

EMBEDDING PROJECT MANAGEMENT INTO XP, SCRUM AND RUP

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Abstract

The latest addition in the field of system engineering is project management of software engineering. Various software project management methods and trends are adopted in order to get high quality software product at inexpensive cost with accurate timeframe for delivery and with minimum uncertainty. There are various activities such as (planning successfully, coordinating, management of risk, scope changes) are tough for a project. All these objectives only achieved when status of the project is appropriately controlled and monitored. (XP), Scrum, RUP and Project management (PMBOK) are helping in development of software's more easily and rapidly. In this paper first will study methodologies and how activities and knowledge areas of project management and how these can be embedded into modern development life cycle of Scrum, XP, and RUP to improve the quality of software products and minimizing the uncertainties.

Keywords: XP, Scrum, Rup and Project Management

1. Introduction

IT (information Technology) is fastest growing domain in the world. In these days number of companies working in the field of software development, they must have updated knowledge to compete in the market. It is very critical task to choose correct tools, techniques and methodology when we need to deliver good quality and maintainable product within the limit of cost and time [1]. Now days advanced methods and techniques in development of software assisting companies to improve their business, but they have to select method and techniques very carefully. Because some of having negative effect on software product (e.g. poor performance, bad

quality). Good project management helps to produce better quality software solutions and project manager is key player of project management [2]. Traditional Software Development Methodologies are no longer applicable to develop advanced and complex applications. Project management key challenge is to deliver and identify iterative tasks. Project monitoring, risk management, coordination, planning and changing scope are important activities of project managers. In the market plenty of project management best practices exist, project managers are getting advantage by picking up correct one. This research aim is to give detailed view of the advance methodologies (extreme Programming (XP), Scrum, RUP and PMBOK) in software project management and how these methodologies map to the project management. How these modern methodologies cover 9 knowledge areas and 5 process of project management. This study is important because still many software development companies, which follow traditional software development methodologies, suffer to cope with regular changes happening even if there are different ways to tackle changes offered by these methodologies. This paper is organized as follows, section 2 will review the literature; section 3 will explore agile methodologies XP, Scrum and RUP along with PM mapping; and finally section 4 will conclude with discussion and future work.

2. Review of Related Literature

During software development vital procedure to monitor is “How project management being carried out”. A well managed project generates positive results as well as helping to represent the activities sequence, which project managers are performing. Project management key challenge is to deliver and identify iterative tasks. Project monitoring, risk management, coordination, planning and changing scope are important activities of project managers. [7][8]. Developments of projects with economy uncertainty are adding more pressure to achieve maximum value. Project planning is laborious and time consuming activity in conventional methods of software development. Modern methodologies are leading to produce high quality software products. Agile methodology XP offers milestones which are mostly resolved by their preference and steadily delivered [9]. Project management challenge is delivery and identifications of repetitive tasks. Plenty of project management framework are exists now, project managers are taking advantage by choosing right practice [6]. One of the best practices is PMBOK (Project Management Body of Knowledge) presented by Project Management Institute [12]. PMBOK defines 44 processes of project formally which illustrate during project life cycle. The implementations of these processes are structured into 2 axes: 9 knowledge areas and 5 process groups which will be elaborate thoroughly in this section. In each process there is

some inputs (planning, documentation, designing, other data, etc), outputs (products, documentation), techniques and tools, these are not specific [13]. These processes are guideline who wants to implement.

a. Process Groups of Project Management

Initiating processes: Performed authorizing and define phase or new project. The process of initiating will take a part in every phase. So that project phases cannot be equal to process groups. Bear in mind that project phases may be not similar; however five process groups will be part of every project. There is couple of key points which need to address to the initiating of processes. First the development of the project charter and second is identification of project stakeholders and last one is project statement. Project end also needed in processes initiating. Somebody have to start the activities and make sure that work completed by the team, lessons learned documents, assignments of resources, and client satisfaction thorough work.

Planning processes: comprises on organizing and sustaining an effective plan to make sure that project focusing on the organization requirements and objectives. Currently for projects there is numerous plans, like plan for management of scope, plan for management of cost, plan for management of procurement, plan for communication management, plan for risk management, human resource and so on, specify all the knowledge areas associated with project. For instance, to complete the task of project a plan should be build by project team, schedule associate tasks for a particular work, calculating cots of executing the job, acquiring resources to achieve the task and etc. To calculate altering terms and conditions of project within the organization, teams frequently review plans while every stage of project.

Executing processes: comprises on aligning people and assets to fulfill the different plans and developments of products, services and output of the phase or project. For instance processes executing consist of information distribution, organizing expectation of stakeholders, do quality assurance and project team development.

Controlling and monitoring processes includes continuous evaluation and growth monitoring to make sure that project team fulfilling objectives of the project. The staff and project managers are observing and determining the growth against plans and when take necessary actions when required. Reporting performance is an ordinary process in controlling and monitoring, where stake holders may find out any required changes which can be necessary for the project to keep on track.

Closing processes this process group performed to settle all the activities against the process groups to officially finish the project. Mostly in this group administrative actions are frequently involved, for example project files archiving, contracts closing, documentation of learned lesions, and

officially receive acceptance of work which is delivered as a component of project or phase [14].

b. Project Management 9 Knowledge Areas

Integration management depicting activates and processes which integrate various facets of project management. It comprises of the “Develop Project Charter”; “Develop Preliminary Project Scope Statement”; “Develop Project Management Plan”; “Direct and Manage Project Execution”; “Monitor and Control Project Work”; “Integrated Change Control” and “Project Closure”.

Scope management wrap up processes which take responsibility of project scope controlling. It contains “Create Work Breakdown Structure (WBS)”; “Scope Planning”; “Scope Definition”; “Scope Verification” and “Scope Control”.

Time Management elaborating the processes which are concerned to project completion on well-timed. It contains “Activity Resource Estimating”; “Activity Definition”; “Activity Sequencing”; “Activity Duration Estimating”; “Schedule Development” and “Schedule Control”.

Project Cost Management, these are the process for controlling and planning of budget for the project. It is describing “determine budgeting”, “cost control” and “cost estimation.”

Project Quality Management defining processes which are responsible to make sure that project is meeting the objectives which are required to complete the project. It contains “Quality Planning”, “Perform Quality Assurance” and “Performing Quality Control”.

Project Human Resource Management includes all necessary processes for organizing and managing the project team. It consists of “Human Resource Planning”; “Acquire Project Team”; “Develop Project Team” and “Manage Project Team”.

Project Communications Management defining processes which are related to the project communication mechanisms, and timely related to proper generation, accumulation, storage, distribution and eventual nature of project information. It contains “Communications Planning”; “Information Distribution”; “Performance Reporting” and “Manage Stakeholders”.

Project Risk Management define concerned processes which are related to project risk management.. It comprises of “Qualitative Risk Analysis”; “Risk Management Planning”; “Risk Identification”; “Quantitative Risk Analysis”; “Risk Response Planning” and “Risk Monitoring and Control”.

Project Procurement Management defining all processes which are dealing with product acquiring and services required for project completion.

It comprises of “Request Seller Responses”, “Plan Purchases and Acquisitions”; “Plan Contracting”; and “Select Sellers”.

3. Agile methodologies

Structure methods were developed from waterfall model and about 1995 agile methodologies were introduced in this response. Structure methods are slow and heavy. Agile methodologies facilitate developers to eliminate complicated and technical behaviors of traditional methodologies as most developers don’t like to waste time in testing, detecting errors and ultimately changing code again and again [5]. There for, with the help of agile methodologies developers are ready to do the changes and fixing issues easily, even problem may occur nearly completion of the project. When programmers are working they have preferences and agile methodologies motivating them to do additional work. Normally they have preference programming and design to be documented and tested. Agile methodologies are concentrating on mostly similar programming activates, that are generally concurrent with the same interest of programmers [5].

3.1 Extreme Programming (XP)

There are many agile methods exists some are (RUP (Rational Unified Process), XP (Extreme Programming), Scrum, Pragmatic Programming, Crystal Methods and Scrum), XP is the most famous in all of these. Coding is measured as main feature of extreme programming. XP was presented by Ward Cunningham and Kent Beck. Both of them recognized the ability of main in “loop pair programming”. There were several practices used by expert developers and those were lost in complex software methods and processes defined in XP approach to development [1].

XP VS PMBOK [16]

PMBOK	XP
Project Scope Management	
<ul style="list-style-type: none"> ➤ Gathering requirements (Requirement ,RMP, RTM) <ul style="list-style-type: none"> ➤ Identify scope (Scope statement, deliverables , exclusion/inclusions, assumptions/constraints) ➤ Develop work breakdown structure (WBS, WBS diagram, WBS dictionary) ➤ Scope verification (Accepted features, CRs) <ul style="list-style-type: none"> ➤ Scope Control (Change Control) 	<ul style="list-style-type: none"> ➤ Collecting user requirements or stories <ul style="list-style-type: none"> ➤ Planning for release ➤ Planning for small releases
Project Time Management	
<ul style="list-style-type: none"> ➤ Identify Activity (Iteration-level, activity list, low level in WBS) <ul style="list-style-type: none"> ➤ Serialization of Activities (Network Diagram, Critical Path) <ul style="list-style-type: none"> ➤ Estimate Activities 	<ul style="list-style-type: none"> ➤ Planning for release ➤ Planning for iterations

<ul style="list-style-type: none"> ➤ Development Schedule such as strategic level, Project schedule and baseline ➤ Control Schedule (PP updates, SV, SPI) 	
Project Cost Management	
<ul style="list-style-type: none"> ➤ Cost Budgeting (Cost performance baseline) ➤ Cost Control (Earned Value Management, CPI, EAC) 	Not available
Project Quality Management	
<ul style="list-style-type: none"> ➤ Develop the Project Team (team-building, training, soft skills development, performance assessments) ➤ Manage the Project Team (updates to PP and Org, corrective/preventative actions) 	<ul style="list-style-type: none"> ➤ Concentrating on acceptance , unit testing <ul style="list-style-type: none"> ➤ Based on simplicity ➤ Using project principles
Project Human Resource Management	
<ul style="list-style-type: none"> ➤ Human Resource Planning (HR Plan using project schedule and PP) <ul style="list-style-type: none"> ➤ Project Team acquiring <ul style="list-style-type: none"> • (Staffing Management Plan: staff acquisition, calendars, staff release) 	<ul style="list-style-type: none"> ➤ Rotating staff to numerous positions. <ul style="list-style-type: none"> ➤ Pair of programmers working together. ➤ Providing excellent working conditions (without overtime).
Project Communications Management	
<ul style="list-style-type: none"> ➤ Identify Stakeholders (stakeholder register and management strategy) <ul style="list-style-type: none"> ➤ Communication Planning (Comm, Mgmt Plan) ➤ Information Distribution ➤ Manage Stakeholder expectation <ul style="list-style-type: none"> ➤ Performance Reporting ➤ (EVA, histograms, S-curves) 	<ul style="list-style-type: none"> ➤ Use of system metaphor ➤ Always customer presented ➤ On a daily basis meetings ➤ Project standard are used
Project Risk Management	
<ul style="list-style-type: none"> ➤ Risk Planning (Risk Management Plan – methodology, risk categories, risk (probability x impact) matrix, tolerances, reporting) <ul style="list-style-type: none"> ➤ Risk Identification (Risk Register) ➤ Risk Response Planning (strategy for +/-ve risks, Avoidance, Mitigation, Acceptance, Transfer) ➤ Monitor and Control Risks 	<ul style="list-style-type: none"> ➤ Make prototype to bound the risk
Project Procurement Management	
<ul style="list-style-type: none"> ➤ Plan Procurements (procurement mgmt. plan – make or buy, criteria, SOWs) <ul style="list-style-type: none"> ➤ Conduct Procurements (awards) ➤ Administer Procurements (procurement documentation, PP updates) 	<ul style="list-style-type: none"> ➤ There is no availability

Scrum

Scrum is very simple and helpful framework for management of cross functional teams to get additional high quality output. Teams are allowed to select the amount of work according to their capacity and to produce their best which results in an extreme creative work environment. Based on business importance scrum concentrate on work priority, making better quality what they are delivering and generating more revenue, especially late gross. Make pattern to accept the change requirements while the process of development in short time, steady intervals. In scrum teams are allowed to make priority of requirements which is given by customer, and in real time working according to the need of customer. Through all this scrum is offering to the customer what they need at delivery time (achieving customer satisfaction) during excrete waste (that work is not valuable for the customer) [17]. Scrum is very plain and easy “inspect and adapt” framework that consist of roles, ceremonies and artifacts [18]. These are designed for software delivery in sprints, normally in thirty day cycles. The model scrum has three main components:

- **Roles:** Owner of product, Scrum Master, Team.
- **Ceremonies:** Planning Sprint, Review Sprint, and Scrum Daily Meeting
- **Artifacts:** Burn down Chart, Backlog of Product and Backlog Sprint

Practice / PMI Process	Practice / Scrum Process
Scope Management	
<ul style="list-style-type: none"> ➤ Gathering requirements (Requirement ,RMP, RTM) ➤ Identify scope (Scope statement, deliverables , exclusion/inclusions, assumptions/constraints) ➤ Develop work breakdown structure (WBS, WBS diagram, WBS dictionary) 	<ul style="list-style-type: none"> ➤ Develop a list of product backlog items & prioritize them ➤ Choose product backlog items for the next release ➤ Develop a work breakdown structure of features for the coming release. ➤ Moreover divide it into small individual features per each sprint ➤ Through feature acceptance (by PO); utilizing product backlog & tracing tools ➤ Managing through product backlog & PO protect the iteration.
<ul style="list-style-type: none"> ➤ Scope verification (Accepted features, CRs) <ul style="list-style-type: none"> ➤ Scope Control (Change Control) 	
Time Management	

<ul style="list-style-type: none"> ➤ Identify Activity (Iteration-level, activity list, low level in WBS) <ul style="list-style-type: none"> ➤ Serialization of Activities (Network Diagram, Critical Path) <ul style="list-style-type: none"> ➤ Estimate Activities ➤ Development Schedule such as strategic level, Project schedule and baseline ➤ Control Schedule (PP updates, SV, SPI) 	<ul style="list-style-type: none"> ➤ Scenarios are selected for the next sprint by the team; tasks are defined to accomplish the release features <ul style="list-style-type: none"> ➤ Scrum team conducting during sprint planning meetings. ➤ Task Estimation is performed for story ➤ Development of overall schedule for the release <ul style="list-style-type: none"> ➤ Feature for the sprints are estimated (Just-In-Time planning) ➤ Estimation are doing based on empirical data also called team velocity ➤ Team is responsible for managing sprint features differentiation
Cost Management	
<ul style="list-style-type: none"> ➤ Cost Estimation (Individual activity cost are estimated for summary and detail using different cost estimation tools or methods such analogous, Parametric, 3-point (PERT) estimation, Expert Judgment or PM software) <ul style="list-style-type: none"> ➤ Cost Budgeting (Cost performance baseline) ➤ Cost Control (Earned Value Management, CPI, EAC) 	<ul style="list-style-type: none"> ➤ Top-down cost estimation is performed of the releases & sprints, using tools such as Project Velocity, Ideal Days, Analogy, Expert Opinion or Disaggregation. ➤ Bottom-up cost estimation approach of the sprint calculated. <ul style="list-style-type: none"> ➤ Further calculation on the estimates depends on changes, esoteric/ extra functionality and modern technology. ➤ Feature or Schedule buffer is adding <ul style="list-style-type: none"> ➤ Cost Baseline is created. ➤ Review the cost baseline after two sprints (when actual team velocity is known) ➤ Product Burn Down Charts is using as Cost controlling tool; use Agile EVM in some projects
Quality Management	

<ul style="list-style-type: none"> ➤ Develop the Project Team (team-building, training, soft skills development, performance assessments) ➤ Manage the Project Team (updates to PP and Org, corrective/preventative actions) <ul style="list-style-type: none"> ➤ Quality Planning (Quality Management Plan, Process Improvement Plan, Quality Metrics) ➤ Quality Assurance (quality audits, process analysis, QA department) ➤ Quality Control (7 basic tool of QC, Statistical sampling, validated deliverables, QC department) 	<ul style="list-style-type: none"> ➤ Consider the scrum principles or values (commitment, openness, focus, courage and respect) to develop and build team <ul style="list-style-type: none"> ➤ Foster self-organization in team building; co-location ➤ Facilitate and mentor the self-organize team by providing continuous feedback <ul style="list-style-type: none"> ➤ Be as a servant-leader ➤ Trusted quality is maintained in Scrum practices (Definition of Done, working software, early & frequent testing, impediment removal, coding/testing standards, metrics) ➤ Scrum team is responsible for high quality in project <ul style="list-style-type: none"> ➤ QA in Scrum performed by the development team, third party can be perform as an extra sprint (sprint N+1) to regulate compliance requirements
Human Resource Management	
<ul style="list-style-type: none"> ➤ Human Resource Planning (HR Plan using project schedule and PP) <ul style="list-style-type: none"> ➤ Project Team acquiring (Staffing Management Plan: staff acquisition, calendars, staff release) 	<ul style="list-style-type: none"> ➤ Team size depends on the project nature & schedule as well budget. ➤ Plan for seven (plus or minus 2) fully-dedicated members ➤ Distribute the project into small teams if the scope is big. ➤ Initially build a cross-functional team and sustain up to the end of project.
Communication Management	

<ul style="list-style-type: none"> ➤ Identify Stakeholders (stakeholder register and management strategy) ➤ Communication Planning (Comm, Mgmt Plan) ➤ Information Distribution ➤ Manage Stakeholder expectation <ul style="list-style-type: none"> ➤ Performance Reporting ➤ (EVA, histograms, S-curves) 	<ul style="list-style-type: none"> ➤ Define the stakeholders and include a PO in the Scrum team. ➤ Project status can measure by release/sprint backlogs and Burn down Charts ➤ Visual Indices about project status are information warners. ➤ Stakeholder management is done through business representative (PO). ➤ Cost and Schedule are predictable but steady. ➤ Release/Sprint Burndown Charts showing live performance of project features, i.e. VI of project status
Risk Management	
<ul style="list-style-type: none"> ➤ Risk Planning (Risk Management Plan – methodology, risk categories, risk (probability x impact) matrix, tolerances, reporting) ➤ Risk Identification (Risk Register) ➤ Risk Response Planning (strategy for +/-ve risks, Avoidance, Mitigation, Acceptance, Transfer) ➤ Monitor and Control Risks 	<ul style="list-style-type: none"> ➤ Risk planning are part of sprint/release planning and review meetings. ➤ Full team is involved in risk planning & mitigation. ➤ Introducing risks in daily stand up, sprint / release planning & reviews; via ad hoc SWOT Analysis, Checklists, Brainstorming etc ➤ Avoidance (change scope or resources), Mitigation (POC), Transfer (Outsource), Acceptance (Contingency plans) ➤ Monitoring taking as part of the team planning and review
Procurement Management	

<ul style="list-style-type: none"> ➤ Plan Procurements (procurement mgmt. plan – make or buy, criteria, SOWs) ➤ Conduct Procurements (awards) ➤ Administer Procurements (procurement documentation, PP updates) ➤ Close Procurements 	<ul style="list-style-type: none"> ➤ Team provides input for defining requirements of procurement using pre-iterations or concepts (POCs) ➤ Scrum team performs evolutions & provides input to contract documents ➤ Scrum allowing early termination of contracts, quoting as ‘Money for Nothing’ contract type – a customer can cancel a contract at the end sprints by paying 20-30% contract value ‘Change for Free’ ➤ Extra sprint (Sprint N+1) may be used for formal administration task; project sign off retrospectives
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Rational Unified Process (RUP)

The RUP or in full Rational Unified Process is a methodology of software design paradigm based on iterative process, initially created by the company named Rational Software Company. The Company Rational Software later acquired in 2003 by IBM. RUP is not a concrete perspective rather the whole software design process is explicitly explained with high level of details, resulting in highly adaptable and has high applicability on medium to large software projects. The RUP methodology is generally considered as out of the box ready to implement process, but as RUP is modular in nature, it is designed and documented by specific type of language regarded as UML or Unified Modeling Language, the ease of use and understandability makes it a preferred choice to adapt the methodology for the particular and specific needs of single project or many projects within an organization [21]. The key difference between RUP and its counterparts is that, RUP doesn't follow the traditional waterfall approach. The different phases like requirements gathering, system analysis, design, implementation, integration and testing doesn't have a stringent sequence to be followed. RUP makes use of iterative approach so that a software product is designed, created and released in successions of incremental iterations, in which every iteration may or may not include all the phases of traditional SDLC cycle.

PMI vs RUP

Practice / PMI Process	Practice / Scrum Process
Scope Management	
<ul style="list-style-type: none"> ➤ Collect Requirements (Requirement ,RMP, RTM) ➤ Define Scope (Scope statement Deliverables , exclusion/inclusions, Assumptions/constraints) ➤ Create work breakdown structure (WBS, WBS diagram, WBS dictionary) ➤ Verify Scope (Accepted features, CRs) <ul style="list-style-type: none"> ➤ Control Scope (Change Control) 	<ul style="list-style-type: none"> ➤ Rational Unified Process handling Requirements ➤ Directly there is no mapping with RUP ➤ Iteration assessment and milestone reviewing ➤ Iterations and phases planning
Time Management	
<ul style="list-style-type: none"> ➤ Define Activity (Iteration-level, activity list, lowest level in WBS) ➤ Sequence Activities (Network Diagram, Critical Path) <ul style="list-style-type: none"> ➤ Estimate Activities ➤ Schedule Development ➤ (Strategic level, Project schedule and baseline) ➤ Control Schedule (PP updates, SV, SPI) 	<ul style="list-style-type: none"> ➤ Iterations and phases planning <ul style="list-style-type: none"> ➤ Design plan for iteration ➤ Iteration Assessment ➤ Problems and exception handling ➤ Reassessment of project planning
Cost Management	
<ul style="list-style-type: none"> ➤ Cost Estimation <ul style="list-style-type: none"> ➤ (Activity cost estimation for summary and detail using analogous, Parametric, 3-point (PERT) estimation, Expert Judgment or PM software) ➤ Cost Budgeting (Cost performance baseline) ➤ Cost Control (Earned Value Management, CPI, EAC) 	<ul style="list-style-type: none"> ➤ Iterations and phases planning ➤ Directly there is no mapping with RUP
Quality Management	
<ul style="list-style-type: none"> ➤ Quality Planning <ul style="list-style-type: none"> ➤ (Quality Management Plan, Process Improvement Plan, Quality Metrics) ➤ Quality Assurance (quality audits, process analysis, QA department) ➤ Quality Control (7 basic tool of QC, Statistical sampling, validated deliverables, QC department) 	<ul style="list-style-type: none"> ➤ Formulate plan for quality assurance ➤ RUP handling conditions for change management and configuration management
Human Resource Management	
<ul style="list-style-type: none"> ➤ Human Resource Planning (HR Plan using project schedule and PP) <ul style="list-style-type: none"> ➤ Project Team acquiring ➤ (Staffing Management Plan: staff acquisition, calendars, staff release) 	<ul style="list-style-type: none"> ➤ Specifying project organization and staff acquiring. ➤ Work allocation and scheduling and problem and exceptions handling
Communication Management	

<ul style="list-style-type: none"> ➤ Identify Stakeholders (stakeholder register and management strategy) ➤ Communication Planning (Comm, Mgmt Plan) ➤ Information Distribution ➤ Manage Stakeholder expectation ➤ Performance Reporting ➤ (EVA, histograms, S-curves) 	<ul style="list-style-type: none"> ➤ Rational unified process handling requirement and business modeling ➤ Software development compilation plan <ul style="list-style-type: none"> ➤ Status report ➤ Iterations and phases planning <ul style="list-style-type: none"> ➤
Risk Management	
<ul style="list-style-type: none"> ➤ Risk Planning (Risk Management Plan – methodology, risk categories, risk (probability x impact) matrix, tolerances, reporting) ➤ Risk Identification (Risk Register) ➤ Risk Response Planning (strategy for +/-ve risks, Avoidance, Mitigation, Acceptance, Transfer) ➤ Monitor and Control Risks 	<ul style="list-style-type: none"> ➤ Formulate plan for risk management ➤ Risk assessment and identifications
Procurement Management	
<ul style="list-style-type: none"> ➤ Plan Procurements (procurement mgmt. plan – make or buy, criteria, SOWs) ➤ Conduct Procurements (awards) ➤ Administer Procurements (procurement documentation, PP updates) ➤ Close Procurements 	<ul style="list-style-type: none"> ➤ Directly there is no mapping with rational unified process

4. Conclusion & Future Work

RUP, XP and Scrum are project management techniques but still not specifying all required facets to cover all project management’s areas aspects, in conventional logic specifically. Partially this was expected but the processes of conventional project management are completely compared and defined with methodologies of agile and considered as “empirical”. Hence, the following we can conclude from this study.

Scrum, XP and RUP are focusing in the following knowledge areas:

- Management of Scope, requirements management.
- Human resource management.
- Quality management, officially not defined, using standards, frequent testing and reviews
- Document and deliveries.
- Software projects specific

The other side, following knowledge areas are not covered by agile methodologies

- explicitly risks are not managed,
- Agile methodologies are not handling cost.
- Procurement management is not covered at all.
- Cover some aspects of project.

Therefore, by connecting PMBOK with agile methodologies will be benefited for the community belongs to software project management. In the future it is required to have a detailed mapping between PMBOK processes and agile methodologies.

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