GAHIMSS Chapter

CPHIMS Review Session

Systems Analysis

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CPHIMS Competency Areas

CPHIMS Examination Content Outline (effective February, 2014)	Cognitive Level						Total	
	Recall		Application		Analysis			
1. General	22	22%	6	6%	0	0%	28	28%
A. Healthcare Environment	10	10%	4	4%	0	0%	14	14%
B. Technology Environment	12	12%	2	2%	0	0%	14	14%
2. Systems	3	3%	22	22%	15	15%	40	40%
A. Analysis	2	2%	10	10%	4	4%	16	16%
B. Design	0	0%	3	3%	3	3%	6	6%
C. Selection, Implementation, Support, and Maintenance	0	0%	4	4%	3	3%	7	7%
D. Testing and Evaluation	0	0%	2	2%	3	3%	5	5%
E. Privacy and Security	1	1%	3	3%	2	2%	6	6%
3. Administration	5	5%	18	18%	9	9%	32	32%
A. Leadership	3	3%	10	10%	9	9%	22	22%
B. Management	2	2%	8	8%	0	0%	10	10%
Total	30	30%	46	46%	24	24%	100	100%

Introduction – Planning Hierarchy and Taxonomy

- Organizational Strategic Plan
  - Strategic Information Systems Plan
    - Systems Development Lifecycle (SDLC) (A conceptual model used in project management that describes the stages involved in an information system development project from the initial feasibility study through maintenance of the completed application)
      - There are numerous models for SDLC. Most contain these domains:
        - Needs Analysis
        - **Systems Analysis (determines and defines what's needed in a system)**
        - **Systems Design (how the system is built/acquired and how it works/interoperates)**
        - System Implementation (get it going)
        - **Testing and Evaluation (does it perform as expected?)**
        - Systems Operation (keep it running)

Introduction - Strategic Information Systems Plan

- Is a statement of the IT Organization's vision for how it will deploy technology to achieve its mission, goals, and objectives.

- It helps to define the role of IT in the organization.

- It aligns IT initiatives with the overall business's Strategic Plan

- It includes:
  - Overall current and future technology needs
  - Technical infrastructure and future priorities
  - Major direction and initiatives for the IT organization
  - 3 to 5 year timeline
  - Estimates of capital and operating costs (optional)

- And it uses Systems Analysis
  - Through executive interviews, SWOT exercises, trend analysis
  - To foster and imbue "systems thinking" into plan development:
    - How do initiatives align with organizational plan?
    - How do initiatives relate with each other?
    - What and where are the intersection, integration and synergy opportunities amongst initiatives?

Systems Analysis

Learning Objectives – Systems Analysis

- Describe the purpose and list the major components of the systems analysis phase of the system development lifecycle.

- Articulate the differences between problem analysis and needs assessment and the role of each in systems analysis.

- Explain how the "current" and "future state analysis" are used to identify and "elicit" requirements.

- Describe the value of using a cost-benefit analysis and analysis of alternatives in setting the priority of an initiative.

- List the project management stages which are most important to the systems analysis phase.

Introduction – Systems Analysis

- What is Systems Analysis?
  - A set of techniques and tools for understanding an organization's operating environment in order to improve a process or outcome through the use of information technology.

- Why is Systems Analysis important?
  - Information technology is widely viewed as a key enabler of improved care.
  - SA can improve the "fit" between the organization's technology and care delivery effectiveness.
  - Rapid technology changes and increasing user sophistication tend to compress deployment and upgrade times so that the consequences of errors in selection, deployment and use of solutions are magnified.

Components of Systems Analysis

- Problem Analysis
  - Definition, Cause, Solution
- Preliminary Investigation
  - Needs Assessment, Feasibility Analysis, Report of Findings
- Requirements Analysis
  - Current State, Future State, Priorities, Stakeholder sign-off
- Analysis of Alternatives
  - Alternatives, Cost-Benefit Analysis
- Proposal/Approval
  - Proposal, Executive Presentation, Enthusiastic Endorsement
- Project Management
  - PM Body of Knowledge, Initializing, Planning

Problem Analysis

- First and most important part of Systems Analysis
- Capture in a Problem Statement
  - Define the problem
  - Identify where the problem is occurring
  - Describe the size of the problem
  - Describe the impact of the problem on the organization
- Identify the cause
  - Interviews
  - Monitoring tools
  - Flowcharting
  - Symptomatic vs root cause
- Identify and implement solution
  - Priority
  - Directed at root cause or symptom
  - Unintended consequences
  - Other opportunities for improvement revealed?

Preliminary Investigation

- Needs assessment
  - Proactive, unlike problem analysis which is often reactive
  - Avoids a 'quick-fix' mentality and looks at broader issues
  - Goal is to provide a recommendation on the scope and benefits of a solution
  - Information gained can later assist in requirements analysis and system selection but these are not part of needs assessment.
  - Validates that the perceived needs are real
  - Should be vendor neutral
  - Sponsored by leadership
  - Conducted by analysts and subject matter experts
  - Objectivity, independence and competence critical for credible findings
  - Tools
    - interviews with executive and department leadership, subject matter experts (internal and external), direct and indirect users, and other stakeholders.
    - Review of existing documentation
    - Observation
    - Surveys
    - Data analysis

Preliminary Investigation (continued)

- In healthcare the most unique and critical contributors to the needs assessment are clinicians
  - Subject to operating policies of the institution
  - Follow clinical practice guidelines
  - Bound by dictates of professional training and standards
- Clinician involvement in major projects should include
  - Clinical executives – those holding executive or department chairs
  - Clinical leaders – peer leaders
  - Clinical practitioners – active practice and face day-to-day challenges of care delivery
  - Clinical knowledge keepers – academics and researchers
  - Clinical informaticists – understand IT and its importance for research, analysis and process improvement

Preliminary Investigation (continued)

- Feasibility analysis or readiness assessment addresses the organizations ability to implement the solution
- Identifies gaps that must be addressed before deployment/implementation
- Covers such things as
  - Technical infrastructure
  - Application inventory
  - Ability to integrate with existing systems
  - Organizational readiness
- Output or deliverable is a "report of findings"
  - Articulates the objective, techniques used, participants, results, and recommended solution or approach.
  - Answers these questions:
    - What is the need or potential value to the organization of the solution
    - What is the scope of the solution
    - Is the solution feasible given the current technology and operating environment, and if not, what are the major gaps.

Requirements Analysis - General

- More detailed description of what the system should do
  - Inputs, outputs, processing, performance and security
- Greater detail than the needs assessment
  - Needs assessment focuses on "why"
  - Requirements analysis focuses on the "what"
- Goal is to either
  - Describe the solution in sufficient detail to support the design and implementation or
  - To support the selection of a vendor product
- Greatest risk in system development project is to miss or misinterpret a requirement
- Provide objectivity in selecting vendor products
- Requirements must not merely be "gathered" but "elicited" from the organization.
- The successful analyst must truly understand the business overall and the needs of the users/stakeholders/organization

Requirements Analysis – Current State

- Also called the "As Is" analysis

- Identifies those fundamental business processes that the solution will need to support.

- Describes how those processes are supported today along with current deficiencies

- Importance of Current State analysis linked to span or scope of change brought on by new system.

- Tools and techniques similar to those in needs assessment.
  - Interdisciplinary requirements workshops
  - Process charting
    - Activity diagram – describes the sequence of activities in a process and the logic controlling them.
    - Data flow diagram – indicates how data is input, stored, processed and output.
    - Flowchart – similar to activity diagrams and well suited for more complex processes.

Requirements Analysis – Current State – Risks

- Risk of current state analysis is that it can limit the thinking of participants to "inside the box"

- Can mask differences between requirements and artifacts of current process.

- Can introduce bias into the group.

- Defend by limiting the time on current state analysis and focus on high level requirements.

Requirements Analysis – Future State

- Identifies the requirements (the "what") for new solutions
- The deficiencies of the current state are creatively considered within the context of the initiative.
- Challenge is to remain focused on the "what" and not the "how" (which is in the SDLC design phase)
- Consideration of new processes associated w/ new solution
  - This is the time for process reengineering
  - Consider adopting best practices from other organizations
  - Focus on outcomes not tasks
  - Consider the problems identified in the current state analysis
- Develop "use case" models and examples
- Clearly articulate the integration of information across internal and external systems.
- Include privacy and security considerations.

Requirements Analysis – Describe and Prioritize

- Goal is to communicate to stakeholders how the solution will bridge the gap between the current state and the future state.

- No standard format

- Important to restate assumptions used regarding changes to processes that must occur to enable the solution

- Should describe what are "needs" and what are "wants"

- Sign-off is critical and includes not just a signature but a commitment to understanding and accepting the requirements as adequate to deliver the solutions anticipated benefits.

- Sign-off reduces the chance of confusion over exactly what the requirements are and serves as a baseline for change requests.

Analysis of Alternatives and Cost-Benefit Analysis

- Most common alternatives considered:
  - Do nothing
  - Enhance the existing solution
  - Partially implement the proposed solution
- Cost benefit analysis (CBA) often used for large initiatives
  - Validates the costs will yield benefits of equal or greater value than the costs
  - Provides a comparison of competing initiatives
  - Can be used to hold stakeholders accountable for realizing the benefits
- CBA often a joint effort of project team, stakeholders and finance staff
- CBA best after requirements are completed
- CBA usually done over a 5 year period.

Obtaining Organizational Commitment

- Final step in Systems Analysis phase
- At least two components:
    - A firm understanding of what the solution is and how it will impact the organization
    - Includes a formal specific and enthusiastic commitment to the proposed solution from the stakeholders and decision makers.
- Commitment must be enthusiastic in order for the proposed solution to be successful
- Initiatives that proceed with only tacit or no approval run enormous risks of failure
- Includes
    - Executive summary
    - PowerPoint presentation summarizing the findings
    - Proposal in all its detail

Project Management

- Effective PM is a critical component of successful Healthcare IT initiatives
- Purpose is to apply accepted practices to realize the project's objectives
- Recognized standard for PM is the Project Management Body of Knowledge (PMBOK) established by the Project Management Institute (PMI)
- PMBOK is certified by the American National Standards Institute (ANSI/PMI 99-001-2008)
- Many healthcare organizations have a Project Management Office (PMO) to manage their internal initiatives

Project Management - Continued

- PMBOK defines generally accepted good practice in PM and defines the 5 stages of all projects:
    - Initiating: defines and authorizes the project scope
    - Planning: refines the objectives and plans the activities, resources an schedule
    - Executing: performs the activities of implementing the project
    - Monitoring/controlling: determines of the project is keeping on schedule and budget and determines corrective action
    - Closing: terminates the project and ensures hand-offs are make

System Design

Learning Objectives – Systems Design

- Describe how the systems design stage fits within the system development life cycle (SDLC).

- List the members and the responsibilities of the systems design team

- Explain why the role of systems design changes when selecting a pre-developed vendor system

- Describe how business processes and needs are accommodated during the design stage

- Define and describe the differences between the request for proposal (RFP) and the request for information (RFI)

Introduction

- Systems Design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements.

- What is Systems Design as used in the context of the SDLC?
  - Activities and processes used to develop a Technical Specifications Document which describes:
    - The inputs, outputs, and transformations of data passing through the system
    - The technology chosen to implement and maintain the system

- What is **not** Systems Design?
  - Brainstorming technique for new systems features
  - Development of additional functional specifications
  - Exclusively a vendor activity

Purpose and Goals of Systems Design

- Create accurate technical specifications
- Choose between "build-or-buy" development approaches
- Insure the design supports the business needs
- Minimize compatibility and compliance issues
- Develop the RFI/RFP
- Identify dependent sub-systems
- Ensure user acceptance

Systems design components relevant to HIS today

- Design selection
- Technological specifications
- Systems compatibility
- Compliance
- Continuity
- Interoperability

Systems Design for Internal Development and Vendors

- Design the system
    - Output specifications
    - Input specifications
    - Data specifications
    - Code and programming specifications
    - Flow diagrams and Use Cases
    - Development Cost/Benefit analysis
- Preliminary design review
- Design user support and training
- Conversion and migration strategies
- Security risk assessment and mitigation
- Critical design review and sign-off
- Present deliverables for management approval

Systems Design Team

- Team Leader – domain expertise, IS experience, organizational maturity
- **Systems Analysts**
- **End-users**
- **RFP Committee**
- Developers
- Trainers
- Legal
- Purchasing
- Project Management Office
- Domain Experts and Consultants

Design Deliverables and Tools

- Technical specifications document
  - Translates functional specs to technical specs. Go into RFI or RFP.
- Systems design document
  - Primarily used in internal development projects.
  - Contains the input/output and data specifications
  - Should include a cost/benefit analysis
  - If "buy" vs "build" the vendor's design document should be reviewed by the organization
- Security risk document – assessment results
  - Network hardening, intrusion detection, DR, vulnerability analysis
- Conversion and integration plan – compatibility findings
  - System interface description should be included if there is data exchange w/ other systems
- Training plan – initial and ongoing
- Prototypes and mock-ups – useful when building systems.
- Tools – Uniform Modeling Language (UML)

Technology Evaluation Process

- Competency elements:
  - Knowledge of current/existing technologies
  - Insight into emerging technologies
  - Awareness of your organizational strategy and culture

- When reviewing a vendor's technical specifications document the design team should match the vendor's technology to the organization's technology, security, and training requirements in the following areas:
  - What technology is the vendor offering?
  - What technology will the vendor offer in the future?
  - What technology do we currently have?
  - What technology do we plan on having in the future?

Additional considerations in Systems Design

- Selecting a Design Approach: Build or Buy
    - The most common approach is to acquire a commercial system
        - These systems have already gone through the design and development stages
- Accommodating Business Processes
    - Review existing processes – flowcharts
        - How processes SHOULD work vs OBSERVED PRACTICES
        - Map vendor's system workflow diagrams to your business processes
        - Utilize process engineers if possible
        - Consider a new system's affect on existing cost allocation methods
- Supporting Business Needs
    - Know: What are the business needs? Where are they documented? How are they prioritized?
    - Map technical specifications to the business needs.
    - Strive to discern business needs of the future and consider them in decision processes.

Additional considerations in Systems Design - 2

- System Integration and Compatibility
    - SW and HW compatibility
    - Network infrastructure compatibility
    - Data and protocol standardization
    - Systems interfacing
- System Compliance
    - Healthcare industry compliance
    - Regulatory compliance
    - Organizational compliance

RFI/RFP Development

- Request for Information (RFI)
  - Planning document
  - Bi-directional exchange of information
  - Sample topics:
    - Instructions for response
    - Statement of scope
    - Functional requirements document
    - Business information (corporate structure, installed base, clientele)
    - Level of detail varies from case to case
    - Usually less than 10 pages
    - Preliminary cost estimates
    - Support and maintenance levels
    - Software release dates
    - Expected retirement of existing SW
    - Update/upgrade path options
    - Licensing structure
    - Technical specifications
    - Sample implementation plan
    - Site visit opportunities

RFI/RFP Development - 2

- Request for Proposal (RFP)
  - Is an **invitation** to present a proposal for a system that can satisfy the functional requirements and technological specifications collected during the analysis and design phases (which should match the organization's business needs).
  - Requests and responses should include considerable detail including services associated with implementation, training and maintenance.
  - Should allow a Total Cost of Ownership (TCO) to be computed
  - Will transition into a contract upon vendor selection
  - Contains
    - Vendor Questionnaire
    - Scope
    - Limitations
  - **Is a window into the culture of the customer**
  - **Is expensive for vendors and potential customers**

Data Management Practices

- Describe the methods by which system data is accessed, secured, retained, exchanged and stored.

- Should conform to existing internal practices.

- Should be flexible and adaptable over time
    - Vendor Neutral Archive
    - Content management systems
    - Disaster recovery options