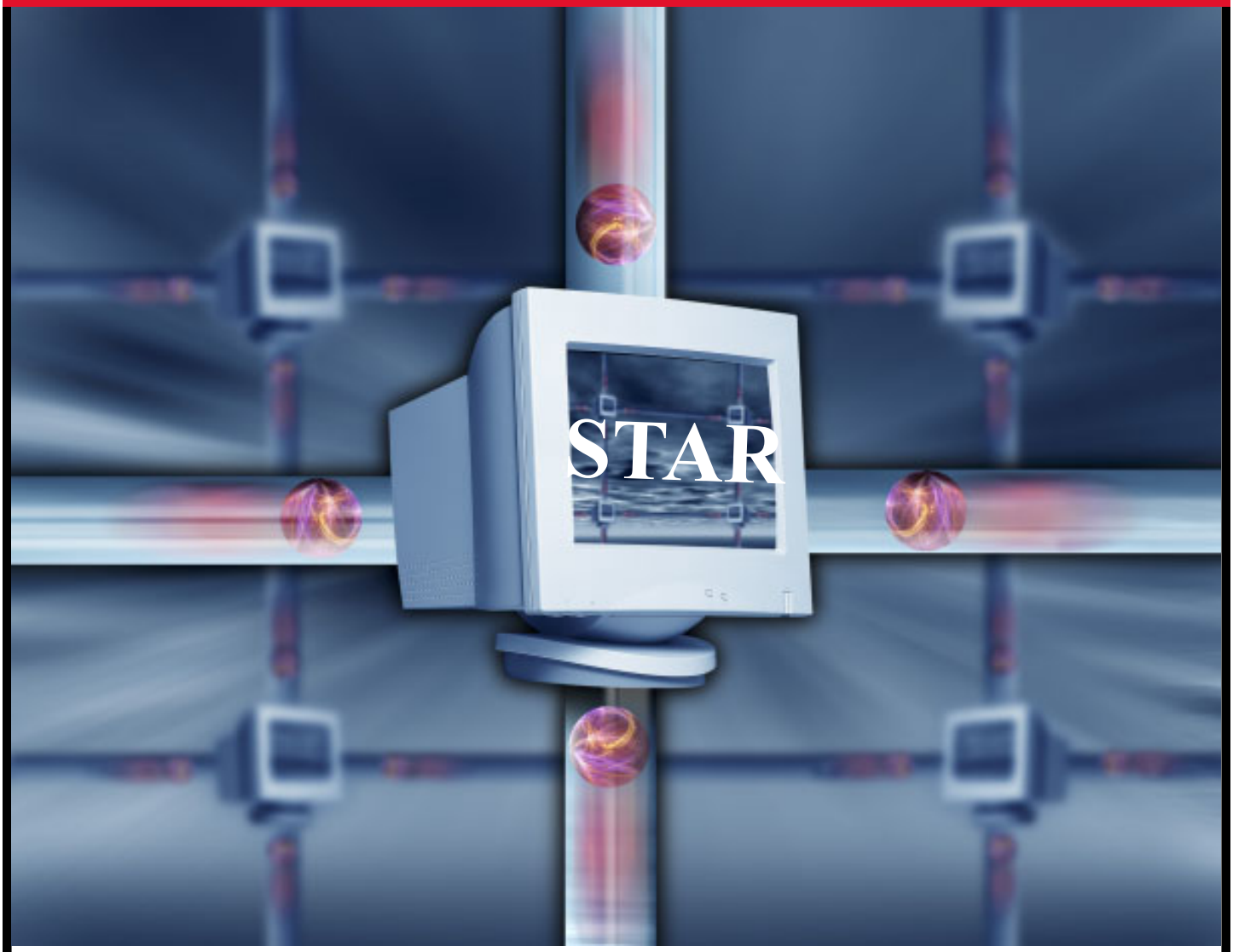
Strategic Technology Architecture Roadmap



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STAR

Strategic Technology Architecture Roadmap

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PUBLIC VERSION

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STAR 1.0

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Section 1.0

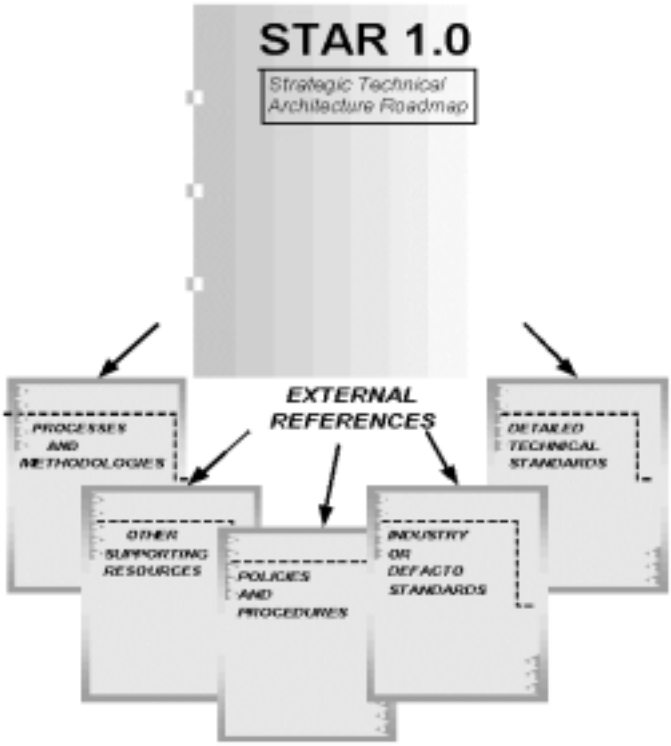
Preface

1.0 Preface

1.1 What is STAR?

STAR is our acronym for Strategic Technical Architecture Roadmap. STAR is a framework for <u>any</u> implementer of information technology within our enterprise – that is -- no matter <u>*who*</u> (Office of Information Technology, individual business units, a contractor or business partner, etc) the implementer might be.

STAR is a living document which serves as a high level reference for <u>*why, how, when, and what*</u> information technology should be implemented within our enterprise. STAR also serves as an index or pointer to other, more detailed, technical references/resources that compliment our technical architecture.



1.2 Who is the intended audience for this publication?

The intended audience for this and future STAR publications is anyone who conceives, plans, approves, manages, or implements information systems and technology within our enterprise.

1.3 Background

In May, 2003, the Nebraska Workforce Development, Department of Labor (NWD) embarked on a 60-day initiative with the goal of delivering our first version of a high-level technical architecture roadmap in preparation for future automation initiatives -- specifically, to define the target "future state" technology architecture for the Office of Unemployment Insurance's (OUI's) Benefit Payments System (BPS) modernization project. This deliverable, STAR 1.0, represents the successful outcome of this initiative.

1.4 What is technical architecture, and why is it important?

Technical Architecture can be defined as a business-driven set of processes, principles, and beneficial standards that steer the engineering of an organization's information/data systems, application portfolios, and technology infrastructure. By designing our future business information/technology systems within a framework of beneficial standards, we will be able to realize the most reliable and cost effective technology solutions that meet our functional business requirements.

Business Drivers for Enterprise-wide Technical Architecture

- Lower total cost of development/execution/ownership
- Faster time to market/implementation/operation
- Higher flexibility to change/modification
- Higher availability/reliability/security
- Higher ease of use/access/integration
- Reduced overall complexity
- Increased alignment of technology with business directions

Technical Architecture and Cost Savings

Gartner, an industry-respected advisor for the information technology and business community, says the following:

"When adhered to by infrastructure builders, the consistent use of products and methodologies through architecture can provide significant savings. Although hard to prove, savings estimates range from 10-20% of infrastructure costs."

1.5 What and who is information technology?

In STAR 1.0, we define the term "information technology" to denote, in the broadest sense, "the collections of data, applications, systems, and technologies found within our enterprise." Information Technology also happens to be the name of an office within the NWD organization. In order avoid misinterpretation, when referring to this office; we will use the acronym OIT (Office of Information Technology).

1.6 What are our next steps?

With formal adoption of STAR 1.0, all future OUI technology initiatives (including the BPS modernization project) will be developed in consideration of the principles and standards described therein. STAR will be updated regularly as business and technology drivers evolve through a formal administration and governance process (see Section 11.0).

Section 2.0

Executive Summary

2.0 Executive Summary

2.1 Background

This document, STAR 1.0, represents one of the principle deliverables resulting from a project task order awarded in May 2003. The project objective, "to deliver a strategic technology architecture roadmap, in support of the BPS modernization project, within 60 days", has been successfully completed.

2.2 Approach

Government and industry best practices were employed to deliver this "fast track" enterprise architecture project, including META Group (Enterprise Architecture Best Practices), and Zachman Framework (The Framework for Enterprise Architecture). Our approach to this project involved capturing high-level business knowledge from key business teams in order to gain an understanding of "future state" business processes, priorities, constraints, drivers, and opportunities. This business understanding was then used to formulate an optimal "business-driven" enterprise technology architecture roadmap, along with a governance process, which will serve NWD's needs well into the future.

2.3 Recommendations

A significant number of technological recommendations have resulted from the STAR 1.0 initiative and are presented within this document. These recommendations address key questions such as: 1) what is the optimal technology architecture to deliver a modernized BPS system today, which will also be flexible enough to accommodate our needs into the future? 2) What approach should be taken in development and migration to the new system? 3) How should the project be sourced? 4) Which specific technologies will be employed, and what is the organizational and training impact for us to support the new system? Highlights of these recommendations follow:

- N-tier architecture will be our strategic direction, and represents current industry best practices for developing new systems such as BPS. N-tier describes the architecture used to develop a vendor neutral, flexible, component-based, object-oriented, system based on open Internet technologies. (see Section 8.2)
- An incremental and iterative development approach will be employed to manage project complexity, and to reduce project risk. (see Sections 5.5 and 7.2.5)
- During the initial project development lifecycle, we will leverage existing and mature technology services offerings from our current state government technology providers (IMS and DOC) to reduce overall project risk. An evaluation of the "right-sourcing" of utility-style functions where appropriate and practical, will occur through the entire systems life cycle. (see Section 12.0)
- Assuming we build our system from the ground up, J2EE-based (Java) system architecture may afford us the most flexibility, provide us the widest variety of sourcing and hosting alternatives, and serve to minimize overall project risk. We have not completely ruled out a scenario where Microsoft .NET system architecture, adopted from another state's or vendor's model BPS system, or through a "ground up" development project, could also be a viable and cost effective alternative. (see Section 12.3)
- An enterprise-wide data warehouse, which is designed and deployed in conjunction with the BPS modernization project, will fulfill our future ad hoc and standardized (including federally

mandated) reporting requirements, in the most flexible and cost effective manner. (see Section 6.3)

- In parallel to the BPS system development, our overall Enterprise Security Architecture must be significantly revamped. A number of policy and technology initiatives must be implemented to provide the secure information and technical computing environment required to securely operate the new BPS system. (see Section 9.0)
- Significant organizational, process, and skill-set transformation will need to occur throughout the systems development lifecycle, and will be a critical success factor in delivery of a new BPS system. Additional organizational roles will be necessary to support the new architecture, formal project management processes must be implemented and technical staff skills training and retooling will be required. (see Section 12.5)
- As we move to N-tier architecture, our current physical technology environment should continue to be enhanced in support of high-availability (24x7x365) computing services (see Section 9.7)

2.4 Next Steps

Building upon the work from the initial Benefits Payment System Project Proposal (October 2002) and the technical architecture now defined within STAR 1.0, we are prepared to enter the inception phase of the BPS modernization project. Planning for this phase, scheduled to be completed in August 2003, has begun.

Section 3.0

STAR Vision, Scope and Objectives

3.0 STAR Vision, Scope, and Objectives

3.1 STAR Project Vision

To cooperatively develop, adopt, and govern a formal business-driven, Strategic Technical Architecture Roadmap for the Office of Unemployment Insurance (OUI) which will best position NWD to meet evolving unemployment insurance business needs.

3.2 STAR Scope

Throughout this document, the term "enterprise" is used to refer to the organizational scope of STAR 1.0 and is now described.

Description of Enterprise

STAR 1.0 will be used to guide future OUI automation efforts within the NWD.

Additionally, opportunities for overall architectural integration among OUI and the entire NWD agency (as well as among OUI's external partners), are considered within the STAR 1.0 architecture. Future versions of STAR may serve to influence the strategic technology architecture roadmap for the entire NWD and our strategic partners.

3.3 STAR Objectives

STAR is a living document, which will evolve as business and technology drivers change. Initially, STAR 1.0 will include high level technical design guidance in support of the Benefits Payment System (BPS) modernization project.

- "Current and Future State" Business, Information, Application, and Technical Architecture
- Architecture Transition Strategy/Roadmap
- Architectural Development, Administration, and Governance Process
- Project Management Methodology Strategy
- Enterprise Security, Disaster Recovery & Business Continuity Planning
- Organizational Readiness/Tooling & Training Requirements
- Sourcing Principles/Strategy

Section 4.0

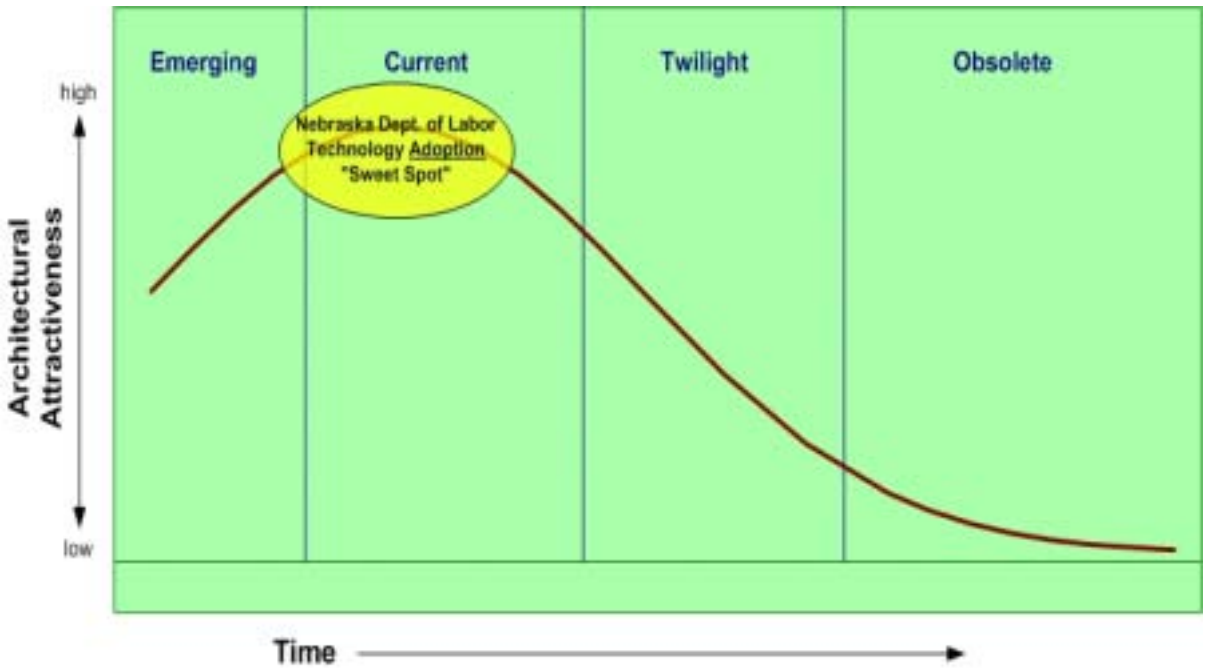
Information Technology Systems Lifecycle

4.0 Information Technology Systems Lifecycle

The figure below can be used to illustrate the lifecycle phases of a particular information technology.

The actual duration of the lifecycle can vary considerably among technologies. Emerging technologies (for example, technology associated with wireless and handheld computing) may have lifecycles as short as 6 months. Other more established technology (for example desktop computer systems, programming languages, or operating systems) may have lifecycles in excess of 3 years.

NWD Technology Systems Lifecycle



The technology lifecycle plays out as follows. Individual technologies are conceived or born (emerging), then often become mainstream, widely adopted, and proven (current). Over time, a current technology eventually will begin to lose its attractiveness (twilight) when newer, competing technologies move to mainstream and begin to take its place. Finally, the technology dies (obsolete) as vendor support is pulled, technology market share shrinks to zero, and professionals who have knowledge of, and can support, the technology become harder to recruit and retain.

When considering adoption of a new technology, the NWD finds best practice in adopting technology systems in the "sweet spot" which lies principally within the "current" phase. This is a fair balance among 1) minimizing risk by selecting only proven, mature technologies for new implementations, vs. 2) maximizing the length of the technology lifecycle and realizing competitive benefits from being an early adopter of new technologies.

In this document, we will classify architectural standards as either emerging, current, or twilight. In many instances, we identify several emerging (and perhaps competing) standards for a specific architectural category. This signifies that a commitment has not yet been made, and/or that further evaluation may be necessary before a selection is made. As an additional note, it's important to cast a "wide net" when considering future state architecture, and not prematurely dismiss emerging technology scenarios before they mature.

Emerging: Technologies that have not yet been widely adopted, but are promising, and should be evaluated for inclusion in our "target" (or desired) architecture for future implementation within the enterprise. A subset of technologies in the emerging category will be designated as our "target" architecture. "Target" will imply that a decision has been made to actively move towards implementation. Examples of emerging technologies may include point-zero releases of a new software version, "vaporware" that has been announced but not shipped, beta hardware products, or newer processes for managing the AD (Application Development) lifecycle that have not yet been proven or widely adopted. In some cases, to gain competitive advantages, enterprises may wish to actively test and selectively implement emerging technologies, but should recognize the risks involved when riding the fine line between "leading edge" and "bleeding edge" technologies.

Current: Current technologies are proven, widely adopted, well supported and "work". When implementing a new system, we should select technologies within the "current" category whenever possible.

Twilight: Twilight technologies still work well, and may be well supported, but have been (or soon will be) replaced by newer versions of similar technology. We should be developing a plan to migrate away from technologies in the twilight classification. Although there may be no immediate business need to migrate, a strategy should be developed as a contingency.

Obsolete: Obsolete technologies may actually still work, but newer versions of the technology are now in the widely accepted and proven (current) classification. Vendor support may be costly and/or difficult to obtain, and extraordinary measures may need to be taken to keep the technologies operational. Ideally, enterprises should replace technologies before they become classified as obsolete.

Section 5.0

Enterprise Business and Services Architecture

5.0 Enterprise Business and Services Architecture

The Zachman Framework (see Section 11.0) prescribes that an organization should fully explore their enterprise business mission, vision, goals, strategies, and key business processes, before adopting the optimal supporting technology architecture. The following three Sections (5.0, 6.0, and 7.0) represent analysis and discovery corresponding to Zachman Framework rows 1 and 2. This "business architecture" will be updated in future versions of STAR, and will guide all future technology architecture decisions.

5.1 Business Goals

NWD goals are to be customer satisfaction driven, a leader in our business, and the best run agency in State government. We achieve these goals through a set of strategies.

Nebraska Workforce Development

Continuous Improvement Journey

Our mission statement

NWD provides the framework for a system that focuses on meeting the needs of businesses for skilled workers; and the training, education, and employment needs of Nebraska's citizens.

Our vision statement

We are highly skilled professionals serving as Workforce Ambassadors. We lead workforce development efforts by providing integrated services, tools, consultation, and information through dynamic partnerships. Our efforts result in safe, successful Nebraskans equipped to meet current and future labor market needs.

5.2 High Level Business Strategies

- By being high level communicators
- Through strategic use of technology
- By attaining a high profile and high visibility
- As a good corporate citizen in our communities
- By being customer driven

5.3 Key Opportunities for Business Process Automation and Re-engineering

With this context of overarching goals/strategies in mind, business architecture discovery meeting were conducted with over 50 key subject matter experts to 1) document our organization's key/core business processes, 2) document opportunities for automation of those key business processes, and 3) envision "future state" considerations/influences/opportunities which should drive the selection of our technology architecture, and which support our agency goals.

In summary, of the 64 key business functions identified, 24 (38%) were rated as "high opportunity" for future automation, 18 (28%) were rated as "medium opportunity" for future automation, and 22 (34%) were rated as "low opportunity" for future automation.

Additionally, ratings were assigned (0-100%) to each of the 64 business functions indicating the percent of that current business process that is currently optimally automated. Optimal automation is defined as that which meets or exceeds business requirements through the maximal application of current technology.

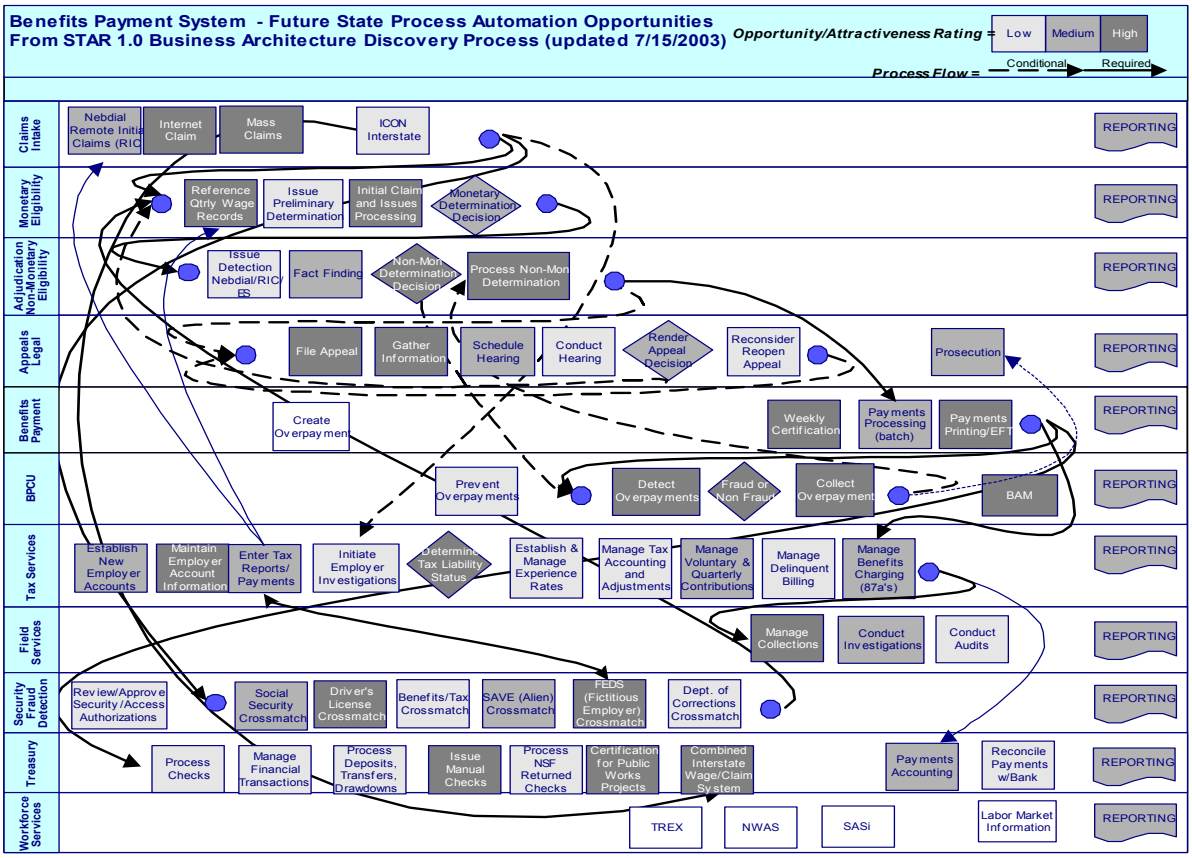
The diagram on the right presents one interpretation of these findings, which can serve to drive our future development priorities.

One can use the results of this business architecture discovery process to set scope and priority for future systems development. As an example, we must assume that processes rated "high opportunity", and with "low" percent of (current) optimal automation, would be among highest consideration for new automation features.

Appendix A and B contains additional detailed findings from the business architecture discovery meetings which will be used to define more detailed requirements for the new BPS system.

5.4 Holistic Business Process Analysis

One must also consider interconnected-ness between key business functions, in setting development priorities for any new systems development. A business function, which at first doesn't appear to rate a high development priority, may actually constrain other, more critical business process flows. Creating a holistic view of the entire, system-wide business process flow is the first step in understanding this interconnected-ness, and how it will drive our decisions for future development priorities.



5.5 The New BPS: One Incremental Step At a Time

Developing an incremental approach to a project the size and complexity of BPS, involves careful consideration and planning. Among the objectives:

1) To minimize project risk, by focusing on manageable, incremental, delivery of new function.
2) To minimize the amount and complexity of the interim integration requirements between the old and new systems. This is sometimes called application integration or scaffolding, and can

involve both data tier (synchronization or replication) and application tier (program to program) integration challenges.

3) To deliver tangible business value (while unplugging legacy function) with nearly every project increment.

4) To not overlook the opportunity for holistic business process improvement or re-engineering, by a traditional "business unit" approach to defining increments.

5.5.1 Example of Incremental Approach

Following project planning and requirements phases, the "execution" phase of the BPS project will likely consist of a carefully orchestrated sequence of incremental phases, which constitute a "Lego building block" approach to our system development, where each increment adds functionality and extends the work in the previous incremental phases. This approach works especially well in today's component-based, object-oriented, development world (J2EE or .NET), and must be managed through a formal process.

The following table illustrates one possible 10-phase development project scenario, where parallel requirements, analysis, design, development, and delivery is occurring, for multiple business unit functions, within every phase.

Increment/Phase (each cell in matrix involves iterative activity sequence of requirements, analysis/design, implementation, test, etc)			
Business Function	Information/Data, Document/Image and Integration Scaffolding	Business Rules, Application Workflow, and Integration Scaffolding	User Experience/Interface and Exception Processing
Claims Intake	**1**	**2**	**3** (tested/deployed function)
Monetary Eligibility	**2**	**3**	**4** (tested/deployed function)
Adjudication/Non-Mon	**3**	**4**	**5** (tested/deployed function)
Appeals/Legal	**4**	**5**	**6** (tested/deployed function)
Benefits Payment	**5**	**6**	**7** (tested/deployed function)
BPCU	**6**	**7**	**8** (tested/deployed function)
Treasury	**7**	**8**	**9** (tested/deployed function)
Security and Fraud Detection/Prevention	**8**	**9**	**10** (tested/deployed function)
Tax Services*	Integration Analysis Only	Integration Analysis Only	Integration Analysis Only
Field Services*	Integration Analysis Only	Integration Analysis Only	Integration Analysis Only
Workforce Services*	Integration Analysis Only	Integration Analysis Only	Integration Analysis Only

**An assumption is being made that significant re-engineering/re-development of these existing systems will not be included within the scope of the BPS project. Validation of this assumption will occur during the BPS project requirements planning phase.*

5.6 Current and Future State Claimant and Employer Services By Medium

A variety of direct services are offered to claimants and employers (NWD's "customers") through a number of NWD functional team units.

Traditionally, customer services have been provided via direct interaction (in person or via phone), through interactive voice response (IVR), and via paper (mail). In order to better support the mission of our department, our customers should be able to choose new mediums to interact with our services including email, Internet, and telephone-based voice recognition technologies. Through the STAR 1.0 Business Architecture Discovery Process Meetings an analysis of the current and planned mediums for services delivery have been formulated. The following tables, Claimant Services by Medium and Business Services by Medium, are now presented.

OUI Claimant Services by Medium

C=Currently implemented, I=Implementation in progress, and P=Planned

Current Claimant Service		Internet	IVR	Telephone (Assisted)	Electronic Media (CD/Tape/Cartridge)	Fax	Email	EFT	Paper
File a claim (Intrastate)	Initial	I	C	C					C*
	UCX/FE	P		C					C*
	Reopen	I	C	C					C*
	Add'l	I		C					C*
	DUA/TR			C					C
File a claim (Interstate)	Initial	P		C					C*
	Reopen			C					C*
		P							
	Add'l	P		C					C*
Claim certification (Intrastate)		P	C	C*					C*
Claim certification (Interstate)									
Receive benefits (payment)								P	C
Notification of determination									C
File an appeal									C
Supply claim documentation		P				C			C
Claim specific inquiry		P		C		C	C		C
Claim specific inquiry (Check status)		P	C	C		C	C		

Current Claimant Service	Internet	IVR	Telephone (Assisted)	Electronic Media (CD/Tape/Cartridge)	Fax	Email	EFT	Paper
Complete/request form								
Check appeal status (Clm't)			C			C		C
Fact-finding Notification			C			P		C
Search appeal decisions				C				C
OWS interview notice			C					
Payment arrangement for over-payment								
General inquiry (location and hours)	C		C			C		C
Frequently Asked Questions (FAQs)	C		C					C
Request publication								C
Read publication	C							C
Address Change			C			C		C

* Exception Basis Only

OUI Business Services by Medium

C=Currently implemented, I=Implementation in progress, and P=Planned

Business Service	Internet	IVR	Telephone (Assisted)	Electronic Media (CD/Tape/Cartridge)	Fax	E-mail	EFT	Paper
Assign account	C (partial)							C
Transfer account								C
Wage report	C			C	C			C
Tax report	C				C			C
Correction to submitted report	C				C			C
Collect tax payment	C							C
Notice of status change	C (partial)		C		C	C		C
General inquiry	P		C			P		C
Account inquiry	P		C					C
Request form 16 or Proof of Credit	P		C		C			C
Request blank forms or written information	P		C			C		C
File an appeal					C			C
Issue account credit notice	P							C
Request for refund	P							C
Monthly Statement (A/R)	P							C
Send 87A and 87AR	P							C
Receive interstate 350s					C			
Submit Penalty Waiver Request					C			C
Notification of Waiver Decision								C
Annual Rate Notice	P							C
Collect voluntary contribution	P							C
Arrange Payment Plan			C					C

5.6 Currently Planned Major Business and Technology Initiatives 2003-2006

A number of significant business and technology initiatives are underway, or are anticipated to be underway, during the next 36 months. Significant risk will result, if this "portfolio" of potential projects is not planned and managed carefully in consideration of the BPS modernization initiative. A careful evaluation of each initiative will result in a finding of 1) whether the initiative should be included within the scope of the BPS modernization project, 2) whether the initiative should proceed in parallel to the BPS modernization project, or 3) whether the initiative should be delayed or put on hold (for initiatives which are not mandated) during the BPS systems development lifecycle. A preliminary listing of these initiatives is now presented.

Name of Initiative	Description	Project Priority *High* *Medium* *Low*	Project Phase *Initiating* *Planning* *Executing* *Controlling* *Closing*	Project Approved?	Schedule
BPS Modernization	Legislature appropriated 6.8 million dollars for the design, development and building of a new BPS to begin approximately 07/01/2003 and a 30-36 months timeline.	Some table information suppressed in public copy of this publication.			
Internet initial claims	We are a federal grant recipient. Development currently progressing in-house	[redacted]			
UI Connect Enhancements	Consider new phase of functional enhancements				
Neb-Dial replacement	Current continued weeks IVR system is 7 years old and not meeting needs. Effort under way to replace as soon as this fall. Desire to migrate to EIC.				
Trade Act 2002 and HCTC	Necessary programming effort under way.				
Interim Disqualification Study	Legislature has requested a study this summer to include types of disqualification. If this leads to legislation next year, it could be significant system changes.				
RIC enhancements	Continue enhancements to RIC application				
Debit cards	Investigate feasibility in association with other Nebraska state government agencies	[redacted]			
Direct deposit	Investigate in conjunction with successful Internet initial claims application				
Document Management, Case Management, Imaging, Workflow, and COLD	Review opportunities and alternatives to SCANTRAX. Also, review document retention requirements, process re-engineering, and overall opportunities for workflow automation.				

Name of Initiative	Description	Project Priority *High* *Medium* *Low*	Project Phase *Initiating* *Planning* *Executing* *Controlling* *Closing*	Project Approved?	Schedule
Child Support Withholding Automation	Integration with child support withholding processes				
SSA interface/exchange enhancements	Planning in progress for automated interfaces as per SSA requirements				
Enterprise-wide email platform migration to Lotus Notes	Feasibility under consideration				
Security Self Assessment Certification/Accreditation	(NIST SP 800-26 framework)				
Enterprise Information Security Policy Review	As per STAR 1.0 recommendation				
Security Architecture Implementation	Including DMZ, Firewall, IDS, etc				
Formalized BCP/DR Planning Initiatives	As per STAR 1.0 recommendations and in support of new BPS project				
Enterprise Program Management Office (EPMO) formation and management	As per STAR 1.0 recommendations				
Voice Recognition	Investigating state of technology and reviewing guidance from ITSC.org.				
Voice over IP	As per STAR 1.0 recommendations, deferring to our telecommunications provider (DOC) for guidance in this area.				
Secure Wireless/Wired Mobile Communications	Requirements to be determined in association of any new mobile application developments				
Office Relocation Remodeling	Planning underway				

Name of Initiative	Description	Project Priority *High* *Medium* *Low*	Project Phase *Initiating* *Planning* *Executing* *Controlling* *Closing*	Project Approved?	Schedule
Server Consolidation	Leveraging opportunity to combine functions of servers nearing end of lifecycle onto fewer (larger) servers to reduce cost, and reduce administration overhead.				
Tax System CASE tool replacement/ conversion	Replace the unsupported CASE tool software before the software or the machines they run on quit working.				
HUD information exchange	Develop program to provide Tax, Wage and Benefit information to HUD as required				
State Patrol / Crime Commission	Work with IMS to create a real time access to our data. We will provide Employer and Benefit info. To the Crime Commission for use by State Patrol and others.				
Distribution of Suit Money	Research and install a fair plan to move money from the Suit Fund back to the employer accounts by the end of the year.				
ICON IB6 Format Changes	There is a project underway at Lockheed Martin to rebuild the IB6 subsystem of the ICON system. When Lockheed Martin gets it done we will be expected to implement the changes on our system.				
Systematic Alien Verification for Entitlement (SAVE)	INS verification of aliens				
Eligibility Review Program	A closer look at claimant work search and eligibility				
National New Hires directory	Access to the National New Hires directory for skip tracing and cross-match programs as per HR4 legislation. Interfaces/impacts BATS.				

Section 6.0

Enterprise Information Architecture

6.0 INFORMATION ARCHITECTURE

Information Architecture is defined as the technologies, principles, and processes that are related to the creation, security, management, integration, and use of information (data) within our enterprise.

6.1 High Level Principles for Information Architecture

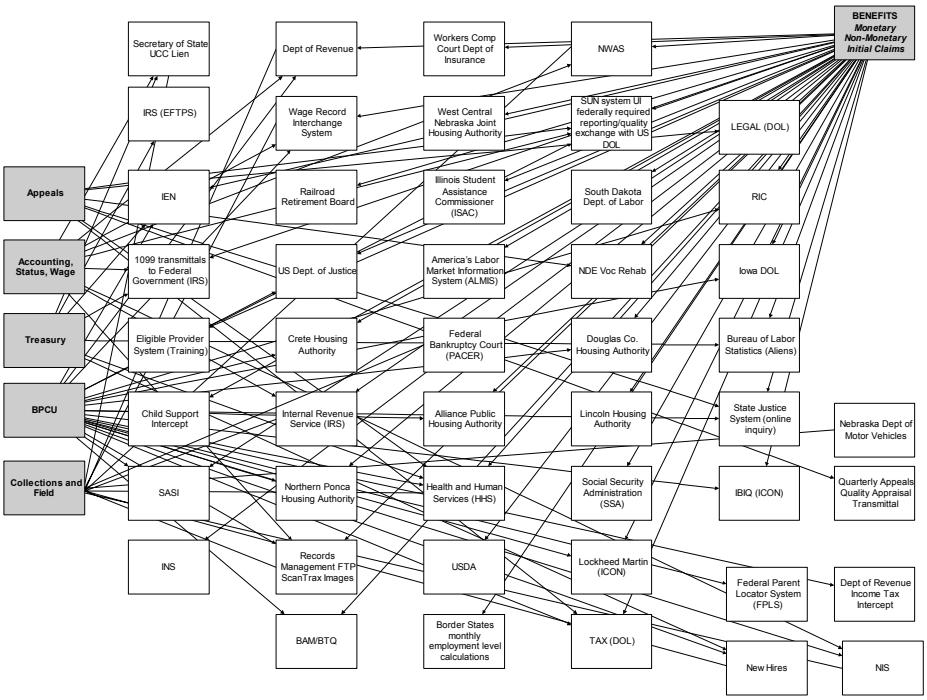
- Continued use of SSN number as a unique program-level identifier may be someday restricted under government privacy/confidentiality laws. Assume that a NWD-specific identification number may be needed in future systems, as well. Use of SSN for validation of individual's identity may still be allowed.
- Single original source/location for all enterprise data (single record of authority)
- Single responsible data custodian (and optionally, a data steward with delegated responsibility) assigned to individual data systems, and who is responsible for data quality and definition of security roles/authorizations
- Secure/robust
- Available/reliable
- Accessible (if authorized)
- Minimize the number and complexity of data interfaces
- Re-usable, integrated, shared, metadata framework
- Appropriate controls for security, audit, and quality
- Utilize open standards wherever possible
- Future state business requirements indicate that geo-coding, which refers to the collection and management of location (or geographic mapping) data, will become important for both claimant and business addresses. In anticipation of this requirement, we must capture both physical and mailing address for all entities. We must also adopt standard postal format for all addresses, so that geo-coding translation, when required, can be automated.
- Information reporting requirements. Assume no shorter than daily period resolution for most business reporting requirements. The vast majority of Labor Market Information (LMI) reporting requirements are driven by weekly benefit periods. Weekly benefit periods may be defined in several ways, so daily resolution becomes minimum reporting requirement.

6.2 External Interfaces

As we define our current and future state information architecture, an understanding of how information (data) flows to and from our agency is required. The following diagram illustrates the number and complexity the external interfaces being managed in the current system. Each of these interfaces may

be manual, automated, and/or manual access to an automated system. In the BPS requirements definition phase, additional levels of understanding of our current and potential external information interfaces, will be determined. Also, an in depth understanding of internal (within NWD) information interfaces will be needed in support of enterprise integration and scaffolding (interim integration) requirements.

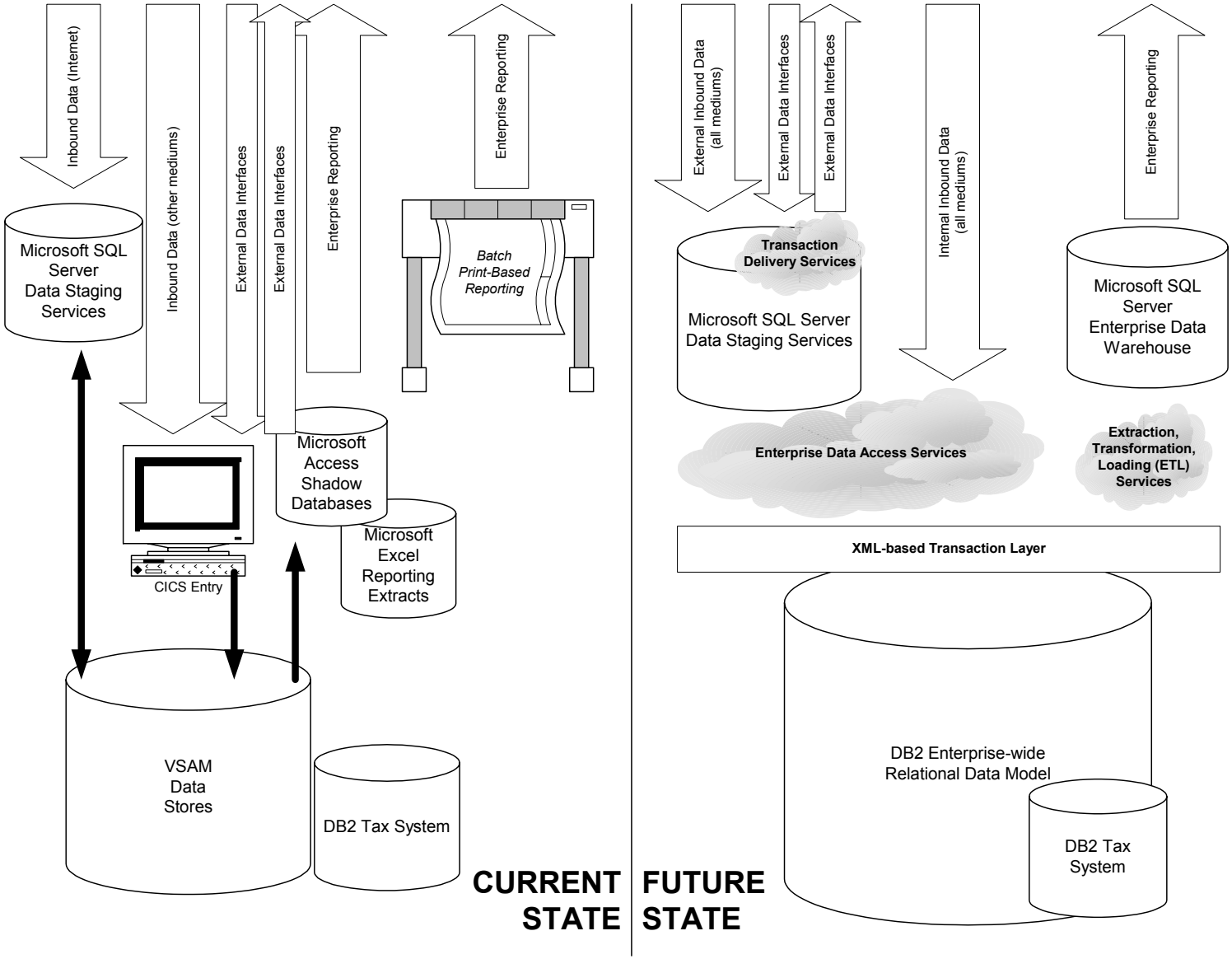
BPS External Interfaces to Key Functional Units
Diagram Illustrating Number and Complexity



6.3 Enterprise Information Reporting (Data Warehousing)

A key design principle for the new BPS system is flexibility and adaptability. In the spirit of this principle, a requirement for a more modernized approach to enterprise information reporting has been identified. The current BPS system data is housed within legacy VSAM storage architecture. Access to this VSAM data is constrained and only possible through COBOL/CICS programs and custom programming. Ad hoc information reporting is difficult, time consuming, and costly to perform. The future BPS system data tier will be housed in a modern, relational, data structure (likely DB2 on OS/390). A summarized "snapshot" of this operational data store can be easily and periodically transformed (loaded) into an enterprise-wide data warehouse. This warehouse will fulfill our future ad hoc and standardized (including federally mandated) reporting requirements, in the most flexible and cost effective manner. The following diagram illustrates our current and future state information architecture.

Current and Future State Enterprise Data/Information Architecture



6.3 Information Architecture Principles and Standards Table

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Shared core or "Federated" Databases	Core business data that is shared among 2 or more business units.	Single original source/location (record of authority) Minimize the number and complexity of data interfaces	None	BPS shared database architecture	Enterprise-wide Relational Data Model (to be developed) Single record of authority on enterprise DBMS system. Other copies of data can exist, but should only serve transitory purposes. All mission critical transactions should update the record of authority. Shared Enterprise Data Warehouse (for reporting)
Metadata Repository	Data about data. Descriptions of data entities that are part of a enterprise data dictionary	Re-usable, integrated, shared, metadata framework	none	Application-level meta-data management Entities not standardized and reused across the enterprise	Enterprise-level meta-data management through a common Data Dictionary Single entity description and format used across enterprise. Governance of meta-data repository and formal change control processes in place. Common terminology/nomenclature used when dealing with enterprise meta-data.

Category	Description	Guiding Principles	Standards		
			Twilight	**Current**	**Emerging (Target)**
Data Extraction, Transformation, Loading	Specialized data management tools that provide capability to move and transform data between online/production data systems, and data warehouses.	Minimize the number and complexity of data interfaces	None	Batch-oriented processes to move and transform data No formal data warehouse architecture in place	IBM Data Propagator (Data Joiner, Visual Warehouse) Informatica PowerCenter 6
Data Mining Tools	Specialized data management tools that provide for advanced reporting and correlation of disparate data.	Accessible (if authorized)	Batch-oriented reporting	Crystal Reports	ESRI ArcView (GIS/Spatial Analysis) Crystal Reports Enterprise Informatica PowerAnalyzer
Data Visualization Tools	Typically end user desktop tools used to transform data into information.	Accessible (if authorized)	Batch-oriented reporting	Crystal Reports	ESRI ArcView (GIS/Spatial Analysis) Crystal Reports Enterprise Informatica PowerAnalyzer

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Database Monitoring Tools	Specialized database administration tools which provide for problem monitoring and performance management	Appropriate controls for security, audit, performance, and quality	None	None	(dependant upon platform)
Information privacy and Data Security		Evolving state and federal privacy guidelines Single data owner/custodian for each repository (who is responsible for data quality and definition of security)	none	none	NWD Information Security Policy

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Data/Document retention	Formal policy/guideline defining specific legal, state, federal, or program-specific retention requirements for enterprise data sets and document/images.	Retention requirements tied to underlying regulation, law, or business requirements.	none	Data retention policy set by Nebraska Secretary of State's office. Most documents retained for period of 5 years (or more). Most benefits and claim data archived after period of 3 years.	NWD Information Retention Policy

Category	Description	Guiding Principles	Standards		
			Twilight	**Current**	**Emerging (Target)**
B2B (Business to Business electronic commerce) EDI (electronic data interchange) Internal company application integration	Describes standards about how secure electronic transactions are described, encrypted, transmitted, and acknowledged across a private or public (Internet) network infrastructure.	Industry standard set of formats and protocols for electronic transactions among business partners XML-based transaction formats becoming industry standard for describing data Many industries developing specific XML-based schema tailored to their business sector.	Point to point, proprietary. No encryption Modem to modem	Point to point proprietary (negotiated) transaction formats Manual interfaces See NWD External Interfaces diagram.	XML-based transactions for our external business partners who can participate. Minimum accepted standard for encryption (see Security Architecture section) Minimize number of proprietary, point-to-point (negotiated) transaction formats.
Data API's Access /Interface Standards		Utilize open standards wherever possible	Procedural language, SQL-based	ODBC, JDBC, OLEDB, direct to database API	ODBC, **JDBC**, OLEDB

Section 7.0

Enterprise Application Architecture

7.0 ENTERPRISE APPLICATION ARCHITECTURE

Application Architecture is defined as the technologies, principles, and processes that are related to the creation, security, management, integration, and use of applications within our organization.

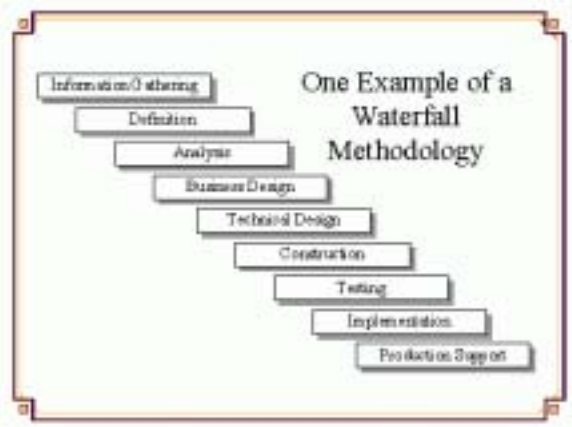
7.1 Principles for Enterprise Application Architecture

- A Systems Development Life Cycle (SDLC), appropriate for the size and type of project, is to be adopted for each system development effort and is managed across its entire system life cycle (SLC).
- Throughout the entire SLC, application status must be reportable and measurable to management as well as technical and business audiences.
- Guided by enterprise-wide, business-driven, prioritization, all systems should be identified, designed, and implemented in a timely and efficient manner.
- Systems planning should be coordinated and communicated in a strategic manner, across all business units in the enterprise.
- Through the proposed Enterprise Project Management Office (EPMO) function (see section 10.0), we must adopt a formal, business unit driven, prioritization process. Processes employed should be measurable and repeatable.
- Vendors providing services or solutions shall be evaluated on a wide variety of criteria that are designed to minimize exposure to unnecessary risk to our business customers.
- Systems conceived should have desirable characteristics that include being Portable, Scaleable, Reliable, Accessible, Secure, and Affordable
- Technologies, processes, or methodologies shall be adopted to meet the needs of the enterprise, and will conform to the STAR technical architecture.
- Adopt open and industry-standard systems technologies and processes where-ever practical and appropriate.
- Scope Management will be implemented through a formally adopted project management methodology.
- Change Management will be implemented through a formally adopted project management methodology.
- Quality Management will be implemented through a formally adopted project management methodology.
- Risk Management will be implemented through a formally adopted project management methodology.
- Systems and/or software Version Control and Configuration Management shall be adopted for systems.
- Documentation, as appropriate to all audience levels (ie, user, developer, technical, etc) is designed, developed, and delivered prior to system testing.
- Formal Training, as appropriate to the type and complexity of systems implemented, must be seen as critical to success of a systems implementation.

- Following implementation, there will be an identified formal process and procedure for maintenance, support, and administration. Business-driven prioritization also applies here. Ongoing evaluation and monitoring of 1) cost of ownership and 2) whether the system continues to meet business requirements will be the key factors driving systems retirement schedule (end of SLC).

7.2 System Development Life Cycle (SDLC) Models

A Systems Development Life Cycle (SDLC), appropriate for the size and type of project, is to be adopted for each system development effort and is managed across its entire system life cycle (SLC). Over the last 20 years, a number of effective approaches have evolved and are described below. The Enterprise Application Architecture Principles and Standards Table in Section 7.5 provides additional guidance on selection of appropriate SDLC based on type of development project.

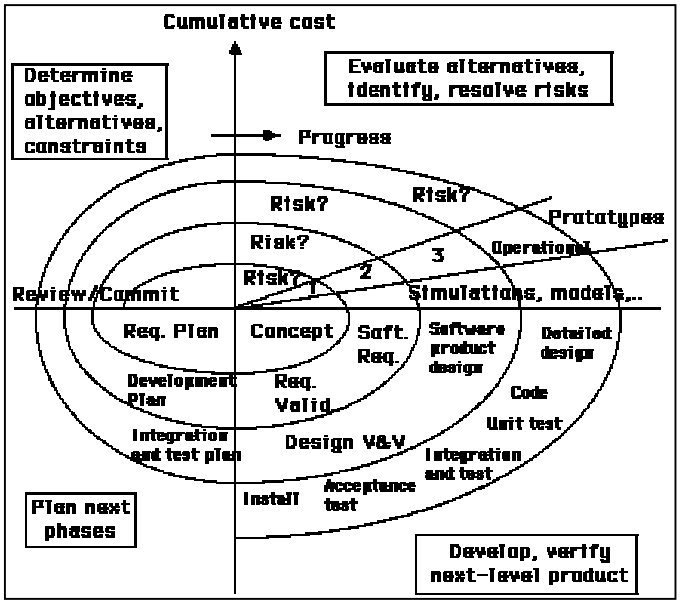


7.2.1 Waterfall Model

The waterfall model prescribes a sequential execution of a set of development and management processes, with no return to an earlier activity once it is completed. Some variants of the waterfall model allow revisiting the immediately preceding activity ("feedback loops") if inconsistencies or new problems are encountered during the current activity. The diagram on the left illustrates one implementation of the waterfall approach.

7.2.2 Spiral Model

The spiral model was developed to address the weaknesses of the waterfall model, especially its lack of resilience in the face of change. The spiral model focuses on addressing risks incrementally by repeating the waterfall model in a series of cycles or rounds: Each round consists of four phases as illustrated in the diagram on the right.



7.2.3 Prototyping — the Sawtooth and Shark Tooth Models

As a software product is being developed, the developers' view of the system diverges from the client's view, since the developer's focus on design and implementation while the client remains focused on requirements.

The sawtooth model provides checkpoints during the development process in order to check that development is proceeding in a direction that will eventually meet the client's requirements. Typically, the checkpoints involve demonstrating a prototype to the client. For example, two prototypes may be developed:

A revolutionary prototype is an illustrative model of the system, representing only a small fraction of the required functionality. An evolutionary prototype, shown late in the development process, is based on a completed design and implements some of the required functionality.

The shark tooth model adds management reviews and demonstrations to the sawtooth model. Since these may be seen to be at an intermediate level of abstraction, a diagram of the model includes large "teeth" and small "teeth".

7.2.4 Rapid Application Development and the Time Box Model

Rapid application development (RAD) is an approach rather than a model. Its proponents view formal life cycle models as inherently inefficient, due to the large amount of documentation and the number of reviews required. The formality of such models is seen as interfering with customer communication.

Instead, RAD focuses on developing a sequence of evolutionary prototypes which are reviewed with the customer, both to ensure that the system is developing toward the user's requirements and to discover further requirements.

The process is controlled by restricting the development period for every prototype to a well-defined period of time, called a time box. Each time box includes analysis, design, and implementation of a prototype.

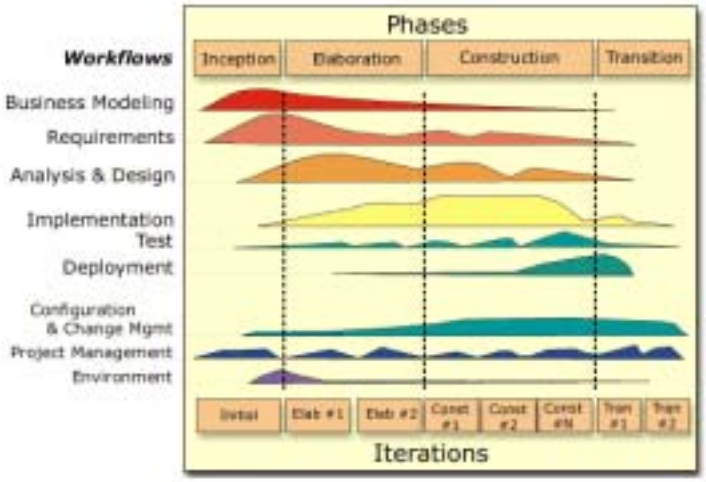
One problem with RAD is reaching closure -- the customer always has feedback, and the developers and the customer may never agree that the project is done.

7.2.5 Iterative and Incremental Development

The Rational Unified Process (RUP) is an example of an iterative and incremental software development process. Its designers — Ivar Jacobson, Grady Booch, and James Rumbaugh -- characterize the process as:

Use-case driven — The use case model describes the complete functionality of the system. It replaces the traditional functional specification of the system, extending the question "What is the system supposed to do?" with the words "for each user?" The use cases drive the development process: developers create design and implementation models to realize the use cases, and testers test the implementation to ensure that the use cases are correctly implemented.

Architecture-centric — The software architecture represents the most significant static and dynamic aspects of the system — the platform on which the software is to run, reusable components and frameworks available, deployment considerations, legacy systems, and nonfunctional requirements. The architect selects the use cases which represent the key functions of the system (5% to 10% of all the use cases), specifies them in detail, and realizes them in terms of subsystems, classes, and components.



Iterative and incremental — The software development project is divided into mini-projects, each of which is an iteration that results in an increment. Each iteration deals with the most important risks and realizes a group of use cases that together extend the usability of the product as developed so far. In the early phases, a superficial design might be replaced by a more detailed or sophisticated one; in later phases, increments are typically additive in nature.

The figure above illustrates the phases and iterations in the RUP (Rational Unified Process) systems development life cycle.

7.3 Current Application Systems Inventory

The following table is presented as a partial inventory of the suite of application systems currently in place for OUI. As part of the BPS system design, a plan for integration with, or replacement of, each of these applications will need to be developed.

CURRENT APPLICATION	SYSTEMS OWNER	LANGUAGE
CICS Menu/driver	OUI-wide	CICS;DB2
Benefit Claimant Profiling Quarterly Reports	Benefits	COBOL;CICS;VSAM
Benefits Performance Quality Review	Benefits	COBOL;CICS;VSAM
Benefits/Employment Security Payments	Benefits	COBOL;CICS;VSAM
Employer Benefit Charges	Benefits	COBOL;CICS;VSAM
Neb-dial IVR	Benefits	COBOL;CICS;VSAM
UI/NWAS Legacy	Benefits	COBOL;CICS;VSAM
Remote Initial Claims Interface	Benefits	COBOL;CICS;VSAM
Remote Initial Claims	Benefits	VB;SQL-Server
Benefit Audit Tracking System	BPCU	COBOL;CICS;DB2
New Hires	BPCU	COBOL;CICS;DB2
Overpayments/Employment Security	BPCU	COBOL;CICS;VSAM
Quarterly Internet Crossmatch	BPCU	COBOL;CICS;VSAM
Crossmatch	BPCU	COBOL;DB2
Income Tax Intercept	BPCU	COBOL;DB2
Information Exchange Network (EIN)	Cost Model	COBOL;CICS;DB2
Cost Model MIS Reports	Cost Model	COBOL;VSAM
Performance Measure Review	Cost Model	COBOL;VSAM
UI CICS menus/internal security	Internal Security	COBOL;CICS;DB2
ICON/UI Interstate claims	Interstate	COBOL;CICS;VSAM
ICON/XFE	Interstate	COBOL;CICS;VSAM
ICON/IB6 Charges	Interstate	COBOL;VSAM
Benefits/Employment Service Registration	OWS	COBOL;VSAM
Benefit Payment Statistics	OWS(LMI)	COBOL;VSAM
Benefit Audit Measures (BAM)	PE	COBOL
Tax & Wage Validation	PE	COBOL;DB2
Benefits/Appeals/Overpayment Validation	PE	COBOL;VSAM;DB2
Field Audit Laptop System	Tax	ACCESS
Employer Benefit Charges (ESC)	Tax	COBOL;CICS;DB2
Employer Wage Reporting (EWR)	Tax	COBOL;CICS;DB2
Employer Tax/Contributions	Tax	COBOL;DB2
Employer Wage Report Tapes	Tax	COBOL;FTP
UIConnect	Tax	HTML;ColdFusion;JavaScript
Treasury Checks & Bank Reciliation	Treasury	COBOL

7.4 Future State Application Architecture Requirements Definition Approach

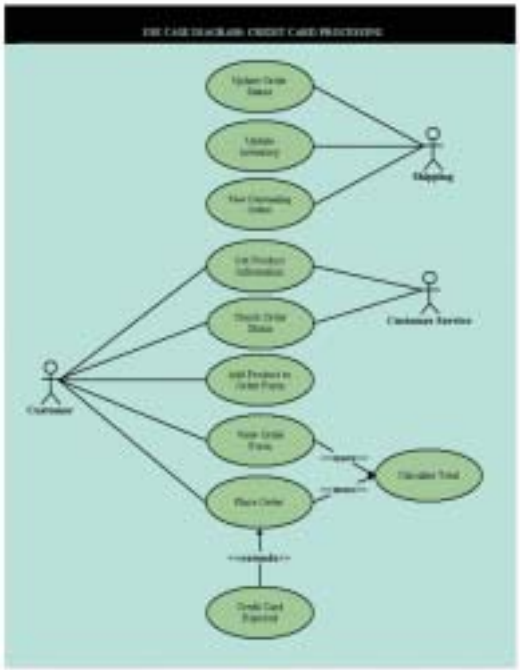
As first discussed in section 5, an incremental/phased approach to future state application requirements will be employed. Identification of the 64 key business processes was the first step and has been completed. Now, each of those 64 key business processes can be further "decomposed" into their respective Use Cases and the overall dependencies identified. A collective vision will be captured through a series of JAD sessions with key business resources/teams, and will be used to drive the design for the overall application.

Other techniques will also be employed, in support of detailed systems design for the new BPS system:

- Reverse Engineering of Current Application Source Code
- Detailed Analysis of Internal and External Interfaces (Integration)
- Reverse Engineering of Current Database Schema
- Leveraging Other State's and Organization's best practices, knowledge and systems design approach.

What is a Use Case?

A Use Case model is a standard way to describe the proposed functionality of a new system. It is part of the widely adopted, UML (Unified Modeling Language) specification, and is used to describe and communicate requirements among project teams and developers. A Use Case represents a discrete unit of interaction between a user (human or machine) and the system. A Use Case is a single unit of meaningful work; for example: **login to system**, **create initial claim, issue monetary determination, and update employer account** are all Use Cases. Each Use Case has a description which describes the functionality that will be built in the proposed system. A Use Case may 'include' another Use Case's functionality or 'extend' another Use Case with its own behavior. The following is an example of a simple set of use cases:



7.5 Applications Architecture Principles and Standards Table

Category	Description	Guiding Principles	Standards		
			Twilight	**Current**	**Emerging (Target)**
SDLC (System Development Life Cycle)	The overall process of developing information systems through a multi-step process from investigation of initial requirements through analysis, design, implementation and maintenance. There are many different models and methodologies, but each generally consists of a series of defined steps or stages.	A Systems Development Life Cycle (SDLC), appropriate for the size and type of project, should be adopted for all systems and is managed across its entire system life cycle (SLC)	Waterfall	Waterfall, Iterative, Spiral	**Iterative (Functional Prototyping aka Spiral) for large and/or complex projects, where requirements cannot be fully documented or are likely to evolve during the SDLC.** **Incremental or Phased Development for all medium and/or large projects to reduce risk, and provide incremental functionality/value at delivery milestones.** **Waterfall approach may still be appropriate for small projects*, but only where requirements are clear and not likely to change during the SDLC.** **Consider "Rule of 2's" for small project definition (fewer than 2 organizational units, 2 weeks, or $2,000)*
Product and Project Management		**Adoption of a formal project management methodology (PMM) appropriate and practical for size and scope of project being managed.** Throughout the entire SLC, status must be reportable and measurable to management as well as technical and business audiences.	none	Ad hoc project management processes	**NWD's PMM (formal project management methodology)**

Category	Description	Guiding Principles	Standards		
			Twilight	**Current**	**Emerging (Target)**
Project Request Tracking		Adoption of a formal scope change process		none	**NWD's PMM (formal project management methodology)**
Business Case Development		Evaluation and monitoring of overall SLC costs		none	**NWD's PMM (formal project management methodology)**
Project Prioritization and Approval					**Holistic, enterprise-wide, project prioritization and approval through coordinated business-unit process/project review processes.**
Application Integration Application Interfaces and Middleware			Ad hoc, and developed as required	Incorporated into initial project costs when requirements are known	**Through development of enterprise interface definitions and workflows, every application is enabled for integration**
Application Security			none	RACF-based security authorizations for mainframe applications	**LDAP-enabled application security** **Single Signon** **Role-based Security**
Workflow			None	Ad hoc, via email or database values	
Documentation Tools			None	none	**tbd**
Requirements Documentation and Management			None	Word/Excel	**Rational RequisitePro (UML)**
Source Code/Version Control Tools			None	SafeSource	**Rational XDE**
Training Tools			None	none	**tbd**
Testing Tools			None	none	**tbd**
Programming Language Standards			none	COBOL HTML Java Javascript	**J2EE (Java, Javascript, EJB, Servlets)** **.NET (C#, COBOL.NET, etc)** **HTML**

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Development Environment (CASE)			Tax System CASE tool (name?)	none	Websphere Visual Studio Visual Studio.NET
User Interface Standards			none	Character based GUI	GUI-based

Section 8.0

Enterprise Technology Architecture

8.0 Enterprise Technology Architecture Section

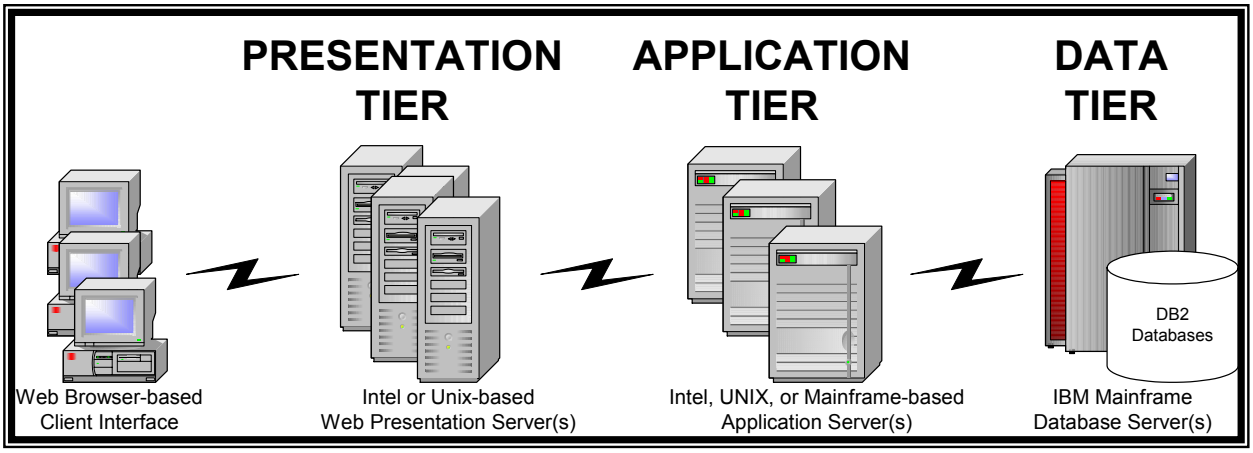
Technology Architecture is defined as the underlying telecommunications and computing infrastructure which supports information technology services within an organization. This includes the communication networks, servers, and desktop computers, along with the tools to manage, maintain, and operate them across our enterprise. The application and information architecture is built with, and dependent upon, this infrastructure.

8.1 Technology Architecture Principles

- Open/Stable/Scalable/Flexible/Secure/Reliable/Robust
- Cost effective
- Consideration of, and integration with, central State of Nebraska computing services (IMS) and telecommunications services (DOC) as our strategic technology partners
- Balance Leading/Cutting Edge with Risk
- N-Tier architecture

8.2 N-Tier Computing Architecture

In N-tier, the overall application processing is typically componentized among a database tier, application tier, and a presentation tier. Integration among the tiers is accomplished using open, standards-based communication protocols, and is independent of the actual systems and platforms being used. It's not uncommon, within N-tier architecture, to leverage services from disparate platforms (such as mainframe, UNIX, mid-range, as well as PC-based) among the tiers.



Within our own new N-tier architecture, it's very likely that we will leverage services currently offered by our own state government technology services provider (IMS) in support of one or more of our "tiers". In a traditional legacy application environment, we asked ourselves "what is the single best platform to run our application on?" In today's N-tier architecture, we ask a similar question, but the answer can be different for each tier of our application. This flexibility is part of what makes N-tier attractive. See Section 12.0 for a more detailed investigation of our optimal sourcing strategy and scenarios, by tier.

8.3 Emerging Technology

In FY2004, several emerging technologies have been identified as being potentially attractive in supporting NWD's business mission and strategies. These technologies are described below:

8.3.1 Voice Recognition

Voice recognition technologies, as applied in a call center environment, have significantly matured in the past 3-4 years. Some states are now beginning to look at voice recognition technologies as a compliment to their already effective automated IVR (interactive voice response) services. Through voice recognition, it's hoped that automated call handling (ACH) performance within UI call centers will go up as abandoned call rates (ACR's) go down.

Typically, voice recognition is first deployed cautiously, solely as an alternative to navigate existing call menu trees (e.g., "Press or say 1 …").

Once this is in place, the stage is set for more aggressive use of voice recognition to capture relevant information from a caller (e.g., "Key or say your social security number …").

These aforementioned applications for voice recognition are relatively low cost, low risk, and can be managed in parallel to traditional IVR services. They also offer fallback touchtone response options, for noisy environments, or where a caller may want to preserve a more private/quiet call interaction (e.g., on an airplane, or in a restaurant).

Natural language voice recognition (NLVR) is also beginning to surface for some specialized applications today, but is considered emerging (high risk) for state UI operations at this time.

To illustrate this type of "human to technology" interaction, one might use examples such as a popular service based on NLVR called "Tell Me" (1-800-555-8355). This free (advertiser supported) service allows NLVR-style interactions between a caller and automated system to provide a variety of useful information such as updated weather, news, driving directions, and sports. "Tell Me" is often used as an example to illustrate the potential benefits (as well as the challenges … including dialect, language, environment, and background noise) of NLVR technology. Another good example of a specialized use of NLVR is AT&T's 1-800 Directory Assistance application (1-800-555-1212).

When considering the application of voice recognition technologies for NWD, consideration must be given to the audience, their typical environment which they will interact with us from, and the critical requirement to have alternative interaction mediums available

New technical guidance from **www.ITSC.org** is now available to State UI agencies. The whitepaper, entitled ***VoiceXML and Speech Recognition – Nominal Architecture, Vendors, Standards, and State UI Agency Applicability*** is dated July 2003.

8.3.2 Wireless Computing

Limited application seen within FY2004 for wireless (either digital cellular or wireless LAN) technology for NWD knowledge workers, as the vast majority of the NWD organization is not in a highly mobile or disconnected network environment.

The one exception may be field services staff, who currently replicate/synchronize notebook computer-based data systems with a central database. Wireless (cellular), or wired/dialup communications could allow this synchronization to occur on a more frequent basis, without regard

to location. Security is primary consideration, and appropriate measures, which are defined in Section 9.0, must be deployed for any such mobile (wired or wireless) solution.

Wireless LAN (802.11) technology is also now sometimes deployed in standard administrative office-style environments (instead of traditional wired networking), where wiring may be impractical, or where mobility of the workforce drives the requirements. For NWD, in our current/existing (wired) buildings/facilities, this requirement is not compelling at this time.

3.3.3Electronic Funds Transfer (EFT)

EFT refers to the electronic movement of monies from one account to another. This technology is robust, well established, cost effective, and has been in widespread use within the banking industry for decades. For a cash benefit program such as NWD UI benefits, EFT technology must be considered as the most attractive (cost efficient and effective) strategy going forward, and will be more attractive than printing/mailing a traditional paper check, or even issuing a electronic benefit card.

An assumption should be made that a majority of our UI benefits "audience" will have an established bank (checking or savings) account which can accept EFT payments, and will eventually become comfortable with enrolling in an EFT payment option. There are obvious pluses for both NWD and our benefits audience including 1)quicker access to benefits, 2) better security (no lost or stolen checks), and 3) time savings for the claimant. Once we're ready, NWD should market this capability, and provide incentives to make it extremely easy for claimants to enroll in EFT, while at the same time consider "politically correct" disincentives for claimants to continue receiving paper claim checks. As an example, one scenario was identified in the STAR 1.0 Business Architecture Discovery Meetings where (as a cost saving initiative) NWD would move to a bi-weekly claim check print cycle, and to remain on a weekly schedule, a claimant would need to enroll in EFT.

8.3.4 Electronic Benefit Cards

The State of Oregon is the first state to pilot a dedicated electronic UI benefits card. This card is called the Reliacard (a Visa-style debit card) and is offered in alliance with US-Bank. In Oregon's pilot, 14,000 UI benefit recipients were invited to participate, and the first 500 to respond were included in the pilot. They are currently in month three (as of July, 2003) of the pilot, and all is going well. Oregon is breaking new ground with this technology, and time will tell whether this project is successful and becomes widely adopted. NWD should continue to monitor the results of the Oregon pilot, and consider whether dedicated electronic UI benefit card technology may prove beneficial for all or a portion of our client base in the future.

For future UI benefit card services, an even more promising scenario may be to "piggyback" off of other state benefit payment programs (such as Food Stamps, Child Support, WIC, etc) -- in effect creating a "Universal" Nebraska Electronic Benefit Card program. There are challenges with integration, as UI benefits are considered a "cash benefit", while benefits from other programs are typically constrained (for example, approved foodstuffs for Food Stamps, or approved food packages for WIC) to program-specific benefits. Nonetheless, the opportunity is high for potential integration, and (at least) sharing of best practices for this emerging area, therefore NWD is participating in state government discussions on this subject.

8.3.5 Voice over IP

Voice over IP (VoIP) involves the implementation of technology to pass voice calls over a managed digital communications network. Essentially, this allows voice calls to share the same network that our computers use. The potential benefits are obvious – essentially "free" calling within the VoIP network. The reality is that the setup, administration, and management of VoIP technology often outweigh the potential benefits to be realized.

Coordination with Division of Communications (DOC) is occurring on this particular subject area. DOC is cautiously evaluating VoIP technology for potential agency applications. With current state per-minute voice costs, the business case, for most state government applications, has not been found to be compelling at the current time.

8.3.6Electronic Document Management, Imaging, Workflow, and COLD (Computer Output to Laser Disk)

Although these technologies are mature and well established in organizations around the world, they deserve mention here as an attractive technology opportunity for NWD. Preliminary requirements findings indicate a compelling business case to leverage all of these technologies within a newly engineered BPS system, and an evaluation of this opportunity is ongoing.

8.4 Enterprise Technology Architecture - Principles and Standards Table

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Workgroup and Personal Printing Services	Standards for enterprise-wide printing services	Cost effective (including media costs) Services meet 80% or more of enterprise printing requirements. Trending towards electronic document and image management. Minimize number of printer standards supported.	Dot Matrix Printers Impact Printers	Lexmark Laser Printer Inkjet Printers (for personal use)	Network Attached Small Workgroup, Low Duty Cycle WorkGroup Laser Printer Network Attached Large Workgroup, Heavy Duty Cycle WorkGroup Laser Printer (multi-bin, duplex, etc) Approve Inkjet Printers on exception/waiver basis only.
Standard Desktop Platform	Standards for enterprise-wide desktop computing platforms.	Standard platforms meet 80% or more of enterprise computing requirements. Minimize number of desktop hardware standards and software images supported. Leverage volume purchasing power, by standardizing on nominal number of configurations, and single vendor. Planned technology obsolescence.	Ad hoc standards enforcement, some enforcement of vendor/brand. Individual business units define configurations All desktop operating systems supported. No formal technology replacement cycle	Dell Thin Client Desktop with Flat Screen Monitor Dell Professional Workstation Dell Analyst Workstation Windows 95, 98, NT, 2000, XP Informal enforcement of technology replacement cycle.	Two standard desktop images/configurations: Dell Professional Workstation (move to flat screen monitor option as price parity with traditional CRT monitors is reached) Dell Analyst Workstation (move to flat screen monitor when price parity is reached) Window XP Professional Operating System 3-4 year planned replacement cycle on desktop computers 3 year planned replacement cycle on notebook computers.

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Enterprise Reporting Tool	Standards for enterprise-wide reporting tool.	Flexible and with needed features to support a wide range of requirements. Easy to use.	Batch report processing	Crystal Reports Batch report processing	Crystal Enterprise Version Crystal Web Access Batch report processing
Data Tier	In n-tier computing model, the data tier manages the information repositories and data access control	Scalable, robust, reliable, secure, and cost effective.	OS/390 VSAM Oracle FARS system Foxpro	OS/390 DB2 SQL Server Microsoft Access (for standalone use only)	OS/390 DB2 (enterprise data systems platform) SQL Server (data warehouse, transitory data systems, temporary storage)
Business/Application Tier	In n-tier computing model, the business/application tier centralizes all the business logic (rules) for every application.	Scalable, robust, reliable, secure, and cost effective.	COBOL	COBOL/CICS on OS/390 ColdFusion (HTML/Javascript)	Macromedia Coldfusion MX server for IBM Websphere (J2EE) Websphere (J2EE)
Integration Tier	In n-tier computing model, the integration tier manages the communication (synchronization, replication, transaction delivery, etc) among disparate (internal or external) enterprise systems.	Scalable, robust, reliable, secure, and cost effective.	Batch Processing	Batch Processing	XML-based transactions among loosely coupled systems (both internal and external to NWD).
Workflow, Document Management, Imaging	Services related to the creation, storage, management and administration of electronic documents, images, and workflow.	Scalable, robust, reliable, secure, and cost effective.	n/a	SCANTRAX Lotus Notes Application Workflow	Lotus Notes Application Workflow Domino.DOC ieStream

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Presentation/Web Tier	In n-tier computing model, the presentation tier manages the user experience (user interface) for every application.	Scalable, robust, reliable, secure, and cost effective.	n/a	IIS	IIS WebSphere RedHat Linux/Apache Web Server
Telephony Services	Services related to call center and computer to voice technology integration.	Scalable, robust, reliable, secure, and cost effective.	Nortel Periphonics (NEBDIAL)	EIC version 1.3 (RIC)	EIC version 2.2 (RIC and Continued Claims)
Report, Forms, Output Management	Forms Design and Management Software	Flexible. Able to support newer document formats. Able to integrate with COLD.	MIX/ISIS	MIX/ISIS	tbd
Wireless & Mobile	Standards related to mobile (either wireless or wired) access to mission-critical systems. See also Section 9 – Enterprise Security Architecture.	Scalable, robust, reliable, secure, and cost effective.	n/a	n/a	n/a

Category	Description	Guiding Principles	Standards		
			Twilight	**Current**	**Emerging (Target)**
Systems Management/Network Monitoring	Enterprise standards for systems and network monitoring (roles, responsibilities, process and toolsets)	Coordination and partnership with DOC and IMS to provide holistic monitoring of all mission-critical systems.	No or little proactive monitoring of mission critical systems/networks/services. Monitoring focused on availability, rather than performance/QOS.	No single monitoring console, service, or responsibility role assigned. IMS/DOC performing some monitoring, and NWD supplements with point monitoring solutions/processes. No end-to-end accountability for monitoring functions. Monitoring remains focused on availability, rather than performance/QOS. What's Up Gold	Single monitoring console (or perhaps a suite of integrated SNMP-based products with ability to report to central console). NWD assumes ultimate end-to-end accountability for service, but relies on 3rd party providers (DOC/IMS/etc) to provide "window" into their monitoring systems (and/or ability to collect SNMP-based alerts/traps for reporting). Both availability and performance/QOS metrics are available, and are used to optimize n-tier application systems. Evaluation of SMS, LANDESK, NSMC, Tivoli, etc, underway.

Section 9.0

Enterprise Security, Business Continuity Planning, and Disaster Recovery Architecture

9.0 Enterprise Security Architecture

9.1 Introduction

Our continually changing world now dictates that security rises to the top of all concerns for government, education, and private sector organizations in the United States. Since "9/11", awareness of security exposures in the workplace, at home, and during travel, has escalated dramatically.

Specifically, state government UI programs throughout the United States, have detected an increasing number of fraud and security incidents. Damages, in some instances, have been in the millions of dollars. The US Department of Labor (as well as our other federal government partners, such as SSA) continues to place increasing emphasis on enhanced security and anti-fraud measures. Our federal partners predict additional security certification and authorization mandates for state UI programs within the next couple of years.

Security Risk Management
A Five Step Process

1. Asset Identification
2. Threat Assessment
3. Vulnerability Assessment
4. Risk Assessment
5. Implement Countermeasures

Source: National Infrastructure Protection Center November 2002

As state UI programs continue to extend their services to the Internet, and encounter an even greater number of threats and vulnerabilities, a new approach must be dictated. Security/fraud awareness, prevention, detection, and response must now be elevated to the highest levels of priority, and be made an integral part of every business process.

Security is an ongoing process. Unfortunately, the implementation of our optimal security architecture cannot happen overnight. Through ongoing investment in security as a "process", we will begin moving towards the levels of security that are appropriate and practical, for our own agency. There is no such thing as a "100% secure" system. When we proclaim a particular system "secure", we merely mean that we've adopted reasonable measures, in proportion to the value of the assets being protected, to mitigate the most likely risks.

One must also recognize that technology, alone, cannot protect information systems. The human factor nearly always becomes the weakest link in the "security chain". Therefore, often overlooked 1) security awareness, 2) education, and 3) promotion, should top NWD's list of security initiatives.

We have the opportunity, within the STAR architecture framework; to "build in" enhanced security and anti-fraud measures to be implemented and governed for all new systems within our enterprise. The following principles and standards communicate our optimal "target" security strategy. These principles and standards will continue to evolve in future iterations of STAR, but should now be considered for all future security investments within NWD.

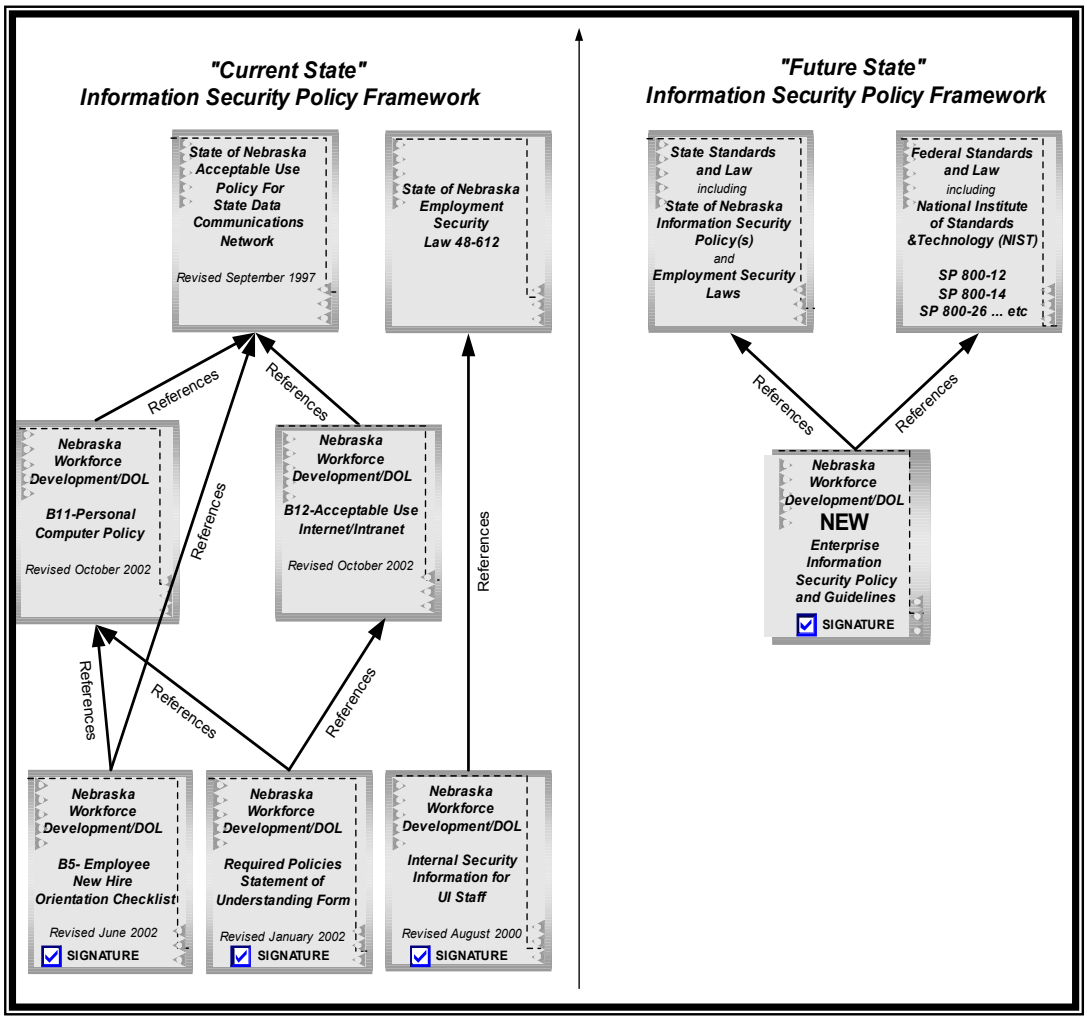
9.2 Overarching Security Principles

- Enterprise security responsibility and accountability shall be elevated to the highest levels of the Department of Labor
- In STAR, we use the terms appropriate and practical to refer to security measures which are in direct proportion to the value of the asset needing protection.
- A formal enterprise information security policy shall be adopted by the Department of Labor. All associates (including employees, contractors, vendors, and partners) with access to our enterprise systems shall be required to acknowledge the policy, via signature, before initially accessing systems, and thereafter, at least once each year.
- All enterprise security measures shall be developed in consideration and support of the enterprise information security policy.
- Enterprise security should be consistent and managed across all organizations, platforms, networks, domains, applications, and data systems within the enterprise.
- Heightened enterprise security awareness shall permeate the entire organization. A formal security awareness promotion and educational campaign shall be coordinated.
- Only services, which are expressly required to support business processes, should be allowed and configured. All other services shall be denied.
- Electronic information that is stored and/or transmitted through our enterprise networks shall be considered for encryption where practical and appropriate.
- Multifactor authentication principles of 1) what you know (userid/password), 2) what you have (electronic certificate, PKI, smartcard, etc), and 3) who you are (retina scan, fingerprint, voiceprint, etc), should be adopted where appropriate and practical.
- Mission critical systems with high vulnerability, or under high threat, and which do not employ multifactor authentication or encryption shall be identified and subject to more thorough audit and IDS (Intrusion Detection Systems) requirements.
- Responsibility for maintaining confidentiality of an individual's authentication process shall rest solely with the specific employee/contractor/vendor/etc (thereafter referred to as associate) assigned that authentication.
- A logical security model will define trust domains (areas of similar security) within our organization, for the purposes of our security architecture. Appropriate levels of security will be implemented/adopted in relation to the value of the information assets being protected.
- Between trust domains, the following security measures will be among those considered: 1) authentication/network access control, 2) virus protection, 3) intrusion detection, and/or 4) encryption
- Enterprise shall employ active virus detection and management services at multiple tiers, including network, application, and systems layers.
- Remote (wired/wireless, via Internet, and/or dialup) access shall be controlled through a single ingress point, and managed with a consistent authentication, authorization, and audit process. VPN or SSL shall be the preferred access mode for all types of remote access.

- Logon ID's will be assigned to all individuals. No shared or group logon ID's will be allowed.
- Mandatory password expiration will be enforced. Inactive account deletion periods will be defined and enforced.
- Periodic internal and external security reviews shall be performed for high-risk program areas as appropriate. In accordance with US DOL Unemployment Insurance Program Letter 34-87, a risk analysis of all UI programs operations is to occur at least once every three years, or whenever significant changes occur to UI law, programs, or personnel; new programs are implemented; changes in computer or physical security; or when significant errors or irregularities are detected.

9.3 Policy-Based Information Security Strategy

Effective policy is the foundation for a security strategy. Additional federal government influences will drive our agency's future security architecture. The following figure illustrates our current, as well as the future, information security policy framework which should drive future security requirements for our enterprise. The recommended enhancements include:



9.3.1 Acknowledgement of the ever-evolving federal and state government requirements for security, which we must continually reference, and implement within our own state agency.

9.3.2 Address gap in current policy to more fully address "information security and privacy".

9.3.3 Look at opportunities to combine existing policies and streamline into an overall, uniform, policy structure, with single signature requirement.

9.3.4 Expand scope of security policy audience to include all users of our agency information systems (including employees, contractors, partners, vendors, etc.)

9.4 Security Authentication (N-Factor) Overview

One of the most critical success factors for any organization's security architecture is creating a balance between systems accessibility (functionality, ease of use) and security (including risk management) through effective security authentication. Authentication answers the question, to a specified degree of confidence, of "who are you?", and provides the mechanism for automated systems to validate identify of a particular individual.

The following sections describe 3-factor authentication, and give examples of how each factor might be used. Authentication approaches must be considered for employees, our customers, and our external partners. As we develop new systems, we must be aware of each of these authentication approaches, and be prepared to employ them where practical and appropriate.

"Three Factors" Authentication

Knowledge Factor - Something I know.
Possession Factor - Something I have.
Biometric Factor - Something I am.

9.4.1 The Knowledge Factor

Knowledge Factors in the guise of passwords for system and network logon have both strengths and weaknesses. The user provides a claimed identity such as a name and the Knowledge

Factor. The Knowledge Factor provided by the user is matched against the reference

Knowledge Factor obtained via the user identification.

Strengths

Ubiquitous. This implies they have high awareness and wide acceptance.

Reliable. Either it matches or it does not; there is no ambiguity in their verification.

Virtually free. Typically, every application and system relies on passwords for access controls. Of course, this doesn't take into consideration the cost of administration and management.

Easy to use. The user only needs to enter two items.

Weaknesses

Subject to memory loss. People easily and often forget passwords and PINs.

Subject to guessing. Dictionary words and personal associations, such as family and pet names, are too often used.

Subject to social engineering. Someone implying or posing as someone that they're not to improperly gain information or system access.

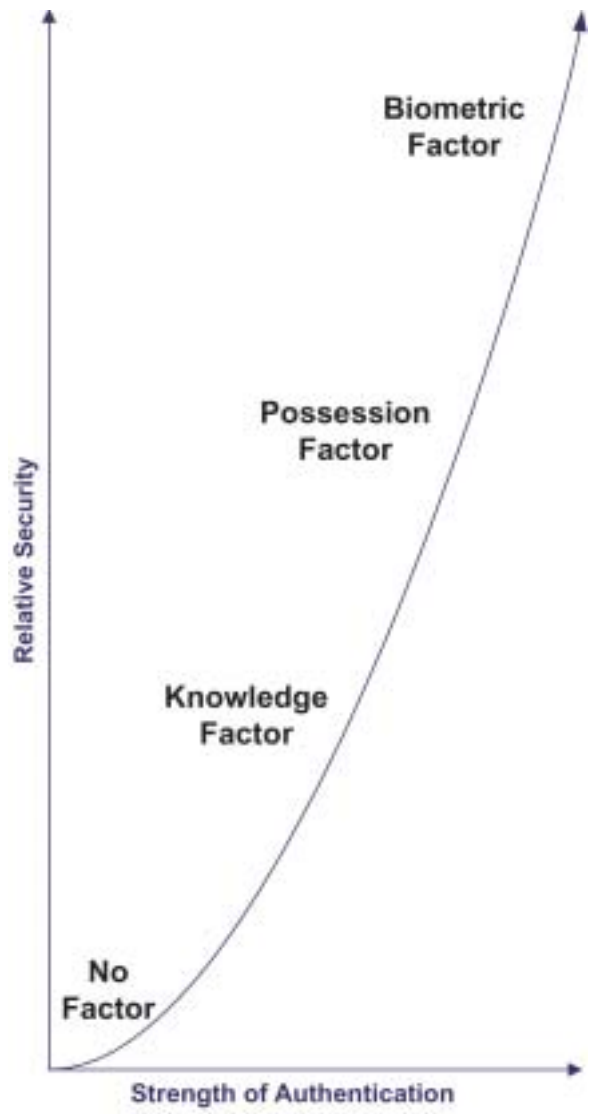
Subject to poor administration. Passwords are often not properly chosen, assigned, or managed.

9.4.2 The Possession Factor

Possession Factors are used to provide additional assurance that the user has authorization, andcover a wide range of devices, such as door keys, driver's licenses, employee badges, ATM and credit cards, and cryptographic keys. Possession Factors also have both strengths andweaknesses.

Strengths

- **They are common.** While not as ubiquitous as passwords, they are in widespread use in many forms such as credit cards.
- **They are reliable.** For example, credit cards using magnetic stripes are proven technology.
- **They are costly.** Physical tokens must be manufactured and purchased.
- ***Weaknesses***
- **They are often difficult to use.** For example, the magnetic stripe must be swiped against the reader.
- **They can be left behind.** Employees routinely forget their ID badge at home, and users forget to take their credit cards when they go shopping.
- **They are subject to duplication.** For example, the magnetic stripe data can be copied, and a counterfeit card can be manufactured.
- **They are subject to social engineering.** Again, someone implying or posing as someone that they're not to improperly gain access or information.
- **They require asset management.** Physical devices must be procured, they must be issued to the users, and they must be replaced when lost or stolen.



9.4.3 The Biometric Factor

Biometric Factors embody a wide variety of technologies, including fingerprints, iris, voice, hand geometry, and face images. The user must first enroll his or her biometric information,

called a *biometric template*, using a biometric reader. Authentication occurs when subsequent biometric data is validated against the template. Unlike the other authentication factors, biometrics can be used for either verification or for identification.

Strengths

- **Somewhat costly**. Pricing has vastly improved and is becoming more competitive.
- **Easy to use**. The user only needs to touch, look, or speak into the biometric reader for authentication.
- **Cannot be forgotten, lost, or stolen.** That is, not easily anyway … this is you.
- **Difficult to counterfeit**. And if the biometric system adheres to industry standards, it cannot be forged.
- **Social engineering risk low.** Cannot be loaned or given away.

Weaknesses

- **Limited to niche markets.** This is rapidly changing, as biometrics become more reliable, cheaper, and well accepted.
- **Technology may be difficult to manage.** Users must be enrolled, and the biometric templates must be securely distributed.

9.5 Electronic Communications: Privacy and Security Considerations

- Consider all external (outside of NWD) email and/or chat (IRC, instant messaging, etc) communications to be un-secure.
- Promote agency-sponsored/managed web portals for secure (SSL) customer-to-agency or agency-to-customer communications via web-based forms and/or secure web-based messaging services. Investigate the emerging Nebraska's Secure Information Exchange portal services, as potential solution for secure agency external communications.
- Display NWD security/confidentiality disclaimers wherever agency email addresses are promoted (flyers, web sites, brochures, etc). Essentially, the disclaimer will urge clients to NOT send requests containing sensitive/internal/proprietary/confidential information through un-secure email services.
- Develop standard staff protocol for handling (responding to) electronic requests containing sensitive, proprietary, or confidential information. For example: Upon receipt of such communications, a standard response/reply will be generated which communicates why the request cannot be served through this medium, and directing the customer to inquire through other approved/secure mediums. For example, a phone or fax number, web portal address, or postal mail.
- Implement standard (automatically generated) agency-wide, privacy disclaimer for all outbound email messages from NWD associates. To effect:

  This message may contain proprietary information. If you are not the intended recipient of this message, please reply to this sender, and delete this message immediately.

  Contents copyright 2003, Nebraska Workforce Development, Department of Labor

- Educate, promote, and provide awareness-training to employees, customers, and partners as to risks of using electronic communications to transfer sensitive/internal/proprietary/confidential information.

9.6 Business Continuity Planning and Disaster Recovery

In association with the new BPS system development efforts, an updated/revised Business Continuity Planning and Disaster Recovery (BCP/DR) Plan must be developed. This plan identifies the people, processes, and resources needed to insure that the mission critical operations of our agency are not affected, if computer operations are suspended for a period of time. The plan also outlines the agency's recovery from loss of technology services with NWD, or through our partners (DOC and IMS).

The current NWD Disaster Recovery Plan (last updated June 2002) can be used as a baseline/guide for development of our future BCP/DR plan, but will need to be significantly revised, in order to accommodate BCP/DR in our new N-tier architecture environment.

9.7 Considerations for Physical Infrastructure and Hosting Services

NWD's current data center is housed on 4th floor of the NWD Administrative Office building at 550 South 16th Street in downtown Lincoln, Nebraska. It is approximately 1 block from the IMS data center which houses the state mainframe, and much of the data communications infrastructure.

An assumption that can be made is that NWD will assume (along with DOC and IMS) overall responsibility in providing a robust, secure, fault tolerant computing environment for the new N-Tier BPS system. Among the likely sourcing scenarios is that NWD will either 1) share, or 2) assume full responsibility for, application and presentation tier computing services.

A survey of NWD's data center facility exposes a number of deficiencies which should be addressed, should NWD be considered among the hosting providers for the new BPS system. These are summarized as follows:

Specific recommendations suppressed in public copy of this publication.

“Future State” Firewall, DMZ, and IDS Architecture: Logical Network Security Diagram

In the past, NWD has relied on network security measures such as packet filtering (rudimentary firewall), network address translation (NAT), and virtual switched LAN’s (VLANs) to provide basic levels of network security. This approach, while effective in its time, is inadequate for todays (and tomorrow’s) expanded service offerings.

The diagram on the right, communicates a “best practices” approach for NWD to designate network security domains, partition the network domains through managed firewall functions, and the implementation of a low-cost intrusion detection system (IDS).

This general approach will serve NWD’s requirements for all future web services functionality being considered as part of the BPS modernization initiative.

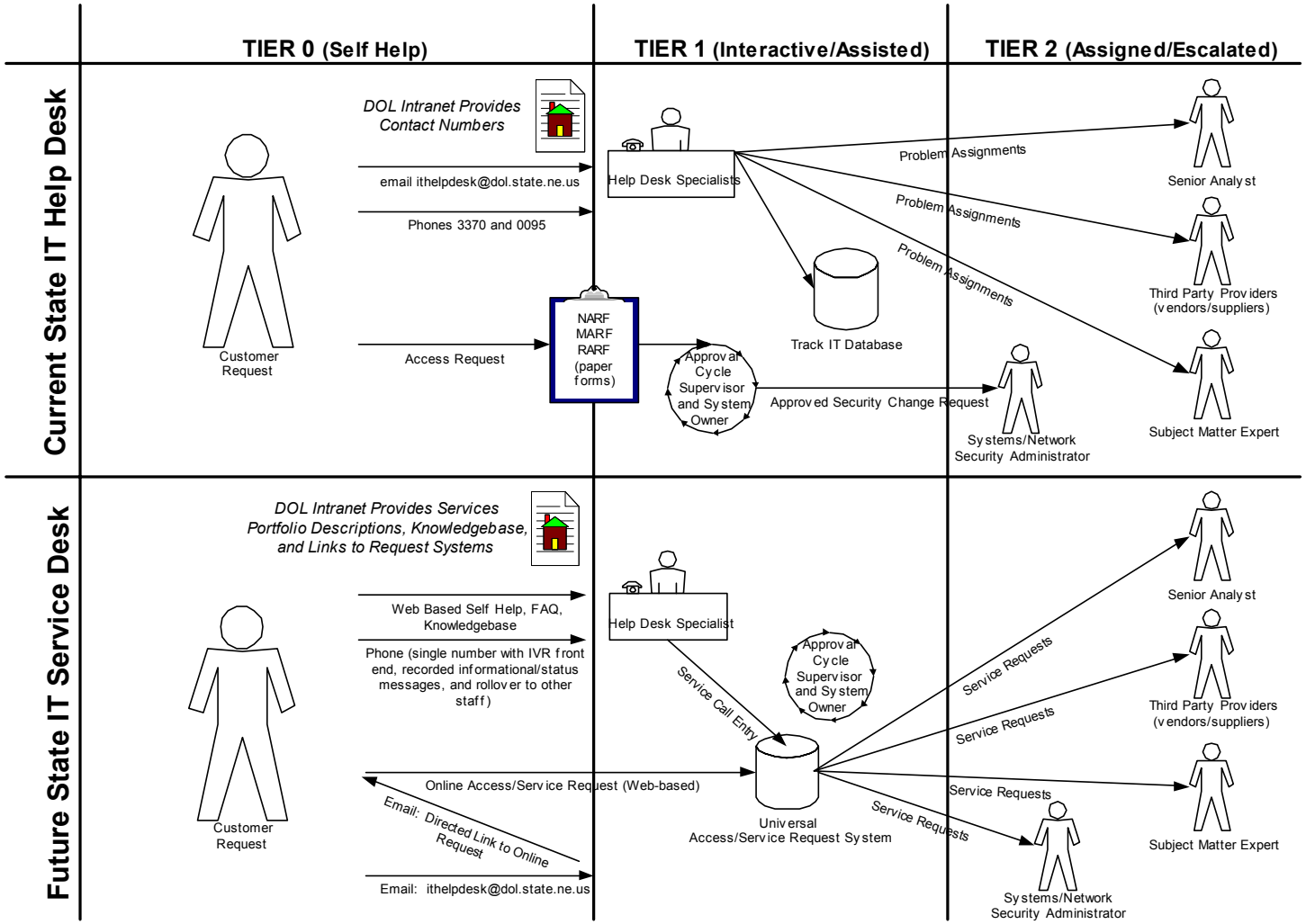
Diagram suppressed in public copy of this publication.

Current and Future State Integrated Security Access Request and Administration

An important component of any information security strategy involves careful definition, controls, and monitoring/audit of the processes and workflow involved in authorizing access to mission-critical networks, systems, and information repositories.

The diagram on the right illustrates the planned enhancements which will be adopted for our future state security access request systems.

By centralizing all request types, managing workflow approval processes, and storing an audit log of all transactions electronically (vs paper format), appropriate controls can be implemented for our authorization request/approval systems.



9.8 Enterprise Security Architecture: Principles and Standards Table

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Firewall **(enterprise and personal)**	Network-based access control that is typically administered between internal (corporate) and external (Internet or other) networks.	From a network perspective, a nominal (minimum required) number of points of potential ingress/egress to our enterprise should be configured. All ingress/egress points not specifically tied to critical business requirements should be eliminated. All ingress/egress points shall be firewalled, and actively monitored through a robust intrusion detection system (IDS)	Security standards suppressed in public copy of this publication		
Wireless and Mobile Secu-rity Access	Includes remote (both wireless and wired) access from company associates who are physically outside of our corporate firewall.	Single, controlled wireless gateway with authentication, authorization, encryption, and audit	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Information privacy and Data Security		Single data owner/custodian (who is responsible for data quality and definition of security)	[redacted]		
Virus Management Systems	Measures implemented to proactively manage/control the spread and affect of computer virus/worm activities.	NWD employs multi-layered virus detection and prevention system by Symantec and other leading security systems vendors. Virus management systems are deployed at the email gateway (or firewall), email server, file server, and personal computer/notebook layers. Virus signatures and software are continually updated at all layers, via a centralized, network-based, distribution console. Additional content filtering/blocking is performed for both email and web access.	[redacted]		
Intrusion Detection Systems (IDS)	IDS systems provides vital, real-time information about our network and possible threats to the infrastructure. Pattern-detecting and signature-based IDS alerts are monitored to guard against unknown or next-generation threats.	Advanced correlation, logging, detection, and threshold notification based on patterns. IDS capabilities at all points of network ingress/egress. IDS capabilities at borders of trust domains Automatic/realtime response to cyberthreats.	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Encryption (General)	Mechanism employed to insure that sensitive data/information (confidential or proprietary) remains secured.	Electronic communication which transverses trust domains (areas of lesser or greater security) shall be encrypted where appropriate and feasible.			

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
External Security Threat Monitoring and Reporting	Members of our security team continually monitor government, law enforcement, and security sources (including over a dozen web sites) for the latest security exposures and threat alerts.	Early detection of identified security threats Teaming with external organizations for the benefit of overall government security	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Authentica-tion	Determining with certainty, who are you?	Identity theft prevention Protection against social engi-neering. Multifactor (2 factor at mini-mum, and 3 factor where ap-propriate) authentication should be employed wherever feasible and appropriate. Multifactor principles of 1) what you know (userid/password), 2) what you have (electronic certificate, PKI, smartcard, etc), and 3) who you are (retina scan, fin-gerprint, voiceprint, etc), should be adopted as and where appropriate.	[redacted]		
Authorization	What systems, net-works, buildings, etc do you have access to?	Single sign-on to reduce com-plexity. Role based security to general-ize authorization based on job functions. Configuring only minimum required access to enterprise services.			

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Security Systems Audit	Audit (what has occurred?)				

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Enterprise Security Audit and Independent Assessment		Leveraging external service providers to decrease overall security exposures. Employ services of friendly hacking to identify exposures before the "bad guys" do. Self certification through NIST security guidelines.	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Physical Security Access	Control and management of physical ingress/egress to company owned facilities for both people and resources.	Configuring only *minimum required* access to enterprise services. Understanding all potential considerations for security, in a publicly accessible facility or service center. Adopting appropriate and practical physical security measures, in consideration of the intended use of the facility, in proportion to the value of the assets being protected.	[redacted]		
Organizational Roles and Responsibilities	A set of clearly defined roles and responsibilities assigned to security.	Security is managed at the highest levels in our organization	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Employee Security Awareness	Ongoing security promotion and awareness programs targeted to Company associates.	Our strongest tool in the fight against cyber-terrorism and increasing our security profile is employee security awareness.	[redacted]		

Category	Description	Guiding Principles	Standards		
			Twilight	Current	Emerging (Target)
Security Policy Foundation and Enforcement	A formal written enterprise security policy (s) which clearly spells out each associate's security responsibilities, and consequences for neglect of those responsibilities.	A comprehensive, information security policy is the foundation for every company's security architecture Violations of the information security policy are grounds for dismissal.	[redacted]		

Section 10.0

Enterprise Project Management Architecture

10.0 Program/Project Management Architecture

Currently, NWD has few formal IT project management processes and tools in place to insure consistent and effective project delivery practices across the enterprise.

Organizations wishing to minimize project risk, reduce project cost/time overrun, and improve overall chances for project success have taken action to increase their project management maturity levels.

This generally involves gaining high level management support for the adoption of a formal PMM (Project Management Methodology) appropriate to the size and complexity of the projects being managed, education for PM's (project managers), and overall coordination by a PMO (Project Management Office) function.

Standish Group CHAOS Report (1994)

- Seventy-four percent of all IT projects fail, come in over budget or run past the original deadline... 28 percent of projects fail altogether.
- Nearly half of all application development projects cost 70 percent more than originally budgeted. Managers cite lack of user input as the main reason for project failure.
- 52.7 percent of IT projects cost 189 percent of their original estimates. In larger companies [where the average cost of a development project is $2,322,000], only 9% of the projects come in on time and on budget.

10.1 Project Management Body of Knowledge (PMBOK) and the Project Management Institute (PMI)

NWD has adopted the PMI-endorsed PMBOK as a future state model for our NWD Project Management Methodology (PMM). PMBOK is widely accepted, flexible, and presents a "best practices" approach to implementing formal project management processes in any sized organization. PMI (see www.PMI.org) is a member-supported organization supporting project management professionals, maintains the PMBOK, and sets standards for certification of project managers.

10.2 Enterprise Project Management Office (EPMO) and PMOUSA

Among the recommendations developed within STAR 1.0, is to formalize project management processes across our enterprise, and to implement a PMBOK-based, project management office *function* which serves to guide all future business and IT projects.

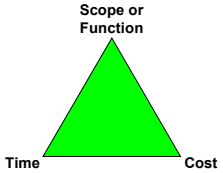
Gartner recognizes three styles of PMO's:

1) The Project Repository Model – simply serves as a source of information on project methodology and standards.
2) The Project Coach Model – An extension of the repository, this model assumes a willingness to share some project management practices across business functions, and uses the project office to coordinate the communication.
3) The Enterprise Project Office Model – The most permanent, consolidated, organizational model concentrates on project management within the project office.

Specifically, the recommendation for our enterprise is to implement an EPMO function with characteristics from all 3 styles identified by Gartner. This EPMO should be implemented in support of, and in anticipation of, the BPS modernization project, and may be staffed by a com-

bination of internal staff (full or part-time, with project management responsibilities) and outside vendor support, as needed. All future IT (or business projects with IT components) should be planned, managed, and delivered through the EPMO processes.

Given the size of our organization, a matrix-style (vs a permanent organizational unit, with full time PM's) EPMO function will serve our needs best. In the matrix-style EMPO, a lead IT manager is assigned (full or part time) to serve in the EPMO director role. During each project's life-cycle, the PM for that particular project has dotted-line reporting responsibility to the EPMO director who also shares (with the PM's supervisor) review/evaluation responsibilities for that employee or contractor. As an example, if there are 5 projects occurring at a particular time, the EPMO director would share reporting/supervisory responsibility for 5 project managers.

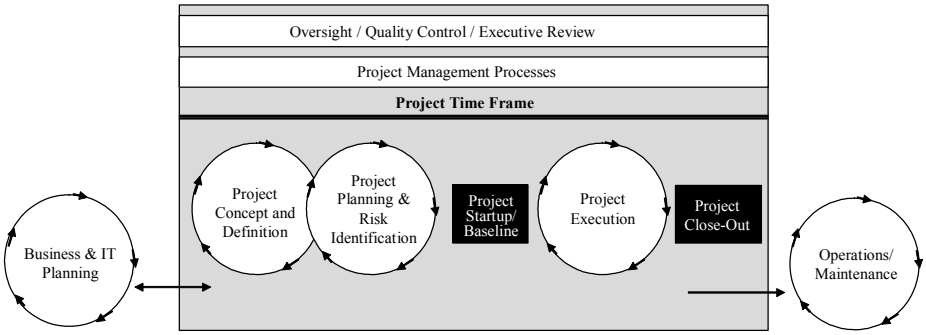


Services provided by our EPMO should include:

- Develop/manage PMM tools, templates, and methodology (PMBOK-based)
- Develop/manage collaborative web environment for project management processes and as a repository for information about specific projects. Recommended platform for this web environment is Lotus Quickplace.
- Facilitate project management training, awareness, and certification. Conduct internal symposiums/workshops, and select training vendors/events.
- Facilitate project planning using the adopted methodologies, for all projects.
- Coordinate STAR technical architecture governance checkpoint reviews for all projects.
- Provide overall project quality monitoring, security, and risk identification/assessment/mitigation.
- Conduct project troubleshooting, and serve in an internal audit capacity.
- Facilitate web-based project status reporting to management and project teams.
- Vendor/contract oversight and management.

PMOUSA (see www.PMOUSA.com) is a global resource with free templates available to individuals implementing EPMO's in their own organization.

10.3 Project Management is an Iterative Process

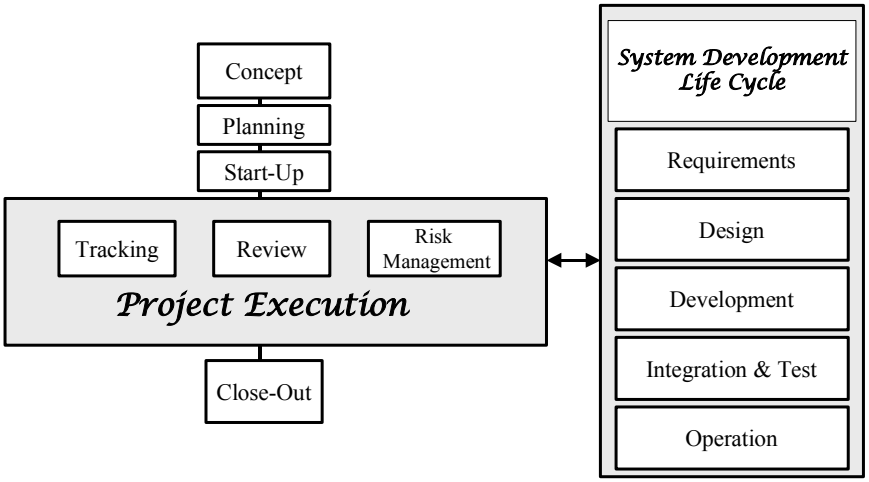


The arrows (see figure on the right) illustrate that effective project management is an iterative process. It is not a lock-step sequence of activities. In some instances, phases overlap. As an example, the delineation between concept definition and planning can sometimes be difficult to distinguish.

Other activities, such as risk, quality, cost, time, and resource management are controlled with every cycle of the project. The PMM addresses the management of the project, not the systems development life cycle of a project development effort.

10.4 PMM Relationship to the System Development Life Cycle (SDLC)

As illustrated in the figure on the right, the SDLC occurs within the project execution portion of the project. The project management and associated activities are independent of the specific development methodology selected.



The project management methodology does not dictate a specific systems development life cycle (SDLC) model (such as a waterfall, spiral, incremental, or iterative). Instead, it is a generic methodology for project management that accommodates various development approaches and a variety of detailed execution procedures.

One common misconception is to think of PMM and the PMO as applicable to software development activities only. In fact, an effective PMM can and should be applied to ANY type of business or IT project (i.e. network infrastructure upgrades, development of an employee training program, product/service development, developing a company marketing strategy, or building a suspension bridge). In these cases, one simply plugs in the appropriate "SDLC" applicable to that genre of project. Reference section 7.0, Enterprise Application Architecture, for a complete discussion of software SDLC.

Section 11.0

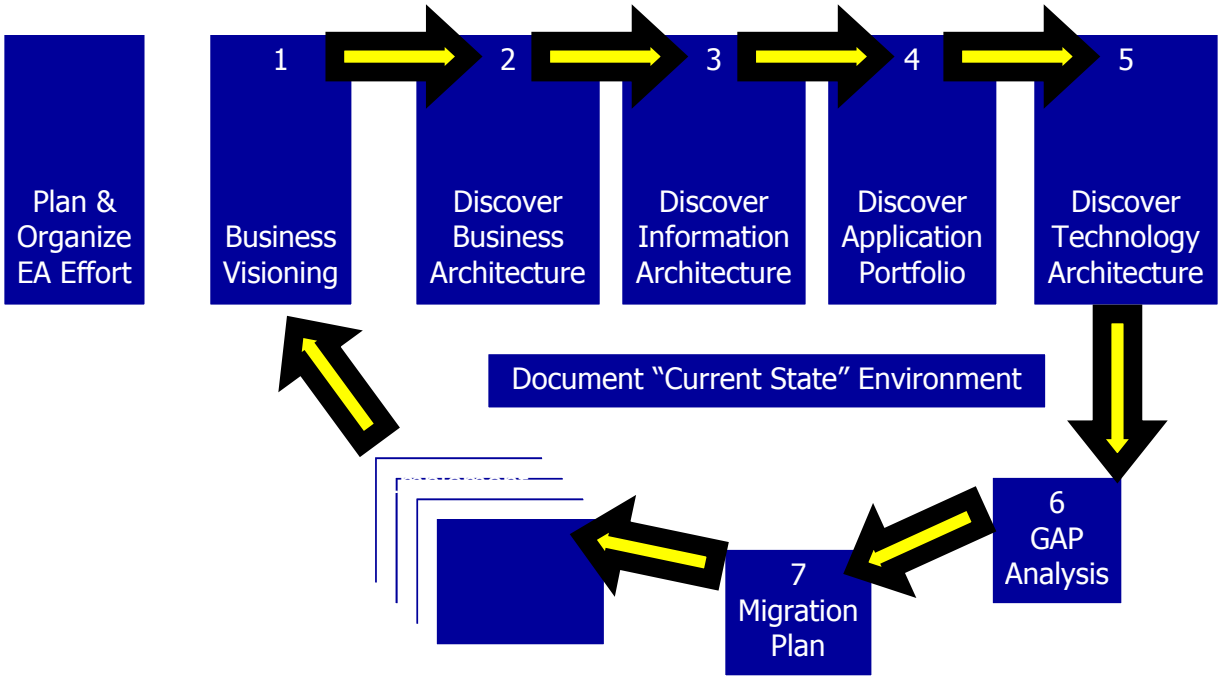
Enterprise Architecture Development, Administration, and Governance

11.0 STAR Development, Administration, and Governance

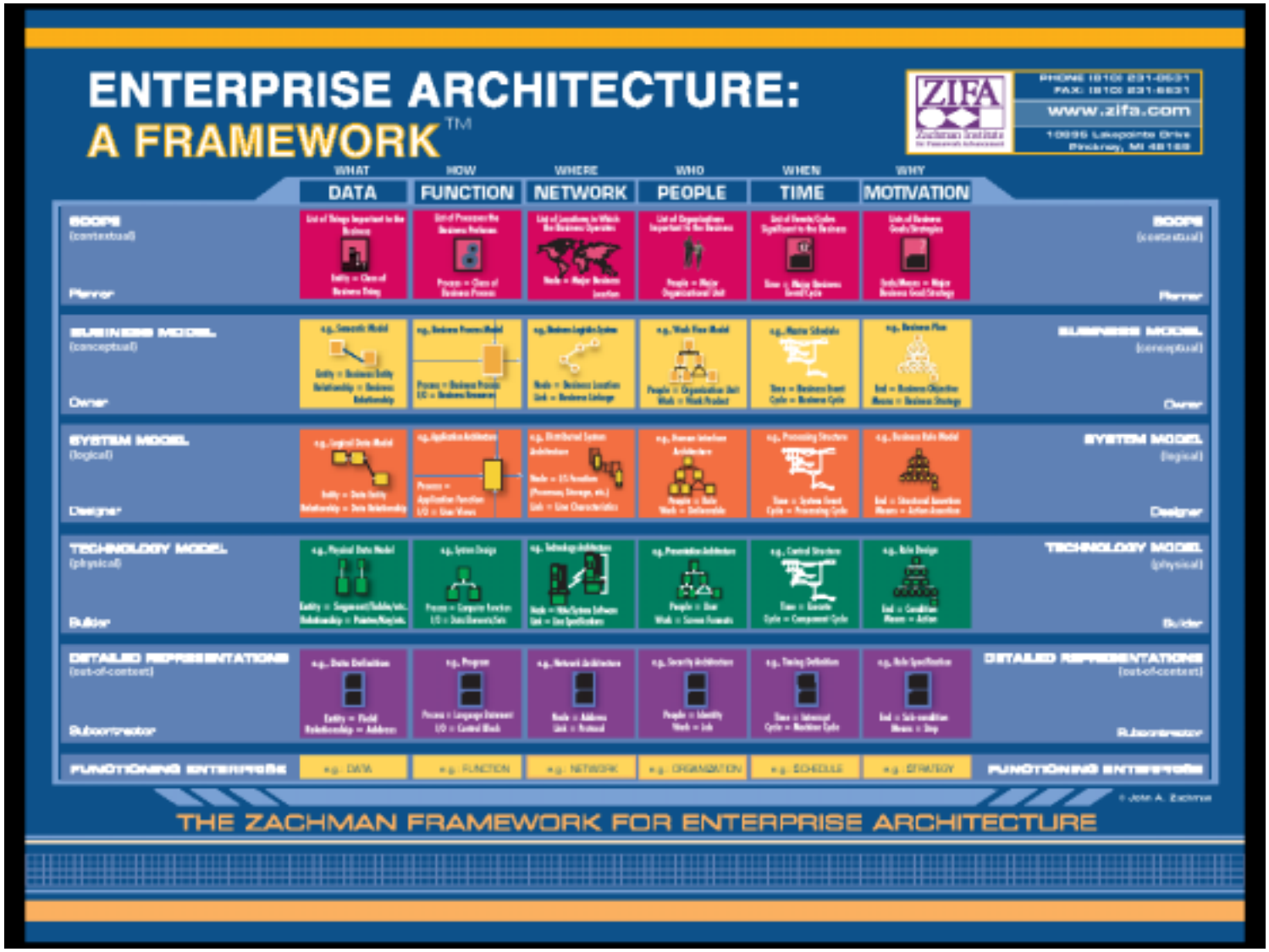
11.1 Our Approach to Enterprise Technical Architecture

There are a number of approaches which business and government sector organizations have used to develop enterprise technical architecture. This discipline is relatively new, and is evolving rapidly. Our approach, using the Zachman Framework (section 11.3) for architecture classification/representation, as well as guidance regarding the optimal sequence of activities, from META Group's Enterprise Architecture Desk Reference (section 11.2), represents current industry best practices, and has been adopted for utilization within the STAR framework.

11.2 META Group's Enterprise Architecture Development Process Model



11.3The Zachman Framework



11.4 Administration Plan for STAR

11.4.1 Incremental Electronic Updates

The STAR architecture will be updated, on an as needed basis, throughout the year. Incremental updates shall be versioned as "point releases" (e.g. STAR 1.1, 1.2, 1.3 … etc), and published/updated/promoted electronically (via Intranet web site). These updates will be largely technical in nature – designed to allow our STAR document to respond to rapidly evolving technological changes, when they affect our target "future state" architecture.

- Executive Director of Information Technology will initiate each incremental review/update process, on an as needed basis.
- STAR Executive Steering Committee will review/approve each incremental update.
- Approved incremental update will be published electronically.

11.4.2 Annual Review and Update

The STAR architecture shall, at least once per year, and coinciding with the annual state budget development cycle, be updated as a major "point zero" release (e.g. STAR 2.0, 3.0, 4.0 … etc). The annual review shall include a rollup of the incremental technical updates since the last point-zero release, as well as a review of the entire document in consideration of business and technology changes.

- In coordination with the annual state budget review and planning cycle, the STAR Executive Steering Committee shall direct a project to review the entire STAR architecture in consideration of evolving business/technical landscape, state/federal budgetary constraints/opportunities, and the agency's mission, vision, and strategies.
- The STAR Executive Steering Committee will review/approve the update and recommend agency-wide adoption.
- Agency executive team will formally adopt the STAR architecture for the coming fiscal year.
- Adopted "point zero" STAR architecture will be published in both hardcopy and electronic format.

11.5 Architectural Governance

The most recently published incremental "point release" or annual "point-zero release" of the STAR architecture shall govern all new technology initiatives within NWD. An architectural governance process helps to insure that new initiatives are closely aligned with our "target" technical architecture and supports key business processes and strategic initiatives.

11.5.1 Internal Project Checkpoint Reviews

For projects that are managed via our IT Project Management Methodology (PMM), a STAR checkpoint review at the completion of each major project phase insures this technical and business alignment. Each project manager, in addition to the project sponsor and/or steering committee, is to be accountable and responsible for STAR architectural compliance. (see STAR Project Checkpoint Review on following page).

11.5.2 External Sourcing and Service Providers

Requests for Proposal (RFP), Request for Quotation (RFQ), service contracts, and any other proposed contracts or agreements with 3rd party vendors shall include verbiage to effect that "solutions or services which are consistent with, and support NWD STAR architecture standards and

principles will receive highest consideration". Where practical and appropriate, the evaluation of proposals or contracts will include weighted scoring that encourages vendors to supply architecturally compliant products, solutions, or services.

STAR Architecture Project Checkpoint Review

Project Title/Name

Project Manager/Date Completed

Guideline: NWD's PMM (project management methodology) requires that information technology initiatives be reviewed for STAR architecture compliance at the completion of each project phase (and/or iteration). The project manager shall complete and submit this document, as part of the outputs for each PMM phase. Publishing this completed document, on the Project's Quickplace, will initiate the architecture review process.

Completed Project Phase (check one)

- ☐ Initiation/Concept
- ☐ Analysis/Requirements
- ☐ Design
- ☐ Development
- ☐ Deployment
- ☐ Closeout

Declaration of STAR architecture compliance (check one)

- ☐ I certify that all of the technologies, methodologies, tools, principles, and standards that are, and will be, utilized for this project are identified as either "current" or "target" standards within the currently adopted version of the STAR technical architecture, or …
- ☐ The following are technologies, tools, principles, and standards that I have identified to be utilized for this project and are not identified in the currently adopted STAR technical architecture as "current" or "target" standards.

Name	Description	Key Business Process Supported	Key Business Strategy Supported

Attach additional pages if needed.

Project Manager Signature _____ Date _____

(To be completed as part of architectural review and approval)

- ☐ Project is compliant with currently published STAR architecture
- ☐ The project architecture does not comply with the STAR architecture; therefore the STAR architecture should be updated to embrace the project architecture
- ☐ The project architecture does not comply with the STAR architecture; therefore a temporary STAR waiver should be approved. In this case, a plan for eventual architectural compliance should be developed and submitted as part of the project documentation.
- ☐ The project architecture does not comply with the STAR architecture; therefore the project (as currently described) should undergo a formal re-evaluation by the project sponsor.

Executive Director of Information Technology (Approval) _____ Date _____

11.6 Architectural Process Maturity – Where do we stand?

(Shaded area indicates status at beginning of STAR project, the ✯ indicates our progress through adoption of STAR 1.0)

	Level 1 Initial	Level 2 Repeatable	Level 3 Defined	Level 4 Managed	Level 5 Optimized
Link to Business Vision/Mission	No, or implicit, linkage to mission strategies or mission drivers.	Explicit linkage to mission strategies.	Explicit linkage to mission drivers or information requirements.	✯ Periodic re-examination of mission drivers. End-to-end process cycle time is measured.	Process metrics for mission linkage driven into requirements-gathering process improvements.
Management Involvement	"What's architecture?" "Why do we need it?" "That won't work here."	Management awareness of architecture effort. Much nodding of heads. Some resistance to implications of having architecture.	Management aware of architecture effort and supportive. Management actively supports architectural standards.	✯ Senior management reviews architecture process cycle times, variances.	✯ Management involvement in optimizing process improvements in architecture development and governance.
Line-of-Business Participation	"We support the architecture process as long as it represents the standards we've already chosen." "Standards will only inhibit our ability to deliver mission value."	Recognition that it's painful supporting too many kinds of technologies. Perhaps tired of implementing stovepipe applications created in a vacuum.	✯ Recognition that architectural standards can reduce integration complexity and enhance overall ability of LOB IT to achieve mission goals. Most lines of business participate actively in architecture definition.	✯ All lines of business participate actively in architecture definition.	Line-of-business feedback on architecture process is used to drive architecture process improvements.
Architecture Process Definition	Doesn't exist, or exists in form completely out of date (from the last effort that failed).	Being actively developed. Process definition not widely communicated.	✯ Defined and communicated to IT staff and mission management with LOB or organization-wide IT responsibilities.	✯ Architecture process is part of the culture, with strong linkages to other core IT and mission processes (process re-engineering, fiscal planning)	Concerted efforts to optimize and continuously improve architecture process definition. Modeling of proposed process changes before implementation.
Architecture Development	No architecture to speak of. Some product standards, established by various ad hoc means.	✯ Architecture standards exist, but not necessarily linked to overarching conceptual architecture.	✯ Architecture standards development linked to mission drivers via conceptual architecture of principles and best practices.	Component architectures defined down to product and configuration standards. Architecture conformance measured at deployed systems.	Same as Level 4, with process exceptions (standards waivers) used to improve architecture definition process.
Architecture Communication	The "notebook", documenting the last version of the architecture. May have been handed out to IT staff. New IT staff may not automatically get copies.	✯ The "notebook" is updated periodically, or a Web site is used to document architecture deliverables. Few tools (e.g., office suite, graphics packages) are used to document architecture.	✯ Architecture documents updated and expanded regularly. "Live" documentation of the architecture, via internal Web site, Notes database, etc. Tools are used to support maintaining architecture documentation.	Architecture documents updated regularly, and frequency monitored across architecture content. Regular presentations to IT staff on architecture process, with IT architecture process coverage in new-hire training.	Same as Level 4, with process exceptions (standards waivers) used to improve architecture communication process improvements.
Governance	No explicit governance of architectural standards.	✯ Explicit governance of a few architectural standards. Variances may go undetected in the design and implementation phases.	✯ Explicit governance of the bulk of information technology investments. Formal processes for managing variances.	✯ Explicit governance of information technology investments. Formal processes for managing variances feeds back into architecture definition.	Same as Level 4, with process exceptions (standards waivers) used to improve architecture governance process.
Enterprise Program Management	Little or no formal project management discipline and skills. Lack of formal priority-setting mechanism for mission plans.	Planning and scheduling activities linked to time-based architecture development. Project risk and impact assessment conducted with or by the architecture team.	✯ Future staff/skill requirements based on target Technical Architecture. Change management procedures exist and are linked to a formal architecture review. Adherence to formal project methodology includes a design review "gate" hosted by the architecture team.	Program initiation and mission case development co-authored by EPMO director and chief architect. Vendor management is a core competency. Contingency planning requirements fed into architecture planning cycle.	Value assurance program in effect. Vendor contract renewals based on measured performance and adherence to corporate architecture standards. Mission continuity planning is a core competency and plans are refreshed based on target architecture and transition planning activities.
Holistic Enterprise Architecture	Little or no formal modeling techniques and documentation or inventory of mission processes, information entities, and applications.	✯ Basic application inventory exists and is maintained. Business models exist for parts of the mission (e.g., product lines, LOBs).	Application inventory is linked to the mission and systems are classified within a basic portfolio of technical condition and mission value. Enterprise business models exist and are referenced during solution design and development.	Application portfolio planning and business modeling manifest within the enterprise architecture process model. Modeling techniques and methods are re-examined periodically to ensure content is well understood and communicated. Enterprise modeling cycle times are measured.	Enterprise solution portfolio replaces application portfolio by encompassing all of the components of solution delivery:, (business logic, data, infrastructure, services, and business changes). Enterprise business modeling is a competency of line management and staff. Models are kept current in an enterprise repository.

	Level 1 Initial	Level 2 Repeatable	Level 3 Defined	Level 4 Managed	Level 5 Optimized
Technology Investment and Procurement	No IT procurement strategy. Little or no involvement of purchasing personnel in enterprise architecture process.	Some adherence to existing product and standards. Little or no formal architecture governance of purchase requisition and order content.	★ Procurement strategy exists and includes compliance measures to enterprise architecture. RFQ, RFI, and RFP content is influenced by the architecture content. Purchasing personnel actively involved in enterprise architecture governance.	★ All planned technology purchases are guided and governed by the architecture content. RFI and RFP evaluations are integrated in the architecture planning activities (technology, applications, IT services).	No unplanned technology procurement activity.

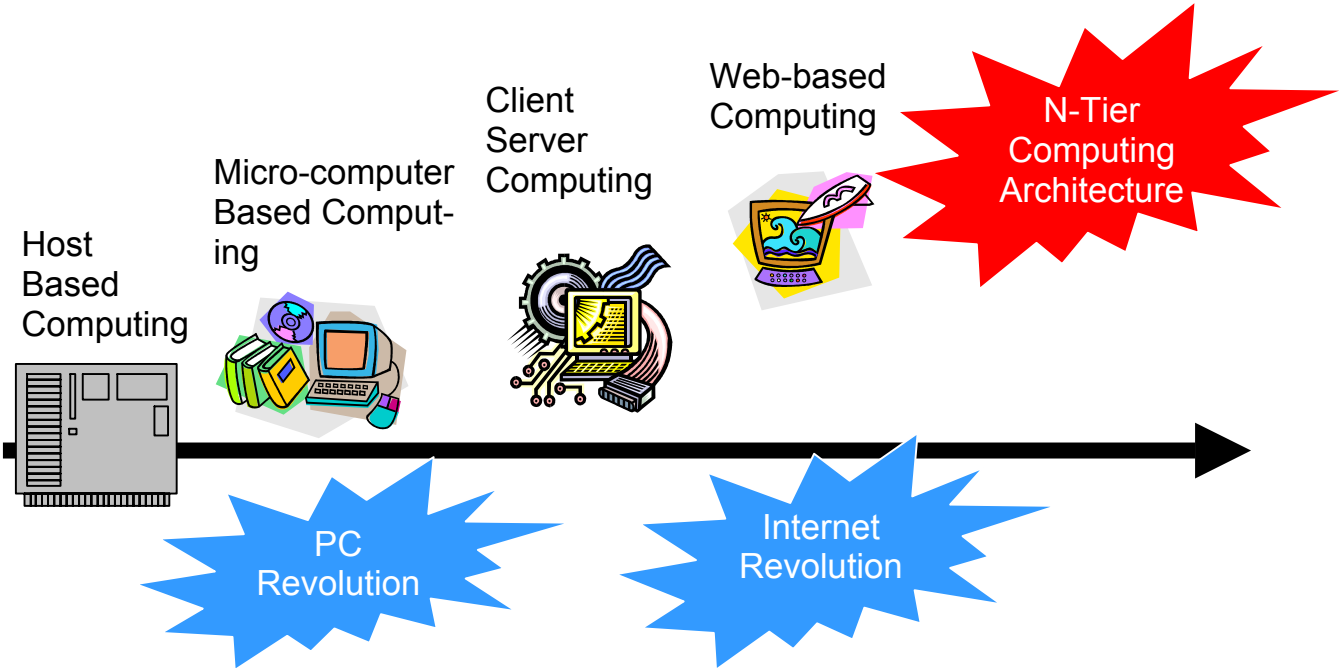
Section 12.0

Organizational Transition and Sourcing

12.0 Organizational Transition and Sourcing

The organizational (both IT and business unit) impact associated with major technological transitions, cannot be underestimated, and must be considered as a major risk factor for adoption of any new technology, and/or for re-engineering of key business processes. This section explores the interrelated issues of organizational transition and technology sourcing, and provides specific direction for our optimal "go forward" strategy.

Moving to the latest, greatest technology architecture is a significant challenge for any organization. NWD's OIT challenges are compounded in that we're jumping directly from a 1st generation (Host Based) to a 4th generation (N-Tier) computing paradigm without the benefit of significant experience gained with the intermediary technologies (see illustration below). This is a significant identified risk, which we must mitigate through creative sourcing and transition strategies.



For all organizations, "best practice" for sourcing includes an evaluation of organizational core (business) vs. non-core (utility) competencies:

- **Non-core:** Sometimes categorized as utility services, these are the commodity items that are readily available from vendors or partners. These services don't necessarily allow our organization to differentiate ourselves from our peers, and may actually cost more to build, manage, and operate if we chose to do it ourselves, therefore, they're often outsourced. Examples might include voice and data wide area network communications services, PC hardware repair services, or technical training.

- **Core:** These are the business competencies which are difficult or expensive to "hire or contract". They involve intimate knowledge of the business operations/organization and opportunities for improvement therein. By nurturing core competencies, an organization can evolve to the highest levels of maturity. It should be noted that organizations are often consumed with non-core activities (keeping the utility services running), and never have time to fully invest in, and embrace the opportunities that core services present. An example of a core service would be re-engineering a key business process, piloting a new technology for application with an organization, or participating in new computer applications systems development.

12.1 Key Organizational Transition and Sourcing Principles

- NWD will leverage external technology vendor and partner resources during the transition to the new technical architecture, for support of business process re-engineering, and staff training throughout the entire BPS development cycle.
- NWD will grow the internal capabilities needed to provide operational and management support to the newly deployed/developed BPS system. This means that NWD staff will eventually have capabilities, skills, technology, and knowledge to manage, operate, maintain, and add functionality to the new BPS system without vendor assistance.
- A long term focus: Outsourcing very rarely results in a reduction in costs, but can add value in offloading non-core (utility or commodity) functions/services, or to facilitate migration to new technologies. The strategic implications of our sourcing strategy must be considered.
- NWD will consider all "utility or commodity" functions/services as candidates for external sourcing and will constantly benchmark whether those utility functions/services can be performed "faster, cheaper, better" in-house.
- NWD will continually review and optimize the sourcing strategy according to principles developed through the ongoing STAR architecture development processes.
- Our long term sourcing strategy <u>should not</u> be constrained by our current organizational/skills capabilities. Interim sourcing of critical skills shall be used to supplement existing capabilities, only until those capabilities can be grown in-house. Transition to our optimal sourcing balance/strategy may take years, and will need to be re-evaluated within each version of STAR.
- Communication: All staff members must be kept fully informed and invited to participate in development of future sourcing strategy changes.
- Service-level agreements (SLAs) should be formalized for all critical sourcing relationships. The SLA's must be business driven (linked to business drivers/metrics).
- Sourcing management: Once a deal to outsource a particular good or service is made, a number of critical roles must be maintained, inhouse. This often includes contract management, vendor management, performance management, and overall project management functions. Often, enterprises do not make plans or budget for sufficient resources to manage their outsourcing deals, assuming that once the contract is signed, internal resource needs go away. NWD shall consider the role of sourcing management to be critical to success of the overall sourcing strategy.

- During the BPS system development project, a moratorium shall be placed on all but the most critical current systems development, maintenance, and support. Only critical federal, state, or executive mandates should be considered for development. With all mandates, an opportunity analysis will be performed to evaluate whether the mandate could be included within scope of the new BPS system, instead of being implemented in the legacy BPS system. Routine or low to medium priority requests or projects should be evaluated by the BPS steering committee for approval. This helps to insure that focus, priority, and limited resources are shifted to design/development of new systems, and those current systems maintenance activities are managed properly.

12.2 Sourcing Strategy

This section presents a scenario-based sourcing strategy for the BPS modernization project. Our sourcing strategy will become more clearly defined as we complete our next phase of the BPS project.

As first identified in the initial BPS Project Proposal (October 2002), a number of scenarios exist for the delivery of a new Benefits Payment System for the State of Nebraska. The following table further explores the technology sourcing scenarios associated with a "build vs. transfer/modify" decision.

"Buy vs. Build" Decision Process

- Are there potential solutions meeting 80% of our requirements?
- Are there vendors capable of implementing those solutions?
- Are the solutions cost-effective (total systems lifecycle, that is)?
- Can we build it quicker, cheaper, and/or better?

Sourcing Scenario Analysis Table

MOST PROBABLE SOURCING SCENARIOS					
MOST PROBABLE DEVELOPMENT STRATEGIES	Application Development		Technology Operations		
	Design/Build	Maintain/Enhance	Data Tier	Application/Integration Tiers	Presentation Tier
We will transfer and modify another State's, Organization's, or Vendor's Microsoft .NET-based System	Vendor or Integrator with OIT Support	OIT	OIT (SQL Server) or IMS (DB2)	OIT (.NET)	OIT (Visual Studio.NET)
We will transfer and modify another State's, Organization's, or Vendor's J2EE-based system	Vendor or Integrator with OIT and IMS Support	OIT and/or IMS	IMS (DB2)	OIT and/or IMS (J2EE/Websphere)	OIT (Websphere Studio)
We will develop, in-house a J2EE-based system with vendor supplementation	OIT and IMS with Vendor or Integrator Support	OIT and/or IMS	IMS (DB2)	OIT and/or IMS (J2EE/Websphere)	OIT (Websphere Studio)
We will develop, in-house a .NET-based system with vendor supplementation	OIT with Vendor support.	OIT	OIT (SQL Server) or IMS (DB2)	OIT (.NET)	OIT (Visual Studio.NET)
We will outsource the development of J2EE-based system with state staff supplementation	Vendor or Integrator with OIT and IMS Support	OIT and/or IMS	IMS (DB2)	OIT and/or IMS (J2EE/Websphere)	OIT (Websphere Studio)
We will outsource the development of .NET-based system with state staff supplementation	Vendor or Integrator with OIT support	OIT	OIT (SQL Server) or IMS (DB2)	OIT (.NET)	OIT (Visual Studio.NET)
We will outsource the development of the ITSC "CORE" Oracle-based reference system, with state staff supplementation. Strategy would include an eventual migration to J2EE-standard tiers	Vendor or Integrator with OIT support	OIT	OIT (Oracle)	OIT (Oracle 9i AS)	OIT (Oracle Developer Suite)

12.3 Sourcing Risk Management and Total Cost of Ownership

As identified in the STAR 1.0 Business Architecture Discovery Process, system availability, reliability, and security are among the top considerations for any new BPS system architecture. In our current mainframe environment, we rely principally upon IMS to provide the high-availability hosting, security, and disaster recovery services for BPS. With the new n-tier BPS system, OIT will likely share a significant proportion of responsibility for high-availability hosting, security, and disaster recovery services.

We must consider interim sourcing strategies which could reduce the BPS project's implementation complexity, scope, and risk. Upon successful delivery of a new BPS system (when the overall risk profile is lessened) a review and evaluation of the permanent sourcing strategy could then be performed. As an example, should we choose the J2EE path, one might consider utilizing IMS-sourced hosting services for data and application tiers while BPS is in development phase (a period of 1-2 years), and then upon successful delivery of the BPS project, reconsider optimal sourcing strategy for the hosting of the operational phase.

This could include a cost-benefit analysis of running Websphere application tier services (for example) on an OIT-hosted Unix platform, or perhaps even moving entirely away from the mainframe (if cost-benefit analysis proved favorable) to OIT-hosted data tier services on a mid-range (Unix or AS/400) or Intel-based platform. In today's standards-based world, these types of technological transitions can be readily accomplished, without significant risk or application rework involved.

If we chose a .NET scenario, we (NWD) would be primarily responsible for development, hosting, and management of up to (potentially) all 3 tiers of the application. Consideration would then need to be given to building high-availability, high-capacity, hosting services, along with the additional staff resources to manage it, in parallel to the BPS systems development project. It should be recognized that this additional technological transformation does introduce significant project risk, and our sourcing options and platforms are quite limited.

When evaluating sourcing scenarios, we must fully explore all risks, as well as the Total Cost of Ownership (TCO) for each alternative over the entire Systems Life Cycle (SLC) – not merely the upfront acquisition and development costs.

12.4 Organizational Assessment and Transition

NWD's OIT is comprised of approximately 44 staff providing services typically associated with a full-service, medium-sized, IT organization that supports a technology-driven state government organization. These services include application/database development and maintenance services (approx 24 staff), help desk services (approx 3 staff), telecom, network and operations services (approx 13 staff), and administration services (approx 4 staff).

Additional Organizational Roles Required

- Enterprise security
- Database administration, management, and warehousing
- Project management office
- Architecture, strategy, and standards

12.5 Future State Organizational Considerations

An organization which can eventually develop, support, manage, maintain, and operate a modern, n-tier, Benefits Payment System must have additional IT organizational roles assigned and responsible for 1)

enterprise security, 2) database administration/management/warehousing, 3) project management office, and 4) architecture, strategy, and standards. In small to medium-sized organizations (such as NWD's OIT), the project management office function, along with architecture, strategy, and standards functions are often successfully combined into a single function.

When embarking upon a significant technological transformation (such as the BPS modernization project), one must also consider an interim OIT organizational structure which will support, and give needed priority, to the planning and execution phases of the project. This would entail formal dedication of staff teams to the development project, assignment of key project roles and responsibilities to internal staff, temporary changes in reporting structures, and a commitment toward the goal of knowledge transfer throughout the entire project development cycle.

With the reassignment of key staff to interim project roles, comes the realization that some current "non-critical" functions and services (involving routine systems maintenance, enhancements, and low-medium priority requests) must be discontinued/frozen during the project development cycle. A moratorium on all but the most critical development initiatives must be imposed. This moratorium would not include business critical initiatives such as federal, state, or executive mandates.

One additional organizational role which should be considered is expanded internal staff training/education services. Individual components of a training strategy can be outsourced, but there is no substitute for technical and business knowledge transfer among our experienced employees. Therefore, we must look inward for this wisdom. This role can very well span both business and IT training functions, coordinating education delivery (traditional as well as computer based training) for both technology and business topics. Other, more cross-cutting, requirements exist for topics such as security awareness, fraud detection/prevention, quality control, and customer relationship management. With NWD's aging workforce challenges, and Commissioner Lecuona's Succession Planning Initiative, the requirement to expand internal educational services is compelling.

12.6 NWD's OIT Organizational Skills Inventory and Training Strategy

In July 2003, in support of the BPS modernization project, a skills "self assessment" survey was completed by all OIT technical staff. A summarized version of that assessment is provided in the "current state" column of the table below. Additionally, "future state" staff skill-set requirements were projected in consideration one of our key principles, (growing internal capabilities necessary to manage a modernized BPS system), with a target date of July 2006. The resulting Gap Analysis column serves as a guide to the training requirement (both number of staff, and target skill levels achieved) for the next 3 years. Training strategies should include all of the following:

- Externally provided instructor-led, classroom or conference/seminar, training
- Internal, peer to peer skills and knowledge transfer
- Internal, vendor to staff skills transfer and collaborative learning opportunities
- Internal, computer based training or self-paced "on-the-job" learning opportunities

(note: Both IBM Websphere/J2EE and Microsoft .NET requirements are included pending statement of direction)

	No Exposure=0
	Minimal Exposure=1
	Entry Level Experience or Training=2
	Intermediate Level Experience or Training=3
	Advanced Level Experience=4
	Accomplished Subject Matter Expert=5

	Current State (July 2003 Current)		Future State (July 2006 Target)		Gap Analysis
SKILL AREA	# OF FTE WITH EXPOSURE	HIGHEST SKILL RATING	# OF FTE WITH EXPOSURE	HIGHEST SKILL RATING	(Training Requirement) FTE/Skill *Example: 6/4 indicates that 6 additional staff should be trained and highest (team) skill level needs to be elevated by 4.*
Active Directory Administration	Staffing skills ratings suppressed in public copy of this publication.				
Active Directory Design					
Active Server Pages (ASP)					
ActiveX					
Adobe Illustrator					
Adobe PageMaker					
Antivirus Maintenance/Admin					
Backup Software/Management					
Borland Delphi					
C					
C++					
Cascading Style Sheets					
CGI					
Citrix/Terminal Server					
Cobol					

ColdFusion					
COM/DCOM					
CORBA					
Corel WordPerfect					
DHTML					
HTML					
IBM CICS					
IBM DB2					
IBM WebSphere					
Intuit Quickbooks Pro					
IT Project Management					
J2EE					
Java					
Java Fundamental Classes					
Java Servlets, Java Beans					
JavaScript					
LAN/WAN Devices					
LAN/WAN Security					
Linux Administration					
Lotus Notes Administration					
Lotus Notes Development					
Lotus Notes for Users					
Macromedia Authorware					
Macromedia Dreamweaver					
Macromedia Flash					
Mail Inserter					
Mainframe Print Operations					
Microsoft .NET Platform					
Microsoft Access Administra-					

tion					
Microsoft Access Programming					
Microsoft Excel					
Microsoft Exchange Server					
Microsoft FrontPage					
Microsoft IIS					
Microsoft Outlook					
Microsoft Powerpoint					
Microsoft SMS					
Microsoft SQL Server					
Microsoft Visio					
Microsoft Visual Basic					
Microsoft Visual FoxPro					
Microsoft Visual Studio .NET					
Microsoft Windows 2000 Professional					
Microsoft Windows 2000 Server					
Microsoft Windows 98					
Microsoft Windows NT Administration					
Microsoft Word					
MQ-Series					
MySQL					
Networking Essentials					
OPC					
Oracle Administration					
Oracle Developer					
Oracle PL/SQL					
OS-MVS-Job Control Language					
PC Hardware					

PC/Server Security					
Peachtree Complete Accounting					
Perl					
PHP					
Relational databases					
SAP R3 Basis					
Seagate Crystal Reports					
Security - General					
Sun Solaris System Administra-tion					
Sybase Powerbuilder					
TCP/IP					
TSO/ISPF/DSPF					
Unix Administration					
Visual Basic Script					
Visual C++					
VRML					
XML					

Section 13

Appendices

Appendix A

Key Business Processes by Future State Automation Opportunity

Source: From STAR 1.0 Business Architecture Discovery Meetings May 12th-June 12th, 2003

BUSINESS FUNCTION	BUSINESS PROCESS	FUTURE STATE OPPORTUNITY RATING FOR AUTOMATION OF BUSINESS PROCESS (1=Low, 2=Medium, 3=High)	% OF CURRENT PROCESS EFFECTIVELY AUTOMATED
BENEFIT PAYMENTS	Weekly Certification	Ratings suppressed in public copy of this publication	
NON MONETARY DETERMINATION	Determination/Re-determination		
APPEALS	Information Gathering – Build Case File		
BENEFIT PAYMENTS	Check Printing/Payment - EFT		
MONETARY DETERMINATION	Initial Claim and Issues Processing		
SECURITY & FRAUD DETECTION	FEDS		
CLAIMS INTAKE	BPS/Direct		
MONETARY DETERMINATION	Use Quarterly Wage Records		
BENEFITS PAYMENT CONTROL	Detect OP		
TREASURY/TRUST FUND	Combined Interstate wage/claim system		
TAX	keep accounting records for internal control purposes		
TAX	process voluntary contributions each February/March		
BENEFITS PAYMENT CONTROL	Establish OP as fraud/non-fraud		
TAX	Field - Collections		

BUSINESS FUNCTION	BUSINESS PROCESS	FUTURE STATE OPPORTUNITY RATING FOR AUTOMATION OF BUSINESS PROCESS (1=Low, 2=Medium, 3=High)	% OF CURRENT PROCESS EFFECTIVELY AUTOMATED
BENEFITS PAYMENT CONTROL	Collect OP	[redacted]	[redacted]
TREASURY/TRUST FUND	Issue manual checks	[redacted]	[redacted]
TREASURY/TRUST FUND	Issue certification for public works projects	[redacted]	[redacted]
TAX	maintain basic account information	[redacted]	[redacted]
NON MONETARY DETERMINATION	Decision making - Nebdial/manual 50/50	[redacted]	[redacted]
CLAIMS INTAKE	Internet (10-20% anticipated)	[redacted]	[redacted]
CLAIMS INTAKE	Mass Claims	[redacted]	[redacted]
APPEALS	Filing of Appeal – Claimant/Company	[redacted]	[redacted]
TAX	review applications and determine liability status of potentially liable employers	[redacted]	[redacted]
SECURITY & FRAUD DETECTION	Motor Vehicle Drivers License cross-match	[redacted]	[redacted]
APPEALS	Render Decision	[redacted]	[redacted]
CLAIMS INTAKE	RIC (90% current claim volume)	[redacted]	[redacted]
BENEFIT PAYMENTS	Nightly Batch Processing	[redacted]	[redacted]
BENEFIT PAYMENTS	Accounting	[redacted]	[redacted]
TAX	Receive tax reports and payments & enter data from reports and payments into mainframe system	[redacted]	[redacted]
NON MONETARY DETERMINATION	Reporting	[redacted]	[redacted]
MONETARY DETERMINATION	Issue WBA/MBA Monetary Determination	[redacted]	[redacted]
APPEALS	Schedule Hearing	[redacted]	[redacted]
TAX	establish accounts for new employers and inactivate accounts	[redacted]	[redacted]
TAX	87a's Benefit Charging	[redacted]	[redacted]

BUSINESS FUNCTION	BUSINESS PROCESS	FUTURE STATE OPPORTUNITY RATING FOR AUTOMATION OF BUSINESS PROCESS (1=Low, 2=Medium, 3=High)	% OF CURRENT PROCESS EFFECTIVELY AUTOMATED
TAX	Field - Investigations		
TAX	process quarterly wage items from employers tapes, paper, online		
TREASURY/TRUST FUND	Reporting		
SECURITY & FRAUD DETECTION	SAVE (Alien certification) cross-match		
NON MONETARY DETERMINATION	Fact finding -rebuttal		
BENEFITS PAYMENT CONTROL	Legal Activities, Criminal Prosecution, Civil Actions		
SECURITY & FRAUD DETECTION	Social Security cross-match		
SECURITY & FRAUD DETECTION	Benefits/Tax cross-match		
MONETARY DETERMINATION	Issue Preliminary Monetary Determination		
NON MONETARY DETERMINATION	Issue detection Nebdial/RIC/ES		
TAX	adjusting entries to correct or move wage data		
TREASURY/TRUST FUND	Receive checks, encode/deposit for tax/benefits		
TAX	initiate contacts/investigations on subject employers		
TAX	make accounting adjustments to update or correct errors in reporting		
TAX	establish annual experience rates for each employers		
TAX	contact employers regarding reporting problems with reading tapes, paper, or online filings		
CLAIMS INTAKE	ICON/Interstate (5% current claim volume)		
BENEFIT PAYMENTS	Reconciliation with Bank (accounting back into BPS system) Progress is already being made with CD com-		

BUSINESS FUNCTION	BUSINESS PROCESS	FUTURE STATE OPPORTUNITY RATING FOR AUTOMATION OF BUSINESS PROCESS (1=Low, 2=Medium, 3=High)	% OF CURRENT PROCESS EFFECTIVELY AUTOMATED
	ing back from USBank		
TREASURY/TRUST FUND	Financial Transaction (both banking and internal) Management and Reconciliation		
TREASURY/TRUST FUND	Deposits, Drawdowns, and Transfer funds (manual and EFT)		
TAX	Delinquent billing process		
TAX	oversee contract data entry performance		
APPEALS	Reconsideration/Reopening		
TAX	Field - Auditing		
TAX	transfer of experience accounts		
BENEFITS PAYMENT CONTROL	Prevent Overpayments (OP)		
TREASURY/TRUST FUND	Process NSF returned checks		
SECURITY & FRAUD DETECTION	Approve Security/Access Authorizations for Data/Systems Access (both internal employees and external partners)		
APPEALS	Conduct Hearing		
SECURITY & FRAUD DETECTION	Department of Corrections crossmatch to detect inmates who are attempting to collect benefits		

Appendix B

Benefits Payment System Opportunities and Challenges

Source: STAR 1.0 Business Architecture Discovery Meetings May 12th-June 12th, 2003

General Opportunities

- New systems should be intuitive, user friendly, and easy to train new staff
- Enhanced Employer Services
- Automate Mass Claim Filing
- Claimants – Services Must Be Easier to Find and Use
- Common Paymaster across Government services (is NWD the chosen one?)
- Customer Service Continual Improvement
- Opportunities for NWD to drive needed changes to legislation
- Requirement for security and fraud detection/prevention to audit/log all transactions and image archive documents where appropriate
- RIC – especially development of enhanced tax linkages
- Internet new functionality – Initial Claims, Continued Claims, Claim Status, etc
- Speech Recognition (interesting but may not be as compelling as other opportunities, at this time)
- Email (for claims intake support/guidance/communication)
- CRM-like functions including user-feedback/survey and reporting for quality management, feedback, and continuous improvement
- Be more proactive to employers/claimant (information "push" rather than "pull")
- Consider virtual claim/call center for expanded capabilities (special needs, languages, off hours)
- Anytime/anywhere/anyhow expectation (technology enablement)
- Identity/Security fraud detection/prevention (DMV/SSA crosschecks)
- Overall, the opportunity for benefit appeals "electronic case management" is high. Case loads are typically 3,000-4,000 annually.
- Tax Appeals Case Loads Averages about 2 or 3 dozen per year (approx 30).
- Electronic Audio Capture (to optical storage) for Hearings (retain records for 4 years). Does not eliminate requirement for transcription
- Online Filing of Appeals
- Pros/cons of whether to further attempt to pre-mitigate potential appeals by providing claimants more information, upfront, as to the likely appeal outcome. Online Appeal

Precedent Searches public (Internet) version, non-identifiable, summary, FAQ, categorized (digest of opinions) private (Intranet) version, full details, ad hoc query

- Automated Appeal Case Mailing Management (30,000+ mailings), savings on postage, utilize existing print/stuff/mail technology operations, staff savings
- Opt-out for paper mailings in lieu of email notifications, savings on postage, customer service benefits may be attractive, need to insure guaranteed delivery/receipt, security/confidentiality essential, opt-out option given when registering appeal online
- Carry-forward accounting for multi-year (inter-year) benefit claims processing will help insure that final monetary result is correct.
- UI Connect expansion: 350's web based
- Benefit Charges … move to weekly report through UI connect (opt out of paper/quarterly or provide ad-hoc if employer prefers)
- Reporting (employer-based)
- Payment Protest via web
- In general, provide enhanced View/Update Capabilities for Employer Account/Status Information
- Improvement completeness/accuracy of wage data for use by Monetary processes
- Multiple claim types per individual claim.
- Ability to automatically, through expert rules, draw benefits from appropriate monetary pool. Event/time/logic driven to insure that claimant is drawing benefits from correct fund, AND that accounting is performed correctly. Integration with Benefit's overpayments and other influencing business processes.
- Geo-coding of both employer and claimant data entities. This is a requirement for the future system, and will be required for NWD (ETA/BLS) reporting. Need to accommodate and maintain both physical and mailing addresses for all entities. GIS analysis is the future objective.
- May need to look at address to coordinate geo-coding translation software. Also related issue of data cleansing/formatting of addresses to standard postal code. Zip code resolution may be sufficient for short term, but higher resolution will be a requirement in future.
- Data warehousing/reporting requirement high. Business case for NWD-hosted data warehouse should be conducted. Data warehouse could support all NWD reporting needs (both for LMI and for management information systems reporting). Need to look at host platform placement (IMS S/390 vs NWD Intel-based) and DBMS. Also, will need to factor in requirement for ETL capabilities from software such as Informatica.
- Reporting period is generally weekly. We should look at daily resolution for any data warehouse application, so will have ability to report on a variety of changing "benefit weeks".
- Intercept of tax refund data to for cross-matching with Collections activities

- Streamlining of Mailings/Notifications through web services interfaces and/or secure email
    - Separation information (250K/year)
    - Rate notices (40K/year)
    - Notice of benefit charges 87a
    - 2000 mailings/field-rep/year
- EFT capabilities for Collections transactions
- Field Services - Automatic investigation assignments from electronic system vs current download/manual assignment processes.
- In general, more effective document indexing for SCANTRAX image storage/retrieval – current system still requires manual searching through large numbers of images, to find specific pages needed. Explore alternative systems.
- Investigate requirements for bonding of reimbursable accounts (school districts, non profits, healthcare, etc) to help further buffer/protect/stabilize trust fund balances.
- State licensed/permitted employers … restaurants; daycare, dentists, doctors, etc… interrelate licensure/permit approval to UI compliance.
- Need for a collection contact tracking screen for the Tax Reps daily contact history.
- Rules-based adjudication (both manual… knowledgebase, and automated … expert systems)
- Ability to use secure email/chat, or other electronic means to facilitate the adjudication process. Critical to capture/manage all such transactions as part of integrated case management.
- Adjudication workflow
- Holistic/integrated case management … integration between electronic data systems and images
- 350's/87a'/charge notices/etc can eventually can be offered through UIConnect (likely as a push email, with web link to review account) with customer opt out (of paper).
- WP capability in new system… for free-form text management
- Flexibility in easily changing/managing adjudication outcome codes
- New legislation/law can be driven where needed. This is an opportunity.
- Automatic event detection tickler/trigger management for future adjudication/non-mon events which impact claim
- EFT/Smartcard transactions -> offer weekly payment cycle as carrot for adoption. Investigate Biweekly Benefit Check payment cycle for paper checks to reduce costs
    - potential increase in window of time for detection of overpayment
    - reduce overhead for manual checks/balances

    - reduce audit process overhead by moving to bi-weekly
- Reduce Manual Processes
- Exception Processing
- Canadian addresses a current problem…. Investigate postal formatting software
- Manual Diverts – move divert process to pre-print process to improve efficiency
- Improve accuracy of charge records/accounting/journal to reduce manual review/accounting processes.
- OLTP (event/queue driven) vs Batch processing for cross-checks and payment processing.
- Will trend towards centralized (state and federal gov) administrative/benefits management programs continue? If so, should BPCU embrace a shared disbursement system with other state and federal entities? Lead agency? NWD/Revenue/?
- Debt collection … does moving to centralized or outsourced collection services make good business sense? Pros/cons?
- Is there trending tendencies towards prevention (proactive) vs detection and collection (reactive) processes for BPCU? How does this impact federal metrics for error rates and BAM (55% collection rate requirements).
- Principle: Early detection/collection increases collection success rate. System should support earliest possible OP detection.
- Capture contact phone number for all claims, through Caller ID.
- If legislation prohibiting use of SSN for identification passes, and/or a customer "opt out" option is given, then a unique NWD id number will need to be assigned. This may impact ability to prevent, detect, and collect overpayments.
- Can we move to a requirement for EFT of benefits to a bank account? Can EFT also work in reverse, to adjust/collect overpayments? Pursue alliances with banking networks to assist in fraud/non-fraud overpayment and collections.
- Multi-case Appeals (group of claimants filing under similar circumstances)
    - not a growing problem
    - very infrequent occurrence (declining)
    - evaluation should be performed whether opportunity to easily accommodate in future BPS system design
    - essentially, requirement is to link multiple cases into a "master" or "parent" case file
- Accept credit card payments.
- Continued trending towards increasing proportion of small (vs medium/large) businesses will challenge BPCU operational processes during the next 5-10 years. There will be more employers to track, and it will be more difficult to legitimize claims/employers.

- In general, we need more flexibility, overall, in Benefits System capabilities.
- Significant proportion of cross checking activity is manual, or requires manual access to a remote automated system. Investigate the development of automated software "agents" which perform crosschecking activities on a continual basis with a broad number of sources.
- Re-engineering of technology processes provides best opportunity for re-engineering of business processes.
- Avoid only the "automation of current manual processes or services"
- Modification of job functions, work titles, and grade levels is likely to be required in order to align with the new system. This is likely to occur, not only within the IT department, but across the entire enterprise.
- New/enhanced processes include enhanced security processes, configuration/change management, project management, quality control, and audit.
- Review availability requirements for new system. Is 24/7/365 the expectation? How to accommodate without shift work?

- **Challenges**
- Confidentiality
- Privacy
- Security
- Diversity of served population continues to increase
- Funding, budget pressures
- Law/legislation $'s
- Funding allocation control from Federal Government to States
- Re-qualification Changes pending
- Increase in proportion of 3rd party providers (ASP's for wage/accounting/HR for companies)
- Accessibility/Availability … Does 24x7x365 become the expectation with web/voice/IVR/chat/email?
- Legislative/law changes regarding re-qualification will have unknown impact on case types/loads.
- Pressures to reconsider Social Security Number as unique identifier for individual is high
- Staff knowledge a priceless resource. Risk of losing with aging workforce issues. Must adopt an expert rules-based systems approach where decision trees are "clear-cut". Knowledge-base for decision processing, reducing staff training time, and to increase consistency in interpretation and application of business rules.

- $'s
- Evolving legislation/rules
- Privacy/ID issues
- Flexibility/Adaptability/Agility (key characteristics in new system)
- NWD becoming common clearinghouse for information about people.
- Diverse Populations served, languages, special needs
- Client expectations are higher than ever for claims processing services (availability, functionality, speed)
- Trending towards "free agent" society
- Definition of "employment" is blurring making field determination more complex/difficult
- For similar reasons, it is also becoming more difficult to determine "independent contractor" status in all organizations.
- Current Field Services staffing/system/process makes is difficult to engage large employers with complex requirements and discovery needs.
- Potential Legislation
- UI reform
- Benefits ratio tax system
- Redistribution of tax rate across SIC codes

Section 14

Glossary of Business and Technology Terminology

STAR Glossary of Business and Technology Terms

ACD	Automated Call Distribution
ACR	Abandoned Call Rate
ADA	Americans with Disabilities Act
AMM	META Group's Architecture Maturity Model
AWS	America's Workforce System
BAM	Benefit Accuracy Measurement
BCP/DR	Business Continuity Planning and Disaster Recovery
BPCU	Benefits Payment Control Unit
BPS	Benefits Payment System
BYE	Benefit Year Ending
CBT	Computer Based Training
CD	Compact Disk
CICS	Customer Information Control System
CMM	Software Engineering Institute's Capability Maturity Model
COBOL	Common Business-Oriented Language
COLD	Computer Output to Laser Disk Technology
CORBA	Common Object Request Broker Architecture
CSR	Customer Service Representative, customer service representative
CTI	Computer Telephony Integration
CWC	Combined Wage Claims
DOC	Division of Communications
DOL	Department of Labor
EA	Enterprise Architecture (see also EAP)
EAP	Enterprise Architecture Planning
EIC	Enterprise Interaction Center
Email	Electronic mail
ES	Employment Services

Fax	Facsimile
FTP	File Transfer Protocol
HTML	HyperText MarkUp Language
IBIQ	Interstate Benefit Inquiry
ICON	Interstate Connectivity Network
IE	Internet Explorer
IMS	Information Management Services
INS	Immigration and Naturalization Service
IT	Information Technology
ITSC	Information Technology Support Center
IVR	Interactive Voice Response
J2EE	Java 2 Enterprise Edition
J2SE	Java 2 Standard Edition
JES	Job Entry Service
LAN	Local Area Network
LDAP	Lightweight Directory Access Protocol
NASWA	National Association of State Workforce Agencies
NJE	Network Job Entry
NWD	Nebraska Workforce Development, Department of Labor
OCR	Optical Character Recognition
OIT	Office of Information Technology (Nebraska Workforce Development)
PDF	portable data file
PBX	private branch exchange
PE	Program Evaluation
PIN	personal identification number
PKI	Public Key Infrastructure

PMBOK	Project Management Body of Knowledge
PMM	Project Management Methodology
PMO	Project Management Office (also sometimes referred to as Enterprise PMO, or EPMO)
RFI	Request for Information
RFQ	Request for Quotation
RFP	Request for Proposal
RUP	IBM Rational Unified Process
SBR	supplemental budget request
SDLC	Systems Development Life Cycle
SLC	Systems Lifecycle
SEI	Software Engineering Institute
SNA	System Network Architecture
SSA	Social Security Administration
SSL	Secure Socket Layer
SSN	social security number
STAR	Strategic Technology Architecture Roadmap
TCP/IP	transmission control protocol/Internet protocol
UCFE	Unemployment Compensation for Federal Employees
UCX	Unemployment Compensation for Ex-military
UI	Unemployment Insurance
UML	Unified Modeling Language
US	United States
USPS	United States Postal Service
VLAN	Virtual Local Area Network
VoIP	Voice Over Internet Protocol
VSAM	virtual storage access method

WAN	wide area network
WIA	Workforce Investment Act
WMS	Workflow Management System, workflow management system
XML	eXtensible MarkUp Language