1. An audit of the QA system in a client company, outline and discuss the key elements of the audit | Explain the QA precautionary actions you may take if some aspects of the audit are not to ISO9001 standards

Information Systems are integral to a client company. Key business processes are enabled using information systems. The purpose of IS audit is to **review and provide feedback, assurances and suggestions.**

IT audit is "The process of collecting and evaluating evidence to determine whether a computer system (IS) **safeguard assets**, **maintains data integrity**, **achieves organizational goals** and **effectively** and **consumes resources efficiently**".

Thus, the main action is to identify problem or issue, set criteria and standards, observe practice and data collection, compare performance with criteria and standards, implementing change.

3 key areas of concerns that IS audits need to address:

Availability - Available for the business at all times, protected against all types of losses and disasters.

Confidentiality (Security) - The information in the system will be disclosed only to those who need it

Integrity - The information provided in the system always be accurate, reliable and timely and Ensures that no unauthorized modifications

Why is an IS Audit?

Corporate governance / regulatory requirement / asset owner request / operations review

Scope of an IS audit?

(1) Physical and environmental review—this includes physical security, power supply, air conditioning, humidity control and other environmental factors.

(2) System Administration review – this includes security review of the operating systems, database management systems, all system administration procedures and compliance.

(3) Application software review – the business application could be payroll, invoicing, a web-based customer order processing system or an enterprise resource planning system that actually runs the business

(4) Network Security review – Review of internal and external connections to the system, perimeter security, firewall review, router access control lists, port scanning and instruction detection are some typical areas of coverage.

(5) Business continuity review – this includes existence and maintenance of fault tolerant and redundant hardware, backup procedures and storage, and documented and tested disaster recovery/business continuity plan.

(6) Data Integrity review – the purpose of this is scrutiny of live data to verify adequacy of controls and impact of weaknesses, as noticed from any of the above reviews. Such substantive testing can be done using generalized audit software (computer assisted audit techniques)

An audit may vary in how much is covered. It could **depend on the client** sometimes. It is important to cover all the elements, but do not need to

be done in one assignment.

Risk based approach is a useful approach where cost prevents auditing all aspects of a system. Order priorities on basis of risk. Risk can affect each system differently

If the restaurant booking system or online banking crushed, these companies will be lost money seriously but if this happened in the company blog or hair salon booking system, it may just have few effects.

(1) Conduct an inventory of IS and categories them

(2) Identify the critical functions

(3) Assess the risks and rating them

(4) Rank system and decide audit plan (priority, resource, schedule)

Audit Process:

Preparation / Formal kick off / Audit in progress / Formal findings presentation (report) / Follow up on corrective Actions / Extra (Certification)

QA (Quality assurance) systems emphasize catching defects before they get into the final product. It is a proven management concept which avoids mistakes and defects to keep do things right in the first time and continuous improvement.

Implementing quality systems require integrity ethics, training, trust, leadership, teamwork, communication and recognition to be present in an organization.

QA Standards are a set of standards that a company chooses to implement to show to their customers they are committed to delivering quality products and services to their customers.

The international standard ISO 9000 is the most recognized standard used, which guarantees that a company delivers quality products and services ISO 9000 is a series of standards developed and published by International Organization for Standardization (ISO)

Benefits: Companies strive for a total quality system because quality is what the customer demands. / Ensure that products and services provided meet customer requirements. / Ensure consistency in the day to day operations. / Ensure that processes are repeatable and predictable. / Allow the company to create and retain satisfied customers. / Improve the efficiency, reduce operating cost and minimize unproductive time. All of these features are important in having a competitive company. Each industry will have its own ISO 9000 standard. If some aspects of audit are not to standard ISO9001, I will set them as high priority when conduct audit and implement the following steps:

Locate the issues: For example, if one of the application software does not meet the ISO9001, we should understand the conditions, characteristics and functions of the software, and find out reasons why it fails to meet standard, if it is due to technologies, or management, or human issues.

Study the ISO 9001: We should ensure that we have fully understood the nature and scope of the ISO 9001, so that we can find the differences and defects and improve them to meet the standard.

Meeting and discussion: Organize meeting within my audit team to discuss the problems and work out the solutions.

Generate conclusion: Generate the conclusion of the issues formally.

Implementation plan: Provide the implementation plan to my client company, with report about our findings and specific evaluations and suggestions.

3. NZ police case study. Discuss what went wrong in this case study how would you have done things differently? Does Whittakar (1999), "What went wrong? Unsuccessful information technology projects" provide any insights into this particular disaster? (10 marks),

Case review: long period (7 years)

(1) Initial estimate 30.1 Million (3 phases)

(2) Add new user requirements

(3) Change operation systems

(4) 12 months behind, project manager resigns

(5) Cost estimate increased, is 4 times than original estimate

(6) Hardware supplier pulled out

(7) Project cancelled (cost 100 million)

Four major reasons:

1. Incomplete project requirement

2. Unrealistic schedules

3. Insufficient resource planning

4. Poor communications

Triple Constraint:

Scope, Time, Cost

Project management challenges at every stage:

Initial process / plan process / control process / execute process / close process

The aim of the project manager is to have the project completed on time and within budget, at the same time satisfying the quality of work required.

Key planning principle: 4 steps

(1) Determine work breakdown structure

WBS: it is a deliverable-oriented grouping of project elements that organizes and defines the total scope of the project –

Deliverable: a unit of output that can be delivered

Activity: a major work category

Task: a small unit of work that makes up an activity

(2) Estimate amount of effort required

Estimating duration for each activity in the work breakdown structure is a difficult task. It is usually based on previous experience of attempting similar tasks. If a similar project has not previously been attempted, then effort estimation is even more difficult.

(3) Determine dependencies between activities

In order to translate a work breakdown structure into a work schedule we need to determine which activities must be completed before others may begin. Such activities are called predecessors. It is important to identify predecessors completely and accurately, because they determine the duration and flexibility of the whole project. The project manager must have a thorough understanding of the project, such as the nature of each activity.

(4) Devise project schedule

Based on above three steps, we can devise the schedule of the project.

CPM: Critical Path Method

The longest path through the network

Five steps in project estimation:

(1) Determine the size of the project

(2) Determine the effort required

(3) Decide on the resources needed

(4) Calculate the duration

(5) Calculate the cost

How: expert judgement / sum of the parts / estimation by analogy

The article helps a lot on the project plan. It defined and analyzed 3 major reasons that lead to a failed IT project according to a case:

(1) Poor project planning

(2) A week business case

(3) Lack of top management involvement and support

4. You have been asked by your manager at work to develop a proposal for a new IT project idea. Discuss the key elements that he will require for submission to the investment committee to ensure funding is made available, i.e. what resources, technology, timing, budgets, etc. will be required, does "IT projects: a basis for success" from Wateridge (1995) help in this exercise? (10 marks)

IT projects: a basis for success:

This article helps a lot in this exercise. It reminds us that we should focus on the success criteria and have a thorough understanding on it. The success criteria need to be defined clearly, agreed by all parties at the beginning of project.

Criteria list:

• Project achieves purpose

• It meets pre-stated objectives

• It is on specification, on cost and on time

• It provides satisfactory benefit to owner

• It satisfies the needs of both users and project team

5. You are Senior Manager of Change in the "Best IT Company Pty Ltd", you have been asked by your manager to implement a change program using the ADKAR model. Discuss the key aspects of this project and how you would go about it (10 marks).

ADKAR:

Awareness: of the need to change / of the nature of the change

Desire: to support the change / to participate and engage

Knowledge: on how to change / how to implement new skills and behaviors

Ability: to implement the change / to demonstrate performance

Reinforcement: to sustain the change / to build a culture and competence around change

ADKAR model:

• Awareness of the need to change

Why we have to change. We have a different business goal, so we need to convert current strategies, resources or managements. We have to change if we want to have a positive financial performance.

• Awareness of the nature of the change

Make sure everyone knows what exactly the change is, especially the hierarchy. Deeply understand the nature, characteristics, scope, risks, methods and processes of the change.

• Desire to support the change

All staff should agree on the change project. Make sure nobody reject the project.

• Desire to participate and engage

All staff should participate in the project. Make sure they keep moving towards the same and specific goals according to the change project.

• Knowledge on how to change

Make sure we have enough knowledge to complete the change successfully before the implement. We need to establish the specific plan and choose the appropriate methods on how to change effectively and successfully.

• Knowledge on how to implement new skills and behaviors

Change project may require new technologies or new operations of the staff. Prepare on that as well.

• Ability to implement the change

Make sure we have the ability to implement the change project such as human resources, hardware, software, technologies and investment.

• Ability to demonstrate performance

Make sure we have the ability to assess the results or performance. Focus on the process of the change. Judge the performance to adjust the process.

• Reinforcement to sustain the change

Change is a process. Make sure to maintain it.

• Reinforcement to build a culture and competence around change

Complete the process of change and summarize and assess the project.

Change management is the "people side" of a project an important to IT Talent retention and attrition. Compare with project management, it is the people side of how to move from current state to future state. Generally speaking, is where you are today and where you want to be. Despite of the ADKAR model, we still need to take care of the Psychology of change like the senders' mentality and receivers' orientation. Also, not everyone changes at the same pace.

Effectively doing change management has four steps:

(1) Recognizing the changes in the broader business environment

(2) Developing the necessary adjustments for their company's needs

(3) Training their employees on the appropriate changes

(4) Winning the support of the employees with the persuasiveness of the appropriate adjustments

6. **You have been given a project scope for a new ERP system and are required to estimate a project costing. Describe the approach you will**

take, what elements of the project you will need to cost the project, and possible resources required. Does Cook-Davies's (2002) article on "The real success factors on projects" help in this exercise – discuss.

Five steps in project estimation:

(1) Determine the size of the project

(2) Determine the effort required

(3) Decide on the resources needed

(4) Calculate the duration

(5) Calculate the cost

How: expert judgement / sum of the parts / estimation by analogy

Four elements of project estimation:

• Effort: amount of human resource consumed e.g. person-hours

• Resources: human, materials, and equipment

• Duration: time take to complete a task Duration = effort / resource • Cost: budget for completion for a task Cost = resource * rate

Three questions:

What factors lead to a project management success? What factors lead to a successful project?

What factors lead to consistently successful projects?

This article shows answers from more than 70 large organizations, and identifies 12 factors.

7. Describe the possible risks and what you will do to ensure the project is on track and all risks are mitigated, describe what measures you would take to ensure timely delivery of the project. Does the work by Thomas & Fernandez (2008) "Success in IT projects: A matter of definition" help to ensure you can stay on track?

If the project is slipping: Identify cause / Notify management / Plan remedial strategy / Revise budget / Revise project schedule / Communicate the state of affairs. Do the "Identify – Assess – Evaluate – Monitor – Establish" cycle in organizational, regional, system level and keep communication and learning all the time in the process. **Establish the context—Identify the risks – Analyse the risks – Evaluate the risks – Treat the risks, keep "communicate and consult" and "monitor and review" all the time in this process.**

What not to do in this situation

Ignore it / notify management / plan remedial strategy / revise budget / revise project schedule / communicate the state of affairs

Risk management involves

Identifying risks involves determining which risks are likely to affect a project and documenting the characteristics of each.

Assessing risks involves prioritizing risks based on their probability and impact of occurrence.

Planning risk responses involves taking steps to enhance opportunities and reduce threats to meeting project objectives.

Monitoring and controlling risks involve monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project.

Risk management is one of the most important aspects of a project and it can help to deal with uncertainty. 'Risk' is the probability that an uncertain event or condition will negatively impact project performance or success. **Risk management involves: Identifying risks, assessing risks, Planning risk response, Tracking and controlling risks**

Making informed decisions under conditions of uncertainty. The manager must balance the opportunity offered by each action against possible negative consequence of associated risks. Making decisions now, about future possibilities, rather than having to make them in the future. Being active rather than passive.

Possible risks? Time overrun on particular task / staff illness / staff leaving / technical 'hitch' – need for invention / technology failure / late delivery / failure to meet specifications / budget overrun

How to deal with risk? (1) **avoiding risk:** Change the project plan to eliminate the risk or condition. {Use older well-tried software or technology, rather than 'bleeding' edge / Locate power station away from fault line and the coast} (2) **mitigating risk:** Reduce the likelihood an adverse event will occur and reduce impact of adverse event. {Ensure good staff conditions / Employ multiple employees who can cover for each other / Build some slack into the project schedule / Have several projects on the go concurrently / Have disaster recovery plan in place} (3) **transferring risk:** pay a premium to pass the risk to another party like insurance. {Take out insurance / Impose penalties on contractors for late delivery / Outsource critical elements of the project} (4) **sharing risk:** allocating risk to different parties. {Joint ventures / Distributed tasks} (5) **accepting risk:** making a conscious decision to accept the risk and deal with the event if it happens.

PM need to identify the risk level which includes critical risk, high risk, moderate risk and low risk. Consider different level and take different measure.

Success in IT projects: a matter of definition:

The paper suggests that when success criteria are formally defined and then. Measured, IT project outcomes are improved and project resources are better utilized. In addition, it also provides some effective methods for defining and measuring IT project success.

The criteria: project management success, technical success and business success. (1) on-time, on-budget (2) delivery of benefits (3) met business objectives and business continuity (4) sponsor, project team, customer / user and stakeholder satisfaction (5) products or system meet the quality

Success was more than just meeting the requirements detailed in the business case.

Based on this paper, three effective practices were identified: (1) an agreed definition of success, (2) consistent measurement, and (3) the use of results.

Understand the ways to deal with risks:

Example:

• Assess the risk priority; if it's possible then delay the complete time to provide more time to fix the technology problem.

• Call technical supports from third party

• Use outsources to develop new one to instead the failed part or use older technique to

instead old

In many cases it is not cost effective to start by developing a contingency plan, the better response is to allocate a certain amount of resources to mitigate a risk.

Contingency plan could be considered as how deal with the risks. Possible answer:

Crashing the tasks on the critical paths

Use more advanced technology

Stuff overtime working

Outsourcing IT Talent

8. As an IT professional you may be interested in joining the Australian Computer Society, outline the benefits of joining the ACS, what factors will influence you joining this organisation (10 marks)

Obtain recognition / Increase my competitive / Further my career / Access essential knowledge / Network with peers / Uphold the highest standards

9. As an IT project engineer, ethics in your professional is of utmost importance. However, you know that in your company, many of the IT engineers are incorrectly using unauthorised software from a large supplier, would you ignore it this malpractice, or what steps would you and should take? (10 marks)

Ethical behavior is not always easy. Quality control is an essential element of good practice. Supervision must be thorough. Communication between management and line workers is not always easy. It is important to report poor practice. It needs courage

No, as an IT professional I will not ignore this problem. Used unauthorized software is a big issue of ethic. It may be even not legal. For instance, if the IT engineers are widely using unauthorized Microsoft Office, because the document of file is not support by Microsoft, it may even cause the loss of important document.

If I observe a case of criminal or unethical practice:

1. Ensure that such practices are brought to attention of those with appropriate authority 2. Try normal channels initially, if that fails:

• Make objections known promptly

• Focus on issues in tactful low-key manner

• Be accurate, keep formal records

• Seek legal advice

• Check with ACS

Step in dealing with ethical dilemmas:

1. Define the problem

2. Identify the stakeholders

3. Identify practical alternatives

4. Determine measurable impact of each alternative 5. Arrive at a tentative decision

6. Decide how to implement the decision

18. V model

Advantage of v-model:

(1) Simple and easy to use.

(2) Testing activities like planning, test designing happens well before coding. This saves a lot of time. Hence higher chance of success over the waterfall model.

(3) Proactive defect tracking – that is defects are found at early stage.

(4) Avoids the downward flow of the defects.

(5) Works well for small projects where requirements are easily understood.

We are dealing with the large bank merge project, so the most important part of testing is integration testing.

Bank merges test strategy:

How can secure the transfer large amount of client data to new entity

Ensure continuity of business and create positive experiences

Test each small part individually before integrates them

Risk- based approach: analyze each requirement and give them a risk rating, high risks got the high priority

Test NFR(non-functional requirement) early and not wait until all functional requirement Horizontal Integration is an integration method in which a specialized subsystem is dedicated to communication between other subsystems. This allows cutting the number of connections to only one per subsystem which will connect directly to the ESB. The ESB is capable of translating the interface into another interface. This allows cutting the costs of integration and provides extreme flexibility. With systems integrated using this method, it is possible to completely replace one subsystem with another subsystem which provides similar functionality but exports different interfaces, all this completely transparent for the rest of the subsystems.

The only action required is to implement the new interface between the ESB and the new subsystem.finished

Verification:

Check for conformance and consistency with the specification

Process oriented

Static testing, using reviews, inspections, walk-through carried out by programming team

Validation:

Checking that the specification is what the user actually wanted

Product oriented

Dynamic testing using test scripts, scenarios

Sponsor and end users involved in testing

Implications:

Means that testing is considered early in the development life cycle, well before coding

Avoids chaos towards the end of the project

System design is continuously checked

against specifications (verification) and

against user requirements (validation)

Means that the probability that the final product will satisfy the user's needs is much improved

System integration is the process of linking together different computing systems and software applications physically or functionally, to act as a coordinated whole.

Vertical Integration is the process of integrating subsystems according to their functionality by creating functional entities also referred to as silos. The benefit of this method is that the integration is performed quickly and involves only the necessary vendors, therefore, this method is cheaper in the short term. On the other hand, cost-of-ownership can be substantially higher than seen in other methods, since in case of new or enhanced functionality, the only possible way to implement would be by implementing another silo.

Star Integration is a process of integration of the systems where each system is interconnected to each of the remaining subsystems. From the feature perspective, this method often seems preferable, due to the extreme flexibility of the reuse of functionality.

Horizontal Integration is an integration method in which a specialized subsystem is dedicated to communication between other subsystems. This allows cutting the number of connections to only one per subsystem which will connect directly to the ESB. The ESB is capable of translating the interface into another interface. This allows cutting the costs of integration and provides extreme flexibility. With systems integrated using this method,

it is possible to completely replace one subsystem with another subsystem which provides similar functionality but exports different interfaces, all this completely transparent for the rest of the subsystems. The only action required is to implement the new interface between the ESB and the new subsystem.

Question 10.

Steps in problem solving

1. Define problem
2. Gather intelligence
- This involves collecting information about the system
- It may involve constructing a model of the system, which could be concrete or mathematical
3. Consider possible solutions to the problem and evaluate them
4. Choose preferred solution (can depend on objectives)
5. Implement the solution
6. Monitor success or otherwise of chosen solution

Decision Analysis

Decision Analysis provides a framework for analyzing decision problems by:

- Structuring and breaking them down into more manageable parts;
- Explicitly considering the possible alternatives, available information, involved

uncertainties, and relevant preferences;

- Combining these to arrive at optimal or "sufficiently good" decisions.

The DA process usually proceeds by building models and using them to perform various analyses and simulations. Typical modeling techniques include decision trees, influence diagrams, and multi-attribute utility models.

Decision Support Systems

Decision Support Systems are defined as interactive computer-based systems intended to help decision makers utilize data and models in order to identify and solve problems and make decisions.

Their major characteristics are:

- DSS incorporate both data and models;
- They are designed to assist managers in semi-structured or unstructured

decision-making processes;

• DSS support, rather than replace, managerial judgment;

• They are aimed at improving the effectiveness–rather than efficiency–of decisions

Data Warehousing

Data warehouse is a database used for reporting and data analysis. It is a central repository of data which is created by integrating data from one or more disparate sources. Data warehouses store current as well as historical data and are used for creating trending reports for senior management reporting. It can allow end users to perform extensive analysis more efficiently, allows a consolidated view of corporate data, making data quality better, enhanced system performance and simplified data access.

OLAP (online analytical processing) is computer processing that enables a user to easily and selectively extract and view data from different points of view. It can locate the intersection of dimensions and display them.

Question 11.

KPIs should be:

1. Relevant: relate to some important aspect of business

2. Indicative: reflect success or failure of business

3. Measurable: can be expressed quantitatively

4. Predictive: able to predict the future of a particular trend

5. Understood: known relationship to performance

Choose the best KPI for you:

1. cost or schedule performance index (CPI or SPI)

2. customer satisfaction,

3. employee satisfaction,

4. value of new business,

5. net profit before tax,

6. return on investment,

7. comparison of this period with last period

8. net cash flow,

9. expenses as a ratio to revenue,

10. health and safety record,

11. manufacturing capacity and operational efficiency

The dashboard is an easy to read, often single page, real-time user interface, showing a graphical presentation of the current status (snapshot) and historical trends of an organization's Key Performance Indicators (KPIs) to enable instantaneous and informed decisions to be made at a glance.

Benefits of dashboards

(1) Facilitate recognition of problems before they lead to other problems

(2) Offer opportunity for early corrective action

(3) Help avoid: escalating costs / Deteriorating value of benefits / missed deadlines /

Schedule slippages that cannot be corrected

Difficulties encountered with KPIs

• Lack of agreement among stakeholders

• Not understood by stakeholders

• Not trusted by stakeholders

• Can effect team behavior

• Team members believe that they are being spied on by management

Discuss: yes, this article indicates that Information System Development Project (ISDP) failure plays a key role in the long term success of any organization desirous of continuous improvement via evaluation and monitoring of its information systems (IS) development efforts.

Question 16.

The critical path in this project is 1,2,5,7,8,9,11,12. The task number 8 is in the critical path, therefore, if the task number 8 is delayed, the entire project schedule will be delayed.

The first option to bring the project back onto schedule is crashing. Crashing is a technique for making cost and schedule trade-offs to obtain the greatest amount of schedule compression for the least incremental cost. The main advantage of crashing is shortening the time it takes to finish a project. The main disadvantage of crashing is that it often increases total project costs.

The second option to bring the project back onto schedule is fast tracking. Fast tracking involves doing activities in parallel that you would normally do in sequence. The main advantage of fast tracking, like crashing, is that it can shorten the time it takes to finish a project. The main disadvantage of fast tracking is that it can end up lengthening the project schedule since starting some tasks too soon often increases project risk and results in rework.

Question 19.

This question mainly examines the communication and team work of the project.

If I was a project direct and found such problem. The first and very important thing is to find out the cause of the problem. According to the question, the engineer is bad at time management. So, it is very important to help him make a time schedule for his tasks and also talks to him about the importance of his task.

Question 15 and Question 20.

Why is software testing so difficult?

Testing tends to be largely an informal task

Testing can never guarantee to find all errors …

… because there can never be a 'enough' test cases for testing to be said to be 'complete'

Testing is expensive, takes a lot of time and is very tedious

Programmers often fail to find errors in programs that they have written

Essential attributes:

Correct: behaves according to the functional requirements;

produces the right result for any given set of inputs

Reliable: behaves as expected on every occasion;

over any period of time

Robust: behaves in a predictable and controllable fashion even if the input not valid;

a program may be correct but not robust

Quality attributes:

Useful: accomplishes something the user needs;

output can be input to another program

Usable: 'intuitive', i.e. can use without having to be shown how;

minimum input by the user;

usability depends on the interface;

compare terms 'user friendly' and 'ease of use';

Maintainable: easily modified for new requirements

Efficient: requires minimum time and resource

Scalable: will continue to behave in an acceptable manner as size or volume of input is increased;

scalability can depend on efficiency

Experience / Ability to constantly learn / Professional skill

Testing during development

Component testing is also known as module and program testing. It finds the defects in the module and verifies the functioning of software. It is used to ensure that each component behaves correctly and uses white-box testing to check each program function fully.

Integration testing is the phase in software testing in which individual software modules are combined and tested as a group. It is used to test interaction between related components and focuses on interfaces between components.

System testing is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. It is used to ensure that the user requirements have been met and focuses on usual business processes, and normal workflow.

Implementation Testing:

Performance testing is in general testing performed to determine how a system performs in terms of responsiveness and stability under a particular workload. It is used to test system performance under maximum expected load and simulates key processes under maximum load.

Soak testing involves testing a system with a significant load extended over a significant period of time, to discover how the system behaves under sustained use. It is used to ensure that system is stable over extended period.

Stress testing (sometimes called torture testing) is a form of deliberately intense or thorough testing used to determine the stability of a given system or entity. It is used to checks effects of over-load.

Acceptance testing is a test conducted to determine if the requirements of a specification or contract are met. It is used to compare system functionality against agreed-on user requirements and carried out by client using scenarios, supervised by developer.