create and manage CAD files, while using a FileNET-type system to manage other documentation. The goal is to implement an integrated solution that can address DOT business issues through management of both technical and non-technical information.

FileNET's Solution: Engineers, support staff and management have fast and effective access to their entire storehouse of documents and drawings via the FileNET content and process management system. The Green Pasture Software (GPS) (FileNET partner) Work In Progress (WIP) product allows for the automation of document control procedures. The GPS WIP software is a layered application. GPS also supports electronic viewing and redlining capabilities, seamless integration of CAD tools, and Web access to drawings

from anywhere, allowing users to browse all libraries from a common desktop interface with minimal training. This allows for streamlined operations and design processes, saving both time and money. Content Certified By Green Pasture means that when an electrical designer checks out a plant-engineering document, it reflects recent changes by the Heating, Ventilating, Air Conditioning (HVAC) contractor. It means that when an administrative assistant on the other side of the country or the other side of the globe checks out a standard operating procedure (SOP), it will contain recent approved modifications. It means that every controlled document an employee, contractor or vendor accesses will be the document of record, not an outdated version or unauthorized update.

FileNET Partners: Green Pasture Software (GPS) provides a comprehensive solution based on FileNET Panagon for management of compound CAD drawings, including:

- a) Reference files and redline layers
- b) Management of the engineering revision process
- c) Management of drawing production.

The FileNET GPS combination is used by more than 50 leading government agencies, utilities, transportation, manufacturing and petrochemical companies, including several DOTs, several major water districts, American Telephone and Telegraph (AT&T), Dupont, Exxon, Alcan Aluminum, Merck & Co., and CSX Railroad (CSX). Cimmetry Solutions provides a simpler CAD viewing and visualization application for managing Two Dimension (2D) and Three Dimension (3D) CAD files directly within a Panagon environment. Also, FileNET maintains a partnership with Bentley Systems for those DOTs that may wish to use both the Panagon Content Services and the Bentley ProjectWise systems and integrate the two.

Competitive Strengths/Weaknesses: The FileNET/Green Pasture suite of software offers greater functionality than Documentum for this application. A Doculabs Report, available on the GPS Website, compares the two solutions. A number of DOTs have selected the Panagon/GPS solution against all competitors.

The Bentley Systems ProjectWise software is also a notable solution candidate. Bentley Systems ProjectWise offers minimal content services functionality but excels in managing MicroStation files and in managing engineering projects.

FileNET Customers: Pennsylvania, Indiana, Arizona, and Kansas are a few of the DOTs that have installed FileNET Panagon software to help increase operational and maintenance efficiencies by making controlled documents

available online for employees. Contractors and vendors can streamline common process flows using change management tools, automate common document control procedures, and can reduce the effort required to access controlled documents. To help avoid mistakes that result from relying on outdated documents, like ordering the wrong part, the products will meet the needs of both general users who typically work with word processing documents and spreadsheets, and technical users, who work with CAD drawings. Panagon software will enable users to locate and zoom in on and plot CAD drawings from their workstations even if they don't have the native CAD application, and it will provide a more stable network environment than is possible using a mix of incompatible document management systems.

Referenceable Customers: All of the above

8.5.2 Green Pasture Software

The combination of Green Pasture's Software and FileNET products provides a comprehensive collaborative content management solution for streamlining controlled document management processes. Green Pasture joined FileNET as a Valuenet partner in 1995. The combination of FileNET's robust enterprise infrastructure and Green Pasture's specialized controlled document management application gives users a comprehensive solution that can be easily implemented and managed in a single department or across an entire organization. The teaming of FileNET IDMS with Green Pasture's application for managing CAD drawings and other controlled documents creates a solution specifically tailored for state departments of transportation. Many DOTs across the country have standardized on this solution.

W/EDGE

GPS W/EDGE software is Green Pasture Software's technical knowledge management application, delivered exclusively on Panagon. The W/EDGE application is built on a three-tier computing model, which consists of a client tier (client services), a brokering tier (W/EDGE services), and a back-end tier (library services).

All client and brokering-tier services are provided natively, and library services are provided by FileNET Panagon Integrated Document Management Content Services (IDMCS) document repository. GPS uses the document services repository of Panagon exclusively for managing the storage of all file types, including word processing, spreadsheet, images, and CAD files.

W/EDGE delivers complex document management, work in progress (WIP), and rendition services from W/EDGE's middle-tier services. Such layers are invoked by a user request, which submits the request to the W/EDGE middle tier. The middle tier then brokers the necessary objects from the Panagon repository.

To accelerate client requests for a document over the Web, W/EDGE incorporates a cache services module at both the middle and client tiers. Information including access control lists, meta-data, and document structure is cached at the user workstation, greatly accelerating system performance. User requests need only travel to the repository (third/back-end tier) for the document itself. Further, the W/EDGE Library Object communicates directly with the document repository, thus bypassing the Web server for document requests and optimizing system performance and scalability.

In addition to the cache services provided at the middle tier, W/EDGE also furnishes cache services at the client itself. Once a document is retrieved by a workstation from cache services (middle tier), a copy of the document is stored at the workstation itself (client tier). Such cached documents remain at the client until the user logs out of W/EDGE, at which time all documents stored in the Windows temporary directory from W/EDGE are removed. This is an important aspect of file management, considering the size of documents a typical W/EDGE user is requesting.

Geographically Dispersed Users

The GPS W/EDGE client desktop provides Web-centric access to an EDM system by delivering all required components of the system to the client desktop through a customer-specified Web address. The user interface is delivered via Active X compatible browsers. GPS certified W/EDGE on Microsoft Internet Explorer (MSIE). A totally Web-based deployment for all system users eliminates the cost and overhead associated with traditional client-server deployments. It does not matter if personnel are located at the headquarters, offsite at a field location, or dialed into your network through a laptop in a hotel room. End users do not have to install any software before they leave their main office. Software is automatically downloaded to the client desktop based upon the user and group name in the document management system. From the client desktop Web browser, GPS W/EDGE provides access the library, menu functions, and commands available to each user.

Zero Administration

The GPS W/EDGE software provides a Zero Administration Client, which minimizes the level of effort required to deploy client desktop software. The Zero Administration Client is named as such because the administrator configures the client interface through a client configuration tool. The configuration tool can be located on a workstation or server anywhere within the EDM system domain. The client interface is then delivered to the end user's workstation when the end user connects to the EDM Web address. The IT staff can modify the menu structures, add new functions, take away toolbar options, change security on dialogs, and put them into place while users are still accessing the system. Changes to the client workstation software are made the next time the end user logs into W/EDGE.

User/Group Based Configuration

The GPS W/EDGE configuration is based upon the end user's username or active group within the EDM library. Specific views, profiles, menus, or search dialogs can be designated for use only by certain end users or groups.

Full EDM Capabilities through Web Interface

Using W/EDGE, users have all document management functionality normally associated with a thick client, including application integration. As long as the user has security rights into the library and a Web browser, they can access the library. From a Web browser, users are able to check out documents and launch the native application of the document. If they do not have the native application on their desktop, W/EDGE can launch a selected viewer.

Another benefit to the W/EDGE desktop is the True Web Integration™ component, which allows users to work from within MicroStation, AutoCAD, AutoVue, Microsoft Word, and Excel, accessing files stored in the library without ever leaving their application.

Users also have the ability to print documents without having the native application on their system. They can mail, rendition documents, and execute bulk modification commands such as bulk check-in / check-out, or transition to another document state. Users can also view multiple documents at one time and view/create multiple markups.

GPS W/EDGE has extensive compound document functionality. W/EDGE automatically stores CAD compound document information in the document management system, so that users do not have to duplicate this process. W/EDGE also automates the creation of compound document relationships for redline/annotation files, and renditions. Finally, W/EDGE is able to handle any manually created compound documents with a variety of relationship types.

The W/EDGE desktop is completely configurable. You can customize menus, toolbars, and dialog boxes for any user or group. To minimize keystrokes, and to assist data validity, default values for document profile information can be provided in the form of dropdown boxes, combo boxes, or even controlled vocabulary lists.

When searching, attribute values are available via quick lists built from the data present in the library. Quick lists are simply a list of values that have been used and indexed for that field.

W/EDGE allows you to determine how each of your users will interface with the document management system. By customizing the menus, and dialog boxes to the needs of individual users or user groups, you can allow some users the ability

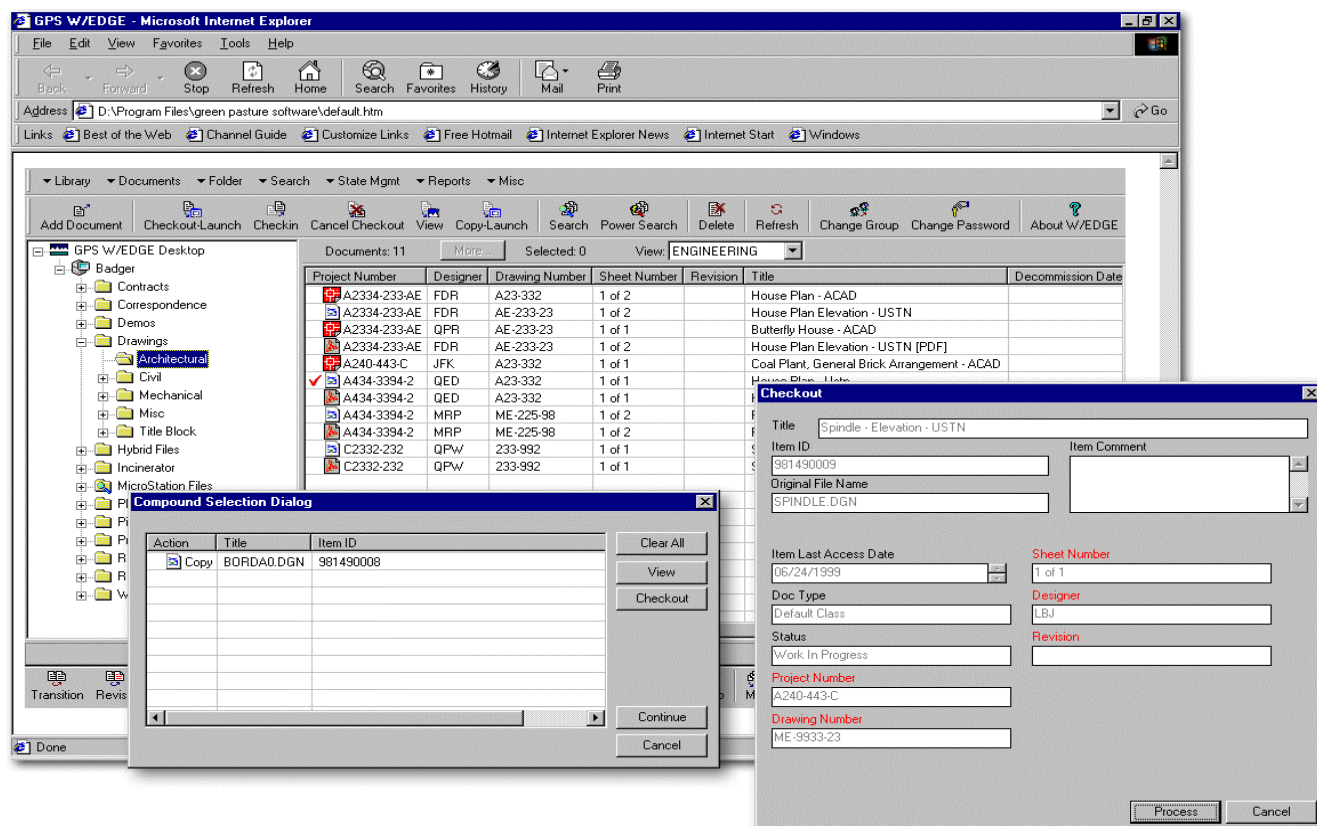
to view, copy, or print, while others will have the ability to approve documents, mail them, look at the compound document structure, or create complex searches.

Using GPS W/EDGE and the FileNET IDM Content Services library (IDMCS), users have the ability to manage their documents by creating unique folder structures in the library. The folders are customizable. Users can organize their document by project name, location, discipline, and many other options. Folders are merely abstractions; documents are not stored in folders, which contain only references to the documents. GPS W/EDGE provides commands to help you organize and navigate through your folders. For example, if you have forgotten where you have stored your documents, you can perform a search and it will tell you the folder in which they are located.

GPS W/EDGE has other key functions that can help to organize and easily retrieve documents. Through the change management process, W/EDGE has the ability to place documents in specific folders based upon their document type and state as the document transitions from state to state. W/EDGE also supports the concept of stored search folders. Stored search folders allow a user to create a search, assign it to a folder, and execute it whenever the folder is opened. For example, this concept is extremely useful for project managers needing to collect documents with their project number. These document references would automatically show up in their folder without ever having to track them down.

Search Capabilities Quick Search

Figure 8-1 Green Pasture Software Search Capability



GPS W/EDGE has a variety of search options. Two types of search screens are provided: a simple search and a Power Search for the more robust searching needs. Both search screens support searches using a combination of attribute and content data. W/EDGE allows the administrator to generate different search templates for specific user and groups. A person in the legal department may be interested in searching upon contract numbers, while a person in document processing may want to search on office location code and data processing number. Users can search upon document attribute information, such as title, project number, or drawing number, or they have the option to search upon version and check out information like 'checked out by user', 'checked in by group'. They also have the option to combine attribute-based searches with content-based searches.

W/EDGE also offers the Power Search for users needing to define more flexible or complex searches. In the Power Search, users can string search criteria together

using a variety of Boolean operators, including ‘and/or’ statements. The results are returned within the normal client interface and include the total number of documents found versus displayed. From the results screen, the users have access to all their normal document menus. Once the search results are displayed, users can use the ‘Generate Report’ command to export and save their search results in a template or external file.

Full Text Search Filters provided for CAD

The FileNET IDMCS system provides a robust content search function, which supports content-based searches on many file formats. Green Pasture Software enhances this function by adding the capability to search for text within AutoCAD and MicroStation CAD file formats. This can be very useful if, for example, a user is looking for a specific pump to replace in 30 different drawings. They can just search upon that pump number and get a hit of each drawing in which it is referenced.

Saved Search Requests

GPS W/EDGE also provides the ability to save your search requests. This is handy for searches that you know you will want to execute on a regular basis. Saved searches can be stored at the user, group, or library level, enabling controlled access. They can also be attached to a folder, so whenever a user wants to use the search, all they have to do is open the folder to execute the request.

The search results have a couple of optional displays. Users typically want to see specific documents they are working with, but other times they may need to view related files as well. That is why W/EDGE gives the option of including/excluding renditions, thumbnails, or markups within their results. W/EDGE also provides the ability to set a maximum display return number in the event that a search results in too many “hits”.

Hard Copy/ External Document Support

Green Pasture Software understands that important documents are not all in electronic format. Many organizations have legacy data that is still critical to their business, and it is mandatory that this information be tracked. GPS W/EDGE supports unprotected files as if they were electronic. The user community can set up specific profile and comment fields so the organization can track the location, date of creation, the creator, and who might have this object checked out. The users have just as many customizable options as they do if these files are in electronic format.

Controlled Vocabulary List Support

GPS W/EDGE provides a tool to generate controlled vocabulary lists (CVL). Based upon the document class, the administrator can assign different CVLs to the same index attribute, or custom property. CVLs provide a mechanism to force the user to choose attribute data from a pre-defined list, thus eliminating the chance of

entering erroneous data. CVLs also support the ability to apply different CVLs to custom properties based upon the active user or group. For example, an enterprise may have a document control group that needs to see one set of project numbers, and a human resource group that needs to view a separate set of project numbers. Separate and distinct project number CVLs can be defined and assigned to each user group.

Hierarchical or Value Dependent CVLs

GPS W/EDGE provides the ability to create a hierarchy of CVLs (i.e., a conditional pick list). With hierarchical CVLs, the value of a property is dependent the value assigned to some other property. When a user selects the first value for a custom property, he/she is given the second property populated with a list that is dependent on the first one. For example, if you had a set of specific projects, the user selects the project code, and based upon that value, the site property is populated with only the sites that pertain to that project identification. If a different project is selected, then the site changes to reflect only sites that are related to that specific project.

Multi Selection Actions

Green Pasture Software took the standard Microsoft Windows approach when developing the W/EDGE product. Using the same keystrokes associated with Microsoft products, users can multiple-select many documents within any type of view, and perform a variety of operations. This is all part of the configuration. Users can view, check out, print, and copy multiple documents. They can even select multiple documents and perform a bulk modify.

Viewing and Redlining

GPS W/EDGE provides a viewer option that adds viewing and redline support for over 200 file formats. Most CAD-oriented projects involve many staff members who do not have a CAD application installed on their system, but who must still review and approve documents. W/EDGE provides Cimmetry System's AutoVue Professional as an optional viewer. AutoVue is a robust and full-featured native format view, redline, and markup application. It can display over 200 native file formats, including native Microsoft Word, Excel, AutoCAD, and Intergraph/MicroStation. AutoVue Professional supports a full-featured redline and markup capability for all viewable formats. AutoVue Professional also supports the viewing image files, including J-size engineering documents. It allows users to zoom in, pan, rotate, print, or plot drawings A through G size, and it provides large variety of markup tools. AutoVue Professional's markup capabilities are extensive. AutoVue Professional can create sticky notes, markup in multiple colors with various fonts, and use a variety of stamps. AutoVue also contains extensive online help and tool tips.

Support for Alternate Viewers

W/EDGE is currently integrated with AutoVue, but can launch any other Windows viewer. Redline or markup files created using one of these tools are managed by W/EDGE in the same manner as reference files. W/EDGE also provides the ability to view markup files created in AutoVue within the supported CAD applications. This capability is especially beneficial to the designers. The ability to open redline files within AutoCAD or MicroStation as an overlay on their open CAD file allows markups to be easily added to the master drawing

Compound Document Support

GPS W/EDGE supports the creation and tracking of compound documents within the library. The compound documents relationships stored in the library are built at the version level. GPS W/EDGE supports a variety of document relationships: from a simple parent to child, to a CAD reference, a variety of rendition relationships, and the markup relationship. We understand that there is a difference between how different types of relationships must be handled. For example, a CAD reference file is something a user will want to see each time they check-out the master or parent document, while a PDF rendition file may play no part in a check-out operation.

For audit and version history reasons, relationships are maintained at the version level. It must always be possible to retrieve a specific version of a master file, and all the related files, as they existed when that version was created. For example, version 5 of a master file may currently be related to version 3 of one of its reference files. However, when the master file was at version 2, it may have been related to version 1 of the reference file. If a user retrieves version 2 of the master, the system must return version 1 of the reference file. This capability makes it possible to track the changes made to a specific file throughout its life cycle

Child to Parent View

One key feature unique to W/EDGE is the ability to look at a file and find all of its child or parent documents. In the engineering environment, a child file, such as a border reference file, can have multiple parents. In the event that the border file undergoes a modification, it may be useful to determine which files use it as a reference file (i.e., which files are its parents). It is also important to note that a child file cannot be deleted if it has active parents.

W/EDGE is also capable of creating static or dynamic links. When a compound document is added, a relationship is generated based upon the version IDs of the documents. Based upon the user configuration, users can opt to always see the current version of the child, but the link is still fixed at the initial level until they choose to update the link. If it is preferable to maintain the link at the current state, the configuration can be set such that users do not have the option to always display the current version. Many clients have chosen to generate a rendition of

the compound documents at this point, so the CAD file and its references will be displayed as one file.

Another type of compound document relationship is one between the master file and a markup file. A relationship is generated when a user leaves the viewer/annotation tool, and the annotation is added to the library. This relationship is also built upon the version level. The next time a user goes to view that document, a redline selection dialog will appear presenting the markups. If checking out an AutoCAD or MicroStation file and launching the default application, the user has the option to overlay the markup file right on top of their live file in AutoCAD/MicroStation allowing them to make the changes while seeing the markup file temporarily displayed. This way they do not have to have both AutoVue and their CAD application launched.

CAD File and Reference File Management

GPS W/EDGE is tightly integrated with MicroStation and AutoCAD. GPS is both a Bentley Synergy Partner and an AutoDesk Registered Developer. Through the integration with AutoCAD and MicroStation, W/EDGE strives to make the interaction with the document management system as seamless and simple as possible for the CAD user. W/EDGE captures File Open and Close operations, such that documents are optionally checked out from the library on open, and checked in on close. Users of AutoCAD and MicroStation never have to leave their application to interact with the document management system.

GPS W/EDGE also has two-way title block / attribute updating capabilities. When a designer adds a file from MicroStation or AutoCAD, W/EDGE scans for the configured block/cell, and then imports the attribute information from the file into the library attributes for that document. This works the other way as well. When a designer checks out and launches a file, W/EDGE captures the library property data and populates the attributes in the block or cell of the drawing. The attribute update feature can be configured to be one way or bi-directional and can be automatically invoked.

CAD & Related Reference Files

GPS W/EDGE has the ability to handle complex CAD documents and their related reference files. Whenever an AutoCAD or MicroStation file is checked into the library, W/EDGE reads the file header to determine the reference file structure. It then adds the master file and its associated reference files to the library and duplicates the information in an internal relationship object. This means the design staff does not have to duplicate the creation of this relationship; the work the designer has put into building a reference file structure during their design session is leveraged during the check-in process.

W/EDGE will also scan the library to determine if the reference file already exists in the library. If the reference file is found in the library, W/EDGE will offer the

user the option to add the new reference file on the drive or attach to the file already in the library. When a user checks out a file from the library, W/EDGE reads the library relationship object to determine which reference files to return with the master. At Check-in time, W/EDGE reads the CAD file header to determine the reference file structure and compares that structure to the relationship object in the library. Once again, the user is offered the opportunity to add any new reference files to the library. The internal relationship object is modified (if necessary) to match the information in the CAD file header.

Raster/ Vector Relationships

W/EDGE also contains strong capabilities for working with raster/vector hybrid documents. If the references are not stored in the header of the document, W/EDGE can still pick up and create relationships with the RLC (Raster Based Engineering Format), REF (Hybrid Engineering File Format used by GTX package), TIFF, the Hybrid Engineering File Format (CIT), or other file types. W/EDGE also has a special function called the “Build Hybrid” command, which can be used to start the initial hybrid file. Build Hybrid allows the user to select the TIFF image and match it up with a vector seed file. The seed file then becomes the master file, with the TIFF now being the CAD reference or other child file type.

CAD users also perform certain file operations that are unique to their work environment, such as attaching reference files, placing blocks or cells, and attaching redline files for reference purposes. W/EDGE provides key-in commands to automate these procedures in both AutoCAD and MicroStation.

Drawing Preview

The Thumbnail Preview command provides the user the ability to see a snapshot of the document before proceeding with a checkout operation, or pulling a drawing over a wide area network. Thumbnails can be configured to be generated upon the document add, check-in, or even a transition to a new document state. While the GPS Rendition Server module is required to generate the thumbnails, no additional software is necessary to view the image.

Additionally, the Thumbnail Preview dialog can be configured to give end users the same options they have inside the regular interface (Check-in, print, transition, etc.). Users can even scroll through the different versions to see how the drawing has changed. If they decide they want to modify the drawing, a right mouse click can provide them with a command list that can allow them to check out and launch the drawing into the native application. W/EDGE also supports scrolling through multiple drawings in case the user wants to look at a quick snapshot of an entire project. Version and property information of the master file is provided with each thumbnail. Thumbnail Preview is just one of many different kinds of renditions that Green Pasture Software supports.

Microsoft Office Product Integration

GPS W/EDGE is one of the only Web-based products available that offers integration with a variety of applications. Just like in the CAD environment, users are able to work from within Microsoft Word or Excel. As a user launches Word, they will be prompted asking if they would like to log in to one of the document management libraries. From here, they can work on their tasks. When they exit the application or close a document, they will be prompted to add their documents to the library. If they choose to work on another document, they will be presented with the option to retrieve from their network environment or the library.

Segregation between Approved and Work in Progress Documents

Many documents such as standard operating procedures undergo a constant review, modify, and publish (release) cycle. GPS developed the Work In Progress (WIP) module in response to customer requests to maintain a published or released version of a document, while retaining the capability to continue to work on the “active” version. The released document is known as a revision. GPS W/EDGE provides the capability to create a new revision under strict security; while the last published revision is still the only one viewable by the consumers.

When a new revision is released, the old revision can optionally be marked as “superseded” or “obsolete”, eliminating any confusion as to which is the current revision. This is all done automatically through the WIP manager functions. Administrators can configure the system so it will automatically change the security of the Superseded model so consumers will now view only the new Published revision.

The GPS W/EDGE WIP Manager module is a document transition and change management utility. Based upon the document class, state, and your defined rules, the security of a document automatically changes as it is passed from state to state. As an organization, you configure the Document Classes and States that best fit your working situation. You set the state that you would like to be your Published or Approved States. W/EDGE takes advantage of the base security provided by the library and makes it even stronger. W/EDGE WIP Manager is extremely flexible. Administrators have the ability to make specific users(s) or group(s) owner at a given state, but to take away printing/plotting privileges until the next state. They can give one group viewing privileges, but not allow them to add markups at that specific time in the document life cycle.

Document Centric Workflow

GPS W/EDGE contains many document-centric workflow components. W/EDGE is able to control documents through their entire life cycle from the day of creation, to a published state, to their day of disposal. As a document moves from state to state for approval, the security automatically changes to give users different privileges and a variety of levels of control. The transition cycle can automatically notify the project team that the document or set of documents is

waiting for their review or approval. You can even have the documents sent to a specific set of folders based upon the state. The project team at this time can be designated as the new owners, and are allowed to check out or view the documents, create markups, and then send them back for more changes. At this time, the other users will gain owner status again and be notified that more changes need to take place. As these changes are taking place, W/EDGE is keeping a detailed audit trail. The log file can tell who has viewed the document, printed, copied, modified any of the properties, or made changes to the document. Through the automatic email notification, users are able to route the documents. If they have some spontaneous changes that need to be made and are outside the norm of operation, they still have the ability to manually mail the document reference or electronic copies of the document to another user or group for approval and review.

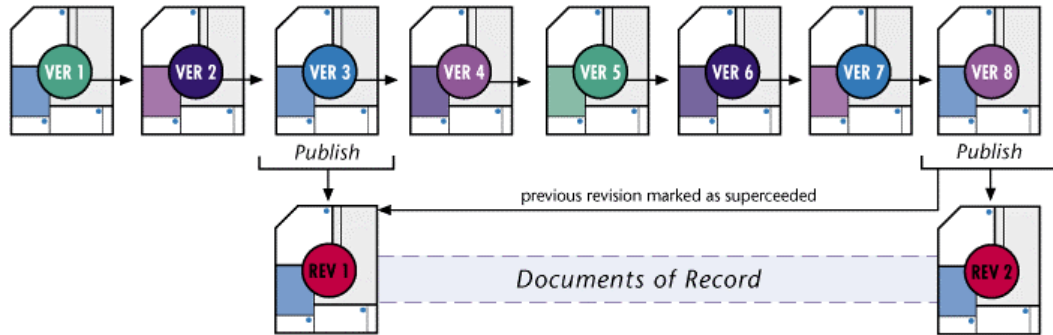
Revision Versus Version Control

The FileNET library provides basic version control of documents. Every time a document is added to the system, it becomes version 1. When users check out the document to modify and then check it back in, the version number is incremented. Through this process, the version number may be very large before the document is actually complete. Once the document is complete, a user with the appropriate authority “issues” or “releases” the document. At that point it is a document of record and becomes Revision 1. When a user wants to revise this document of record, the published Revision is still available for the user community to access. A new revision is created in the background at a Work in Progress or Draft phase.

The Revision numbering scheme is completely customizable. Based upon the document class, revision numbers can be numeric, alphanumeric, or user definable. The administrator can configure W/EDGE to increment at every state, only when the document is first added or revised, or only when the document is pushed to become the new document of record.

W/EDGE also supports concurrent revision support. Some groups of users need to access and modify the same document at the same time. Later, these modifications will be merged into one revision that will be transitioned to the Published state. When the final document is approved and transitioned to Published, the other revisions in this tree can be automatically transitioned to a state called “Orphaned” or “Inactive”, once again completely customizable. The other revisions remain part of the history of the document in its ongoing life cycle, as shown in Figure 8-2.

Figure 8-2 GPS W/EDGE Revision Support



W/EDGE is capable of keeping an ongoing document transaction history all through the Web. Most document management systems can track when a document is being checked out, checked in or deleted. W/EDGE not only audits check out information, it also keeps track of who has viewed, copied, and even printed the document. W/EDGE even keeps track of when the property data was last modified.

Uniqueness Checks or System Validation

Many organizations have a sequence of procedure numbers or drawing numbers that are unique to the entire firm or just to a specific project. Many have the requirement that a specific original filename is never repeated. W/EDGE provides a unique identification control on any custom or system displayed property available. Administration can configure the system to check on a combination of properties. For instance, if an organization has a specification code of SPC101 (Sample Document Classification Code), the library can be configured such that there will be only one document allowed in the system with the specification code of SPC101. The system can also be configured to allow multiple revisions of SPC101, but all in the same document class or states. This unique identifier can span across specific document classes or across the entire library.

Rules-Based Change Management

GPS W/EDGE is a rules-based change management and document management system. With most document management systems you will find heightened security, version control, viewing, copy, and print capabilities. W/EDGE goes well beyond these basic functions to provide a true change management engine.

Based upon the document class and state, the user's files will be controlled in a specific way. When a document is added to a library, the document usually is assigned a default security based upon the user or group that added it. GPS W/EDGE does not assign security based on who added the document. The security is set based upon the state and class of the document. Some organizations have users whose task is just scanning in drawings. Rather than have them be the

owner of these drawings, W/EDGE automatically sets a variable security level defined by the class of the document. W/EDGE not only changes the security, but the class and state combination can trigger specific actions. The Administrator configures the system according to the user's business rules. Based on that configuration, a given state can trigger a change in the online version limit, such as going to a Published state – perhaps the last 5 versions are no longer needed. The state can also trigger moving the documents to specific folders, submit a print or plot request, index the document at a given state, or change the profile information to be all lower or uppercase for a standard look.

GPS W/EDGE also has the ability to automatically modify the profile information to be a combination of other profile data. An example would be if an organization's drawing number consisted of the Project Site Code (CVO), Discipline number (142), number of sheets (42), and sheet number (5), W/EDGE could automatically merge these codes to become the drawing number (for example: CVO142425 would be a possible number). This option supports a variety of separators and works with all system and custom properties that are available for modification.

Drawing Number Generation

GPS W/EDGE provides the functionality to automatically generate drawing numbers according to your numbering scheme. Since each organization is unique, drawing number generators are created based on customer specification. The numbering usually takes place when a document is added to the library. It can be numeric, alphanumeric, or whatever best fits the user's organization. Once configured, this functionality can be used to automatically generate the next single or series of drawing numbers.

Printing Capabilities

Green Pasture Software makes printing or plotting from the desktop a simple one-button operation. The GPS Print / Plot Service and client allow users to print documents in their native file format without having to enter the native application or tie up their own desktop. The ability to plot from the W/EDGE desktop is of particular importance for large organizations. With this capability, engineers or managers who may not have a CAD or viewing product on their local workstation are still able to generate their own hard copies. Plot generation is reduced to a one-button operation. The GPS Print / Plot Service provides several methods for printing to meet most business needs, including Windows printing as well as AutoCAD and MicroStation. GPS Print / Plot Service can automate single file, multi-file, and folder printing.

GPS Print / Plot Service flags the file in the library whenever a print / plot request is submitted. On a simple workstation or server, the GPS Print / Plot Service periodically polls the library for print tasks. GPS supports batch printing and plotting and even supports timing requests, allowing users to queue a batch of

print / plots to be executed at a designated time (e.g., during the night when the system is not normally busy). Plotting AutoCAD and MicroStation documents is as simple as printing a regular text file. The GPS Print / Plot Service supports the use of AutoCAD and MicroStation plot configuration files for any customer-specific re-symbolization and custom plot information. Because the output has been generated via the native application, details such as line weights, line styles, and custom fonts are printed correctly. GPS Print / Plot Service also supports remote plotting. This can be extremely useful if you have project members dispersed across several project sites. If a design becomes the new document of record, generating the hard copy at the different locations can be as easy as a one-button operation or can be done automatically by the WIP Manager as the file or project is transitioned to the new Published status.

Rendition Support

The GPS Rendition Service generates un-editable copies of documents within the FileNET IDMCS library. This allows for the publishing of information to a wide user base while the authors are creating and maintaining the master documents. The Rendition Service offers multi-library processing and can span the corporate network. Used in conjunction with the GPS W/EDGE client, renditions or published version of documents can be created and released for view to the necessary users. Rendition creation can be automated such that a rendition is generated only when defined by specific document life cycle processes.

The GPS Rendition Service automates the process of rendering files into PDF, TIFF, and thumbnail renditions. OCR renditions of image files can be generated to allow full text indexing and content search capabilities for those files. Upon add and check-in of a document into the library, the file is optionally tagged and queued to the GPS Rendition Service. The server daemon polls the library for files need to be rendered, retrieves the document by Item ID and version number along with any related documents, and renders them to the appropriate format. The rendition is created and added to the library, and then a relationship is automatically built and maintained between the master document and the rendition. The administrator has the option of saving renditions for all versions of the master document, online versions only, or just the current version.

OCR renditions allow users to search on the textual content within a scanned image in the library. When a full text search is performed, the TIFF and the OCR rendition will be returned.

Multiple options are available for thumbnail renditions – Thumbnails can be configured in a variety of sizes, colors depths, and backgrounds.

TIFF Renditions are created from a supplied translation tool. The Rendition Service will create a single-page TIFF rendition that will be a raster snapshot of the document.

The GPS Rendition Service automates the process of creating renditions. The GPS Rendition Service supports rendering MicroStation, AutoCAD, and raster images into thumbnail Device-independent bitmap (DIB) files. The GPS Rendition Service also supports the generation of PDF renditions via Adobe Acrobat Distiller.

Bulk Loading of Files

As an IDMCS system grows and you add new users to your system, you must capture vast amounts of electronic documents to make them productive. You cannot wait for them to manually enter each document into the system one at a time. Also, in today's environment, many companies rely on outside suppliers to provide electronic documents. Project files, reports, market analysis – all these documents are the lifeblood of your organization and must be a part of your corporate knowledge repository.

Green Pasture Software designed the Bulk Loader utility to solve these types of problems. By using a file describing each of the documents, the system will automatically load documents into your Panagon IDMCS library. In addition to simply loading the documents, the Bulk Loader maintains the status of each document so you can ensure all documents are correctly processed into your system. The Bulk Loader utility will preserve relationships linking the information in disparate documents. The Bulk Loader also allows the configuration of default values or operations for a single document or multiple documents in the batch. The Bulk Loader will allow you to insert an attribute value, assign default security access, and specify folder locations for documents, as well as many other document-related functions. By loading your IDMCS users data, you can ensure that the documents and data contained in your system contribute to the mission of your organization.

Through use of its unique import/export capability, GPS Bulk Loader can also serve as the basis for an electronic submittal system. Simply save settings for a task, such as a weekly upload of a specific report. Then, at the appropriate time each week, load the saved settings and initiate the bulk load. Such a mechanism supporting a consistent and repeatable load process will serve to enhance the quality of data stored in your library.

Consistency Checks for Version Support

The GPS Bulk Loader may be configured to check for document uniqueness based on one or more attributes. If a non-unique document is identified during the bulk load process, the system had the capability to add the file as a new version of the already existing file or to mark the operation as failed.

Bulk Load -Compound Document Support

The GPS Bulk Loader provides varied support for compound documents. The system may be configured to automatically detect CAD reference files. You may also customize the system to create file relationships based on your business rules.

Once defined, configuration settings may be saved and used again and again. This can be particularly useful in situations where it is necessary to repetitively add information, allowing the Bulk Loader to function as an electronic submittal application.

Bulk Loader allows you to establish default attribute settings for your session. You may set default values for any non-system-controlled attribute. Defaults may also be overridden for individual files. A default access control list may also be established for the bulk load session. This will serve to ensure appropriate access your newly added files.

Add to Specific Folders

Documents may be added to specific folders as part of the bulk load process, aiding in document accessibility and therefore enhancing the usability of your system.

Detailed Log file

GPS Bulk Loader has been developed to run in an unattended mode. Should any errors be encountered during a bulk loading session, detailed information will be written to a log file. This allows you to correct any issues with specific files and repeat the load process.

8.5.3 Spicer Imagenation

Overview

With a significant presence in EDM, Product Data Management (PDM), and reprographic industries, Spicer's products help companies improve productivity, reduce time to market, achieve regulatory or quality management compliance, and more. Spicer's family of products includes Imagenation® for Windows and UNIX, Image a•X (ActiveX™ Controls), ViewCafé, BatchCon, and DocuJet (see Figures 8-3 & 8-4).

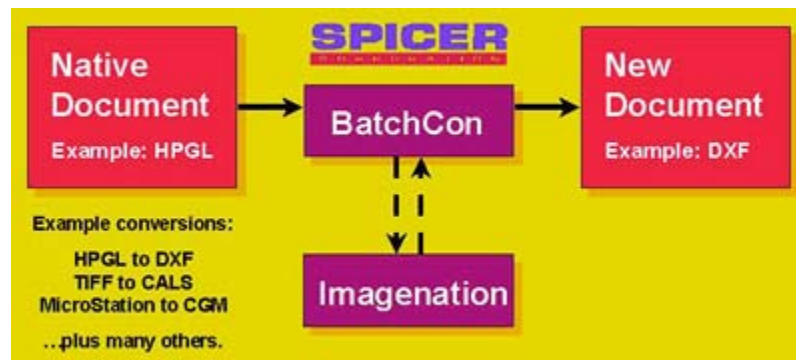
Imagenation® is a powerful tool for accessing, sharing, and distributing your information. Its ability to handle the majority of document viewing requirements—from native file viewing, 3D CAD model viewing, to direct scanning and cleanup of paper documents, to document markup and revision—makes Imagenation one of the most frequently selected viewing tools on the market.

Image a•X combines the flexibility of Microsoft's ActiveX™ technology and the proven view-markup-print-edit capability of Spicer's Imagenation. Now you can integrate Imagenation's functionality into your document solutions—whether they be traditional networked database solutions or sophisticated intranet/Web solutions.

ViewCafé brings the power of Java 2 and Spicer ThinSpeed™ technology to Web-based collaboration, viewing, and markup. Capable of accessing over 150 file formats, ViewCafé lets users view, share, distribute, and collaborate online with partners, suppliers, and customers. In many cases, users require little to no training, making enterprise-wide deployment quick and easy. Scalable architecture gives ViewCafé the ability to handle a virtually limitless number of users, while its customizable API gives administrators complete control over security and functionality.

BatchCon is an automated, configurable 32-bit conversion utility, which converts groups of files from one format to another. As an add-on application to Imagenation, it runs in the background, monitoring an in-queue directory and watching for files to convert. Vector files can be converted to either a raster or another vector format. Raster files can be converted to either a single-page raster file or a multipage raster file.

Figure 8-3 Spicer Imagenation Component Model

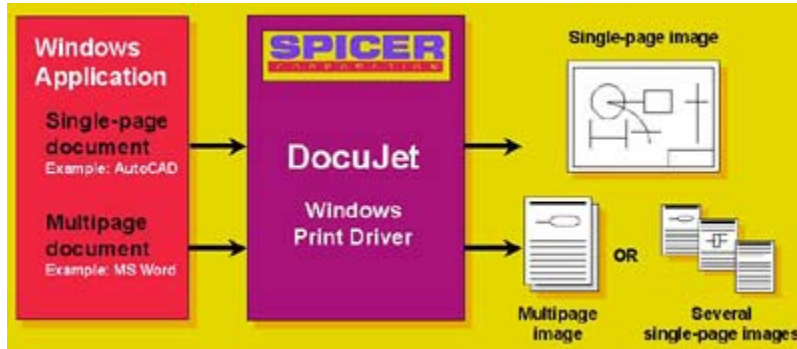


DocuJet is a useful tool for generating secure, easily viewable raster renditions from any Windows application. It functions as a print driver for printers and plotters. With DocuJet installed, any user on a network can generate standard raster images that can be passed directly to printers and plotters for processing. Or the images can be passed to a network print queue. Common applications include:

- Creating raster image renditions of files for archiving
- Generating images for a network print queue or fax server
- Creating secure, shareable renditions for review and markup

- Creating custom print driver for advanced print solutions

Figure 8-4 Spicer DocuJet Rendition Support



Users can also:

- Create a single multi-page document: DocuJet can capture the print of a multi-page document, such as a Microsoft Word document, and produce a single, multi-page raster image.
- Create multiple single-page images: Use the Auto File Name template — specifying the drive, folder, and file name template — to make DocuJet automatically generate unique, yet similar, file names for each image.
- Add DocuJet features to existing print solutions: Select the Port option to pass the resulting image directly to devices that support DocuJet output formats. With the Other Printer option, you can use DocuJet's advanced print options when printing to other devices.
- Printing Options: DocuJet, which is installed on client desktops, functions as any other Windows print driver does. However, instead of simply printing the document on a printer or plotter, it can create an image file of the document. DocuJet can set custom pen widths and patterns to improve readability when printing color documents to black-and-white printers or image files. A minimum line width can be set to ensure that extremely fine lines are visible when printed. Custom settings can be saved in Pen Mapping Files.
- Output Formats: User-determined DocuJet generates image format at the time the document is printed: TIFF Group 3 Fax, TIFF Group 4, TIFF Uncompressed, or Continuous Acquisition and Life Cycle Support Format Standard (CALS) 1 Group 4.

8.5.4 Bentley Systems

The Bentley Systems MicroStation product is currently in use at ADOT in groups such as Roadway Engineering, Computer-Aided Engineering, and Environmental Planning. The objective of this section is to describe the current features and capabilities of the product, to ensure that the IDMS audience and stakeholders have an appropriate view and perspective on this engineering document management solution.

Bentley Systems, Incorporated, is a global provider of collaborative software solutions that enable users to create, manage, and publish architectural, engineering and construction (AEC) content. Their software solutions are used to design, engineer, build, and operate large constructed assets such as roadways, bridges, buildings, power plants, and utility networks.

Bentley's reach spans the globe, serving more than 300,000 professionals and more than 20,000 companies and organizations. Bentley's product offerings are broken into four major subsections. Since content management and content publishing applications were reviewed previously, we will review only Bentley's engineering design and engineering application products.

Engineering Design: Bentley's flagship engineering design platform, MicroStation, stands at the center of Bentley's solutions for building, civil engineering, transportation, process plants, discrete manufacturing facilities, utilities, and telecommunication networks.

MicroStation Raster Editor (I/RAS) B: This powerful tool for organizations works with scanned raster data. A proven raster editor, it offers a complete set of tools to meet the needs of engineers, architects, facilities managers, and other professionals. MicroStation I/RAS B is an essential element in any MicroStation workflow, as it is the ideal product to digitally archive, clean up, or convert scanned drawings. With MicroStation I/RAS B tools, you can restore and revise legacy drawings in raster format. It includes a full suite of engineering tools to help in the conversion from raster to vector. A powerful Optical Character Recognition (OCR) engine allows seamless conversion of raster text-to-text elements and automated conversion for lines and symbols. MicroStation I/RAS B is ProjectWise compliant and fully integrated into MicroStation.

MicroStation PowerDraft: This product was designed to address computer drafters' immediate productivity needs with focused capabilities. It employs an easy-to-use graphical user interface, intuitive viewing techniques, and an innovative set of industry-recognized tools for 2D and simple 3D production drafting. PowerDraft reads MicroStation design files and AutoCAD File Extension (DWG) and Interchange format to convert engineering documents (DXF) files directly. Based on the same Java MicroStation Dialog Manager

(JMDL) kernel that is incorporated in MicroStation/J, MicroStation PowerDraft runs both MicroStation Dialog Manager (MDL) applications and 100% Pure Java applets without modification, providing the foundation for advanced functionality. It can also be easily customized using MicroStation Beginner's All-purpose Symbolic Instruction Code Program Development Language (BASIC). MicroStation PowerDraft is optimized for Microsoft Windows configurations and provides QuickVision GL support for the interactive manipulation of 3D models in shaded mode.

MicroStation PowerScope: PowerScope provides complete and accurate read-only access to data created with MicroStation-based engineering software using technology that exists in MicroStation. It enables project reviewers to view and comment on designs, without altering design data. In multi-tier client-server environments, MicroStation PowerScope greatly contributes to a consistent, automated review workflow by complementing thin Bentley Publisher clients. Both extend the use of live engineering project drawings and models throughout the enterprise, enhancing project collaboration. MicroStation PowerScope employs a very simple graphical user interface, intuitive viewing techniques, and an innovative set of mark-up and sketching tools, making it an ideal design review product for casual users and project managers. Optimized for Microsoft Windows configurations, MicroStation PowerScope is easily customized and directly reads Bentley MicroStation File Extension (DGN) files and AutoCAD DWG and DXF files.

Engineering Applications: Bentley offers a comprehensive portfolio of product and services for creating, managing, and publishing all project and facility information. Bentley technologies streamline workflows and leverage engineering content, enabling synchronization between disciplines, geographic locations, and decision makers—every aspect of the design, engineering, construction, operations, and maintenance of your engineered assets.

Bentley's engineering applications extend the MicroStation feature set, offering a comprehensive portfolio of design and engineering applications to meet the demanding needs of your discipline-specific workflows. Components of the Bentley suite include:

- **ActiveAsset Inquirer** complements ActiveAsset Planner, giving access to participants in the Financial Management (FM) process who only need to review and extract information via a Web browser.
- **ActiveAsset Planner** assists facility management professionals in tracking corporate space and assets, from deployment to decommissioning.

- **Architecture for MicroStation TriForma** automates the architectural design and production process, from conceptual design to construction documentation.
- **Bentley Interference Manager** is an application for the detection, review, and management of component interferences in 3D models.
- **Bentley MicroStation Package (GEOPAK) Rebar** is the de facto standard for reinforced concrete detailing and scheduling.
- **GEOPAK Bridge** offers powerful, intelligent bridge modeling and analysis, as well as intuitive access to project data.
- **GEOPAK Civil Engineering Suite** addresses every major civil design discipline, providing a complete set of industry-specific solutions.
- **GEOPAK Site** provides a visual, interactive environment for site design, utilizing a set of very dynamic and flexible tools.
- **GEOPAK Survey** was created for professional surveyors and handles all surveying needs in a field-to-finish environment.
- **GeoMacao** is an interactive civil engineering solution for production road design following European standards.
- **GeoTransport ARPS (Advanced Routing and Permitting System)** automates the process of issuing overweight and/or overdimensional truck permits for a state.
- **GeoTransport Advanced Transportation Management System (ATMS)** integrates automatic traffic surveillance and control technology with real-time spatial information display, modeling, and analysis.
- **GeoTransport Location Data Manager** provides an API library for n-tier application development, linking datasets in disparate formats and different linear referencing systems.
- **GeoTransport Right of Way Office** allows users to capture, query, display, and report project and parcel information.
- **HVAC for MicroStation TriForma** is for mechanical engineers and designers who desire a product that offers a choice in workflow and intuitive operation.

- **InRail** is designed for the rail industry, providing rigorous regression analysis and rail-specific geometry tools.
- **InRoads Bridge** helps define bridge geometries and create precise 3D geometric models.
- **InRoads** include the features your road and site design work requires, from field to design to construction.
- **InRoads Site** provides powerful site design, digital terrain modeling, and robust coordinate geometry tools.
- **InRoads Storm & Sanitary** offers advanced 3D modeling, design and analysis, drawing production, and data management capabilities.
- **InRoads Survey** enables users to transfer data from electronic fieldbooks to the MicroStation or AutoCAD environment with interactive data editing capabilities.
- **IsoExtractor** is an application for generating isometric drawings directly from 3D piping models.
- **IsoExtractor for Piping Design Software (PDS)** is an application for generating isometric drawings directly from 3D PDS models.
- **Bentley MicroStation Design Product L/ISO** is an application specifically designed to facilitate the drafting of 3D isometric pipelines.
- **MicroStation CivilPAK** gives civil engineers and technicians an intuitive set of civil design and production tools.
- **MicroStation Descartes** is a comprehensive solution for image-mapping, visualization, and raster-to-vector conversion.
- **MicroStation Equipment Modeler** is an application for modeling building and plant equipment within a 3D environment.
- **MicroStation GeoGraphics** allows users to integrate engineering and mapping applications with premier data collection, editing, cleanup, and analysis tools.
- **MicroStation GeoGraphics SELECT Series** combines several powerful geoenvironmental tools into one solution, adding value for SELECT (a Bentley MicroStation GeoEngineering Tool) members that require advanced and comprehensive mapping/GIS functionality.

- **MicroStation GeoOutlook** is a stand-alone data access and decision support tool for mapping and GIS applications.
- **MicroStation GeoWasteWater** is a comprehensive, high-productivity engineering solution for wastewater network management.
- **MicroStation GeoWater** is a comprehensive solution for water network management.
- **MicroStation Raceways** is an application for modeling electrical system cable trays and conduits in a 3D environment.
- **MicroStation Schematics** provides a specialized engine for creating schematics symbology and intelligent drawing objects.
- **MicroStation Telco** provides high-productivity work order design and workprint generation capabilities.
- **MicroStation TriForma** is a 3D solids modeling software for architectural and engineering design.
- **PlantSpace Instrumentation** is used for the design and maintenance of instrumentation documentation and related electrical engineering for process and power plants.
- **PlantSpace Piping and Instrumentation Diagram (P&ID)** is a powerful application for creating piping and instrumentation diagrams.
- **PlantSpace Piping** is an application for 3D piping design, proven around the world on all scales and sizes of projects.
- **PlantSpace SupportModeler** is an application used to model pipe supports.
- **Rail Portfolio** is a subscription program that offers the most complete set of civil engineering tools from the InRoads family of products.
- **Road Portfolio** is a subscription program that includes InRoads, InRoads Survey, InRoads Site, InRoads Storm & Sanitary, and InRoads Bridge. The subscription provides flexibility for civil project workloads.
- **Structural for MicroStation TriForma** optimizes MicroStation TriForma for structural design and construction documentation.

8.5.5 Cimmetyr AutoVue

Cimmetyr Systems, Inc., a leader in visual data access and collaboration, has developed a family of solutions for individual, company-wide, and B2B viewing and collaboration. Their applications – AutoVue, AutoVue Professional, AutoVue SolidModel, AutoVue SolidModel Professional, and Panoramic – support hundreds of formats, providing easier and faster access to data.

AutoVue is not concerned as to whether information comes from a scanner, a word processor, a 3D model, a CAD drawing, a spreadsheet, a fax, or any of over 200 different formats. It will open it. It will display it quickly. It can even print it.

AutoVue can markup, redline, and annotate documents, even those that do not normally support annotations, using a variety of tools: lines, shapes, text, graphics, sticky-notes, symbols and hot spots. Markups are performed on a separate layer and are saved separately, leaving the original document intact.

Positioning with FileNET

Knowledge management requires that users have reliable data access. A key in accessing information is the ability to view or visualize information made available to users, whether on a local workstation, across the organizational LAN, or across the Internet. It is a simple truism that people need quick and easy access to the information they need to do their job. For example, a plant maintenance or safety engineer requires print drawings before going to a job site, or better yet, access to those drawings via a laptop while on the job site. A project manager requires access to product plans when determining feasibility, costs, or scheduling of manufacturing.

Collaboration across the enterprise requires that all users are able to access, review, and comment on any information being developed within, or outside, the organization, whether the documents originate in the engineering, manufacturing, finance, or executive offices (or from business partners or customers).

Although solutions exist that deliver the infrastructure for collaboration, users cannot participate in most of the processes because they lack tools to view the large variety of file formats, nor can they attach their comments to these various documents because they lack the tools to annotate or markup the files. Individuals and organizations would require licensed copies of each authoring software package in order to view and share all documents, but the cost would be prohibitive. For example, only 10-14% of users in an average enterprise are equipped with technical document (CAD) authoring software, which means that 85% of the users cannot view these plans because they cannot access the file format.

The other issue is safety of the document, preventing users from altering the information in a document when and if the document is opened for viewing in the native authoring program. If every user did have the means to open, view, and edit files, the organization would risk losing valuable information, as non-technical users could inadvertently modify or destroy sections of the documents.

By delivering visualization and collaboration solutions that can display and markup engineering, manufacturing, and office documents, Cimmetry provides users, individual, company-wide, and B2B, with a single point of access to over 200 different 2D/3D CAD, plot, raster, hybrid, and Office document types, allowing them to view native files and annotate documents without risk of losing or modifying valuable information.

Cimmetry delivers these solutions at a fraction of the cost required to deliver all the authoring applications to each user's desktop. The comments created by AutoVue users are saved to separate files, enabling a security paradigm based on organizational requirements and/or rules.

Key Product(s)/Integration Overview:

VueLink for FileNET provides integration between FileNET IDM and the AutoVue viewing and markup software.

AutoVue can be extended to make use of the metadata embedded in drawings to provide links to other related documents. When combined with FileNET Document Management System, this capability can provide an intuitive navigation system for the repository of information.

AutoVue provides further extension and customization for information access with Hyperlinks. Elements in a P&ID can be hyperlinked to the related information in the database, and the information can be accessed with a single click.

AutoVue is also a printing solution. It offers a vast array of valuable printing options, including batch printing, stamps, watermarks, and banners. AutoVue's printing options are straightforward enough for the casual user, yet feature-packed for the power user. Print Preview helps eliminate unwanted print jobs, giving complete control over what comes out of the printer or plotter.

Cimmetry Systems' AutoVue for Java, known as JVue, is a Java-based viewing and markup tool designed to make reviewing documents over the Internet easy. The product uses thin-client architecture to let you view a wide variety of documents online. JVue is ideally suited for online project collaboration in which team members and support staff are scattered in remote locations.

In addition, Green Pasture has developed and markets a value-added component that integrates AutoVue with FileNET's Panagon.

Key Features:

- Supports over 200 formats.
- Windows-compliant user interface includes multiple, dockable, customizable toolbars, allowing you to set up your desktop the way you want.
- Intuitive user interface makes functions available in drop-down menus, in the right-click menu, and on the toolbars. The graphical user interface will be familiar to Windows users, allowing most people to pick up the basics in half an hour.
- Multiple Document Interface (MDI) allows multiple windows, even containing documents in different formats, to be open at the same time.
- Automatic document format recognition relies on the contents of the file, not its file extension, so that the file is opened in the correct mode every time.
- Built-in scripting language for creating macros makes repeat tasks faster and easier.
- Powerful right-mouse-button functionality lets you quickly access frequently used features via right-click menus.
- Streaming and Interruptible - AutoVue displays data, as it is being read and processed. No need to wait for the entire document to be read, processed, and finally displayed before the user can begin working on it. You may also interrupt the loading of a file and load a new one at any time.
- Handy thumbnail feature lets you create thumbnails for entire directories for quicker visual browsing and navigation. This unique feature makes locating the right file an easy and efficient process.
- Capture interface to TWAIN (Generic Scanner / PC Interface Standard) - compliant scanners.
- Messaging Application Programming Interface (MAPI) e-mail enabled: send your files and / or markups directly from within the AutoVue interface.
- Menus can be extended to include any additional tools, script files or other applications you desire
- Platforms: Disk Operating System (DOS), Windows 3.1, Windows 95 / 98 / 2000 / NT, and Unix.

Viewing Features

- View over 150 popular office and graphics formats originating from word processors, spreadsheets, and databases, including Acrobat PDF, Lotus 123, Microsoft Word, Excel, PowerPoint, Desktop TIFF, Visio, and WordPerfect.
- Full zoom and pan features, including magnifying glass and magnifying window.
- Text Search function lets you search for specific words or phrases.

Engineering Viewing Features

- View over 200 engineering drawing and office document formats including AutoCAD, CALS Group IV Compression Standard (G4), Gerber, Hewlett Packard Graphics Language (HPGL), Initial Graphics Exchange Specification (IGES) 2D, MicroStation, Postscript, large-format TIFF, etc.
- Advanced zooming functions let you view the data you need at the zoom level you want. Dynamic or static Bird's Eye, Spyglass, and Spy Window allow you to zoom along paths, e.g., follow a pipe, electric line, or road.
- Zoom, rotate, flip, and fit to screen are only some of the many viewing options available to you in AutoVue.
- Take measurements including, area, distance, cumulative distance, and takeoffs.
- Compare two versions of a drawing and AutoVue will automatically highlight those elements that have been added, removed, or remain unchanged. Color-coding makes this a simple yet invaluable feature.
- Overlay drawings - view or print several documents or drawings at once, even if they are in different formats. This is particularly useful for hybrid files or scanned documents with a vector counterpart.
- Supports very large raster image files.
- Text Search function lets you search for specific words, even in CAD drawings.
- Directly access AutoCAD: xRefs, Blocks, Layers and Named Views; MicroStation: Reference Files, Cells, Levels, and Saved Views. Toggle layer levels on and off.
- Call up cells and views.
- Query non-graphical CAD drawing entity data, such as element tags and attributes.
- Enhance large raster files for display purposes.
- Includes support for hybrid (raster/vector) files.

3D Viewing Features

- View all popular 3D model formats, including the Integrated suite of software applications from IBM/ Dassault Systems covering all aspects of product design: Computer Aided Design (CAD), Computer Aided Engineering (CAE) and Computer Aided Manufacturing (CAM) (CATIA), IGES 3D, Pro/ENGINEER, Solid Designer, Solid Edge, SolidWorks, Standard for the Exchange of Product Model Data, is a comprehensive ISO standard--ISO 10303 (STEP), Standard Template Library (STL), and Virtual Reality Modeling Language (VRML).
- Render the model in several 3D modes, including shaded model, wireframe, silhouette, and hidden line removal.
- View 2D modes and drafts of models.
- Color and highlight different parts of assemblies.

- Transform model parts independently of one another. This essential feature gives you the versatility necessary to explore different configurations, move parts out of the way to better view hidden areas of the model, and break an assembly down into its components.
- Navigate through an assembly and its related drafts at a click of the mouse.
- Color-code parts and make them visible or hidden for ease of distinction.
- Standard 3D views are available including isometric and perspective views. You can also define your own views.
- You can section models or parts of models using user-defined section planes and export the section edges as a separate file.
- Perform precise measurements on all dimensions, including angles, arcs, circles, surface area, distance, and cumulative distance.
- Snapping lets you precisely locate edges, vertices, mid-edges, etc. so that measurements will be exact.
- You can calculate mass properties for the whole or part of the model, including center of gravity, moments of inertia, inertia tensor, and many more.
- The mass properties default option is precise measurement based on boundary representation (B-reps). You can also measure using tessellation.
- Measure the minimum distance between any two points on a model or part.
- Define the light settings, with options such as light direction, color, and type.

Printing, Plotting, & Conversion

- Print Preview your documents before printing, saving time as well as ink and paper.
- Print or plot to any Windows-supported printer or plotter.
- Recognize and "emulate" CAD system's print / plot features. Apply attributes to your markup entities to match those used in drawings, whether using AutoCAD, MicroStation, or other CAD packages.
- Match markup pen colors and line widths to the ones you use in CAD drawings to produce identical prints and plots. Create and save settings to use on other print or plots generated.
- Print to scale, print to fit, print whole drawings, print what is displayed, print large output as tiles, paper selection, and force to black are just a few of the options available.
- Insert watermarks, stamps, headers, and footers information such as the full path, drive, directory, base name, file extension, total number of pages, current page number, date, time, or any text you want. Import a graphic to be used as a stamp and change its position and size as needed.
- Query the host system with which AutoVue is integrated for additional information. For example, AutoVue can query the host system to include the status of the document in the workflow process. AutoVue could then automatically incorporate this information to print into AutoVue Print Headers or Footers.
- Define margins.

- Use AutoVue to print from other applications or from the command prompt.
- Print markups and markup notes along with the document.
- Batch print sets of documents.
- Convert your files to other formats, such as CALS G4, HPGL, TIFF, etc.
- Convert multiple files by batch.

Markup, Annotation & Redlining Features

- Annotate or redline your document using an extensive set of markup entities, including hyperlinks to other documents, boxes, lines, arcs, clouds, text, hideout, and sticky-notes.
- Import or create your own symbols and organize them into libraries. Browse through your libraries and preview symbols before dragging them onto the markup.
- Attach hyperlinks to any entity, linking markup to any file, application, or script.
- Attach sticky-notes to any entity, including word processor features such as formatting.
- Simultaneously open and view multiple markup files and activate or deactivate them selectively. Turn markup layers on and off as required. Combine markup files from several participants into a single consolidated file.
- Support for multiple layers. Layers can selectively be toggled visible or hidden.
- Use graphics from other Windows applications, such as Object Link and Embedding (OLE) technology.
- Add new entities, markup functions, or tools with external plug-ins created using tool kits provided by Cimmetry. “Intellistamp” is one example of an external plug-in tool developed by Cimmetry. Intellistamp allows stamping a markup with document and user information pulled directly from your host system.
- Directly import your markup files into your CAD application.

Integration Interfaces / API

AutoVue has been designed to interface with other applications and systems to provide seamless viewing and optional markup capabilities. Many off-the-shelf integrations between AutoVue and EDM / PDM / ERP / Computerized Maintenance Management System (CMMS) and other systems are available. Cimmetry, their partners, or third-party consultants and developers have developed them.

The following lists the various Application Program Interfaces (API) available in AutoVue:

- Command Line Launch Options: Specify startup features. These specifications could include opening a set of documents, automatically printing documents,

specifying alternative configuration files, or automatically performing a search.

- Scripting: AutoVue can automatically execute a script on startup. The startup script may perform a wide variety of operations, including disabling menu items, setting configuration options, view manipulations, printing, and conversion operations.
- OLE Automation: This is a popular mechanism that allows applications to communicate with each other. AutoVue provides an OLE Automation interface that allows other applications to control AutoVue's execution by passing scripting commands.
- DDE Integration: DDE (Dynamic Data Exchange) provides functionality similar to OLE Automation. AutoVue provides DDE server functionality allowing the same control of AutoVue features.
- DLL Integration: Another control interface for use by applications that do not provide the OLE Automation or DDE client functionality.
- DM-API: This API allows AutoVue to be tightly integrated with Document Management Systems. This includes hooks to override document selections, the opening and closing of documents, saving documents, markup management and management of hybrid files and drawings with external reference files. The DM-API is available for the AutoVue Web client and AutoVue for JAVA server application.
- Tool API: Additional commands can be added to AutoVue's user interface through this interface. Tools can provide a wide range of additional operations.
- ActiveX: Powerful capabilities are available through AutoVue's ActiveX interface. Quickly and easily add viewing, printing and markup capabilities to your custom application. Also create Web pages that provide native viewing of documents.
- VCET API: VCET (Viewing and Conversion Enabling Technology) is the engine behind AutoVue that includes the file decoding/parsing technologies
- PAFS: PAFS (Portable Additional Formats Specification), the rendering engines, the printing engines, and the conversion engines. AutoVue itself is a user-interface that sits on top of VCET. The VCET API is a Windows messaging-based API that is open, allowing developers to build custom interfaces in the programming language of their choice. For advanced developers.
- EDAT API: EDAT (Engineering Data Access Technology) allows developers to develop tools that query CAD drawings (AutoCAD DWG, DXF and MicroStation DGN) and extract entity information (geometry /extended data /attribute tags) and metadata.
- Markup API: The Markup API is the engine that provides AutoVue's markup capabilities and gives developers access to them. Used in conjunction with the VCET API, developers can quickly prototype and develop powerful viewing and markup solutions to fit specific needs.

- UDE (User Defined Entity within Cimmetry AutoVue) API: Special-purpose markup entity types can be added to the set of markup types that are provided by default.

In addition to the above APIs, additional tools are provided with AutoVue. These include:

- Out text: This utility lets you extract text information from virtually any type of document, whether it be CAD, Vector, text, etc. This utility is perfect for extracting text from a file and providing the textual data to an index/search engine.
- Ftype: this utility provides the file type of a file. For example, the filename doc1.doc Ftype lets you determine that the file is a Microsoft Word version 6 document. This ability is great for implementing batch check-in of files into a document management system, or for providing Multipurpose Internet Mail Extensions (MIME) type information to your Web server.
- CAD Integration: launch AutoVue seamlessly from within AutoCAD or MicroStation. Import Markups and more.

Engineering and design change cycles are a key issue in every product development cycle. AutoVue can simplify the Engineering Change Notice (ECN) / Engineering Change Order (ECO) cycle, shorten time-to-market, reduce design errors, and generally improve the organization's competitive position. AutoVue can help an organization meet ISO standards by providing the required view and print features securely integrated with ISO software and processes. With AutoVue, documents are instantly Web-ready. Documents published online are available in the corporate portal without needing to convert them. With AutoVue, all participants in the value chain have around-the-clock worldwide access to all the information they require. The AutoVue browser plug-ins gives viewing capability for virtually anything on the Internet.

8.5.2 Conclusion

Each of the four products has particular strengths and weaknesses as they relate to the ADOT requirements. However, Green Pasture's tight integration with the FileNET product suite makes it the most viable option for ADOT as they move forward. Bentley's product suite is comprehensive and powerful, and it also may be directly integrated and interfaced to the FileNET Panagon environment. The Spicer and Cimmetry products provide robust toolsets for integration, and their viewers and print drivers have become somewhat of an industry standard and could be integrated with the FileNET Panagon suite. However, in view of Green Pasture's existing integration, the others are relegated to a second choice.

9. ELECTRONIC FORMS SOLUTIONS

9.1 EXECUTIVE OVERVIEW

Electronic forms software represents the user interface to workflow applications and is an essential ingredient for streamlining business processes and enabling Web-based business transactions. Electronic forms provide an easy to use, standardized way for business users to input content and initiate a workflow process.

During the past several months, Covansys has evaluated the current state of electronic forms applications as they relate to IDMS technology. This software evaluation reviews the three major electronic forms vendors in today's market. Covansys' goal was to explore leading electronic forms vendors and recommend a product flexible enough to address ADOT's current and future business goals.

9.2 ELECTRONIC FORMS OVERVIEW

Electronic forms are quickly gaining market acceptance as an effective means of creating and deploying business process automation solutions. Organizations implementing eBusiness and eGovernment initiatives have a common goal – to leverage existing investments in the Internet infrastructure and to increase worker productivity and improve customer service levels. Many organizations have focused their efforts on replacing paper-based forms with on-line electronic forms. Electronic forms provide the “self-help” service environment for customers and employees, while still providing a manageable object to save and store for legal and historical purposes.

9.2.1 Electronic Forms Technology

Electronic form solutions typically provide a number of standard components, including intelligent capture, process automation, and output/presentation solutions.

9.2.2 Intelligent Capture

Intelligent form capture products are server-based products that will automatically detect the browser type and platform, whether PC, Mac, UNIX, or Linux, and that deliver the stored capture form template in the appropriate language (for instance, Dynamic Hypertext Markup Language (DHTML), HTML, or Java). Intelligent form capture solutions provide server-side execution of the intelligence that is in the form template and dynamically generate a PDF document of the form template

or data for fill and print capability or for saving the form locally. Intelligent capture offerings validate data entry by performing calculations, accessing databases, or enforcing business rules on field-level data. Many intelligent capture solutions can integrate certificates with products such as Entrust/TruePass and SmartTrust Personal to digitally sign form data.

9.2.3 Process Automation

Process automation provides a role-based environment to apply business rules and flexible e-mail and Web-based electronic routing of electronic forms through a business process. A graphical process designer is provided to design the business process. EAI (Enterprise Application Integration) tools are provided to seamlessly automate core business process with existing line-of-business and legacy systems. Some vendors do not provide their own process automation but rely on third-party workflow vendors to provide this capability.

9.2.4 Presentment (Output Solutions)

Most electronic forms vendors will also provide Web-based document output solutions. These output solutions enable data from business applications to be formatted and published to the Web or wireless device (e.g., invoices, billing statements, reports, or customer inquiry records). Vendors with output solutions provide the necessary tools to create intelligent document presentment applications and the run-time environment required to present the documents in a Web environment. Upon request, an output solution combines templates with data and generates an HTML or PDF document in the Web browser or a Web Site Meta Language (WML) document in a wireless device.

9.3 EVALUATION CRITERIA - DIFFERENTIATING THE PRODUCTS

First, and foremost, an electronic form vendor should provide a friendly, fast, and convenient way for users to enter complete and valid data. The data validation rules should be embedded in the form itself, rather than accomplished in a post-processing environment. This provides the user an interactive real-time experience. Often data validation requires a database look-up. The rules should allow this database query, providing the user real-time choices based on query results. The vendor's form-builder tools should allow the application designer to do this easily.

Once the form is completed, many applications require that it be presented in a formatted document to the user for a final check or an authorization by means of a digital signature. The ability to print, fax, e-mail, or submit by wireless should be provided by the vendor and included in the software tools. Once the form is

validated and submitted, it is passed to a back-end system. The back-end system could be an update of data to a transaction database and introduction into a workflow process for review and approval and/or storage for historical and legal purposes. Electronic forms packages should include a robust presentation module and multiple delivery options. Integration of digital signature options for authorization and automation processing in the form of workflow greatly enhances the numbers and kinds of applications where electronic forms can be implemented.

Covansys considered how well each vendor addresses some of the major business and technical issues of electronic forms (see Table 9-1). These business and technical issues include:

9.3.1 Graphical User Interface Forms Designer

The design utility is used for building the form template. The form designer includes tools to create the ‘look & feel’ of the form, defining and setting field attributes, validations, database look-ups, and calculations. Design utilities employ a graphical ‘point & click’ user interface.

9.3.2 Client Support

The client interface for electronic forms can be a desktop computer, the Web, or a mobile device such as a Personal Digital Assistance (PDA), laptop computer, or cellular phone.

9.3.3 Web Server Support

The product should support both Microsoft and Unix Web-based servers.

9.3.4 SOAP

A SOAP (Simple Object Access Protocol) interface enables integration with Java application servers, such as BEA WebLogic Server and iPLANET Application Server.

9.3.5 Database Support / Integration

Product should be XML based, providing the ability to capture XML data for integration into existing business processes and applications. Product should support all leading databases.

9.3.6 Digital Signature Support

Electronic forms should provide out-of-the-box integration with signature objects supporting major security vendors. Solution should be flexible enough for signing sections or entire form content.

9.3.7 Section 508 Accessibility Support

Product should be compliant with the Federal Government Section 508 Electronic and Technology Accessibility Standards for disabled persons.

9.3.8 Zero Administration

No download or plug-in should be required for Web-based users.

9.3.9 Mobile Device Support

Product should provide intelligent data capture from handheld devices.

9.3.10 E-mail Integration

Product should provide out-of-the-box integration with leading e-mail providers, with little or no customization required.

9.4 PRODUCTS EVALUATED

Covansys evaluated three product suites using information gathered from leading industry analysts, including Giga Information Group, Gartner Group, Forrester Research, Bruce Silver Associates, and Doculabs Reports. Information was also obtained from vendor Web sites, public Web sites, and Covansys' intellectual capital.

9.4.1 Product Summary

Table 9-1 Electronic Forms Evaluation

Features			
Graphical User Interface Forms Designer	YES	YES	YES
Form Data Validation	YES	YES	YES
Form Auto Fill from Database	YES	YES	YES
Database Form Data Validation	YES	YES	YES
Off-Line Form Fill	YES	YES	NO
Database Support			
Microsoft SQL	YES	YES	YES
Oracle	YES	YES	NO
ODBC	YES	YES	YES
Database Integration	YES	YES	YES
Web Server Support			
Microsoft IIS	YES	YES	YES
Apache WebServer	YES	YES	NO
BEA Weblogic	YES	NO	NO
IBM WebSphere	YES	NO	NO
iPlanet (Sun-One)	YES	NO	NO
SOAP Supported	YES	YES	NO
Client Support			
Microsoft Internet Explorer			
5	YES	YES	YES
5.5	YES	YES	YES
6	YES	NO	YES
Pocket IE	YES	NO	NO
Netscape Communicator			
4.7	YES	YES1	NO
6.1	YES	YES2	NO
Opera			
5	YES	NO	NO
Zero Administration client (no plug ins)	YES	YES	NO
E-mail Integration			
Microsoft Outlook	YES	YES	YES
SMTP/POP3	YES	YES	
Digital Signature Support (PKI)	YES	YES	YES
US Section 508 Compliance	YES	YES	YES
Mobile Device Support			
Microsoft Pocket CE/Windows CE	YES	NO	NO
Palm OS	NO	NO	NO
Notes: 1. PDF Support Only; 2. HTML Support Only			

9.5 CORPORATE INFORMATION ABOUT DOCUMENT IMAGING FIRMS

9.5.1 Adobe Accelio

Founded in 1982, Adobe Systems Incorporated builds award-winning software solutions for network publishing, including Web, print, video, wireless, and broadband applications. Its graphic design, imaging, dynamic media, and authoring tools enable customers to create, publish, and deliver visually rich content for various types of media. Web and graphic designers, professional publishers, document-intensive organizations, business users, and consumers use the company's products. Adobe is the second largest PC software company in the U.S., with annual revenues exceeding \$1.2 billion. It employs over 2,800 employees worldwide and has operations in North America, Europe, the Pacific Rim, Japan, and Latin America. Adobe's worldwide headquarters are in San Jose, California. The Adobe global distribution network spans every continent, with more than 8.5 million users worldwide.

On April 11, 2001, Adobe Systems acquired Accelio Corporation. The Adobe Accelio Reachforms solutions are the industry standard and foundation for Web-enabled business process solutions.

9.5.2 Cardiff

In business since 1991, Cardiff has a global distribution network spanning every continent and more than 20,000 customers worldwide. Cardiff is a privately held company based in San Diego, California. Cardiff investment partners include DICOM Group PLC (Private Limited Company). (London: DCM.L), a leading supplier of software and consulting services for implementing automated document capture applications; Granite Ventures, LLC (Limited Liability Company), formerly H&Q Venture Associates, LLC, a leading early-stage technology venture capital firm; and HarbourVest Partners, a private investment organization.

9.5.3 Shana

Founded in 1985, Shana is a privately owned corporation based in Edmonton, Alberta, with offices in Canada and the United States. Shana provides eForms solutions to two million users in 65 countries. Shana has strategic technology partnerships with a number of companies, including FileNET Corporation, Microsoft, Entrust Technologies, EDS and Apple Computer.

9.6 SUMMARY AND RECOMMENDATIONS

In evaluating and selecting an electronic forms solution to complement IDMS, a determination must be made of the percentage of built-in, out of the box capabilities which accompanies the forms solution, versus the amount of custom coding required to deliver the appropriate functionality. The implications of that division will be magnified as electronic forms take on an expanded role in ADOT's organization.

Additionally electronic form deployment on handheld devices is a distinct advantage in state transportation departments. There is a need in DOTs to offer a service to mobile workers (e.g., field engineers, maintenance personnel) to collect data and feed it back to the head office. Handheld devices are more reliable, easier to use, easier to maintain and 30% - 50% less expensive than laptops.

After careful review of the established criteria, it is apparent that all three vendors (Accelio, Cardiff and Shana) provide excellent core functionality. There are significant similarities between the three products in database support, graphical forms designer tools, digital signature support, Section 508 compliance and Web client support. Shana and Accelio are both long-time market leaders with the lion's share of the customer base.

Covansys recommends the selection of Adobe Accelio. This is based on their ability to deploy electronic forms on mobile devices, which is a significant advantage over Shana and Cardiff. Adobe Accelio is significantly more platform independent than Shana or Cardiff, providing ADOT once again with more deployment options. Additionally, as the only publicly held company, Adobe Accelio is the only one for which Covansys could evaluate financial position. And finally Covansys also feels that the recent acquisition of Accelio by Adobe positions them more firmly in the market place. Adobe is the second largest software vendor in the United States, with annual revenues exceeding 1.2 billion dollars.

10. INFRASTRUCTURE TECHNOLOGY ASSESSMENT

10.1 EXECUTIVE OVERVIEW

10.1.1 Project Definition

Our objective was to conduct a high level review of ADOT's LAN/WAN infrastructure in cooperation with ADOT's IT technical teams (PC/LAN and Network Communications). This review was conducted to collect and analyze information in the following areas:

- Determine the suitability of the existing LAN/WAN environment to support the implementation of an IDMS
- Gather information and statistics about the current LAN/WAN environment
- Gather domain knowledge about ADOT's WAN frame relay setup
- Identify potential single points of failure, bottlenecks, and bandwidth/throughput constraints

This review document describes the general aspects of the current network and in no way reflects the overall usefulness or suitability for which the network was implemented.

10.1.2 Business Goals and Objectives

As part of the comprehensive evaluation of the Integrated Document Management System (IDMS) options for the Arizona Department of Transportation (ADOT), Covansys' Enterprise Technology Group (ETG) was tasked to review ADOT's network infrastructure. The initial assumptions made by the ETG team regarding the network environment focused on the identification of any utilization problems or bandwidth restrictions within ADOT's LAN/WAN and remote office sites. The primary objectives were to identify poor performance or unacceptable delays moving data as they relate to the implementation of an IDMS.

10.1.3 Analysis Summary

- Complete a comprehensive review of network bandwidth capability at sites that have been identified as having over 65% utilization

- Review high-availability solutions at those sites where downtime must be minimal or where network outages would cause disproportionate impact to the operations of ADOT
- Determine hardware platform life cycle and ensure that all new hardware is designed to meet the requirements of an IDMS
- Ensure that IT staff has training and expertise with the technologies related to IDMS
- Investigate complementary technologies, such as storage area networking and network attached storage

10.2 PROJECT OVERVIEW

10.2.1 Project Methodology

Much of the information gathered during this assessment was obtained jointly between the ETG and ADOT’s IT technical teams during interview sessions, telephone conversations and email. Information obtained through these communications helped in gathering key information as it applies to the Open Systems Interconnect (OSI) model.

For this particular project, Covansys used a subset of five layers from the seven-layer OSI model (Table 10-1). This allowed us to address the areas pertinent to the implementation of an IDMS within the scope of the review.

ISO Open Systems Interconnect (OSI) Communications Model

During the course of the technology assessment, only portions of the physical, data link, network, transport, and application layers were reviewed. These areas are considered the most pertinent for the evaluation of the infrastructure related to the implementation of an IDMS.

Table 10-1 ISO Communication Model Layers

OSI Layer	Description
Layer 1	Physical
Layer 2	Data Link
Layer 3	Network
Layer 4	Transport
Layer 5	Session
Layer 6	Presentation
Layer 7	Application

10.2.2 Project Participants

For the duration of this assessment, Covansys provided enterprise technology consultants. ADOT IT staff members in their specific fields of expertise supplemented our consultants.

10.2.3 Current Technology Environment

a) Local Area Network (LAN)

At the ADOT Phoenix main campus, Nortel routers and switches are connected with fiber and category 5 enhanced cabling to provide a Gigabit (GB) Local Area Network (LAN) backbone and 10/100 MB switched Ethernet to the end user. Internet Protocol (IP) is used at the network layer, and the TCP protocol at the transport layer is the major protocol used by existing ADOT business applications. Remote sites' LAN environment is a mixture of 16MB Token Ring and 10/100 Ethernet topographies. ADOT is currently in the process of incrementally converting Token Ring environment sites to 10/100 Ethernet environments.

The current server backbone at the Phoenix campus is a mixture of both 100 Mbps and Gigabit non-blocking dedicated bandwidth to the local switch. This amount of bandwidth to the servers is sufficient to run existing applications at ADOT LAN, and no serious performance issues were noted at the time of this review.

b) Wide Area Network (WAN)

ADOT's WAN team is responsible for maintaining the Wide Area Network, which is highly redundant at business-critical locations and all of the remote sites. The WAN consists of 56K point-to-point circuits and frame relay over T1 lines. They are also in the process of incrementally upgrading the WAN backbone with T3 lines (High-speed telecommunications connection) and an Asynchronous Transfer Mode (ATM) network.

c) Network Operating System

The NOS (network operating system) is Windows NT-SP6. ADOT has approximately 260 servers distributed within 6 NT domains. These servers are running functions like File/Print, SQL, Systems Management Server (SMS), Data Warehouse, Terminal Server, Webmail, Systems Network Architecture (SNA), IIS, Dynamic Host Configuration Protocol (DHCP), and Domain Name System or Service (DNS). Currently, ADOT has only a few servers running Windows 2000.

The direction is to convert all servers to Windows 2000 and implement Microsoft Active Directory as the primary directory service. No timetable is set for this conversion.

d) Server Platforms

Servers at approximately 200 remote offices perform file and printer services. Typically, these servers are either:

- Compaq Proliant 866MHz single PIII with 18G Hard Disk (HD), 1GB-500MB Random Access Memory (RAM) (This is the most recent configuration)
- Compaq Proliant 1600 400MHz single PIII with a 9-18G HD

It was determined in the course of the assessment that disk utilization varies greatly within the environment and ranges from 5% to 95% with a mean of approximately 50%.

e) Desktop Platforms

95% of the ADOT client workstations run Windows NT 4.0, on a PIII processor platform with 32-64MB RAM and 300MB to 1GB HD. All desktop clients authenticate to a Windows NT Domain.

f) Application Architecture

ADOT maintains a homogenous environment based on Microsoft products:

- Electronic Mail (E-Mail) Server: Exchange
- Email Client: Outlook
- Web Server: Internet Information Server
- File/Print Services: NT/2000
- TCP/IP Services: NT/2000
- User Authentication: NT/2000
- Directory Services: Active Directory (Future)
- Network Operating System: NT/2000
- Desktop Operating System: NT
- Productivity Suite: Microsoft Office

g) Current Network Implementation/OSI

▪ Physical Layer

The physical layer defines the electrical, mechanical, procedural, and functional specifications for activating, maintaining, and deactivating the physical link between end systems. Evaluating the physical layer is important because it checks whether the physical backbone conforms to industry standards and is sufficient to support the organization's current and future application load.

• Premises Data Wiring

At most sites, including the Phoenix main campus, Category 5 enhanced and multi-mode fiber is used, with some instances of Type 1.

• Topologies Deployed

Currently, a star topology is implemented, created via fiber connections from Main Distribution Frames (MDFs) to IDFs and via copper connections from the IDFs to the client computers.

- Ethernet Gigabit & 10/100 Ethernet Cabling Standard (BaseT)
- Token Ring
- Wide Area Point-to-Point and T1 Frame Relay
- ADOT LAN topologies at remote sites have bandwidth capabilities determined by 16MB Token Ring, 10/100 Mbps Ethernet or both (see Appendix 14.1.2).

• Data Link Layer

The Data Link Layer provides reliable transit of data across a physical link. It is concerned with physical addressing, network topology, line discipline, error notification, ordered delivery of frames, and flow control. It is vital to monitor the Data Link Layer because it provides key information (such as utilization, throughput, and errors) for the various network segments.

• Protocol Data Unit (PDU) or Framing

According to ADOT IT technical teams, the following topologies are predominant for both the LAN and WAN:

- Ethernet Framing – Ethernet II
- Token Ring Framing – 802.5

- Wide Area Network – High Level Data Link Control / Point to Point Protocol (HDLC/PPP) and Frame Relay
- **Topologies Deployed**

The Frame Relay topology at ADOT is a star topology (see Appendix 14.1.2). Also known as hub-and-spoke configuration, this is the most popular Frame Relay network topology. In this topology, remote sites are connected to a central site that generally provides a service or application.
- **Advantages**

The two main advantages of star topologies are:

 - Simplified network management
 - Minimized tariff costs
- **Disadvantages**

There are potentially significant disadvantages to the star topology. These encompass both the reliability of the circuit and its performance. These major points are listed below:

 - The core router represents a single point of failure
 - The core router limits overall performance for access to backbone resources because it is a single pipe through which all traffic intended for the backbone (or for the other regional routers) must pass.
 - Scalability is limited
- **Utilization of Bandwidth and Throughput**

Bandwidth refers to a system's or sub-system's ability to perform work. Throughput is the total amount of work that the system actually does. In the case of the network paradigm, bandwidth can be assumed to be all nodes participating with a system. Therefore, if you have a switch with 50 ten megabits/second (10 Mbps) ports, the bandwidth that the switch is capable of supporting is 500 Mbps or more. If all destination traffic between nodes were in a pseudo-random pattern, the switch would be able to provide this amount of bandwidth. Since this traffic pattern is never the case, the switch will never provide this much throughput.

According to ADOT IT technical teams, the overall LAN has an overall low utilization and looks extremely robust, based on Gigabit & Fast Ethernet, with gigabit uplinks throughout the main facility.

- **Network Layer**

The network layer's basic purpose is to provide data transfer capability across the communication sub-network. It provides connectivity and path selection between two end systems and is the layer where routing occurs. The objective of the network topology assessment is not only to examine the network for potential inefficiencies and flaws, but also to provide valuable information about how the organization is positioned in terms of industry standards and trends.

- **Internet Protocol (IP)**

The ADOT network is currently using IP as their major protocol.

- **IP Routing**

Open Shortest Path First (OSPF) is the routing protocol running over the ADOT WAN backbone. This protocol also works with higher-end applications to decide routes on the dynamic of a particular application process. It can also engage load-balancing techniques to carefully calculate ways to balance traffic over multiple routes on an inter network. This is an essential capability if low delay factors are to be achieved throughout the internetwork.

- **Utilization and capacity**

According to the ADOT WAN team, the WAN backbone and frame relay circuits are within normal operational criteria. They pointed out that average frame relay circuit utilization is 70%-80%, with peaks at times to 90% -100% of the committed information rate (CIR).

Note: At this time, the amount of data exchanged between the ADOT main sites (Phoenix, Tucson, Flagstaff, and Prescott) and the remote sites is unknown. Since no monitoring session was performed during the assessment, any performance issues during the delivery of the IDMS project will need to be addressed prior to implementation.

- **Transport Layer**

The main function of the transport layer is to provide reliable network communication between end nodes. It provides mechanisms for the establishment, maintenance, and termination of virtual circuits, transport fault detection and recovery, and information flow control. Problems in the transport layer would cause overall network or subnetwork degradation and result in networked application access and use.

The ADOT network is currently using TCP as their major protocol.

- **Application Layer**

The most critical component of the network infrastructure assessment is to understand which applications currently impact or will impact the network. The application layer provides services to application processes (such as e-mail, file transfer, and terminal emulation) that are outside of the OSI model. The application layer identifies and establishes the availability of intended communication partners (and the resources required to connect with them), synchronizes cooperating applications, and establishes agreement on procedures for error recovery and control of data integrity.

Note: At this time, the application bandwidth at the ADOT main sites (Phoenix, Tucson, Flagstaff, and Prescott) and the remote sites is unknown. Since no monitoring session was performed during the assessment, any performance issues during the delivery of the IDMS project will need to be addressed prior to implementation.

See Appendix for review of ADOT critical business applications.

10.2.3 Recommendations Analysis

a) **IDMS Specific**

- **LAN Architecture**

The overall LAN architecture at ADOT's main campus in Phoenix looks extremely robust, with gigabit uplinks throughout the main facility. This will support the bandwidth needs of any new application, including any IDMS solution.

- **Server and Desktop Architecture**

The standard server and desktop recommended by IDMS vendors to support their product are P133 MHz or greater, with a minimum of 32 MB RAM, 300 MB disk, and a high-resolution monitor and controller. The ADOT current standard servers and desktop meet or exceed these minimums.

- **WAN Architecture**

The overall ADOT WAN backbone (see Appendix 14.2) appears to be sufficiently robust and reliable good shape, as core routers are partially meshed with T1 connections. According to ADOT WAN technical teams, to facilitate an extremely robust WAN backbone, they are in the process of incrementally upgrading the WAN backbone with T3 lines and an ATM

network. Additionally, they will upgrade critical remote offices with frame relay circuits greater than 56Kbps.

The WAN network appears to provide the bandwidth necessary for the implementation of an IDMS. However, the existing WAN circuit's capacity at some remote sites may present an issue. In the meantime, information from network management tools, service providers, and router statistics can indicate if these circuits are highly utilized for long durations. If that were the case, it would indicate a need for additional capacity.

- **Circuit Capacity**

It is not recommended to run data across any circuit that is at 80% - 90% of its capacity. This condition could cause excessive re-transmissions and overflow of some of the buffers in the end-to-end router platforms between two specific wide area sites. If more than 80% to 90% utilization is being achieved, even though there is still 10% available capacity, it would be better to upgrade the circuit to increase the level of performance.

The other factors involved in making this decision are the type of router technology employed, the type of protocols implemented, and the consistency of this level of traffic.

At this time the amount of data exchanged between the main ADOT site and the remote sites is unknown. Monitoring of this data exchange was not performed during the assessment. Therefore, any performance issues encountered during the delivery of the project will need to be addressed at that time.

b) Example

For the Frame Relay 2 circuit at Phoenix-1 router, a backbone router is attached to Frame Relay cloud at 1.544 Mbps, while the remote sites are attached at 56Kbps. Because of the speed mismatch, a bottleneck often exists for traffic on the virtual circuit (VC) when the backbone router tries to communicate with a remote site. This bottleneck results in poor response times for traffic, such as System Network Architecture (SNA) or interactive Telnet, when it is stuck behind a large File Transfer Protocol (FTP) packet on the low-speed line. Packets get dropped at the bottleneck, resulting in lost SNA sessions and possibly causing the backbone router to retransmit unacknowledged packets, making the congestion problem worse.

c) General

Although it was not part of this study's deliverables, after going through interview sessions and looking at ADOT's current network infrastructure,

Covansys recommends the following best practices based on the overall enterprise architecture.

Physical/Power

- Uninterruptible Power Supply devices should be present at all key active device locations
- Remove/Replace any remaining legacy cabling and wire
- Certify category 5 enhanced and fiber compliance for all cabling runs

LAN

- Replace the Token Ring with Ethernet to minimize the LAN topologies.
- Create Virtual Local Area Networks (VLANs) in the network to address any Layer 2 issues and have efficient bandwidth utilization, security, and load-balancing multiple paths. Currently, ADOT has implemented a Layer 2 flat-switched campus network. Within a flat-switched network, every device sees every packet that is transmitted. This creates issues with scalability, security, and managing multiple paths to a destination in a network. VLANs will resolve many of the Layer 2 issues that arise from a flat-switched campus network.

WAN

Unchecked network growth causes problems, and possibly from unforeseen directions. This will cause the network to “break”. To prevent a network from breaking, establish guidelines or policies that define the steps for growth of the network and proactively prevent its failure. The number of workstations and the type of applications implemented affect network performance, especially over the WAN. One possible guideline might be to bump up the network bandwidth at certain threshold values or the number of network users on the ADOT WAN.

The implementation of an application on the LAN does not guarantee that it will work on the WAN. Problems in the network are created when other services get added, such as the Internet, with business applications. Internet traffic (from both volume and packet-size points of view) can hog the line. If left unchecked, this can cause a network failure. It may be difficult to predict the effect of any one application. However, there should be a policy that defines quantifiable performance factors. Policies, such as acceptable delay times, give the IT staff guidelines to use in both designing for and maintaining network performance.

Partially meshed Frame Relay topologies offer superior fault tolerance (through redundant star configurations) and are less expensive than a fully meshed environment. In general, ADOT should implement the minimum meshing to eliminate single point-of-failure risk.

If it is not already configured, enable the Frame Relay Traffic Shaping (per Permanent Virtual Circuit (PVC)) feature on the routers. This feature will limit the outbound traffic rate to the line speed of the receiving router. This will also help prevent buffer overflow in Frame Relay switches.

To stabilize network performance on the WAN, configure workstations with a small TCP receive window size. This helps reduce unregulated peak traffic flows on return traffic.

Provide high-bandwidth paths for growth in the ADOT WAN network. To support high-bandwidth applications and services like voice or video support, two alternate technologies may provide enhanced performance for the ADOT WAN. These technologies are Digital Subscriber Line (DSL) and Asynchronous Transfer Mode (ATM). In addition, a higher access rate interconnection based on the current technology may be used. Specifically, we are speaking of Dedicated, private line service (DS3) signaling rates.

Those devices that are more critical to the operation of the network (backbone routers, Internet connections, and servers) should be designed with redundancy in mind. However, redundancy may be very expensive. Redundancy is ultimately a policy decision between acceptable risk and cost. Redundant network components should be considered from a strategic, mission-critical point of view.

Other

- Document all cabling and equipment with as-built drawings.
- Develop procedures and policies for proactive network management and capacity planning.

d) Summary

ADOT IT must allocate the proper amount of bandwidth for any IDMS system design to provide satisfactory application bandwidth requirements. This is probably the most difficult part of the design process. To be successful, ADOT must understand the bandwidth needs of IDMS applications and the number of concurrent users, as well as the nature of the underlying protocols. Recommendations will be made regarding the bandwidth requirements once IDMS utilization estimates have been made.

Due to the high-level nature of this study, the scope did not cover the gathering of raw network data related to network bandwidth utilization or application needs analysis that would be useful in base-lining the overall network performance.

11. IMPLEMENTATION PLAN & COSTS

11.1 OVERVIEW

11.1.1 IDMS Opportunity Areas

Based on our analysis and research into the IDMS deployments at ADOT, we recommend IDMS implementations proceed in the application areas with highest impact, visibility, and need for the IDMS solutions.

Based on our research and observations, high potential IDMS target opportunities consist of the following areas:

1. Transportation Support Group

- Cost Accounting
- Procurement

2. Intermodal Transportation Division

- Bridge Group
- Roadway Engineering
- Computer Aided Engineering

3. Motor Vehicles Division

- Competitive Government Partnerships
 - Title & Registration Partnerships Program
 - Motor Carrier Services
- Executive Hearing Office
- MVD Records & Training

Deployments in each of these areas will have maximum impact in terms of file integrity, reduction of filing space, reduction in production backlogs, and increased ability to share information between multiple users.

These areas also represent a cross section of the office/administrative/clerical and engineering user communities, which will further help consolidate and unify the IDMS approach within ADOT.

Finally, by targeting these areas initially, ADOT will build on the current level of success and experience in areas such as Bridge Group where the FileNET / GPS W/EDGE solution is currently underway.

11.1.2 Off the Shelf vs. Custom Interface

IDMS implementations rarely proceed on the basis of simple application of Commercial Off the Shelf (COTS) software. While individual IDMS platform software suppliers provide the individual software components, which address scanning, indexing, storage, workflow, retrieval and other modular functions within the IDMS environment, systems integration (SI) firms are generally required to tailor or customize the COTS software to meet the specific point application requirements and provide the custom interfaces and menus required in each target IDMS opportunity. Creating a user-friendlier interface for the application is not a major effort but will greatly lower the training burden for users. SI (Systems Integration) firms are also recruited to provide training and documentation to the IDMS customer and again these programs are tailored to the unique set of needs and requirements identified for each target opportunity area.

It is important that any IDMS implementation be first addressed through the appropriate procurement model with respect to IDMS software and integration services. It is important that ADOT select IDMS software which is based on open, scalable client/server architecture and which can be rapidly prototyped and customized to fit the specific needs of each of the IDMS target departments while still adhering to a consistent, unified set of architectural standards across ADOT.

11.1.3 Project Timeframe Metrics

Any discussion regarding the project timeframe must discriminate between two fundamental measurement factors:

- a) Project Person Hours
- b) Project Elapsed Hours

Project Person Hours are the time unit used to calibrate the actual time expended by contractor resources to fulfill the requirement of the project. Project Person Hours relate to the time expended by contractor resources either on site developing and deploying IDMS applications or off site building and testing IDMS programs.

Project Person Hours are used to calculate resource costs. Project Person Hours multiplied by the dollar hourly rate for each project resource results in the total costs for that specific resource.

Project Elapsed Hours are different from Project Person Hours and are used to measure the start time and ending time of the project, as well as the start time and end time of each component phase and activity within the IDMS project.

An IDMS project, for example, could theoretically take 16 weeks in project elapsed hours to complete, while requiring only 4 weeks of project person hours on the part of the IDMS contractor. In this case, the IDMS contractor could theoretically spread 4 person weeks or $4 \times 40 = 160$ person hours of effort

composed of multiple resources over 16 project weeks or 16x40=(640) elapsed project hours. In this case, the 160 person hours of effort conceivably could be applied in phases within the total project elapsed hours, and breaks occur between phases where no work occur by the contractor, which will allow the target ADOT agency to reorganize and prepare for the implementation of the IDMS solution.

11.1.4 Cost Disclaimer

All costs included in this IDMS report reflect current pricing on industry brand name IDMS hardware and software, which are current as of the publication date of the IDMS Report. These prices are subject to change and will vary based on component costs, market trends, and other factors, which govern the availability and costs of IDMS products on the open market.

Therefore, please note that all the following IDMS costs and times associated with IDMS projects are preliminary estimates only and will require further validation and confirmation based on application requirements in each functional area, and appropriate resizing of the IDMS to meet the specific application criteria of each opportunity.

The following cost models are presented strictly as guideline templates, which can be used to generate costs in each functional area and across the different sections of ADOT.

Each of the IDMS application areas will now be examined in detail and initial costs will be presented for completion of the specific IDMS deployment in each area.

11.2 TRANSPORTATION SUPPORT GROUP

11.2.1 Cost Accounting

Overview

Because Cost Accounting handles most of the financial transactions for highway projects within ADOT, especially with respect to contracts, this department could make substantial gains in terms of productivity, reduced backlogs, and service levels through the application of IDMS. Red Book, Green Book, mainframe reports and Federal billing information and files are all candidate documents that can be captured within IDMS. In addition, the IDMS storage and retrieval base systems can store and retrieve contract related documents and ensure that end users are provided concurrent access to these mission critical documents. Because project documents and files must be maintained for five years, IDMS solutions provide a capable, reliable repository for this information and will make this available upon demand based on predefined metadata indices defined in the

supporting Relational Database Management System (RDBMS) which facilitates search, lookup and retrieval of documents to the workstations.

Other documents related to the project life cycle include:

- Contractor payments
- Budgetary allocations
- Correspondence with 3rd party contractors
- Bids
- Engineering approvals
- Final contractor payment
- Federal audit files
- Purchase Orders / Invoices

In addition, implementation of IDMS within Cost Accounting will reduce the traffic and flow of paper and documents between State Archives and the department, and provide local control over historical records without significantly increasing filing space requirements through the use of optical disk media.

Furthermore, the effective use of IDMS technologies within Cost Accounting probably would be highly visible to the rest of the ADOT community, who would view Cost Accounting as a pace setter and lead example of the productive use of these technologies.

The following phases are required to fully implement the IDMS solution within Cost Accounting:

- Initial IDMS visioning and design assessment
- Construction and prototype development of the IDMS solution
- Deployment, testing, and training

These phases will give Cost Accounting a base foundation IDMS system for document capture, indexing, storage and retrieval which will address the requirements of the electronic file cabinet scenario. The IDMS system design is sufficiently scalable and flexible that other modules can be developed and added to the IDMS system, such as workflow and electronic report management as the need arises. Specific time required to implement add on components such as workflow and report management are defined after installation and user acceptance of the base system. In addition, the client/server architecture of the IDMS solution will allow other functional areas within the Transportation Support Group to add their component applications to the IDMS environment as required.

Finally, backup and historical documents are readily converted into the starter Cost Accounting IDMS system and specific resources and time required to perform this conversion will need to be additionally addressed.

Initial Cost Estimates

Initial IDMS costs based on a 50-user starter system would consist of the following:

Table 11-1 Preliminary IDMS Cost Estimates for Cost Accounting

		Software	Unit	Extended	Yearly
Qty	Model		Cost	Cost	Maintenance
1	304839	Workgroup Content Services	10,000	10,000	1,800
50	304843	Content Services Dedicated User License 3.x	720	36,000	6,480
1	304838	Content Services Development Environment	5,000	5,000	900
1	502206	SQL Server Customer Supplied	0	0	0
1	305468	Web Services /IDM Toolkit 3.x	7,500	7,500	1,350
1	305136	Web Services	5,000	5,000	900
2	305089	Capture Desktop 3.x	6,000	12,000	2,160
1	305090	Capture Professional Toolkit	5,000	5,000	900
1	305118	Fax Inbound	3,000	3,000	540
1	304675	Fax Outbound	6,000	6,000	1,080
		Software Subtotal:		\$89,500	\$16,110
		Hardware			
1	Application Server (Content Svcs)	Dual Intel Xeon 2.4Ghz/512K Cache, 1 GB Memory, (4) 18GB Small Computer Systems Interface (SCSI) Hard Drive, Uninterruptible Power Supply, Tape Backup Unit, Windows 2000	8,194	8,194	410
1	Application Server (Web Server)	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000	2,442	2,442	122
1	Fax Gateway Server	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000, Brooktrout TR114+P4L (4 Port Fax Gateway Controller) 4PT Loop Peripheral Component Interconnect (PCI)	5,737	5,737	287
1	Optical Library, 300mx	32 Platter / (2) Drive 9.1 GB Drive, SCSI Cable, (32) 9.1 GB Write Once, Read Many (WORM) Optical Disks, Adaptec SCSI Controller, Disk Extender Hierarchical Storage Management (HSM)	28,140	28,140	1,407
1	Scan Station	Intel Pentium IV, 1.8GHz, 128MB RAM, 20" Monitor, Windows 2000 Professional, 20GB ATA Integrated Drive Electronics (IDE) Drive	1,098	1,098	55
1	High Speed Scanner	60ppm, 11x17", Video Interface, Virtual Rescan	22,995	22,995	1,150
1	EH-850-2000	Scanner Controller Interface	1,495	1,495	75
		Hardware Subtotal:		\$70,101	\$3,505
		Consulting Services			
		a) Requirements Analysis Phase		6,000	
		(1 Consultant / 40 hours @ \$150 hr)			
		b) Document Management System (DMS) Application Development / Deployment		36,000	
		(2 Consultant / 120 hours @ \$150 hr)			
		c) Project Management		28,000	
		(1 Project Manager / 160 hours @ \$175hr)			
		d) Training / Quality Assurance		8,800	
		(1 Consultant / 80 hours @ \$110 per hour)			

		e) Related Travel Expenses & Lodging		12,000	
		<u>Consulting Subtotal:</u>		\$90,800	
		<u>Investment Summary</u>			
		<u>Software</u>		\$105,610	
		<u>Hardware:</u>		\$ 73,606	
		<u>Services:</u>		\$ 90,800	
		<u>Grand Total:</u>		\$270,016	

This IDMS configuration will provide Cost Accounting with the necessary magnetic and optical media storage capacity, which will maintain the current application files and accommodate future growth in terms of numbers of workstations, peripherals, and future volumes of documents and images as the application load increases. On-line access to document images and text files is provided using both the ‘thick’ client and ‘thin’ client browser based workstations. The FileNET eProcess workflow solution can be added to this IDMS configuration as required.

11.2.2 Procurement

Overview

The primary focus of Procurement is on the Purchase Orders and Contracts necessary to acquire the products and services from supplier organizations, which sustain the construction and maintenance activities of ADOT.

Procurement requires rapid, efficient access to on-line contracts and purchase order information, as well as the ability to update the mainframe ADVANTAGE system as required on an on-going basis.

Security and workflow are key requirements. Security is necessary to keep the key file documents from unauthorized viewing and access. Workflow is necessary to support the decision process on specific purchase orders based on the dollar value of the purchase order.

Initial Cost Estimates

The Procurement IDMS system is based on a 100-user system, which incorporates FileNET Content Services and eProcess workflow. In addition, the necessary hardware would be configured to support the workflow and work management capability.

Estimated costs for Procurement consist of the following:

Table 11-2 Preliminary IDMS Cost Estimates for Procurement

		Software	Unit	Extend	Yearly
Qty	Model		Cost	Cost	Maintenance
1	304840	Enterprise Content Services	20,000	20,000	3,600
100	304843	Content Services Dedicated User License 3.x	640	64,000	11,520
1	304838	Content Services Development Environment	5,000	5,000	900
1	502206	SQL Server Customer Supplied	0	0	0
1	305468	Web Services /IDM Toolkit 3.x	7,500	7,500	1,350
2	305089	Capture Desktop 3.x	6,000	12,000	2,160
1	305090	Capture Professional Toolkit	5,000	5,000	900
1	305118	Fax Inbound	3,000	3,000	540
1	304675	Fax Outbound	6,000	6,000	1,080
1	305240	eProcess Services	20,000	20,000	3,600
1	305241	eProcess Services Toolkit	10,000	10,000	1,800
100	305132	Workflow Services User License	480	48,000	8,640
		Software Subtotal:		\$200,500	\$36,090
		Hardware			
1	Workflow Server (eProcess)	Intel Xeon 2GHz, 1GB Memory, (2) 18GB Disk, Windows 2000 Server	6,469	6,469	323
1	Application Server (Content Svcs)	Dual Intel Xeon 2.4Ghz/512K Cache, 1 GB Memory, (4) 18GB SCSI Hard Drive, Uninterruptible Power Supply, Tape Backup Unit, Windows 2000	8,194	8,194	410
1	Application Server (Web Server)	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000	2,442	2,442	122
1	Fax Gateway Server	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000, Brooktrout TR114+P4L 4PT Loop PCI	5,737	5,737	287
1	Optical Library, 300mx	32 Platter / (2) Drive 9.1 GB Drive, SCSI Cable, (32) 9.1 GB WORM Optical Disks, Adaptec SCSI Controller, Disk Extender HSM	28,140	28,140	1,407
2	Scan Station	Intel Pentium IV, 1.8GHz, 128MB RAM, 20" Monitor, Windows 2000 Professional, 20GB ATA IDE Drive	1,098	2,196	110
2	High Speed Scanner	60ppm, 11x17", Video Interface, Virtual Rescan	22,995	45,990	2,300
2	EH-850-2000	Scanner Controller Interface	1,495	2,990	150
		Hardware Subtotal:		\$102,158	\$5,108
		Consulting Services			
		a) Requirements Analysis Phase		12,000	
		(1 Consultant / 2 week @ \$150 hr)			
		b) DMS Application Development / Deployment		72,000	
		(2 Consultant / 6 weeks @ \$150 hr)			
		c) Project Management		56,000	
		(1 Project Manager / 8 Weeks @ \$175hr)			

		e) Training / Quality Assurance			8,800
		(1 Consultant / 2 weeks @ \$110 per hour)			
		f) Related Travel Expenses & Lodging			24,000
		<i>Consulting Subtotal:</i>			\$172,800
		<u>Investment Summary</u>			
		<i>Software:</i>			\$236,590
		<i>Hardware:</i>			\$107,265
		<i>Services:</i>			\$172,800
		<i>Grand Total:</i>			\$516,655

11.3 INTERMODAL TRANSPORTATION DIVISION

11.3.1 Bridge Group, Roadway Engineering, Computer Aided Engineering

Overview

The initial target opportunity areas within ITD will require a combination of standard document IDMS and engineering document IDMS solutions. Each department area will require close collaboration between office/clerical end users and engineering document specialists and end users.

Initial Cost Estimates

The following outlines the costs and activities associated with the IDMS deployment in each of the three target areas within ITD.

Table 11-3 Preliminary Cost Estimates for Intermodal Transportation Division

		Software	Unit	Extend	Yearly
Qty	Model		Cost	Cost	Maintenance
1	304839	Workgroup Content Services	10,000	10,000	1,800
25	304843	Content Services Dedicated User License 3.x	760	19,000	3,420
1	304838	Content Services Development Environment	5,000	5,000	900
1	502206	SQL Server Customer Supplied	0	0	0
1	305468	Web Services /IDM Toolkit 3.x	7,500	7,500	1,350
1	305136	Web Services	5,000	5,000	900
3	305089	Capture Desktop 3.x	6,000	18,000	3,240
1	305090	Capture Professional Toolkit	5,000	5,000	900
1	305118	Fax Inbound	3,000	3,000	540
1	304675	Fax Outbound	6,000	6,000	1,080
25	GPS-Wdge	Green Pasture Software W/EDGE	1,567	39,175	7,052
25	Spicer-Img	Spicer Imagenation Viewer (Markup Editing)	312	7,800	1,404
		<u>Software Subtotal:</u>		\$125,475	\$22,586
		<u>Hardware</u>			
1	Application Server (Content Svcs)	Dual Intel Xeon 2.4Ghz/512K Cache, 1 GB Memory, (4) 18GB SCSI Hard Drive, Uninterruptible Power Supply, Tape Backup Unit, Windows 2000	8,194	8,194	410
1	Application Server (Web Server)	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000	2,442	2,442	122
1	Fax Gateway Server	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000, Brooktrout TR114+P4L 4PT Loop PCI	5,737	5,737	287
1	Optical Library, 300mx	32 Platter / (2) Drive 9.1 GB Drive, SCSI Cable, (32) 9.1 GB WORM Optical Disks, Adaptec SCSI Controller, Disk Extender HSM	28,140	28,140	1,407
3	Scan Station	Intel Pentium IV, 1.8GHz, 128MB RAM, 20" Monitor, Windows 2000 Professional, 20GB ATA IDE Drive	1,098	3,294	165
3	High Speed Scanner	60ppm, 11x17", Video Interface, Virtual Rescan	22,995	68,985	3,449
3	EH-850-2000	Scanner Controller Interface	1,495	4,485	224
		<u>Hardware Subtotal:</u>		\$121,277	\$6,064
		<u>Consulting Services</u>			
		a) Requirements Analysis Phase		12,000	
		(1 Consultant / 2 weeks @ \$150 hr)			
		b) DMS Application Development / Deployment		120,000	
		(2 Consultant / 10 weeks @ \$150 hr)			
		c) Project Management		84,000	

		(1 Project Manager / 12 Weeks @ \$175hr)			
		e) Training / Quality Assurance		8,800	
		(1 Consultant / 2 weeks @ \$110 per hour)			
		f) Related Travel Expenses & Lodging		24,000	
		<u>Consulting Subtotal:</u>		\$248,800	
		<u>Investment Summary</u>			
		<u>Software:</u>		\$148,061	
		<u>Hardware:</u>		\$127,340	
		<u>Services:</u>		\$248,800	
		<u>Grand Total:</u>		\$524,201	

11.4 MOTOR VEHICLE DIVISION

11.4.1 Overview

The Motor Vehicle Division requires a robust level of IDMS capabilities in each of the recommended target opportunities. The IDMS solution will need to combine imaging, workflow, content management, electronic report management, and fax gateway automation.

11.4.2 Initial Cost Estimates

The following outlines the costs and activities associated with the IDMS deployment in each of the three target areas within MVD.

Table 11-4 Preliminary IDMS Cost Estimates for Motor Vehicle Division

		Software	Unit	Extend	Yearly
Qty	Model		Cost	Cost	Maintenance
1	304840	Enterprise Content Services	20,000	20,000	3,600
250	304843	Content Services Dedicated User License 3.x	560	140,000	25,200
1	304838	Content Services Development Environment	5,000	5,000	900
1	502206	SQL Server Customer Supplied	0	0	0
1	305468	Web Services /IDM Toolkit 3.x	7,500	7,500	1,350
1	305240	EProcess Services	20,000	20,000	3,600
1	305241	eProcess Services Toolkit	10,000	10,000	1,800
250	305132	Workflow Services User License	420	105,000	18,900
3	305089	Capture Desktop 3.x	6,000	18,000	3,240
1	305090	Capture Professional Toolkit	5,000	5,000	900
1	305118	Fax Inbound	3,000	3,000	540
1	304675	Fax Outbound	6,000	6,000	1,080
		Software Subtotal:		\$339,500	\$61,110
		Hardware			
1	Workflow Server (eProcess)	Intel Xeon 2GHz, 1GB Memory, (2) 18GB Disk, Windows 2000 Server	6,469	6,469	323
1	Application Server (Content Svcs)	Dual Intel Xeon 2.4Ghz/512K Cache, 1 GB Memory, (4) 18GB SCSI Hard Drive, Uninterruptible Power Supply, Tape Backup Unit, Windows 2000	8,194	8,194	410
1	Application Server (Web Server)	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000	2,442	2,442	122
1	Fax Gateway Server	Intel Pentium III 1 GHz, 256MB Memory, (2) 18GB SCSI, Windows 2000, Brooktrout TR114+P4L 4PT Loop PCI	5,737	5,737	287
1	Optical Library, 300mx	32 Platter / (2) Drive 9.1 GB Drive, SCSI Cable, (32) 9.1 GB WORM Optical Disks, Adaptec SCSI Controller, Disk Extender HSM	28,140	28,140	1,407
3	Scan Station	Intel Pentium IV, 1.8GHz, 128MB RAM, 20" Monitor, Windows 2000 Professional, 20GB ATA IDE Drive	1,098	3,294	165
3	High Speed Scanner	60ppm, 11x17", Video Interface, Virtual Rescan	22,995	68,985	3,449
3	EH-850-2000	Scanner Controller Interface	1,495	4,485	224
		Hardware Subtotal:		\$127,746	\$6,387
		Consulting Services			
		a) Requirements Analysis Phase		36,000	
		(1 Consultant / 6 weeks @ \$150 hr)			
		b) DMS Application Development / Deployment		144,000	
		(2 Consultant / 12 weeks @ \$150 hr)			
		c) Project Management		126,000	

	(1 Project Manager / 18 Weeks @ \$175hr)			
	d) Training / Quality Assurance		8,800	
	(1 Consultant / 2 weeks @ \$110 per hour)			
	e) Related Travel Expenses & Lodging		27,000	
		<i>Consulting Subtotal:</i>	\$341,800	
	<u>Investment Summary</u>			
		<i>Hardware:</i>	\$134,133	
		<i>Services:</i>	\$341,800	
		<i>Grand Total:</i>	\$876,543	

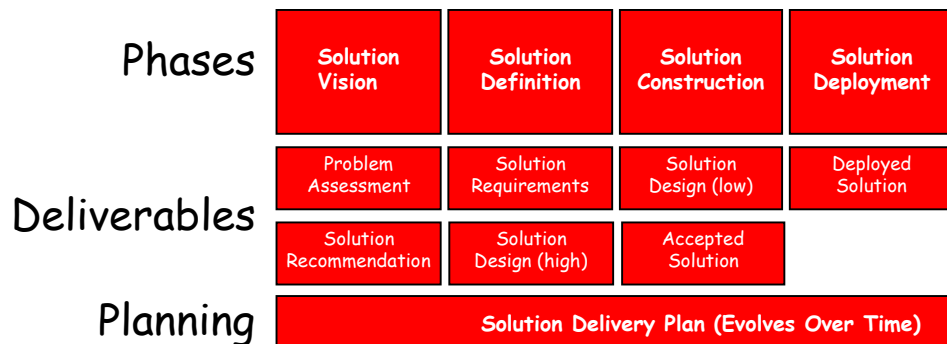
11.5 IDMS PROJECT METHODOLOGY

To meet the goals and objectives of future IDMS projects, the use of a specialized IDMS project methodology tailored to the requirements of IDMS deployments is recommended. A discrete, multi-phase IDMS project methodology will address the major stages of the project life cycle from solution vision through solution deployment and support.

Approach

Figure 11-1 indicates the recommended phases of a project methodology to implement IDMS within ADOT.

Figure 11-1 IDMS Project Methodology Phases



The following sections will discuss each phase of the solution delivery process, beginning with the first phase for the IDMS project, Solution Definition.

The Solution Delivery Plan will act as the overall project plan for services provided to ADOT. It details the project strategies and planning required for each phase, deliverable, and schedule. This plan will be developed by the IDMS Project Manager during the initiation of work, and will be updated at the end of each IDMS phase. The end of phase updates must include the detailed delivery strategies for the following phase (deliverables, resources, schedule, etc.), as well as delivery strategies for future phases, if known.

The following sections will discuss the phases for the ADOT IDMS Project and associated phase deliverables.

11.5.1 Solution Vision

This phase addresses the business problem and solution goals. The overall intent of the proposal may be summed up in this phase, as it addresses the aim of the delivered solution. In the Solution Vision phase, the IDMS Project Team seeks to understand the customer's business, assess the business problems, and develop a high-level solution recommendation on how to meet the business goals of ADOT, including improved processing efficiency, disaster recovery, and personnel cost avoidance.

a) Activities

Understanding the business includes:

- Building a relationship with the organization's leadership, at executive, Management Information Systems (MIS), and end-user / administrator levels.
- Defining the customer's direct and indirect external influences (customers, legal mandates, budgetary constraints, etc.)
- Exploring how the organization plans to position itself in the short, medium, and long-term periods
- Assessing the customer's internal organizational dynamics (people, processes and technologies)
- Documenting the organization's vision statement, strategies used to support that vision statement, and the critical success factors by which the organization will measure success

The assessment will include a review of the customer's people, organization, processes and existing technologies that impact or are impacted by the business problems or any potential solution recommendation. Together, the project team will develop, refine and/or revise the solution vision that will streamline mainstream work at ADOT and lead to higher productivity and operational efficiency. At the end of the process, an understanding of the business issues should be sufficiently developed, such that IDMS Project Team has a high degree of confidence in the solution vision.

This phase will establish sponsorship and ownership at the highest level in order to assure the success of the delivered solution. As a result, each project sponsor should understand the business problem(s) and be able to quickly articulate the solution vision to employees, customers and other sponsors within the organization.

Before an IDMS solution is proposed to ADOT, the following actions must occur:

- Understand ADOT business problem and identify where bottlenecks and processing inefficiencies occur throughout the major aspects of operation
- Understand where the customer plans to be in the next one to three years
- Explore the apparent business problem(s) the customer wants to correct
- Review in some detail the root cause of the problem(s)

The problem assessment provides the Project Team the opportunity to work on-site at ADOT in mission critical areas. The Project Team can observe how the customer's organization functions, and observe first-hand how decisions are made. An IDMS solution that will meet the customer's expectations is based on an understanding of the customer's business requirements. Once the Project Team understands the problems and their root causes, they can then begin to evaluate and explore solutions that address the current tactical needs as well as integrate with the customer's long-term strategic plan, in terms of document management solutions which increase productivity, quality, and level of service.

The problem domain should be explored from the following views:

- How do external/internal customers impact the problem?
- How does the current technological environment impact the problem?
- How is ADOT impacted by the problem?
- How are the ADOT users impacted by the problem?

- Do physical constraints (location, size, durability, etc.) affect the problem?
- Do conflicting organizational goals add to the problem?

b) Deliverables

Typical deliverables generated during the Solution Vision phase include the following:

- Problem Assessment
- Solution Recommendation

These deliverables will essentially 1) confirm the findings in the Request for Proposal (RFP) and update the information in the RFP as required to reflect current processing and 2) provide a preliminary solution configuration and estimate on the consulting services required to implement the IDMS.

11.5.2 Solution Definition

During this phase, the Project Team works with ADOT to define the high-level solution for the each specific project. To arrive at this solution, the Project Team gathers and analyzes individual group requirements while they define a big picture view of the design. The objective of gathering requirements is to establish and document the criteria by which the proposed solution will be built, delivered, and accepted by ADOT. In addition, a prototype of the IDMS solution is generated so that ADOT personnel have the opportunity to review and approve the direction and functionality of the IDMS system.

a) Activities

Recommended activities conducted by the Project Team during the Solution Definition phase include the following:

- Conduct facilitated sessions with the ADOT’s business process experts, subject matter experts and key managers within the individual areas of opportunity. These sessions will be led by Project Team consultants but will focus on achieving consensus of the needs for IDMS system, such as how to expedite processing of refund applications, or process enrollment forms or change of information, and the associated favorable impact on customer service.
- As needed, conduct one-on-one interviews with ADOT’s business process experts, key subject matter experts, and key managers. These interviews will be done to prepare for the facilitated sessions, to follow-up on session issues and results, and to cover ADOT personnel that could not attend the session

- Examine company documentation, legacy systems and processes with the assistance of ADOT's business process expert
- Conduct prototyping sessions with key ADOT representatives from each of the functional areas within ADOT.

In broad terms, requirements cover business needs, user requests, and technical prerequisites. If a requirement is not measurable, verifiable, or testable, then it cannot be stated and evaluated as a success criteria and should not be included in a requirements document. Functional requirements should be at a level of detail that will allow the design team to map a solution with sufficient specificity such that the delivered solution will be accepted by ADOT.

While textual requirements are valuable for verification and completeness, often a prototype of the system provides a better definition of exactly what users want. The Project Team will implement a prototype of the specific IDMS application during this time. The focus of the prototype will be on the needs of the individual area of operation as selected by the ADOT. The main objective of the prototype will be to define user interface approach, define how processes will be supported by the IDMS application, and identify key index fields for different asset types.

The IDMS prototype will be built using process and technology experts. The IDMS Project Team deploys the prototype, the appropriate mix of designers, developers, and Q/A (Q/A) test personnel to generate a full working prototype, and thereby arrives at the proof of concept of the ADOT IDMS solution, as a precursor to the final production system. The appropriate hardware and software will be deployed during the prototype phase.

The IDMS high-level functional design will build on the conceptual architecture and confirm the components required to implement the solution. The high-level design is the process of conceiving, inventing, or developing a scheme for turning a requirement or specification for solution software into operational application software programs. The high-level design will also identify the overall hardware and software configuration required for the solution, and also define the modifications to the system that are required for the IDMS solution. This information is input into the project detailed design that focuses on the operations of individual routines and small collections of routines.

Finally, a plan will be created that lays out, in detail, the activities and timeframe for implementing the IDMS solution using MS-Project, Visio, and other core project management tools.

b) Deliverables

The following are the recommended deliverables during the Solution Definition phase:

- IDMS Requirements Specification
- IDMS Prototype
- IDMS High-Level Design Document

11.5.3 Solution Construction

The objective of the Solution Construction Phase is to deliver the IDMS solution on-time and on-budget such that it:

- Realizes the IDMS solution as defined in Solution Definition
- Meets the IDMS specified acceptance criteria and requirements
- Is ready to deploy in a production environment

During this phase, the Project Team will complete a detailed system design for the IDMS solution. The Project Team will then construct its solution based on the approved detailed design, approaching this construction to meet the ADOT's unique requirements. Additionally, during this phase, a test plan and training plan will be developed.

a) Activities

The Project Team will transform the high-level design into a detailed design that contains sufficient information to construct the IDMS solution. This design describes all of the design components needed to begin construction of the IDMS solution. The Project Team should present this detailed design for approval by the ADOT as a deliverable.

Using the approved detailed design, the Project Team will begin solution construction for ADOT. The Project Team will also complete coding for modifications and customizations required for the IDMS solution, coding and setup of pre-defined queries, database modifications and setup, and coding of reports.

During the coding activities, the Project Team will also create a test plan for the IDMS. The test plan will describe the testing criteria and environment, as well as contain test scripts. Test scripts provide a description of inputs, execution instructions and expected results created to determine if a specific application software feature works correctly or if a specific customer

requirement was satisfied. ADOT personnel will assist in the collection of information and development of the test scripts.

The Project Team consultants will conduct developer (or unit) testing of each system feature.

When appropriate unit testing is complete, the Project Team will integrate and system test components with the package software before ADOT proceeds to acceptance test. System testing confirms that the IDMS solution – as a system – functions as expected. This includes functionality testing, performance testing, and load testing.

Acceptance testing demonstrates that the IDMS solution meets the requirements defined during the Solution Definition phase. ADOT personnel will be required to perform system and acceptance testing of the system. When testing is completed, test results will be provided to the ADOT as a deliverable.

If, during any part of this phase or the project in general, ADOT personnel identify any changes to the IDMS requirements, such changes need to be evaluated separately and approved by the ADOT Project Sponsor. The Sponsor may approve the estimation or impact analysis of a change before approving the change. Similarly, the Sponsor may request that the end users prioritize a group of changes in terms of the business need for each change. Such scope changes will be tracked and communicated via the project's change control process, and all scope changes will be documented in a Change Control Document.

Finally, the Project Team will develop a training manual for the IDMS solution. The training manual will be based on industry standard training manuals but will be tailored for the specifics of the IDMS solution.

b) Deliverables

The Project Team will create the following deliverables during the Solution Construction phase:

- IDMS Detailed Design Document
- IDMS Test Plan and Test Results
- IDMS Training Documentation
- IDMS Ready for Deployment after completing Acceptance Test
- Change Control Document

11.5.4 Solution Deployment

The Solution Deployment phase transitions the IDMS from ADOT's acceptance to a production system. The Project Team will work with ADOT administration personnel to ensure that the system is operating effectively. In addition, the Project Team will conduct training on the IDMS so users understand how to use it.

a) Activities

During the Solution Deployment phase, the Project Team will execute a variety of specifically customized activities – based on what ADOT needs from us and what your personnel can handle on their own. These activities may include distribution, installation, configuration, site testing, and training. The main focus of the activities will be to ensure that – to the satisfaction of ADOT's Project Sponsor – the IDMS is considered “in production” and the Solution Support phase begins. During the Solution Delivery phase, the Project Team will work with ADOT to define what “in production” means. The following are the key activities we perform during this phase:

- Assist in moving the system to a production environment by ensuring that the system is installed properly, has initial data loaded into it, interfaces are operational in the production environment, and any scheduled processes are in place and operate as scheduled.
- Conduct one or more training classes. Covansys uses a “train-the-trainer” concept whereby an ADOT person is trained to take over training for the system in the future.
- Conduct knowledge transfer activities to system administration and maintenance personnel. The need for this often depends on whether subsequent releases of the system are being implemented. If there are future releases planned, there may be Project Team consultants on-site that can handle such issues.
- Provide one week of production support during the first week of operation of the new system.

During this phase, any proposed enhancements or changes to the system will be documented in an IDMS Change Control Document. Suggested IDMS enhancements will be formally provided to ADOT for review and comments. Enhancements can be implemented based upon mutual agreement between ADOT and the Project Team.

b) Deliverables

- IDMS Change Control Document
- IDMS Deployment and Transition Report, if requested and appropriate
- Deployment Site Certifications, if requested.

11.5.5 IDMS Project Manager

In addition to the phases and their activities, the Project Team will manage the project in a consistent manner to ensure the overall success of the IDMS Solution. Project management is a critical aspect to meeting the goals and objectives of a project.

The Project Manager's main duty is to act as the liaison between the Project Team and the ADOT Project Sponsor. The Project Manager is responsible for the day-to-day tasks of the project. The Project Manager's duties include establishing major project milestones for the IDMS, finalizing the list of project deliverables – with agreement from ADOT, performing the project kick-off meeting, providing status reports to the ADOT Project Sponsor, and developing and maintaining the project work plan.

11.5.6 Quality Assurance

Quality assurance (QA) as implemented by the Project Team strives to implement quality at all levels of the project. At the project level, the project QA team ensures adherence to project standards and processes and definitions of quality; at a higher level, a delivery manager ensures the quality of the overall project execution.

The initial step is the development of a Quality Management Plan. The plan identifies all quality standards and project guidelines needed for each phase and deliverable of the project. Important as input to the Quality Management Plan is the project planning information (Scope Statement, Schedule), which documents the major project deliverables and project objectives. The Quality Management Plan addresses delivery management, scope control, configuration management, and version control, testing, deliverable quality, and methodology compliance. It also contains definitions of the standards, measurement guidelines, and deliverable checklists. The Project Team will work with ADOT to ensure that the Quality Management Plan meets the specific needs of the project.

To ensure implementation of the Quality Management Plan, the Project Team conducts quality audits on a regular basis to evaluate the overall project performance and to provide confidence that the project is satisfying the quality standards. If quality standards are not being met, additional quality controls may be defined and incorporated into the Quality Management Plan and specific tasks

incorporated into the Project Plan. The quality audit will identify lessons learned and recommendations to be incorporated into the Quality Management Plan.

The Project Manager assumes responsibility for reviewing quality assessments and acting on suggestions in a timely manner. Individual team members are responsible for quality control throughout the project, focusing on prevention of defects rather than inspection. Specific quality checkpoints are incorporated into detailed team plans as defined by the Quality Management Plan.

When problems are identified, corrective actions are taken. In these situations, it is important to correctly identify the source of the problem so that appropriate corrective or preventive actions can occur at appropriate levels. For example, when an individual team member produces a deliverable that does not conform to standards, the corrective action may be reviewing the standards with the individual and reworking the deliverable. When problems are identified at the team level, the corrective action may be to verify and clarify the standards, or to provide additional training to the project team.

Quality Assurance (QA) Directors will visit the project to ensure its success and to provide support and guidance to the Project Manager. QA reviews occur monthly to quarterly, based on the size and duration of a project.

11.5.7 Acceptance and Licensing

User acceptance and signoff is a discrete milestone at the end of each of the four phases and will be based on overall user and administrator satisfaction and the ability of the IDMS solution to meet target specifications as originally conceived and agreed upon in the original design.

11.5.8 Documentation

The Project Team recognizes the critical value of user, administrator, and IS personnel documentation in terms of communicating system capability, defining the application program interface (API) structure used by developers, and as training guides for new end users and personnel.

End user, developer, and application developer documentation is available on-line in electronic form as well as hardcopy. Typically IDMS solutions come with a full set of user documentation on Compact Disk Read Only Memory (CD ROM). In addition, customer personnel can usually access system documentation via the software vendor's Website for download directly to the workstation.

There are no limits on copying and distributing the documentation without charge within the population of licensed users.

The documentation is sufficiently detailed and specific so that end users and key personnel can identify, troubleshoot, and diagnose system and application issues without vendor involvement. When used in conjunction with training courses, the documentation acts as integral reference material required for on-going support.

Periodic updates and regular newsletters are distributed which identify problem fixes and enhancements as well as suggest other fine tuning methods and approaches to optimize performance within the IDMS environment.

Computer Based Training (CBT) CDs are available which will facilitate the training process of end users and other key personnel staff members.

11.6 MAINTENANCE / SUPPORT

11.6.1 Warranty

The Project Team and software vendor typically will cover the IDMS application under warranty for 90 days after the acceptance date of the IDMS application. During this warranty period, any bug fixes or incidents will be covered and addressed without cost to ADOT.

Servers are covered under hardware warranty for 3 years beyond purchase date. Optical jukeboxes and scanners are covered under warranty for 1 year.

11.6.2 Support Policy

ADOT potentially would be covered under the standard technical support contracts from IDMS suppliers. The following description outlines an example technical support contract from an industry leading IDMS supplier.

The Technical Support Program is designed to meet the needs of customers using larger systems and, potentially, more critical production situations. These customers require the convenience of easy access to software releases and *Real-Time* phone support to ensure maximum stability and system uptime. In addition, the program may be customized to better-fit customer needs by selecting from a range of optional services.

Real-Time phone support indicates calls are routed to the next available technical engineer whenever possible. This means work begins on that call immediately. Should a call be queued for *Call-Back*, targeted response times are:

- **2 Hours - System Down / No Workaround**

- **8 Hours - Intermittent Case**
- **24 Hours – Electronic Support**

Principal Period of Maintenance (PPM) for support coverage at the Helpdesk Response Centers is Monday through Friday, 8:00 a.m. to 6:00 p.m., customer local time. Actual days and hours of coverage may vary by region.

Right To New Versions is included with the technical support program. Customers are provided all major and minor software releases as they become available, to keep their systems current with the latest fixes, along with new features and functionality.

The Technical Support Program is provided via annual service agreements, which renew each year automatically unless the client specifically elects to cancel the program. Technical Support Program pricing is a percentage of software license list prices, billed annually. In addition, an annual minimum fee applies. Please note that the minimum \$10,000 for the Technical Support Program is applied on a per system basis, after all discounts have been applied. Any exceptions require the approval of the Customer Service Regional Director.

11.6.3 Help Desk / Support Location

It is recommended that the IDMS contractor provide comprehensive Help Desk support from a location within the same time zone as ADOT. The IDMS Help Desk will act as a conduit and receiving for end user, administrative, and development issues and ensure that the IDMS issues receive appropriate visibility and escalation and are resolved to the satisfaction of all parties involved.

11.6.4 Upgrade Support

Upgrade support is recommended to all key software components required to run the IDMS platform within each agency group. ADOT should acquire appropriate software and upgrade support, which will allow IDMS software versions to stay current with industry standard software and hardware components running in the client/server environment.

11.6.5 Other Services Provided

- a) The Project Team will act as the initial point of contact for all maintenance services for the IDMS environment necessary to continue or restore normal operations. Maintenance services must be coordinated with a single client-designated maintenance representative. The Project Team will not assume responsibility for third party product maintenance; however, the Project Team

will coordinate with third parties to ensure that proper maintenance support is provided.

b) Maintenance services will be provided during the Project Team's normal working hours, i.e., 8 a.m. through 5:30 PM, Pacific Time, Monday through Friday, excluding the Project Team's holidays. Maintenance services will include the following:

- Corrective action for any applicable software malfunction which has been reported to the Project Team using the Project Team's Client Communications Form Procedures and which prevents the system from operating substantially in accordance with the Functional Specification and which cannot be accommodated or "worked around" through acceptable adjustments in work habits or operating procedures. Corrective action can consist of modifications to the software to bring the system into substantial accordance with the Functional Specifications, work around procedures developed by the Project Team if they involve minor adjustments to current procedures, or a combination thereof.
- Delivery of minor system upgrades at a mutually agreed schedule that may include engineering, software and/or documentation changes recommended by the Project Team to correct minor defects and/or to meet the Functional Specifications. Minor system upgrades and corrective actions will be delivered to the client-designated maintenance representative, who will be responsible for the qualification, installation and testing of the revised software.

11.7 TRAINING

The Project Team will provide the basic training necessary to support, maintain, and properly use the system. The training will be job-specific for end users, with the exception of the System Administrators, who will be trained on all facets of the system. Training for System Administrators will include basic operation of the system, as well as system maintenance, backup and recovery procedures, system monitoring and error control, and application development.

The Project Team will develop a training workbook that will be used to train workstation end users on the new application. The workbook will highlight the features of the new system and provide step-by-step training lessons for the workstation application.

A train-the-trainer approach is recommended for staff training, whereby the Project Team will train up to three end users, usually department supervisors or

key managers, on the new system during a one-week period. These individuals will then become the trainers for the remaining end user population.

11.7.1 System Administration

The Project Team will provide training to System Administrators throughout the project. During the software installation, the System Administrators will receive training on installing the software, configuring the database tables, and establishing the security profiles of the users. The Project Team will also provide training on the proper procedures for backing up the system and general system management.

11.7.2 User

The Project Team will provide customized user training on-site in classes of approximately ten students each until each department is fully trained. This user course will familiarize departmental end users with the use of the IDMS application, menus, and other key topics. In addition, the Project Team will have sufficient personnel on-site to promptly answer questions.

12. IDMS BEST PRACTICES

12.1 OVERVIEW

The following section will discuss and compare the use and implementation of document management technologies within other state transportation groups across the county. Our interest is in comparing the experiences and lessons taught from other state transportation groups that have implemented Integrated Document Management Systems (IDMS) and applying these lessons and information to the opportunity at the Arizona Department of Transportation (ADOT).

By following a ‘best practices’ model and by defining industry performance benchmarks, the expectation is that we can design and build superior, ‘world class’ technology solutions over the long run, that lead to significant increases in productivity, quality, and level of public service from ADOT.

Specific objectives of this document include the following:

- a) ***Identify relevant installations of document management solutions within the transportation groups*** and other state agencies and indicate the key benefits and advantages derived from these technology deployments.
- b) ***Examine the technology platform used by each specific installation*** and explore the competitive advantages of the specific technology platform selected for each opportunity.
- c) ***Examine the major business drivers and requirements*** that motivated each agency to move forward with document management as a mainstream technology.
- d) ***Evaluate the level of sponsorship and control within the subject organization*** and examine the key ownership issues, which relate to the maintenance and operation of the IDMS solutions.
- e) ***Examine the major barriers or hurdles to sound implementation of IDMS technologies*** within other state transportation groups and how each agency overcame the hurdles to achieve their IDMS solution.
- f) ***Examine future planning issues and considerations regarding the use of IDMS solutions*** and identify the various milestones and horizons that must be addressed during the formulation of a sound business and technology plan for IDMS within ADOT.

Whenever possible, we use case studies from other transportation agency groups similar in makeup and approach to ADOT. To the extent possible, we designate

contacts within other state transportation agency groups whom ADOT representatives can contact for further information and clarification relative to IDMS solutions.

We intend this document to be a working paper and not a static document or analysis. We prefer that this document be used to trigger further thought and analysis within ADOT relative to best business practices and approach, recognizing that technology in itself will solve few problems unless technology and information systems are implemented with an appropriate vision and understanding of core business objectives and deliverables.

With this in mind, we ask ADOT to provide feedback and insights based on the information provided in this document, in order to further assess and refine the ‘best practices’ approach within ADOT and to build the appropriate understanding to go forward with IDMS successfully.

12.2 TARGET APPLICATION AREAS

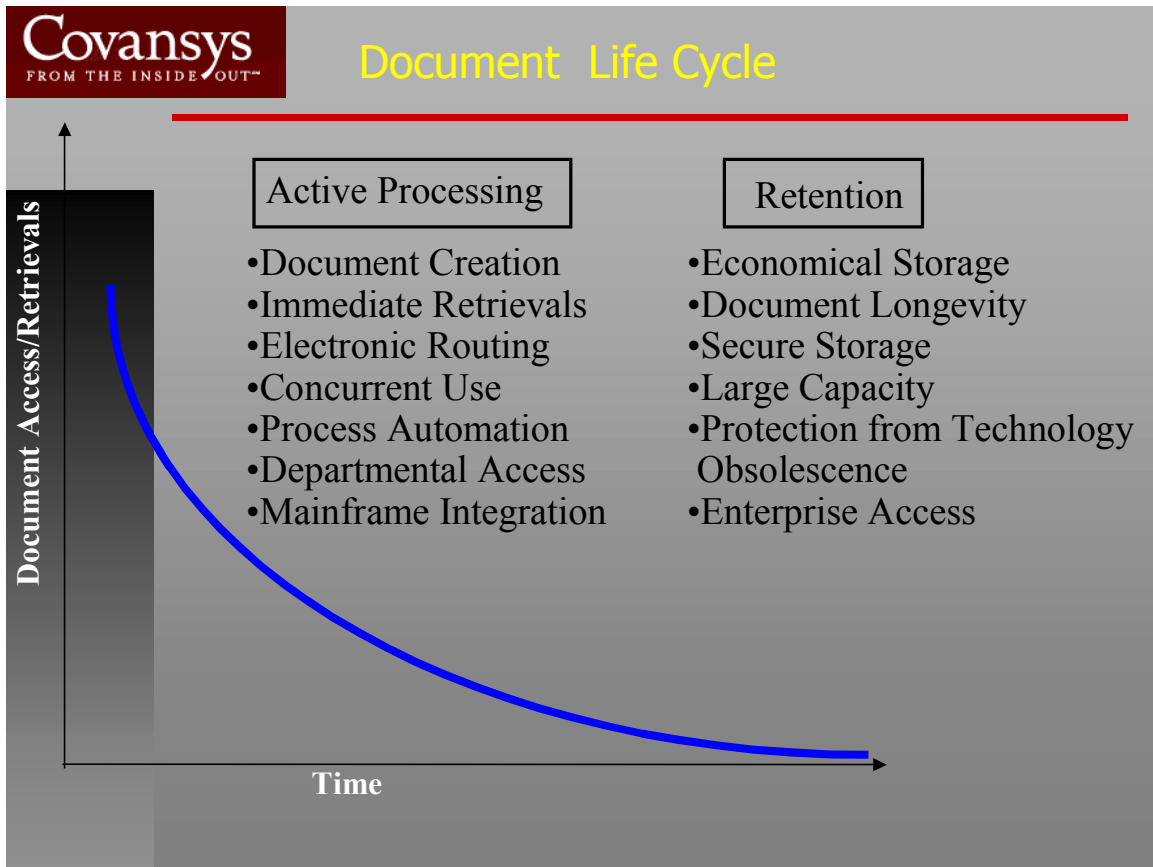
As shown by the ‘best practices’ implementations of IDMS technologies within other state agencies, there is a range of target application areas and solution profiles. In general, these IDMS applications have high visibility and represent significant investments in terms of underlying hardware, software, training, and consulting support. The use of these IDMS technologies has resulted in quantum gains in productivity, quality, and levels of internal and public service.

Not surprisingly, the IDMS applications run in paper-rich application areas where access to customer forms and files is a critical business driver. IDMS helps eliminate the key physical processing and filing constraints associated with the hardcopy information and streamlines the business process.

In particular, the IDMS applications we have identified in various DOTs across the country have addressed the primary document management storage and retrieval requirements in the document life cycle, as depicted in Figure 12-1.

These requirements include a) the ability to provide rapid capture and retrieval of on-line documents in high-volume, high-transaction environments to support superior customer service and b) the ability to migrate documents onto long-term storage media for archiving and retention, while eliminating cumbersome manual systems (such as microfilm) and eliminating the need for filing cabinets for paper documents.

Figure 12-1 IDMS Document Life Cycle



Candidate vertical application areas for IDMS technologies include the following:

- New driver licensing, renewals, and forms
- Driver suspension and revocation information
- Automobile school certificates
- Accident and police reports
- Organ donation consent forms
- Insurance inquiries and legal correspondence
- Automobile registration and renewals
- Road construction blueprints and maintenance records
- Bridge maintenance and repair records
- Highway maps, engineering drawings, and geographic information systems

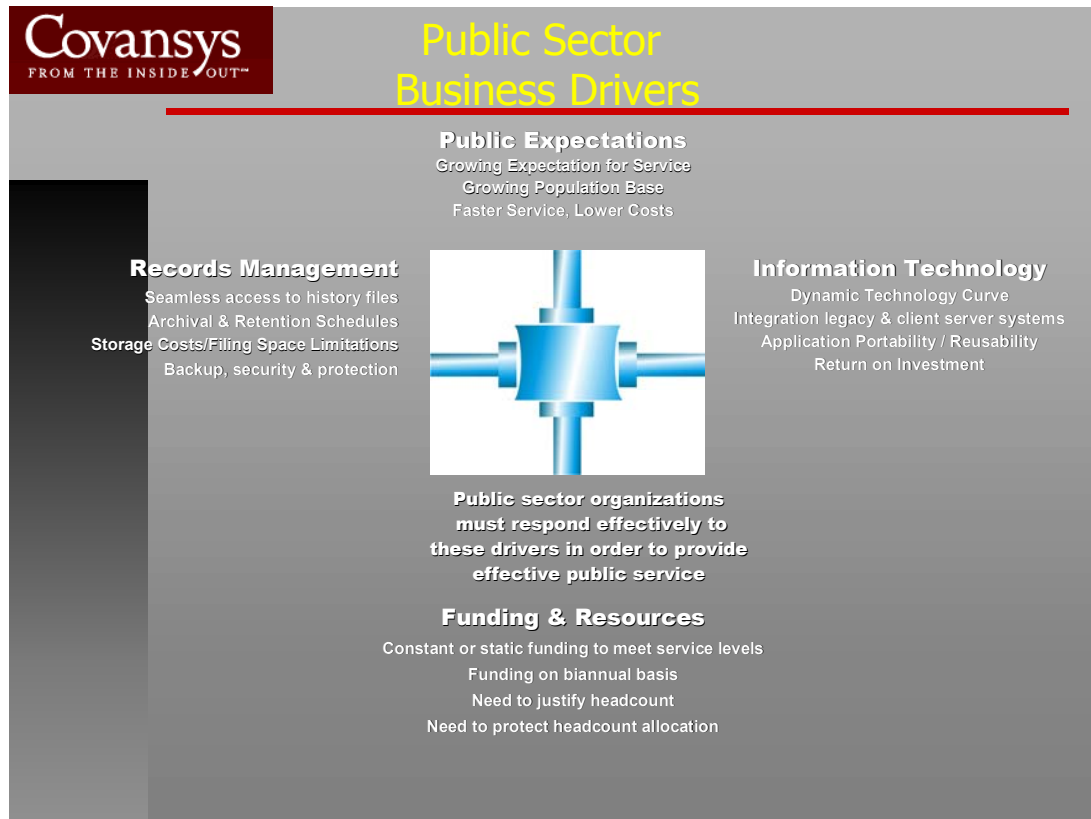
Candidate horizontal applications for IDMS technologies include the following:

- Human resource, employee applications, resumes, and benefits information
- Accounts payable, invoice, and purchase order processing
- Correspondence management and control

Employee procedure manuals

There are a myriad of business drivers associated with these target IDMS applications, as depicted in Figure 12-2. However, the application of any IDMS or other technology implementation must promote and address the ultimate business driver: **public safety and awareness**.

Figure 12-2 Public Sector Business Drivers



Substantial public liabilities exist associated with maintaining and managing bridges and roads in good repair, and there is significant interest to the public welfare in identifying bad drivers and keeping them off the road. These processes, which are tied directly to public safety and welfare, are inherently paper driven and require the DOT to maintain and manage an intricate paper trail and chronological record within easy, efficient access for examiners and other officials.

In addition, public expectations and the need for effective services are increasing, especially in high growth states like Arizona and Nevada. Funding allocations, however, are not necessarily growing at a rate to meet these required service levels. Productivity is the answer, and by increasing efficiency and productivity

from existing staff members through tools such as IDMS, public sector groups can better assist and support the public and meet rising expectations for service.

As we will learn from the experiences of other state transportation groups, by capturing and digitizing this hardcopy information, IDMS technologies allow reliable and efficient access to historical driver and other transportation records, while cutting dramatically the costs and space associated with records storage.

The inefficiencies of the paper-based filing and review process are eliminated, while end users are given rapid access to secure transportation files at the desktop, integrated with the other departmental and legacy mainframe applications.

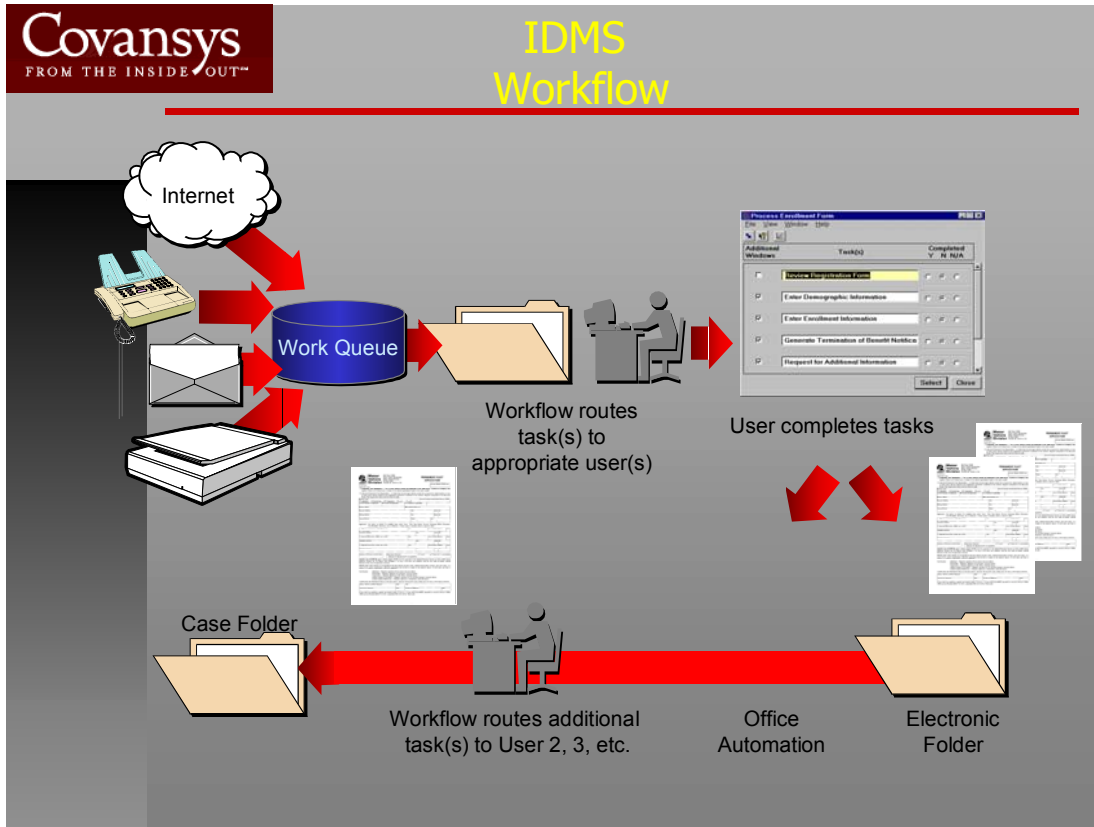
In addition, IDMS technologies complement, or in some case make obsolete, the use of and dependency on microfilm and micrographics technologies. The time delay and labor associated with capturing live documents on film are eliminated through the digital scanning process.

In general, experience with IDMS in the transportation community has been favorable, and the application of IDMS has resulted in significant productivity and efficiency benefits. Transportation groups point to better service levels, better internal team coordination, and more reliable, efficient access to hardcopy information as the key benefits of IDMS deployments. The overriding message, however, is that the in-depth design and analysis up front is critical to the success of the IDMS deployment; conversely, rarely will a mission-critical technology like IDMS succeed without the requisite design and planning up front

Transportation groups experienced with IDMS technologies point to their better control over the hardcopy information, better ability to concentrate mission-critical information in the hands of end users and decision makers, and improved overall ability to streamline the core work processes. End user groups are quick to point out that they have immediate on-line access to specific document folders without the need to wait or retrieve the physical folders. They are also keen on the ability to share single documents concurrently without the need for copying or duplication. Administrators also are vocal in championing the benefits of IDMS and point to the ability to telescope the work process and determine where, for example, a specific transaction (such as a license renewal application or driver correspondence) stands in the review and approval process and then to reroute this transaction if necessary to another work queue via workload balancing.

Figure 12-3 shows a typical workflow management application and the ability to stage, store, and forward customer documents as electronic files and folders across the workplace. Workflow technologies provide greater visibility and control over mission-critical work processes; allow administrators and process owners to rapidly identify bottlenecks, redundancies, and chokepoints in the work process; and streamline the flow of information and folders through the work environment.

Figure 12-3 IDMS Workflow Management



Engineers are also supporters of IDMS technologies. Engineers recognize both the need for and limitations of hardcopy-based information, including architectural and engineering drawings, specifications, maps, and so forth. The ability to rapidly access and retrieve this information over the network, or to download the required files via CD, and then drill down to assembly, subassembly, and component layers is a key interest and benefit to the engineering community.

On account of the engineering interest in IDMS technologies, we have included a significant amount of information and input on the Green Pasture Software (GPS) W/EDGE product and solution. W/EDGE will facilitate the inclusion and integration of CAD drawings, roadway design files, large-format documents, construction as-built diagrams, and other mission-critical information in the engineering environment.

In summary, Covansys has determined through our 'best practices' research that there is a substantial opportunity for employing IDMS technologies within the transportation sector and ample precedent for using these technologies to reduce the traffic of paper and increase the flow and control of information in the

workplace, thus providing superior productivity, quality, and level of services to the driving and flying public.

12.3 IDMS / DOT CASE STUDIES

This section includes specific case studies where IDMS has been successfully implemented in state transportation groups. We examine the application of IDMS by specific document type and functional area and highlight the individual agency group(s) that has successfully deployed the IDMS solution.

12.3.1 Construction, Engineering, Accident Reports

Design / Construction documents and accident reports play a fundamental role in the management of information at the various Department of Transportation groups we considered. Design/Construction documents provided the vital blueprints and building plans supporting bridges, overpasses, tunnels, airline runways, and other vital transportation structures. Accident reports document vehicle collisions and other roadway-related incidents and allow examiners and court officials to assess accountability and liability associated with a specific accident.

Engineers and highway planners are the primary stakeholders with respect to design/construction documents. Engineers and planners need rapid access to design/construction documents both in the office and at remote construction or repair sites. Engineers also need to track document revisions and updates and view the detailed history of updates to specific highway structures, such as an interstate bridge, railroad overpass, or toll facility. Finally, the engineering community needs an orderly way to track engineering change orders (ECOs) and status updates to individual drawings. In most cases, engineers want to view the entire history of individual ECO transactions and then view the specific changes on the blueprint or architectural document using a scaled navigation page.

Accident reports have to be captured and logged on an immediate basis within the DOT environment. Information on the accident report generally must be keyed and indexed into an associated mainframe database. Accident reports are typically maintained up to 7 years for legal and statutory reasons and the storage of these reports presents challenges in terms of both retrieval and excessive filing space.

12.3.2 Pennsylvania DOT

Pennsylvania DOT employs a powerful engineering document management solution to maintain the originals and versions of source architectural documents. The Pennsylvania DOT solution is based on the FileNET Panagon environment and allows them to maintain and manage road and construction documents. It provides easy and efficient access to this information over the desktop while maintaining version control, redlining, and edits to the original source files.

For procurement, Pennsylvania DOT was rigorous and thorough in their product evaluation process. They took a visionary approach and selected a product set that had the breadth to cover the range of their application requirements and the depth to meet document-handling requirements on an individual department basis.

Pennsylvania employs the electronic file folder concept, as shown in Figure 12-4. The electronic folder replaces the manual document jacket and allows end users to search, retrieve, and extract the necessary Road and Construction documents to the workstation for further research and review.

Pennsylvania DOT has invested approximately \$12 million in IDMS and supporting technologies. These investments have led to significant increases in task compression, reduction in information float, and greatly increased end user convenience and access to information.

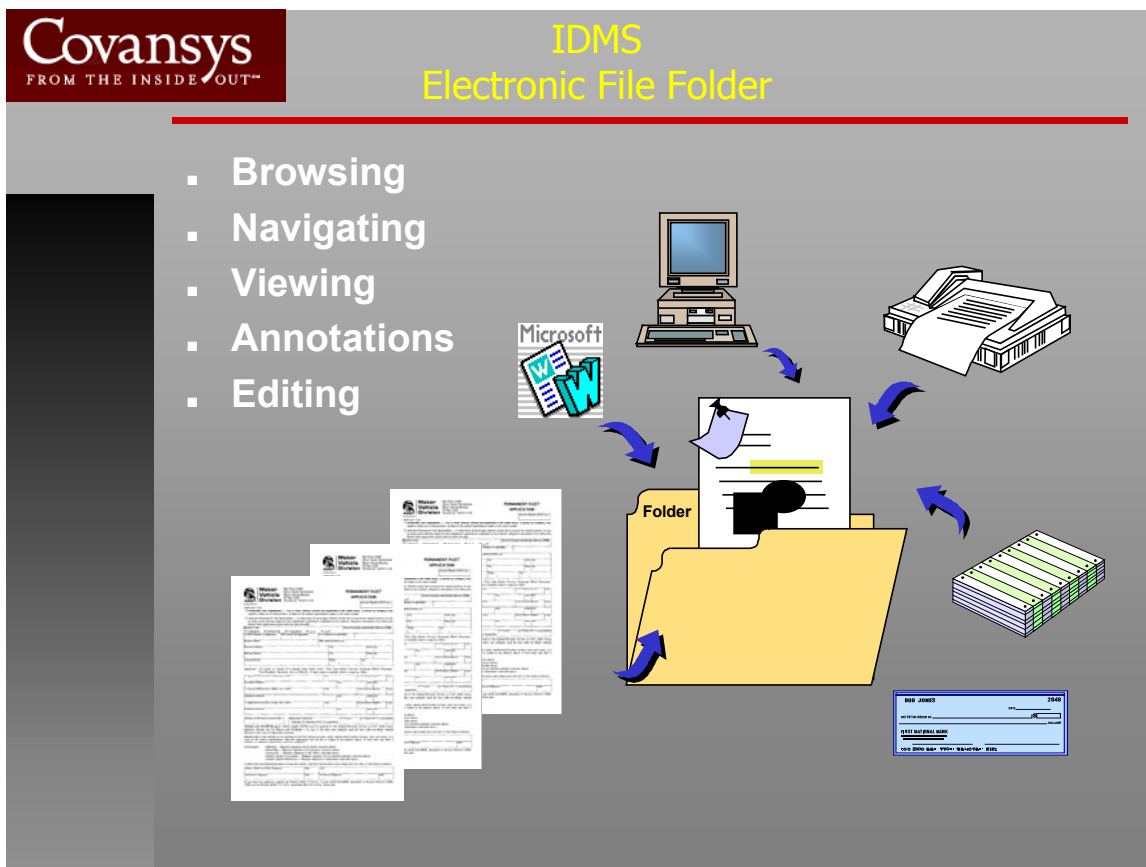
Pennsylvania DOT plans to use the Green Pasture Software (GPS) W/EDGE solution integrated with their current FileNET backend document repository to support large-scale engineering drawings and large format documents in 2002.

The key contact for the GPS implementation at Pennsylvania DOT is the third party responsible for the W/EDGE deployment:

Sharla Sterling
ssterling@ciber.com
(717) 691-5500

Figure 12-4

IDMS Electronic File Folder



12.3.3 Ohio DOT

The Ohio Department of Transportation is responsible for construction services, highway maintenance and management, environmental services, weather information, public transit, urban transportation, planning, and transportation information systems.

Ohio DOT initiated a study to determine a set of imaging standards and select a document imaging product that will also allow departments to pass and share information anywhere in the agency. It will support departments in the area of workflow, imaging, and document management as the need arises. It will include support offices and districts, as needed, by the use of a centralized database and distributed imaging servers.

Contacts: Brian Cunningham, Director of Communications
1980 West Broad St.
Columbus, OH 43223
614-4663553
bcunning@dot.state.oh.us

12.4 DRIVER LICENSING APPLICATIONS

12.4.1 Kansas Driver Control Bureau

The Kansas Driver Control Bureau wanted a workflow imaging system to remove the paperwork from the administration of its 1.7 million-driver database. It examined FileNET's customer references on the ground before making any decisions. "We were able to see systems working at full capacity and received positive recommendations from each company," said State Project Manager Marti Gonzales.

Kansas implemented the system and currently has 2.5 million records online, processing 3,000 documents every day. The number of manual steps in Driver Control was reduced from 27 to nine and they eliminated 50 hours per week in searching for lost files and clerical work, reduced the average length of a telephone inquiry from seven minutes to three, eliminated 11 full-time positions for an annual savings of \$227,000, and freed up 1,624 square feet of office and warehouse filing space.

When then-Governor Joan Finney approved funding in 1993 for a new imaging system for the state's Division of Vehicles, she told Betty McBride, director of the division, that she wasn't worried about the system's high cost or the possibility that some workers might lose their jobs. Rather, she was concerned whether the technology would actually help improve customer service.

"That was our number one priority," recalled McBride, not cost saving or reducing the number of filing cabinets in the division. Today, that goal has been met, thanks to the division's diligent efforts at developing and implementing a document imaging system that provides workers with instant access to drivers' records.

McBride, who used to receive numerous phone calls every day from drivers with complaints, now gets only one or two taxpayer calls per week, none of which have anything to do with poor service. She credits the turnaround to the online availability of records and the imaging system's ability to speed up processing time. "We now have immediate and multiple access to driver records, reducing processing time and eliminating lost and misfiled records."

Prior to imaging, customer service at the Division of Vehicles was disappearing under a blanket of paper documents. Every day, the division processes as many as 4,500 pieces of mail. The documents, which identify problem drivers and restrict driving privileges, ended up in folders filed in one of 144 five-drawer filing cabinets.

With as many as five different people and departments handling a driver's record during the course of an investigation, keeping track of the records was not easy. Because the division receives as many as 3,000 calls per day from drivers inquiring about the status of their licenses, it sometimes took workers between seven and 10 days to track down an individual folder. By 1992, the division was receiving as many as 75 complaints per day, allowed more than 1,500 incoming calls per day to go unanswered, and had a filing backlog of six months. To determine the best way to turn things around, the division conducted a study with three different companies, all of which recommended using imaging technology as a solution.

With a sympathetic governor and state legislature supporting her efforts, McBride received funding to build a \$1.4 million document imaging system. In March 1993, the division awarded a contract to FileNET, based on their proposal involving workflow.

Imaging technology converts paper documents into electronic images, which can be stored and retrieved more efficiently in their digital format. High-speed digital scanners convert paper documents into compressed electronic image files that are rapidly distributed across the agency network. The specific document capture and indexing screen used in their capture process is shown in Figure 12-5. In addition, Kansas DOT users make significant use of annotation and mark-up tools available in the end user workstation palette, as shown in Figure 12-6. These include sticky notes, date/time stamps, text messages and further detail that add clarification and meaningful content to the specific DOT document in question.

Figure 12-5 IDMS Capture & Indexing Screen

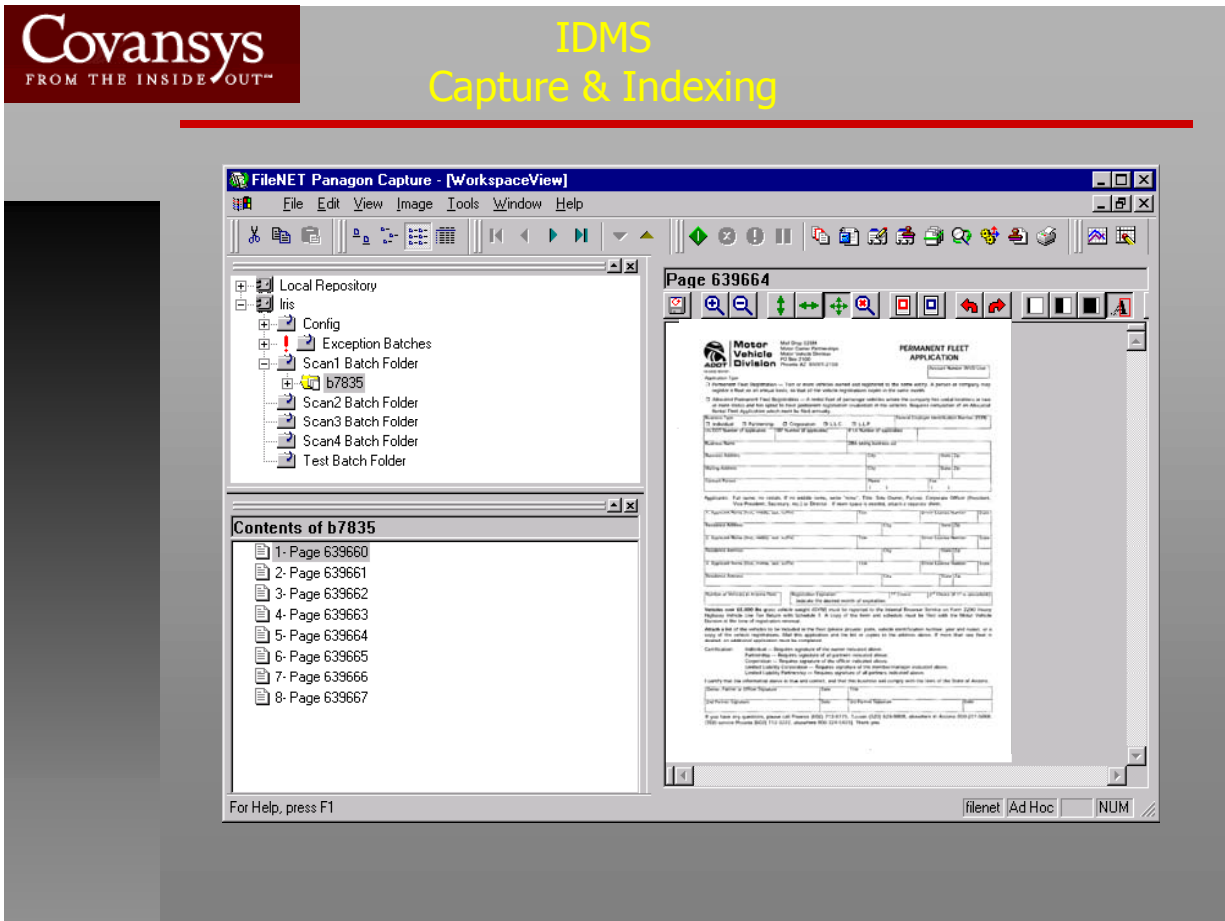


Figure 12-6

IDMS / Mainframe Integration

The image displays a software interface for IDMS / Mainframe Integration. At the top left is the Covansys logo with the tagline "FROM THE INSIDE OUT™". The main title is "IDMS / Mainframe Integration". Below this, there are three main components:

- Mainframe Screen:** A terminal window titled "Mainframe Integration Screen" showing a data entry form. Fields include "CON", "NAME", "STRT", "CBE", "PROV", "DATE", "P", "T", "PROC", "MOSS", "MS", "SUBCHG", "NC", "ALLOWD", "A", "R", "M", "TOTAL PATRD", "A", "O", "I", "O", "C", "A", "L", "O", "C", "P", "D", "T", "CALCULATED TOTAL", "PARTICIPATING PROVIDER ID", and "MAGNIFIED FIELD". A blue arrow points from the "MAGNIFIED FIELD" area to the "Image Window".
- Image Window:** A window titled "ADOT Facility 122334" showing a magnified view of the "MAGNIFIED FIELD" data.
- Field Magnification Window:** A window titled "PERMANENT FLEET APPLICATION" showing a detailed form for vehicle registration. It includes fields for "Business Name", "Business Address", "Mailing Address", "Contact Person", "Title", "City", "State", "Zip", "Phone", "Fax", "E-mail", "Driver License Number", "State", "Residence Address", "City", "State", "Zip", "Registration Expiration", "Date", "Type", "Year", "Make", "Model", "VIN", "Plate", "Vehicle Identification Number", "Year", "Make", "Model", "VIN", "Plate", "Vehicle Identification Number". It also includes a "Certification" section with checkboxes for "Individual", "Partnership", "Corporation", "Limited Liability Partnership", and "Limited Liability Corporation".

At the bottom left, there are "Annotation Tools" including a mouse cursor, a text box, a line tool, a highlighter, a sticky note, and a magnifying glass.

Workflow technology applies the concept of factory automation to the work tasks, assisting the routing and management of documents.

Kansas DOT also makes significant use of electronic forms processing. The agency specifically employs the Reachforms product from Accelio to provide the public electronic access to agency forms and documents for rapid completion over the Web. The use of the Reachforms product from Accelio has eliminated the unnecessary use of paper documents and improved operational efficiency and productivity while increasing service levels provided to the traveling public.

According to Gary Carter, bureau chief of Driver Control, a significant part of the project called for converting more than one million paper records into electronic images, so that all existing records would be online when the system went into operation.

Work started with a pilot project in the Driver Review Section, which determines whether people with medical problems, such as poor vision, should have a driver's license. FileNET, using a subcontractor, converted approximately 100,000 records and then tested the system using workflow. Once all the kinks were worked out with the pilot, conversion continued with the rest of the records until the entire system was ready by October 1993.

Today, 54 workers use the imaging system to handle four important applications: driver review, driver control, driver's licenses, and car dealer licenses. Each day up to 15,000 documents are scanned into the system and ready for processing within 24 hours.

The system automatically routes a record to the next available worker. When the document images come on screen, data from the driver's mainframe file appears in a window on the screen simultaneously. Based on the information in the document images, the worker posts an action to the mainframe – usually a revocation or suspension of the driver's license – and then moves on to the next case.

At night, all the data concerning the day's actions is downloaded from the mainframe to the imaging server where letters are generated. One copy of the letter is saved as an image to the driver's electronic file; the other is printed out for mailing the next day.

According to an internal audit, the division's imaging system will pay for itself in five years. When plans were drawn up to digitize the state's drivers' licenses, cost estimates for a new system were \$1.6 million. Instead, the division spent \$100,000 to add the capability to the existing FileNET system.

In October 1995, the Division's Driver Control Bureau received the Silver Award in Imaging World magazine's annual top 100 customers and users competition.

According to McBride, the low-cost upgrade was no fluke. "We did a good job designing a system that could expand for future applications," she said. "From the beginning we designed the original system as always having the capability of being a division-wide system."

What made the project such a success? McBride credits the partnership forged between the division and FileNET, and the fact that the division, not the vendor, determined what the system was going to do for the workers. Carter agreed. "We were unwilling to settle for anything less than what we wanted," he said.

Another reason for the system's success was the involvement of the users during the design, development, and implementation of the system. "We started from day one selling the system to the users," said Carter. The way to do that is not to try

and hide any problems from them. "We met with the users on a daily basis and encouraged their involvement and input," he explained. Added McBride: "Everybody bought off on the project. They really felt that they were part of the success story."

The Kansas Division of Vehicles' document imaging system consists of:

- Three FileNET scanners (two duplex, one simplex)
- One optical disc jukebox containing 12-inch discs
- Two FileNET servers
- Four printers
- 54 workstations

The entire system runs on an Ethernet network and has a Token Ring connection that provides access to the mainframe where the drivers' data files are located. FileNET software was used for the imaging applications, the workflow, and the databases.

In addition, Kansas DOT makes significant use of the GPS W/EDGE product to maintain and manage engineering drawings, CADD drawing files, and road and bridge construction documents. The W/EDGE product integrates with the FileNET backend server and repository and streamlines the access to critical road and bridge construction files for rapid review and distribution. GPS provides a scaleable, automated file retrieval/tracking system for CADD construction plans and related information, as well as access to addendums, change orders, and as-bid/as-constructed stages.

The engineering CADD drawing integration, including redlining and multiplayer support via the GPS W/EDGE solution, is shown in Figure 12-7.

The contact information for this project is:

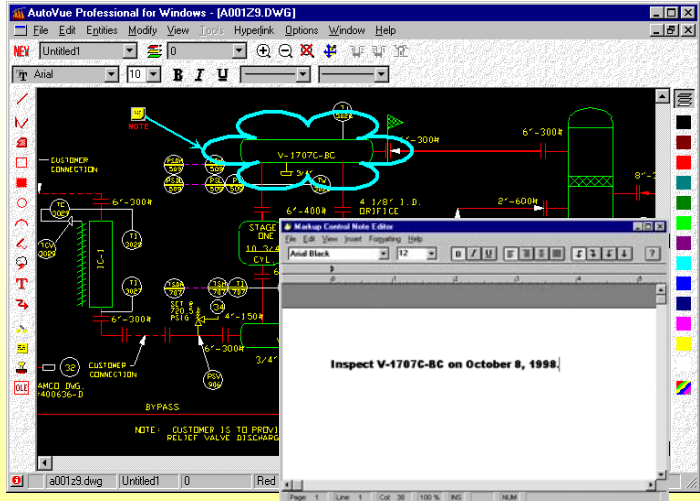
Kansas Department of Transportation
915 Harrison, Room 754 - Docking State Office Building
Topeka, KS 66612-1568
785-296-3585

Figure 12-7 GPS W/EDGE at Kansas DOT


Covansys
FROM THE INSIDE OUT™

GPS W/EDGE at Kansas DOT - Redlines / Viewing

- ❖ View 200 plus Engineering and Business Formats
- ❖ Markup / Redline / Annotate 200 plus Engineering and Business Formats
- ❖ True Web Integration™ w/ W/EDGE / Panagon IDMS
- ❖ Security can be Managed by Markup Layer



The screenshot displays the AutoVue Professional for Windows interface. The main window shows a technical drawing with various components and dimensions. A redline is visible, and a 'Markup Control Note Editor' window is open, displaying the text: 'Inspect V-1707C-BC on October 8, 1998'. The interface includes a menu bar, a toolbar, and a status bar.



A decorative graphic element consisting of a blue and white zigzag pattern above a solid green rectangle.

12.4.2 Virginia Department of Motor Vehicles

The Virginia Department Motor Vehicles (DMV) has undergone a full business process reengineering and technology assessment to examine the use of digital imaging and workflow technologies and investigate the use of more efficient business processes within the agency.

Specific areas of focus include:

- Mail-in driver license renewals and associated review and approval processes
- Mail-in vehicle license renewals
- The use of barcodes to assist in the scanning, indexing, and sorting process
- Forms processing, OCR, mark sense, and forms redesign opportunities (Figure 12-8).

The key contact on this technology case study is:

Jan Bond
Technology Contracting Officer
Tel: 804.367.8077
Fax: 804.367.6338
E-mail: dmvjpb@dmv.state.va.us

Figure 12-8 IDMS Bar Code Processing / Optical Character Recognition (OCR)

Covansys
FROM THE INSIDE OUT™

Bar Code Processing / OCR

OCR Engine Extracts:

- a) Bar Codes
- a) Alphanumeric Data
- b) Mark Sense Fields

Motor Vehicle Division PERMANENT FLEET APPLICATION

Application Type: permanent fleet registration — (1) one or more vehicles owned and registered to the same entity. A person or company may register a fleet on an annual basis, so that all the vehicle registration expires in the same month.

Allocated Permanent Fleet Registration — A fleet fleet of permanent vehicles, unless the company has retail locations in two or more states and has opted to have permanent registration credentials in the vehicles. Requires completion of an Allocated Fleet Application which must be filed annually.

Business Type: Individual Partnership Corporation LLC Other (If applicable) Federal Employer Identification Number (FEIN)

Business Name: John Citizen City: _____ State: _____

Residence Address: _____ City: _____ State: _____

Mailing Address: _____ City: _____ State: _____

Contact Person: _____ Phone: _____ Fax: _____

Applicant: Full name, no initials, if no middle name, write "none". Title: Sales Officer, Purposes, Corporate Officer (President, Vice President, Secretary, etc.) or Director. If more space is needed, attach a separate sheet.

Residence Address: _____ City: _____ State: _____

Business Address: _____ City: _____ State: _____

Business Address: _____ City: _____ State: _____

Business Address: _____ City: _____ State: _____

Number of Vehicles in Arizona Fleet: _____ Registration Expires: _____ (Indicate the desired month of expiration.)

Vehicle weight 85,000 lbs. gross vehicle weight (GVW) must be reported to the nearest Revenue Division on Form 2200 Heavy Highway Vehicle Use Tax Return with Schedule 1. A copy of the form and schedule must be filed with the Motor Vehicle Division at the time of registration renewal.

Attach a list of the vehicles to be included in the Fleet (please provide plate, vehicle identification number, year and model, or a copy of the vehicle registration. Mail this application and the list or copies to the address above. If more than one fleet is desired, an additional application must be completed).

Certification: Individual — Requires signature of the owner indicated above.
Partnership — Requires signature of all partners indicated above.
Corporation — Requires signature of the officer indicated above.
Limited Liability Partnership — Requires signature of the member/manager indicated above.
Limited Liability Partnership — Requires signature of all partners indicated above.

I certify that the information above is true and correct, and that this business will comply with the laws of the State of Arizona.

Owner, Partner or Officer Signature: _____ Date: _____ Title: _____

Signature: _____ Date: _____ Title: _____

If you have any questions, please call Phoenix (602) 712-6173, Tucson (520) 629-6808, elsewhere in Arizona (602) 251-5866, (TDD service) Phoenix (602) 712-3222, statewide (800) 324-6425. Thank you.

12.4.3 State of Missouri Department of Motor Vehicles and Drivers Licenses

The State of Missouri Department of Motor Vehicles and Drivers Licenses decided to implement forms-processing software to capture data directly from the driver's license and vehicle registration renewal application forms. Missouri DMV standardized on electronic forms processing software from the TiS group out of Ramat Gan, Israel, to provide this functionality.

The DMV receives approximately 20,000 pages per day from its uniform field offices and contracted fee offices throughout Missouri. The forms are scanned using Bell + Howell scanners at the DMV's main office in Jefferson City, and the scanned images are processed with TiS' software. The captured data is then

uploaded to the DMV's mainframe application. The data is also used for the retrieval of documents from microfilm.

In addition, both fax gateway and Internet access to mission critical documents are under evaluation. The specific application scenarios are shown in Figures 12-9 and 12-10.

Figure 12-9 IDMS Fax Gateway Integration

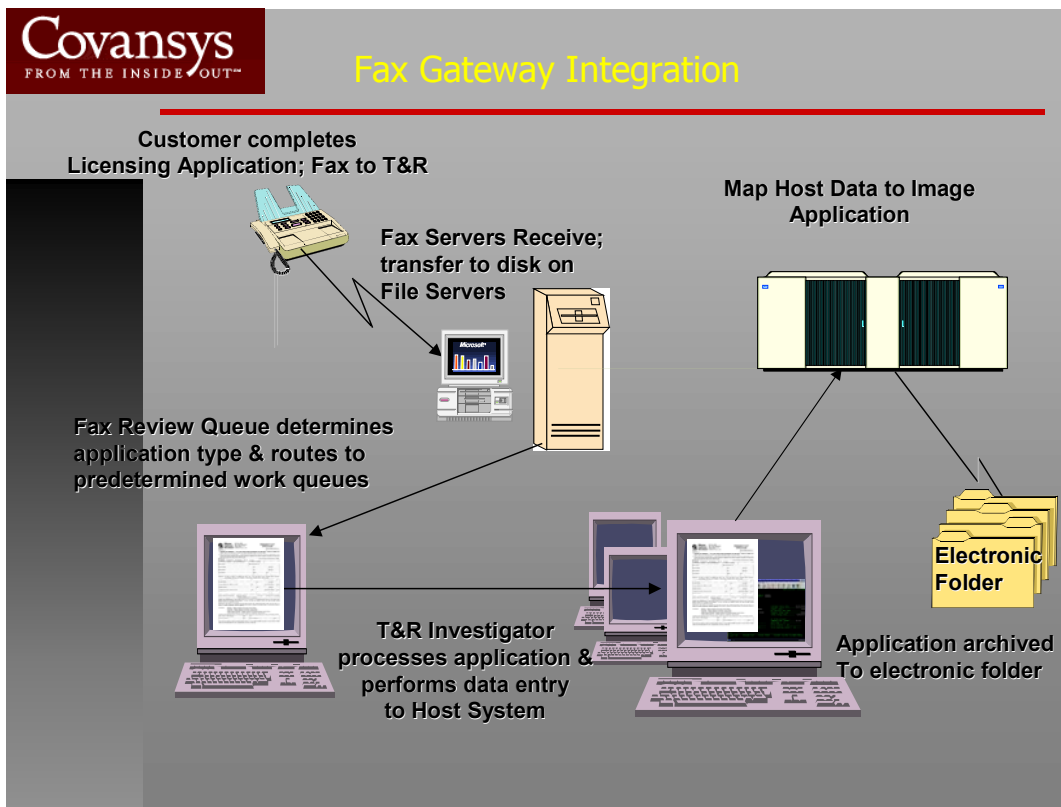
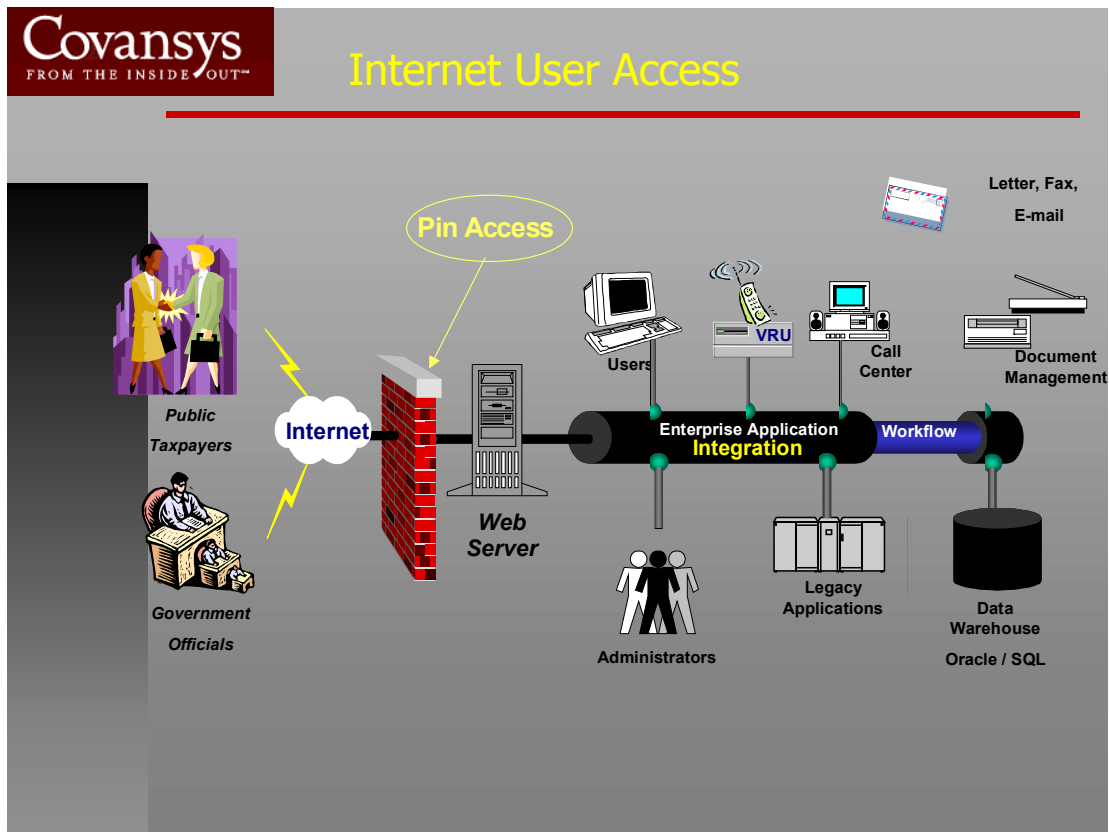


Figure 12-10

IDMS Internet User Access



12.4.4 State of North Dakota DMV

The North Dakota DMV has implemented a digital licensing system based on open client/server standards. North Dakota recently signed a seven-year contract with Unisys Corp. to provide instant license issuance for the state's 400,000 drivers. Unisys uses client/server technology to produce digital licenses at 26 permanent sites throughout the state. Each site has a video camera, video printer, handheld scanner, imaging workstation, and license printer. The handheld scanner is used to digitally capture the driver's signature. The computers are connected via an information network to a single database located in Bismarck, the state capital. The database stores demographic information about North Dakota's drivers, while a separate server stores photos and fingerprints. The state originally wanted to keep all data on the mainframe, but the costs would have been prohibitive. Using the latest imaging technology has enabled North Dakota to provide a mobile licensing service for communities located too far away from an online site. Roving examiners can run a licensing system from a

standard-sized van. The only difference is that drivers receive a temporary license first.

Contact is: Doug Faiman
Director of Technology
701-328-2560

12.5 OTHER TRANSPORTATION APPLICATIONS

12.5.1 City of Buffalo Bureau of Parking Violations

The City of Buffalo, New York, Bureau of Parking Violations is aggressive in pursuing payment of parking violations. For many years, however, the bureau was saddled with older computers and an inefficient data entry system. Efficient data entry and document management were critical to recovering this key revenue stream for the city.

Mounting paperwork bottleneck and substantial lost revenues led to the decision to implement a forms-processing solution to reduce data entry and provide more efficient capture of forms-based information. The new system is built around OCR *for* Forms™, a user-friendly, innovative information capture software system developed by Microsystems Technology of Tampa, Florida. The software reads information from a scanned or faxed document and converts it into ASCII text in a computer database. It has the capacity to process information automatically from documents – such as case tickets, hearing requests, vehicle registration, and ticket dismissal notices – in hand-printed, machine-printed, bar-coded, or check-boxed form.

A Paperless Paper Trail

Thanks to the new software, a paper-intensive practice has been transformed into a virtually paperless operation. Using the software, the bureau has eliminated its old documentation method, one that involved cramming manila folders with slips of paper clipped together.

These days, when a respondent pays a parking ticket, the paid ticket, including the envelope's postmark, is scanned into the new system and the computer generates a unique number and assigns it to that ticket—creating a file. Having the postmark on hand is critical to proving whether a ticket was paid on time and whether late penalties can be billed. If a respondent contests a late fee, the bureau has immediate and visual proof of the postmark date literally at their fingertips.

When a question arises about a ticket, all of the documentation is grouped together and easily retrievable from the database. Only the identification number generated during the initial scanning of the ticket is needed. The product allows the database to be searched by that single number and pulls up a complete picture of the ticket and its status.

12.6 STATE OF TEXAS DOT

12.6.1 Overview

The State of Texas DOT (TxDOT) provides a best practices model of a coordinated agency-wide response to an IDMS initiative and the need for IDMS solutions across the agency. In July 1999, TxDOT established a formal program to address a growing concern regarding numerous document management initiatives without a coordinated agency-wide approach.

As a result of the TxDOT IDMS Project, the agency established a business strategy and technical framework for implementing 'true' enterprise document management systems based on consistent business models, operating environments, and enterprise rules. At TxDOT, 'enterprise' refers to a consistent approach for implementing document management systems across the agency.

To begin the initiative, TxDOT placed all planned document management initiatives on hold agency-wide and hired an industry IDMS consultant to guide the project team. The core IDMS project team, working with a project board and sponsors, defined the following vision statement:

"Meeting the unique document management needs of individual business areas while supporting universal document sharing requirements of TxDOT to improve operational performance"

This vision established TxDOT's long-term strategy for IDMS represented by the team's project goal: *"managing the wide variety of documents (business and engineering) that exist in TxDOT with one architecture and one usage model"*.

The major components of this goal are defined as follows:

- One architecture — development and implementation of a consistent technology environment as an enterprise platform for document management systems
- One usage model — development of a second implementation of a standard operating model that is relevant across the enterprise, to ensure that document management systems are used consistently.

By following this approach, TxDOT has been able to:

- Implement a consistent document management platform (not application) that can be extended throughout the agency

- Develop a model for universal access to enterprise document-based information repositories
- Define uniform implementation and administration functions across workgroups and departments
- Implement consistent document and information management process standards
- Establish a coordinated project approach for document control and management agency-wide

12.6.2 IDMS Project Deliverables

The deliverables from each of the TxDOT IDMS Project phases are described in more detail in this section.

Phase 1: Define Organizational Requirements for Enterprise Document Management

The 'IDMS Usage Model and Requirements Document' developed an agency-wide model for defining document management requirements. This model established the foundation for an IDMS architecture utilizing the existing infrastructure and technologies where possible. In addition, this deliverable defined specific IDMS requirements by application type, document services, component technologies, and records management requirements.

The business models defined during this phase included the following:

- Document Life Cycle Model defines the stages of activity in the life cycle of a document that varies by document collection and business process
- IDMS Usage Model — defines a standard operating model that is relevant across application types, document life cycles, and document usage patterns

Phase 2: Establish an IDMS Framework

The 'IDMS Architecture and Strategy' established a universal IDMS technology framework. The IDMS core solution architecture was developed to be compatible with the agency core technology architecture. In addition, the IDMS deliverable defined the on going document management standards and sub-system standards, standard operating environment, and overall IDMS application framework. The operating standards and enterprise rules defined during this phase included the following:

a) Operating Environments:

- Workflow Model — standards for authoring tools/capture tools and process, document organization hierarchy and classification/indexing, document process actions, and permissions
- Repository Model — standards for active and inactive document repository design, including retrieval functions and access models
- Publishing Model — standards for electronic document distribution and publishing

- Retention Model — standards for compliance with agency record retention, scheduling, archiving, and destruction
- Security Model — standards for document management application security, document services security, and network security

b) Enterprise Rules:

- Agency-wide business rules that must be followed by every implementation
- Specific business rules that apply based on specific document management usage patterns

Phase 3: Evaluate and Validate IDMS Solution Provider(s)

The 'IDMS Solution Matrix' was developed to address the complexity of the document management environment by offering multiple solutions to meet the unique needs of individual business areas. The IDMS Solution Matrix established a strategic IDMS platform provider to function as the foundation for enterprise document management. The IDMS platform provider selected was FileNET Corporation. In addition to the FileNET tools, TxDOT also supports and utilizes Project Wise from Bentley Systems (for technical and engineering applications) and Alchemy Solutions from Information Management Research (for document publishing and archiving applications).

In order to assist end users with the selection of the appropriate vendor solution, the IDMS team developed a Web-based (Intranet) application called 'Bill of Materials (BOMS) Profiler'. This application guides individual project teams through a pre-defined interview process to collect data regarding the targeted application or process. IDMS Profiler produces reports or 'profiles' that recommend a specific solution and identify the standard operating models and enterprise rules that apply.

Phase 4: Prototype the IDMS Architecture and Strategy

This phase tested the assumptions and recommendations made in the first 3 project phases and resulted in 'IDMS Prototype Results and Project Recommendations'. The prototype projects included several current users as well as the implementation of new document management systems. In conjunction with this deliverable, the IDMS team published a document-naming model. This model was developed by a project task force to establish consistent enterprise document naming for document repositories, document folders, individual documents, and required system-assigned processing fields.

Phase 5: Create an IDMS Implementation and Support Plan

This phase established an 'IDMS Implementation and Support Model' that defined the roles and responsibilities of IDMS teams (centralized and decentralized) and the on-going requirements for IDMS implementation and support. The goal of this effort was to develop a business model that defines the organization structure and resources required for supporting document management technology as a 'core technology' agency-wide. In addition, an agency-wide EDMS project methodology was established to standardize IDMS project tasks and activities.

TxDOT IDMS Project Implementation Phase

Since the completion of the formal TxDOT IDMS Project in August 2000, the agency has been moving forward with IDMS implementation projects that were placed on hold in July 1999. These projects range from the addition of new document services (such as Web access) for current document management systems to the design and implementation of new applications. Table 12-1 lists the current production document management systems at TxDOT:

Table 12-1 Current IDMS Production Systems at TxDOT

Division (District/Office)	Application or Process	Solution Vendor
Finance Division	Voucher Image Processing	FileNET
Motor Carrier Division	Motor Carrier Credentialing System	FileNET
Houston District	District-Wide Document Management	FileNET
Right of Way Division	Historical Right of Way Documents	FileNET
Administration Division	Commission Documents	FileNET
Texas Turnpike Authority	Toll Road Documents	FileNET
General Services Division	Plans On-Line	Alchemy
Odessa District	District Construction Records	Alchemy
Yoakum District	District Construction Records	Alchemy

In addition to these users, the central EDMS team is working with numerous project teams to guide them through the IDMS project methodology, which includes completion of the IDMS Profiler on-line interview questionnaires and analysis of the profile reports.

12.6.3 Contact Information

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12.7 OTHER IDMS APPLICATIONS WITHIN ARIZONA

12.7.1 Industrial Commission of Arizona

The Industrial Commission of Arizona has been using imaging and workflow since October 1991 to manage more than 175,000 injury claims filed by state workers each year. The \$1.8 million project, which included an overhaul of the commission's mainframe, was designed and built by FileNET Corp. using their Workflow software and Hewlett-Packard servers to automatically route incoming claims to a staff of 80-plus workers.

According to Larry Etchechury, the commission's director, the agency completely redesigned its business rules to take advantage of imaging technology and workflow. Where there were once as many as eight daily "hand-offs" of incoming documents between workers, now claims are scanned and indexed to the commission's mainframe database, then automatically routed to claims technicians for processing.

The technicians can easily generate documents on a case by automatically transferring data from the mainframe to the document using FileNET's workflow software. This feature has reduced the 12-minute injury-form-completion process down to only 30 seconds. Along with other features, such as work volume monitoring by supervisors, the system has eliminated an enormous filing backlog while boosting overall productivity in the range of 33 percent to 50 percent. "This system simply would not be as functional without workflow software," stated Etchechury.

12.7.2 Arizona Compensation Fund

Where a high volume of particles follow an exact line in a repetitive fashion, production workflow systems often produce faster response time, increased productivity, improved service, and tighter quality control, as well as greater accuracy. This classification applies to high-performance document routing and transaction applications, such as claims processing or credit approval.

Arizona's Compensation Fund handles workers' compensation claims for 60% of the employers in the state. With 10,000 new documents per day pouring into its Phoenix headquarters, manual processing proved cumbersome.

According to Judy Link, the project manager in charge of automating the fund, "The typical problem with manual file handling is that legal, investigations, claims reps, supervisors, the medical-payment area, and managed-care people all require access to claims files – sometimes at the same time".

The state implemented an Eastman Software imaging and workflow solution to streamline the claims and medical-payment functions. Paper documents are captured in the mailroom and sent through high-speed scanning. A workflow queue designed for each claims clerk assigns case files according to established rules. If one individual's workload is too heavy, reassignment can take place.

12.7.3 Arizona Department of Liquor Licensing Control

Arizona Department of Liquor Licensing Control uses a Business Process Reengineering (BPR) tool for modeling, simulation, and analysis to reengineer licensing issuance and investigations using imaging technology. They employ Simprocess from Workflow Simulation Company (CACI) International, a leading BPR tool for modeling, simulation, and analysis. The department was able to reduce the time it took to issue a license by 25% while driving down the cost of issuance by 33%. Costs related to license investigations were reduced by 80%.

12.8 SPECIALIZED IDMS / DOT APPLICATIONS

This section examines the specialized application areas addressed by implementations and deployments of IDMS within the DOT sector. The following applications are a sample of IDMS solutions available to ADOT as the agency moves forward with the business planning and design model for the use of IDMS within ADOT.

12.8.1 Request for Proposal (RFP) Generation

Numerous Department of Transportation groups have employed specialized software to construct customized RFP documents for issuance to the vendor community. The specialized software recognizes the need for specific RFP

documents that detail requirements and objectives within the transportation environment and also recognizes the time, effort, and labor that are required to assemble a focused, competitive RFP for release to the vendor and integration community.

Software solutions such as the RFP Generation Company (ESPS) CoreDossier solution provide quick, seamless integration of critical document types, such as MS Word, .PDF, CAD/CAM files, and other critical documents into a single, unified RFP document ready for release to the general sales community.

The Indiana Department Transportation (IDOT), for example, uses ESPS CoreDossier to rapidly compile and author RFP documents for posting out to the Web. The ability to assimilate component documents irrespective of format, and to condense and compile this information into a single, coherent RFP has supported an effective, timely procurement and acquisition model at IDOT.

12.8.2 Engineering Documents

The primary target documents relative to engineering include road construction, bridge construction, and general building and facility architectural drawings. The specialized IDMS application used across various state transportation agencies to address this requirement is the Green Pasture Software (GPS) W/EDGE product.

ADOT has already elected to purchase the W/EDGE solution to maintain and manage the range of engineering drawings within the agency. The decision to incorporate W/EDGE within your solution portfolio is supported on a best-practices basis by the use of the product in other states.

W/EDGE has been deployed at large state transportation groups, including Pennsylvania DOT, Kansas DOT, Texas DOT, and Indiana DOT to manage engineering drawings, CAD/CAM files, and other supporting documents in the engineering environment.

The California Department of Transportation (CalTrans) has deployed W/EDGE to support approximately 4,000 design engineers using CAD/CAM on a daily basis. They also employ the solution to maintain and manage GIS files.

Any deployment or use of the MicroStation engineering environment is a good candidate for use of the W/EDGE solution to maintain and manage this information in an organized, intuitive folder management system.

13. BRIDGE GROUP IDMS EVALUATION

13.1 EXECUTIVE SUMMARY

Covansys conducted a review of the implementation of the Integrated Document Management System within ADOT's Bridge Group as part of agency-wide evaluation of document management opportunities within ADOT. Interviews and system walkthroughs were conducted, along with a review of pertinent documentation in January 2002. The system was just entering production with all users trained at that time. The IDMS uses out-of-the-box functionality from FileNET and can best be characterized as an electronic file cabinet for Bridge Group documents, primarily documents associated with specific structures and inspections.

Overall, the Bridge Group IDMS appears to be a successful deployment of electronic document management technologies. The users are becoming accustomed to the application, documents are gradually being entered, and the likelihood of long-term success is high. This pilot application has the potential to serve as the springboard for increased usage of IDMS within ADOT. The products are robust and well supported by strong vendors, the technology fits within the Information Technology infrastructure and standards established within ADOT, and several potential extensions of the technology exist within ADOT. These potential applications include:

- Extending the usage of the current application beyond the main campus in Phoenix
- Actively managing creation and update of CAD drawings (workflow)
- Adding additional users and document types into the current application to extend the usage
- Providing Internet/Intranet access to the Bridge Group documents

In order to fully realize the potential for deploying IDMS in other units at ADOT or extending the usage of the current application, several factors need to be considered. These factors include the receptivity for adopting new computer systems by the user community, adherence to the appropriate State Information Technology standards, any incremental staffing or staff savings encountered, applicable records retention/acceptable media standards, and impact on the current information technology infrastructure.

Covansys offers the following recommendations for ADOT consideration:

- Adopt FileNET/GPS as standard
- Consider custom user interface

- Extend usage of current system

We believe that these recommendations offer the greatest opportunity to extend IDMS within ADOT and provide the greatest leverage for the current IDMS investment.

13.2 CURRENT SITUATION

Covansys, as part of our contract to provide an overall evaluation of IDMS options for ADOT, was tasked with reviewing the implementation of the IDMS solution within the Bridge Group. This section provides an overview of our observations based on review of relevant documentation and on-site meetings conducted on January 17, 2002, between representatives of ADOT's Bridge Group and Covansys.

The documents reviewed by the Covansys team included the original Request for Proposal for the Bridge Group IDMS implementation, listings of the Bridge Group documents to be included in the IDMS, and the manual for the Bridge Group Integrated Document Management System (BG IDMS). Additionally, the Covansys team had the opportunity to observe a user training session on the BG IDMS.

The remainder of this section provides our understanding and observations on the implementation of the BG IDMS.

13.3 OBJECTIVES FOR IMPLEMENTING IDMS

Covansys reviewed the initial ADOT Solicitation Number T00-190051 used to procure the Bridge Group IDMS. From that solicitation, we extracted the following objectives for the IDMS implementation:

- Improve efficiency of information access, sharing, maintenance, and management
- Centralize information and documents relative to specific bridges or highway projects
- Handle documents in a variety of formats including paper, digital, and film
- Avoid issues associated with utilizing out-of-date documents
- Move towards a paperless environment
- Act as a pilot implementation site for the IDMS technology within ADOT
- Comply with the applicable IT standards

These objectives were reaffirmed during our on-site meetings with ADOT personnel. Furthermore, these are fairly typical objectives for most

implementations of IDMS technologies, whether in a Department of Transportation environment or not.

Of particular importance, in our opinion, is the objective to serve as a pilot implementation for integrated document management within ADOT. Successfully meeting this objective while providing the anticipated benefits to the Bridge Group will provide the greatest overall benefit to ADOT. It will ease the acceptance of IDMS technology within other groups, shorten the implementation cycles by leveraging lessons learned, and, ultimately, accelerate the benefits that other DOTs have experienced in implementing these technologies.

13.4 PROJECT PROGRESS TO DATE

The Bridge Group IDMS has been in the design, development, and implementation cycle for approximately one year. As is customary in these types of pilot implementations, several approaches have been tested for electronically managing the Bridge Group document collection. The result was that the FileNET Panagon Content Services product was implemented in an off-the-shelf configuration. The project is now in full production.

13.4.1 IDMS Capabilities

The original configuration of the Bridge Group's IDMS included the FileNET Content Services product designed to provide the repository for the Bridge Group documents, along with a companion product from Green Pasture Software (GPS), W/EDGE, which provides specialized functionality for managing engineering drawings. The following lists provide a high-level overview of the functionality provided by these products.

FileNET Content Services Functionality

- Central repository for all electronic file types
- Library services, check-in/ check-out
- Management of multiple versions and renditions (file formats) for each document
- Security profiles for users and documents
- Search/retrieve based on index attributes or full text content of documents
- Viewing of over 200 file formats, including most image and office document formats

GPS W/EDGE Functionality (not currently implemented)

- Management of CAD files, including cross reference files
- Viewing and markup of several CAD file types in both vector and raster formats

- Management of the drawing life cycle from creation through review and approval
- Specialized publishing of CAD files to print/plot and Web

As previously noted, the current IDMS is utilizing only the FileNET Content Services capabilities listed above. The Bridge Group implementation team determined that a phased rollout of functionality would be more acceptable to the various user groups.

13.4.2 Document/Folder Structure

The BG IDMS is organized according to a pre-set folder structure within a single library. This folder structure includes:

- Staff—personnel-related documents
- Bridges— reports, specifications, photos, etc
- Projects— project documents for each major design completion phase

Currently, most of the information in these folders consists of electronic files created by Bridge Group personnel since August 2001. At the current time, there are very few engineering drawings in the system.

13.4.3 Security/User Roles

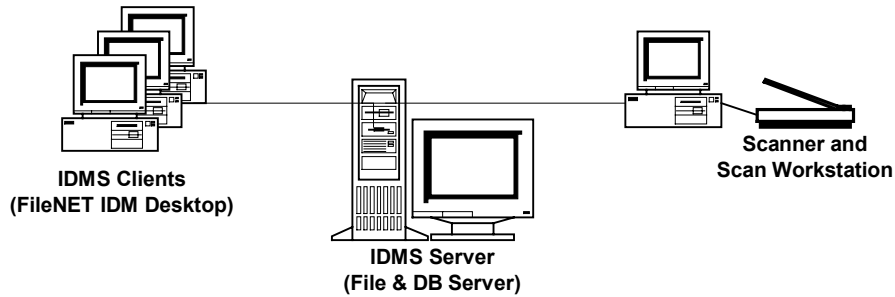
The security profiles established for the IDMS are very basic and appropriate for this application. All of the users have the ability to add and view documents in the system, since the documents are intended for general usage with no confidentiality. System administration privileges are restricted to very few people who can set up new users, create additional folders and libraries, delete documents, and perform backup and restoration activities.

13.4.4 Current Product Architecture

The IDMS system is implemented within the normal ADOT information technology infrastructure. The application is deployed in a standard client-server model with FileNET Content Services residing on a Windows 2000 Server and using SQL Server 2000 as the underlying relational database. The clients are the standard ADOT workstations with a mixture of Windows NT 4.0, Windows 2000, and Windows98 as operating systems. The only IDMS component installed at the clients is the FileNET IDM Desktop product, which provides library search and document-viewing capabilities. The IDMS system also incorporates a single scanner, which handles A- or B-sized documents and scans the documents into PDF format. Currently, due to bandwidth limitations, all of the clients are within

the main ADOT campus. Figure 13-1 provides a simplistic overview of the system configuration.

Figure 13-1 Bridge Group IDMS Configuration



13.5 ORGANIZATIONAL DYNAMICS

The IDMS implementation within the Bridge Group is typical of most information system deployments in regards to organizational readiness for the new system and related business process changes. Organizations are typically somewhat resistant to changing their business practices due to the uncertainty of how the staff's daily routine will be impacted. Accordingly, it is important in an information technology project to identify a 'quick win' scenario for a pilot group who will embrace the new system and act as an internal marketing resource for the larger organization. Within the Bridge Group, this has been achieved by reducing the functionality delivered to the out-of-the-box capabilities of FileNET Content Services and deferring deployment of the GPS portion of the solution. This provides a comparatively easy application to learn with basic document check-in, search, and retrieval functionality.

Based on our discussions with the Bridge Group system sponsors and our observation of the user training session, this appears to be the case. Users are able to file new documents into the IDMS, apply a few indexing fields, and then have the documents available for retrieval and viewing by the whole group. At this time, all of these activities are performed using the features of the FileNET IDM Desktop product. This product is very generic and, as a result, the screens used to define the simple or complex search criteria are somewhat cumbersome. Should ADOT desire to roll this application out to a broader user group, consideration

should be given to creating a more streamlined user interface for the search screen.

The life cycle management of engineering drawings, which is provided by the GPS W/EDGE product, will be more difficult to implement, as this represents a more radical change in daily activities for the engineers and designers within ADOT. Our experience, however, is that this functionality is a natural addition to the IDMS capabilities once the users are accustomed to dealing with electronic documents versus paper documents. Exposure and daily usage of the IDMS will facilitate this expansion, should ADOT choose to deploy this capability.

From the organizational perspective, we believe that the IDMS will be accepted by the Bridge Group and used to increase the efficiency of the Group. Additionally, this will offer ADOT the opportunity to use the Bridge Group as a pilot implementation and showcase for other business units considering the adoption of IDMS technologies.

13.6 SUMMARY

The current implementation of FileNET Content Services within the Bridge Group looks to be set up for success. Ownership of the applications by key business users has been established. Users have been trained in a very interactive hands-on fashion designed to promote comfort with the application. The application being deployed exercises standard out-of-the-box functionality from FileNET, which has been demonstrated to work for many other organizations. The design of the application does not dictate that any backfile conversion be done to make the application usable. The users can start to input documents on their own timetable and receive the benefits of the application immediately. Over time, as the on-line document population grows, the utility of the application to a broader user base will become greater.

13.7 FUTURE DIRECTION

This section discusses the potential future impacts of both internal and external issues on the Bridge Group IDMS. The intent of this section is to identify items that ADOT may want to consider in extending IDMS to other business units or in extending the current Bridge Group implementation by adding users or functionality.

13.7.1 FileNET and GPS as Vendors

One primary area of concern in the adoption and extension of document management technologies across ADOT is the viability of the product vendors. Currently, the marketplace has many products with similar IDMS capabilities. Only minor technical or functional differences exist between many of the products. Therefore, the relative strength of the vendors is often a prime determinant in the product selection process. No organization wants to commit hundreds of thousands of dollars to a product selection if the vendor may not be in business 12 months after the purchase.

Fortunately in the case of the Bridge Group, the market leader, FileNET, has been selected as the primary product vendor. FileNET is considered the leader by most industry analysts, such as Gartner Group, due to its longevity, installed base, financial strength, and product functionality. ADOT can be reasonably assured that the FileNET products will be continually enhanced and fully supported. Additionally, as major changes occur in the information technology infrastructure, such as new operating system releases, FileNET will release products that are compatible with these new technologies.

Green Pasture Software (GPS) is a much smaller software vendor than FileNET. The W/EDGE product has been developed to be the engineering drawing management application that utilizes FileNET's Content Services repository. At this point, very few other packages developed on FileNET provide this functionality. Accordingly, GPS has the majority of the engineering drawing control market for FileNET customers. This dominant position could potentially change in the future, as new products and companies enter this market. We believe this risk to be slight, however, as the market is limited and the cost of entry is fairly high. Major Fortune 500 customers, such as ExxonMobil, have selected the FileNET/GPS products as corporate standards, which helps to validate ADOT's selection.

13.7.2 Possible Application Areas

At the present time, the Bridge Group IDMS is being used as a general electronic file cabinet for pertinent documents. The most logical extension of the IDMS is to add active management of the drawing creation/revision life cycle by deploying the W/EDGE product within the design area. Another possible extension is to make the drawings and records available to remote internal and selected external users, such as ADOT contractors, by implementing the Internet/Intranet capabilities of FileNET. Another potential application is to integrate GIS maps with FileNET, such that all the pertinent records for a bridge are linked to the bridge symbol on the appropriate map.

13.7.3 Other Considerations

Several factors need to be taken into account as ADOT considers the decision to extend the current IDMS implementation. These factors include the receptivity for adopting new computer systems by the user community, adherence to the appropriate State IT standards, any incremental staffing or staff savings encountered, applicable records retention/acceptable media standards, and impact on the current information technology infrastructure. The remainder of this section will examine each of these factors in greater detail.

13.7.4 User Environment

The primary factor to consider in deploying additional IDMS applications is the receptivity of the target user community to new computer applications and the corresponding changes in work habits. The user community must perceive value in the new application and be willing to undertake the learning necessary to adopt the application, or it is doomed to fail. Based on the fact that the target population is highly technical, fear of technology is not an issue. However, normal resistance to change will be encountered as everyone has a certain resistance to changing work habits. The new applications cannot be perceived as too radical a departure from today's work habits and, likewise, cannot afford to perform poorly or contain clearly erroneous data/documents.

Given that one of the potential applications involves the management of CAD drawings, utilization of the W/EDGE product will permit users to continue working in the MicroStation environment as the primary user interface and have the FileNET/W/EDGE environments somewhat masked by this. This feature should aid in the overall acceptance of the application should ADOT decide to deploy it.

Another aspect of the user environment to consider is the ease of use and 'friendliness' of the user interface. The current IDMS utilizes the standard FileNET Panagon IDM Desktop as the user interface. This interface is very generic and is not optimized for the functionality required by ADOT. Before deploying additional applications, consideration should be given to creating a custom user interface that provides only the specific functionality required and is tailored to the users within ADOT.

13.7.5 Information Technology (IT) Standards

A primary concern with extending the IDMS applications is to ensure adherence to the applicable State IT standards. Currently, the IDMS application is deployed as a client/server application using Microsoft Windows 2000 or NT as the

operating system and SQL Server 2000 as the database management component. Typical factors to consider for future implementations will be selection of appropriate thin-client architectures, look and feel of any customized graphical user interfaces (GUIs), and support for emerging IT directions such as desktop operating system upgrades. At this point, we believe that the FileNET and GPS products support most common IT architectures and will stay current with operating system and database releases from Microsoft.

13.7.6 Staffing

Impact of the extension of IDMS in ADOT on the staff within the organizational units must be considered. Two senior individuals within the Bridge Group are handling the system administration and training requirements for the current IDMS implementation as collateral duties. If more applications or departments are added, a similar staff allocation will be required to support the IDMS system. The requirement is typically part-time for a knowledgeable individual, sometimes called a SuperUser. The SuperUser typically has a broad background in the business operations of the organization and can answer questions on document index structures along with any workflow or work process questions.

13.7.6 Archive/Records Standards

As more documents are entered into the IDMS, clear policies must be established on document retention and document media types. For DOTs, document retention is often linked to the life of the structure or road, which is typically decades long. Additionally, many states have strict standards on records retention and permissibility of maintaining only electronic records. Finally, for records retention periods of decades, consideration must be given to technological obsolescence—will there be machines and software available several decades in the future to read historical records? For these reasons, many states are opting to maintain microfilm copies of records as the primary medium, in addition to any electronic versions.

There is precedent, however, for maintaining only electronic records in highly regulated industries, such as the nuclear power industry. The Nuclear Regulatory Commission does permit utilities to maintain electronic records in unalterable formats, such as TIFF or PDF, written on unalterable media, such as Write Once, Read Many (WORM) optical platters. These platters are subject to periodic sampling to ensure that there has been no degradation and that the files can be read by currently available technology. In the case of ADOT, the policies for electronic record retention should be established based on guidance from the State Records Management group and ADOT counsel for legal ramifications.

13.7.7 Infrastructure

Any extension of IDMS to other areas must account for any infrastructure limitations. For example, a typical scenario would extend access to the current Bridge Group IDMS to remote field offices over the Internet/Intranet. In order for the system to be usable, sufficient network bandwidth must exist in these locations to support retrieval and viewing of the files. Other areas of concern include disaster recovery, including secure backup of the server and compatibility of the desktop machines with the requirements to support FileNET.

13.8 RECOMMENDATIONS

This section provides our overall recommendations for the Bridge Group IDMS and future extensions of this application.

13.8.1 Adopt FileNET/GPS as Standard

The investment made to date in the Bridge Group IDMS appears to be paying off as more and more users adopt the system and the document population expands. The underlying product, FileNET Panagon Content Services, appears to deliver all the necessary functionality. We recommend that this product, along with the companion product for engineering drawing control, Green Pasture W/EDGE, be adopted as the future platform for IDMS implementations within ADOT.

13.8.2 Consider Custom User Interface

The current user interface for the Bridge Group IDMS can be complex to use, particularly for construction of complex searches. Consideration should be given to creating a user-friendlier interface for the application prior to adding users and groups. This will not be a major effort but will greatly lower the training burden for users. As part of this decision, consideration should be given to rolling out a browser-based user interface. This will ease the system administration burden by avoiding updates at the desktop and will provide a more familiar interface to the users.

13.8.3 Extend Current IDMS

The current IDMS is constructed as a general document repository. As such, it is amenable to easy addition of document types and users with minor configuration changes.

14 CONCLUSIONS

The 18 month IDMS study commissioned by ADOT determined a significant case for electronic document management exists within the organization. The research and analysis conducted by the study team allowed all key stakeholders and participants to ‘freeze the action’, evaluate the core business processes and document flows, and reexamine ADOT’s document handling procedures and approach.

The IDMS study found compelling reasons to proceed with IDMS technologies and incorporate IDMS solutions as an integral, strategic information technology within ADOT. The widespread use and adoption of consistent, industry standard IDMS technologies will help eliminate many of the inefficiencies and barriers, which impede the flow of information, which often occur today in the manual work environment at ADOT. Sound implementation of IDMS technologies using a phased project implementation approach also promises to unify a number of the different business cultures within ADOT, and provide a cohesive framework for obtaining and leveraging information to the benefit of the traveling public.

The IDMS Study determined that significant potential benefits exist in the following areas:

- File integrity and ability to locate specific mission critical files at the workstation, using an intuitive, user friendly interface based on Windows technology, eliminating the need to physically search through files, folders, microfilm archives or other manual storage system.
- Backup and security of documents and ability to create mirror image Write Once, Read Many (WORM) optical disks for secure storage of documents in off site facilities
- Electronic forms processing and ability to capture information and data directly off the scanned images without the need to perform manual data entry, using optical character recognition (OCR) and other automated systems
- High volume, high compression storage on 5.25” WORM optical disks which will help reduce or eliminate the footprint and manual filing work associated with current 4 drawer filing cabinets
- Fax gateway automation and the ability to send and receive digital images as fax documents directly in or out of the IDMS environment, as a component of the current e-mail systems such as Notes or Microsoft (MS) Exchange.
- Automated workflow and work management techniques which will allow supervisors and administrators to obtain a top-down view of the work in process, make any adjustments to individual work queues, and balance the flow of work, such as licensing applications within the work environment.
- Production metrics and the ability to determine how much work has been performed within a specific time window, and the ability to assign dollar costs to work

performed within ADOT, and determine appropriate return on investment in terms of new full-time-equivalent employees (FTEs) and new technology investments in network, workstations, and server components.

- Virtual access to documents as scanned or stored electronic files, irrespective of user location, across a wide area network, or via Internet/Intranet access, using a thin client, browser based workstation, allowing ADOT personnel and engineers for example to examine roadway maps and construction diagrams without the need to physically copy and transport the document to their location.

Achieving, however, this basic set of capabilities and benefits using IDMS is not an overnight proposition. Our study determined that there still exists a fundamental need or attachment to the paper document within the organization, and before any new IDMS technology implementation occurs, the respective IDMS sponsors must ensure that the related cultural and business factors are addressed within the target user community. It is important to recognize, however, that this issue is not unique to ADOT, and the various other ADOT groups the Research Team contacted during the course of the study also spoke to the need for human factors reengineering, with special focus on training and education.

The research resulted in a series of key conclusions:

- a. Physical documents remain the preponderant media of choice within the organization for the storage, retention, and dissemination of information, in comparison to other information forms. While use of mainframe and departmental systems, microfilm/fiche archive systems and other information delivery systems is of course significant, the vast majority of information, both from an office and engineering perspective, still resides in paper format, managed in document archives, folders, and filing areas. This large base of paper-based information represents a significant opportunity for further reengineering and automation, allowing ADOT to streamline work processes and elevate service levels to customers.
- b. Documents, by themselves, do not constitute a limiting factor in terms of productivity and efficiency. Current document handling procedures and techniques, however, within the organization can be significantly reengineered and enhanced through the strategic use of IDMS technologies. Today at ADOT, documents tend to reside in functional silos corresponding to individual divisions and business units, and the opportunity to share and leverage these assets across functional groups is limited. By digitizing document information and converting this information to electronic format, ADOT will gain quantum increases in the organizational efficiency and ability to coordinate and share mission critical documents across the organization, while also enhancing security and access to sensitive files managed within the secure IDMS information framework.

- c. A wide array of business cultures, perspectives, and technical competencies exist within the organization. Any future IDMS deployment must have substance and depth to cross departmental boundaries and effectively share information between stakeholders within a secure access framework. The phased implementation of IDMS across departments within ADOT is expected to help bridge the different business units and allow more rapid flow and sharing of mission critical documents and files between stakeholders.
- d. It is important to note that the primary hurdles to IDMS as a source of innovation and improved productivity, are not, in the final analysis, technological in nature or related to any significant limitations in the IDMS architectural model. Virtually all industry standard IDMS solutions on the market are production ready and worthy. Instead, the gating factors discovered during the course of the IDMS study, which could impede application of IDMS are primarily cultural in nature, and related to the human factors within the organization, and not related to a specific technology model. Any implementation of IDMS, therefore, must be accompanied by the appropriate training and indoctrination modules, which allow end users to become fully educated and aware of IDMS capabilities and understand that IDMS technologies are being deployed not to reduce staff or head count per se, but instead to enhance productivity, efficiency and ability to serve the traveling public.

In addition, other DOT organizations such as Pennsylvania, Kansas, and Texas speak to a general flattening of the organization, decision hierarchies, and overall business culture within the organization, which accompany enterprise use of IDMS. In these comparable DOT organizations, the business culture, and corresponding decision hierarchies tend to compress and flatten, as information and documents from the IDMS repository now move laterally and transparently through the organization between informed stakeholders, who are then positioned to more effectively serve their clients on a collaborative, ‘just in time’ basis.

Before application of IDMS, the work culture found in these peer DOT organizations was reactive in nature and heavily dependent on the access to physical files and dossiers. In these DOT organizations, prior to the application of IDMS, and similar to today’s work model at ADOT, the movement of physical paper folders and dossiers between desks would define the actual work process and work could only proceed as quickly as documents could move between participants.

The application IDMS brought broad changes to these other DOT organizations in terms of business culture, as evidenced by improved task compression, reduced information float, and increased end user convenience to information. Reactive, paper based work environments became transformed into knowledge enabled and efficient work cultures, defined by transparent

access to document information and increased ability to anticipate change and respond quickly to customer requirements.

- e. Legal issues with respect to the storage and management of digital records are not fully resolved within the State of Arizona. Therefore, the recommendation is that physical paper and microfilm be stored off site after the originals are scanned and captured within the IDMS, until such time that digital images are fully accepted and certified within the court system of the State of Arizona. In the meantime, the recommendation and finding of this report is that senior stakeholders continue to monitor the situation and status of the legality of optical storage within the State of Arizona via the State Archivist group and perhaps also influence pending legislation and decision making in this area.
- f. Legal issues notwithstanding, the end user community will make significant strides and gains in productivity, efficiency, and ease of access to on-line IDMS information through the use of industry standard IDMS systems such as FileNET Panagon or Documentum. Impact points with respect to IDMS include increased user morale, better collaboration between stakeholders, reduced contention for documents and other intellectual assets, and lower turnover as ability to service the customer increases.
- g. The infrastructure exists today to deploy the propagate IDMS technologies as a mainstay technology within ADOT. Successful IDMS deployment has already occurred within the Bridges Group. It is simply a question of replicating the approach and methodology used within the Bridges Group, to further grow IDMS within the organization, and achieve the appropriate desired return on investment from the technologies.
- h. FileNET Panagon is the recommended IDMS platform of choice, based on our analysis of the available market offerings, including eiStream, Documentum, Spicer, Green Pastures Software, Cimmetry, and other current office and engineering IDMS products. FileNET Panagon offers a consolidated suite of imaging, workflow, report management, and content/library management, over either a 'thick client', local workstation environment or via an industry standard 'thin client' user workstation. In addition, FileNET provides the necessary extensions and application program interface (API) tools, which allow access to geographic information systems (GIS) and engineering drawing based information. The successful use of the existing FileNET system in the Bridges Group at ADOT also provides further precedent for the use of FileNET in other areas within ADOT.
- i. Because the IDMS market is dynamic and evolving, in terms of higher capabilities and performance at a lower overall purchase price, we recommend that ADOT continue to research the market and stay informed of current IDMS capabilities and features, either through direct contact with supplier groups such as FileNET and Documentum, or via interface to the appropriate

product suppliers. It would also greatly benefit the audience interviewed for this study to have a working internal session which allow current vendor products to be demonstrated and presented to user groups from across the agency, to further increase awareness of IDMS and the respective benefits which are generated from the technology.

- j. Furthermore, involvement with the respective IDMS industry trade groups such as the Association for Information and Image Management (AIIM) and the Association of Records Management Administrators (ARMA) is also recommended. Direct involvement with the local chapters of these organizations will allow ADOT participants to hear first hand accounts of other implementation success stories and IDMS application scenarios, both within the public sector and in commercial operations such as finance and insurance. This experience will help ADOT acquire more education and background and help building the necessary reference framework for moving forward with IDMS within the organization.

The IDMS Study was the first step towards normalizing the organization's approach to IDMS technologies, and establishing a baseline in terms of the specific benefits which could be achieved at a departmental level, through the use of a consistent, standardized IDMS vision and approach. The recommendation of the Study Team is to continue to explore the use of IDMS technologies, target 1-2 specific new high value areas where immediate results and efficiencies can be generated from IDMS, and invoke the necessary acquisition and procurement guidelines and strategy to go forward with IDMS. The implementation of IDMS within a consistent enterprise strategy and framework will then reinforce ADOT's position as a pacesetter with respect to new technologies and a leader in innovation and staff productivity within the State of Arizona.

In addition to these results and conclusions, which may be leveraged internally within ADOT, a significant number of lessons and information from the IDMS study engagement can be leveraged by external, peer DOT organizations, who may themselves be at an early evaluation of IDMS solutions. These lessons can be extended to peer DOT organizations in other states and locations within the country, so as to better position and align them appropriately with respect to IDMS technologies.

Specific lessons and opportunities for other state DOTs include the following:

- a. It is critical to establish consensus and gather requirements across the organization as had been accomplished through the IDMS study. IDMS systems cannot exist as separate 'islands of technology' isolated from the mainstream information infrastructure of the DOT, instead they must be designed and implemented as integral components of the information strategy and architecture of the organization. Therefore the use of an initial research and recommendations report prepared by a 3rd party consulting organization is advised.

- b. IDMS technologies should not be positioned and leveraged as a driver of reduced costs through headcount or FTE reduction within DOT organizations. Instead, the key mission and goal of IDMS implementations is to reinforce best practices methodology and increase productivity and efficiency within the organization, so that significantly more work and production is accomplished by the existing headcount. And while IDMS can better establish costs metrics, by quantifying the costs associated with work performed by a specific business unit or headcount, IDMS systems in themselves are not a vehicle necessarily to be deployed to cut costs, headcount or expenses. Instead, they should be viewed as drivers of new productivity and service levels, and cost justification should flow from there.
- c. IDMS technologies should be positioned where they have the most visible impact on customer and client service. Position and target IDMS to run initially in high visibility customer service environments where access to physical files and historical records is a limiting factor, such as driver licensing, title and registration, vehicle certifications and similar high visibility applications.
- d. Recruit the end user community early and often into the IDMS planning and design process. Of all the major technology groups, IDMS technologies are largely driven at a grass roots level by end users who are frustrated with the lack of access and control over mission critical files. They simply want to serve external and internal customers better using more effective tools. It is imperative that planners welcome and solicit feedback from the end user community and any major decisions with respect to IDMS do not occur in a vacuum without the solid input from end users.
- e. A properly planned and implemented IDMS system, such as the case within the Bridges Group, has the effect of unifying people and stakeholders within the organization. IDMS should be viewed as a vehicle to move information beyond functional silos and allow transparent access to documents and files by people between multiple, different departments, files which ordinarily would have been inaccessible to people outside the direct physical boundaries of the department or functional business unit. By allowing documents to move transparently as secure electronic files between different functional groups, eliminating the constraint of the hardcopy, new synergies and opportunities for collaboration can develop between different user groups, in turn increasing organizational productivity and efficiency.
- f. New IDMS systems rarely cost justify themselves based on fixed dollar savings. Nominal savings can result from the elimination of microfilm, excessive duplication costs, warehouse and transport costs. However, the

final justification for the systems is through enhanced productivity and ability to better leverage staff and knowledge workers to perform higher value work within a flatter, more efficiency service organization.

- g. Finally, the any impediments to change are not, in the final analysis, technologically based in nature. Instead, successful implementation of IDMS requires careful analysis and understanding of the cultural factors within the organization and the ability to bring multiple, often competing business cultures in harmony with the final objectives of the IDMS deployment. Any IDMS deployment or initiative has to cover a myriad range of competing business cultures, from roadway engineering, to bridge construction, to accounts payable and office management. The goal and mission of the IDMS deployment will be to offer extensions to all these work environments and allow them to coordinate work and activities via the seamless, uniform and reliable access to documents provided by a distributed IDMS.

In summary, an IDMS study like the one conducted for ADOT is a first step towards normalizing an organization's approach to IDMS technologies, and establishing a baseline in terms of the specific benefits which could be achieved at a departmental level, through the use of a consistent, standardized IDMS vision and approach. The recommendation of the Study Team is to continue to explore the use of IDMS technologies, target one or two specific new high value areas where immediate results and efficiencies can be generated from IDMS, and invoke the necessary acquisition and procurement guidelines and strategy to go forward with IDMS. The implementation of IDMS within a consistent enterprise strategy and framework will then reinforce ADOT's position as a pacesetter with respect to new technologies and a leader in innovation and staff productivity within the State of Arizona and as an example for other state DOTs with similar needs.

APPENDIX

A.1 ADOT INFRASTRUCTURE TECHNOLOGY

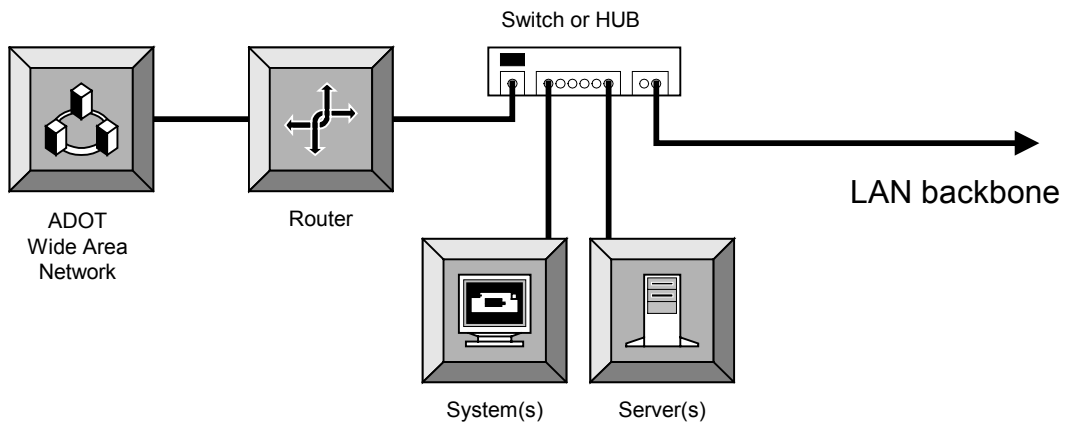
A.1.1 Enterprise Application Matrix

Table A-1 Enterprise Applications Matrix

Name of Application	Type of Application	Criticality	Type of Traffic flow	Protocol Used by Application	# of Users	Data Stores
Exchange	E-Mail	High	Client Server	TCP/IP	4,400	48
IIS	Intranet/Internet	High	Client Server	TCP/IP	4,800	7
SQL	Database	High	Client Server	TCP/IP	4,500	14
Construction Reporting Enterprise Application (FAST)	Construction Reporting	High	Client Server	TCP/IP	450	1
Maintenance Reporting Enterprise Application (PECOS)	Maintenance Reporting	High	Client Server	TCP/IP	400-500	1
CADD	Drafting	High	Client Server	TCP/IP	200	4
B2 Cash Drawer	Fee Accounting	High	Client Server	TCP/IP	2,500	70

A.1.2 Basic LAN/WAN topology at ADOT remote site office

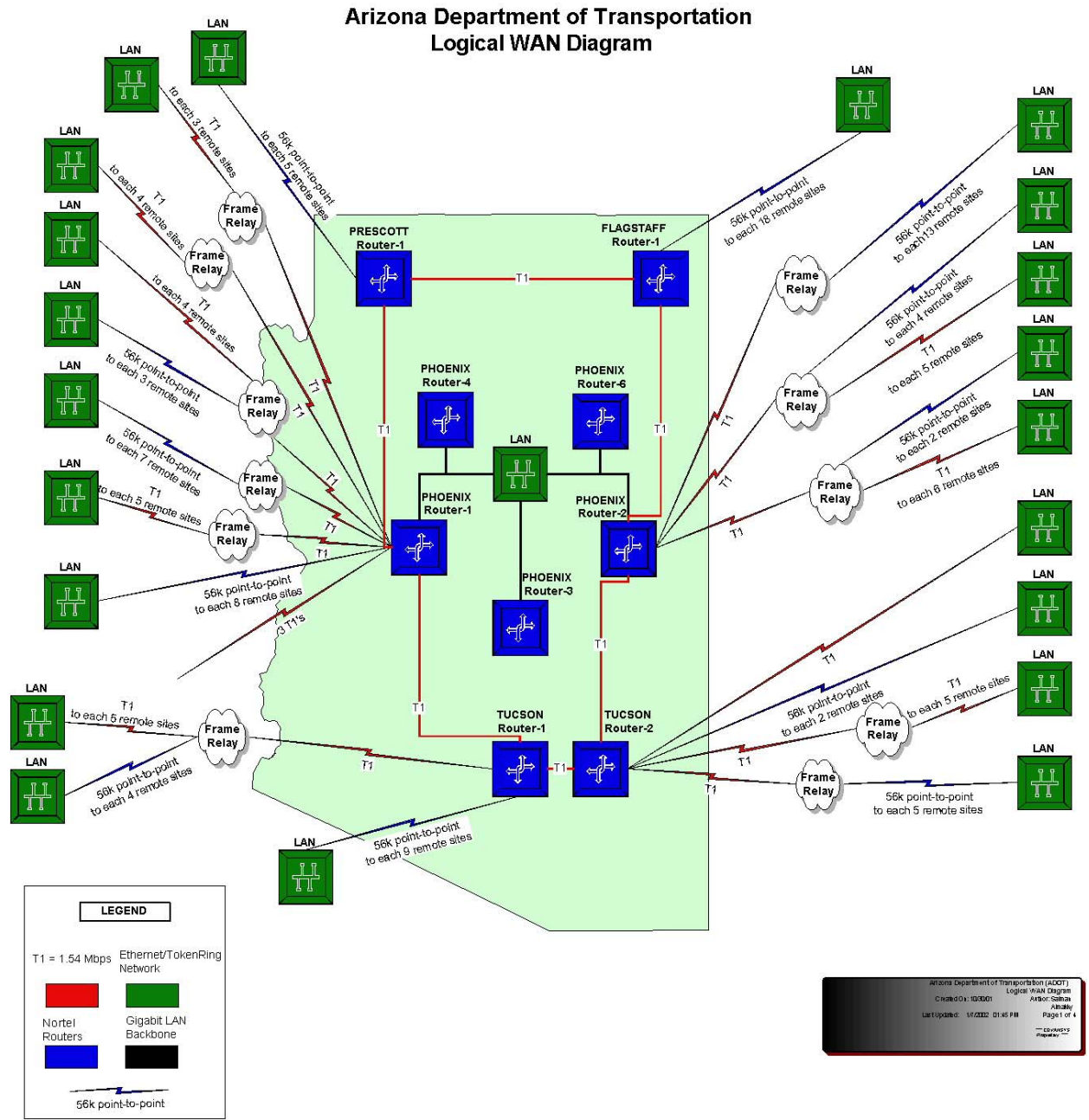
Figure A-1 LAN/WAN Topology at ADOT remote site office



A.1.3

ADOT Logical WAN Configuration

Figure A-2 ADOT Logical Wide Area Network Configuration



A.1.4 ADOT WAN Circuit Speeds and Sites LAN Topologies

a) Backbone Router: Phoenix Router 1

- **T1 Sites**

Equipment Service:	Ethernet-Token Ring
T&R 28th / Washington:	Ethernet-Token Ring
- **56K Sites**

PDE Ehrenberg:	Ethernet
2501 W Georgia:	Ethernet-Token Ring
Red Mountain, S Price Rd	Ethernet-Token Ring
Showlow:	Ethernet-Token Ring
MVD Ajo:	Ethernet
MVD Coolidge:	Ethernet-Token Ring
MVD Superior:	Ethernet-Token Ring
MVD Parker:	Ethernet-Token Ring

b) Backbone Router: Phoenix Router 1 (Frame Relay 1)

- **T1 Sites**

WAN T1 Frame Relay (FR) Test:	Ethernet
Arizona Highways Magazine:	Ethernet
Prescott Valley:	Ethernet-Token Ring
Yuma Dist III:	Ethernet-Token Ring
Glendale Constr (Julio):	Ethernet-Token Ring

c) Backbone Router: Phoenix Router 1 (Frame Relay 2)

PDE Kingman:	Ethernet
PDE Topock:	Ethernet
PDE Yuma I-8 EB:	Ethernet
PDE Yuma B-8:	Ethernet
PDE San Louis:	Ethernet
PDE Sandera:	Ethernet
PDE Lukeville:	Ethernet

d) Backbone Router: Phoenix Router 1 (Frame Relay 3)

- **T1 Sites**

Cutter Aviation:	Ethernet
Aeronautics:	Ethernet
Camp Verde:	Ethernet-Token Ring

Avondale: Ethernet
Phoenix Landscape: Ethernet

- **56K Sites**
Recker Road: Ethernet
Buckeye Const: Ethernet

e) Backbone Router: Phoenix Router 1 (Frame Relay 4)

- **T1 Sites**
MVD Kingman: Ethernet-Token Ring
MVD Bullhead City: Ethernet-Token Ring
MVD Lake Havasu: Ethernet-Token Ring
MVD Holbrook: Ethernet-Token Ring

f) Backbone Router: Phoenix Router 1 (Frame Relay 5)

- **T1 Sites**
Wickieup: Ethernet
Holbrook: Ethernet-Token Ring
Kingman: Ethernet-Token Ring

g) Backbone Router: Phoenix Router 2

- **T1 Sites**
MVD 3737 N 7 Ave: Ethernet
MVD Central Permits: Ethernet
T1 Test Labs: Ethernet
23rd Ave & Durango: Ethernet-Token Ring
Traffic Eng Central Ave: Ethernet
Human Resource Development Center (HRDC): Ethernet-Token Ring
- **56K Sites**
El Salado: Ethernet
56K Test Lab 28th Washington: Ethernet

h) Backbone Router: Phoenix Router 2 (Frame Relay 1)

- **T1 Sites**
Traffic Signals: Ethernet
9827 N 32nd St: Ethernet-Token Ring
Black Canyon: Ethernet-Token Ring
Sky Harbor, McDowell: Ethernet-Token Ring
Emergency Medical Services(EMS) Capitol: Ethernet-Token Ring
Salt River: Ethernet

- **56K Sites**
 - Deer Valley Ethernet-Token Ring
 - West Area Office Ethernet-Token Ring
 - East Area Office Ethernet-Token Ring
 - EMS Country Club Ethernet-Token Ring

i) Backbone Router: Phoenix Router 2 (Frame Relay 2)

- **56K Sites**
 - Roosevelt Ethernet
 - St. Johns Ethernet
 - Springerville Ethernet
 - Indian Pine Ethernet
 - Needle Mountain Ethernet
 - Seligman Ethernet
 - Chambers Ethernet
 - Keams Canyon Ethernet
 - Kayenta Ethernet
 - Ganado Ethernet
 - Page Maint Ethernet
 - Snowflake Traffic Ethernet
 - Littlefield Maint Ethernet

j) Backbone Router: Phoenix Router 2 (Frame Relay 3)

- **T1 Sites**
 - Casa Grande Maint Ethernet
 - Payson Ethernet
- **56K Sites**
 - Superior Maint Ethernet
 - Winslow Maint Ethernet
 - Gila Bend Maint Ethernet
 - Williams Maint Ethernet
 - Wickenburg Maint Ethernet
 - L. Antipole Maint Ethernet
 - Gray Mountain Maint Ethernet

k) Backbone Router: Phoenix Router 3

- **T1 Sites**
 - MVD Central Region Ethernet
 - MVD Valley Auto Dr Ethernet
 - MVD Scottsdale, Parade Ln Ethernet

MVD 221 E Olympic Dr	Ethernet-Token Ring
MVD Mesa	Ethernet-Token Ring
MVD 20626 N 26 th Ave	Ethernet
MVD Mesa 7613 E Main	Ethernet-Token Ring
MVD Chandler	Ethernet-Token Ring
MVD Tempe	Ethernet-Token Ring
MVD Goodyear	Ethernet-Token Ring

- **56K Sites**

MVD Buckeye	Ethernet-Token Ring
300 W Washington	Ethernet-Token Ring
MVD Sun City	Ethernet-Token Ring
WAN Point to Point (PTP) Test	Ethernet-Token Ring

l) Backbone Router: Phoenix Router 3 (Frame Relay 1)

- **T1 Sites**

MVD 13201 N 7 th St	Ethernet-Token Ring
MVD Mesa Drive	Ethernet-Token Ring
MVD Yuma	Ethernet-Token Ring
MVD Sedona	Ethernet-Token Ring
MVD Casa Grande	Ethernet-Toke Ring
MVD Apache Junction	Ethernet-Token Ring
- **56K Sites**

MVD 3877 N 7 th St	Ethernet
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m) Backbone Router: Phoenix Router 3 (Frame Relay 2)

- **T1 Sites**

MVD Flagstaff Birch Road	Ethernet
MVD Avondale	Ethernet-Token Ring
MVD Surprise	Ethernet-Token Ring
MVD Glendale	Ethernet-Token Ring
MVD 48 th St/Broadway	Ethernet-Token Ring
- **56K Sites**

MVD Wickenburg	Ethernet
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n) Backbone Router: Phoenix Router 3 (Frame Relay 3)

- **56K Sites**

MVD Teec Nos Pos	Ethernet
MVD Windows Rock	Ethernet
MVD Chinle	Ethernet

MVD Tuba City	Ethernet
MVD Colorado City	Ethernet
Fredonia Maint	Ethernet
MVD Littlefield	Ethernet

o) Backbone Router: Phoenix Router 4

- **56K Sites**

WAN Point to Point (PP) Test	Ethernet
WAN PP Test	Ethernet
WAN PP Test	Ethernet
WAN PP Test	Ethernet
WAN PP Test	Ethernet

p) Backbone Router: Phoenix Router 4 (Frame Relay 1)

- **T1 Sites**

Wide Area Network Frame Relay (WAN FR) Test
Ethernet

q) Backbone Router: Prescott Router 1

- **56K Sites**

MVD Clarkdale	Ethernet-Token Ring
Cordes Junction	Ethernet-Token Ring
Site A	Token Ring
Site B	Token Ring
Test Segment	Ethernet

r) Backbone Router: Flagstaff Router 1

- **56K Sites**

Flagstaff Huntington	Token Ring
Railhead	Token Ring
4 th St	Token Ring
East Lab	Token Ring
EMS Showlow	Token Ring
EMS Page	Token Ring
MVD Showlow	Ethernet-Token Ring
MVD St. Johns	Ethernet-Token Ring
MVD Payson	Ethernet-Token Ring
MVD Page	Ethernet-Token Ring
MVD Fredonia	Ethernet-Token Ring
MVD Williams	Ethernet-Token Ring
MVD Williams	Ethernet-Token Ring

MVD Winslow	Ethernet-Token Ring
MVD Springerville	Ethernet-Token Ring
Port of Entry (POE) St. George	Ethernet
Site A	Token Ring
Site B	Token Ring
Site C	Token Ring

s) Backbone Router: Tucson Router 1

<ul style="list-style-type: none"> • 56K Sites 	
MVD Tucson City Court	Ethernet-Token Ring
MVD Davis-Montham AFB	Ethernet-Token Ring
MVD Douglas	Ethernet-Token Ring
MVD Bisbee	Ethernet-Token Ring
MVD Benson	Ethernet-Token Ring
MVD Kearny	Ethernet-Token Ring
MVD San Manuel	Ethernet-Token Ring
MVD Wilcox	Ethernet-Token Ring
MVD Green Valley	Ethernet-Token Ring

t) Backbone Router: Tucson Router 1 (Frame Relay 1)

<ul style="list-style-type: none"> • T1 Sites 	
MVD Tucson North	Ethernet-Token Ring
MVD Sierra Visto	Ethernet-Token Ring
MVD Nogales	Ethernet-Token Ring
MVD Tucson East	Ethernet-Token Ring
PDE Nogales (fed)	Ethernet-Token Ring
<ul style="list-style-type: none"> • 56K Sites 	
PDE San Simon	Ethernet
PDE Douglas (state)	Ethernet
PDE Douglas (fed)	Ethernet
PDE Naco (fed)	Ethernet

u) Backbone Router: Tucson Router 1

<ul style="list-style-type: none"> • T1 Site 	
EMS Tucson	Ethernet
<ul style="list-style-type: none"> • 56K Sites 	
EMS Safford	Ethernet-Token Ring
MVD Claypool	Ethernet-Token Ring
MVD Safford	Ethernet-Token Ring
MVD Clifton	Ethernet-Token Ring

MVD CDL	Ethernet-Token Ring
Site A	Ethernet-Token Ring
Site B	Ethernet-Token Ring
Site C	Ethernet-Token Ring
Site D	Ethernet-Token Ring
Site E	Ethernet-Token Ring

v) **Backbone Router: Tucson Router 2 (Frame Relay 1)**

• T1 Sites	
Globe	Ethernet-Token Ring
Safford Dist	Ethernet-Token Ring
Benson	Ethernet-Token Ring
Tucson Const	Ethernet-Token Ring
Tucson Maint	Ethernet-Token Ring

w) **Backbone Router: Tucson Router 2 (Frame Relay 2)**

• 56K Sites	
Safford Maint	Ethernet
Douglas Maint	Ethernet
St. David Maint	Ethernet
Wilcox Maint	Ethernet
Oracle Maint	Ethernet
Nogales Maint	Ethernet
Three Points Maint	Ethernet

A.2 REQUEST FOR IMAGING UTILIZATION

REQUEST FOR DOCUMENT IMAGING IMPLEMENTATION



Arizona State Library, Archives and Public Records
RECORDS MANAGEMENT DIVISION
 1919 West Jefferson Street, Phoenix, Arizona 85009
 Phone: 602-542-3741 ● Fax: 602-542-3890 ● E-mail: rmd@lib.az.us

Authorized pursuant to A.R.S. §41-1348 (Violation of this statute is a misdemeanor crime.)		New req. <input type="checkbox"/>	Revised <input type="checkbox"/>	Date Submitted
State Agency <input type="checkbox"/>	Political Subdivision	Agency Name		
Org. Unit/Division		Office	Phone	
Address		City	AZ	Zip
Submitted By (Name)	Title	Signature X		
DESCRIPTION OF RECORDS TO BE IMAGED: (Include record series name as it appears on the retention and disposition schedule and list various documents included in the series.)				
Record Series				Retention (yrs.)
MICROFILM/FILM-BASED IMAGING (Briefly describe the filming application in the "Comments" area of this request.) <input type="checkbox"/>		ELECTRONIC/DIGITAL IMAGING (Complete the balance of this request.) <input type="checkbox"/>		
STUDIES PERFORMED: <input type="checkbox"/> Feasibility (attach copy)		<input type="checkbox"/> Cost/Benefit (attach copy)	<input type="checkbox"/> P.I.J. (attach copy)	
LIST HARDWARE BELOW:		LIST SOFTWARE BELOW:		
MIGRATION/EXIT PLAN FOR LONG TERM RECORDS (Retention of 10 years or more)				
<input type="checkbox"/> Migration/Exit Plan Adopted		<input type="checkbox"/> 5% – 10% System Cost annually Budgeted		<input type="checkbox"/> Vendor Source Code in Escrow
IMAGING SYSTEM HAS ABILITY TO COMPLETELY PURGE/DESTROY/EXPUNGE OBSOLETE RECORDS (IMAGES).				<input type="checkbox"/> Yes <input type="checkbox"/> No
OPEN SYSTEM ARCHITECTURE				<input type="checkbox"/> Yes <input type="checkbox"/> No
NONPROPRIETARY HARDWARE AND SOFTWARE				<input type="checkbox"/> Yes <input type="checkbox"/> No
IMAGE FORMAT		<input type="checkbox"/> TIFF with Std. Headers <input type="checkbox"/> Group 3 <input type="checkbox"/> Group 4 <input type="checkbox"/> Other:		
IMAGE RESOLUTION		<input type="checkbox"/> 200 dpi <input type="checkbox"/> 300 dpi <input type="checkbox"/> 400 dpi <input type="checkbox"/> Other:		<input type="checkbox"/> Bimodal <input type="checkbox"/> Grayscale
INDEXING		<input type="checkbox"/> O.C.R. <input type="checkbox"/> Manual <input type="checkbox"/> Number of fields:		BACKUP MEDIA:
COMMENTS:				
Approved by:			Approval Date	
Director, Arizona State Library, Archives and Public Records			Expires on (Approval date + 5 years)	