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Managment Principles and Practices of Integrating Quality in the Project Life Cycle

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MANAGEMENT PRINCIPLES AND PRACTICES OF INTEGRATING QUALITY IN THE PROJECT LIFE CYCLE

Master of Science in Project Management

AT

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BY

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Elvis Shyta

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ABSTRACT

In a fast transforming market and advancing technology, the ability to be agile is a necessity for the success of any organizations' project.

Many organizations that have been basing their managing practices in traditional methodologies, have been shifting to Agile in order to meet the market's needs. The agile project management methodology is designed to build quality in, deliver faster by leveraging highly collaborative teams and iterative flexibility in design. However this transition often brings a high project failure rate. Hence having a clear understanding of what causes the project failures is crucial. Oftentimes these reasons are beyond the control of project managers. However there is a misunderstanding and misuse of Agile methodologies especially by new project managers, where they tend to eliminate project planning. Quality management is an important element of a project plan, as it identifies requirements and determines metrics to measure quality. Hence, as such should be well defined.

Compelling questions as: could every organization avoid (minimize) project failures by building quality in? or Is the project failure rate associated with the processes or with the people? usually are challenging to answer by organizations.

The purpose of this thesis is to examine the challenges institutions face when adopting modern project management methodologies, to emphasize the importance of quality management, and also to determine steps of building quality in the project life cycle. The results are founded by review of relevant literature regarding, and analysis of various data findings; the scope of the results isn't to define an entirely new set of practices but rather to formulate a set of best practices in building quality in.

Among the main findings of this thesis are:

- Despite this continuous trend to use Agile methods almost everywhere, projects often are approved without an objective assessment of quality. And quality is often expected through inspection rather than planted into the project lifecycle.
- Having a clear understanding of the acceptance metric for quality management in any project is critical for a successful plan.
- The purpose of quality management is to understand customer expectations and to build a proactive plan to achieve them.
- Quality management has three main components: Quality Planning, Quality Assurance, and Quality Control and Improvements.

Keywords: Quality Management, Project Management, Traditional Methodology, Agile

1 INTRODUCTION

Regardless of the industry of the organization, choosing the right project management is an essential component of the business. Different methodologies of project management emphasize different demands. Traditional methodologies are based in a linear process and focus on upfront planning, so they have no scope for correction once the project is underway. On the other hand, Agile project management emerges as a response to the failure of the waterfall method for managing software development. The Agile methodology has flexibility to pivot a project and grants opportunity to change continually until its final deliverable. Regardless of the methodology used, the importance of the quality of the final deliverables is major.

1.1 Background

Nowadays many companies are moving to Agile methods fully or partially, and this transition has created confusion to the leadership which can not get rid of the processes. The uncertainty this transition brings to the new project managers is high and it leads to many misunderstanding and wrongly using Agile. Moving to Agile does not necessarily mean eliminating documentation totally and eliminating planning due to constantly changing. Quality does not come naturally and it should not be expected from inspection; quality should be planted in. Agile is all about building quality in, and eliminating quality planning leads to project failure.

1.2 Reasons for Quality Management

In a world that transforms quickly economically and socially, and where technology keeps advancing, it’s no surprise that the traditional methods of project management don’t meet

the market's needs and they don't add value to the customer. Hence, it's no surprise that over the past decades, more institutions are embracing new methodologies of software development.

Even though many believe that the modern methods of project management cannot substitute the traditional methods, the advantages of the Agile methodology are numerous and substantial. Agile methodologies offer flexibility and timely response to the market needs, while Waterfall once the project is underway changes can be minimal. Since Agile requires minimal documentation there is a tendency to eliminate quality management. Quality management or as called quality journey there is a seven step process that starts with identification of the customers, and ends with the quality improvement. Quality management is an important part of a project plan, as it defines activities to be taken and metrics to measure results.

1.3 Discussion of the Problem

Many organizations that have been basing their modes in traditional methodologies, have been shifting to modern Agile methodologies either partially or fully. However, despite the shift there is a high rate of failure. Hence one raises the question: is the problem associated with the processes or with the people?

During this transition, many project managers forget to include Quality Management in their project plan, and quality management is an important element of the project plan as it identifies customers and prioritizes requirements. It is very important to define early in the project what quality means. The root of the problem is the lack of metrics to measure quality. Hence having a clear understanding of the acceptance metric for quality management in any project is critical for a successful plan.

1.4 Problem Formulation and Purpose

The purpose of this thesis is to examine the challenges institutions face when adopting modern project management methodologies, to emphasize the importance of quality management, and also to determine steps of building quality in the project life cycle.

In short, our main problem formulation is the following:

How to implement quality modern methodologies of learning in traditional education institutions to accommodate the current requirements and have emergency plan(s) for continuation of business to fit a given situation?

We'll research this objective by:

- Reviewing literature and theory on new project management methodologies
- Analyzing the similarities and differences between traditional (Waterfall) and modern (Agile) methodologies
- Analyzing the impact of Agile methodology in software development
- Determining sequenced steps in implementing quality principles and practices in the project life cycle

1.5 Limitations and Delimitations

The purpose of this thesis is to determine steps of building quality management in the project life cycle and also to examine the challenges institutions face when adapting modern project management methodologies. I focus on ways to determine sequence steps in this implementation by listing a set of steps and procedures. However, the results of this thesis are

founded by a literature review and analysis of various case studies and data finding which are limited. Hence its scope is not to define an entirely new methodology or in-depth courses of actions but rather to formulate a set of best practices successfully planting quality and not expecting throw inspection.

2 LITERATURE REVIEW

2.1 Evolution of Quality

The concept of quality did not develop overnight. It evolved in progressive steps based on the needs and constraints of the times. In this section we give a brief review of major historic events that pushed the concept of quality forward.

2.1.1 History & Variation

The concept of quality seems to be born during the 1970s and before during craft productions. During this period, individual craftsmen who produced for others were responsible for all aspects of this process. They were designing the items, obtaining supplies, developing production technologies, selling to customers and even handling the complaints. During this time, there were no schools or training courses of any type; craftsmen had adopted the skills of their masters, and perhaps developed new and more efficient methods over time.

As the need for more items increased, new methods started to appear, and workers started to combine their forces. The industrial revolution pushed in the direction of increased quantity and commonality. Factories arose and work was broken into tasks per individual. In 1911, new ideas and analyses emphasized “how you do it” versus “what you do”. This change of focus from the worker to the process separated planning (seen as responsibility of management) and

execution (seen as responsibility of workers); and resulted in no communication between workers and management.

In the years that followed (1918), studies about variation and repeatable processes lead to outlined principles of statistical process control (SPC); these principles aimed to improve quality by minimizing variation. It was in 1939 when the plan-do-check-act cycle as a means of implementing quality improvements was introduced for the first time.

However, variations meant potential waste. And during World War II, demans increased drastically and they reduced quality. Quality became all about the numbers. However, it is worth mentioning that Japan considered quality a major component in becoming an international competitor, so they took steps to put quality concepts into practice, especially SPC. Among other variables, they added internal customers to their quality equation. These steps made Japan a global economic superpower, and “Made in Japan" became a respected label.

2.2 Comparison Of Quality Processes Then And Now

Undoubtedly, the concept of quality has changed over the years. In this section, we put face to face the differences of quality principles of some past time versus of recent time. Please see Table 1.

In the past, quality involved three elements: inspection, statistics, and rework. At some point through the process the degree of quality gets and then statistical techniques were applied to determine the rate of performance. Usually higher levels of quality would translate into higher costs due to the costs of defective items that needed to be refixed.

On the other hand, nowadays quality involves different sets of elements. It begins by understanding customers’ requirements but it doesn’t get done through statistics. However,

variation is analyzed by statistical means and the process of improvement starts aiming to reduce variability. Furthermore, this process reduces defects and increases predictability and consistency.

Quality Then	*Quality Now*
Inspection: Inspect something at the end of production to determine if it meets specifications	Customer focus: Customer requirements are the base
Statistics: Establish statistical goals for conformance	Variation: Understand it, control it
Rework: Fix (or discard) nonconforming product	Continuous improvement: Products and processes improve forever

Table 1

2.3 Pioneers Of Quality

Dr. Joseph M. Juran is considered by many to be the father of many of the quality management techniques still used in industry today. His quality management approach is based on three principle:

1- Pareto principle or as known as 80/20 rule

2- Management theory. This involves a change of thinking, moving focus from the quality of the end product to a wider examination of the human dimension of quality management.

3- Three process (Juran Trilogy): Quality Planning, Quality Control, Quality Improvement

Walter A Shewhart had focused his work on reducing variation in manufacturing processes. He first introduced the "Shewhart Cycle" Plan-Do-Check-Act, and also was the originator of statistical quality control (SQC)

William Edwards Deming is known as the leading management thinker of quality. His theory is based on cooperation and continual improvement. He took the Shewhart Cycle and adjusted it to Plan-Do-Study-Act or known now as Deming Wheel, and is a systematic process for gaining value, and learning for continuous improvement.

Philip B. Crosby is known for the Cost of Quality concept, as he argues that the cost of improving quality will be greater than reducing the cost of quality. He is also known for his book Quality is Free, and the program to improve quality he created called Zero Defects.

2.4 Academic Publications

1- "**Prevention over inspection**. Quality should be planned, designed, and built into—not inspected into the project's management or the project's deliverables. The cost of preventing mistakes is generally much less than the cost of correcting mistakes when they are found by inspection or during usage." PMBOK Guide Ref (29)

2- "Cost of quality (COQ). Cost of quality refers to the total cost of the conformance work and the nonconformance work that should be done as a compensatory effort because, on the first attempt to perform that work, the potential exists that some portion of the required work effort may be done or has been done incorrectly. The costs for quality work may be incurred throughout the deliverable's life cycle." PMBOK Guide Ref(29)

I totally agree with these statements because both of them are based on the Philip Corsby theory of "Quality is Free" (1979). According to Crosby it costs more if things are not done right the first time. This concept is used widely by Mercedes as they prepare their technicians to fix the cars right at the first time. Doing things right and doing the right things are two different

things. Another reason I agree with both statements is because I believe that doing the Right Things, Right, is very important to control the cost.

3- “In Juran’s view, quality assurance is similar to quality control but performed by those not directly involved in producing the product. Juran also adds the essential element of quality improvement, which the PMBOK® Guide does not include as a distinct process” Ref (22)

I partially agree with Juran's point of view. I believe Quality Improvement is a great element of Quality management, as he says that if you don’t improve you will be out of business. I disagree with the statement that Quality Assurance and Quality Control are the same. Quality control addresses the outcome and it monitors the performance and takes actions about the results, while Quality Assurance addresses the methods, it is a set of activities that the team will perform to meet project objectives.

3 DATA FINDINGS

3.1 Comparison of Waterfall VS Agile Methodologies

There are two methodologies we use today for software development: Waterfall and Agile.

Waterfall	Agile
Sequential	Continuous
Extensive Documentation	Less Documentation
Focus on Process	Focus on Communication
Formal	Informal
Gradual Change	Rapid Change

Both of the methodologies have advantages and disadvantages. There is no doubt about the benefits that Agile has brought in the workplace. Today we have some incredible technology which is developed using Agile methodologies. The question is when and how the shift from Waterfall to Agile happened?

3.2 Shift To Agile

First came the crisis. In the early 1990s, an increase in PC usage on the enterprises was seen, and software development faced a crisis. Experts in the industry estimated that the time between a business need and actual application in production was about three years. The businesses moved so fast that many projects were canceled and many of them that were completed didn't meet business current needs. And in certain industries the lag was even more than three years.

Being in this situation business leaders and software developers were so frustrated. Software developers wanted to escape from the heavy documentation of waterfall and tried to find the easiest way to develop software. They wanted something that is more timely and responsive. Seventeen software developers started to meet informally and try to find better ways to develop software, and in 2001 the Agile Manifesto was created.

It is worth mentioning that Agile is not a methodology, but there methodologies like Scrum, Kanban Lean, that use Agile practices and principles. Some of these methodologies have existed even before the Agile Manifesto was created. For example Scrum is seen to be working since late 1980s and early 1990s.

3.2.1 Agile Manifesto

- Individuals over processes & tools
- Working software over extensive documentations
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Most of the companies nowadays have shifted partially or fully into Agile, however we see that Agile is misused or wrongly used. For business leaders they are having a hard time escaping from the processes and documentation, and also delegating authority to take decisions to their employees. Agile is also misused, especially by new project managers, they try to use Agile almost in every project. Using Agile methodologies does not mean totally avoiding documentation and not having a project plan, because of the continuous change. The whole idea of Agile is to build quality in and not inspect it.

3.3 Triple Constraints

Projects fail or don't meet customer expectations for many reasons, sometimes for reasons beyond their control. If we refer to triple constraints the quality sits right in the center of the triangle. As a project manager you need to deliver a project on time, on budget and meet customer requirements, and this project should add value, only then you have delivered quality.

3.4 Statistics

In this short section, we state some data findings regarding project failures.

- 66% of IT project fail even partially or fully
- 70% of digital transformation don't meet their target
- 10% of each dollar spend on project is wasted due to poor performance
- 17% of large IT project go so badly that they threaten organization existence
- Worldwide cost of project failure is about $3 Billion, or 4,7% of global GDP

4 ANALYSIS

4.1 Introduction To Quality Management

Projects start in the initiation stage where business needs and requirements are identified, and this is the phase where the “Why” question is answered. The business requirements should be measurable with clearly defined acceptance criteria, and the business case should clearly demonstrate the benefits and values of the project. So the question is what should you do to build quality into the project?

The answer is Quality Management. There exist many approaches to quality management. PMBOK Guide describes three elements of Quality Management: Quality Planning, Quality Assurance and Quality Control.

Joseph Juran, one of the pioneers of Quality management, has introduced Quality Improvement, and he thinks that if you don't change you will be out of business. He also thinks Quality Assurance and Quality Control are the same thing but done by different people.

In this paper I describe another approach where both these views are blend together:

1- Quality Planning

2- Quality Assurance

3- Quality Control & Quality Improvement

4.2 Quality Planning

The main document of project quality is the Quality Management Plan, and the PMBOK Guide describes it as the "process of identifying quality requirements/standards for the project and its deliverables and documenting how the project will demonstrate compliance with the quality requirements". The goal of this activity is to build quality and not inspect it, so the project managers do not need to depend on inspection and fixing errors, but through planning they should design and build in quality. There are few templates for a quality management plan, however it would be better that the project manager build a customized one that fits the needs of the project and not use a general template. A general framework of quality management plan include the following elements:

1- Quality Policy: Establishes the main principles that should govern the organization while implementing its system for quality management. Many organizations have quality policies that usually are generally stated and the project team may use an existing policy only if it is a good fit for the project.

2- Who is in charge? The answer of this question is not just to provide the name of the project manager, but for project success it should address project and organizational infrastructure and describe participants, reporting chains and clearly define responsibilities, because when everyone is in charge no one is responsible.

3- Where are we going? Projects fail for many different reasons and managing quality effectively depends on specific performance targets. Sometimes goals provide broad descriptions of what the project is aiming to achieve, and requirements provide more detailed descriptions. Kenneth Rose in his book Project Quality Management stated that Operational definition "describes what

something is and how it is measured, providing the means for understanding goals and requirements that might be vague".

4- How are we going to get there? This question should address resources, standards and processes. Resources should include: funds, human resources, tools, and organization elements. Processes define the things that need to be done to fulfill requirements and to achieve project goals. Standards are an important part of the plan, because quality planning is all about identifying quality standards.

4.2.1 Identifying Customers

Customers are divided in three categories:

- External (the paying client, end user and suppliers)
- Internal (elements in the supplier process customer chain)
- Hidden (the one who concerns about the project outcome but not directly involved).

Sometimes identifying customer is not an easy task and customer identification goes through a four step process:

1- Analyze the contract: This activity will identify an external customer, the paying client, which may or may not be the end user. If the end user is not clear then the project team should coordinate with the paying client to determine if the paying customer is the end user. Contract may identify the suppliers/vendors, and if they are not identified from the contract, then the project team should coordinate with the organization's procurement to determine what suppliers will be.

2- Analyze the project team and organization: This analysis should identify the internal customers, how the work will proceed, what organization's elements and project will participate and how they will work together.

3- Analyze product use: Doing this analysis will disclose the end user, who will use the product and how they will use it. The goal of Quality is to satisfy the customer needs and analyzing the product may discover hidden customers.

4- Analyze the mean of production: This analysis is important because it takes a process view and may clarify internal customers or may add additional ones that were missed when analyzing the project team and organization.

4.2.2 Prioritizing Customers

In a project not all customers are considered equal, so the project team must prioritize them. Prioritizing customers will give the project team a better understanding of the relative importance of many customers, and the goal is not to identify which one to eliminate but it gives the project team the clarity when distributing/applying limited resources. Also, the project team should keep in mind that one single customer can stop the project.

A great tool to use for prioritizing customers is the L-shape matrix, which compares the customers to each other on a one to one basis.

	A	B	C	D	E	F	Row Total	Relative Dec. Value
A		5	1	10	1/5	1/5	16.4	0.21
B	1/5		1/5	1	1	5	7.4	0.09
C	1	5		1/5	1/10	5	11.3	0.14
D	1/10	1	5		1/5	1	7.3	0.09
E	5	1	10	5		1/10	21.1	0.26
F	5	1/5	1/5	1	10		16.4	0.21
						Grand Total	79.9	

Key:
10 Much more important
5 More important
1 Equally important
1/5 Less important
1/10 Much less important

Step 1: List all elements to be prioritized along both vertical and horizontal axes.

Step 2: Compare each element to each other on a one to one basis, to determine importance. Here is how it works: A in the vertical column is compared to B along the horizontal row to the right, then A to C and D to the horizontal row. When we compare A on the vertical axis to B on the horizontal axis we evaluate A against B. Each comparison determines the reverse comparison, for example if A compares to B is 5, then B compares to A is 1/5. After completing the comparison, you sum each row into Row total, then you sum the Row totals into Grand total.

Step 3: Divide each individual row by the grand total, and the result shows the percentage of the row total which indicates priority.

4.2.3 Prioritizing Requirements

Same as with customers, the same theory applies to the requirements as well, not all requirements are created equal, and that one single requirement may stop the project.

A method to prioritize requirements is the Full Analytical Criteria Method, which is a three step process, and uses the L shape matrix.

Step 1: Prioritize the customers the same as we explained above.

Step 2: Prioritize the requirements by comparing with each other, same as we did with the customers. We should put ourselves in the shoes of the customers and prepare the L shape matrix considering their point of view. The result is a number of matrices equal to the number of customers.

Step 3: Combine all results into a single matrix of project priorities. We list the customers along the horizontal axis and the requirements along the vertical axis. The picture below gives an example of the integrated matrix:

Customer-Weighted Requirements Prioritization	State of Dakota (0.28)	Hardware Dev Div (0.01)	Users (0.34)	FCC (0.27)	UCC (0.10)	Row Total	Relative Decimal Value
Access	0.04	0.00	0.11	0.02	0.00	0.17	0.17
Speed	0.00	0.00	0.06	0.02	0.00	0.08	0.08
Reliability	0.04	0.00	0.11	0.02	0.00	0.17	0.17
Environmentally Friendly	0.10	0.00	0.01	0.02	0.06	0.18	0.18
Regulatory Compliant	0.10	0.00	0.07	0.21	0.03	0.40	0.40
					Grand Total	1.0	

It is of crucial importance to prioritize customers and requirements early in the project, before the project plan or project design has been completed, because avoiding these steps may result in a project plan that leads the project in the wrong direction.

4.2.4 Identifying Standards

We can see standards in two ways, one way where a standard is a prescribed way of doing something, another way prescribed standards as targets to be met or quantifiable definitions of generally stated requirements. But in the traditional view, targets are specifications, not standards. Identifying standards and specifications are part of quality planning. Standards guide project implementation and describe how the team should employ processes.

There exist many standards a team can consider, such as ISO standards, ANSI national standards. ISO standards such as ISO 9000 series (Quality Management) should be considered by the team if they are not required by the contract. Organizations might have created their own standards that are proven and mandatory for use.

Specifications are details of requirements, while requirements are generally stated, specifications are exact, specific and measurable. Progressing from requirements to specifications is very important, and operational definitions prove the link between them. Operational definitions describe what something is and how it is measured.

Progressing from requirements to specification is done through a three step process:

1- Identify requirements

2- Develop an operational definition

3- Develop a specific value against which performance will be measured to determine success.

Standards and specifications are the end of quality planning and both are the foundation for quality assurance and control.

4.3 Quality Assurance

Quality assurance in the PMBOK Guide is defined as “the process of auditing the quality requirements and the results from quality control measures to ensure that appropriate quality standards and operational definitions are used”. The definition suggests somehow independent auditing that mixes in results from quality control activities. This relation between quality assurance and quality control creates a confusion for project managers, and if both use measurement and analysis of project performance, then where do they differ?

On a daily basis people use both terms interchangeably even though they are different technically. Quality assurance is viewed as a bridge between quality planning and quality control. In order to be effective quality assurance must have a clear definition that establishes its role and separates it from other processes.

Briefly quality control addresses the outcomes and it monitors the performance and takes actions about the results. Quality assurance addresses the methods, so it is the combined set of activities that the team will perform to meet project objectives.

4.3.1 ISO Standards

Still today there is a misunderstanding about the ISO standards, and many new project managers know that ISO standard is a standard of a product or service. ISO 9000 series of

quality management standards assist an organization in developing, implementing and sustaining a quality management system that functions independently of the specific product or service. ISO 9000 defines quality assurance as part of quality management that focuses on providing confidence that quality requirements will be met. However certification of the quality management system does not guarantee the quality of the product or service produced.

Quality assurance is a set of activities that project performance will conform to project requirements, and these are the activities that the project team will do to check project performance against the project plan.

4.3.2 Assurance Activities

Activities comes from a strict process of steps:

1- Select standard or specifications

2- Define activity that will collect data and compare to the plan using operational definition. Develop and apply metrics

3- Provide & define resources

4- Assign responsibility to a specific entity

5- Assemble activities into a quality assurance plan

4.3.3 Metrics

Metrics are a means of measurement to determine the degree of conformance to specifications, and they link together, requirements, specifications, assurance activities, metrics themselves.

1- Requirements which are generally stated

2- Specifications which are specific and measurable

3- Assurance activities (action to be taken)

4- Metrics which are means of measurement

4.3.4 Quality Assurance Plan

The questions come naturally: How can we track all assurance activities when a project has thousands of tasks?

Project manager and his team need to create a quality assurance plan if the organization does not already have one. A quality assurance plan should include:

1- WBS

2- Requirements

3- Specifications

4- Assurance activities (whats need to be done)

5- Schedule (when needs to be done)

6- Who is responsible for doing it

4.3.5 Quality Audit

Quality audit is a very important step because it determines the effectiveness of quality assurance activities. It is a structured review of performance against the plan, and it may be

conducted by internal or external elements and also it may be conducted on a schedule basis or random. Usually audits conducted from external sources are more respected by third parties as they often provide more objective results.

As mentioned previously in the paper ISO 9000 series are quality management standards. Quality auditors certified from third party organizations can come into your organization toward a fee and conduct a comprehensive audit that could meet ISO requirements, and provide helpful information for the organization.

4.4 Quality Control And Quality Improvement

PMBOK Guide defines quality control as "the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes". Quality control is the process where the team based on the results determine corrective actions. If the results are within specification, the team knows that the project performance is going as planned. If the results show some degree of variance, then the team must identify the course of variance and take corrective actions to fix it. Results also provide feedback to the quality assurance process, and provide data that are examined during audits. If the performance doesn't conform to specifications that the quality assurance activities are not having the expected effect, the team should analyze the data and improve activities, and update the quality assurance plan.

4.4.1 Inspection

The primary goal of quality management is to build quality in, and not inspect it, but this does not mean that since we are planning quality we will eliminate inspection.

Inspection is different depending on the methodology we use. In waterfall methodology inspection is done at the end of the process to make sure it conforms to specification before it is shipped to the customer. While in Agile inspection is done in the process, and have small frequent inspections to make sure the process is performing as planned, and avoid rework.

4.4.2 Quality Control Tools

There exist many tools for quality control that the team can benefit from. Ishikawa's Tools or differently known as Seven Basic Tools is a great one to use.

Ishikawa Tools

1- Cause and effect diagram "fishbone diagram": this diagram provides a visual easy to understand diagram that starts with a problem and then lists the cause, sub causes until reaching the root of the problem.

2- Check sheets: is a structure table that allows teams to list the problems on the left and then provide information of the problem on the right such as frequency and severity.

3- Control chart: this tool track process change over time, and teams use it to process data and to determine if the process variation is under control or out of control, and if it is out of control then the team must use other tool such as fishbone diagram to determine the root chaos of the problem.

4- Histogram: is a graph that shows frequency distributions for a specific data set.

5- Pareto chart: 80% of the process problems occur because of mistakes of 20% of the factors involved in the process. This tool helps teams to focus on identifying and improving the most important aspects of the process.

6- Scatter diagram: provide an easy to understand visual relation between two sets of data, by placing plot points on X and Y axis.

7- Stratification: this tool takes a set of data and breaks it down into categories that provide more insight.

4.4.3 Quality Improvement

Joseph Juran defines quality improvement as a "breakthrough the organized creation of beneficial change and the attainment of unprecedented levels of performance". Quality improvement is a process that uses objective measurement and data, and begins with collecting data. The Japanese word "kaizen" which means continual, incremental improvement is widely used in quality-related activities. So why do organizations need continuous quality improvement?

1- To improve products, reduce deficiencies, which will increase customer satisfaction, improve reputation and increase competitiveness.

2- Improving processes may result in less waste, fewer defects and more efficient use of time

3- Quality improvement might reduce cost, which can increase competitiveness by lowering prices

4- We live in a fast changing world and to keep up, technology development requires change and quality improvement.

5- Today we compete in a global market, and often competitors may have an advantage in price because of their labor cost, so quality improvement can make products more competitive to face their low cost labor markets.

There is no doubt about the importance of quality improvement, but the question is why doesn't everyone support it?

The reasons can be different. Team members may have previous experience where their efforts to improve quality didn't give the expected results. Another reason can be when the team members or the upper management think that improving quality costs more. This happens often when everyone is focused on short term costs and believes rather than long term benefits, and that improving quality will have a devastating effect on the project. To improve means to change, and people are resistant to change because they are scared from the unknown or comfort with the status quo.

2.1.1 Improvement Methodology

A well proven discipline to quality improvement is the Plan, Do, Check, Act cycle. First this cycle was introduced by Walter Shewhart in 1939.

1- Plan: This is the first phase, and the team should select a process for improvement, and it may be the process that suggests the highest chances for success or what suggests the greater payback. It may be beneficial for the team to select a process that has high chances for success because

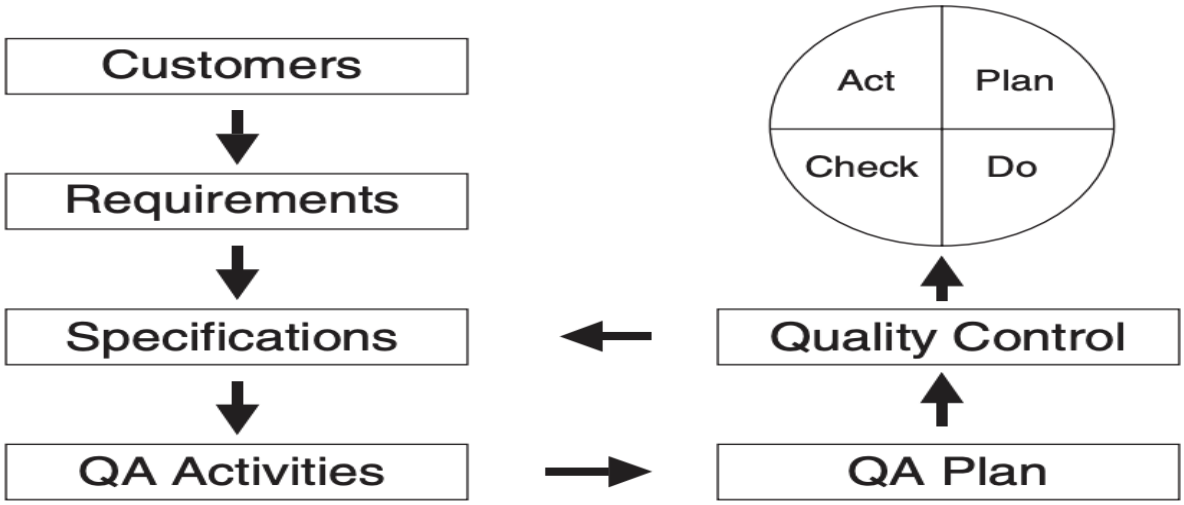
everyone in the organization will be encouraged by success. After selecting the process, analyze it and plan a change that will have a beneficial effect.

2- Do: This is the phase to apply the change planned, and it is important to apply on a small scale, and not a change across the entire system. If it is applied in a Big Bang fashion it might lead to change fatigue into the workforce, especially if the plan does not have the expected effect, or furthermore making things worse. This can be fatal for the entire organization to further quality improvement.

3- Check: At this phase we see the effect of the change, and carefully study the results. The project team should understand the effect of the change, why they occurred and how they might affect other processes in the system.

4- Act: This is the last phase, and if the results of the change are as expected, this shows that the change will probably work as planned, and scale up the change in the entire system. This is a cycle of continual improvement, and if the results are as expected then move on to the next aspect of the process, but if the results are not as expected, then turn back to the first step “Plan”, revisit the process, adjust the plan and do it over again. This time you don't start from zero, you start with experience, better information and knowledge about what did not work, and knowing what not to do is as important as knowing what to do.

The quality journey is a seven step process, and provides a framework for project quality management. It prescribes specific things the project managers and their teams can do to build quality in, and this is a framework that is applicable almost to any project.



5 CONCLUSION

This chapter provides a summary of the analysis and a conclusion of the findings, and raises recommendations for further research questions.

5.1 Summary

In this thesis, I examine the institutions' reasons for project failures when adapting new project methodologies and formulate a list of best practices in order to minimize failure and build quality.

This objective was searched by reviewing literature and data findings on traditional and modern methodologies and also through analyzing the importance of quality management, by recommending sequence steps in implementing quality principles and practices in the project life cycle.

5.2 Conclusions and Recommendations

As the number of companies who adopt Agile methodologies increases, the failure project rates remain high. Moving to Agile does not necessarily mean eliminating documentation and planning fully. Quality does not come naturally but it should be planned in each project.

Considering the shift to Agile and the high rates of project failures, we wonder whether the problem is caused by the processes or by the people (of the organization). It is important to have highly skilled individuals in the teams but if we lack processes, people will not be disciplined. Similarly, in the other direction: If we have the processes, people are the ones who make the difference.

Regardless of the methodology used, quality management is an important part of a project plan, as it defines activities to be taken and metrics to measure results. However, managers still fail to set well-defined acceptance criteria for project quality.

The purpose of Quality Management is to understand customer requirements and to create a proactive plan to meet them.

Quality Management has three main elements:

1- Quality Planning: Starts with identifying and prioritizing customers and then it prioritizes each customer requirement. Customers are not equal because there is always one customer that can stop the project, and the same theory applies to requirements.

2- Quality Assurance: QA addresses the methods and is a set of activities to be taken in order to meet project objectives. It starts with standards, QA activities, Metrics, QA plan, and it ends with Quality Audit to make sure the effectiveness of assurance activities.

3- Quality Control & Quality Improvement: Quality control starts with inspection, and this does not mean that since we are planning quality we need to eliminate inspection. Inspection is very important as it makes sure the product conforms to specifications before it is shipped to the customer. Quality improvement is another important element of Quality management, and to plan means to change. Improvement is done through the Plan- Do -Check- Act. Plan the change, and then apply it to a small scale experiment and if the results are as expected then apply the change to the whole process. If the results are not as expected then adjust the plan, and re-apply again.

The project manager should keep in mind that he and the project team does not define quality, only the customer can determine quality.

I am closing with a quote of Benjamin Franklin: “If you fail to plan, you are planning to fail”.

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Capstone Planning Document
Name: Elvis Shyta Program: MSPM
Contact Information: Email: eshyta@clarku.edu
Phone: 617 749 5121

Employer (if applicable): NA
Current Job Title (if applicable): Full Time Student
Prior Degree(s): BA, MPA, MBA

The Capstone is intended to be an integrative learning experience where students reflect on courses and experiences within their programs of study and apply that knowledge in a specified project to demonstrate their understanding of important program competencies. Planning for this integrative experience is important to ensuring that you engage in an experience that supports your personal and professional goals. Our goal is to support and guide you. In 2-3 pages, we ask that you respond to the following questions to help us understand your current thoughts and/or plan for your Capstone. We recognize that thoughts and plans may not be fully formed and, in fact, may change prior to implementation.

Personal/Professional Goals

- What are your plans after graduation?
  - I plan to continue my education (CAGS, another Master's degree, doctoral degree).
  - I plan to continue working with my current company/organization.
  - I plan to explore opportunities for advancement.

○ I plan to pursue work as a researcher or faculty.

○ I am not sure.

○ Other. (please explain)

MSPM3999Capstone Planning DocumentPage 1 of 6

I have a Bachelor in Business Administration and a MPA from my home country (Albania), and also a MBA with two concentrations (Managing Computer Systems & People Management) from Hellenic American University, NH. After I finished my MBA I decided to pursue my studies at Clark University in the MSPM program, as I think this master will open new doors for me.

I am an international student and I am graduating this December, and I would like to do an internship (OPT) after graduation. I would like to pursue a project/program management career or work as a researcher or faculty, but I am open to new opportunities because being an international student comes with some limitations.

● What are your strengths within your discipline?

I have worked for more than 10 years in different industries such as Telecommunication, Hospitality, Food & Manufacture, Finance, and held several high managerial positions. I do not have much experience in project management, even though I have been part of some projects which were not very well structured. What I consider a strength in project management is that I can easily put myself in the customer's shoes, because I have always been a customer in those small projects, and I believe understanding the customer’s perspective is very important in order to deliver a project that meets its requirements.

● In what areas would you like to explore within your discipline?

I would like to explore Quality Management, because no matter what kind of project or methodology is used, what is Important is the quality of the final deliverables.

Individual/Group Preferences

● Would you prefer to work on your Capstone individually or as part of a small team?

MSPM3999Capstone Planning DocumentPage 2 of 6

○ Individually (Master's thesis can only be done individually.)

○ Small team

○ I don't have a preference at this time.

If you are interested in being part of a small team, do you have individuals in mind with whom you would like to work?

Have you connected with them about being part of a team?

For the Capstone I decided to go for Research Thesis, and this is for several reasons. First I would like to work on the research, and Second is because after I talked with classmates, our interests do not match.

Considering Capstone Topics and Options

● Capstone Focus Area/Topic. Please describe up to 3 ideas or topics of interest that you would like to focus on in your Capstone. Think about what you want to learn more about, how you might like to apply your knowledge from your program, or even what products/services you might like to design using the knowledge and skills you have

acquired in your program? After I did some research and especially after the Zoom meeting with my advisor I decided to work on Quality Management, and this is the only topic I am interested in now.

● What interests you most about each of these ideas/topics?

As I mentioned earlier no matter what methodology we used, what matters is the Quality of the final product.

● How does each idea/topic relate to your personal and professional goals?

I would like to pursue a project/program management career, and in project management it's of crucial importance to know and understand what quality is. Customers are seeking for quality and the organization promises it, but it is the project manager who has to do it.

● What courses and/or experiences have prepared you to further explore these ideas/topics?

MSPM3999Capstone Planning DocumentPage 3 of 6

Unfortunately the MSPM program at Clark does not have a dedicated Quality Management course, but this topic is included in the “Risk, Quality and Change Management” course. The amount of knowledge, assignments, and case studies that we cover in Quality Management, I believe is not enough, and this pushed me to explore further in this topic.

● What knowledge or skills—that you don’t currently possess--do you think you will need to address these ideas/topics for your Capstone project? Refer to section Suggested

Knowledge & Skills Resources below.

The skills and knowledge I want to possess after this research are:

- How to Source a Project

- Develop a Research Question

- Mixed Methods

- Quality Management

- Communication Plan

- Project Management Methodologies

- Project Management Process Groups

- Stakeholder Management

● There are three options for Capstone. Which option seems to best align with each idea/topic? Refer to the Capstone descriptions.

Thesis Research Please add the information requested for the Capstone Option you think best aligns with each idea/topic.

● Master's Thesis (individual project only)

1. Topic Area or draft title

Topic Area : Quality Management. Final title not definite yet

2. Brief description of the topic

Quality is one of the main components of the project's success and everyone talks about it, but at the end why is it so hard to achieve it? Is this because of misunderstanding, lack of knowledge or tool missing?

In this research I want to analyze how Quality has evolved over time and how it is applied in today's world. I also want to analyze Quality in the project life cycle, from the Initiation & Planning phase to Quality Assurance. In the end I would like to come up with some recommendations and techniques/tools, and how to use them in the workplace to manage project quality. I would like to see how these techniques/tools will be applied in different project management methodologies, or even industries and if there would be any difference, and if so, provide a “guide” on how to apply them.

3. Have you identified a faculty mentor? Please include name and contact information.

My faculty mentor is Mary Piecewicz:

Contact Info: Email: MPiecewicz@clarku.edu Phone: 508 259 0172

● Field Project

1. Brief description of the project

2. What do you envision will be the deliverables for the project?

3. Do you have a prospective client or clients (organization/company) in mind for the project? If so, please list the client or clients, along with contact information?

4. Provide the name and title of the client who will sponsor of the project.

● Case Study

1. Focus of Case Study: What question does the case study intend to answer?

2. How will the development of this Case Study benefit and/or contribute to your field?

3. How do you envision the Case Study will be used and by whom?

MSPM3999Capstone Planning DocumentPage 5 of 6

Faculty Review and Comment: Date: _____

Suggested Additional Knowledge & Skills Resources:

Methods

Developing a Research Question

Quantitative Methods

Qualitative Methods

Mixed Methods

Approaches to Evaluation

How to Source a Project

Other: (please specify):

Project Management Methodologies (Waterfall, Agile, Lean, DMAIC, etc.)

Project Management Process Groups (Initiation, Planning, Execution, Monitoring and Controlling, and Closing)

Quality Management

Risk Management

Stakeholder Management

Change Management

Communication Plan

Marketing Plan

PMI Talent Triangle (Ways of Working, Power Skills, Business Acumen)

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School of Professional Studies

Project Charter
“Management Principles and Practises of Integrating Quality in the Project Life Cycle”

Table of Contents

1 Project Overview

1.1 Introduction *(The introduction provides a summary of what the project is designed to achieve, along with some background information on why the project is being done – the business drivers, the opportunity to be exploited, costs to be reduced etc.)*

Projects very often can be unclear or offer up benefits that can not be achieved, for this reason quality is crucial to achieve good quality project outcome. Project quality management is an important aspect of any project, but often it is misunderstood or wrongly applied. Along with numerous studies and articles that address various aspects of quality, many tools and techniques exist, however a clear guide on how to apply them effectively is not given to project managers. The goal of this research is to make quality easily understandable and applicable to any project, and provide a clear guideline on how and when to use each tool, so project managers can make better decisions and be more successful.

1.2 Major Stakeholders *(List all the key stakeholders (decision makers and anyone who will be impacted by the project outcomes).*

- Elvis Shyta
- Mary Piecewicz
- School of Professional Studies
- Robert H. Goddard Library

2 Project Goal and Scope

2.1 Project Goal *(Define the high-level goals of the project).*

The goal of this research is to provide a background of quality concepts, tools and techniques and their evolution over time. It attempts to make quality easily understandable and applicable at any project, and give practical advice and suggestions on four aspects of project quality:

Quality Planning, Quality Assurance, Quality Control, and Continuous Improvement. This research also attempts to provide to project managers how to implement quality in the project life cycle, when and how to use each tool, how to effectively utilize data and measure results to effectively communicate with stakeholders. The ultimate goal is to give project managers an immediate hand on capability to improve project implementation and customer satisfaction by making quality an integral part of the projects.

2.2 **Project Scope** *(The project scope details the work to be taken in order to achieve the project goal. It is just as important to explicitly state what is not included in scope as it is to state what the project will deliver).*

In Scope:

- Implementation of quality in the project life cycle
- Research from 1970' to 2022
- Use academic articles
- Focus on IT projects

Out of Scope:

- Wikipedia
- Construction Industry
- Manufacture Industry

3 **Assumptions (***An assumption is anything the project team or client considered to be true, real or certain often without any proof or demonstration. List in bullet format).*

1- Assuming Participants Will Give Honest Responses

2- Assuming Data Collected to be Accurate

3- Assuming no Major Shifts on Technology

4- Assuming no Changes of Capstone Advisor

4. Constraints (*Anything that restricts or dictates the actions of the project team. These can include the so-called 'Triple Constraint'- the 'triangle' of time, cost and scope - and every project as project drivers has one or two, if not all three project constraints).*

1- Time Constraint

2- Lack of Previous Researches

3- Scope of Discussion

4- Methods Used to Collect Data

5- Don't Look to Specific Industry

5 Risks *(Risk is any unexpected event that might affect the people, processes, technology, and resources negatively or positively by the project)*

1- Unrealistic Expectations

2- Research Has Low Chance to Achieve Outcome

3- Technology Risk "Lost of Data"

4- Legal Risk "Plagiarized Materials"

5- Risk of not Delivering on Time

6 Communication Plan (*Describe how the project team will communicate effectively with team members, the client and the capstone advisor).*

(For capstone thesis/case study students this section is not required)

NA

7 Project Team (*List the project team members involved in the project including the client and capstone advisor).* ***(For capstone thesis/case study students this section is not required)***

NA

8 High Level Roles & Responsibilities of Project Team

(For capstone thesis/case study students this section is not required)

	Team Members				
Tasks					
Project Lead					
Responsible for the project charter					
Responsible for the ensuring effective communication					
Responsible for the quality of the final paper					
Responsible for the quality of the final presentation					
Responsible for submitting peer reviews					
Problem identification and analysis					
Problem resolution					

NA

9 Measures of Success (*Detailed measurements that will indicate that the project is a success)*

Project Outcomes	Measure of Success
Final Paper	Passing Grade
	Final Paper Get Published
	Deliver on Time
	Final Paper Add Value to PM
Presentation	Presentation and Q&A finished on time
	Good grade on Presentation

10 Stakeholder Sign-off

(For capstone thesis/case study students only capstone advisor signature is required)

This project charter has been signed off by the client, capstone advisor and project team members.

_____	_____	_____
Name	Title	Date
_____	_____	_____
Name	Title	Date
_____	_____	_____
Name	Title	Date
_____	_____	_____
Name	Title	Date

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Capstone Status Report 1

Capstone Project Name: Management Principles and Practices of integrating Quality in the Project Life Cycle

Student Name: Elvis Shyta

Date: 10/06/2022

Accomplished to date:

- Research and data findings. From all the articles that I have gone through I have selected around 12 articles (academic & commercial) that are valuable for my project. Beside 3 books that I am using, most of the data I have gathered are from PMI, HBR, and Clark Library.
- After gathering the right information I have prepared the PLAN for how I am going to work on the project. I started to structure the project and divided it into sections.

Issues/Concerns:

I don't have any issue or concern so far.

Plans for next 30 days:

- Plan for the coming month is Executing the Plan. Gather information for each section, and work on them separately.

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Capstone Status Report 2

Capstone Project Name: Management Principles and Practices of integrating Quality in the Project Life Cycle

Student Name: Elvis Shyta

Date: 11/10/2022

Accomplished to date:

- Research and data findings
- After gathering the right information I have prepared the PLAN for how I am going to work on the project. I structured the project and divided it into sections, and started building into them.

Issues/Concerns:

Time concerns. Due to a family health emergency, I haven't been working as I supposed or wanted to work.

Plans for next 30 days:

- Plan for the coming month is to build into the project and look for extra materials if needed.

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Capstone Status Report 3

Capstone Project Name: Management Principles and Practices of integrating Quality in the Project Life Cycle

Student Name: Elvis Shyta

Date: 12/01/2022

Accomplished to date:

- Research and data findings
- Prepared the project draft, and developing it to put everything together for the final paper.

Issues/Concerns:

No concerns at this moment. I am putting everything together even though I was not able to work consistently for a few weeks.

Plans for next 30 days:

- Preparing powerpoint presentation for Dec 6, and wrapping up the final paper

MANAGEMENT PRINCIPLES AND PRACTICES OF INTEGRATING QUALITY IN THE PROJECT LIFE CYCLE

CLARK
UNIVERSITY

Elvis Shyta

December 6, 2022

Agenda

- Introduction
- Waterfall vs Agile
- Projects Statistics
- Quality Journey
  - Quality Plan
  - Quality Assurance
  - Quality Control & Quality Improvement

Introduction - Iron Triangle

3

Software Development Approaches

- Waterfall
  - Extensive Documentation
  - Sequential
  - Formal
  - Process Focus
  - Gradual Change
- Agile
  - Minimal Documentation
  - Continuous
  - Informal
  - Communication Focus
  - Rapid Change

4

Agile Manifesto

- Individual > Processes
- Working Software > Documentations
- Customer Collaboration > Contract Negotiation
- Responding to Change > Following a Plan

Project Success Statistics

- 66% of IT Project Fails (Partially or Fully)
- 70% of Digital Transformation Don't Meet Target
- 10% of Every Dollar Spent is Wasted Due to Poor Performance
- 17% of Large IT Projects Go So Badly That Threaten Company's Existence
- Worldwide Cost of Project Failure is $3 Trillion or $4.7% of Global GDP

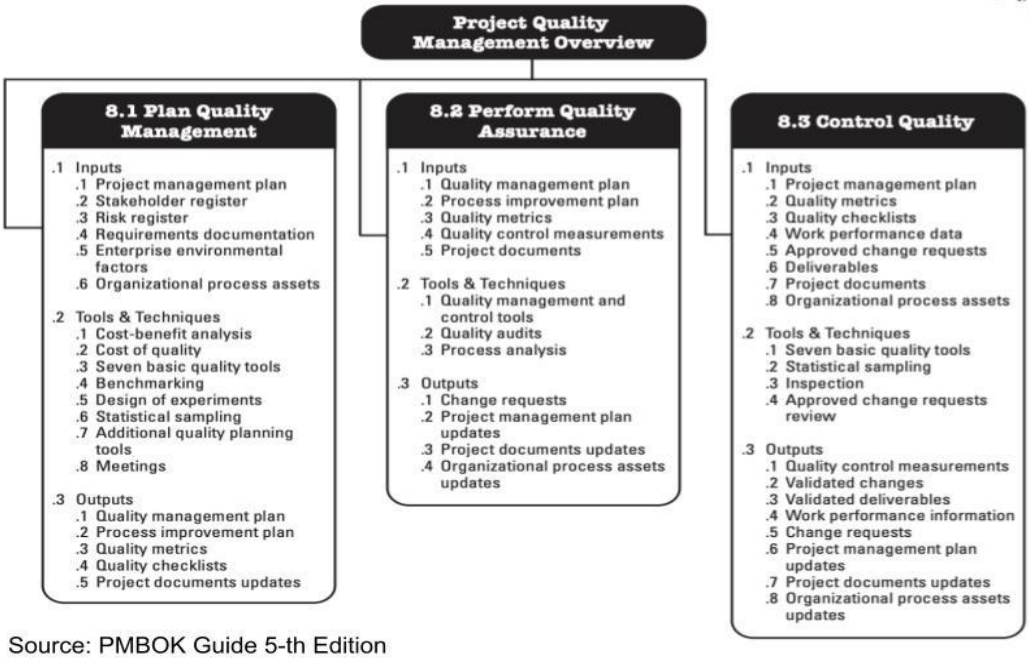
What Is Going Wrong?

- People or Processes?
- Are We Applying the Right Methodology?
- Are We Missing Steps?
- Are We Building Quality or Expecting Through Inspection?

Agile is not a methodology

"Agile is not what you do, Agility is how you do it"
Dave Thomas

Project Quality Management



Source: PMBOK Guide 5-th Edition

Quality Management

- Quality Planning
- Quality Assurance
- Quality Control & Quality Improvement

Joseph Juran

- Quality Improvement
- Quality Assurance = Quality Control

Quality Planning

- Identify & Prioritize Customers/Stakeholders
- Prioritize Requirements
- Identify Standards

	A	B	C	D	E	F	Row Total	Relative Dec. Value
A		5	1	10	1/5	1/5	16.4	0.21
B	1/5		1/5	1	1	5	7.4	0.09
C	1	5		1/5	1/10	5	11.3	0.14
D	1/10	1	5		1/5	1	7.3	0.09
E	5	1	10	5		1/10	21.1	0.26
F	5	1/5	1/5	1	10		16.4	0.21
						Grand Total	79.9	

Key:
10 Much more important
5 More important
1 Equally important
1/5 Less important
1/10 Much less important

Source: Project Quality Management: Why, What and How

Quality Assurance

- ISO Standards - 9000 Series
- Assurance Activities
- Metrics
- Quality Assurance Plan
- Quality Audit

Quality Control & Improvement

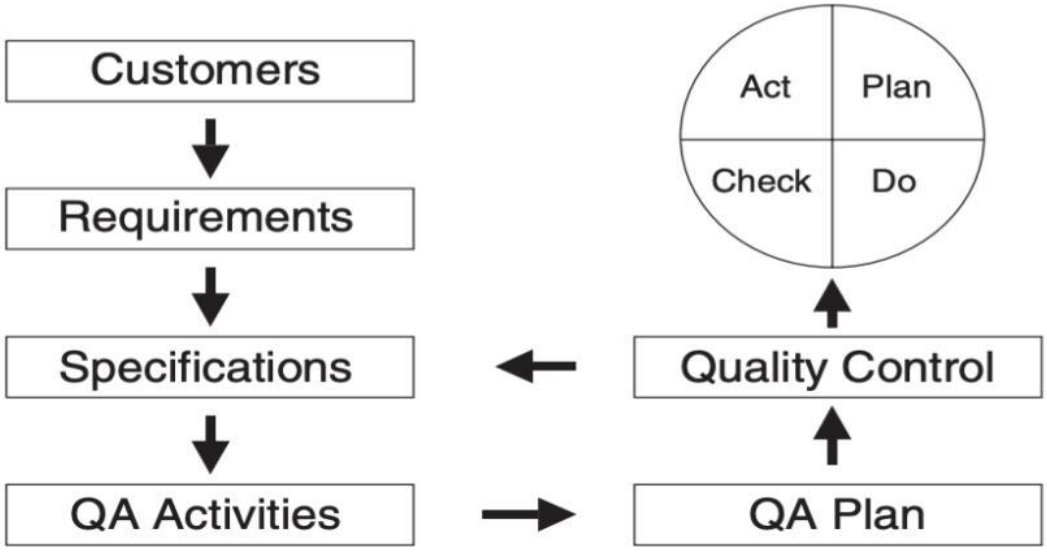
Quality Control

- Inspection
  - Waterfall at the end
  - Agile in process
- Quality Control Tools
  - Ishikawa Tools

Quality Improvement

- Reasons for Improvement
  - Reduce Cost
  - Increase Customer Satisfaction
  - Less Waste
- Improvement Methodology

Quality Journey



Source: Project Quality Management: Why, What and How

13

Conclusion

- Agile is all about building quality in, and not inspecting it
- The purpose of Quality Management is to understand customer expectations and create a proactive plan to meet or exceed them
- Customer Determine Quality, PM & The Team Do Not

"If you fail to plan, you are planning to fail"

Benjamin Franklin

14

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Thank You

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