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What, When, Why, and How?
A Comparison between Agile Project Management and Traditional Project Management Methods

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ABSTRACT: *Agile project management (APM) has emerged as a new approach to managing high-risk and time-sensitive projects as it has proven to provide better productivity, higher quality, and more efficient decision making. In addition, APM has proven to result in lower overall project costs and faster time to market, due to its framework that is based on frequent customer interaction and frequent and quick delivery cycles. In spite of its momentum in various industries, a great deal of ambiguity exists in defining the details of APM methodology, processes, tools, and approach, especially when being compared with traditional project management (TPM) methods and processes. This confusion is amplified when software-related practices and specific artefacts are used to describe the APM because its method was influenced by agile software-development practices. This research study compares and contrasts the APM with TPM in the five process groups and 10 knowledge areas defined in the Project Management Institute PMBOK (2013). Moreover, it compares the two methods in key management disciplines related to leadership style, communication, change, scope, and risk management.*

KEYWORDS: Agile Management, Traditional Project Management, Project Risk, Change Management

INTRODUCTION

The increasing pressure to deliver quality products in a dynamic and rapidly changing global market forced professionals to develop APM methodologies (Fitsilis, 2008). Although traditional project methodologies are regarded as the source of formality in project management and have been in use for a long time and their success in certain industries is highlighted by various scholars (Grundy & Brown, 2004; Kerzner, 2003; Papke-Shields, Beise, & Quan, 2009, Whitty &Maylor, 2009) for complex projects, especially information-technology (IT) and software projects, traditional methods can be relatively ineffective as requirements are intangible and volatile. The use of TPM in these types of projects has led to several problems and failures, due to its rigid nature and the adoption of strict linear processes for planning, executing, and controlling (Owen, Koskela, Henrich, & Codinhoto, 2006). APM has emerged as a highly iterative and incremental process in which project teams and stakeholders actively collaborate to understand the domain, identify what needs to be built, and prioritize functionality. Agile has been increasingly adopted and used in projects characterized by uncertainty and unpredictability (Alleman, 2005; Cicmil, Williams, Thomas, & Hodgson, 2006). According to (Mah, 2008), more than 80% of global firms and large public-sector projects apply APM. In addition, according to a study conducted by Rico, Sayani, and Sone(2009), agile projects were 20 times more productive compared with traditional projects.

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As APM has been initiated and influenced by agile software-engineering practices and methods, no clear definition of its processes and methodology has emerged, as all definitions have been influenced by specific software engineering and IT practices and terms. This paper compares TPM and APM methodologies in terms of PMBOK project-management process groups and knowledge areas and management as defined in the disciplines related to communication, risk, change management, and leadership styles. This comparison allows practitioners to identify when it is suitable to use each method, and identify the strengths and limitations of each method.

Project Management Definition and Importance

A project is the organization of people and resources to achieve a defined objective and purpose (Lockett, Reyck, & Sloper, 2008). According to Gareis (2004), A project is characterized by having a defined time for completion, limited budget, well defined and preset objectives, and a series of activities to achieve those objectives. Kerzner (2003) defined project management as the planning, organizing, directing, and controlling of a company's resources to achieve specific goals defined for a particular project. According to the Project Management Institute (PMI, 2013), project management involves applying knowledge, skills, tools, and techniques to project activities to meet or exceed a project's stakeholder needs and expectations. An organization's delivery of business outcomes is realized through the success of projects; hence, project management is the strategy and process through which organizations realize their objectives and success. A survey by McKinsey & Co. found that almost 60% of senior executives identified building a strong project-management discipline in their organization as among the top-three priorities for their organization (PMI, 2010). Furthermore, leading organizations have realized the importance of project management and embraced project management as a tool to control costs and improve projects and organization results. Executives realized that embracing project-management methods and strategies reduces risks, cuts cost, and improves the success rate by delivering what customers want (PMI, 2013).Applying project management methods is crucial to ensuring project success and delivery.

Avoiding project failure is not an easy task, and not being able to determine what is a failed project makes it even harder. What makes project success harder to attain and evaluate is that the same project can be viewed by different people as a total failure, partial failure, or even a success (PMI, 2010). According to the *Chaos Report* by the Standish Group (2013), 39% of all projects were successful by delivering on time and in budget, with required features and functions; 43% were challenged by being late, over budget, or with less than the required features or functions; and 18% were considered failures due to cancelations prior to completion or work delivered but never used. According to the *Chaos Report*, project cost overruns were at 59% in 2012, whereas time overruns were at 71% (Standish Group, 2013).

Traditional Project Management Methodology

According to PMI (2013), the traditional project management (TPM) is defined as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. In addition, TPM involves the completion of fives phases: initiating, planning, executing, monitoring, and controlling, and closing under the guidance and support of the project manager and the project team (PMI, 2013). In addition, project management is concerned with fulfilling the demands of scope, time, cost, risk, and quality in the framework of predetermined stakeholder requirements through the application of 10 knowledge areas:

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scope, time, cost, quality, risk, communication, procurement, human resources, stakeholders, and integration management. These knowledge areas involve the application of various processes and functions by the project manager and team sequentially throughout the various phases of the project to ensure project success and delivery. These processes are classified into five process groups: the initiating process group, planning process group, executing process group, monitoring and controlling process group, and closing process group (PMI, 2013). These process groups were used to describe some of the elements of TPM; some of these elements are characterized by firm and detailed planning such as task breakdown, task allocation, and compliance with milestones, predetermined stakeholder requirements, and a command-and-control leadership style(Atkinson, Crawford, & War, 2006; Saladis &Kerzner, 2009; Tomaszewski, Berander, & Damm, 2008). According to the PMBOK (PMI, 2013), TPM is made of well-defined process groups that guide the management of projects thorough each process group's knowledge and skill areas. Project-management process groups are linked through the outputs each produces. The output of one process becomes an input to another process. As shown in Figure 1, for instance, the planning process group provides the executing process group with project's plan documentation.

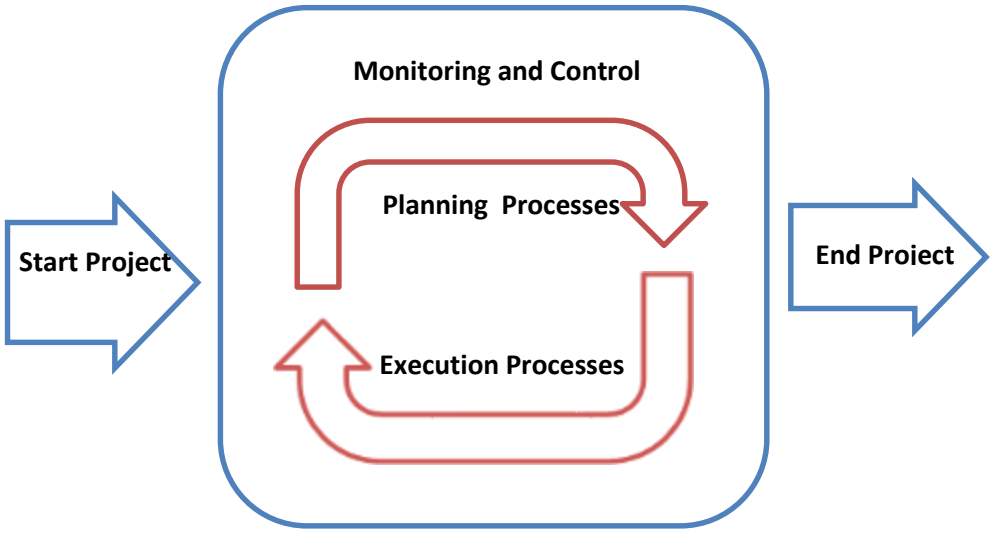

Figure 1: Traditional Project Management Method (TPM) Process Groups.

The initiating process group comprises processes related to authorizing the project, defining its initial scope, financial resources, and identifying stakeholders influencing the success of the project. The planning process group consists of processes aimed at establishing, clarifying, and defining the complete scope of the project and the effort required. This process groups defines the complete project documents that will be used to execute, monitor, and control the project. Documentation includes the project schedule, risk-management plan, quality-management plan, scope-management plan, change-management plan, and project budget. The executing process group carries out those processes needed to complete the work defined in the project-management plan to fulfill project specifications. This process group coordinates people and resources, manages stakeholder expectations, and integrates and executes the activities of the project defined in the project-management plan. The monitoring and controlling process group tracks, reviews, and monitors the progress and performance of the project, identifying any areas in which changes are needed, and initiates the corresponding changes. The closing process group finishes all activities to formally complete the project. This process group verifies that

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the defined processes are completed, the project has been delivered, and all deliverables have been approved and signed off by stakeholders.

For TPM, the success of any project is mainly driven by the iron triangle (project scope, time, and cost), but recent developments show that these are not sufficient to measure success (Papke-Shields et al., 2009; Shenhar, 2004). Other dimensions such as business results and preparing for the future (Saladis & Kerzner, 2009; Sauser, Reilly, & Shenhar, 2009) should also be considered when evaluating the success of a project. TPM is characterized by well-organized and disciplined planning and control methods (Hass, 2007; Thomsett, 2002).The increased need to bring formality into project management (Cadle &Yeates, 2008) and control large development projects (Fitsilis, 2008) resulted in the emergence of TPM. In TPM, the whole project should be carried out in a predetermined orderly sequence (Chin, 2004; Hass, 2007; Weinstein, 2009). Although this was seen as a solution (Cadle &Yeates, 2008), it was seen as major failure in the face of a dynamic project-management environment (Cicmil et al., 2006; Leybourne, 2009). TPM is based on linear processes and practices through which the project manager and team attempts to define and complete the project through detailed, up-front planning at once.

Limitations of the Traditional Project-Management Methodology

The strengths of TPM stem from defining all the steps and requirements of a project before the start of execution. On the other hand, this method can lead to limitations because projects rarely follow sequential flow, as clients usually find it difficult to completely, correctly, and initially define the requirements of a project. TPM is driven by disciplined planning and control methods that are motivated by the assumption that project requirements and activities are predictable and that events and risks affecting the project are predictable and controllable.TPM is based on linear processes and practices through which the project manager and team attempts to define and complete the project at one time, through detailed up-front planning; in addition, in TPM, once a phase is complete, it is expected that it will not be revisited. This assumption and approach can be suitable and in alignment with the nature of some projects such as construction projects, in which the team needs to determine, define, and plan for the complete requirements of the entire building to understand and define the complete scope of deliverables. In contrast, some types of projects, such as software and IT projects, find it difficult to work with the strict and formal approach of TPM. For this type of project, TPM has been viewed as somewhat unproductive, because the requirements are vague, intangible, unpredictable, and subject to change (Chin, 2004). The software and IT world was driven to find an alternative project management method that aligns with the principles, concepts, and nature of software projects. Consequently, APM has emerged in the field of software development to manage software and IT-related projects. Over the years, as a result of the success of APM in the IT and software field, APM has picked so much momentum in other industries as well (Owen et al., 2006).

Agile Project Management Methodology

Agility is defined as the ability to act proactively in a dynamic, arbitrary, and constantly changing environment (Orr, 2005; Owen et al., 2006), and organizational agility is an organization's ability to be adaptable to changing conditions without being forced to change (Ali, Chew, & Tang, 2004). APM is a blend of TPM concepts and flexible, lightweight, collaborative, adaptable to frequent change, yet highly disciplined practices (Rico, 2008). APM concepts and methods have been highly influenced by the concepts of agile software-development methods. Agile development methods such as Scrum, Extreme Programming, and

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Lean are all driven by a set of principles that are principle-based rather than rule-based (Larman, 2004). This set of principles guides the roles, relationships, and activities of the software-development process among the development team, managers, and customers. Those principles are documented in the *Agile Manifesto* defined by the Agile Alliance (Fowler & Highsmith, 2001).

As shown in Figure 2, the APM approach is based on short delivery iterations accompanied by continuous learning (Sauer &Reich, 2009). At the beginning of the project, the project team conducts a streamlined planning, requirements definition, and solution design to initiate the project. Afterwards, the team is involved with subsequent waves of iterations that entail more detailed planning, requirements analysis, design, execution, tests, and delivery to customers and stakeholders.

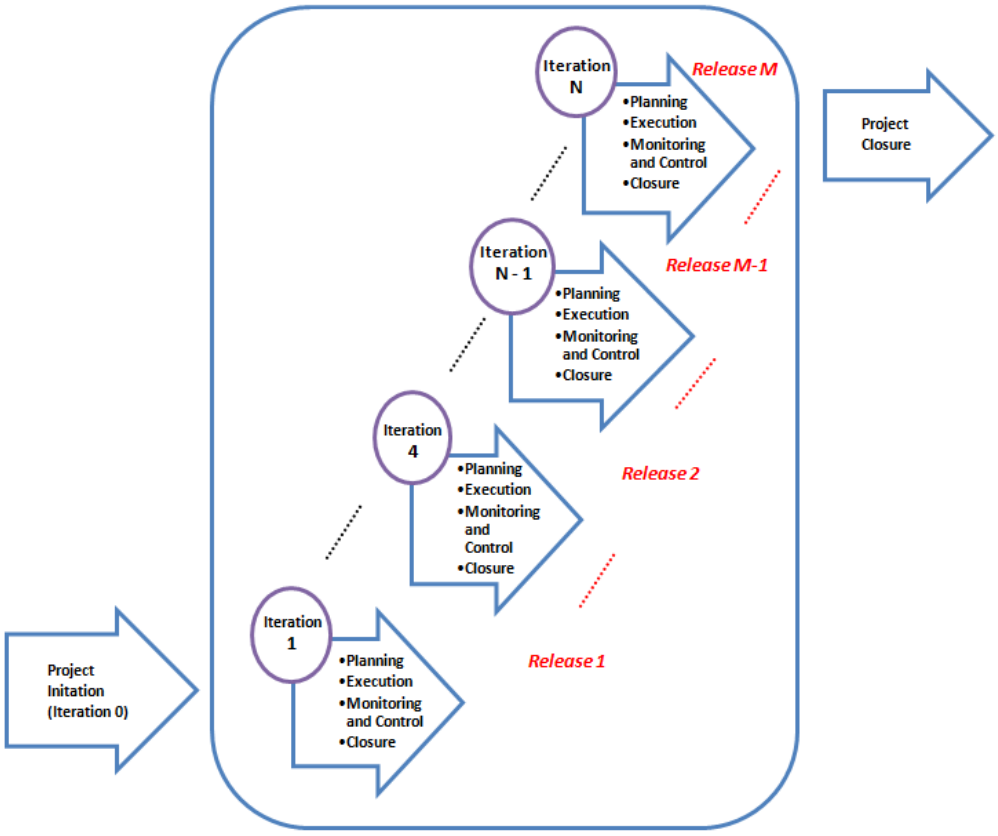

Figure 2: Agile Project Management Method (APM) Process

The APM approach allows for immediate modification of the project as requirements are reviewed and evaluated in each iteration. Furthermore, APM follows a feature-driven management approach; hence, it concentrates on defining a project's scope and requirements by prioritizing the list of project features and requirements based on value, such as increased revenue or market share. Thus, the involvement of the customer in the scope and analysis of the project's requirements is crucial. Customer engagement ensures the agile project team is not investing much effort working on low value or ineffective costly features or requirements. APM puts much emphasis on collaborative development and management to deliver results, getting feedback from customers, and continuous improvement and enhancements (Hass, 2007). APM has highly iterative and incremental processes, where project team members and stakeholders actively collaborate to understand the project domain, identify what needs to be

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built, and establish priority functionality.APM sidled into practice about a decade ago and rapidly grew to be the principal standard for managing IT projects. Despite its recent arrival, APM has the advantage of greater flexibility and collaboration, facilitating its spread throughout various sectors, including the public sector (Rico et al., 2009).
The agility concept started in the field of software development to address the volatile nature of software products and the uncertainty and difficulty of defining requirements early in the project. One unique characteristic of agile development and management is that each iteration is self-contained with activities spanning from requirements analysis to design, implementation, and testing (Larman, 2004). At the end of each iteration, the customer is presented a release that integrates all software components; the customer then provides the needed feedback and refinements in the requirements and features of the system, to be planned and considered in future releases or iterations. Agile software development and management is driven by the principle of value-driven delivery to satisfy customers' needs through early and continuous delivery of valuable and high-priority software-product features. In addition, agile management does not oppose change, as it exploits change to ensure customers' competitive advantage.

APM has been greatly influenced by one of the most popular agile software-development methods: Scrum (Larman & Basili, 2003). The Scrum process is driven by managing iterations called sprints. Scrum development is carried out by a team that is self-directed and self-organizing (Boehm, 2002). The team is given the authority, responsibility, and autonomy to decide how best to meet the goal of iteration. In Scrum, each iteration is called a Sprint. Before each sprint, the team plans the sprint and chooses the backlog items to be developed and tested in the sprint (Boehm, 2002).

In Scrum, there are three main artifacts: the product backlog, the sprint backlog, and the sprint burn-down chart (Schwaber &Beedle, 2002). These should be openly accessible and visible to the Scrum team. The product backlog is an evolving, prioritized list of business and technical functionality that needs to be developed into a system, including defects that should be fixed. A sprint backlog is a list of all business and technology features, enhancements, and defects selected to be addressed in the current sprint. For each task in the sprint backlog, the description of the task, its owner, the status, and the number of hours needed to complete the task are recorded and tracked. The sprint backlog is updated on a daily basis to reflect the number of remaining hours to complete a task. The sprint backlog helps the team predict the level of effort required to complete a sprint. The team has the right to increase or decrease the number of remaining hours for a task, as team members realize that the work was under- or overestimated. The Scrum team is committed to achieving the sprint goal and has full authority to do whatever is necessary to achieve the goal. Usually the size of a Scrum team is seven, plus or minus two. If the project has more than seven members, the team uses an approach known as Scrums of Scrums (Williams & Cockburn, 2003). The sprint burn-down chart illustrates the hours remaining to complete sprint tasks. This chart, updated every day, shows the work remaining on the sprint. The burn-down chart is used to track sprint progress and to decide when items must be removed from the sprint backlog and deferred to the next sprint.

Very important contributors to team success and development progress during iteration are the Scrum Master and Product Owner (ScrumAlliance, 2012). The Scrum Master, responsible for managing the Scrum project, knows and reinforces the sprint goals and objectives, and ensures the application of agile and Scrum values and principles. The Scrum Master is not necessarily

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a management role; it can be carried out by a senior member of the project team or the project manager. The Product Owner is responsible for maximizing the value of the project and the work of the project team through the management, maintenance, prioritization, and clarification of the product backlog. Under agile principles, the project backlog is considered to be a living artifact that goes through progressive refinement with items being added, removed, and updated. The Product Owner is ultimately responsible for managing and maintaining the product backlog along with the project team and stakeholders. In APM, at the end of each sprint, the project team demonstrates the features developed during the competed iteration in a sprint-review meeting with stakeholders and the customer. During this meeting, the team might add new backlog items and assess risk, as necessary. APM is driven by the concept of time-box processes, implying that the length of each sprint is predetermined and the scope for the iteration is chosen to fill its length. Iteration length usually does not go over 4 weeks. Instead of increasing the sprint length to fit the scope, the scope is reduced to fit the sprint length.

Because APM is influenced by agile principles and methods, APM inheritably consists of many rapid iterative-planning and development cycles that allow a project team to constantly and continuously evaluate the growing product and receive immediate feedback from users and stakeholders. Continuous improvement and enhancements are done by the project team not only to the project's products, but also to the team's working methods through their experience and lessons learned in executing each cycle. In APM, the responsibilities of project management are distributed among several roles: the Scrum Master, Product Owner, and team. Although this format is considered one of the advantages of APM, it adds challenges and ambiguity regarding the role of project managers in the APM framework. This confusion and ambiguity in the role of the project manager under APM was addressed by Augustine and Woodcock (2008), stating that the main responsibilities of the manager in an agile environment are setting the direction, establishing simple and generative rules of the system, and encouraging constant feedback, adaptation, and collaboration. The project manager should ensure that APM processes are executed effectively in a highly iterative and incremental manner and that project team members and stakeholders are actively involved in working together to understand the domain, identifying what needs to be done, and prioritizing functionality (Hass, 2007).

Why Use Agile Project Management?

In today's business world, constantly changing business needs, drivers, and requirements present a challenge to projects and their management of scope, cost, and time. Moreover, current business processes are more complex and interrelated than ever before, and projects address more complex organizational structures that involve complex communities consisting of alliances with strategic suppliers, outsourcing vendors, different types of customers, partnership, and competitors. These challenges stress the need to have a flexible and adaptable approach to deliver projects, products, and services faster, to satisfy market completion and customer satisfaction needs (Macheridis, 2009; Shenhar, 2004; Weinstein, 2009). The shortcomings of TPM approaches to meet such demands in all situations led to the evolution and increased adoption of APM (Augustine &Woodcock, 2008). According to PMI (2012), by the end of 2012, agile management methods will be used in 80% of all software-development projects, as research has shown that the use of agile has tripled from December 2008 to May 2011. According to Macheridis (2009) and Owen et al. (2006), APM leads to improved managerial and personnel skills, responsiveness, speed, flexibility, quality, and predictability.

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These improvements may lead organizations to several gains through cost reduction, short time to delivery, and increased client and customer satisfaction and retention.

Traditional Project Management vs. Agile Project Management

The *Guide to the Project Management Body of Knowledge* recognized 47 processes that fall into five basic process groups and 10 knowledge areas (PMI, 2013). A knowledge area is defined as a complete set of concepts, terms, and activities that make up a professional field, project-management field, or area of specialization. These five process groups include initiating, planning, executing, monitoring and controlling, and closing. The 10 knowledge areas include integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, project procurement management, and project stakeholders' management (PMI, 2013). This study compares and contrasts TPM and APM by investigating the approach each project-management method follows to address the PMBOK five process groups and 10 knowledge areas listed above. In addition, the study compares the two methods with regard to key management disciplines related to leadership style, communication, change, and risk management.

Comparison of TPM and APM Regarding Project-Management Process Groups and Knowledge Areas

According to the PMBOK (PMI, 2013), in TPM, to ensure successful project management, the process groups shown in Figure 1 must be carried out in sequence, starting with initiation processes and ending with closing processes. According to PMI (2013), although the processes are defined and intended to be conducted in sequence such that the output of one process group is the input for the next, it is expected to have some form of informal overlap. For instance, although it is intended for the planning phase to completely define project plans before the start of the execution phase, some informal back and forth or iteration between the two phases may be needed. The nature of project management and risk usually requires the monitoring and controlling process groups to interact with other process groups, as shown in Figure 1.The mapping of the 47 project-management processes in the five project-management process groups and 10 knowledge areas for TPM are reflected in Table 1 (PMI, 2013).

Table 1: Traditional Project-Management Process Group and Knowledge-Area Mapping

Knowledge area	Initiating	Planning	Executing	Controlling	Closing
1. Project Integration Management	- Develop Project Charter - Develop Preliminary Project Scope Statement	- Develop project management plan	- Direct and manage project	- Monitor and control work - Perform integrated change control	Close project
2. Project Scope Management		- Plan scope management - Collect requirements - Define scope		- Validate scope - Control scope	

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Knowledge area	Initiating	Planning	Executing	Controlling	Closing
		- Create Work Breakdown Structure			
3. Project Time Management		- Plan schedule management - Define activities - Sequence activities -Estimate activity resources - Estimate activity duration - Develop schedule		- Control schedule	
4. Project Cost Management		- Plan cost management - Estimate cost - Determine budget		- Control cost	
5. Project Quality Management		- Plan quality management	- Perform quality assurance	- Control quality	
6. Project Human Resource Management		- Plan human resource management	- Acquire project team - Develop project team - Manage project team	- Manage project team	
7. Project Communication Management		- Plan communication management	- Manage communication	- Control communication	
8. Project Risk Management		- Risk management planning - Risk identification - Quantitative risk Analysis - Risk response planning		- Risk monitoring and control	
9. Project Procurement Management		- Plan procurement management	- Conduct procurement	- Control procurement	- Close procurement

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Knowledge area	Initiating	Planning	Executing	Controlling	Closing
10. Project Stakeholders Management	- Identify stakeholders	- Plan stakeholders management	- Manage stakeholders engagement	- Control stakeholders engagement	

In contrast with TPM, APM process groups do not follow a simple linear pattern. Many process groups that work on planning, execution, monitoring and control, and closure repeat several times during the life of a project. As shown in Figure 2, in APM, process groups execute responsibilities at the project level as well as the iteration level. In defining the activities of each process group for TPM, the research study takes into account project-related activities and artifacts, as well as software and IT-related ones as APM was mainly driven to support software engineering and development projects. Having that said, APM and its process groups defined are all applicable to other types of projects excluding software specific artifacts. Table 2 defines the process groups to be performed at the project level for each knowledge area, whereas Table 3 defines the same on the iteration level.

Table 2: Agile Project Management Process Group and Knowledge Area Mapping—*Project Level*

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Knowledge area	Initiating	Planning	Executing	Controlling	Closing
1. Project Integration Management	- Develop project charter - Conduct project pilot or feasibility	- *Iteration 0*: prepare environments and support tools such as version control, work-hours tracking systems, automated build, automated test, workstations, servers, load testing, defect tracking systems, time tracking, and status tracking.			- Close project
2. Project Scope Management	Iteration 0: Define product backlog	- *Iteration 0*: High-level scope planning and backlog prioritization, define the initial vision of the solution's architecture. - Define Infrastructure diagram, application flow diagram, logical component diagram, security model, availability requirements, and user interface flow. - Define high-level scope (user stories) - Define the number of releases to be performed for the project; and the number of iterations in each release (Release Roadmap).			
3. Project Time Management		- *Iteration 0*: Estimate team velocity - Define release or delivery plan			
4. Project Cost Management		- *Iteration 0*: Estimate cost Determine budget			

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

5. Project Quality Management		- *Iteration 0:* Plan quality management			
6. Project Human Resource Management		- *Iteration 0*: Finalize and dedicate the project team. - The Project Manager and the Product Owner work to define the needed human resources of the project.			
7. Project Communication Management		- *Iteration 0*: Plan communication management - Define the length of each iteration			
8. Project Risk Management		- *Iteration 0:* High-level risk assessment and planning. Can be conducted as part of the pilot phase			
9. Project Procurement Management		- *Iteration 0:* Plan procurement management	Conduct procurement	Control procurement	Close procurement
10. Project Stakeholders Management	- Identify stakeholders (Product Owner, Scrum Master and others)	- *Iteration 0:* Plan stakeholders management	Manage Stakeholders as part of iterations management		

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Table 3: Agile Project-Management Process Group and Knowledge-Area Mapping—Iteration or Sprint Level

Knowledge area	Initiating	Planning	Executing	Controlling	Closing
1. Project Integration Management	- Revise Product Backlog	- Plan iteration - Conduct sprint planning meeting	- Direct and manage iterations	- Monitor and control iterations	- Conduct sprint review meeting - Conduct sprint retrospective meeting
2. Project Scope Management		- Define iteration scope - Select sprint backlog items from the product backlog		- Conduct daily sprint meeting to verify team and sprint progress	- Verify scope results in the sprint-review meeting with stakeholders - Revise product backlog - Reprioritize product backlog
3. Project Time Management		-Estimate number of story points for each user story and item included in the Sprint backlog		-Update the number of story points remaining for the sprint daily by the project team	-Recalculate team velocity
4. Project Cost Management		-Estimate iteration cost determine iteration budget		-Monitor and control iteration cost	
5. Project Quality Management		-Define iteration acceptance and success criteria by the product owner	-Perform quality assurance as part of iteration work; test-driven development	-Perform quality control by monitoring and revising test results and iteration acceptance criteria	-Acquire customer acceptance and sign off on the iteration/ release

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Knowledge area	Initiating	Planning	Executing	Controlling	Closing
6. Project Human Resource Management		-Define iteration human resources	-Manage team in a collaborative and supportive Leadership and management style	Self-monitoring and controlling team -Conduct daily sprint meetings	
7. Project Communication Management		-Conduct Sprint Planning Meeting	-Insure one on one communication with the team and stakeholders Smart and agile communication methods include e-mails, walk-ins, etc.	-Conduct daily Sprint Meeting Update Sprint burn down chart	-Conduct Sprint Retrospective meeting Conduct Sprint Review meeting
8. Project Risk Management		-Define and plan risk as part of Sprint backlog in the sprint planning meeting		-Manage and control risk during daily Sprint Meeting	-Close, identify, and add new risk to Product backlog Update Risk burn down chart
9. Project Procurement Management				-Manage Procurement	
10. Project Stakeholders Management		-Conduct Sprint Planning meeting	-Conduct daily Sprint meetings	-Update Storyboard -Update iteration burn down chart	-Report Sprint/release status as part of Sprint Review meeting -Update release board

As shown in Table 2 and 3, when using APM, process groups repeatedly execute on the project level as well as the iteration or sprint level. The key difference between the two project-management methods—TPM and APM—is that TPM is characterized by exhaustive, rigid, and detailed planning/control procedures, task breakdown and allocation, and rigid adherence

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to milestones. In contrast, in APM, the planning takes place several times during the life cycle of the project in an incremental manner through the planning of each iteration or sprint. As shown in Table 2, in APM, a high level of planning and a concept or approach definition is usually performed on the project level as part of Iteration 0 of the initiation process group. Iteration 0 refers to the iteration before the sequence of project iterations begins: it is the iteration through which all the project-level work takes place such as high-level scope planning, high-level release planning, definition of resources, project architecture, environment, procurement, stakeholders' definition, and product backlog definition or prioritization. Although agile does not put much emphasis on documentation, a project charter is one of the most important documents to be defined at the project level. In APM, a project charter does not differ from the one authored thorough TPM. However, it is usually recommended, based on best practices, to have the agile process and its details spelled out in the charter to ensure clarity and familiarity of stakeholders with the project's nontraditional management approach. This is important, as agile puts considerable emphasis on evolved planning, delivery, extensive communication, and support from the customer. In APM, the customer should work with or provide a Product Owner during the iteration planning and review meetings.

For the planning process group, both TPM and APM project-level groups perform similar activities for the 10 knowledge areas, with few variations. Those variations stem from the nature of agile artifacts and processes performed in APM. During the planning processes group, APM focuses on defining the first draft of the product backlog, which defines and lists the project requirements as user stories in collaboration with the customer and Product Owner. This corresponds to the Scope Definition Document authored in the TPM as part of the planning process group. In addition, APM drives all estimates for time and cost based on the use of agile estimation related to team velocity (Schuh, 2005) and number of story points (Cohn, 2010) associated with each story in the product backlog. These two parameters determine time and cost estimates for the project. It is very important that in APM these two parameters are refined during iterations to align with the true team's capabilities and project environment in a matter that ensure realistic delivery timeline and cost.

In execution, most time and money are usually spent on execution, during which plans are executed and implemented to create and deliver the desired product. In TPM, the project team goes through execution of the completely defined plans through the planning process group; there is usually no overlap between planning and execution unless a major flaw or risk was identified or took place during project execution. In APM, project execution is completed incrementally and through several iterations and releases. The team completes several iterations, each with its own cycle of planning, execution, monitoring/control, and closure. Each completed iteration feedback and results feed into the planning of the next and future project iterations.

In APM, the main tools for monitoring and control are used at the iteration level through daily Scrum meetings and sprint-review meetings at the end of each iteration or sprint. The daily Scrum is a brief meeting to discuss any issues the team is facing. Removing obstacles blocking team members from performing their sprint tasks is one of the main duties of the Scrum Master. Daily Scrums are held each morning to plan and communicate work for the day and bring up any risks, issues, or impediments. At the end of each iteration or sprint, the Scrum Master leads the sprint demonstration review meeting with the Product Owner. The project team reviews with the Product Owner (customer) what it has completed during the sprint; after the review,

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

the product backlog is updated based on the latest information and business needs leading to the next iteration/sprint cycle. Further, the burn-down chart is one of the most important monitoring and control artifacts used in APM. This chart demonstrates the progress in the current sprint by reflecting the number of remaining story points on a daily basis. This is reflected by APM emphasis on the number of hours remaining to complete a user story rather than the number of hours already spent. In agile, some tasks might be added and dropped from the product or sprint scope as the details of user stories become clearer. In addition to the refinement of the product backlog, the team velocity is monitored and adjusted compared to the actual team performance during the performed iterations. As number of completed iterations increase, the accuracy in calculating the team velocity increases; hence the time and cost to complete the project become clearer and more accurate.

The TPM concept of monitoring and control focuses mainly on maintaining the project iron triangle in accordance with plans identified during the planning process group in scope, cost, and time. This is done mostly through the use of earned-value-analysis methods (PMI, 2013). Some scholars and researchers have attempted to fit the earned-value method into APM processes and practices (Rawsthorne, 2006; Sulaiman, Barton, &Blackburn, 2006). Although this might add another monitoring and control dimension to APM tools, the earned-value method is not considered an APM standard tool. In TPM, variations and variance identified during execution of the project plan in scope (scope creep, time, or cost) are not expected and should not take place. This is one of the major differences between TPM and APM: APM expects variations and variance in scope, cost, and time as an inherited nature of projects and facilitates its processes and artifacts to support and address this unavoidable nature; in contrast, TPM assumes all plans performed are valid and all requirements are well understood and defined, so any variance is reported as negative.

In terms of closure process groups, both APM and TPM treat it differently. In APM, the closure process group is performed at both the project and iteration levels. As the work of each sprint is completed, the sprint review and retrospective meetings take place. During the sprint-review meeting, the project team reviews with the Product Owner and the customer the deliverables of the sprint and refines the project scope accordingly. During the short retrospective meeting, the Scrum Master or Project Manager solicits team members' feedback regarding what happened during the completed sprint from a process and product perspective. The retrospective meeting addresses the questions related to what went well during the last sprint and what should be done differently to improve the product or process. This meeting is similar to the lessons-learned meeting conducted at the end of the project in APM, although it is usually much shorter; the retrospective meeting should not take more than an hour. In contrast, in TPM, the closure process group focuses on the closure and sign off for the project along with conducting a lessons-learned meeting to go over challenges and successes encountered during the project to benefit future projects. Accordingly, the cycle of process improvement in APM is shorter and faster than it is in TPM. In addition, the feedback cycle from the customer on project deliverables is more frequent and faster in APM compared with TPM, as the length of APM iterations should not exceed 4 weeks, compared with the length of a project that might take months or years.

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

Comparison of TPM and APM regarding Key Management Disciplines

In this section, the researcher looks into APM and TPM in terms of key management and leadership aspects related to the type of leadership style used, communication management, change management, and risk management.

1. Leadership Style

APM emphasizes a collaborative leadership (Lee-Kelley & Loong, 2003) and management style rather than the traditional management style that is based on command and control, as in TPM. Both APM and TPM expect the project manager to work with the client management, the project team, and key stakeholders to ensure they know the project's status. Moreover, the project manager should remove any obstacles impacting the progress of the project. APM takes this further by emphasizing the principles of servant leadership through which the project manager is seen as a leader, not a taskmaster. Rather than setting rigid instructions for the team to follow, the project manager should facilitate the team in establishing working relationships, setting ground rules, and fostering collaboration. Servant leaders should not ask anything of the team they would not be ready to do (Crowe, 2012). In addition, APM is driven by collaborative development among all team members and the customer to deliver results that reflect the true need of the customer, and capturing and reflecting candid feedback. A major strength of APM is continuous feedback and improvement. In addition, because APM is usually used in very dynamic projects and environments, it emphasizes adaptive control through its practices; the agile team continuously adapts and improves their methods, incorporating lessons learned from the previous cycle into the next, rather than waiting until the end of the project to discuss lessons learned. This constant collaboration among the team and the customer is the driving force to ensure project success in APM.

In summary, there is a major difference in the role of the project manager in APM compared with TPM. In TPM, the project manager is involved in directing project work in a command-and-control leadership and management style, telling the project team what to do. In contrast, the APM project manager follows a collaborative leadership style, working with the project team to realize project objectives and deliverables through the project's iterative increments.

2. Communication Management

As reported by PMI's 2013 Pulse of the Profession (PMI Pulse, 2013), the most essential success factor in project management is effective communication with all stakeholders. Researchers uncovered that a startling US$75 million is at risk for every US$1 billion spent on projects, due to ineffective communication. Among the top communication challenges identified in the PMI Pulse research were gaps in understanding business benefits and ambiguity in understanding project requirements and expected deliverables and goals as a result of using unclear language and jargon. Moreover, according to Beck (2005), the quality of people on a project, their organization and management are more important to project success than tools or the technical approach they use. In spite of the importance TPM places on communication management through its various process groups and knowledge areas, no clearly defined criteria or outlet of practices in those process groups ensures successful communication, which is one of the main challenges identified by PMI Pulse (2013). In contrast, APM has practices that increase communication bandwidth and frequency among all project communication channels engraved in its processes on the project and iteration level. For instance, APM puts much emphasis on co-located teams including customers and end-users, as this is considered a key factor leading to a highly performing and homogeneous team. These benefits are realized as co-location facilitates coordination, alignment with project goals

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

and requirements, as well as increased collaboration and communication among team members. In addition, face-to-face communication is at the core of communication channels in APM (Crowe, 2012). APM calls for co-located project team members to facilitate what is known as osmotic communication (Griffiths, 2007). Face-to-face communication is always the recommended approach, as it is believed to transfer the most information in a given time period. By nature, APM includes several types of formal and informal communication channels. Informal communication includes face-to-face communication, meetings notes, and collaborative solutions. Osmotic communication is a mean of transmitting valuable information that flows among team members as part of everyday conversation and questions as they work in close proximity to each other. Formal communication tools include meetings and artifacts. These meetings include daily Scrum, sprint review, sprint, and retrospective meetings. Artifacts include products backlog, release plan, sprint backlog, and task board (Crowe, 2012).

The PMI Pulse communications research (2013) found that effective communication leads to more successful projects, allowing organizations to become high performers, and hence APM supports constant, frequent, and face-to-face communication among project stakeholders by nature; for that reason, APM has proven successful when used as a project-management framework. Communication transparency and availability of project key information to the entire team has proven to be valuable in ensuring project success as it empowers project team members to make appropriate and well-informed decisions (Müller & Turner, 2007). Both APM and TPM acknowledge this important factor: APM took this acknowledgment further by stressing the importance of using information-radiation tools such as charts, boards, and frequent meetings, activities not well defined in TPM. Although TPM calls for frequent communication and interaction among project members and stakeholders through various outlets to achieve and ensure project success; however, it does not define the specification of such as part of its methodology and process as APM does.

3. Change and Scope Management

TPM and APM differ clearly in their view of change and how it is addressed. According to TPM, any change to project details and well-defined scope is considered a threat that should be controlled; hence change management is defined as the process and set of tools to prevent scope creep or change (PMI, 2013). Change management achieves this by providing an outlet for requesting, evaluating, planning, and implementing changes to a project scope. Change management has two main goals (PMI, 2013): supporting the processing of changes and enabling traceability of changes. In TPM, any approved change must be reflected to the project-scope baseline and necessary corresponding adjustments to schedule and budget should be reflected to the project schedule and budget baseline.

Change management in the APM view, in contrast, is expected and facilitated. Unlike the wide and deeply defined project scope in TPM, APM focuses on defining high levels yet focused scope in the form of user stories that are scheduled to be released with the defined project-release plan. During the initiation phase of a project, the Product Owner produces user stories for the entire project, but only produces detailed supporting documentation for those user stories scheduled for the first iteration. During the first iteration, the Product Owner produces detailed documentation for user stories to be worked on in the second iteration, and so on. Hence, if the scope changes, the invested time on the scope is minimal and little rework is needed. Furthermore, APM assumes cost, time, and quality are fixed, and only scope can change. In APM, the project team commits to deliver on a fixed date for a certain cost, yet for

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

a flexible scope. As a result, the project team in APM focuses on working on only high-priority project items and requirements that offers the most business value. When a scope change or a new feature is to be added to the project's scope, it has to be swapped with an item with the same number of story points. This approach is different from the TPM approach where new features (scope) are added at the expense of cost and delivery date.

In summary, the difference between APM and TPM regarding scope change management stems from TPM's emphasis on fixing the scope, as it is the core necessity to fix a project's resources, cost, and timeline. In contrast, APM considers functionality of the project that affects the scope to be variable while project resources (time and people) are fixed. Unlike TPM, the aim of agile is to have a small scope, rapid delivery at high rate (Collyer &Warren, 2009), with a greater emphasis on communication rather than a process or plan (Weinstein, 2009). Moreover, APM brings so much emphasis into progressive definition of scope and requirement, especially in cases when the customer is having difficulty articulating requirements. This is ensured as agile processes harness change for customer's competitive advantage and emphasizes continuous attention to technical excellence and process improvement. Agile teams address this challenge through continuous and progressive iterations between planning, execution, control, and delivery.

4. Risk Management

Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality (PMI, 2013). Project risk management includes the processes of conducting risk-management planning, identification, analysis, response planning, and control (PMI, 2013). Risk management calls for managing risk proactively. Only known risks that have been identified and analyzed are possible to be proactively managed. In TPM, it is crucial for the project manager and project team to be committed to address risk management proactively and consistently throughout the project. Moving forward on a project without proactive attention to risk management may lead to unmanaged threats and issues. The TPM process of risk management includes planning risk management, identifying risks, performing qualitative risk analysis, performing quantitative risk analysis, planning risk response, and risk control (PMI, 2013). In addition, TPM uses a risk register to log, manage, monitor, and document a project's risks.

In APM, there is no unanimous agreement on the need for formal risk management due to its iterative, limited scope, and controlled nature. Explicit risk management becomes unnecessary when a project uses an agile approach. The short iterations, focused scope, emphasis on user-acceptance criteria, and frequent customer deliveries help project teams avoid the biggest risk most projects face of eventually delivering nothing or delivering the wrong thing. APM focuses on two artifacts related to risk: the risks register and risk burn-down chart (Alleman, 2005; Boehm & Turner, 2003). The risk register should be made available for the entire team, and managed and maintained collaboratively with the project team. At every iteration planning and review meeting, the risk register is reviewed and updated with any new information obtained over the completed iteration. This way risk management becomes an integral part of the APM process and artifacts. The risk burn-down chart is an APM artifact to track a project's risk-exposure rate among iterations. Risk exposure is a measure in days calculated by multiplying the probability of a risk with the number of lost days in case the risk took place. The risk burn-down chart plots the sum of the risk exposure rate for each iteration; as the number of completed iterations increases, the risk-exposure rate should go down, reflected in a linear drop

ISSN: 2052-6393(Print), ISSN: 2052-6407(Online)

on the chart. The risk burn-down chart provides a quick and easy way of visualizing changes in risk over the life span of a project.

CONCLUSION

Global competition is at an all-time high. Technology is advancing at an unprecedented pace. Organizations must deliver more with fewer resources. Although there is no perfect solution to project management and success, executives and managers are turning to agile project management as a key solution to assist in this challenge. The increasing pressure to deliver quality products in a dynamic and rapidly changing global market forced professionals to develop APM methodologies (Fitsilis, 2008). Traditional project methodologies are regarded as the source of formality in project management and have been in use for a long time; their success in certain industries is highlighted by various scholars (Grundy & Brown, 2004; Kerzner, 2003; Papke-Shields et al., 2009; Whitty &Maylor, 2009). However, for complex projects, especially IT and software ones, traditional methods can be relatively ineffective as requirements are intangible and volatile. APM has emerged with its highly iterative and incremental process, where project team and stakeholders actively work together to understand the domain, identify what needs to be built, and prioritize functionality.

Unlike TPM, the aim of agile is to have a small scope and rapid delivery at a high rate. APM emphasizes communication rather than processes or plans. APM yields impressive benefits; its benefits come from many factors, primary of which is increased productivity and quality. Productivity results from its streamlined nature, adaptability to change, collaborative nature, and focus on profits in the marketplace. Projects that have used APM were five times more effective than those using TPM in cost and quality; furthermore, APM projects had 11 times greater return on investment (Rico et al., 2009). In addition, APM has proven itself a practical way to manage high-risk, time-sensitive research-and-development projects due to its lightweight processes that lead to efficient decision making and productivity (Cui & Olsson, 2009). The frequent customer interaction and early concept testing results in outcomes that are quick and sensitive to markets. These results, in turn, increase customer satisfaction, which improves customer trust, retention and loyalty, and translates into economic benefits such as improved sales, revenues, and overall profitability.

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