

INFO5990: Professional Practice in IT

Week 6: Quality Assurance

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“Quality means doing it right when no one is looking.”

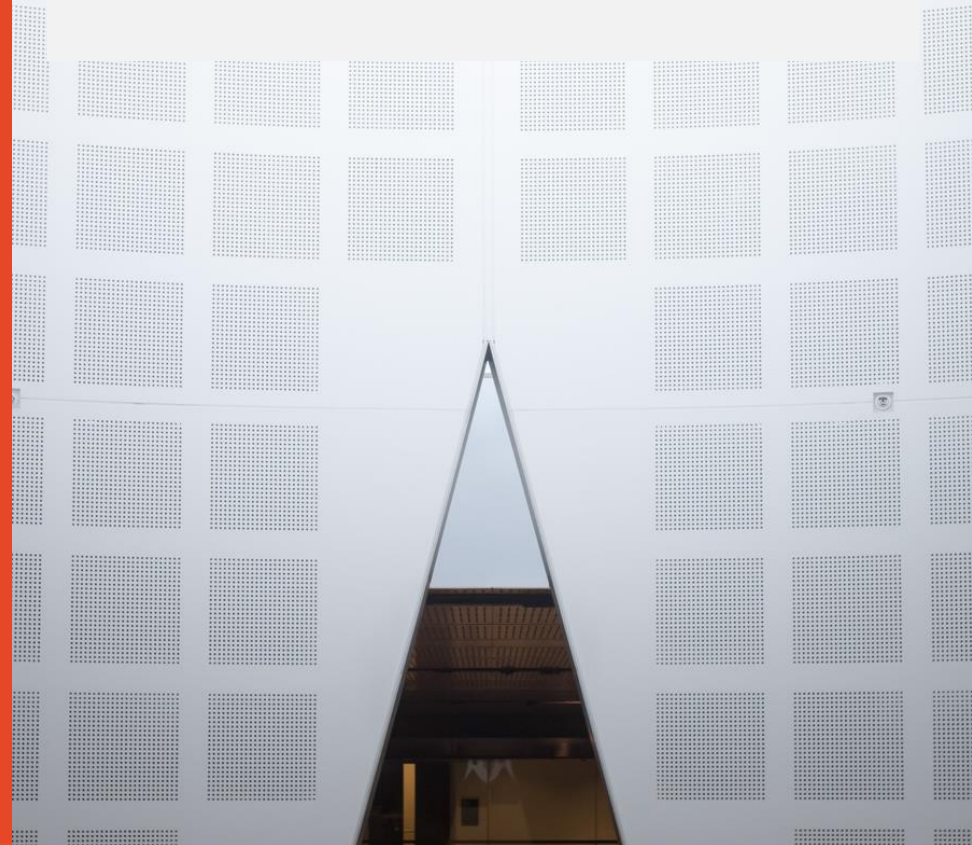
Henry Ford

“Quality is everyone’s responsibility.”

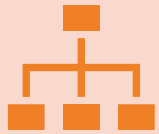
W. Edwards Deming

“Quality is not an act. It is a habit.”

Aristotle



Today...



Project Quality Assurance - Concepts

How do you measure the
quality of a project?

How do you ensure the
quality of a project?



Guest Presenter: Thomson Lee

Quality Assurance

Quality

- “The standard of something as measured against other things of a similar kind; the degree of excellence of something” (*Oxford English Dictionary*)

Assurance

- “Certainty about something” (*Oxford English Dictionary*)

Definition



Quality Assurance (QA) is a **process-centered approach** to ensuring that a company or organization is providing the best possible products or services.



It is related to **Quality Control (QC)**, which focuses on the end result, such as testing a sample of items from a batch after production.

Quality Assurance → Process to ensure that the quality is achieved

Quality Control → Processes to identify whether the quality is achieved



Quality assurance focuses on enhancing and improving the process that is used to create the end result, rather than focusing on the result itself.



Among the parts of the process that are considered in QA are planning, design, development, production and service.



Source: <http://www.wisegeek.com/what-is-quality-assurance.htm>

How do you define and measure 'quality'? *

Project quality is a crucial aspect of technical project leadership, but it can be challenging to define and measure it in a consistent and meaningful way.

Quality criteria

- Specific requirements and expectations that your project stakeholders have for the deliverables and processes of your project.
- Based on various factors customer needs, industry standards, regulatory compliance, best practices or internal policies

Quality standard

- Quality standards are the benchmarks or guidelines that you use to measure and evaluate the quality of your project deliverables and processes.
- Quality refers to the likelihood of reaching the stated objectives or desired costs, or both.

Quality metrics

- Quality metrics are the quantitative indicators that you use to track and report the quality of your project deliverables and processes.
- Based on various dimensions, such as functionality, reliability, usability, efficiency, maintainability, or security.
 - Who determines what 'quality is in any given context?

Comparison of QA vs QC for software

Quality Assurance	Quality Control
It is a process which deliberates on providing assurance that quality request will be achieved.	QC is a process which deliberates on fulfilling the quality request.
A QA aim is to prevent the defect.	A QC aim is to identify and improve the defects.
QA is the technique of managing quality.	QC is a method to verify quality.
QA does not involve executing the program.	QC always involves executing the program.
All team members are responsible for QA.	Testing team is responsible for QC.
QA Example: Verification	QC Example: Validation.
QA means Planning for doing a process.	QC Means Action for executing the planned process.
Statistical Technique used on QA is known as Statistical Process Control (SPC.)	Statistical Technique used on QC is known as Statistical Quality Control (SPC.)
QA makes sure you are doing the right things.	QC makes sure the results of what you've done are what you expected.
QA Defines standards and methodologies to followed in order to meet the customer requirements.	QC ensures that the standards are followed while working on the product.
QA is the process to create the deliverables.	QC is the process to verify that deliverables.
QA is responsible for full software development life cycle.	QC is responsible for software testing life cycle.

Source: <https://www.softwaretestinghelp.com/quality-assurance-vs-quality-control/>

Or simply

Quality assurance systems
emphasize avoiding quality problems
before
they get into the final product.

Key concepts

- It is a proven management concept
- “Consistently do things right, the first time”
- “Continuous improvement”
- Avoiding mistakes and defects
- **Examples of pioneers in this approach?**
 - Frederick Taylor an American mechanical engineer. He was widely known for his methods to improve industrial efficiency.^[1] He was one of the first management consultants.^[2] In 1909, Taylor summed up his efficiency techniques in his book *The Principles of Scientific Management* (https://en.wikipedia.org/wiki/Frederick_Winslow_Taylor)
 - W. Edwards Deming American engineer, statistician, professor, author, lecturer, and management consultant. Educated initially as an electrical engineer and later specializing in mathematical physics, He is known as the father of the quality movement https://en.wikipedia.org/wiki/W._Edwards_Deming
 - Source: <https://deming.org/explore/fourteen-points/>

Key concepts

- General view about quality systems is that although people makes mistakes, most errors stem from faulty processes or systems, and training of people ?

**Do you agree?*

Discuss with your neighbour



Key concepts

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

Why?



How QA relates to IT



PLUS: skills, supply chain (e.g. environmental factors, slavery/fair trade issues) and?

QA Standards

- 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.
- ISO 9000 is the most recognised standard used.
 - It is an international standard
 - Conformance to ISO 9000 is said to guarantee that a company can deliver quality products and services.



<https://www.iso.org/standard/62085.html>

QA Standards

- ISO 9000 is a series of standards developed and published by the International Organisation for Standardisation (ISO)
- ISO Standards get reviewed regularly.
- The current standard is version ISO 9001:2015.
- Each industry will have its own ISO 9000 standard
 - ISO/IEC 90003:2014 provides guidelines for the application of ISO 9001 to computer software.

ISO 9000

- Based on seven quality management principles (QMP)
 - QMP 1 – Customer focus
 - QMP 2 – Leadership
 - QMP 3 – Engagement of people
 - QMP 4 – Process approach
 - QMP 5 – Improvement
 - QMP 6 – Evidence-based decision making
 - QMP 7 – Relationship management
- And these principles will develop over time – e.g. supply chain transparency

Certification

- It can take anywhere from 6 to 18 months for an organisation to go through its certification process
 - Costs can be up towards hundreds of thousands of dollars to millions, depending on the size and complexity of the organisation
- Why do it?
 - Customers require it
 - Powerful marketing tool
 - Reap improvements as a result of meeting the standards
 - An organisation needs to determine if ISO is “for them”
 - Get more work ?

Advantages of a quality system



Companies strive for a total quality system because quality is what the customer (or regulations, or the need for efficiency) demands.



Ensure that products and services provided meet **organisational goals** and objectives and customer requirements **effectively and efficiently**.



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 efficiency, reduce operating costs and minimize unproductive time.



All of these features are important in having a competitive company.

Quality Audits

- What is auditing?
 - Information Systems are integral to organisations.
 - Key business processes are enabled using information systems
 - The purpose of IS audit is to review and provide feedback, assurances and suggestions.



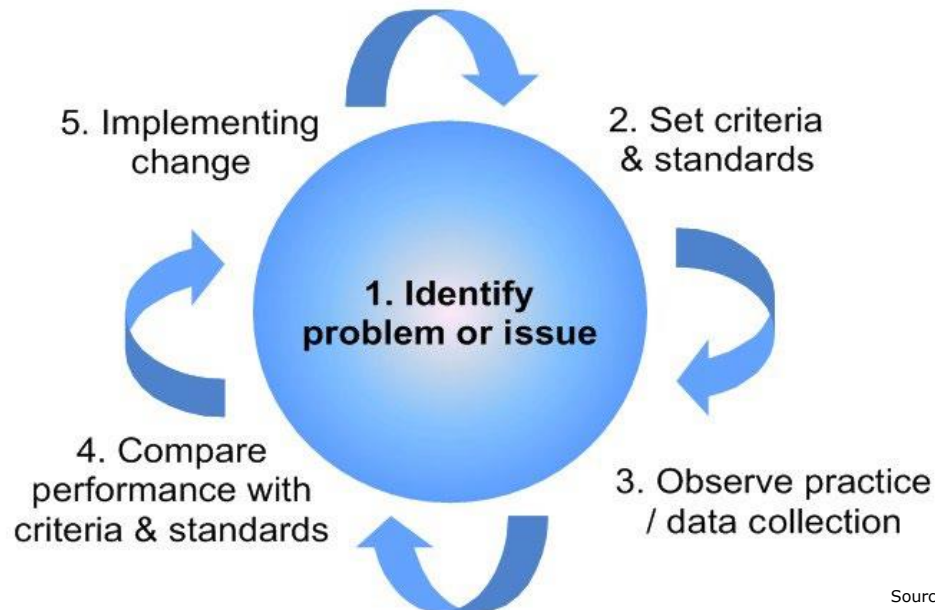
I.T Auditors are paid between \$600-\$1500 per day



Definition

- “The process of collecting and evaluating evidence to determine whether a computer system (information system) safeguards **assets**, maintains **data integrity**, achieves **organisational goals*** and consumes resources **efficiently** and **effectively** ”

– Ron Weber



Source: Vital voice and data

Efficiency and effectiveness

1. Efficiency: getting more output for the same or less effort
e.g.
2. Effectiveness: making sure that the effort achieves the
desired outcome e.g. ..

Process improvement and process maturity

- **What is a process?**
- Processes are like cells in the human body, they are the building blocks of everything
- Process management and process maturity
- Deming
- CMMI, Six Sigma, Lean
- Process mining as a form of data mining

Source: <https://www.smartsheet.com/content/process-maturity#:~:text=Process%20maturity%20is%20a%20measure,there%20is%20continuous%20process%20improvement>.

Source: <https://www.ibm.com/au-en/topics/process-mining#:~:text=the%20next%20step-,What%20is%20process%20mining%3F,and%20other%20areas%20of%20improvement>

Process improvement - the Deming Cycle (Plan-Do-Check-Act (PDCA))

Also the basis of the continuous IT Lifecycle from week 2

PDCA Cycle:



Benefits - the Deming Cycle (Plan-Do-Check-Act (PDCA))

- **Facilitates continuous improvement**
Requires commitment from leadership
- **Flexibility**
Can be used for a wide array of organisational process
- **Simple yet powerful**
 - Outcomes and solutions coming from PDCA that can have a significant impact

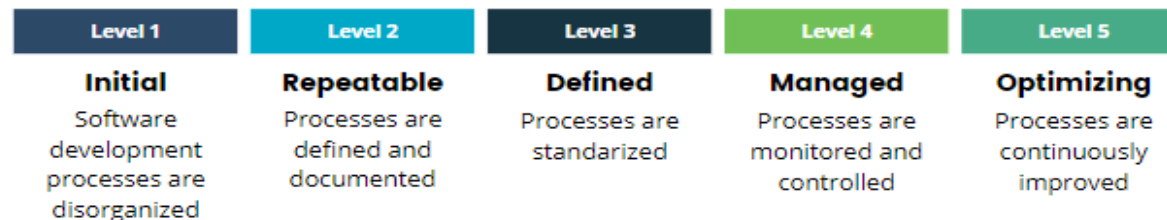
CMM = Capability Maturity Model

- How can you tell if you are doing a good job of managing your organisation?
- How can you monitor your progress on an ongoing basis?
- How do you manage the interactions of systems and processes that are continually evolving?
- How do poor processes impact interoperability, safety, reliability, efficiency, and effectiveness?

Maturity models can help you answer those questions by providing a benchmark to use for assessing how a set of characteristics has evolved.

<https://cmmiinstitute.com/>

5 levels of the Capability Maturity Model



Source: <https://www.preplounge.com/en/case-interview-basics/business-concept-library/useful-business-analysis-tools/the-capability-maturity-model-cmm>

Capability? Maturity? Model?

Capability?

- The ability to do something
 - Perform an action
 - Carry out a process
 - e.g. drive a car; manufacture a car

Maturity?

- Characteristics of being advanced or developed
 - e.g. in a human, psychologically or physiologically
 - e.g. in an organisation, a process which is very efficient

Model?

- A representation of something in the real world which can be used e.g. to understand it, to provide a benchmark to measure it, and to guide actions related to it.
- A model may define measurable levels of maturity

Maturity Levels 1 & 2

– **Maturity Level 1: Initial**

- Process are ad hoc, are often are not reliable or repeatable, and outcomes vary in quality

– **Maturity Level 2: Managed**

- Requirements are managed and processes are planned, performed, measured, and controlled. The status of the work products and the delivery of services are visible to management at defined points.
- Commitments are established among relevant stakeholders and are revised as needed. Work products are reviewed with stakeholders and are controlled.
- The work products and services satisfy their specified requirements, standards, and objectives.

Maturity Levels 3 & 4

– **Maturity Level 3: Defined**

- processes are well characterized and understood, and are described in standards, procedures, tools, and methods throughout the organisation
- Processes for specific projects are tailored from organisational standards
- Processes are managed proactively

– **Maturity Level 4: Quantitatively managed**

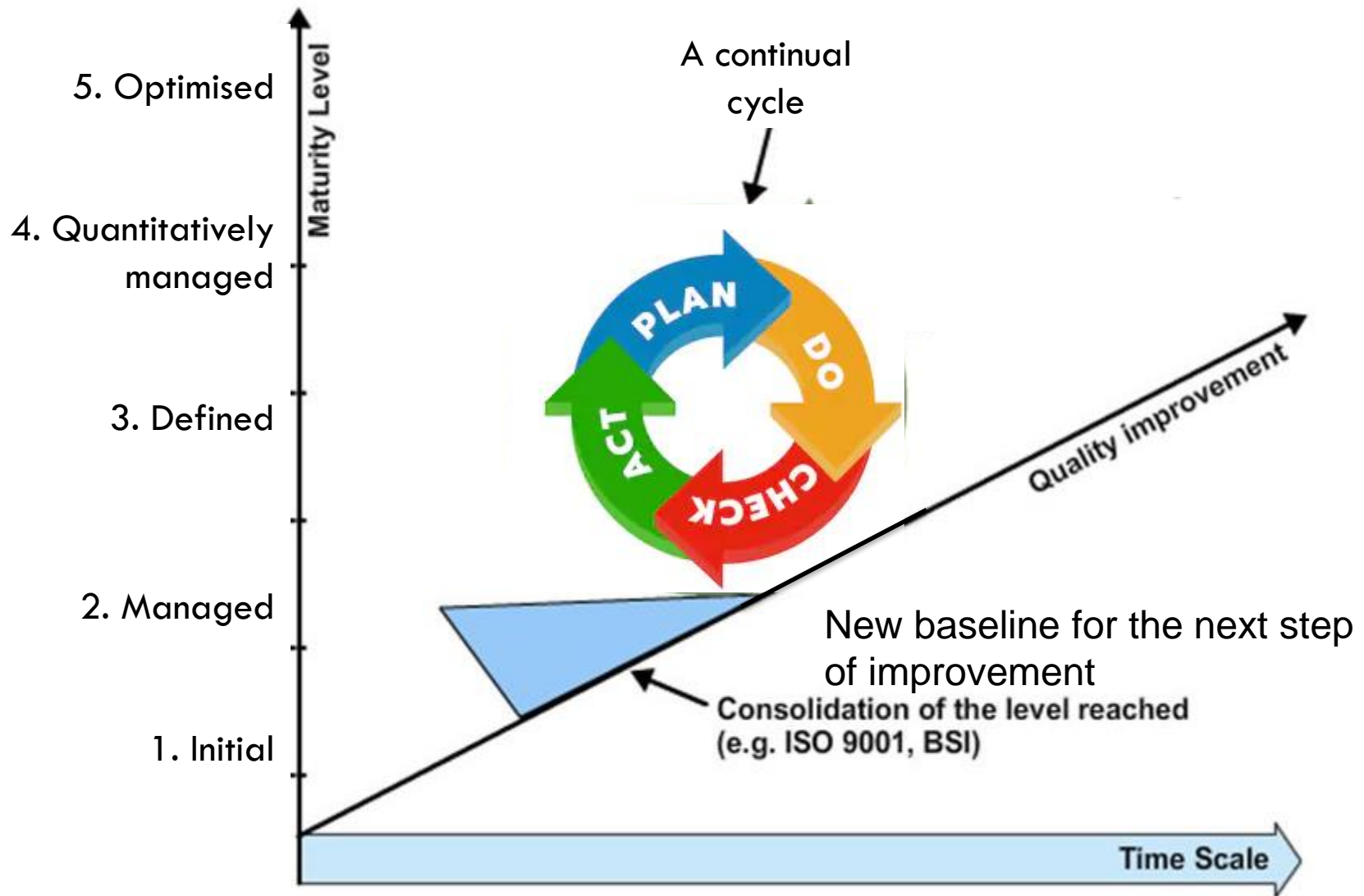
- Quantitative objectives for quality and process performance are established and used as criteria in managing the processes.
- Quantitative objectives are based on the needs of the customer, end users, organization, and process implementers.
- Quality and process performance are understood in statistical terms and are managed throughout the life of the processes.

Maturity Level 5

– Maturity Level 5: Optimised

- Processes are continually improved based on a quantitative understanding of the common causes of variation inherent in processes.
- This level focuses on continually improving process performance through both incremental and innovative technological improvements.
- The quantitative process-improvement objectives for the organization are established, continually revised to reflect changing business objectives, and used as criteria in managing process improvement.

The Deming Cycle and CMMI maturity levels



Why Audit – 3 areas

S.Anantha Sayana (2002) outlines 3 key areas of concerns that IS Audits need to address:

Availability	Will systems be available for the business at all times when required? Are systems well protected against all types of losses and disasters?
Confidentiality	Will information in the system be disclosed only to those who need it?
Integrity	Will the information provided in the system always be accurate, reliable and timely? What ensures that no unauthorized modifications?



Why is an audit done?



Corporate
Governance

Regulatory
Requirements

Asset Owner
Request

Operations
Review

Scope of an audit

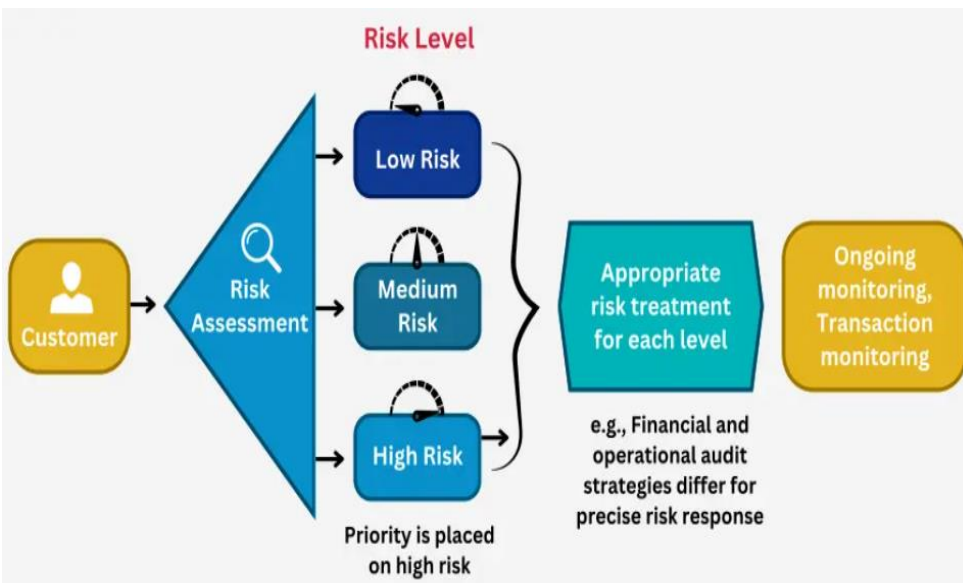
- Physical and environmental review
- System Administration review
- Application software review
- Network Security review
- Business continuity review
- Data Integrity review
- **Could depend on the client sometimes**

Audit risk based approach

- Audit risk is the probability that the company's financial statement contains an error.
- Risks can affect each system differently
- **Example 1:** Non availability of a system
 - Restaurant booking system Vs Company Blog
- **Example 2:** Unauthorised access to system
 - Online Banking V Hair Salon booking system



Risk-based approach



<https://www.sprintzeal.com/blog/risk-based-internal-auditing-approaches>

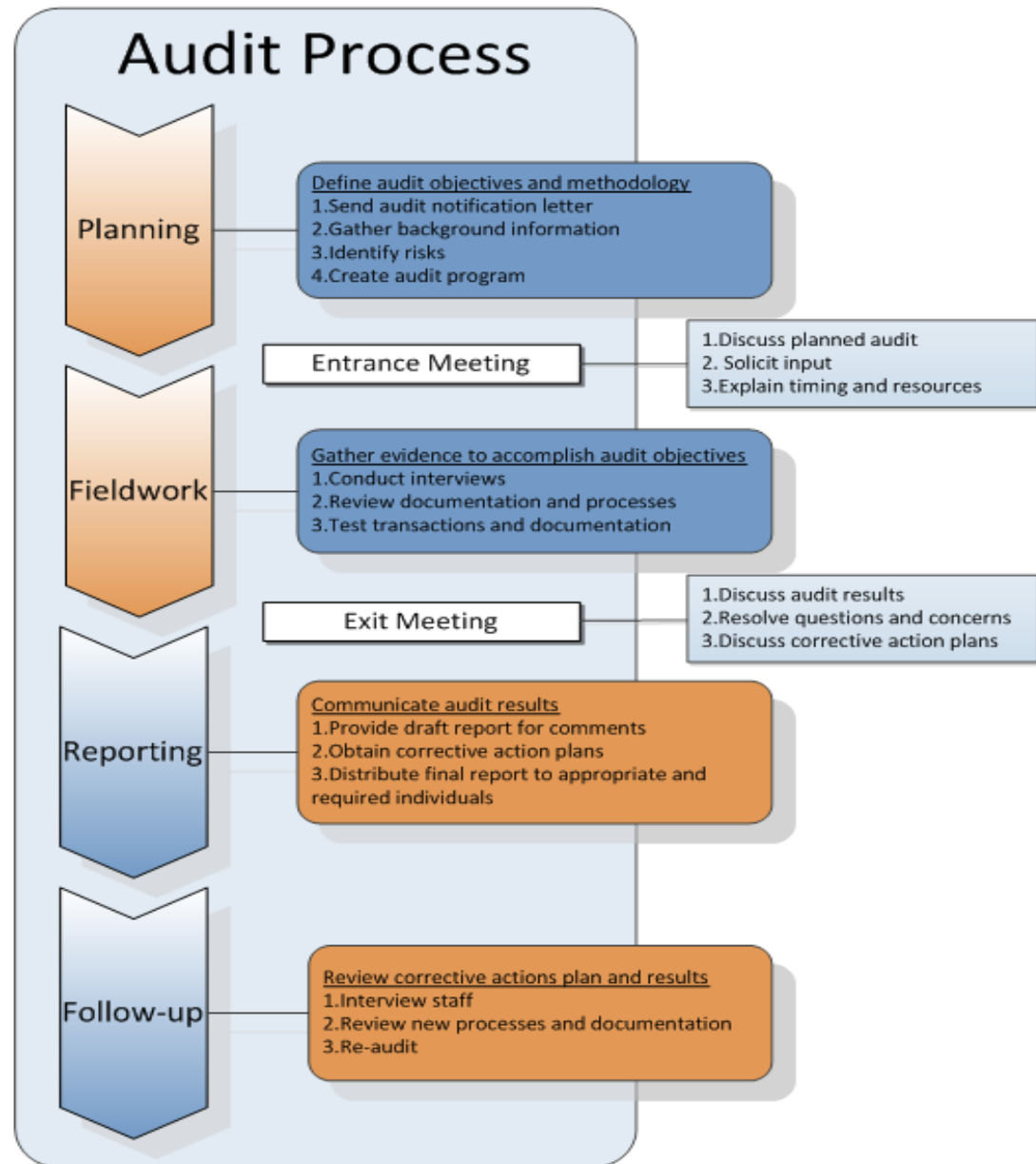
- Conduct an inventory of the information systems and categorise them
- Identify which systems impact critical functions or assets
- Assess risks that affect the system assign a severity rating to them
- Rank Systems and decide audit priority, resources and schedule

Benefits - Risk-based approach

- Align with strategic objectives
- Improve efficiency and effectiveness
- Enhance stakeholder satisfaction
- Support continuous improvement
- Facilitate risk management

The audit process

- Planning
- Fieldwork
- Reporting
- Follow-up
- What else ? Certification in some cases



Auditing an Orchestra: a cautionary tale



A Consultant's audit of Schubert's Unfinished Symphony

After attending a rehearsal of this work we make the following observations and recommendations:

1. We note that the twelve first violins were playing identical notes, as were the second violins. Three violins in each section, suitably amplified, would seem to us to be adequate.
2. Much unnecessary labour is involved in the number of demisemiquavers in this work; we suggest that many of these could be rounded up to the nearest semiquaver thus saving practice time for the individual player and rehearsal time for the entire ensemble. The simplification would also permit more use of trainee and less-skilled players with only marginal loss of precision.
3. We could find no productivity value in string passages being repeated by the horns; all tutti repeats could also be eliminated without any reduction of efficiency.
4. In so labour-intensive an undertaking as a symphony, we regard the long oboe tacet passages to be extremely wasteful. What notes this instrument is called upon to play could, subject to a satisfactory demarcation conference with the Musician's Union, be shared out equitably amongst the other instruments.
5. Conclusion: if the above recommendations are implemented the piece under consideration could be played through in less than half an hour with concomitant savings in overtime, lighting and heating, wear and tear on the instruments and hall rental fees. Also, had the composer been aware of modern cost-effective procedures he might well have finished this work.

Short Break – Back in 5 min
Next
Guest Lecture

INFO5990: Professional Practice in IT

Week 6

Guest Presenter

Thomson Lee

**Audit Office of NSW, and
AI**



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