



**Certified Architect**

**CERTIFIED IT ARCHITECT  
– SPECIALIST**

**Candidate Overview Manual**

2014



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# 1. Summary

Certified IT Architect Professional (CITA-S) is a deliberate and disciplined approach to assure consistent validation of proficiency and experience of practicing IT architects. It is based on a defined set of principles, models, disciplines, concepts, guidelines, and proven practices developed by members of International Association of Software Architects (IASA).

This manual describes the principles and processes for candidates to become CITA-S certified. It provides an overview of its foundational principles, evaluation techniques and essential processes, focusing on having a positive experience with the review board members and successful completion of the CITA-S board process. Candidates on the career path to obtain a CITA-S certification will usually have 10 or more years as a practicing architect. Please see “Practicing Architect” section for a detailed description of this phase.

# 2. Audience

Primary audiences for this manual are candidates who are applying to obtain a CITA-S certification status.

# 3. Career Path



## 4. 5 Pillars of Architecture - Sub-capabilities

### Business Technology Strategy

- Business Fundamentals
- Strategy Rationalization and Development
- Industry Analysis
- Business Valuation
- Investment Prioritization and Planning
- Requirements Discovery and Constraints Analysis
- Compliance
- Business Architecture Methods & Tools
- Decision Support
- Knowledge Management

### IT Environment

- Technical Project Management
- Asset Management
- Change Management
- Infrastructure
- Application Development
- Governance
- Testing Methods, Tools, and Techniques
- Platforms and Frameworks

### Design Skills

- Requirements Modeling
- Architecture Description
- Decomposition and Reuse
- Design Methodologies and Processes
- Design Patterns and Styles
- Design Analysis and Testing
- Traceability Throughout the Lifecycle
- Views & Viewpoints
- The Whole Systems Design

### Human Dynamics

- Managing the Culture
- Customer Relations
- Leadership and Management
- Peer Interaction
- Collaboration and Negotiation
- Presentation Skills
- Writing Skills

### Quality Attributes

- Balancing and Optimizing Quality Attributes
- Manageability, Maintainability, Supportability, Extensibility, and Flexibility
- Monitoring and Management
- Performance, Reliability, Availability, Scalability
- Security
- Usability, Localization, Accessibility, Personalization/Customizability
- Packaging, Delivery, Post Deployment

## 5. Architecture Specializations

### Software Architecture

- Software Architecture Development Methodologies and Processes
- Software Architecture Tools
- Software Engineering for Architects
- Services, Workflow and Messaging
- Advanced Quality Attributes
- Advanced Stakeholder Management
- Software Architecture Patterns
- Technologies, Platforms & Frameworks
- Data/Information/Knowledge Management

### Infrastructure Architecture

- Access and Identity Management
- Capacity Planning
- Common Application Services
- Device Management
- Infrastructure Remote Access
- Network Design
- Operations
- System Management and Services
- Data Center Design
- Provisioning
- Disaster Recovery and Backup
- High Availability Computing

### Business Architecture

- Identify business drivers and risk
- Anticipate future requirements and constraints
- Conduct basic financial statement analysis
- Create project funding models
- Clarify goals, strategies, measures and timelines
- Develop modeling tool set and procedures
- Maintain and support meta models
- Prioritize Investment
- Manage and guide process governance

### Information Architecture

- IA Lifecycle Design Methodologies and Processes
- Information Modeling
- Human Cognition
- Sequential Visualization, Analysis & Design
- Information Interaction and Interface Design
- Information-driven Design
- Advanced Stakeholder Management

## 6. Proficiency Level descriptions:

Certification Level	Proficiency Level	Description of Level
Foundation	1	Awareness - having or showing realization or perception of the subject matter
Associate	2	Basic Information Demonstration - cognizant of or having special or certain knowledge as from firsthand resources
	2.1	Individualized Knowledge - distinctive familiarity gained through study, investigation, observation, experience, association, or understanding of specific techniques
	2.2	Practice - to do or perform often or customarily so as to make habitual or standard procedure
Specialist	2.3	Delivery - mature so as to be able to hand over or provide to the intended target, destination, or audience
	2.5	Connectivity of Ideas - a formulated thought or opinion based on transference of multiple points of individualized knowledge
Professional	3.0	Enterprise Level Leadership - commanding authority or influence to become a principal performer in an especially difficult, complicated, or risky environment
	3.1	Mentorship - being sought out as a trusted counselor or guide to provide insight on subjects ranging from fundamental knowledge through strategic vision
	3.5	Research - investigation and/or experimentation aimed at the discovery and interpretation of facts, revision of accepted direction and application in light of new facts, environments, capabilities, and products
	4.0	Industry Leadership - commanding authority or influence to become a principal performer in setting the direction and alignment of information technology to business capability and value

### 3.2 Specialist (CITA-S)

The specialist architect has reached the degree of skill necessary to deal with the vast majority of architecture opportunities. They have taken the learning from associate and transferred that into knowledge through some practical application. They have worked with mentors/coaches to achieve additional knowledge in their specialization.

Iasa recognizes 4 primary specializations in architecture professional practice today. The specializations are focused areas of practice which can be equated to the specializations in medicine such as surgery.

The CITA-S can deliver a specific solution. The difference between CITA-S and CITA-P is the breadth of scope at which they can operate. A CITA-P should be able to work at a business unit or enterprise level in addition to the project level. A CITA-S would not be expected to have the experience necessary to work at the business unit or enterprise level. A CITA-P would be able to handle multiple columns in multiple business areas; a CITA-S would work only one area at a time.

## 7. Foundational Principles

These are the core principles upon which CITA-S certification is based. They express values and standards that all review board members must adhere to and are common to all review boards.

### 4.1 Nurture Professionalism

Principles that inspire professional quality, values, behaviors and skills of IT architects. Each board member will act ethically, keep good manners, demonstrate respect (to candidates and to each other), maintain good image and appearance and lead through excellence and expertise.

## **7.2 Open and Respectful Communications**

When communicating with candidates, board members will use active and emphatic listening, ponder what they heard and examine own assumptions/perceptions before responding. When it comes to communication with other board members, all dialogues must be based on inclusiveness and clarification of exchanged thoughts. All candidate-specific information heard and discussed during review board process will be kept confidential; board members have to remove any contextual knowledge when harvesting and communicating patterns observed in the board.

## **4.3 Fair and Objective Assessment**

Consistency in the method and criteria increases the validity as well as fairness of assessment – every candidate will have an equal chance of getting a good assessment. Board members will prepare for each review by thoroughly studying submitted documentation and ensure that the candidate is asked questions that have direct correlation with CITA-S knowledge domains.

## **7.3 Assess Against the Performance Bar**

CITA-S is criterion-referencing, not norm-referencing assessment. Criterion-referencing assessment ignores statistical implications of the assessment profile and rather focuses on clear performance criteria. All assessments validate candidates against the same performance bar, regardless of quality and passing statistics of previous candidates.

## **7.4 Support Equal Opportunity**

Board members will recognize how demanding it is to defend an argument in a second language, and that the skill of verbal expression may be different due to cultural particularities. Board members will collaboratively decide (and document) what equal-opportunity equalizers they accept as fair and valid.



## 8. CITA-S Details

The candidate will be expected to meet the following prerequisite requirements.

### 5.1 Prerequisite Overview:

1. Be a member in good standing of the IASA
2. Achieved the Foundation certification or have equivalent knowledge, experience, or credentials (required)
3. Achieved the Associate certification or have equivalent knowledge, experience, or credentials (recommended)
4. Complete application and payment for CITA-S online

### 5.2 General overview of process:

1. **Participate in mentoring sessions** which help prepare for the board review.
  - a. Once you have submitted your application, you will receive a confirmation/process e-mail which will request your mentor name and e-mail address. If you do not already have a mentor, IASA will work with you on obtaining one based off of your specialization.
  - b. Complete the [online self-assessment](#) to gauge your skills within the 5 pillars (optional)
2. **Develop board documentation** (*provided as separate .pdf documents via IASA Dropbox*)
  - a. **Resume**
  - b. **General Proficiency Assessment**
    - i. Approximately 50-100 words for each of the 5 pillars sub-capabilities.
      1. Please describe how you have incorporated the topic into your practice as an IT architect and increased proficiency in the area.
  - c. **Specialization Proficiency Assessment**
    - i. Approximately 50-100 words for each sub-capability in your specialization area.
      1. Please describe how you have utilized the topic into your practice as an IT architect and increased proficiency in each capability area.
  - d. **Architecture Engagements**
    - i. Approximately 400-700 words each covering the following three topics;
      1. Your first project as an architect
      2. Your biggest failure on a project
      3. The project of which you are most proud
  - e. **References on 2 Projects** (*1 unique reference for each project*)
    - i. Project duration dates
    - ii. Involvement dates
    - iii. Project description
    - iv. Overview of responsibilities
    - v. Reference name, job title, e-mail, phone number
  - f. **Additional references:** blogs, projects etc. to share with the board (*optional*)
  - g. **30 Minute Presentation**
    - i. PowerPoint presentation on a project
    - ii. Complex enough to show your technical prowess with integrating multiple technologies in complex environments.
      1. If an old project, approach it as “what I did then/what I might do now”. Need to have business metrics and ROI information.
      2. If current/incomplete project, need to be able to talk about it through the lifecycle, how it will/was measured, what things are highest risk, etc.
3. **Attend 1 hour exam session** (*online or onsite – depends on Chapter bootstrapping availability*)
  - a. 30 minute presentation given by candidate
  - b. 15 minute Q&A Session on documentation provided and PowerPoint
  - c. 15 minute final Q&A session
4. A representative from lasa will contact the candidate to convey results within 1 week after the exam

## **9. Review Board Process**

Moderator of the board is responsible to gather all notes and evaluation forms from the three board members after the board deliberation is complete. IASA will keep this information and update the users profile with the outcome for Iasa's future reference.

All candidates that do not pass CITA-S review board (or have any other objection or complaint) can appeal the decision within 30 days after the review board.

The appeal process is managed by Certification Committee within IASA Board of Education and requires gathering, examination and evaluation of evidences from the appealing party as well as from all members of that composed the review board under appeal.

## 10. Business Fundamentals

Understanding of broad and generic business structures and functions, and the basic nature of running a business. Requires working knowledge of People Management, Organizational Design, Human Resources, Financial Management, Micro and Macro-Economics, Global Trends, Marketing and Sales Strategy, R&D, Production, Quality Control and Fulfillment.

### Expectations

- Can describe the makeup and structure of a business
- Can describe company's business plan
- Has worked with non-IT business owners
- Has researched business trends and changes

Element	Description
<b>Accountancy</b>	A process of communicating financial information about a business entity to stakeholders, using the form of financial statements that show in financial terms the economic resources under the control of management.
<b>Marketing</b>	A process of performing market research, selling products and/or services to customers and promoting them via advertising to further enhance sales. It is an integrated process through which companies build strong customer relationships and creates value.
<b>Organizational Behavior</b>	A study of organizational structures and their internal/external interactions from multiple viewpoints, methods, and levels of analysis.
<b>Management (general)</b>	Management comprises planning, organizing, staffing, leading or directing, and controlling an organization (a group of one or more people or entities) or effort for the purpose of accomplishing a goal.

### Awareness <knows what it is>

- Do you know what a corporate business strategy is?
- Name some organizational structures and corresponding behaviors
- What is the difference between Financial Accounting and Managerial Accounting?
- Why is micro- and macroeconomics relevant to your industry?

### Knowledge <knows how to apply it>

- How would you identify an outdated or misplaced business strategy?
- Can you describe the makeup and structure of your (or your client's) business?
- Articulate your value proposition for Finance, Sales, Marketing, Operations and Product Management
- Explain the 4 C's (Consumer, Cost, Convenience, Communication) of your proposition

### Experience <has applied it>

- What language did you use with non-IT stakeholders?
- What was the business impact of the strategy you created?
- What is the business process that you supported with the project/solution?
- What was the marketing strategy for the product/service you created?

## 11. Strategy Rationalization and Development

The partnership between the business architect and the technical architect relative to the creation of a business model that defines the principles, standards, structure, and dynamics of the integrated business and technical strategic direction. The components of a sound architecture strategy and how to evaluate a business problem and identify an appropriate technology direction. Identifying, analyzing, and simulating market trends.

### Expectations

- Can define a business objective
- Can match technology to the business objectives of a project
- Has identified a technology strategy that impacts entire enterprise
- Has led business in defining IT strategy

Element	Description
<b>Strategic Management</b>	A field that deals with the major (intended and emergent) initiatives taken by executives on behalf of owners, involving utilization of resources, to enhance the performance of firms in their external environments.
<b>Strategic Thinking</b>	Deep understanding of what is critical to the business in making appropriate decisions, anticipation of new trends in the industry by using deep understanding of business and industry trends.
<b>Emerging Technology Monitoring</b>	The identification of new and emerging hardware, software and communication technologies and the assessment of their relevance and potential value as business enablers.
<b>Innovation Management</b>	The capability to recognize and exploit business opportunities provided by IT, to explore possibilities for new ways of conducting business and organizational processes.
<b>Formation of Information Policies</b>	The development of policies, procedures, working practices and training to promote compliance with legislation.

### Awareness <knows what it is>

- What is a business goal? What is a business strategy?
- What is a difference between technology strategy and business strategy?
- What is innovation and how does it relate to the strategy?
- What is the difference between market trends and disruptive discontinuities?

### Knowledge <knows how to apply it>

- Can you define and create a business objective?
- Why do you need to be able to understand business strategy?
- When is a technology a commodity and not a strategic advantage?
- What sources do you use to monitor emerging trends and shape the strategy?

### Experience <has applied it>

- How did you match technology to the business objectives?
- Have you identified a technology strategy that impacts entire enterprise?
- Were you part of the team leading the definition of business and/or IT strategy?
- How did a new disruptor on the market change your strategy and direction?

## 12. Industry Analysis

The foundations of business markets and how organizations function within them. The understanding to combine a particular business vertical with common trends in the technology sector. How to keep track of trends so technology and business skills are constantly improved.

### Expectations

- Can identify top news sources for their company's
- Knows how to investigate the top trends in the industry they operate in
- Has ran a project that increased competitive capability

Element	Description
<b>Industry Research</b>	Capability to discover the common industry terminology, processes, roles and businesses – especially in the primary industry verticals (Manufacturing, Financial Services, Healthcare, Retail, Telecommunications and Government)
<b>Information Analysis</b>	The ability to discover and quantify patterns in industry-specific data. The relevant techniques include statistical and data mining.
<b>Industry Segmentation</b>	A scheme for categorizing industrial and business customers to guide strategic and tactical decision-making, with the goal to identify the most significant differences among current and potential customers that will influence their purchase decisions or buying behavior.
<b>Industry Trends</b>	An assumed tendency of a given industry to move in a particular direction over time; trends are classified as secular trends for long time frames, primary trends for medium time frames, and secondary trends lasting short times.
<b>Sustainability Strategy</b>	The preparation of a sustainability strategy for IT, taking into account political, legislative, economic, social and technological factors. Identification of major external standards, practices or schemes to be adopted.

### Awareness <knows what it is>

- What are specifics of the industry that your customer (or organization) is in?
- What would you do if asked to quickly learn about a new industry segment?
- Why is sustainability relevant for the industry of your customer (or organization)?
- What differentiates your customer (or organization) from their competitors?

### Knowledge <knows how to apply it>

- Name the top three news sources in an industry of your choice?
- Who are your customer's (or organization) competitors in the same industry segment?
- Contrast and compare two industry verticals.
- What are the top three trends in your industry?

### Experience <has applied it>

- Have you run a project to increase competitive capabilities of a company?
- Do you regularly coach others in industry awareness and direction?
- Explain how industry-specific knowledge helped you with right architectural decisions on your project.
- How do you take existing scenario and modify it for a specific industry?

## 13. Business Valuation

How and when to invest in particular technology directions and how to manage the overall portfolio of technology investments. Common techniques for proving the financial benefit of architecture choices and how to apply common financial evaluation techniques.

### Expectations

- Has defined (in numbers and/or ROI, CBA or NPV) a technology decision
- Has identified and delivered a technology which saved or made money
- Knows how much their company spends on maintenance

Element	Description
<b>Financial Expression of Technology Decisions</b>	A process and a set of procedures used to estimate the economic value of an owner's interest in an IT investment.
<b>Financial Management for IT</b>	The overall financial management, control and stewardship of the IT assets and resources used in the provision of IT services, including the identification of materials and energy costs.
<b>Benefits Management</b>	Monitoring for the emergence of anticipated benefits (typically specified as part of the business case for a project) and action to optimize the business impact of individual and combined benefits.

### Awareness <knows what it is>

- What is 'value'? What is 'benefit'?
- What is the unit of measurement for ROI?
- How do you ensure that technology investment provides return beyond investment?
- What is a technology investment portfolio?

### Knowledge <knows how to apply it>

- How would you link your solution outline with profit and loss?
- How do you define the actual value of technology decision?
- What information do you need to make valuable technology decisions?
- How many architects would you need to perform valuation on critical projects?

### Experience <has applied it>

- What is the cost of yearly power consumption of your solution?
- Who brings the most value to the business? Architect vs Business Analyst vs Developer?
- How much does your company spend on maintenance?
- How much money does your company spend on persistence each year?

## 14. Investment Prioritization and Planning

The management of asset and project portfolio lifecycles, including planning and managing, and understanding of the very different investment approaches required for each. Includes skills on trending, spending, prioritization and portfolio analysis. Common understanding of where IT spends its money, what trends it could be investing in and how technology strategy relates to the project portfolio including project priority.

### Expectations

- Can leverage multiple resources for technology trending and planning
- Can manage suppliers through the bidding, selection and oversight process
- Can map current IT spend and capability map to the trending and investments
- Can write or respond to the Request for Proposal from the perspective of technical investment
- Can lead an initiative to increase capability mapping, portfolio investments and optimized procurement

Element	Description
Capability Mapping	The process of modeling what a business does to reach its objectives (its capabilities).
Supplier Relationship Management	The identification and management of external suppliers to ensure successful investments in products and services to achieve desired value.
Procurement Management	The management of, and the provision of policies, internal standards and advice on, the procurement of goods and services in order to maximize the return of IT investments

### Awareness <knows what it is>

- When does an organization issue RFP and why?
- How does an organization manage portfolio of projects?
- What is a capability and how is it related to business and IT?
- Name some policies, standards or regulations that ensure better procurement practices.

### Knowledge <knows how to apply it>

- Who manages IT assets and who manages IT portfolio of projects?
- How does a planning and budgeting cycle work in your organization?
- Who should own a technology investment budget?
- Name some industry trends that can disrupt investment plans.

### Experience <has applied it>

- Describe a project that has been changed once you got an investment authority.
- What was your selection process for IT suppliers that you used on the project?
- What techniques did you use to evaluate the priority of a given project in the portfolio?
- What was your contribution in an RFP process (either on bidding or selecting side)?

## 15. Requirements Discovery and Constraints Analysis

Understanding business requirements with multiple strategic impacts and how such requirements and constraints are formed internally and externally. How to apply those constraints and requirements to their technology and business decisions. Understand and plan for technology capabilities of the current resources/environment. Best practices for ensuring the quality of the business requirements.

### Expectations

- Knows what requirements and constraint are
- Can leverage architecture framework and is able to deliver against one
- Can create a successful strategy from poor requirements
- Can assess requirements and constraints through business risk analysis

Element	Description
<b>Requirements definition and management</b>	The definition and management of the business goals and scope of change initiatives. The specification of business requirements to a level that enables effective delivery of agreed changes.
<b>Business Risk Management</b>	Organization-wide processes and procedures for the management of operational risk arising from any aspect of the use of information technology.
<b>Usability requirements analysis</b>	The establishment, clarification and communication of non-functional requirements for usability. The analysis of the characteristics of users and their tasks, and the technical, organizational and physical environment in which solution will operate.
<b>Sustainability Assessment</b>	The evaluation of the sustainability of operational or planned IT services, devices and day-to-day operations such as travel. The identification of areas requiring attention, and the initiation of actions to change to improve sustainability.

### Awareness <knows what it is>

- Describe what is a difference between requirements and constraints?
- What is an example of an architectural requirement?
- What is the correlation between Requirements Discovery and Requirements Modeling?
- How does a well-defined constraint look like?

### Knowledge <knows how to apply it>

- How do you create a successful strategy from poor requirements?
- How would you know that you captured (almost) all requirements?
- What is a non-architectural requirement? How do you know?
- What are the different categories of requirements you'd capture?

### Experience <has applied it>

- What constraint limited you from the ideal architectural alternative?
- How did you trace the adherence to requirements throughout the solution lifecycle?
- When a constraint prevented you from implementing a requirement, what did you do?
- How did you incorporate sustainability requirements (Green IT) into your plans?



## 16. Compliance

Understanding and mitigation of regulatory impacts to the organization and the design/solution being deployed, including audits, certifications, licensing, and general industry regulation types. The IT architect is expected to have the ability to articulate the regulatory requirements that drive design elements, including regulation, governance, legal and other binding corporate agreements.

### Expectations

- Knows what compliance issues impact their company
- Have been (directly or indirectly) impacted by compliance issues
- Have worked on (or collaborated with) IT Audit projects
- Understands stakeholders' compliance responsibilities and obligations
- Understands compliance and auditing frameworks, such as COBIT or SAS 70

Element	Description
<b>Compliance Review</b>	An independent assessment of the conformity of any activity, process, deliverable, product or service to the criteria of specified standards, such as ISO 27001, local standards, best practice, or other documented requirements.
<b>Technology Audit</b>	A structured analysis of the risks to achievement of business objectives, including the risk that the organization fails to make effective use of new technology to improve delivery and internal effectiveness.
<b>Information Assurance</b>	Setting high level strategy and policy to ensure stakeholder confidence that risk to the integrity of information in storage and transit is managed pragmatically, appropriately and in a cost effective manner.

### Awareness <knows what it is>

- Which companies must comply with SOX?
- Explain any control framework that help with compliance, such as COSO, COBIT for SOX, BITS or other.
- How does COBIT framework help managers, auditors and IT staff?
- How is technology audit linked to compliance review?

### Knowledge <knows how to apply it>

- Would you know how to mitigate compliance issues on the job?
- How does Sarbanes-Oxley regulation (or HIPAA or any other act) translate into IT requirements?
- How is compliance impacted by outsourcing, offshoring or off-premises processing?
- What is included in SAS 70 auditing statement?

### Experience <has applied it>

- Explain SOX regulation to a lay person.
- When would you pursue SAS 70 Type II service auditor's report and why?
- How did you support (internal or external) auditors and in what phases of auditing process?
- Explain the requirement you had to modify in order to remain compliant?

## 17. Business Architecture Methods & Tools

Architecture methods and tools, including enterprise frameworks and methodologies, business process engineering, business process management, business process modeling, workflow, and similar technology in relation to business capabilities and design. The IT Architect is expected to understand and apply best practices for integrating business processes that span multiple internal organizations, including the use of key architecture methodologies and tools.

### Expectations

- Is familiar with various Business Architecture Methodologies
- Understands various approaches to Business Process Management
- Can compare several business architecture methodologies
- Champions the use of an architecture framework or methodology

Element	Description
<b>Business Analysis</b>	The methodical investigation, analysis, review and documentation of all or part of a business in terms of business functions and processes, the information used and the data on which the information is based. The definition of requirements for improving processes and systems, reducing their costs, enhancing their sustainability, and the quantification of potential business benefits.
<b>Business Process Modeling</b>	The activity of representing processes of an enterprise, so that the current process may be analyzed and improved; it may or may not require IT involvement.
<b>Business Process Improvement</b>	The identification of new and alternative approaches to performing business activities. The analysis of business processes, including recognition of the potential for automation of the processes, assessment of the costs and potential benefits of the new approaches considered and, where appropriate, management of change, and assistance with implementation.
<b>Business Process Management</b>	A holistic business management approach that promotes business effectiveness and efficiency while striving for innovation, flexibility, and integration with technology.

### Awareness <knows what it is>

- What design model is used for business stakeholders?
- Define some industry standard architecture methods for creating architecture.
- Describe some processes and tools used to deliver strategy.
- What is the difference between a development methodology and an architecture methodology or framework?

### Knowledge <knows how to apply it>

- What templates or tools are used to engage stakeholders in business architecture?
- Exactly what elements of your job do the existing 'frameworks' help you with?
- What tools would actually help you be a better business technology strategist?
- When do methods and tools begin to truly impact your day to day activities?

### Experience <has applied it>

- How did you integrate your technology stack in chosen architecture methodology?
- How did you manage process and technology integration?
- How did you integrate information flow into methodology and processes?

## 18. Decision Support

Understanding and application of decision support and “smart” systems, including basic concepts and components in decision and business intelligence systems and demonstration of effective architectures using these components.

### Expectations

- Can describe the technical basis for decision management
- Identified and delivered a technology which helped the company to decide faster
- Has insight into key business metrics that are relevant for timely and accurate business decisions

Element	Description
<b>Enterprise Decision Management</b>	Techniques that entail all aspects of managing automated decision design and deployment that an organization uses to manage its interactions with customers, employees and suppliers.
<b>Decision Making</b>	A process resulting in the selection of a course of action among several alternatives, resulting in an action or an opinion of choice.
<b>Business Intelligence</b>	Techniques used in spotting, digging-out, and analyzing business data, providing historical, current, and predictive views of business operations

### Awareness <knows what it is>

- Do you know what the technical basis for decision management is?
- What techniques and processes in decision-making flow could be automated?
- What constitutes an architecturally relevant decision?
- Which specializations should be involved with decision support and why?

### Knowledge <knows how to apply it>

- Could you identify and deliver a technology which saves or makes the company money?
- Do you know where to find how much your company spends on maintenance?
- How do you identify key decision support opportunities?
- How do you keep track of key decisions and why is decision traceability so important?

### Experience <has applied it>

- How did you manage to lower the risk of decision making on the project?
- What supporting tools or techniques did you use on critical decision points of the project?
- What key business metric did you try to improve with your decision-support system?
- How did you know that decisions were too slow, and how did you measure the accuracy of decisions made?

## 19. Knowledge Management

The management of the way in which business information is built, stored, managed, and made easily accessible, including current issues around the organizational challenge of maintaining long-term organizational memory.

### Expectations

- Is familiar with different levels and tools for managing knowledge and intellectual assets
- Has implemented or effectively utilized corporate knowledge management system
- Consistently increases the KM and learning capabilities of the organization
- Understands the value and relevance of intellectual property (IP)

Element	Description
<b>Knowledge Management</b>	A collection of strategies and practices used in an organization to identify, create, represent, distribute, and enable adoption of insights and experiences
<b>Learning and Development Management</b>	The management of professional development and provision of training and education in order to develop business and/or technical skills.
<b>Intellectual Property Creation and Maintenance</b>	Management of distinct types of creations of the mind for which property rights are recognized, including copyrights, trademarks, patents, industrial design rights and trade secrets.
<b>Education and Training Management</b>	The transfer of business and/or technical skills and knowledge and the inculcation of professional attitudes in order to facilitate learning and development.

### Awareness <knows what it is>

- Can you name some tools for managing knowledge vaults and intellectual assets?
- Explain the process of converting tacit knowledge into explicit knowledge.
- What are key differences in knowledge management of new vs. veteran employees?
- Why is intellectual property extraction, preservation and protection so important for IT organizations?

### Knowledge <knows how to apply it>

- How do you decide what Intellectual property to generalize and share?
- What is a patent? What is a Trademark? What is a Copyright?
- Why is readiness and knowledge transfer important in modern enterprises?
- How do adults learn, develop and acquire business and/or technical skills?

### Experience <has applied it>

- What were the key KM requirements you got from your Information Architect?
- Where did you harvest best practices for your project?
- How did you distribute your own lessons learned inside your organization?
- What kind of training and education activities did you plan in various phases of your project?

## 20. Technical Project Management

Role of project management specific to an IT project or program. Understanding the existing deployed solutions (and the limitations of those solutions) in developing the future state capabilities required by new solutions and balancing the cost of the new solution against the overall goals and timelines of the organization. Expected to demonstrate understanding of the factors involved in estimating solutions and their cost and cost tracking methods and tactics.

### Expectations

- Understands major project management concepts
- Has delivered scope, time and effort estimates
- Understands Integration, Scope, Time, Cost, Quality, HR, Communications, Risk and Procurement Management (PMBOK knowledge areas)

Element	Description
<b>Project Management</b>	The management of projects, typically (but not exclusively) involving the development and implementation of business processes to meet identified business needs, acquiring and utilizing the necessary resources and skills, within agreed parameters of cost, timescales, and quality.
<b>Program Management</b>	The identification, planning and coordination of a set of related projects within a program, to manage their interdependencies in support of specific business strategies. The maintenance of a strategic view over the set of projects, providing the framework for implementing business initiatives, or large-scale change, by conceiving, maintaining and communicating a vision of the outcome of the program.
<b>Portfolio Management</b>	The systematic appraisal, evaluation and management of the IT portfolio of programs and projects in support of specific business strategies. The development and application of a portfolio management framework to ensure that all interdependencies are managed and that standards are maintained across the lifecycle of different programs. The delivery and documentation of objective and independent investment appraisal and project review throughout the program lifecycle.

### Awareness <knows what it is>

- How should the architect manage risk? (Proactive or Reactive?)
- What are the major Project Management concepts/areas?
- What is the responsibility of an Architect vs. a PM on projects/programs?
- What success metrics should be used to evaluate a program/project?

### Knowledge <knows how to apply it>

- What Project Management tools are you able to use to manage the projects?
- Explain reasons of cost overrun on technical projects.
- What estimation techniques are you aware of and how do you choose one?
- What is a role of Architect in the portfolio management?

### Experience <has applied it>

- Explain your role in a SCRUM based project?
- Should an IT Architect be able to replace a technical PM on the project?
- How did you manage the scope creep on the project?
- When was your project over (finished)?

## 21. Asset Management

Set of business practices that join financial, contractual and inventory functions to support life cycle management and strategic decision making for the IT environment. It includes management of intellectual property of solutions and architectural components within the IT environment. Assets can include document formats, video, audio, configuration information, and any other way that knowledge is stored and transferred.

### Expectations

- Understands primary concepts in asset management
- Has working knowledge of asset management technologies
- Has delivered (or worked with) an asset management solution

Element	Description
<b>Hardware and Software Lifecycle Management</b>	HW/SW lifecycle management reduces failures and data loss because computer equipment is replaced before it fails, therefore reducing the total cost of asset management over its lifetime.
<b>Service, Warranty and Licensing Management</b>	Management practices that help organization to manage portfolio of services, licenses and warranties from multiple vendors, protecting an organization from losses due to mis-licensing or warranty expirations.
<b>Sustainability Management for IT</b>	The specification, planning and management of changes to IT assets, systems, processes or practices intended to reduce or constrain consumption and/or disposal of energy or materials, within the context of company strategy and policy, and regulatory and contractual requirements.

### Awareness <knows what it is>

- Why is Asset Management deemed a 'primary point of accountability' for the life-cycle management of IT assets?
- Explain some primary concepts in asset management.
- How does Asset Management impact technology strategy decisions?
- What would be an example of sustainable policy for end-of-life management of equipment?

### Knowledge <knows how to apply it>

- Name some of your organization's accounting policies for capital expense purchases.
- How can you use product or service warranty expiration in asset management?
- How can you link architecture lifecycle with asset management processes?
- How can you enhance performance of assets through good asset management?

### Experience <has applied it>

- What is your IT department's road map for equipment management?
- How did migration to off-premises technologies impact your asset management strategy?
- How did you gain and maintain control of the asset inventory within the organization?
- How did you stop 'leaking' of assets and established loss detection on the project?

## 22. Change Management

Change management is a structured approach to shifting/transitioning individuals, teams, and organizations from a current state to a desired future state. It is management of any change to the IT environment, including release management, build, configuration management, device management and proper documentation on change request.

Architects are expected to have a deep understanding of the vital nature of designing and utilizing effective change management processes and the critical role that change control plays in a quality operational design.

### Expectations

- Understands the ITIL (or other common) Change Management concepts
- Leverages or drives Change Management adoption or upgrade process
- Has worked on large transformational project with emphasis on Change Management
- Understands the importance of known state and is aware of consequences of unplanned change

Element	Description
<b>Change Implementation Planning and Management</b>	Management of the process for deploying and integrating IT capabilities into the business in a way that is sensitive to and fully compatible with business operations.
<b>Transformation Management</b>	Integrated approach to leadership and management that enables controlled and sustainable approach to planned or anticipated changes in the organization.
<b>Information Systems Coordination and Control</b>	The coordination of information strategy matters where the adoption of a common change control benefits the entire organization.

### Awareness <knows what it is>

- Explain what should be included in every change management process.
- What effective change management policies would you recommend to a start-up type of organization?
- What elements of the IT environment must be versioned?
- Contrast and compare preventive and corrective actions in change management.

### Knowledge <knows how to apply it>

- How is approach to change on Scrum-based projects different from conventional change management?
- How do you perform the integrated change control across several projects/programs?
- If you could design best change management process, what would it be?
- How does ITIL/MOF/ISO20000 define the change management process?

### Experience <has applied it>

- How did you handle change management in your architecture?
- What was your role and responsibility in CAB (Change Advisory Board)?
- How did you ensure that changes were assessed/approved/implemented in a controlled manner?
- What was the proof that you knew the current state of configuration at all times during the project?

## 23. Infrastructure

An IT infrastructure consists of facilities, network, storage, servers, middleware, and the application software relied upon by the organization's applications, along with the tools, processes, and procedures to build, deploy, install, manage, backup, and restore capability in any of these. In other words, an infrastructure is the foundation upon which application services are delivered, and the operations that keep them running.

All architects are expected to be familiar or have experience with infrastructure concepts such as operations, network engineering, server sizing, storage management, backup and restore technologies, and physical data center design.

### Expectations

- Understands all aspects of infrastructure design, including on-premise, off-premise and hybrid designs
- Can identify and understand infrastructure requirements for a solution and can help design and recommend the appropriate infrastructure solutions for that project
- Understands infrastructure cross-cutting concerns, such as Access and Identity Management, Capacity Planning, Data center design and networking
- Is proficient in at least one operational methodology or framework

Element	Description
<b>IT Operations Management</b>	Processes and services that are used to run IT as a business, including management, implementation, construction, deployment, distribution, verification, installation, execution and maintenance.
<b>Data Center Design</b>	Planning, design, engineering, and construction of data centers & computer rooms, including understanding of geographic/political concerns, facilities design, access controls, powering and cooling of equipment in data centers.
<b>Networking and Remote Access</b>	Activities that focus on capabilities to get access to devices or networks from a remote distance. Understanding of physical networking (wired and wireless), data transfer protocols (such as TCP/IP), network layering and identity management.

### Awareness <knows what it is>

- What are some concerns of packet-switching networks?
- What are the three main goals of data center management?
- What are the latest data center development strategies and trends?
- How did multi-core technology change architectures of modern data center?

### Knowledge <knows how to apply it>

- What is an average power density of efficient data center?
- How does virtualization impact infrastructure dependencies and constraints?
- What types of limitations should you expect from infrastructure team?
- When would you need encrypted data transfer on the private (protected) network?

### Experience <has applied it>

- When you outsourced your infrastructure, what were validation parameters for outsourcing partners?
- What was the required HVAC airflow (in cubic feet or cubic meters) for your datacenter?
- How did you monitor the network saturation caused by your web services?
- What infrastructure parts would you need to redesign if your solution would move to the cloud environment?



## 24. Application Development

Define and describe the varying approaches to application development and will include COTS package implementation and infrastructure upgrades. The functions of opportunity definition, preliminary analysis, software development, testing, deployment, and overall managing of the development environment and process will be covered.

Architects are expected to be familiar or experienced with different ways to approach structuring projects including waterfall, iterative and incremental, different levels of formality (from methods with a high degree of ceremony to agile approaches).

### Expectations

- Understands all major aspects of modern application development
- Has studied application development in detail
- Has participated in application development in their organization
- Is proficient in at least one SDLC/AML methodology or framework

Element	Description
<b>Software Development Lifecycle Management</b>	The provision of advice, assistance and leadership in improving the quality of software development, by focusing on process definition, management, repeatability and measurement. The facilitation of improvements by changing approaches and working practices, typically using recognized models such as the Capability Maturity Model Integration (CMMI), the Software Process Improvement and Capability dEtermination Model (SPICE), Test Process Improvement (TPI) and Test Maturity Model (TMM).
<b>Systems Development Management</b>	The management of resources in order to plan, estimate and carry out programs of systems development work to time, budget and quality targets and in accordance with appropriate policies and standards.
<b>ALM (Application Lifecycle Management) Methods and Tools</b>	Ensuring that appropriate methods and tools for the ALM planning, development, testing, operation, management and maintenance of applications are adopted and used effectively throughout the organization.

### Awareness <knows what it is>

- What are the major aspects of application development?
- What is the difference between Application Lifecycle Management (ALM) and SDLC?
- How do you measure efficiency of Application Development process?
- .

### Knowledge <knows how to apply it>

- What development methodologies are you experienced in?
- Compare EMACS, Eclipse and VSTS environments.
- What are the key aspects of Application Development that all architects are required to understand?
- When you participate in Application Development, what is your role and where is it defined?

### Experience <has applied it>

- How did you interact with Software/Infrastructure/Information Architect on the project?
- What were the disadvantages of bug tracking process you used?
- How did you experience the difference between CMMI 4 and CMMI 5?
- State and explain your point of view: should all architects be required to code?

## 25. Governance

Detail the decision-making environment within an organization and the importance of having clearly defined roles and responsibilities relative to oversight of projects, processes, and products.

Architects are expected to show competence in designing solutions that achieve regulatory goals and objectives and allow for guidance and oversight that continuously track to the needs of the business.

### Expectations

- Understands how governance assures delivery against plan
- Knows the governance mechanisms for their organization
- Monitors/enforces governance standards in their organization
- Can demonstrate governance methods that have positive effect on the organizational culture

Element	Description
<b>Information Management</b>	The overall management of the control and exploitation of all kinds of information, structured and unstructured, to meet the needs of an organization.
<b>Corporate Governance of IT</b>	The planning and implementation of initiatives and procedures to ensure that the IT services used by an organization, and the technology which supports them, deliver value, are efficient in use of resources, and are compliant with all relevant legislation and regulations.
<b>Continuous Guidance and Oversight</b>	Activities that focus on overseeing and guiding the performance or operation of a group with the intent of continuous improvement of quality, performance and results.

### Awareness <knows what it is>

- What portions of a project are most influenced by a governance model?
- How does governance measure value?
- Should IT capabilities be related to the investment choices and why is that relevant to IT governance?
- How is IT Governance different from good IT management practices and control?

### Knowledge <knows how to apply it>

- How do architects participate in governance?
- How much responsibility and accountability should an architect accept?
- Are architects liable for their decisions? How does this differ from IT management?
- What IT governance principles are defined in ISO/IEC 38500:2008 standard?

### Experience <has applied it>

- What are some governance constraints you experienced recently?
- How did you enforce governance standards on the last project?
- How did you offer guidance and oversight without policing?
- How did Six Sigma initiative increase the governance and assured delivery?

## 26. Testing Methods, Tools, and Techniques

Identification of testing methods and tools that are optimized for value, providing the appropriate levels of quality without over-burdening project deliverables.

Architects are expected to be able to detail best practices in testing theory, techniques and tools, and are expected to demonstrate competence in the scientific method and important testing techniques.

### Expectations

- Has knowledge of primary testing methods and tools
- Has in-depth knowledge of testing methods
- Ensures that all deliverables are tested properly

Element	Description
Testing Processes	The concurrent lifecycle process of engineering, using and maintaining testware (test cases, test scripts, test reports, test plans, etc) to measure and improve the quality of the system being tested.
Quality Management	The application of techniques for monitoring and improvement of quality to any aspect of a function or process. The achievement and maintenance of compliance to national and international standards, and to internal policies.
Quality Standards	The development, maintenance, control and distribution of quality standards.
Quality Assurance	The process of ensuring that the agreed quality standards on the project are adhered to and that best practice is spread throughout the organization.

### Awareness <knows what it is>

- How does an architect set testing levels and quality standards?
- What similarities/differences should be enforced/allowed between testing and production environment?
- What does an old adage “You can’t test quality in” mean?
- Who is responsible for quality on agile projects?

### Knowledge <knows how to apply it>

- What are an architect’s key responsibilities to the QA group?
- How does QA impact an architect’s key value metrics?
- What is the difference between unit testing, requirements testing and UAT (User Acceptance Testing)?
- How do you measure quality and how do you assure it?

### Experience <has applied it>

- What was the exception handling strategy in your solution?
- When was the last time you contributed to the design of a testing process?
- How did you evaluate the quality of a system designed to interact with millions devices?
- How did you automate code coverage?

## 27. Platforms and Frameworks

An understanding of how platforms and frameworks relate to each other, and able to evaluate frameworks against each other in specific and different contexts.

An architect is expected to have a working knowledge of primary platforms and frameworks used throughout the public and private sectors, with emphasis on the architectural qualities rather than the specifics of the platform platforms.

### Expectations

- Is aware of the categories of IT frameworks
- Understands the importance of a computing platform
- Monitors trends/changes to major frameworks
- Leads the adoption process for platforms and frameworks

Element	Description
<b>Information Systems Platforms</b>	Covers application server, frameworks, identity storages, persistence engines, relational and non-relational databases, UI frameworks, interpretation environments, rule engines, operating systems, workflow engines and other systems that can store data and/or execute code.
<b>Replatforming, Refactoring and Reengineering</b>	Replatforming is the migration of existing application to a different platform without functional modification of application. Refactoring is the process of changing code without modifying its external functional behavior. Reengineering is the examination and alteration of a system to reconstitute it in a new form.
<b>Architectural Frameworks</b>	A generic base that allows simpler or more abstract elements to be deployed within it and provides an API or interface to which one may attach specific functional elements.

### Awareness <knows what it is>

- What is a computing platform and what is not?
- What is TOGAF and what is it used for?
- When would you use TOGAF vs. Zachman?
- When does replatforming turn into refactoring?

### Knowledge <knows how to apply it>

- Explain the needed evolution of a given framework due to cloud computing.
- How does Zachman framework help you link business requirements with technical design?
- Compare reengineering, refactoring and replatforming.
- Is SharePoint/Notes/Documentum a platform? Why?

### Experience <has applied it>

- Explain key benefits of new refactored system.
- What were the deviations from chosen framework and why did you decide to diverge from it?
- Why did you use TOGAF or Zachman and what were some benefits/drawbacks?
- When is a framework too generic and how did you experience this?

## 28. Requirements Modeling

Multiple ways to model business and technical requirements, architectures, and designs and how to transform models of one type into another. Domain-specific modeling languages and other modeling approaches will be addressed.

### Expectations

- Can show examples of requirements modeling artifacts they have created
- Can describe the different audiences they target for requirements modeling output
- Can describe the type of requirements modeling tools they use

Element	Description
<b>Requirements Definition and Management</b>	The definition and management of the business goals and scope of change initiatives. The specification of business requirements to a level that enables effective delivery of agreed changes.
<b>Business Modeling</b>	The production of abstract or distilled representations of real world/business situations to aid the communication and understanding of existing, conceptual or proposed scenarios.
<b>Functional Requirements Modeling</b>	The set of tasks that allow creation of functional requirements that are actionable, measurable, testable, and link technology decisions to business benefits.

### Awareness <knows what it is>

- Name some properties of good requirements. (necessary, non-ambiguous, concise, consistent, complete, reachable, verifiable, clear)
- Explain the basics of requirements modeling process.
- How are requirements used in project planning and estimation?
- Name some conflicting/contradicting requirements.

### Knowledge <knows how to apply it>

- Explain the difference between (or give some examples of) business and technical requirements.
- How do you know that you modeled all relevant requirements?
- How do you avoid requirements analysis paralysis?
- What is the function of requirements in Test-driven design (TDD)?

### Experience <has applied it>

- Talk about the project that failed due to poor requirements.
- Was UML Use Case flexible enough to capture requirements on your project?
- How did you ensure traceability between high-level and detailed requirements?
- Name some future business problems you are foreseeing with current set of requirements.

## 29. Architecture Description

Architectural description provides detailed architecture communication and includes diagramming notation, architecture views and viewpoints, and is organized into an architecture description language (ADL).

ADLs provide a way to communicate an architecture to all stakeholders, not just technologists, and must:

- Be suitable for communicating architecture to all interested parties.
- Support the tasks of architecture creation, refinement, and validation.
- Provide a basis for further implementation, so it must be able to add information to the ADL specification to enable the final system specification to be derived from the ADL.
- Provide the ability to represent most of the common architectural styles.
- Support analytical capabilities or provide quick generating prototype implementations.

### Expectations

- Can describe the artifacts they typically create
- Can describe tools they use
- Can describe the intent and value of creating descriptions

Element	Description
<b>Conceptual Descriptions and Notations</b>	Standard notations for representing architectural concepts that help promoting mutual communication and understanding of high-level ideas, sketches and solution concepts.
<b>Logical Descriptions and Notations</b>	Notations and descriptions that promote the embodiment of early design decisions, and creation of a transferable abstraction of a system, comprised of components and connections among them.
<b>Implementation Descriptions and Notations</b>	Specific, concrete and implementation-ready descriptions of envisioned system that allow analysis, feasibility testing and implementation of architectural design decisions.

### Awareness <knows what it is>

- Who is the audience for (conceptual, logical, implementation) diagrams?
- Explain the design flow from conceptual to implementation description of architecture artifacts.
- Compare interests of target audience for conceptual, logical and implementation descriptions of architecture.
- How do you describe as-is and to-be architecture? How do you notate the gaps?

### Knowledge <knows how to apply it>

- How do you transform collected architectural information and intents into viable models?
- How do you depict functional requirements of the architecture?
- Compare and contrast UML and ArchiMate.
- Explain the vocabulary of your preferred Architecture Description Language (ADL).

### Experience <has applied it>

- How did you create/adopt effective architecture approaches, methodologies or reference models?
- What formal architecture descriptions did you create?
- Explain and elaborate some models, views and viewpoints you developed.
- How did your architecture description change as you moved from waterfall to agile SDLC?

## 30. Decomposition and Reuse

Decomposition is the process of resolving a functional relationship into its constituent parts in such a way that the original function can be recomposed. This modularity allows the architect to create a compressed representation of the global function and allows for reuse.

Reuse is the process of using capabilities for more than one solution. Rather than recreate a duplicate capability, the architect can identify components that can fulfill the requirements with little or no modification.

Decomposition and reuse become more challenging if an architecture team does not have a consistent and discoverable way to catalogue architectural artifacts.

### Expectations

- Can highlight examples of reuse over build/buy in a project
- Can describe how the approach decomposition
- Can describe how they support decomposition and reuse in their work environments

Element	Description
<b>Business Decomposition</b>	The methodical investigation, analysis, review and documentation of business in terms of business functions and processes, the information used and the data on which the information is based. The definition of requirements for improving processes and systems, reducing their costs, enhancing their sustainability, and the quantification of potential business benefits.
<b>Reuse</b>	A discipline of using proven IT management practices applied consistently over time to generate new streams of value by deploying existing technology, data and processes in new circumstances
<b>IP Reuse and IP Leverage</b>	Effort of consuming, exploring, comprehension, verification and reusing IP (as is) or leveraging IP (with modifications) by a transfer of documentation, technology, design knowledge and/or design flow.
<b>Software Product Lines (SPLs)</b>	Methods, tools and techniques for creating a collection of similar software systems from a shared set of software assets using a common means of production.

### Awareness <knows what it is>

- How does reuse happen in the object oriented world?
- Explain the difference between technical reuse, data reuse and process reuse.
- Name some decomposition methods that lead to better understanding of a complex problem domain.
- What is the difference between IP reuse and IP leverage?.

### Knowledge <knows how to apply it>

- What are Software factories and what problem do they try to solve?
- How does reuse affect enterprise performance and what are the practices associated with effective reuse?
- What are some typical commonalities shared by IT projects that can benefit from reuse and product lines?
- Why is intellectual property reuse so important for an IT consultancy?

### Experience <has applied it>

- How did you build the repository that enabled decomposition and reuse by the team?
- Quantify organizational benefits of product line strategy that you helped to implement.
- How do you charge for reused IP vs. uniquely created IP?
- Did you check with legal expert if you are allowed to reuse and share 3<sup>rd</sup> party IP? Why did (should) you?

## 31. Design Methodologies and Processes

A collection of methods, procedures, standards, tools, and recommended practices used for creating architecture.

Architects must recognize major components of the process in various methods and be able to determine when a given method is appropriate to the problem at hand.

Architects must also understand common development cycles and their role in design

### Expectations

- Can describe the tools and processes they use
- Can describe how they adapt their tools or adopt to other tools to customize for each project
- Can describe the process they used on the projects they presented

Element	Description
<b>Design and Creativity Management</b>	Acts as the interface of management and design and functions as link between the platforms of technology, design, design thinking, corporate management, brand management and marketing management.
<b>Designing Tools, Techniques and Methods</b>	A collection of methods, procedures, standards, tools, and recommended practices used for creating architecture.
<b>Design in various SDLCs</b>	Understanding of common Solution Development Lifecycles and the role/placement of design process within them.

### Awareness <knows what it is>

- Explain the design methodology or tool of your choice.
- What are the signs of poor design?
- What is MDA - Model Driven Architecture and how does it impact the design process?
- How do you design for operations?

### Knowledge <knows how to apply it>

- How should an architect apply design patterns in and common design principles in the design process?
- How would you articulate the value of good design process to business stakeholders?
- Name some principles and tenets that help delivering efficient designs.
- How do you focus on design simplicity that still meets customer's needs?

### Experience <has applied it>

- How did you measure or control the design quality on the project?
- Draw a sample design model that you used in the past.
- Share your experience: is UML (or Archimate) a good visualization tool to support design process?
- What was your level of concern on the project and how did you design and model it?



## 32. Design Patterns and Styles

A pattern is a three-part rule that expresses a relationship between a certain context, a problem, and a solution. As Christopher Alexander suggests, “Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over and over, without ever doing it the same way twice.”

Styles are broader than patterns and more generalized than patterns. For instance, layered architecture is a pattern that follows a call and return style of interaction. Model-Driven Development (MDD) and Representational State Transfer (REST) are examples of styles.

As a practicing IT architect, you should have a demonstrated understanding of metaphor and pattern concepts, styles versus pattern, and demonstrated competence in deriving and communicating pattern and style.

### Expectations

- Can describe their application/delivery of metaphors and patterns on projects they have participated in
- Know the difference between a style, architecture pattern, and design pattern and how they leverage each in projects they participate in

Element	Description
<b>Application of Metaphors, Analogies and Similes</b>	A metaphor is a figure of speech that uses one thing to mean another and makes a comparison between the two. A simile compares two different things in order to create a new meaning. An analogy is a logical argument showing how two things are alike by sharing common characteristics.
<b>Patterns Recognition, Harvesting and Reuse</b>	Processes and activities related to identifying and harvesting reusable solutions to commonly occurring problems. Patterns are descriptions or templates for how to solve a problem that can be used in many different situations.
<b>Leverage of Styles, Patterns and Anti-patterns</b>	Active usage of good styles and well-known patterns and active avoidance of recognized ineffective and/or counterproductive practices (anti-patterns).

### Awareness <knows what it is>

- What horizontal-scaling patterns for a database are you aware of?
- Name some architectural (not development) patterns.
- Compare two similar patterns (MVC pattern with MVP pattern).
- What would be an analogy for singleton pattern?.

### Knowledge <knows how to apply it>

- What Enterprise integration patterns do you know?
- What are some patterns of data partitioning?
- Name some EA strategies and patterns.
- When would you use Web services vs. REST style?

### Experience <has applied it>

- What is a decorator pattern? Why did/didn't you use it?
- Find at least two anti-patterns you induced on your project.
- Why exactly did you ignore standardized patterns for your problem and rather re-invented the solution?
- What are common anti-patterns of SOA architectural style that you used?

### 33. Design Analysis and Testing

Architecture analysis techniques and related tools allow an IT architect to evaluate a design relative to alternatives, describe the structure and state of a design, and analyze the design's dynamic behavior in response to external events. They can then test a design as an artifact for completeness, correctness, efficiency, and a number of other criteria.

Highest priority techniques such as selected ATAM techniques, failure analysis, optimization, prototyping, simulation, scaled modeling, and various forms of walk-throughs and design reviews can be used to perform analysis and testing.

#### Expectations

- Has participated in design analysis
- Has identified and mitigated poor design early
- Validates architecture that solves the intended business problem

Element	Description
<b>Pattern Analysis</b>	The ability to discover and quantify patterns in the design, validate the adequate application of the pattern and analyze the probable outcomes of using (or not using) the pattern.
<b>Identification and Remediation of Poor Design</b>	Analysis techniques and related tools that allow an architect to evaluate and qualify design choices relative to alternatives.
<b>Validation of Design Elements</b>	The process of checking that a solution meets stated requirements and specifications and that the design elements fulfill the intended purpose.

#### Awareness <knows what it is>

- What are some common industry-accepted analysis tools?
- In what stage(s) in the SDLC should you perform the assessment?
- What is the difference between Proof of concept, prototype and pilot?
- What are architecturally significant design decisions that might require additional analysis?

#### Knowledge <knows how to apply it>

- What are the typical phases in architecture analysis process?
- Compare and contrast two evaluation methods of your choice (SAAM, ATAM, ARID, ALMA, SBAR, PBA...)
- After identifying wrong design choices, how can you mitigate that risk?
- How do you perform design analysis and validation on highly agile project?

#### Experience <has applied it>

- What was the chosen assessment method you used to assess the entire system design?
- How did you budget for design analysis and how did you explain/defend it in front of the sponsor?
- What new patterns did you discover and document through design analysis?
- What were the triggers that motivated you to perform design validation?

## 34. Traceability throughout the Lifecycle

Traceability is the process of documenting the life of a business concern and providing bi-directional traceability to the capability or capabilities associated with that concern.

The purpose of having traceability is to facilitate an understanding of the solution under development and to provide the ability to prioritize and manage change.

Architects must be able to provide traceability from initial requirements through to the sustained system and describe the vital role of traceability throughout the lifecycle of developed products. Architects should have mastery in the use of associated techniques and tools, and demonstrate competence in highest priority techniques.

### Expectations

- Can describe how they manage traceability through a project
- Can describe how they track business value of project deliverables
- Can describe how they try priority tradeoffs to business impact

Element	Description
<b>Traceability Management</b>	The processes and techniques to describe and follow the life of an artifact from its origins, through its development and specification, to its subsequent deployment and use, and through periods of ongoing refinement and iterations.
<b>Description of Vision-to-Feature Traceability</b>	Documentation, visualization and description techniques that help define, utilize, reuse, and re-engineer existing, current, and future elements of architecture in a structured and traceable way.
<b>Verification and Validation</b>	The process of checking that a product, service, or system meets specifications and that it fulfills its intended purpose.

### Awareness <knows what it is>

- When is traceability required?
- What is a trace model?
- What is the difference between verification and validation?
- Name some industries/segments/areas where traceability is of utmost importance.

### Knowledge <knows how to apply it>

- Explain traceability reference models.
- How can you trace a specific system component back to the project (or company) vision statement?
- How do you track the business value of architectural artifacts?
- When untraceable artifact is caught, what is the process of its integration?

### Experience <has applied it>

- How did you prove to the stakeholder that the objected functionality was their own requirement?
- What validation process did you follow to assure the adherence to requirements?
- What role in the organization was most interested in traceability and why?
- How did you balance the demand for rapid iterative development and traceability requirement?

## 35. Views & Viewpoints

A view is a representation of one or more structural aspects of an architecture that illustrates how the architecture addresses one or more concerns held by one or more of its stakeholders.

A viewpoint is a collection of patterns, templates, and conventions for constructing one type of view. It defines the stakeholders whose concerns are reflected in the viewpoint and the guidelines, principles, and template models for constructing its views.

An example would be to use an operational viewpoint to create a view targeted at the Help Desk manager. The viewpoint is the template that contains information relevant to the operations of the system, and a view is the end product delivered to someone interested in maintaining the operations.

IT architects must have the ability to compare/contrast concept of views, viewpoints, and perspectives, differences between them and how they work together to describe an architecture. They must be able to discern various stakeholder groups typical of IT development projects, describing the typical viewpoint of each group, and determine the set of views needed to satisfy project requirements.

### Expectations

- Can articulate the difference between a view and a viewpoint
- Can describe 2-3 views they use regularly
- Can create views that provide value

Element	Description
<b>Viewpoints Management</b>	Processes that manage viewpoints (or schemas) for re-use and leverage, capturing construction and usage of views, the information needed, modeling techniques that can be used and a rationale for these choices.
<b>Application of given View Model</b>	Usage of most appropriate representations of the overall architecture in terms meaningful to targeted stakeholders, so architecture can be communicated, understood and verified.
<b>Perspectives, Schemas, Models and Descriptions</b>	Management of the structure and meta-models that describe how and with what the architecture will be described in the most structured way.

### Awareness <knows what it is>

- Describe some common viewpoints that are used most often.
- What are the common tools used to capture and organize views and viewpoints?
- Is a User story in Agile development a view or a viewpoint (or neither)? Why?
- What language or description is used to depict the view?

### Knowledge <knows how to apply it>

- Describe relationships between stakeholders, concerns, views and viewpoints.
- How do you validate that the view is actionable, correct and complete?
- How does Archimate classify Enterprise Architecture viewpoints?
- How do you expose trade-offs and conflicting concerns in a given view?

### Experience <has applied it>

- What were the top three concerns of business stakeholders that you addressed through that viewpoint?
- What new schemas (viewpoints) did you create/improve that are now leveraged on other projects?
- What 5 viewpoints did you have to use if you adhered to ISO standardized RM-ODP?
- What viewpoint did you use to assure the integrity of your architecture?

## 36. Whole Systems Design

Whole system design is:

- The "whole system" of interconnected elements that participate in, impact, and influence the design process, including the nature and rich tradition of design theory and practice, relevancy of understanding design as a discipline.
- The systems sciences, systems theory, and systems thinking; developing “whole systems” perspective and its importance to architects, including recognizing and addressing complex systemic problems and architecture praxis.
- Modeling as essential design action, modeling tools, and business patterns, including the importance of context and the architect’s role in the creation of a design culture.
- Design judgment and the construction of meaning, including work redesign, industry perspectives, and the increasing importance of architectural influence on design.

### Expectations

- Can provide broader vision of environment their projects operate in
- Can discuss how they have leveraged existing services
- Can discuss how knowing about the whole environment has impacted their project

Element	Description
<b>Integrative view of Architecture</b>	The systems sciences, systems theory, and systems thinking; developing “whole systems” perspective and its importance to architects, including recognizing and addressing complex systemic problems.
<b>Synthesis of Systems, Network and Services Design</b>	The "whole system" of interconnected elements that participate in, impact, and influence the design process, including the nature and rich tradition of design theory and practice, relevancy of understanding design as a discipline.
<b>Design Evaluation, Redesign and Decoupling</b>	Design judgment and the construction of meaning, including work redesign, industry perspectives, and the increasing importance of architectural influence on design.

### Awareness <knows what it is>

- What are the frameworks that support the whole systems design?
- What contextual elements should be considered in the whole systems design?
- How do you validate that the given perspective includes the whole system and not just parts of it?
- What elements of organization’s IT environment would you need to understand to gain holistic architectural perspective?

### Knowledge <knows how to apply it>

- How simple should the architecture be? When is it too simple and why?
- What approach would you use to improve poor overall design efficiency?
- What non-measurable factors do you have to take into account when designing the system?
- What are the anticipated complications of ‘brown field’ architectural solutions?

### Experience <has applied it>

- Can you give some examples of holistic standards that you developed as part of the project?
- How did you balance the short-term and long-term perspectives of your design?
- What actions did you take to ensure designs were effective for the entire impacted systems?
- What is the largest scope of concern that you were able to influence through architecture?

## 37. Managing the Culture

Demonstrated understanding of the impact of human culture upon organizations and basic culture recognition and management techniques. Organizational politics unique to the architect's context, the role of culture change agent, and reviews primary culture change techniques and strategies.

### Expectations

- Can describe how they determine what the culture is
- Can describe how they mitigate or leverage internal culture to deliver on a project
- Can describe the tools they employed in challenging cultural situations

Element	Description
<b>Organizational Agility</b>	The ability to understand and interpret how organization works and functions, and the awareness of organizational implications or issues that must be dealt with to achieve an intended outcome.
<b>Consultancy and Advisory</b>	The provision of advice, assistance, and guidance in any area associated with the planning, procurement, provision, delivery, management, maintenance or effective use of information technology.
<b>Accountability</b>	Practice of requiring individuals to adhere to defined standards of performance and quality using clear, performance-based feedback.

### Awareness <knows what it is>

- What is organizational politics?
- Explain some cultural differences and how they apply to architecture.
- How do you build high-performing team?
- What are the traits of a trusted advisor?

### Knowledge <knows how to apply it>

- How do you deal with blame?
- How do you improve team performance?
- How do you put yourself in the position to end the tough conversation?
- Compare a boutique consultancy and a body shop.

### Experience <has applied it>

- What did you do the last time the client yelled at you?
- How did you successfully deliver bad news?
- How did you bridge the cultural gap on outsourced project?
- How did you know that you were considered a trusted advisor?

## 38. Customer Relations

Demonstrated understanding of the psychological dynamics of customer management, and discusses business imperatives, modern techniques and tools for customer relationship management, industry engagement, contractual agreements, transparency and accountability, and related issues. Demonstrate competence in managing high-risk scenarios.

### Expectations

- Can describe their approach to building customer relationships on a project
- Can describe how they would manage various situations (upset customer, two competing stakeholders, contractual negotiations, etc)
- Can describe the highest risk project they successfully delivered

Element	Description
<b>Stakeholder Relationship Management</b>	The coordination of relationships with and between key stakeholders, during the design, management and implementation of business change.
<b>Selling and Sales Support</b>	The identification of sales prospects and their qualification, the development of customer interest and the preparation (including managing the bid process), execution and monitoring of the sale of any IT or related product or service.
<b>Account Management</b>	The coordination of marketing, advisory, selling and delivery activities to internal or external organizations to achieve satisfaction for the customer and an acceptable business return for the supplier.

### Awareness <knows what it is>

- What is a role of an Architect in customer's sales cycle?
- What is a proposal and what are the core elements it should include?
- What is marketing and why is it relevant to an Architect?
- What do you do when stakeholders have conflicting expectations?

### Knowledge <knows how to apply it>

- How do you identify true stakeholders on a new project?
- Are you an advocate of your client or paid resource of your employer?
- How do you deal with disgruntled, upset or betrayed customer?
- What are some promises you legally can't (or shouldn't) make to a customer?

### Experience <has applied it>

- Who was your counterpart on the customer side and what was the relationship like?
- Are you facing any ethical dilemmas with your client?
- What did you do to gain access to your chief stakeholder?
- How did you turn a stalled customer relationship into a mutual success?

## 39. Leadership and Management

Differentiate between leadership, management, and administration. Demonstrated understanding of how to assess one's personal leadership skills and evaluate the leadership attributes of others, and ability to form a personal leadership growth plan. Ability to discuss the unique challenges of leading and managing in a technical environment, understand basic management theory, techniques, and tools, and be able to apply them within the context of the lifecycle of IT products and services.

### Expectations

- Can articulate the difference between leadership and management
- Can describe their approach to leading or managing during projects they documented
- Can describe a leadership or management style or technique that they practice

Element	Description
<b>Organization Design and Implementation</b>	The design and implementation of an organization structure, role profiles, culture, performance measurements, to facilitate strategies for change and for training to enable the change.
<b>Resource Management</b>	The efficient and effective deployment for an organization's resources when they are needed, such as financial resources, inventory, human skills, production resources, or information technology.
<b>Developing Leaders</b>	The practice of ensuring that leadership is actively cultivated and developed by identifying future leadership talent, making their development a key priority and providing individuals who show leadership potential with opportunities to expand their skills and experiences.

### Awareness <knows what it is>

- What are responsibilities of managers and leaders in your organization?
- What are the different personality styles you may encounter?
- What are some management styles you know about and practice?
- How do you identify strong leadership potentials?

### Knowledge <knows how to apply it>

- What is the difference between a manager and a leader?
- Explain your preferred model of personality profiling.
- Why is high churn of workforce a problem?
- How do you help/mentor your co-workers?

### Experience <has applied it>

- How did you rescue a failed project?
- How did you demonstrate that everything is under control?
- What problems keep you up at night?
- What was your worst leadership decision and what would you do instead?



## 40. Peer Interaction

Demonstrated understanding of the psychology of interpersonal human interactions and their importance in the context of IT products and services design and delivery.

### Expectations

- Can describe how they manage stakeholder interactions
- Can describe how they manage interactions with technologists

Element	Description
Interpersonal Skills	Mental and communicative algorithms applied during social communications and interaction to reach certain effects or results.
Professional Development	The facilitation of the professional development of IT practitioners, including initiation, monitoring, review and validation of individual training and development plans.
Coaching and Mentoring	A process for the informal transmission of knowledge, social capital, and the psychosocial support as relevant to work, career, or professional development.

### Awareness <knows what it is>

- What is a well-balanced development plan of an Architect?
- How do you deal with over-inflated egos, especially if they are invaluable stars in the team?
- What are different styles of mentoring?
- When should someone consider to get a mentee (to be a mentor)?

### Knowledge <knows how to apply it>

- Do you understand your impact on others around you?
- What feedback do you usually get from your peers?
- How do you help your mentees grow?
- How do you help quiet and introvert peers to equally participate?

### Experience <has applied it>

- How do others perceive you in the team?
- What advice would you give to an aspiring architect?
- Who can take over your work if you exit the project?
- What would your mentees tell us about you?

## 41. Collaboration and Negotiation

Demonstrated application of communications theory and the specific collaboration and negotiation skills essential to effective functioning as an architect. Understanding of the psychology of human collaboration, networking, as well as strategies and methods for working together and reaching agreement.

### Expectations

- Can describe how they manage difficult peer interactions
- Can describe how they manage collaborative environments
- Can describe successful approaches they have used for negotiating

Element	Description
<b>Negotiation and Conflict Management</b>	A dialogue intended to resolve disputes, to produce an agreement upon courses of action, to bargain for individual or collective advantage, or to craft outcomes to satisfy various interests.
<b>Collaboration, Cooperation and Coordination</b>	A collection of processes where two or more parties work together to realize shared goals or endeavors, by sharing knowledge, effort and building consensus.
<b>Recruitment and Staffing</b>	The process of attracting, screening, and selecting qualified people for a job at an organization or firm. Also includes the remuneration, commission, compensation and fringe benefits negotiations.

### Awareness <knows what it is>

- Compare collaboration and cooperation.
- Name some negotiation techniques.
- What are some best practices for collaboration between two companies?
- What are the main attractors for new recruits?

### Knowledge <knows how to apply it>

- How do you help stakeholders to reach a shared vision?
- How do you move the negotiation process out from the stand-still phase?
- You mentioned competition – what is that and when does it occur?
- How do you screen hiring candidates?

### Experience <has applied it>

- What compromise did you negotiate with the Enterprise Architecture group?
- When someone didn't cooperate with the project direction, what did you do?
- Tell us about your toughest negotiation you remember.
- What was your input in selecting and screening the new manager in your organization?

## 42. Presentation Skills

Describe steps taken and fundamental techniques used to improve presentation skills. The focus is on presentations made to key stakeholders clearly identifying technology strategy decisions and opportunities.

### Expectations

- Can show presentations they have delivered for different audiences on the projects they documented
- Can describe how they manage written and verbal presentations on the projects they documented

Element	Description
<b>Public Speaking</b>	The process of speaking to a group of people in a structured, deliberate manner intended to inform, influence, or entertain the listeners
<b>Information Visualization</b>	Graphic visual representations of information, data or knowledge in order to present complex information quickly and clearly.
<b>Presentation Punctuality and Coherence</b>	Characteristic of being able to communicate a message in a previously-designated time, with systematic or logical consistency that relates to the topic, audience and medium.

### Awareness <knows what it is>

- Explain five basic elements of public speaking (who, what, to whom, using what medium, with what effect).
- What is the function of vocabulary, pitch, tempo and choice of words when addressing the audience?
- What are some major differences in presentation techniques when using videoconferencing technology?
- Compare presentations to one person, small group and large audiences.

### Knowledge <knows how to apply it>

- What is the common language among architects?
- What is the preparation process you use to create, refine and deliver a presentation?
- How do you use humor to change the emotions of your listeners?
- How do you know that you are telling your audience what it wants/needs to hear?

### Experience <has applied it>

- You just used complex intangible engineering phrase. Rephrase for a lay man please?
- Name some topics that you presented to larger audiences in last 12 months.
- How did you build a relationship with the tough technical audience?
- Tell us about your worst public speaking debacle. What went wrong and how you'd fix it today?

## 43. Writing Skills

Understand and demonstrate competence in writing skills necessary to function as an architect and to enhance the growth potential of one's career. Techniques, methods, and examples for book writing, informal composition, memos and e-mail, note taking and technical documentation.

### Expectations

- Can show examples of documents they have produced
- Can show examples of templates they use on projects
- Has a stance of value of maintaining documentation

Element	Description
<b>Content authoring</b>	The planning, design and creation of textual information, supported where necessary by graphical content. This skill includes managing the quality assurance and authoring processes.
<b>Clarity and Simplicity</b>	Ability to write lucid, clear, concise and easy-to-understand sentences without unnecessary clutter and distractions from the expressed idea.
<b>Brevity and Humanity</b>	The practice of conciseness in writing; to use few words to convey the desired message, in a tone, cadence and style that reflects author's personality and intent.

### Awareness <knows what it is>

- What are some methods to improve quality and consistency of written documentation?
- What are architecturally significant documents?
- What does it mean that the document is confidential, internal or sensitive?
- What is the difference between proofreading, editing and formatting?

### Knowledge <knows how to apply it>

- What documents did you author on your own recently?
- Where should you place a conceptual diagram in your documentation?
- How do you programmatically improve writing skills?
- What is a job of technical writer? What are the key skills of technical writing profession?

### Experience <has applied it>

- Who wrote your documentation: you as a Project manager, Business Analyst, or as an Architect?
- What documents did you create and provide to the Enterprise Architect?
- Do you think it was necessary to write 900-pages of system documentation? Did anyone read it all?
- How did you convert your design specification into white paper and user guide?

## 44. Balancing and Optimizing Quality Attributes

Demonstrated management/mitigation of specific issues relative to balancing and optimizing in systems development projects. Application of basic strategies and tactics necessary to provide optimal performance, user experience and return on investment from IT projects.

### Expectations

- Can describe the approach they used to making tradeoffs between quality attributes
- Can describe how they justify their tradeoff decisions
- Can describe differences between tuning an individual application and a product family

Element	Description
Tradeoff Decision Process	Cognitive process resulting in the selection of a course of action among several alternatives in order to achieve the most optimal tradeoffs and well-balanced selected alternative.
Systems Integration and Tuning	The incremental and logical integration and testing of components and/or subsystems in order to create well-balanced operational services.
Human Factors Integration	Achievement of optimum balance of product or service quality attributes, by ensuring that project and enterprise activities take account of all relevant human factors.

### Awareness <knows what it is>

- What is a proper name for non-functional requirements?
- Name some conflicting quality attribute pairs.
- What are the common four core groupings of quality attributes?
- What is the ultimate design goal of tuning and balancing?

### Knowledge <knows how to apply it>

- Explain measurements and dynamics between quality attributes.
- You want to build something secure and responsive and cheap. How do you do that?
- What does it mean to have an optimal and balanced system?
- What are some characteristics in ISO/IEC 9126-1 standard (Evaluation of Software Quality)?

### Experience <has applied it>

- What non-functional requirements did you gather and how?
- What balancing constraints did you have when you analyzed the tradeoffs?
- How did you explain to the stakeholders that their requests are excessive and not balanced?
- How did you balance tuning of your component with the tuning of complete system?

## 45. Manageability, Maintainability, Supportability, Extensibility, and Flexibility

Demonstrated management/mitigation of issues relative to manageability, maintainability, supportability, extensibility, and flexibility.

Demonstrated competence in implementation techniques.

### Expectations

- Can describe how they manage supporting, detracting pairs of quality attributes to determine impact of tradeoffs

Element	Description
<b>Configuration Management</b>	Field of IT management that focuses on establishing and maintaining consistency of a system's or product's performance and its functional and physical attributes with its requirements, design, and operational information throughout its life.
<b>Operations Change Management</b>	Raising and recording of changes, assessing the impact, cost, benefit and risk of proposed changes, developing business justification and obtaining approval, managing and coordinating change implementation, monitoring and reporting on implementation, reviewing and closing change requests.
<b>System Software Maintenance</b>	Processes that lead to requests for modification of a software product after delivery to correct faults, to improve performance or other attributes.
<b>Database Administration</b>	The installation, configuration, upgrade, administration, monitoring and maintenance of database engines.

### Awareness <knows what it is>

- How do you measure testability? Supportability? Understandability?
- Whose responsibility is that development-related attributes are considered during the design phase?
- How should you balance extensibility with the need to deliver on time and budget?
- What are the side effects of poorly designed development-related quality attributes?

### Knowledge <knows how to apply it>

- Where do you draw the line between extensibility and additional cost?
- What is considered a well-maintained system?
- Quantify the value of flexibility/extensibility attributes.
- What is the difference between customization and personalization?

### Experience <has applied it>

- What was your “design for operations” strategy?
- What specification for maintainability did you follow to claim that the system was easy to maintain?
- Was your solution flexible or extensible – or both? Explain.
- When Operations rejected the hand-over due to poor manageability, what were your options?

## 46. Monitoring and Management

Demonstrated understanding of specific quality management imperatives, techniques and tools.

Demonstrated proficiency in problem analysis, capacity planning, service level agreement (SLA) creation and management, and issue response techniques.

### Expectations

- Can describe how they integrate into existing environment
- Can describe their approach to introducing techniques where no techniques are used

Element	Description
<b>Service Level Management</b>	The planning, implementation, control, review and audit of service provision, to meet customer business requirements, including negotiation, implementation and monitoring of service level agreements, and the ongoing management of operational facilities to provide the agreed levels of service.
<b>Service Desk and Incident Management</b>	Processes that focus on capturing and recording perceived incidents and ensuring a prompt recovery of the system through supervising and directing the internal or external resources.
<b>Problem Management</b>	The resolution of problems throughout the information system lifecycle, including classification, prioritization and initiation of action, documentation of root causes and implementation of remedies.

### Awareness <knows what it is>

- What are the basic tools and techniques to monitor production systems?
- What is the difference between SLA and OLA?
- What is the difference between problem management and incident management?
- What is the measurement of problem management?

### Knowledge <knows how to apply it>

- How does monitoring and management work in the outsourced environment?
- Who monitors and manages SaaS/PaaS/IaaS solutions?
- Explain the concepts behind efficient monitoring.
- What are some assets that must be monitored? (configuration, performance, data access)

### Experience <has applied it>

- How did you design for upgrades, patching and instrumentation?
- Did you monitor for configuration changes of designed system?
- How were you able to monitor flooding call originators that choked your web services?
- You used Facebook and Twitter as part of your solution? How did you monitor and manage their outages?

## 47. Performance, Reliability, Availability, Scalability

Demonstrated management/mitigation of issues relating to performance, reliability, availability, and scalability. Demonstrated understanding of quality attributes such as portability and efficiency and competence in implementation techniques.

### Expectations

- Can describe core HADR (High Availability, Disaster Recovery) principles
- Understands BCP (Business Continuity Planning)
- Can plan the adequate initial capacity with sound growth ability
- Can describe performance requirements and different methods to achieve them

Element	Description
<b>Availability Management</b>	The definition, analysis, planning, measurement and improvement of all aspects of the availability of IT services. The overall control and management of service availability to ensure that the level of service delivered in all services is matched to or exceeds the current and future agreed needs of the business.
<b>Capacity Management</b>	The management of the capability, functionality and sustainability of service components (including hardware, software and network) to meet current and forecast needs in a cost effective manner. This includes dealing with both long-term changes and short-term variations in the level of demand.
<b>Continuity Management</b>	The provision of service continuity planning and support, including the identification of information systems which support critical business processes, the assessment of risks to those systems' availability, integrity and confidentiality.
<b>Performance Management</b>	Activities and processes to ensure that planned performance goals are consistently being met in an effective and efficient manner.

### Awareness <knows what it is>

- How much downtime can you afford with 99.9% availability (in minutes)?
- What is high availability?
- How do you plan for unpredictable capacity growth?
- What are some HADR concepts and principles?

### Knowledge <knows how to apply it>

- How do you measure scalability (as opposed to load)?
- What is the link between maintenance window and availability?
- How does a recoverability plan look like?
- How do you plan for the right capacity?

### Experience <has applied it>

- Did you design for de-centralization and what were some drawbacks/benefits of this decision?
- You mentioned you needed “pretty quick” performance. How quick exactly?
- What was your availability target and how did you know you reached it?
- Did you plan to scale up or out?



## 48. Security

Demonstrated understanding of security, privacy, authenticity, access privileges, information protection and disaster recovery, asset management techniques, threat modeling and recovery, and related issues. Demonstrated competence in basic implementation techniques.

### Expectations

- Can describe how they maintain their knowledge of current security trends
- Can describe how they ensure security for their projects

Element	Description
<b>Information Security</b>	The selection, design, justification, implementation and operation of information security controls and management strategies to maintain the confidentiality, integrity, availability, accountability and relevant compliance of information systems.
<b>Infrastructure Security</b>	The management of security controls to protect infrastructure from terrorism, sabotage, information warfare and natural disasters.
<b>Security Administration</b>	The authorization and monitoring of access to IT facilities or infrastructure in accordance with established organizational policy. Includes investigation of unauthorized access, compliance with relevant legislation and other administrative duties relating to security management.
<b>Safety Assessment</b>	The assessment of safety-related software systems to determine compliance with standards and required levels of safety integrity, including the suitability of design, testing, and validation and verification methods, as well as the identification and evaluation of risks and the means by which they can be reduced.

### Awareness <knows what it is>

- What is STRIDE acronym in threat modeling?
- Why is non-repudiation a security concern?
- What is Defense in Depth concept?
- When would an IT system be considered unsafe?

### Knowledge <knows how to apply it>

- How do you protect data-at-rest vs. data-in-transit?
- How do you balance the C-I-A triad for an internet-facing system?
- How do you mitigate the concerns about privacy of data?
- How does SSL work? Is the encryption symmetric or asymmetric?

### Experience <has applied it>

- Was privacy act relevant for security aspect of your architectural decisions?.
- Who did security validation and how did you assist?
- What control did you put in place to catch DoS attack on your service?
- You used DREAD model - what does the A in DREAD stand for?

## 49. Usability, Localization, Accessibility, Personalization/Customizability

Demonstrated understanding of usability and human factors fundamentals. Ability to describe related internationalization strategies and current issues. Demonstrated competence in implementation techniques.

### Expectations

- Can describe how they manage supporting, detracting pairs of quality attributes to determine impact of tradeoffs

Element	Description
<b>Internationalization and Localization</b>	Internationalization is the process of designing a software application so that it can be adapted to various languages and regions without engineering changes. Localization is the process of adapting internationalized software for a specific region or language by adding locale-specific components and translating text.
<b>Usability Evaluation and Impact</b>	Formal assessment of the usability (including health and safety, and accessibility) of new or existing products or services (including prototypes). Methods include user trials, expert review, survey, and analysis.
<b>Systems Ergonomics</b>	The iterative development of the allocation of function, user interaction and job design. The optimization of accessibility and usability, based on user requirements, the context of use, relevant ergonomics knowledge and feedback from evaluations of prototypes.

### Awareness <knows what it is>

- What is the difference between localization and internationalization?
- On what projects is accessibility particularly important?
- What are common techniques to increase discoverability and learnability?
- What is an output from usability study and how can it help an architect?

### Knowledge <knows how to apply it>

- How do you design for usability? Are there some specific techniques or principles?
- How does personalization work for mobile/search/social solutions?
- How should the solution help users recover from errors?
- What standards can you use for usability design and evaluation? (ISO/TR 16982:2002, ISO 9241)

### Experience <has applied it>

- You said that the solution was 'user-friendly'. What exactly does this mean?
- How did your solution allow users to personalize it to their needs?
- How was the decision to support only one browser justified from accessibility perspective?
- If you'd have a chance to redesign your solution today, what would you change to improve its usability?

## 50. Packaging, Delivery, Post Deployment

Demonstrated understanding of the expectations, process and management of IT products following the completion of development and prior to “normal” day-to-day operating conditions.

Techniques used and preferred for data conversion management, deployment strategies, documentation and training, user acceptance testing, and installation and maintenance planning.

Demonstrated competence in highest-priority management techniques.

### Expectations

- Can describe their approach to packaging and delivery
- Can describe how they modify the approaches they use to meet the needs of specific projects
- Can describe how the reach operating status for a project and what support they typically provide for end users training, helpdesk, operations organization

Element	Description
<b>Systems Installation and Decommissioning</b>	The installation, testing, implementation or decommissioning and removal of hardware and appropriate software, following plans and instructions and in accordance with agreed standards.
<b>Release Management</b>	The management of the processes, systems and functions to package, build, test and deploy changes and into the production environment establishing or continuing the specified Service, to enable controlled and effective handover to Operations.

### Awareness <knows what it is>

- Why is unattended deployment of a solution so important?
- Why can application decommissioning/retirement deliver significant cost savings?
- Name some installation software you are familiar with.
- Name some issues with targeting and deployment to mobile platforms.

### Knowledge <knows how to apply it>

- What are current trends in application distribution, delivery and deployment?
- Describe a guardrail, best practice or standard relevant for application packaging.
- What is the Release Role responsibility in MOF?
- How do you deploy an application to a given PaaS platform?

### Experience <has applied it>

- When your solution retires in 10 years, how did you envision data access for reporting and regulatory compliance needs?
- How much re-packaging would your solution require to make its installation SaaS-ready?
- How did you assure transactional installation, so administrator could roll it back completely if requested?
- Who and when updated the CMDB with the new information?