Master of science in Engineering and Management

THESIS TITLE

Analysis, census and competence consolidation within the project, program and portfolio management applied to the automotive industry.

Supervisor:
Alberto De Marco

Co-Supervisor:
Paolo Eugenio Demagistris

<div align="right">

Submitted by:
Syed Sareer Ahmad Shah

</div>

ABSTRACT

The current project management approaches that are practiced in the automotive industry, poses a great difficulty for the platforms/teams in adaptation to the rapidly changing industry and company needs. The Agile transformation in new product development has imposed the need of re-processing the object management techniques with in major OEMs.

The thesis report briefly covers the industry standard project management practices specifically agile methodologies like Kanban and Scrum that can best meet the requirements of the Automotive Industry.

To understand precisely, an empirical approach is used by taking a case study of SumiRiko S.P.A a major supplier of automotive components of leading OEMs, for the Analysis.

The documents of the pilot program started by SumiRiko were studied for more insight of the problem understanding and the desired approach to solve the problems that project teams were facing. A detailed Gemba walks observation for three months is carried out to collect the qualitative data of actual practice the team were doing and comparing it to the standard agile practice (Scrum).

 A general Gap-Analysis is developed at the end of the observation phase and the problems were identified using the Ishikawa problem tree and is-is not problem analysis to conclude the root causes of the problems before planning any strategy. The major problem identified is the lack of the team work and integration of the individuals in the cross-functional teams. The causes observed are lack of training, leadership & vision and non-standardized project management processes.

The strategy selected for the first loop of deming cycle is to fill the gaps with standard practice i.e using Srcum methodology. To blend the Agile technique with the traditional stage-gate approach and develop a customizable Hybrid model for the new product development, specifically in the product and process design phase of the APQP. A strong ICT network and PMO tool like Jira can be used to strengthen the integration of the team and transparent information flow to avoid the data loss and increase the productivity of the team.

TABLE OF CONTENTS

CHAPTER#1 INTRODUCTION

INTRODUCTION AND RESEARCH PURPOSE:

Analysis, census and competence consolidation within the project, program and portfolio management applied to the automotive industry.

1.1. RESEARCH PROGRAM PURPOSE:

To analyze the current maturity level of Project, Program and Portfolio Management within the OEM Automotive industry using matrices and methods related to IPMA Project Excellence Baselines and in relation to IATF 2016 and ISO/TS standards. The key areas of research interest are People and Purpose, Processes and Resources. To identify and propose the best practices for great Leadership implication and strategic alignment with goals for project success. To consistently improve the effective and efficient use of Processes and Resources for the desired Project outcomes. The focus will be on Project and Program, complementing two other IPMA standards i.e. IPMA Individual competence baselines (ICB) to assess and improve the individual competence of Project, Program and Portfolio leaders and IPMA Organizational competence baselines (OCB) to assess the competences of organizations that run projects (IPMA Delta Assessment). The goal is to have a deep analysis and clear understanding of the current situation and trends in the industry in P3M practices and to propose the best Agile PM (Scrum) framework for value creation in automotive sector.

For the purpose stated above, a joint research program between PM Lab at Politecnico and SumiRIko S.P.A will be carried out.

1.2. OBJECTIVES:

Creating a framework that allows organizations, in general, and in the specific OEM Automotive sector (SumiRiko S.P.A) to,

a) Assess the initial situation of the resources available for P3M implementation.
b) Define the ideal objectives of the resources portfolio available for P3M implementation.
c) Strategically and tactically plan the capacity building and create human capital that allows overcoming the crash between the situations stated.
d) Define the resources allocation methods for development of platforms which apply the P3M methods.
e) Design a business plan for evaluation and improvement of continuous macro processing training and skills management.

1.3. RESEARCH QUESTIONS TO BE EXPLORED:

a) Do the current PM practices facilitate and align with the strategic goals of the Automotive industry?
b) How to deal with PP & P people including teamwork, Communication, performance, development and recognition?
c) How PP & P Management Standards Adapts and Fits to the requests of internal and external parties?
d) How does the frame work, teamwork and communication translate into a PP & P management standard? (IPMA Baselines and Scrum Methodology)

1.4. TRADITIONAL PROJECT MANAGEMENT APPROACH:

1.4.1 DEFINITIONS:

PROJECT MANAGEMENT:
The set of methods, tools and organizational prerequisites (a thing that is required as a prior condition for something else to happen or exist) needed to coordinate, through a set of processes, roles and skills, an effort temporary and complex consisting of a set of organizational actions aimed at realizing a certain product or set of products or services

PROGRAM MANAGEMENT:
Managing a set of projects related to each other to achieve one or more strategic goals together. Inserting into a program secures some benefits otherwise unsuitable for projects were managed independently of each other. Examples of benefits may be: risk mitigation, obtaining economies of scale, cost optimization, integration of deliverables produced. In this sense, the program has a scope that necessarily goes beyond individual projects and therefore requires a level of "governance " i.e control

Portfolio Management:
Managing the set of projects and programs that an organization (or a division or business unit) manages it in a period related to the company's strategic plan. Each project or program is present in the portfolio is therefore associated with specific business goals and is evaluated in report on the contribution to the business. Portfolio management (project portfolio management) aims to ensure that the priority of individual projects and programs are periodically reviewed to allocate resources and investments coherently and in line with organizational objectives and strategic objectives.

Project in its Internal and External Context
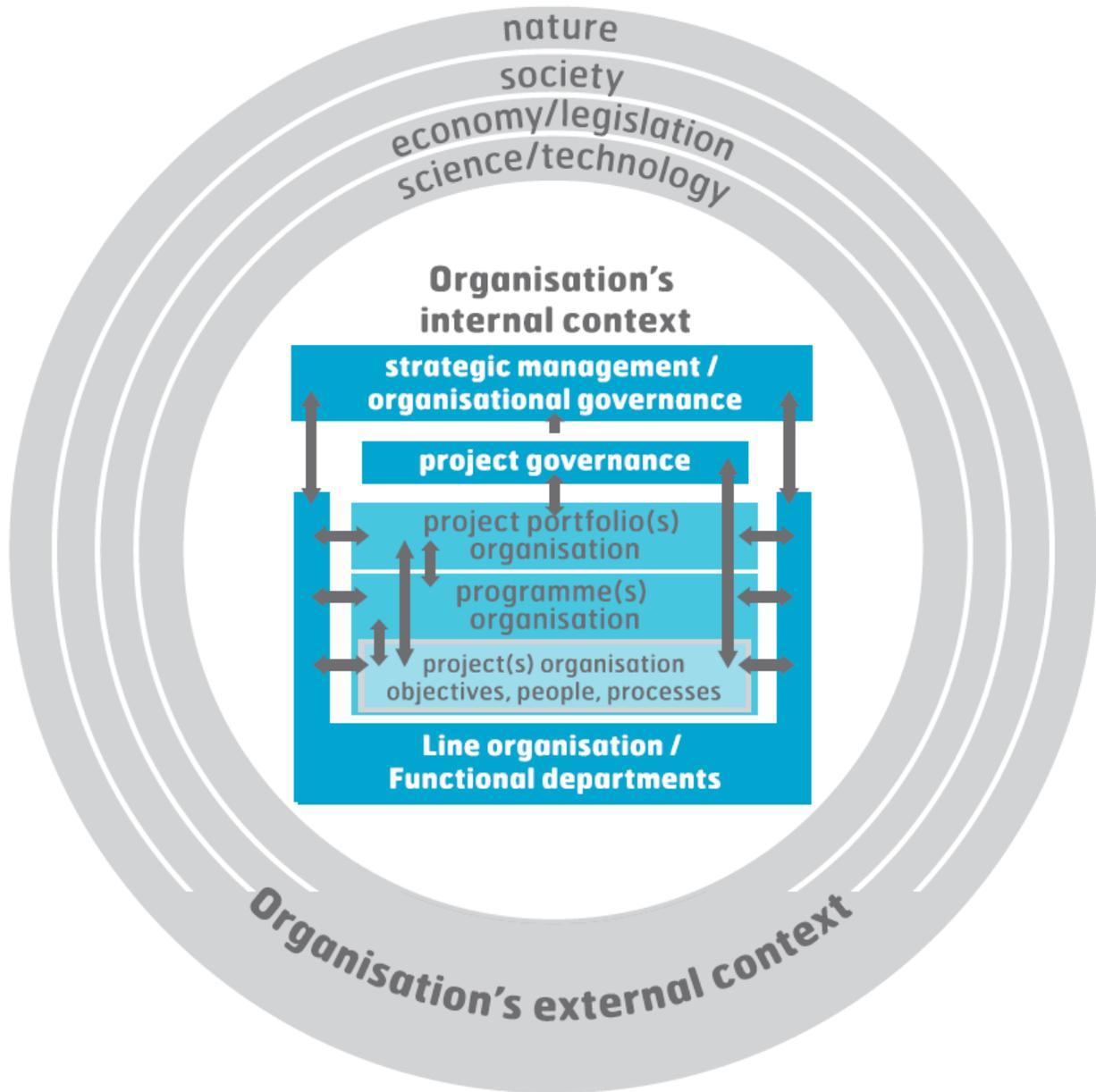
Comparative Overview of Project, Program, and Portfolio Management.

Organizational Project Management	Projects	Programs	Portfolios
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a larger scope and provide more significant benefits.	Portfolios have an organizational scope that changes with the strategic objectives of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	Program managers expect change from both inside and outside the program and are prepared to manage it.	Portfolio managers continuously monitor changes in the broader internal and external environment.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Program managers develop the overall program plan and create high-level plans to guide detailed planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Program managers manage the program staff and the project managers; they provide vision and overall leadership.	Portfolio managers may manage or coordinate portfolio management staff, or program and project staff that may have reporting responsibilities into the aggregate portfolio.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	Success is measured by the degree to which the program satisfies the needs and benefits for which it was undertaken.	Success is measured in terms of the aggregate investment performance and benefit realization of the portfolio.
Monitoring	Project managers monitor and control the work of producing the products, services, or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor strategic changes and aggregate resource allocation, performance results, and risk of the portfolio.

1.4.2 PROJECT MANAGEMENT PROCESSES:

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. This application of knowledge requires the effective management of the project management processes.[1]

A process is a set of interrelated actions and activities performed to create a pre-specified product, service, or result. Each process is characterized by its inputs, the tools and techniques that can be applied, and the resulting outputs.

1.4.3 PROJECT MANAGEMENT PROCESS GROUPS:

- **Initiating Process Group:**
  The Initiating Process Group consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
  Within the Initiating processes, the initial scope is defined and initial financial resources are committed. Internal and external stakeholders who will interact and influence the overall outcome of the project are identified.
  The key purpose of this Process Group is to align the stakeholders' expectations with the project's purpose, give them visibility about the scope and objectives, show how their participation in the project and it associated phases can ensure that their expectations are achieved.

- **Planning Process Group:**
  The Planning Process Group consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives
  The Planning processes develop the project management plan and the project documents that will be used to carry out the project.

- **Executing Process Group:**
  The Executing Process Group consists of those processes performed to complete the work defined in the project management plan to satisfy the project specifications. This Process Group involves coordinating people and resources, managing stakeholder expectations, as well as integrating and performing the activities of the project in accordance with the project management plan.

- **Monitoring and Controlling Process Group:**
  The Monitoring and Controlling Process Group consists of those processes required to track, review, and orchestrate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes

- **Closing Process Group:**
  The Closing Process Group consists of those processes performed to conclude all activities across all Project Management Process Groups to formally complete the project, phase, or contractual obligations. This Process Group, when completed, verifies that the defined processes are completed within all of the Process Groups to close the project or a project phase, as appropriate, and formally establishes that the project or project phase is complete

1.4.4 PROJECT MANAGEMENT PROCESS INTERACTIONS:

The integrative nature of project management requires the Monitoring and Controlling Process Group to interact with the other Process Groups, as shown in Figure.
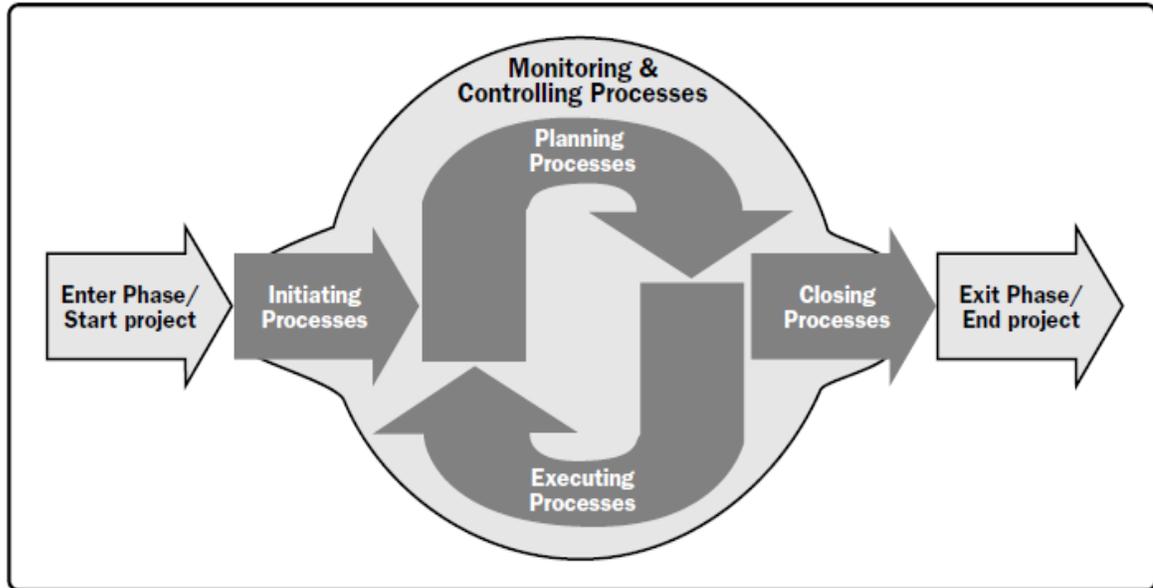
Project management process groups

1.5 KNOWLEDGE AREAS:

Project management processes identified are further grouped into ten separate Knowledge Areas. A Knowledge Area represents a complete set of concepts, terms, and activities that make up a professional field, project management field, or area of specialization. These ten Knowledge Areas are used on most projects most of the time. Project teams should utilize these ten Knowledge Areas and other Knowledge Areas, as appropriate, for their specific project. These knowledge areas are,

- Project Integration Management
- Project Scope Management.
- Project Time Management.
- Project Cost Management.
- Project Quality Management.
- Project Human Resource Management.
- Project Communications Management.
- Project Risk Management.
- Project Procurement Management.
- Project Stakeholder Management.

		Project Management Process Groups				
		Initiating	**Planning**	**Executing**	**Monitoring & Controlling**	**Closing**
Knowledge Areas	**Project Integration Management**	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
	Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
	Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
	Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
	Project Quality Management		8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
	Project Human Resource Management		9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
	Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
	Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
	Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
	Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Project management Process Group and Knowledge Area Mapping

1.6   AGILE PROJECT MANAGEMENT

1.6.1 DEFINITION:

Agile Project Management is an iterative process that focuses on customer value first, team interaction over tasks, and adapting to current business reality rather than following a prescribed plan.

Being Agile means,

- Ability to create and respond to change in order to profit in a turbulent global business environment.
- Ability to quickly reprioritize use of resources when requirements, technology, and knowledge shift.
- Very fast response to sudden market changes and emerging threats, by intensive customer interaction.
- Use of evolutionary, incremental, and iterative delivery to converge on an optimal customer solution.
- Maximizing the business value with right-sized, just enough, and just in time processes and documentation.

1.7.   AGILE MENIFESTO:

The Agile Manifesto is comprised of four foundational values and 12 supporting principles which lead the Agile approach to software development.

1.7.1 STATEMENT OF VALUES:

- **INDIVIDUALS AND INTERACTIONS OVER PROCESSES AND TOOLS**:
  The first value in the Agile Manifesto is "Individuals and interactions over processes and tools." Valuing people more highly than processes or tools is easy to understand because it is the people who respond to business needs and drive the development process. If the process or the tools drive development, the team is less responsive to change and less likely to meet customer needs. Communication is an example of the difference between valuing individuals versus process. In the case of individuals, communication is fluid and happens when a need arises. In the case of process, communication is scheduled and requires specific content.

- **WORKING SOFTWARE OVER COMPREHENSIVE DOCUMENTATION:**
  Historically, enormous amounts of time were spent on documenting the product for development and ultimate delivery. Technical specifications, technical requirements, technical prospectus, interface design documents, test plans, documentation plans, and approvals required for each. The list was extensive and was a cause for the long delays in development. Agile does not eliminate documentation, but it streamlines it in a form that gives the developer what is needed to do the work without getting bogged down in minutiae. Agile documents requirements as user stories, which are sufficient for a software developer to begin the task of building a new function.
  The Agile Manifesto values documentation, but it values working software more.

- **CUSTOMER COLLABORATION OVER CONTRACT NEGOTIATION:**
  Negotiation is the period when the customer and the product manager work out the details of a delivery, with points along the way where the details may be renegotiated. Collaboration is a different creature entirely. With development models such as Waterfall, customers negotiate the requirements for the product, often in great detail, prior to any work starting. This meant the customer was involved in the process of development before development began and after it was completed, but not during the process. The Agile Manifesto describes a customer who is engaged and collaborates throughout the development process, making. This makes it far easier for development to meet their needs of the customer. Agile methods may include the customer at intervals for periodic demos, but a project could just as easily have an end-user as a daily part of the team and attending all meetings, ensuring the product meets the business needs of the customer.

- **RESPONDING TO CHANGE OVER FOLLOWING A PLAN:**
  Traditional software development regarded change as an expense, so it was to be avoided. The intention was to develop detailed, elaborate plans, with a defined set of features and with everything, generally, having as high a priority as everything else, and with a large number of many dependencies on delivering in a certain order so that the team can work on the next piece of the puzzle.

With Agile, the shortness of an iteration means priorities can be shifted from iteration to iteration and new features can be added into the next iteration. Agile's view is that changes always improve a project; changes provide additional value.

1.7.2 AGILE MENIFESTO PRINCIPLES:

01 Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

02 Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

03 Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.

04 Business people and developers must work together daily throughout the project.

05 Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.

06 Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

07 Working software is the primary measure of progress.

08 The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

09 Continuous attention to technical excellence and good design enhances agility.

10 Simplicity—the art of maximizing the amount of work not done—is essential.

11 The best architectures, requirements, and designs emerge from self-organizing teams.

12 At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

1.8. AGLIE METHODOLOGIES:

- Adaptive software development
- Agile modeling
- Disciplined agile delivery
- Dynamic systems development method
- Extreme programming
- Feature-driven development
- Kanban
- Scrum

1.9. THE AGILE TEAM:

An agile team is a cross-functional group of people that have everything, and everyone, necessary to produce a working, tested increment of product. A good agile team picks and choses the management & technical practices that best work for them. (a bad one just picks a couple of practices and falsely believes that somehow "makes them agile"

1.10. LEAN THINKING:

Lean comes from Lean Manufacturing and is a set of principles for achieving quality, speed & customer satisfaction (same as what we're trying to do with agile development, right?). Lean is a set of thinking tools, a collection of interwoven principles that educate, motivate, value and coach people to continuously optimize their work and the way they work.
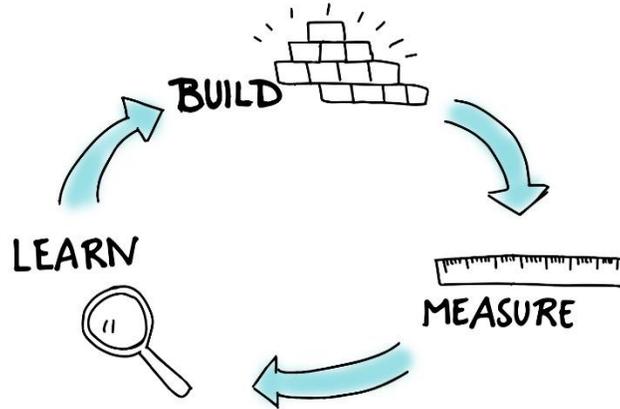
1.11. LEAN PRINCIPLES:

1) Eliminate Waste
2) Build Quality In
3) Create Knowledge
4) Defer Commitment
5) Deliver Fast
6) Respect People
7) Optimize the Whole

In a nutshell, Lean says to relentlessly eliminate anything that isn't adding value and only work on what we absolutely need to be doing at this moment in time. Eliminating waste means eliminating useless meetings, tasks and documentation.). It also means eliminating inefficient ways of working – like multitasking (!) – so we can deliver fast.
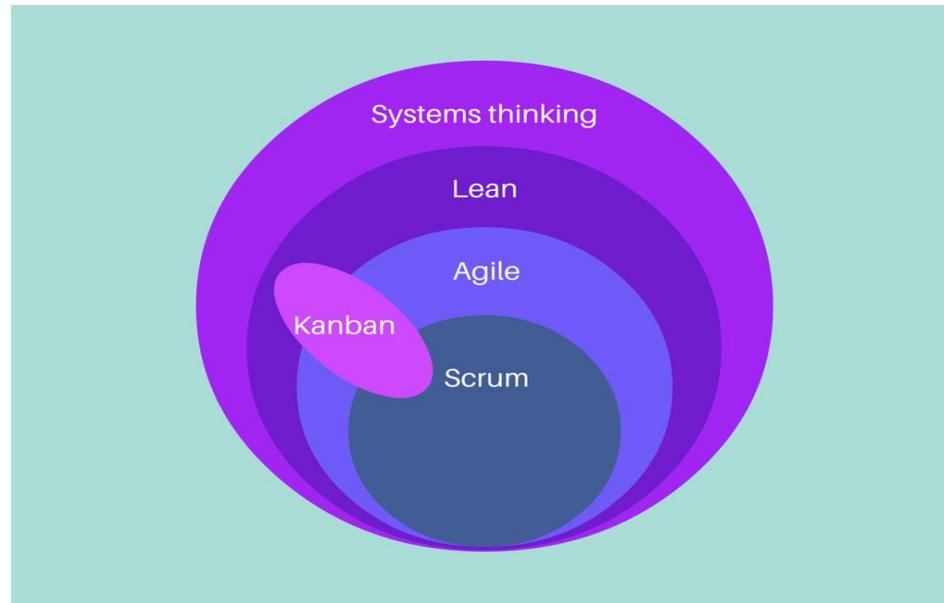
Lean is primarily about respecting PEOPLE in order to optimize VALUE and QUALITY. It is more about creating a context in which people can prosper in order to perform, than about continuously over-stressing the need for results and performance.

1.11.1 PEOPLE:

The corner stone of any system that claims to be Lean are the People. And with 'people' mean every possible actor in the whole ecosystem of the Lean product development/build system: customers, workers, teams, suppliers, managers, internal, external.

The whole system embodies the spirit of KAIZEN, the attitude (!) of continuously minding the process, the product and possible improvements.

It has been said, everyone involved in the value chain works in an integrated way. This is also shown in the relationships with suppliers and external partners. These relationships are not based upon the traditional approach of large volume purchases, big negotiation rounds and pressuring one another.

It's all about building relationships on the sharing of profit (and risk!). Lean contracts incorporate mutual growth.

1.11.2 WASTE:

Before entering the subject of (eliminate) WASTE, let's mention that avoiding waste, via continuous improvement and small step optimizations, is a preferred option.

A good tool or practice to identify structural waste is **VALUE STREAM MAPPING.** All steps and phases in the process of going from 'idea' to 'build' are set out on a timeline. Activities may be labeled as valuable or non-value adding, but possibly also as necessary although not directly value-adding. The Value Ratio can be calculated as the ratio of time spent on Value-adding activities versus Waste activities. It's a figure that may serve as a baseline against which improvement can be measured.

Kanban

This goal of Kanban board tasks are continuous and not bound by time.
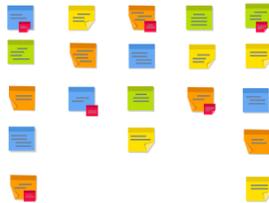
Scrum

The goal of this type of process is to move ALL tasks from the "To Do" to "Done" column in a fixed amount of time, or "Sprint".
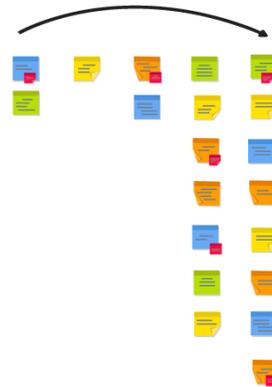
1.12. KANBAN:

Kanban is Japanese word for "visual signal" or "card." The system's highly visual nature allowed teams to communicate more easily on what work needed to be done and when. In simplest terms, KANBAN do better communication through visual management.
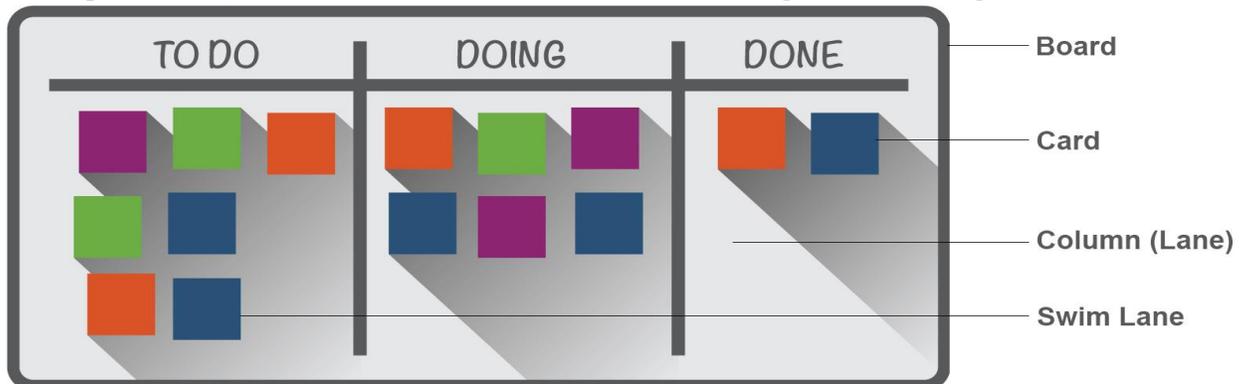
1.12.1 KANBAN PRINCIPLES:

Kanban is about evolution, not revolution.

Kanban is gaining traction as a way to smoothly implement Agile and Lean management methods in tech and non-tech companies around the world.

How it works,

1) **VISUALIZE WORK:**

   By creating a visual model of your work and workflow, you can observe the flow of work moving through your Kanban system. Making the work visible—along with blockers, bottlenecks and queues—instantly leads to increased communication and collaboration.

2) **LIMIT WORK IN PROCESS:**

   By limiting how much unfinished work is in process, you can reduce the time it takes an item to travel through the Kanban system. You can also avoid problems caused by task switching and reduce the need to constantly reprioritize items.

3) **FOCUS ON FLOW:**

   By using work-in-process (WIP) limits and developing team-driven policies, you can optimize your Kanban system to improve the smooth flow of work, collect metrics to analyze flow, and even get leading indicators of future problems by analyzing the flow of work.

4) **CONTINUOUS IMPROVEMENT:**

   Once your Kanban system is in place, it becomes the cornerstone for a culture of continuous improvement. Teams measure their effectiveness by tracking flow, quality, throughput, lead times and more. Experiments and analysis can change the system to improve the team's effectiveness.

1.13. SCRUM:

Scrum is one of the most popular Agile methods. It is an adaptive, iterative, fast, flexible, and effective framework designed to deliver significant value quickly and throughout a project.

The whole process is performed by one cross-functional team working across multiple overlapping phases, during which the team tries to go the distance as a unit, passing the ball back and forth, similar to the way in which a rugby team moves the ball down the field. A scrum is a meeting of the project team to plan its next moves- that is, to decide how to move the ball forward.

Scrum ensures transparency in communication and creates an environment of collective accountability and continuous progress.

A key strength of Scrum lies in its use of cross-functional, self-organized, and empowered teams who divide their work into short, concentrated work cycles called Sprints.
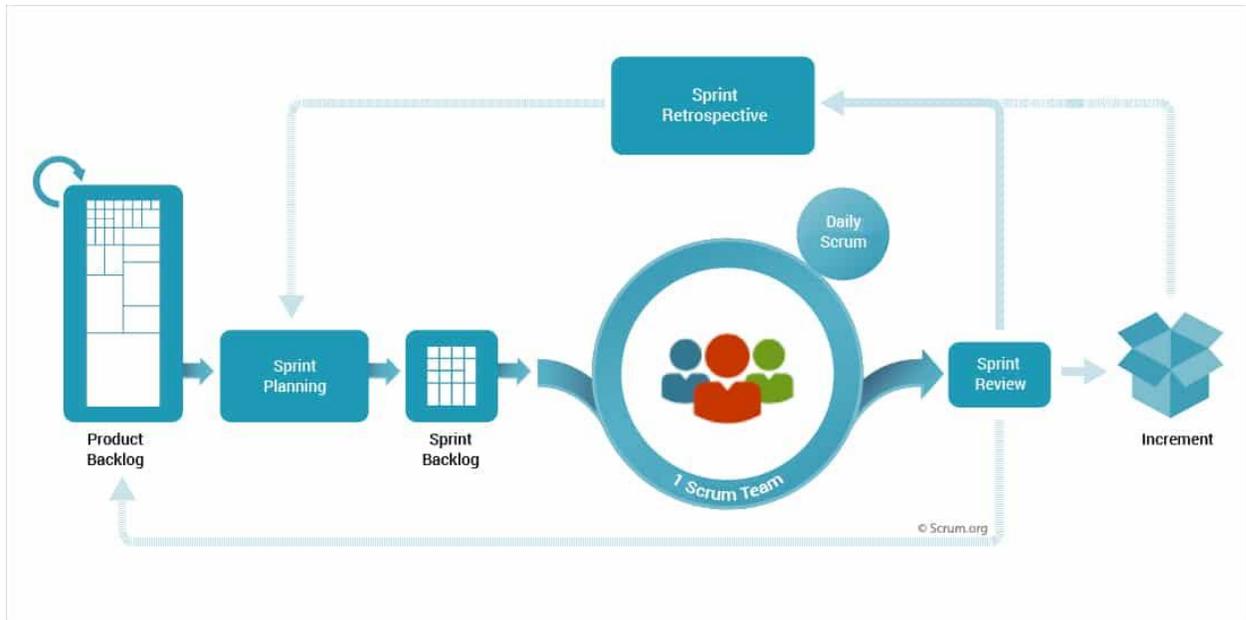
1.13.1. SCRUM PRINCIPLES:

1) **Empirical Process Control:**
This principle emphasizes the core philosophy of Scrum based on
the three main ideas of,

- **TRANSPARENCY:** Transparency allows all facets of any Scrum process to be observed by anyone. This promotes an easy and transparent flow of information throughout the organization and creates an open work culture.
- **INSPECTION**: Use of a common Scrum board and other information radiators which show the progress of the Scrum Team on completing the tasks in the current Sprint. Collection of feedback from the customer and other stakeholders during the Develop Epic(s), Create Prioritized Product Backlog, and Conduct Release Planning processes. Inspection and approval of the Deliverables by the Product Owner and the customer in the Demonstrate and Validate Sprint process.
- **ADAPTION:** Adaptation happens as the Scrum Core Team and Stakeholders learn through transparency and inspection and then adapt by making improvements in the work they are doing.

2) **SELF-ORGANIZATION:**
This principle focuses on today's workers, who deliver significantly greater
value when self-organized and this results in better team buy-in and shared ownership; and an innovative and creative environment which is more conducive for growth.

3) **COLLABORATION:**

This principle focuses on the three core dimensions related to collaborative work: awareness, articulation, and appropriation. It also advocates project management as a shared value-creation process with teams working and interacting together to deliver the greatest value.

4) **VALUE-BASED PRIORITIZATION:**

This principle highlights the focus of Scrum to deliver maximum business value, from early in the project and continuing throughout.

5) **TIME-BOXING:**

This principle describes how time is considered a limiting constraint in Scrum, and used to help effectively manage project planning and execution. Time-boxed elements in Scrum include Sprints, Daily Standup Meetings, Sprint Planning Meetings, and Sprint Review Meetings.

6) **ITERATIVE DEVELOPMENT**:

This principle defines iterative development and emphasizes how to better manage changes and build products that satisfy customer needs. It also delineates the Product Owner's and organization's responsibilities related to iterative development.

1.13.2 SCRUM COMPONENTS:
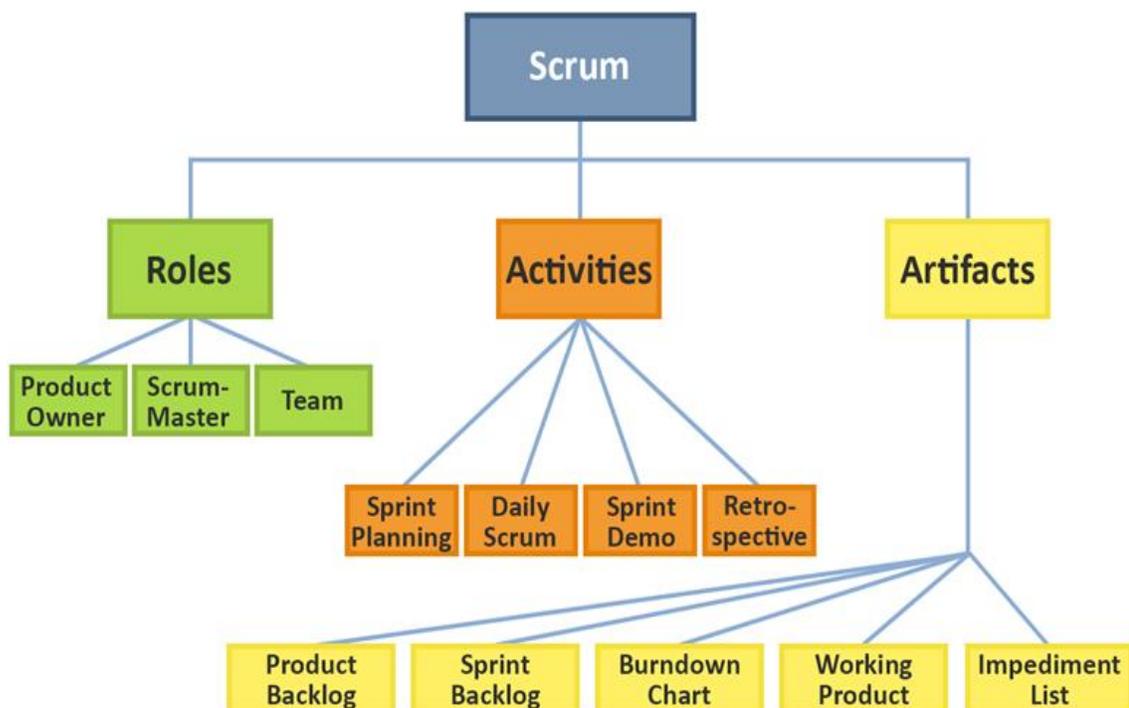
1.13.3 ORGANIZATION(ROLES):

Understanding defined roles and responsibilities in a Scrum project is very important for ensuring the successful implementation of Scrum. The core roles are,

1) **PRODUCT OWNER:** The Product Owner is the person responsible for achieving maximum business value for the project. He or she is also responsible for articulating customer requirements and maintaining business justification for the project. The Product Owner represents the Voice of the Customer.

2) **SCRUM MASTER:** The Scrum Master is a facilitator who ensures that the Scrum Team is provided with an environment conducive to complete the project successfully. The Scrum Master guides, facilitates, and teaches Scrum practices to everyone involved in the project; clears impediments for the team; and, ensures that Scrum processes are being followed.

3) **SCRUM TEAM**: The Scrum Team is the group or team of people who are responsible for understanding the requirements specified by the Product Owner and creating the Deliverables of the project.

Apart from the core roles there are also Non-core roles which are not mandatorily required for the Scrum project and may include team members who are interested in the project. Those includes, Stakeholders, Scrum guidance body and Vendors.
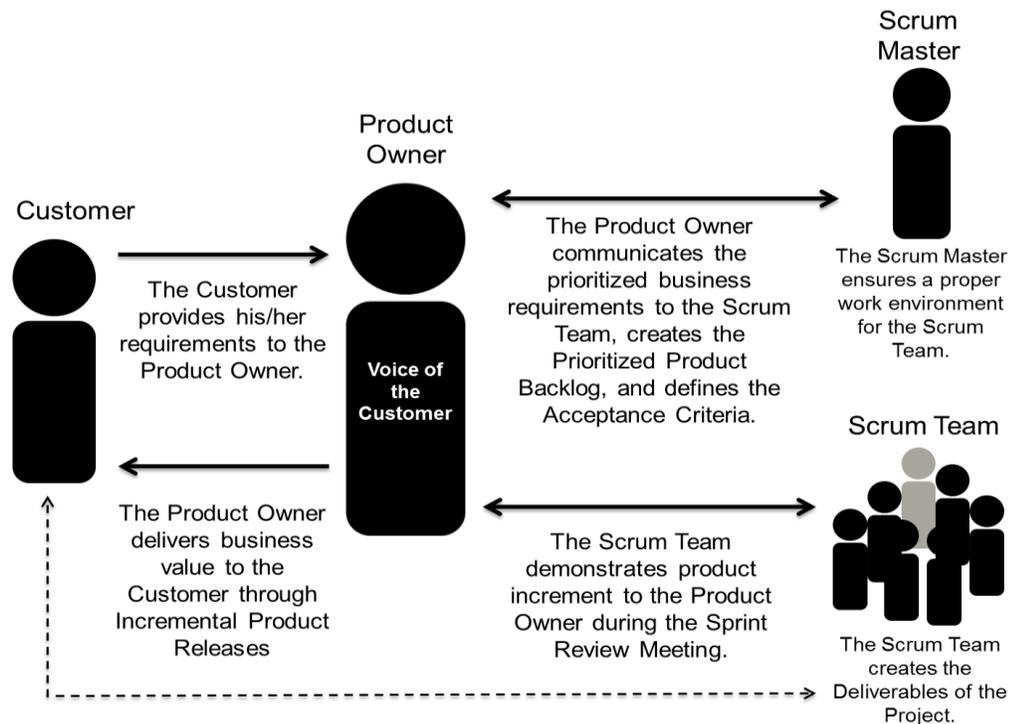
1.13.4 SCRUM EVENTS OR CEREMONIES:

- **SPRINT:**

  The heart of Scrum is a Sprint, a time-box of one month or less during which a "Done", useable, and potentially releasable product Increment is created. Sprints have consistent durations throughout a development effort.

  During the Sprint,

  - o No changes are made that would endanger the Sprint Goal;
  - o Quality goals do not decrease; and,
  - o Scope may be clarified and re-negotiated between the Product Owner and Development Team as more is learned.

  Sprints contain and consist of the Sprint Goal, Sprint Planning, Daily Scrums, the development work, the Sprint Review, and the Sprint Retrospective.

- **SPRINT PLANNING:**

  The work to be performed in the Sprint is planned at the Sprint Planning. This plan is created by the collaborative work of the entire Scrum Team.

  Sprint Planning is time-boxed to a maximum of eight hours for a one-month Sprint.

  Sprint Planning answers the following:

  - o What can be delivered in the Increment resulting from the upcoming Sprint?

- o How will the work needed to deliver the Increment be achieved?
- **SPRINT GOAL:**

  The Sprint Goal is an objective set for the Sprint that can be met through the implementation of Product Backlog. It provides guidance to the Development Team on why it is building the Increment. It is created during the Sprint Planning meeting. As the Development Team works, it keeps the Sprint Goal in mind. To satisfy the Sprint Goal, it implements functionality and technology. If the work turns out to be different than the Development Team expected, they collaborate with the Product Owner to negotiate the scope of Sprint Backlog within the Sprint.

- **DAILY SCRUM:**

  The Daily Scrum is a 15-minute time-boxed event for the Development Team. The Daily Scrum is held every day of the Sprint. At it, the Development Team plans work for the next 24 hours. This optimizes team collaboration and performance by inspecting the work since the last Daily Scrum and forecasting upcoming Sprint work.

  The questions that are discussed are,
  - o What did I do yesterday that helped the Development Team meet the Sprint Goal?
  - o What will I do today to help the Development Team meet the Sprint Goal?
  - o Do I see any impediment that prevents me or the Development Team from meeting the Sprint Goal?

  The Development Team or team members often meet immediately after the Daily Scrum for detailed discussions, or to adapt, or re-plan, the rest of the Sprint's work.

- **SPRINT REVIEW:**

  A Sprint Review is held at the end of the Sprint to inspect the Increment and adapt the Product Backlog if needed. During the Sprint Review, the Scrum Team and stakeholders collaborate about what was done in the Sprint. Based on that and any changes to the Product Backlog during the Sprint, attendees collaborate on the next things that could be done to optimize value. This is an informal meeting, not a status meeting, and the presentation of the Increment is intended to elicit feedback and foster collaboration.

  This is at most a four-hour meeting for one-month Sprints.

  The result of the Sprint Review is a revised Product Backlog that defines the probable Product Backlog items for the next Sprint. The Product Backlog may also be adjusted overall to meet new opportunities.

- **SPRINT RETROSPECTIVE:**

  The Sprint Retrospective is an opportunity for the Scrum Team to inspect itself and create a plan for improvements to be enacted during the next Sprint.

  The Sprint Retrospective occurs after the Sprint Review and prior to the next Sprint Planning. This is at most a three-hour meeting for one-month Sprints.

  The purpose of the Sprint Retrospective is to:

  - Inspect how the last Sprint went with regards to people, relationships, process, and tools;
  - Identify and order the major items that went well and potential improvements; and,
  - Create a plan for implementing improvements to the way the Scrum Team does its work.

The Scrum Master encourages the Scrum Team to improve, within the Scrum process framework, its development process and practices to make it more effective and enjoyable for the next Sprint.

NB: By the end of the Sprint Retrospective, the Scrum Team should have identified improvements that it will implement in the next Sprint.

Implementing these improvements in the next Sprint is the adaptation to the inspection of the Scrum Team itself.

1.13.5 SCRUM ARTIFACTS:

Scrum's artifacts represent work or value to provide transparency and opportunities for inspection and adaptation. Artifacts defined by Scrum are specifically designed to maximize transparency of key information so that everybody has the same understanding of the artifact.

PRODUCT BACKLOG   SPRINT PLANNING   SPRINT BACKLOG

DAILY SCRUM MEETING (EVERY 24 HOURS)

2-4 WEEK SPRINT

POTENTIALLY SHIPABLE PRODUCT INCREMENT

- **PRODUCT BACKLOG:**

  The Product Backlog is an ordered list of everything that is known to be needed in the product. It is the single source of requirements for any changes to be made to the product. The Product Owner is responsible for the Product Backlog, including its content, availability, and ordering.

  A Product Backlog is never complete. The Product Backlog is dynamic; it constantly changes to identify what the product needs to be appropriate, competitive, and useful.

  The Product Backlog lists all features, functions, requirements, enhancements, and fixes that constitute the changes to be made to the product in future releases. Product Backlog items have the attributes of a **description, order, estimate, and value**. Product Backlog refinement is the act of adding detail, estimates, and order to items in the Product Backlog.

- **MONITORING PROGRESS TOWARD GOALS**:

  At any point in time, the total work remaining to reach a goal can be summed. The Product Owner tracks this total work remaining at least every Sprint Review.

  Various projective practices upon trending have been used to forecast progress, like **burn-downs, burn-ups, or cumulative flows.** These have proven useful**.** However, these do not replace the importance of empiricism. In complex environments, what will happen is unknown. Only what has already happened may be used for forward-looking decision-making.
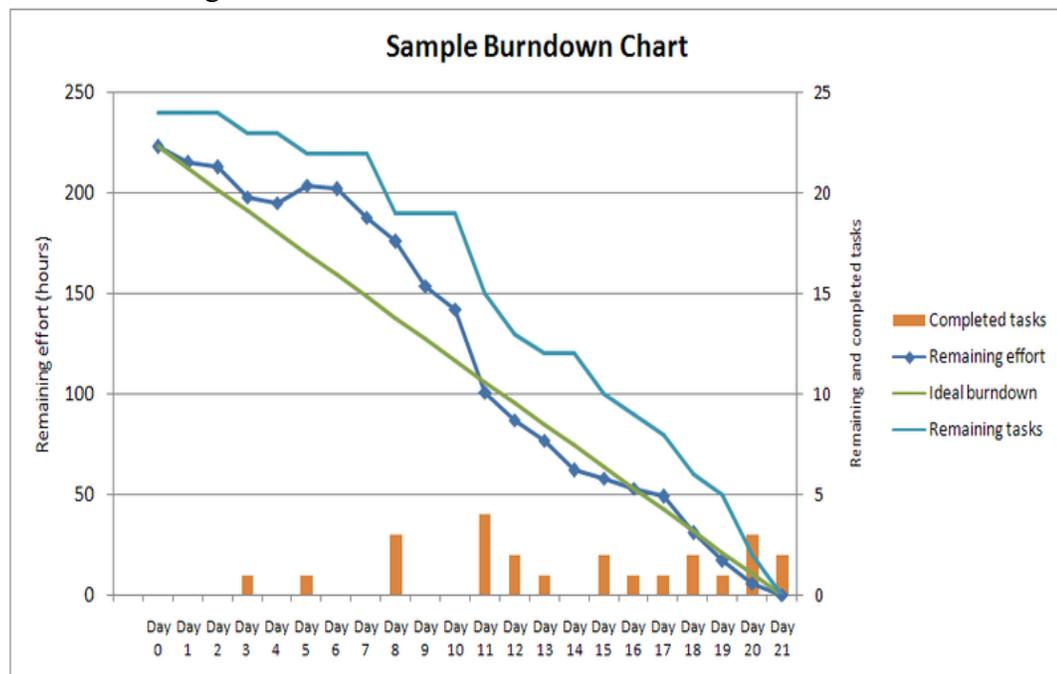
- **SPRINT BACKLOG:**

  The Sprint Backlog is the set of Product Backlog items selected for the Sprint, plus a plan for delivering the product Increment and realizing the Sprint Goal. The Sprint Backlog is a forecast by the Development Team about what functionality will be in the

next Increment and the work needed to deliver that functionality into a "Done" Increment.

The Sprint Backlog makes visible all the work that the Development Team identifies as necessary to meet the Sprint Goal.

NB: To ensure continuous improvement, it includes at least one high priority process improvement identified in the previous Retrospective meeting.

As new work is required, the Development Team adds it to the Sprint Backlog. As work is performed or completed, the estimated remaining work is updated.

NB: Only the Development Team can change its Sprint Backlog during a Sprint.

- **MONITORING SPRINT PROGRESS:**
  At any point in time in a Sprint, the total work remaining in the Sprint Backlog can be summed. The Development Team tracks this total work remaining at least for every Daily Scrum to project the likelihood of achieving the Sprint Goal. By tracking the remaining work throughout the Sprint, the Development Team can manage its progress.

- **INCREMENT:**
  The Increment is the sum of all the Product Backlog items completed during a Sprint and the value of the increments of all previous Sprints.
  At the end of a Sprint, the new Increment must be "Done," which means it must be in useable condition and meet the Scrum Team's definition of "Done." The increment is a step toward a vision or goal (can be cost, quality and time). An increment is a body of inspect-able, done work that supports empiricism at the end of the Sprint.

- **ARTIFACT TRANSPARENCY:**
  Scrum relies on transparency. Decisions to optimize value and control risk are made based on the perceived state of the artifacts. To the extent that transparency is complete, these decisions have a sound basis.
  The Scrum Master must work with the Product Owner, Development Team, and other involved parties to understand if the artifacts are completely transparent. A Scrum Master can detect incomplete transparency by inspecting the artifacts, sensing patterns, listening closely to what is being said, and detecting differences between expected and real results.

1.13.6 DEFINITION OF DONE:

When a Product Backlog item or an Increment is described as "Done", everyone must understand what "Done" means. This is the definition of "Done" for the Scrum Team and is used to assess when work is complete on the product Increment. (IN OUR CASE IT CAN BE THE PHASE COMPLETION OR DELIVERABLES)

Development Teams deliver an Increment of product functionality every Sprint. This Increment is useable, so a Product Owner may choose to immediately release it. If the definition of "Done" for an increment is part of **the conventions, standards or guidelines of the development organization**, all Scrum Teams must follow it as a minimum.

NB: If "Done" for an increment is not a convention of the development organization, the Development Team of the Scrum Team must define a definition of "Done" appropriate for the product.

As Scrum Teams mature, it is expected that their definitions of "Done" will expand to include more stringent criteria for higher quality.

CHAPTER#2 LITERATURE REVIEW

MAPPING AGILE WITH TRADITIONAL(STAGE-GATE) PROJECT MANAGEMENT:

2.1. PROBLEMS WITH TRADTIONAL PROJECT MANAGEMENT APPROACHES:

Pros.	Cons.
Peace of mind – first complete detailed specifications, then build	Waste too much time in writing detailed specification
Well planned – provide estimation effort and cost at definition phase	Unreliable estimation during design phase
Management favor – provide predicable release schedule and detailed activities	Lack of adaptation to unpredictable change
Linear process – know what is the next step	Lack of flexible adaptive steps driven by build-feedback cycles

2.2. MAJOR CHALLENGES:

25
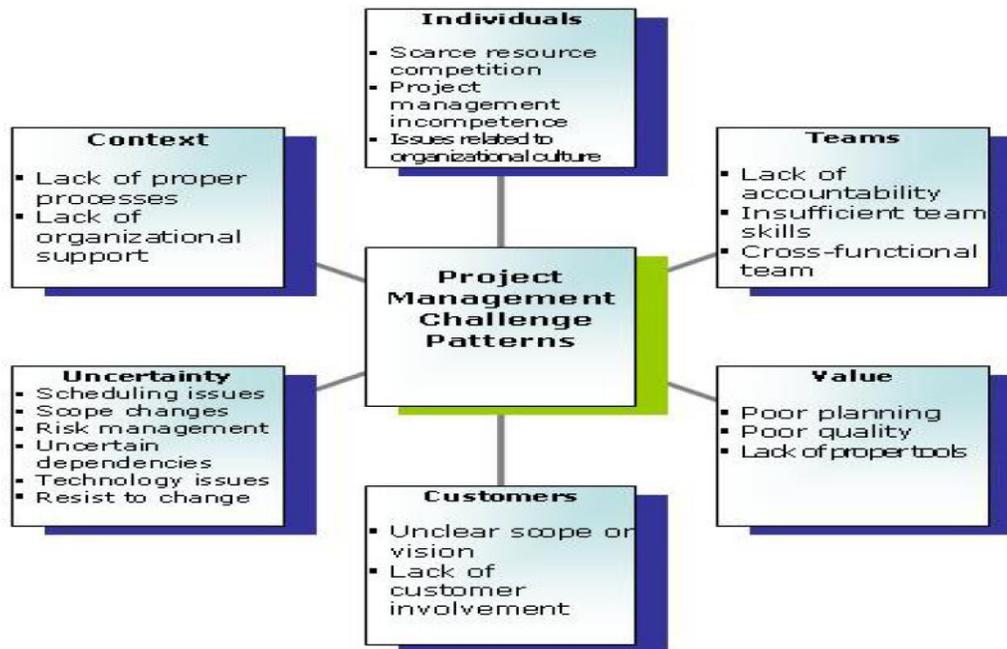
2.3. MAPPING AGILE PRACTICES TO PROJECT MANAGEMENT CHALLENGES:

DOI Value Areas	APM Major Practices	H (+)	PM Major Challenges
	Mapping Agile Project Management Practices to Project Management Challenges Framework		
Individuals	Hiring the right people	1.	Project management incompetence
	Training and pair programming	2.	Scarce resource competition
	Maintain quality of work life	3.	Issues related to organizational culture
	Decentralizing control		
Teams	Emphasizing commitment and leadership	4.	Lack of accountability
	Coaching and mentoring	5.	Insufficient team skills
	Building a self-organizing team	6.	Cross-functional team
Value	Prioritizing feature list for return on investment	7.	Poor planning
	Creating innovative products		
	Eliminating waste		
	Sharing open information	8.	Poor quality
	Using right tools	9.	Lack of tools
Customers	Creating simple vision statements	10.	Unclear scope or vision
	Engaging customer participation	11.	Lack of customer involvement
Uncertainty	Applying iterative and incremental strategies	12.	Scheduling issues Scope Changes
	Observing and assessing practices	13.	Risk management Uncertain dependencies Technology issues
	Taking adaptive actions	14.	Resistance to change
Context	Keeping simple rules	15.	Lack of proper processes
	Building customer-value organization	16.	Lack of organizational support

2.4. AGILE VS STAGE-GATE:

Stage-Gate models, they explain, are generally "plan-driven models," whereas Agile is more "plan and build on the fly."

	Stage-Gate	Agile
Type	Macroplanning	Microplanning, project management
Scope	Idea to launch	Development and testing, can be expanded to pre-development
Organization	Cross-functional team (R&D, marketing, sales, operations)	Technical team (software developers, engineers)
Decision model	Investment model—go/kill decisions involve a senior governance group	Tactical model—decisions about actions for next sprint made largely by self-managed team

In project management, there are three variables: scope of work, budget, and time. In traditional methods, scope of work is fixed (the product requirements), and budget and time are flexible. But in a time-boxed system, for each sprint, time and budgets are fixed, and scope of work flexible.
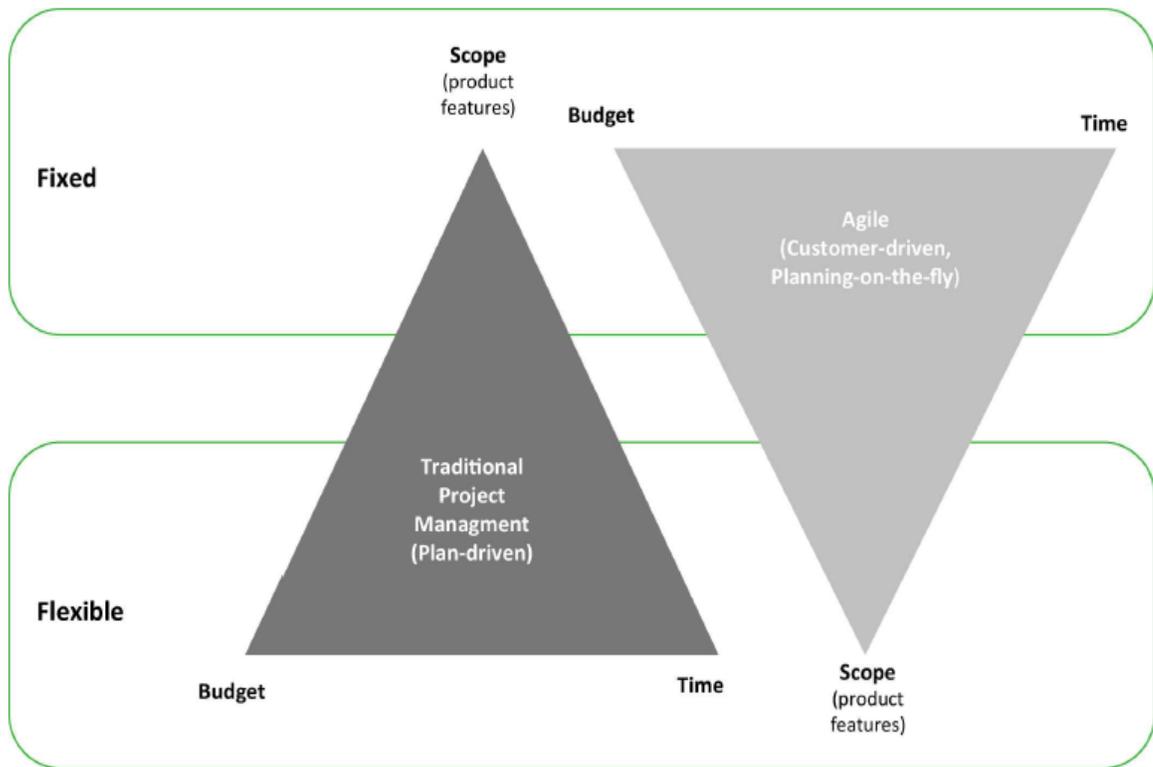
2.5. HYBRID AGILE-STAGE-GATE MODELS:

Challenges to Stage-gate approach, for example, dealing with uncertainties and ambiguity; coping with rapidly changing customer needs and wants; and accommodating the realities of a faster-paced world where plans often change remains. Experience have demanded that Stage-Gate® become more adaptive, more agile, and more accelerated. The novel Agile-Stage-Gate® hybrid approach provides a framework for dealing with uncertainties and ambiguity in the front-end, accelerates the process through the use of time-boxed iterations, and focuses on the results via development of tangible product increments as the measure of progress.
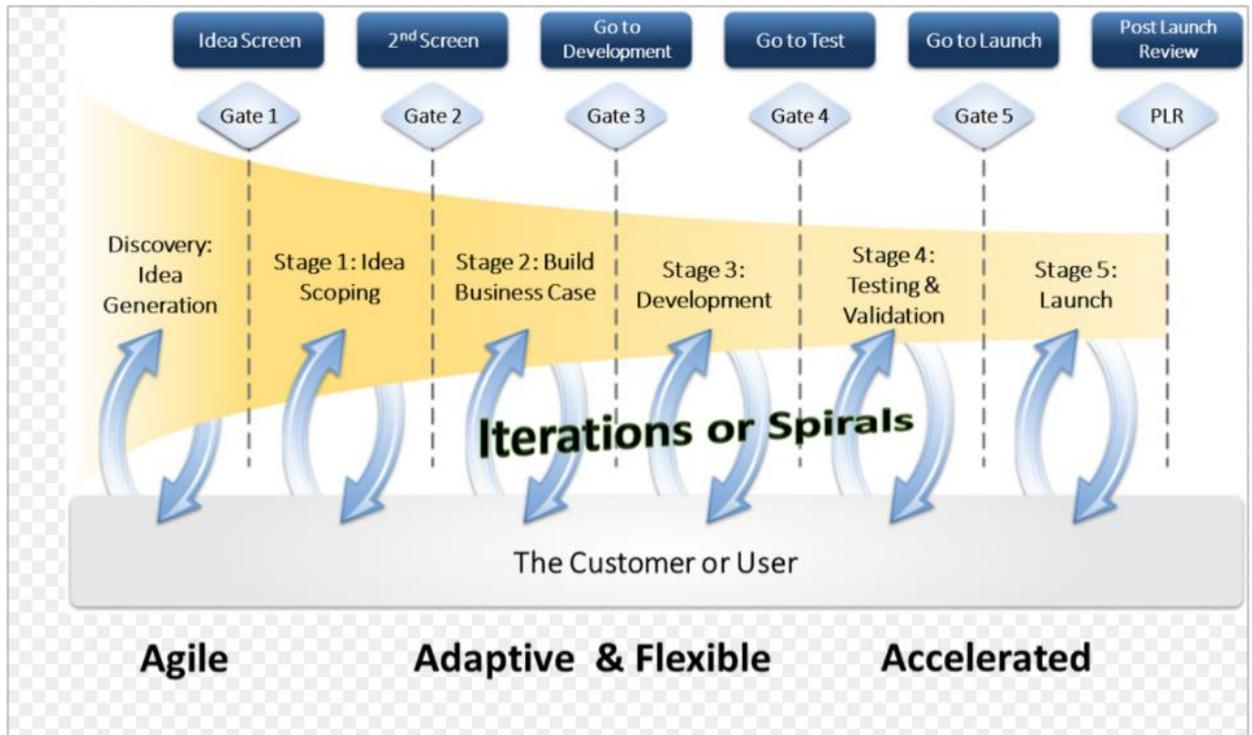
The major payoffs from the Hybrid model are,

1) **BETTER INTERNAL TEAM COMMUNICATION**: leading to the team feeling more in control, and, incidentally, to better and more visually intuitive progress metrics for management, for example, the burn-down chart.

2) **MORE EFFICIENT PLANNING**: based on early customer feedback on the really important product features, avoiding inflexible, fixed plans that lead to delays on important features, and "requirements cramming" at the end of development.

3) **IMPROVED CUSTOMER FEEDBACK**, as Agile processes seek continuous feedback from customers, making the technical project manager a good candidate for the role of customer representative.

4) **CLEARER RESOLUTION OF DOCUMENTATION ISSUES**, as priorities are resolved between documentation and code.

5) **IMPROVED ATTITUDES**, as developers are more motivated by the improved communication and sense of control.

    Agile methods give the stage-gate model powerful tools for microplanning, day-to-day work control, and progress reporting.

    Thus, Agile offers greater efficiency and focus, and Stage-Gate provides a means to coordinate with other development teams and communicate with functions such as marketing and senior management.

2.6. SCRUM AND STAGE-GATE: APPLYING HYBRID DEVELOPMENT PROCESSES TO PHYSICAL PRODUCTS.

Recently, Agile has begun to attract serious interest from developers of physical products. In manufacturing firms, Agile was first adopted by IT departments or by R&D groups in which software development was a key part of hardware projects (for example, telecommunications systems.)

The sprint approach has been enabled by the fact that in some fields (such as electronic and electromechanical systems), hardware development is becoming

more like software development, with shorter, faster iterations in the development stage.

As with other Agile methodologies, Scrum is employed mainly in the development and testing phases of a product-development project.

The project can be approved in the gating process, but the development stage is not definitively planned in advance; instead, it is broken into small increments—iterations or sprints—each with its own sprint plan. Sprints are time-boxed, limited to very short timeframes, typically from one to four weeks.

The definition of success for a sprint and the way tasks are allocated to sprints may be different in the hardware context.

The benefits of combining Agile with Stage-Gate®,

1. Gets the product right	• Iterative development – validates the product, gets something physical in front of customers early, often and cheaply. • A solution to technical issues and even early "proof of concept" • Management more comfortable with moving forward • Deals with changing requirements – fast revisions
2. Deals with uncertainty	• Traditionally,: "the problem" is identified & understood by investigations before Development gets underway • Requirements for the solution defined correctly before Development begins. • BUT when much uncertainty & no amount of studies can get all the answers • The "problem" only can be understood by experimentation • Trial and error – exploring & testing solutions both technical and with the customer • Thus, understanding the requirements is part of the solution-finding
3. Accelerates development	• Time boxed-sprints & time-boxed tasks within sprints • Once a sprint begins, its duration is fixed and cannot be shortened or lengthened • Project teams commit to certain deliverables at the beginning of each sprint then are under self-imposed pressure to deliver within the time frame agreed
4. Focusses teams	• Agile-Stage-Gate teams are dedicated to the one project • Traditional: Project teams are under-resourced, unfocussed, too spread → slow projects • Big improvement: 24.1 percent of top-performing businesses already use focused teams • Scrum places such emphasis on this that it really does happen for every major project
5. Improves within-team communication	• Dedicated teams • Dedicated team room • Daily scrums

Table 1: The benefits of Agile-Stage-Gate

2.7. WHY AGILE-STAGE-GATE HYBRIDS WORKS FOR PHYSICAL PRODUCTS:

The hybrid model balances the benefits and challenges of the two different approaches, creating a number of important advantages. The hybrid Agile–Stage-Gate model, specifically using the Scrum version of Agile:

- **GETS THE PRODUCT RIGHT:** The hybrid method requires the project team to develop something physical or visual, early and cheaply (the sprints), and quickly get it in front of customers for feedback. Because some time People don't know what they want until you show it to them". Especially in the case of more radically innovative products.

  The method shows customers something they can see, all the way through the project, beginning even before the development stage commences.

- **ACCOMMODATE UNCERTAINITY:**

  In traditional stage-and-gate methods, the problem is identified and defined by conducting investigations before development begins. Thus, the requirements for the solution are largely defined even before the product enters development. But not every project is so definable. The agile approach is based on trial and error: building and testing possible solutions, which Agile sprints and iterations allow. Thus, in an Agile or hybrid approach, requirements are not defined before development but are established as part of the solution-finding process.

- **ACCELERATE DEVELOPMENT:**

  Time-boxed sprints, and even time-boxed tasks within sprints, bring a sense of urgency to the development project. Thus project teams commit to certain deliverables at the beginning of each sprint and then are under pressure to deliver within the agreed timeframe. This forces teams to focus on the essentials and deliver results, rather than focusing on a large, finalized list of requirements or features.

- **FOCUS TEAMS:**

  Agile–Stage-Gate project teams are dedicated to the one project to ensure adequate resources to get the work done on the compressed sprint timeline. The notion of dedicated project teams is not new: 24.1 percent of top-performing businesses already use focused teams.

  By ensuring solid resourcing, Agile–Stage-Gate helps drive new products to market much more quickly.

- **IMPROVES WITHIN TEAM COMMUNICATION**:

  Dedicated teams, a dedicated space where the entire team resides, and daily, face-to-face scrums all contribute to improved communication.

  Every study of Agile (whether for IT or physical products) reports this benefit. This leads to more effective, cross-functional teams with good internal cooperation and

communication—a factor frequently cited as a key to both increased speed to market and higher success rates in new product development.

2.8. DEFINING A DONE SPRINT FOR PHYSICAL PRODUCT DEVELOPMENT:

Clearly, Agile, and particularly Scrum, has value for product development, but Scrum methods cannot be directly implemented for hardware without some modification.

One key point of difference is in the definition of sprints and what constitutes a done sprint. A done sprint is a working product (executable software) that meets the goal of the subproject and can be demonstrated to stakeholders (customers).

Thus, each increment—each sprint—yields a working, albeit feature-limited, product.

By contrast, the development of a new machine, food item, or polymer cannot be easily incremental zed. If your product is beer or a diesel engine, you cannot build part of the beer or part of the engine and demonstrate it working; it certainly won't be releasable to the market. Moreover, it is usually not possible to have anything that

actually functions ready and available within a few weeks. Thus the notion of short time-boxed sprints and the IT definition of "done" do not apply so neatly to hardware.

In Hybrid models, each iteration builds a product version somewhere between a concept (or virtual product) and a ready-to-trial prototype.

Unlike in pure Agile, the result of a sprint may not be a working product but is something that can be shown to the customer to seek feedback— to test a market-facing hypothesis and to seek proof of concept.

These product versions, or "protocepts," can be computer-generated 3D drawings, virtual prototypes, crude models, working models, or early prototypes. The result

of a done sprint, in this context, may not be a working product, but it is something physical that the customer can respond to.

If Scrum is applied to earlier stages of the project, for example, the concept and feasibility stages, then the definition of done is relaxed even further, to include anything tangible that can be reviewed by an expert. For example, the results of a market study or voice-of-customer work could count as a done deliverable.

Agile can be employed in particular in the development and testing stages of the Stage-Gate process.

WARAPPING UP: For physical product developers, an Agile–Stage-Gate hybrid product development model is feasible and may yield positive results.

Additionally, spirals—a series of build-test-feedback-revise iterations—make the system more adaptive. these spirals fit well into the Agile sprinting concept, in which at the completion of sprints, some version of the product—a protocept—can be demonstrated to stakeholders (customers and management).

Indeed, integrating Agile-Scrum methods into Stage-Gate to yield this new Agile–Stage-Gate hybrid model may be the most exciting and significant change to the new-

product process since the introduction of gating systems more than 30 years ago.

2.9.   JIRA AS AGILE METHODOLOGY:

Jira Software is an agile project management tool that supports any agile methodology, be it scrum, Kanban, or your own unique flavor. From agile boards to reports, you can plan, track, and manage all your agile software development projects from a single tool. Pick a framework to see how Jira Software can help your team release higher quality software or any other product, faster.

2.9.1 JIRA AS SCRUM TOOL:

Scrum is an agile methodology where products are built in a series of fixed-length iterations. There are four pillars that bring structure to this framework: sprint planning, stand ups (also called daily scrums), sprints, and retrospectives.

- Tools for sprint planning:

  Sprint planning meetings determine what the team should complete in the coming sprint from the backlog, or list of work to be done. Jira Software makes your backlog the center of your sprint planning meeting, so you can estimate stories, adjust sprint scope, check velocity, and re-prioritize issues in real-time.

Version management

Track versions, features, and progress at a glance. Click into a version to see the complete status, including the issues, development data, and potential problems.

Easy backlog grooming

Easily re-prioritize your user stories and bugs. Select one or more issues, then drag and drop to reorder them in your backlog. Create quick filters to surface issues with important attributes.

Sprint planning

Make your backlog the center of your sprint planning meeting. Estimate stories, adjust sprint scope, check velocity, and re-prioritize issues in real-time with the rest of the team.

Story points

Estimate, track and report on story points to help your team become more accurate in future sprints. Use story points, ideal hours, or your own method of estimating.

- **SCRUM BOARD**:

  Scrum boards are used to visualize all the work in a given sprint. Jira Software's scrum boards can be customized to fit your team's unique workflow.

  You can also easily add things like swim lanes to separate epics, assignees, projects, and more.
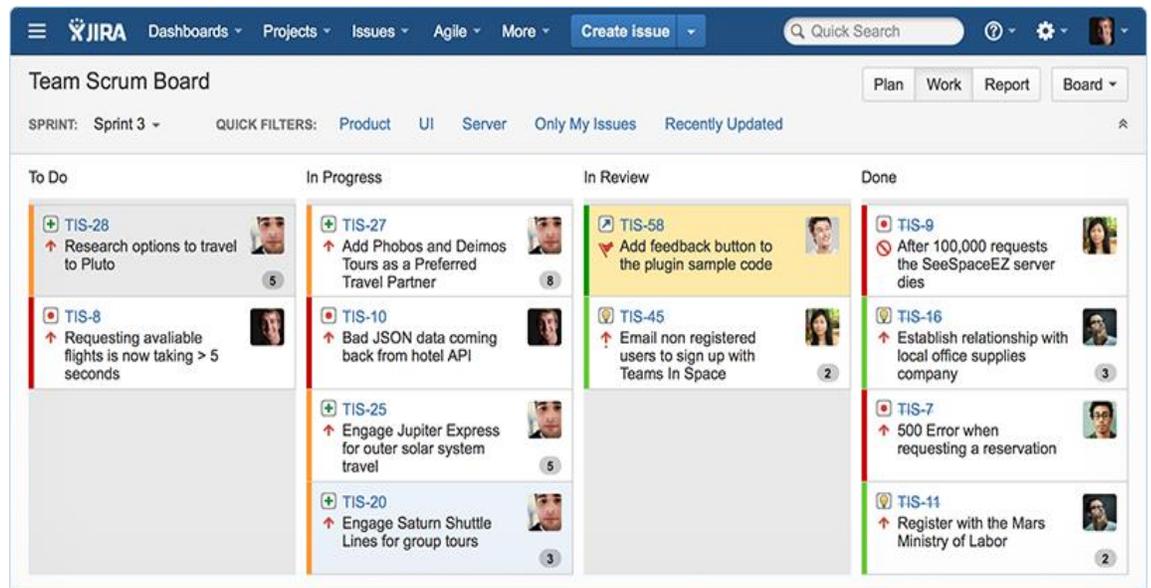
- **Tracking and managing sprints**:
  A sprint is a fixed-length iteration of work, typically one or two weeks in length. Work should be fully scoped and prioritized during the sprint planning meeting, so the team can get started as soon as the sprint begins.

Sprint permissions

Use sprint permissions to define what users can see or do in a given project. Sprint permissions allow you to better delegate permissions and responsibilities to team members, allowing the entire team to be more autonomous and agile.

Custom issue types

Develop custom issue types for bugs, stories, coffee runs, and everything in between. Configure a custom workflow and custom fields for each issue type, so your team can manage work according to its requirements.

Workflows

Create and assemble your own custom workflow states and transitions for every issue type (bugs, stories, epics, coffee runs). Leverage the powerful Jira workflow engine to update issues automatically based on events in other systems, or define criteria that must be met before an issue can progress.

Release hub

Quickly see what's shipping in your next release, and what's left to do to get it out the door. Easily reconcile your source code and issues: automatic warnings are generated for issues with broken builds, missing code or open pull requests.

- **Retrospectives with scrum reports:**
  Jira Software has a number of agile reports specific for scrum teams. For example, Burn-down and Velocity charts, give your team critical insight into their agile process. Reports make retrospectives more data-driven and highlight areas to improve for upcoming sprints.
  Burn-down chart:

Track the total work remaining and project the likelihood of achieving the sprint goal. This helps your team manage its progress and respond accordingly.

	Days	Tasks Done	Remaining	Ideal Done Per Day	Ideal Velocity
Initial Value	0	0	200	10	200
	1	0	200	10	190
	2	5	195	10	180
	3	3	192	10	170
	4	12	180	10	160
	5	17	163	10	150
	6	9	154	10	140
	7	8	146	10	130
	8	13	133	10	120
	9	15	118	10	110
	10	6	112	10	100
	11	18	94	10	90
	12	15	79	10	80
	13	16	63	10	70
	14	11	52	10	60
	15	8	44	10	50
	16	13	31	10	40
	17	9	22	10	30
	18	6	16	10	20
	19	10	6	10	10
	20	6	0	10	0
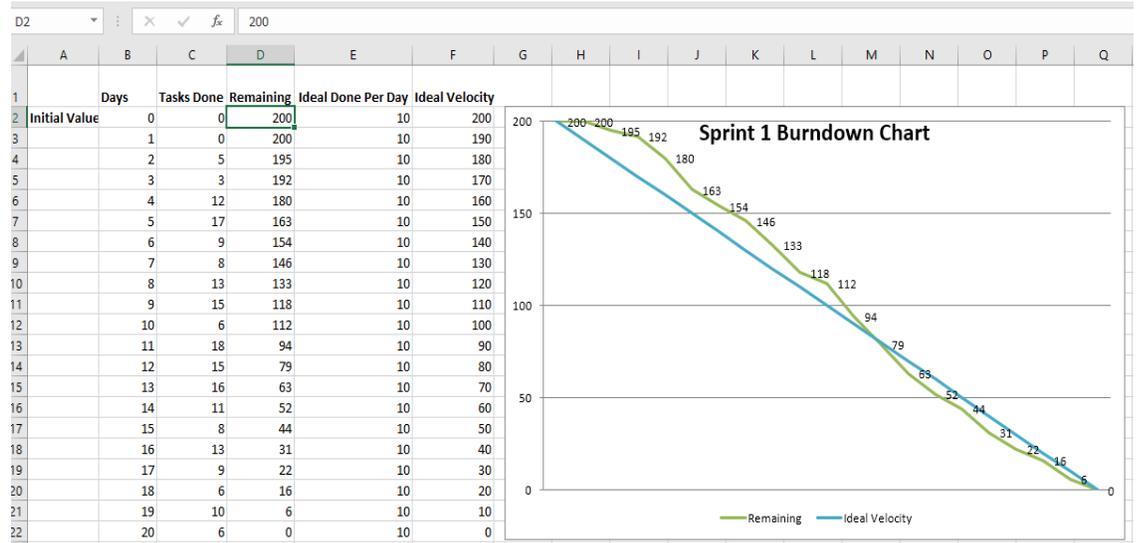
- **Cumulative flow diagram**:
  A cumulative flow diagram shows the number of issues in each status. The team can easily spot blockages by seeing the number of issues that increase in any given state.
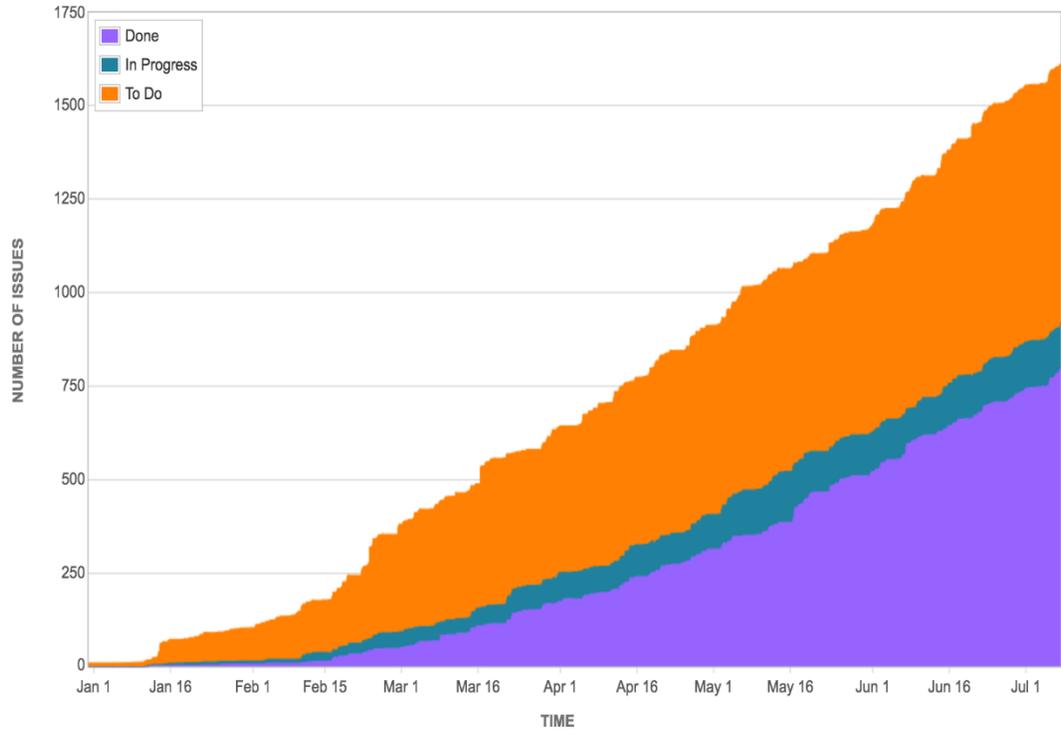
- **Control chart:**

  See the cycle time for your product, version or sprint. This helps you identify whether data from the current process can be used to determine future performance.
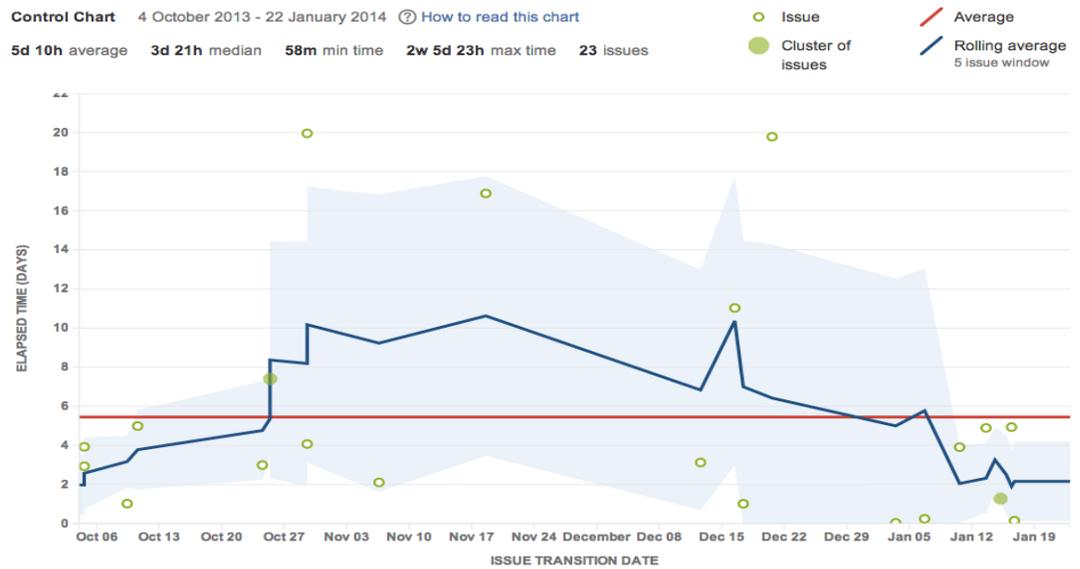
CHAPTER#3 METHODOLOGY

3.1. DATA COLLECTION:

DOCUMENT ANALYSIS:

To understand the purpose and objectives of the project, we got some Documents provided by SumiRiko of the Pilot program. The documents briefly focus on the issues and the proposals for the solution.

PILOT PLATFORM 2.0

To cover some gaps and enhance the performance SumiRiko Started a Pilot program in one of their Platform through specific actions.

3.1.1 KANBANIZATION:

To have more visual management of the work they started with the Kanban approach. To allow the team members of having more clear vision of their tasks and activities to do. To make sure of the priorities and focus on WIP.it gives a mental reward since they will be able to see the tasks move ahead to «Done» status. The team will have better understanding of what they have to do and see what is moving forward makes the job easier and gives motivation. Basic rules of Kanban must be identified and shared.

The expected outcomes of the Kanban approach are,

o Workload visibility
o Tasks execution speed
o Information re-circulating (spamming)
o Meetings jams
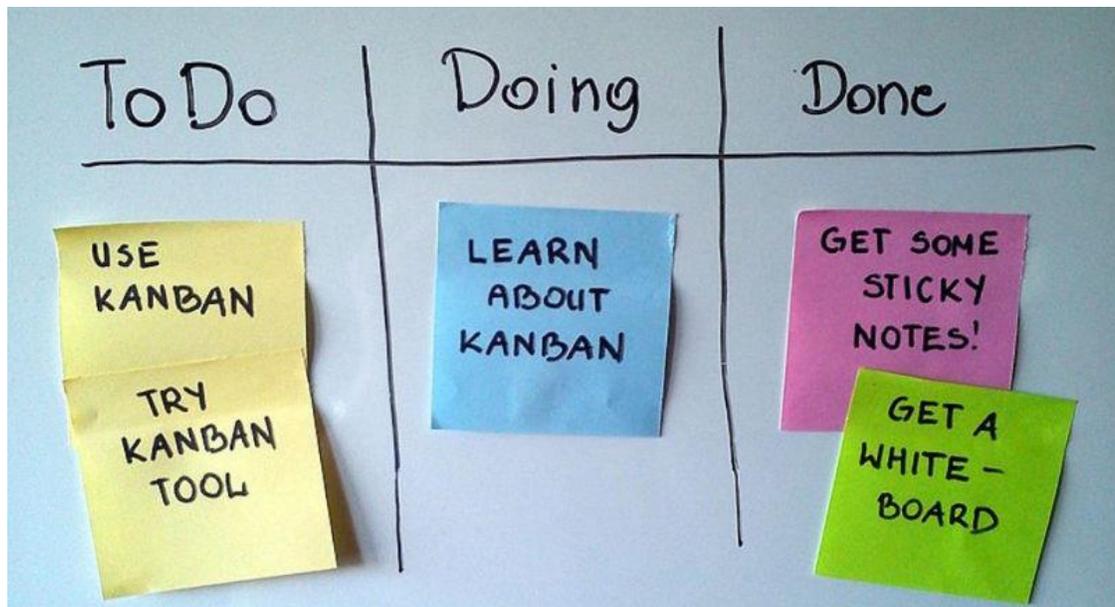
3.1.2 TEAM FORMATION AND ROLES DEFINITION:

They started the Pilot program with one of their integrated team based of French market with the new projects of their customer specifically Renault. The functional team consists of the members from different departments based on their expertise fully and partially dedicated   to   the   project.

|	Who is	What he delivers	Project Involvment
Project Manager	He's the Team leader. **He has the responsibility to meet all the targets** for the Project in terms of respect of Customer's technical, timing and quality expectations. He is also responsible in front of the Company for target cost reaching. He has the authority to assign tasks to the team members.	The PM delivers the project results in terms of Quality, Timing and Technical Satisfaction to the Customer. Profitability of the project is a mission	Fully dedicated
Quality Engineer	The QE is the Project Quality Manager and **he has the responsibility** to develop and follow all those activities needed **to ensure quality** since earliest phases of the project. He stands close to the PM.	The QE support the Product Engineer and the Process Engineer developing the FMEAs in order to produce a robust validation plan and a proper PCP. He's responsible to prepare all the documentation needed for Part Approval.	Fully dedicated
Project Buyer	The Project Buyer represents the Purchasing dept inside the team and **his role is critical whenever a purchased part must be ready** in a specific conditions, in a specific time and place.	The PB receives the list of suppliers nominated by Purchasing dept and works with them in order to ensure the parts approval and the timing needed. He also manages price change request, supporting the PE in case of ECR (Eng. change request)	Fully dedicated
Material manager (Procurement)	**The Logistic Engineer takes care of all material flows** analysis, including incoming goods and deliveries vs Customer Assembly Plants. He's able to identify specific needs for packaging even when not clearly required because quality and costs are his focus, together with timing.	The Log.Eng. analyses the Customer Logistic Requirements and identify the right strategy to fulfill it. Takes care for parts deliveries during the project until Customer Supply Approval. Packaging definition (in/out) is a must.	Partially dedicated
Sales Engineer	**He receives and realizes RFQ's with assistance** of PM involved on specific market/Customer. The Sales Engineer also takes care of all matters referred to price modifications due to product changes occurred during the development, supported by the PM	Offers, market strategy, support to the team in the relation with the Customer	Partially dedicated
Designer	The Designer is the Project Technical Manager. He knows Customer's specifications and **is able provide technical solutions** to problems found during the project development, starting his job with the feasibility analysis at the RFQ time. Works close to QE and the Process Engineer living Robust Design for manufacturing as a mission	The Designer releases all technical information for the Manufacturing area. Drawings and technical sheets are main releases but he actively contributes to PFMEA, supporting as well the Process Engineer for work instructions development. The Designer is who will apply to the Customer what the Product Engineers (R&D) has developed out of business environment and released as "products on shelf".	Fully Dedicated
Process Engineer	The Process Eng., supporting since the RFQ the team during project development, **elaborates the process strategy in terms of tools, machinery and manpower** to ensure full capacity and quality. He knows very well company facilities and understand in advance needs for new equipments or tools (both production and quality).	All documents needed for production must be defined and provided by the Prc.Eng. This also includes capacity verification and quality results. His contribution and commitment on PFMEA is real.	Partially dedicated

3.1.3 VALUE STEREAM ANALYSIS:

They needed to check their main processes to verify if they are still aligned to the needs and current business velocity. To plan the tool to 37ptimize the results and eliminating the wastes and to provide the customer high value with,

- o of the highest quality
- o at the right time

- at an appropriate price and cost expenditure.
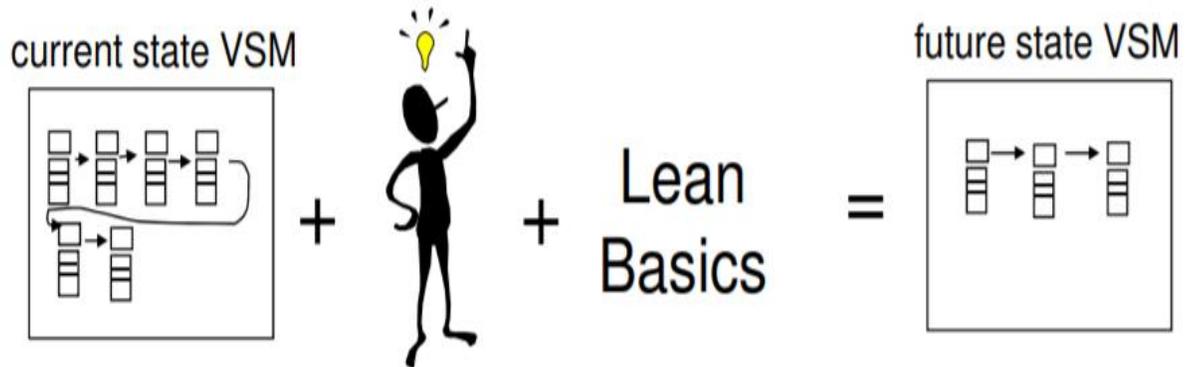
3.1.4 CHANGING THE ENVIRONMENT:

As SumiRiko has transferred from Pipeline to Platform structure since last year, they feel the need of efficiently implementing the Platform concept. It is essential to know how to manage the information and, of course, how to manage innovation in every form. Businesses, which can manage innovation, can create "added value" it is necessary to understand how network effects and externalities create value in Platforms.

Platform is the ability to create new and more value by facilitating exchanges between more parties and within the team. This added value is the success key of platforms and it is the reason why a SumiRiko tried to transfer from "pipelines model" to become platforms.

3.1.5 JOB ROTATION:

A job rotation program will be applied, when possible to move employees through a variety of positions within or among departments, enabling them to gain exposure to different parts of the business while growing and expanding their skill sets.
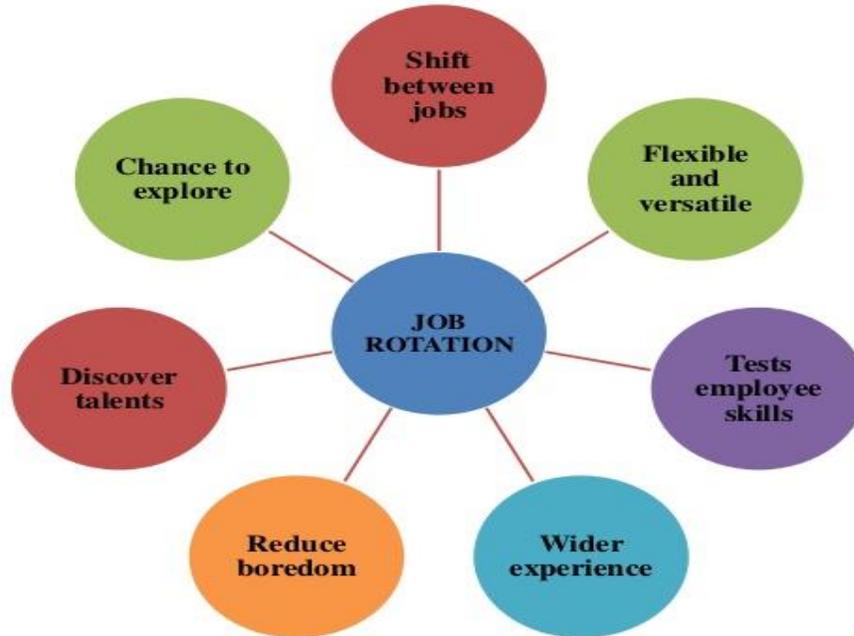
3.2. OBSERVATION AND GEMBA WALKS:

Observation method was used to gather detailed information about the process and current situation. The real time data was collected at SumiRiko devoted location for the Pilot program.

The idea was to fully document the value stream of the process and measure the actual performance against project goals and acquire benchmark information to get an idea of the current levels against the standards of the Agile performance particularly Scrum Methodology.

Through note-taking and interviews the data was collected to verify the existing problem and deficiency in the performance.

3.2.1 PROJECT WORK FLOW:

The tasks of the 5 newly started projects on the Platform are posted on the KANBAN board for the visual management. The board has been divided into five parts. The activities/Tasks are taken form the standard Procedure/Phases followed for the new product development in the Automotive industry i.e Advanced Product Quality Planning (APQP) written on the Gantt Chart. All the products to be developed are mostly in the second (Product Design

and Development) and third phase (Process design and development) of the development stages of APQP.
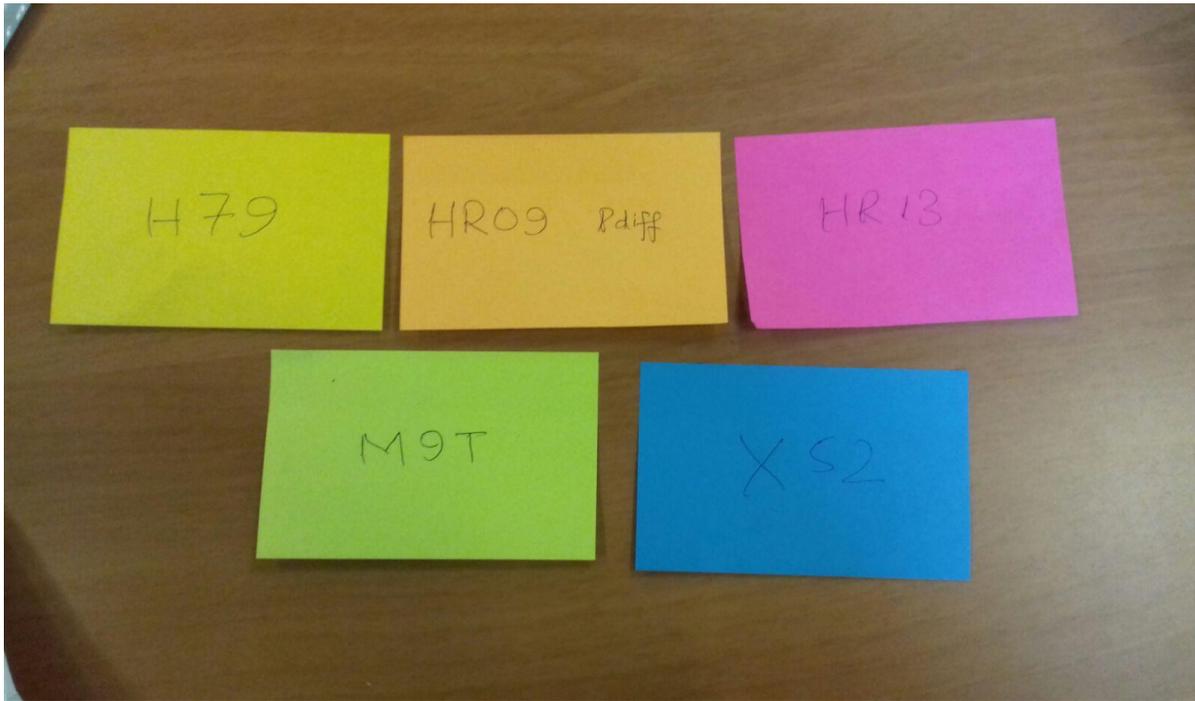
Fig. 6

3.2.2 KANBAN CARD:

Each task is represented by a sticky note/card of a pre-defined color representing the specific project on board. On each card the title/definition of the task is written along with the name of the responsible on a small sticky note. Dates of Ready, doing, Hold, Done and Deadlines (From the Gannt Chart) are mentioned on each Card and should be updated as the task move along the board till its done.
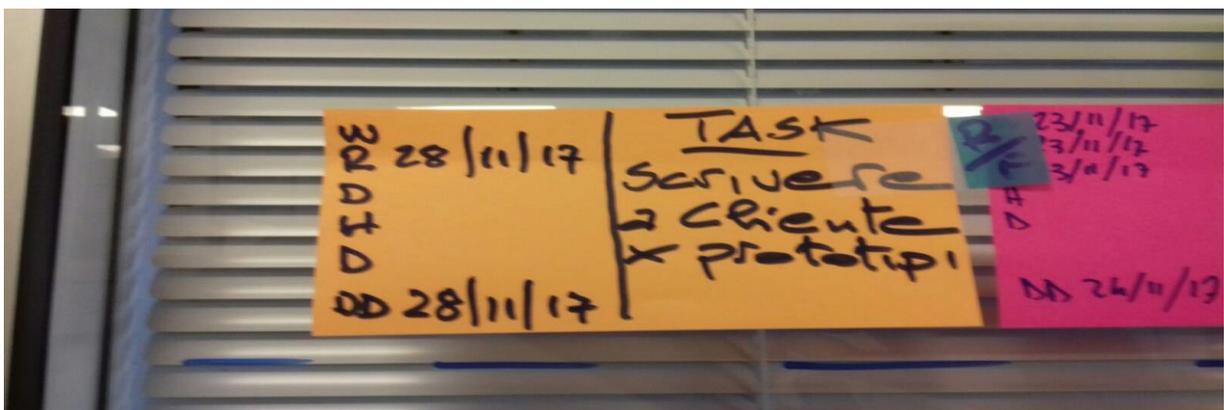
3.2.3   KANBAN BOAD: The board is divided into the following five portions.

- **WAITING:** The waiting section contains all the task and activities that were waiting for the relative dependent activities to be Done. Once the subsequent activity is done the card is moved form the waiting to the ready section.

- **READY:** it contains the activities that are ready for doing based on the deadlines, priority and the availability of the assignee/Team member. Once the team member responsible for the task has the availability for doing that task, the card is moved from Ready to Doing.

- **DOING:** This is considered the most important and critical part of the board to check the status of each task and the number of unfinished activities. Each member is assigned not more than five doing tasks at a time.

- **HOLD:** The Hold section of board has the activities that are hold back because of the barriers/blocking points which can be either Internal or External (Customer, Supplier).

  Special attention is given to this portion as they could slow down the overall flow of the processes and the team takes steps to solve the problems that causes the blockage.
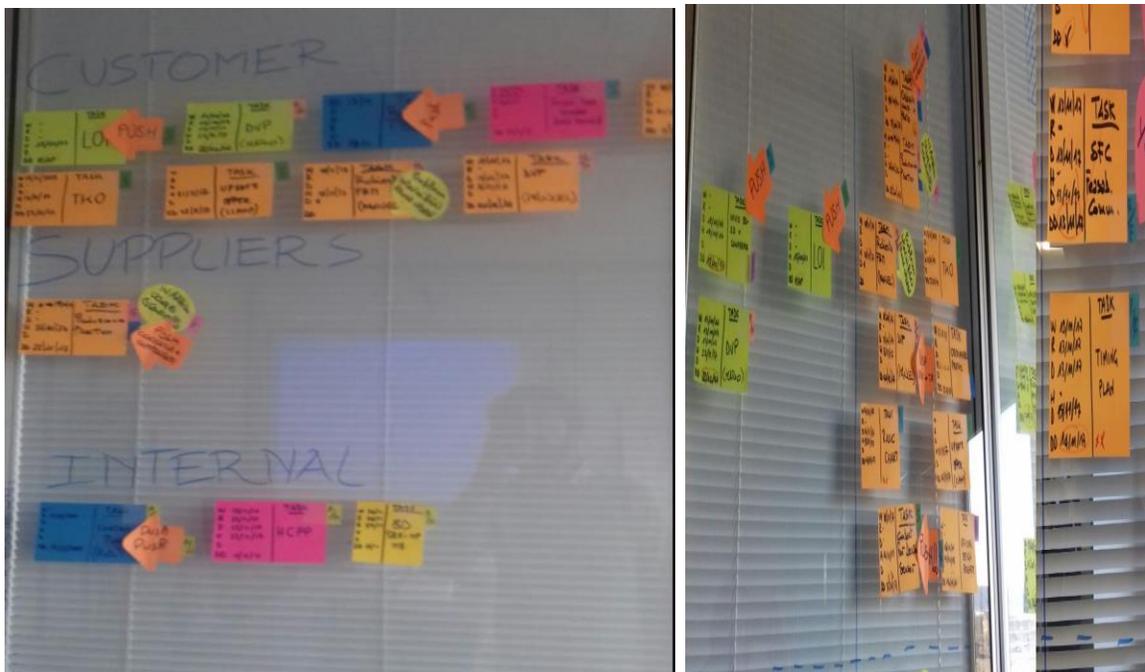
- **DONE:** Once the task is done it is finally shifted to the done part of the board and stays there for not more than three days, at the same time the task done status is updated both on the card and the Gantt Chart of MS office.
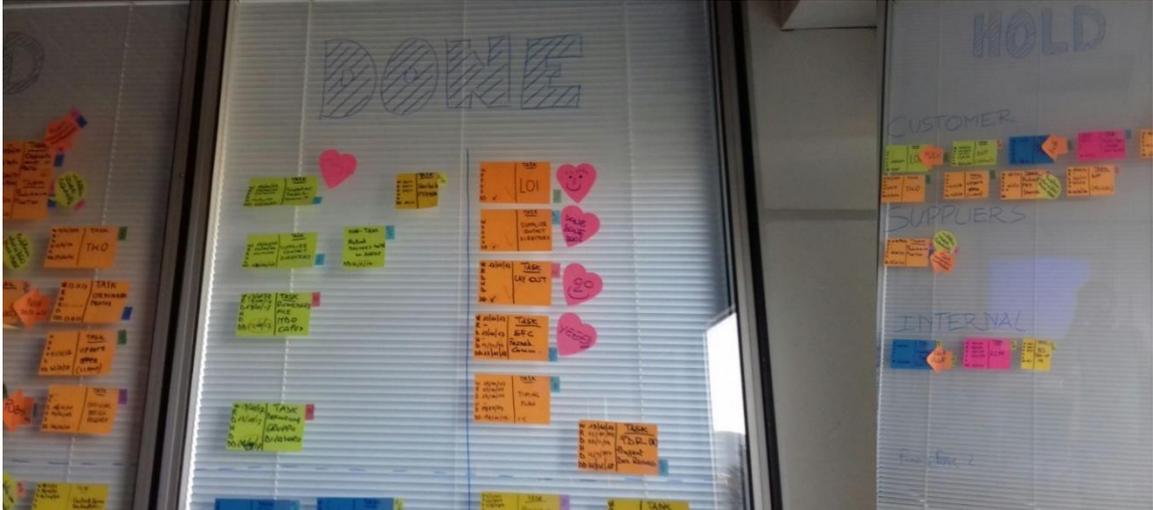
3.2.4 DAILY MEETINGS:

Daily meeting of thirty minutes take place at Kanban Board room lead by the Project Manager. The meeting starts at 8:30 in the morning. All the team members who are fully dedicated to the project are supposed to attend the meeting. Partially dedicated members are called upon through email or call if needed. Any issue or problem related to all the projects are discussed with possible solution or proposals with the team. The PM then check the status of activities on board and each team member is asked the progress of the tasks he/she is assigned to and the cards are moved accordingly. New tasks are also added to the board when needed. The deadlines are strictly followed for each task and the team tries to respect the deadlines to avoid any delay of the delivery if possible.
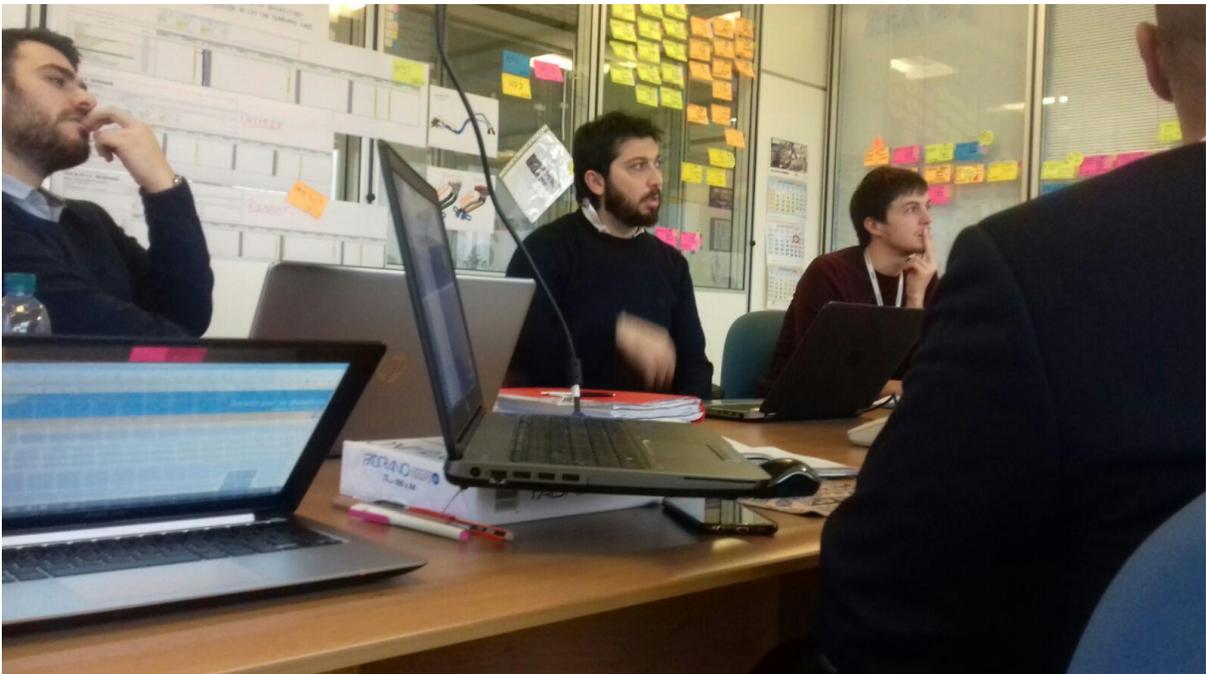
3.3 DATA ANALYSIS:

BENCHMARKING:

The collected data was benchmarked against Scrum Methodology for the new product development in Agile environment and the IPMA Baseline Model for the future project performance assessment.

3.3.1 SCRUM BODY OF KNOWLEDGE (SBOK):

A Guide to the Scrum Body of Knowledge (SBOK™ Guide) provides guidelines for the successful implementation of Scrum—the most popular Agile project management and product development approach. It provides a comprehensive framework that includes the principles, aspects, and processes of Scrum.

Scrum, as defined in the SBOK™ Guide, is applicable to the following:

- o Portfolios, programs, and/or projects in any industry.
- o Products, services, or any other results to be delivered to stakeholders.
- o Projects of any size or complexity.
- **SCRUM ASPECTS:**

1) **ORGANIZATION**: it is one of the most important aspect of the Scrum Methodology that must be managed and addressed throughout the scrum project. It deals with the roles and responsibilities in a scrum project, which is very important if we want to successfully implement Scrum.

The key areas of the Scrum organization are the core roles (Product Owner, Scrum Master and Scrum Team) and non-core roles are Stakeholders (Customer, User, Sponsor), Vendors and Scrum Guidance Body.
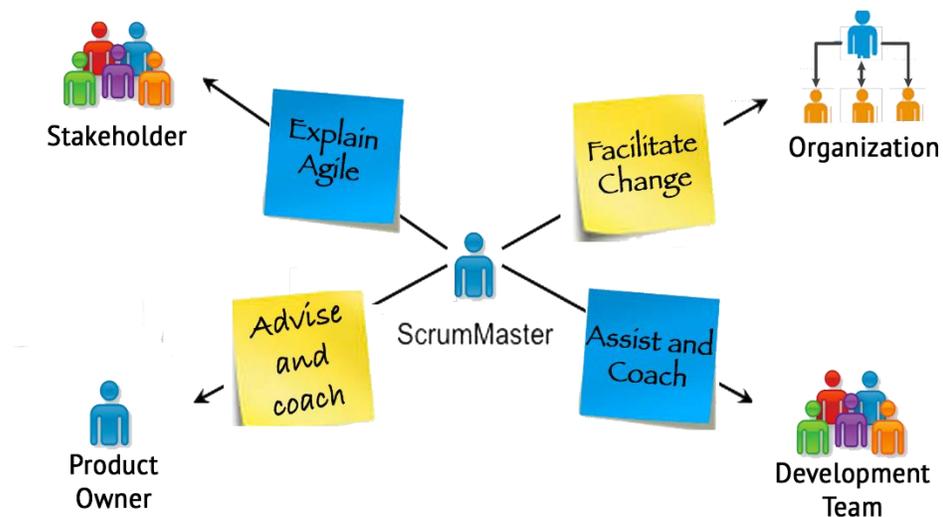
2) **BUSINESS JUSTIFICATION:** It is important for an organization to perform a proper business justification and create a viable Project Vision Statement prior to starting any project. A project is a collaborative enterprise to either create new products or services or to deliver results as defined in the Project Vision Statement. Projects are usually impacted by constraints of time, cost, scope, quality, people, and organizational capabilities. Usually, the results generated by projects are expected to create some form of business or service value. Since value is a primary reason for any organization to move forward with a project, Value-driven Delivery must be the main focus. Delivering value is ingrained in the Scrum framework. Scrum facilitates delivery of value very early on in the project and continues to do so throughout the project lifecycle.

3) **QUALITY:** In Scrum, quality is defined as the ability of the completed product or deliverables to meet the Acceptance Criteria and achieve the business value expected by the customer. To ensure that a project meets quality requirements, Scrum adopts an approach of continuous improvement whereby the team learns from experience and stakeholder engagement to constantly keep the Prioritized Product Backlog updated with any changes in requirements. Any changes to the requirements reflect changes in the internal and external business environment and allow the team to continually work and adapt to achieve those requirements.

4) **CHANGE:** Every project, regardless of its method or framework is exposed to change. It is imperative that project team members understand that the Scrum development processes are designed to embrace change. Organizations should try

to maximize the benefits that arise from change and minimize any negative impacts through diligent change management processes in accordance with the principles of Scrum.

5) **RISK**: To ensure business viability, reduce the probability of project failure, and make more informed business decisions, it is important that risks are effectively managed through a well-organized and methodical approach.

In a Scrum environment, risks are generally minimized, largely due to the work being done in Sprints

whereby a continuous series of Deliverables is produced in very short cycles, Deliverables are compared to expectations, and the Product Owner is actively engaged in the project. However, even in the simplest of projects, things can go wrong, so it is important to have a strategy to identify and address risks.
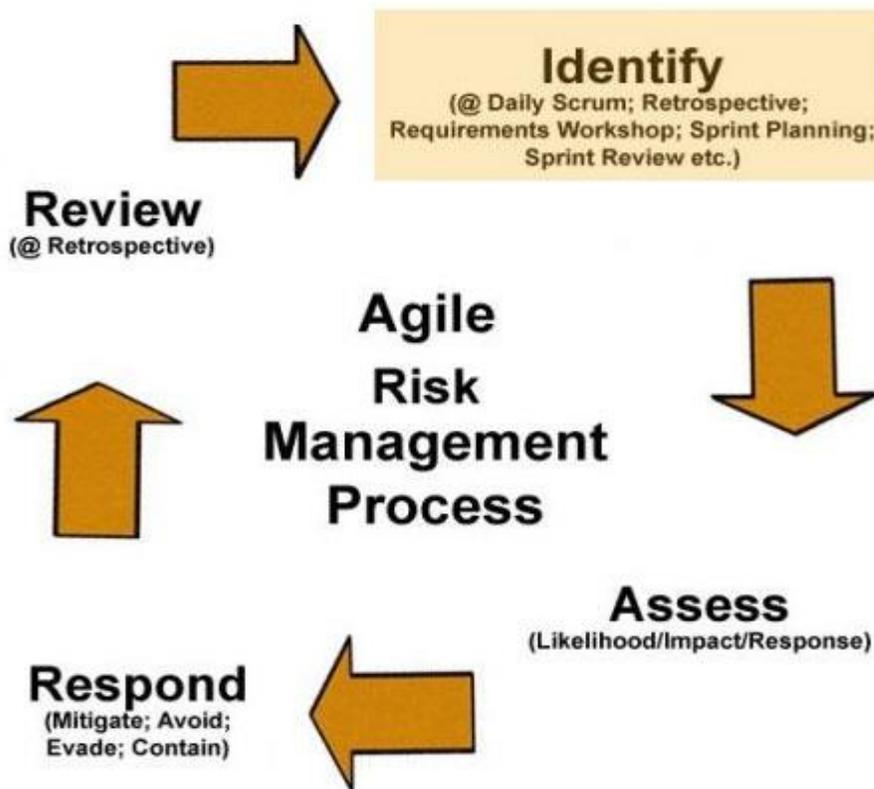
* **PROCESSES:**
  1) **INITIATE:** The Initiate phase processes are related to initiation of a project: Create Project Vision, Identify Scrum Master and Stakeholder(s), Form Scrum Team, Develop Epic(s), Create Prioritized Product Backlog, and Conduct Release Planning.

8.1 Create Project Vision

INPUTS
1. Project Business Case*
TOOLS
1. Project Vision Meeting*
OUTPUTS
1. Identified Product Owner*
2. Project Vision Statement*

8.2 Identify Scrum Master and Stakeholder(s)

INPUTS
1. Product Owner*
2. Project Vision Statement*
TOOLS
1. Selection Criteria*
OUTPUTS
1. Identified Scrum Master*
2. Identified Stakeholder(s)*

8.3 Form Scrum Team

INPUTS
1. Product Owner*
2. Scrum Master*
3. Project Vision Statement*
TOOLS
1. Scrum Team Selection*
OUTPUTS
1. Identified Scrum Team*

8.4 Develop Epic(s)

INPUTS
1. Scrum Core Team*
2. Project Vision Statement*
TOOLS
1. User Group Meetings*
OUTPUTS
1. Epic(s)*
2. Personas*

8.5 Create Prioritized Product Backlog

INPUTS
1. Scrum Core Team*
2. Epic(s)*
3. Personas*
TOOLS
1. User Story Prioritization Methods*
OUTPUTS
1. Prioritized Product Backlog*
2. Done Criteria*

8.6 Conduct Release Planning

INPUTS
1. Scrum Core Team*
2. Stakeholders*
3. Project Vision Statement*
4. Prioritized Product Backlog*
5. Done Criteria*
TOOLS
1. Release Planning Sessions*
2. Release Prioritization Methods*
OUTPUTS
1. Release Planning Schedule*
2. Length of Sprint*

2) **PLAN AND ESTIMATE:** The Plan and Estimate phase consists of processes related to planning and estimating tasks, which include Create User Stories, Estimate User Stories, Commit User Stories, Identify Tasks, Estimate Tasks, and Create Sprint Backlog.

9.1 Create User Stories

INPUTS
1. Scrum Core Team*
2. Prioritized Product Backlog*
3. Done Criteria*
4. Personas*
TOOLS
1. User Story Writing Expertise*
OUTPUTS
1. User Stories*
2. User Story Acceptance Criteria*

9.2 Estimate User Stories

INPUTS
1. Scrum Core Team*
2. User Stories*
TOOLS
1. Estimation Methods*
OUTPUTS
1. Estimated User Stories*

9.3 Commit User Stories

INPUTS
1. Scrum Core Team*
2. Estimated User Stories*
3. Length of Sprint*
TOOLS
1. Sprint Planning Meetings*
OUTPUTS
1. Committed User Stories*

9.4 Identify Tasks

INPUTS
1. Scrum Core Team*
2. Committed User Stories*
TOOLS
1. Sprint Planning Meetings*
OUTPUTS
1. Task List*

9.5 Estimate Tasks

INPUTS
1. Scrum Core Team*
2. Task List*
TOOLS
1. Sprint Planning Meetings*
2. Estimation Criteria*
3. Estimation Methods*
OUTPUTS
1. Effort Estimated Task List*

9.6 Create Sprint Backlog

INPUTS
1. Scrum Core Team*
2. Effort Estimated Task List*
3. Length of Sprint*
TOOLS
1. Sprint Planning Meetings*
OUTPUTS
1. Sprint Backlog*
2. Sprint Burndown Chart*

3) **IMPLEMENT:** The Implement phase is related to the execution of the tasks and activities to create a project's product.

These activities include creating various deliverables, conducting Daily Stand-up Meetings, and grooming (i.e., reviewing, fine-tuning, and regularly updating) the Product Backlog at regular intervals.

10.1 Create Deliverables	10.2 Conduct Daily Standup	10.3 Groom Prioritized Product Backlog
INPUTS 1. Scrum Core Team* 2. Sprint Backlog* 3. Scrumboard* 4. Impediment Log* **TOOLS** 1. Team Expertise* **OUTPUTS** 1. Sprint Deliverables* 2. Updated Scrumboard* 3. Updated Impediment Log*	**INPUTS** 1. Scrum Team* 2. Scrum Master* 3. Sprint Burndown Chart* 4. Impediment Log* **TOOLS** 1. Daily Standup Meeting* 2. Three Daily Questions* **OUTPUTS** 1. Updated Sprint Burndown Chart* 2. Updated Impediment Log*	**INPUTS** 1. Scrum Core Team* 2. Prioritized Product Backlog* **TOOLS** 1. Prioritized Product Backlog Review Meeting* **OUTPUTS** 1. Updated Prioritized Product Backlog*

4) **REVIEW AND RETROSPECT:** The Review and Retrospect phase is concerned with reviewing the deliverables and the work that has been done and determining ways to improve the practices and methods used to do project work. In large organizations the Review and Retrospect processes may also include convening Scrum of Scrums Meetings.

11.1 Demonstrate and Validate Sprint	11.2 Retrospect Sprint
INPUTS 1. Scrum Core Team* 2. Sprint Deliverables* 3. Sprint Backlog* 4. Done Criteria* 5. User Story Acceptance Criteria* **TOOLS** 1. Sprint Review Meetings* **OUTPUTS** 1. Accepted Deliverables*	**INPUTS** 1. Scrum Master* 2. Scrum Team* 3. Outputs from *Demonstrate and Validate Sprint** **TOOLS** 1. Retrospect Sprint Meeting* **OUTPUTS** 1. Agreed Actionable Improvements*

5) **RELEASE:** The Release phase emphasizes delivering the Accepted Deliverables to the customer and identifying, documenting, and internalizing the lessons learned during the project.

12.1 Ship Deliverables

INPUTS
1. Product Owner*
2. Stakeholder(s)*
3. Accepted Deliverables*
4. Release Planning Schedule*

TOOLS
1. Organizational Deployment Methods*

OUTPUTS
1. Working Deliverables Agreement*
2. Working Deliverables*
3. Product Releases*

12.2 Retrospect Project

INPUTS
1. Scrum Core Team(s)*

TOOLS
1. Retrospect Project Meeting*

OUTPUTS
1. Agreed Actionable Improvements*
2. Assigned Action Items and Due Dates*

3.3.2 IPMA PROJECT EXCELLENCE BASELINES:

The approach in the IPMA PEB is generic and applies to all types of projects, regardless of the context of the specific industry, sector or project management approach. It is a guideline providing a general understanding for people in the project, programme and portfolio management striving for project excellence.

It can be used as a measuring tool, as well as an improvement tool to analyse, monitor, develop, improve, develop, train and coach project team leaders interested in developing project excellence skills.

3.3.3 IPMA PROJECT EXCELLENCE BASELINE MODEL:

1) PRINCIPLES BEHIND THE MODEL DESIGN:

The main purpose of the IPMA Project Excellence Model (IPMA PEM) is to provide guideline to organisations in assessing the ability of their project and programs to achieve project excellence.

IPMA complement the two other IPMA standards.

IPMA Individual Competence Baseline (IPMA ICB).

IPMA Organization Competence Baseline (IPMA OCB).

The IPMA can be used regardless of the Project Management approach applied to the project. The main reason for this is that the IPMA PEM does not enforce any particular approach to the project decomposition, organization or planning. It also does not suggest any particular project management tools or technique.

This means that the IPMA PEM can be used for the assessing the implementation of project management within particular projects. It makes IPMA PEM a good

companion for well-established project management methodologies, helping to assess their fitness for the use in particular project situations and to link the use of given methodology with the achieved results.

2) STRUCTURE OF THE MODEL:

The basic structure of the model is simple. The model serves as a standard and offers guidelines for excellent project management regardless of the size of the project, its maturity and context.

The basic structure of the Model is simple. The model serves as a standard for achieving excellence in the Projects and as an assessment tool for measuring the Project Performance at different phases of the project regardless of the size and approach.

The structure is based on the three levels of the Model.

- **AREAS:** it shows the main components of Project Excellence i.e People, Purpose, Processes & Resources and Results. The first two areas are the Enablers of the Project Excellence while the third one is the Outcome of the Successful Leadership and Management of the Processes.

    1) **PEAPLE AND PURPOSE:** People and project purpose is the foundation of project excellence. The right people, led and supported by great leaders, all sharing a common vison and purpose for success, are crucial to drive project improvements and help the project beyond the established standards. The people and purpose area is divided in to three criteria,
        - A1. Leadership and Values.
        - A2. Objectives and Strategy
        - A3. Project team Partners and Suppliers.

    2) **PROCESSES AND RESOURCES:** The practices used for the project management can reinforce excellence through sound processes and adequate resources used in an efficient and sustainable way.
    Processes and Resources area is divided into two criteria
        - B1. Project Management Processes and Resources.
        - B2. Management of other key Processes and Resources.

    3) **PROJECT RESULTS:** The PM approach can only be excellent if it leads to outstanding results for all the stakeholders. This area complements the other two areas with the necessary proof of excellent results as defined by the project stakeholders.
    The project Results area is divided into four criteria.
        - C1. Customer Satisfaction
        - C2. Project Team Satisfaction.
        - C3. Other stakeholder Satisfaction.
        - C4. Project Results.

- **CRITERIA:** This level is primarily intended to enable feedback about the levels of excellence on a particular project to be delivered in a structured way. It describes the key factors that make-up the project excellence areas and enables measurement for development and benchmarking purposes.

3) **CONTINUOUS IMPROVEMENT AS A FOUNDATION FOR EXCELLENCE:**

   Continuous improvement and constant learning are the basis for achieving Project Excellence. The continuous improvement principle is in line with the Deming(PDCA) cycle.
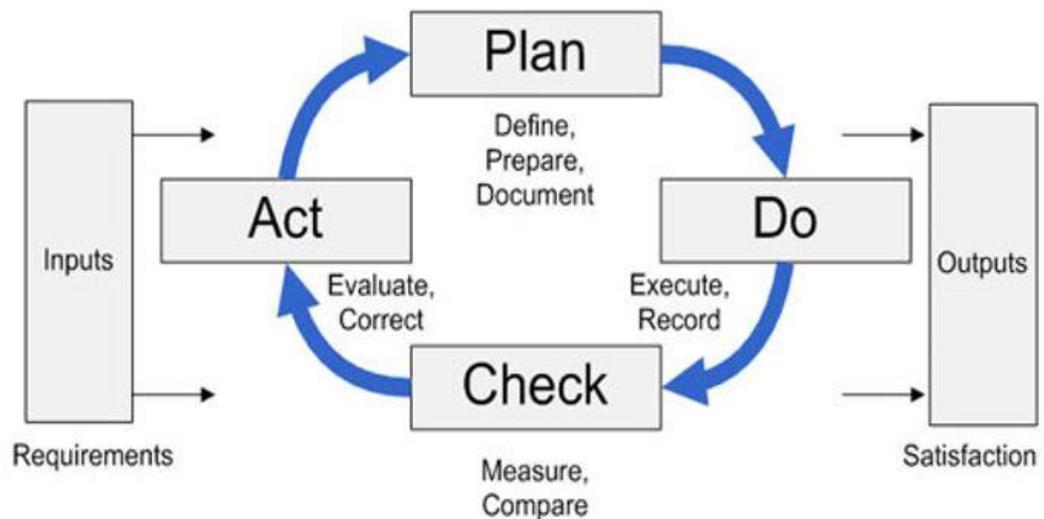
- **PLAN:** In the initial phase of the project, the project team selects sound procedures, methods, approaches and tools to Plan, Execute, Monitor and control the project throughout its life and reflect the complexity of the project. According to the industry or company standard the processes are or process elements are created. The project team adapts the develop project-specific procedures, methods, and appropriate tools that can best meet the requirements of the project.
- **DO:** The procedures and processes selected in the planning phase are implemented by the team in the actual project and makes use of them.
- **CHECK:** the procedures, methods, approaches and tools are regularly evaluated by the project team to determine whether they are appropriate and optimal for managing the project and whether they lead to expected results and/or need to be improved.
- **ACT:** Based on the evaluation, the project team analyses and prioritises the findings and agrees on the activities to be planned and executed to improve the project management approach.

The cycle continues starting from the Planning (Inputs from the previous cycle) and search for the continuous improvements and implementation for the excellence in the Project.

4) SCORING TABLE:

PLAN Defining a sound approach	DO Applying an approach systematically	CHECK Monitoring and analysing results of the chosen approach	ACT Improving and integrating the approach	Score
An innovative approach is developed to meet the needs of the project	All relevant stakeholders are fully committed to the innovative/ significantly improved approach and systematically apply it	All relevant stakeholders are fully engaged in proactive forecasting of potential areas for improvement	All relevant stakeholders are fully engaged in the proactive improvement of the approach and integration beyond the project	up to 100
A proven approach is significantly improved to meet the needs of the project		Proactive forecasting of potential areas for improvement is driven by project leaders	Proactive improvement of the approach and integration within the project is driven by project leaders	up to 80
An adequate approach is clearly agreed by all relevant stakeholders and fully aligned with the needs of the project	The approach is systematically followed by all relevant stakeholders	Results of the approach are regularly monitored and analysed	Effective actions are taken whenever analysis shows potential for improvement	up to 60
An approach is agreed with some relevant stakeholders and partially aligned with the needs of the project	Key elements of the approach are followed by relevant key stakeholders	Significant variances from planned results are noticed by project leaders within a reasonable timeframe	All major variances observed in key areas of the project lead to improvement actions	up to 40
Some approach is agreed with some relevant stakeholders	Some elements of approach are followed by some of the relevant stakeholders	Major variances in key areas are brought to the attention of project leaders	There are attempts to improve the approach when major variances occur	up to 20
No proof	No proof	No proof	No proof	0

3.4   GAP-ANALYSIS:

Gap analysis is done for the comparison of the actual (Pilot Program) with the potential desired (Scrum) process performance.

The gather data from the GEMBA was mapped with the basic SCRUM Agile methodology aspects and processes.

3.4.1   MAPPING WITH SBOK:

The aspects of the SCRUM were mapped with Processes of the Scum methodology based on the sub-criteria, Doing, Some What, Not in Place, and No Proof.

- **DOING**: Doing has all the activities that the Platform (Team) is doing or Done in their defined PM processes in different phases of the projects on the Platform(Renault). The doing activities includes,

  Formation of scrum team, Project charter, Project vision Statement, Business justification Techniques (ROI, NPV), Project Budget, Tasks Dependency Determination (Mandatory, External or internal), Working deliverables agreement (Approval by sponsor and customer), Working Deliverables (Shippable Deliverable increment), Scrum board, Updated Scrum board, Daily Stand-up Meeting, Validation of the Deliverables and Accepted Deliverables.

- **SOMEWHAT**: This part includes the activities that Platform does but is not fully implemented or not doing it according to the defined standards (Scrum) and procedures.

  Somewhat doing/Done activities are Identify Scrum Master and Stakeholder(s), Communication plan (To convey important Information to stakeholders, like the testing activities, records etc.), Prioritized Product Backlog, Release(functionality) planning sessions, Release planning schedule (Driven by date), Deliverables meeting the acceptance criteria or Reject it and Rejected Deliverables (Subsequent Sprint).

- **NOT IN PLACE:** it contains the activities that are not in place yet or not defined for the Pilot Program and needs to be defined and implemented according to the project needs and requirements.

  These activities are,

  Scrum Guidance Body. Identification of Product owner, Scrum Training and coaching, Resource allocation (colocation, Jira), Scrum Team Lessons Learned in Sprint (self-performance Improvement of the team), Continuous Value Justification (Earned value analysis), Measuring Progress towards the Business value, Develop Epics (User group meetings). User stories definitions. User Story Prioritization methods, Prioritized Product Backlog, Risk adjusted Prioritized Product Backlog. Creation of user stories (Required end-user functionality), User story Estimation Methods (Assigning the story points), Estimated user stories (Assigned), Committed User Stories (Subset of Estimated user stories) and Updated Prioritized Product backlog (New stories, change requests, new identified risks).

- **NO PROOF:** Activities with no proof mean the team consider these activities to be not obvious or not creating value for their business processes.

  These activities are,

Risk adjusted Prioritized Product Backlog, Organizational Deployment Methods (processes to ensure compliance with the standards and quality assurance measures), Metrics and Measuring tools for Project Retrospect, agreed actionable improvements, Risk Identification and Assessment (Methods defined), Project/Product prioritization based on the risk and uncertainty, Risk Prioritization, Mitigating and updating the risks.

				SBOK Gap Analysis		
Aspects	**INITIATE**	**PLAN&ESTIMATE**	**IMPLEMENT**	**REVIEW AND RETROSPECT**	**RELEASE PRODUCT**	**Doing(D)**
ORGANIZATION	1) Identification of Product owner.NF, 2)Identify Scrum Master and Stakeholder(s).SW, 3)Scrum Guidance Body.NIP, 3)Formation of scrum team. D, 4)Scrum Training and coaching.NIP, 5)Resouce allocation (colocation,Jira). NIP			1)Scrum Team Lessons Learned in Sprint (self-performance Improvement of the team).NIP		Formation of sc
BUSINESS JUSTIFICATION	1)Create Project vision Statement. D 2)Project charter.D 3)Project Budget. D	1)Business justification Techniques(ROI,NPV). D	2)Continuous Value Justification (Earned value analysis).NIP	1)Measuring Progress towards the Business value.NP	1)Communication plan(To convey important Inforamtion to stakeholders,like the testing activities,rocords etc).SW	Project charter. Statement. Busi justification Tec (ROI,NPV). Proje
PRODUCT , BACKLOG/ SPECIFICATIONS. USER STORY(who What Why)	1)Develop Epics(User group meetings) NIP . 3)User stories definitions.NIP 4)User Story Prioritization methods. NIP 5)Prioritized Product Backlog.SW 6)Risk adjsuted Prioritised Prodcut Backlog. NP	1)Creation of user stories(Required end-user functionality).NIP 2)User story Estimation Methods (Assigning the story points).NIP 4)Estimated user stories (Assigned).NIP 5)Committed User Stories(Subset of Estimated user stories). NIP 6)Identify Tasks(Deliverables). SW 7)Tasks Dependency Determination (Mandatory, External or internal). D	1)Updated Prioritized Product backlog(New stories,change requests,new identified risks).NIP		1)Working deliverables agreement(Approval by sponser and customer).D 2)Working Deliverables(Shippable Deliverable increment).D 3)Product Release.(release content and notes).NP	Tasks Dependen Determination (External or inter deliverables agr (Approval by sp customer). Wor Deliverables(Shi Deliverable incr

SBOK Gap Analysis

Aspects	INITIATE	PLAN&ESTIMATE	IMPLEMENT	REVIEW AND RETROSPECT	RELEASE PRODUCT	Doing(D)	Some what(SW)	Not in Place(NIP)	No Proof(NP)
ORGANIZATION	1) Identification of Product owner.NP, 2)Identify Scrum Master and Stakeholder(s).SW, 3)Scrum Guidance Body.NP, 3)Formation of scrum team. D, 4)Scrum Training and coaching.NIP, 5)Resource allocation (colocation,Jira).NIP					Formation of scrum team.	Identify Scrum Master and Stakeholder(s).	Scrum Guidance Body. Identification of Product owner. Scrum Training and coaching. Resource allocation (colocation,Jira). Scrum Team Lessons Learned in Sprint (self-performance improvement of the team).	
BUSINESS JUSTIFICATION	1)Create Project vision Statement. D 2)Project charter. D 3)Project Budget. D	1)Business justification Techniques(ROI,NPV). D	2)Continuous Value Justification (Earned value analysis).NIP	3)Measuring Progress towards the Business value.NP	1)Communication plan(To convey important Inforamtion to stakeholders,like the testing activities,records etc).SW	Project vision Project charter. Business Budget.	Communication plan(To convey important Information to stakeholders,like the testing activities,records etc).	Continuous Value Justification (Earned value analysis). Measuring Progress towards the Business value.	
PRODUCT BACKLOG/ SPECIFICATIONS, USER STORY(who What Why)	1)Develop Epic(s)/User group meetings).NIP 3)User stories definitions.NIP 4)User Story Prioritization methods. NIP 5)Prioritized Product Backlog.SW 6)Risk adjusted Prioritised Product Backlog. NP	1)Creation of user stories(Required end-user functionality).NIP 2)User story estimation Methods (Assigning the story points).NIP 4)Estimated user stories (Assigned).NIP 5)Committed User Stories(Subset of Estimated user stories). NIP 6)Identify Tasks(Deliverables). SW 7)Tasks Dependency Determination (Mandatory, External or internal). D	1)Updated Prioritized Product backlog(New stories,change requests,new identified risks).NIP		1)Working deliverables agreement(Approval by sponsor and customer).D 2)Working Deliverables(Shippable Deliverable increment).D (Approved by sponsor and customer). Working Deliverables(Shippable Deliverable increment).	Tasks Dependency Determination (Mandatory, External or internal). Working deliverables agreement (Approved by sponsor and customer). Working Deliverables(Shippable Deliverable increment).	Prioritized Product Backlog.	Develop Epic(s)/User group meetings). User stories definitions. User Story Prioritization methods. Prioritized Product Backlog. Risk adjusted Prioritised Product Backlog. Creation of user stories(Required end-user functionality). User story Estimation Methods (Assigning the story points). Estimated user stories(Assigned). Committed User Stories(Subset of Estimated user stories). Updated Prioritized Product backlog(New stories,change requests,new identified risks).	Risk adjusted Prioritised Product Backlog.
SPRINT	1)Release(functionality) planning sessions. SW 2)Release planning schedule(Driven by date). D 3)Length of Sprint. NIP	1)Sprint Backlog.NIP 2) Scrum board. D	1)Software for tracking(Jira).NIP 2)Sprint Deliverables(Tested functionality).NIP 3)Updated Scrum board.D 4)Daily Standup Meeting.D 5)Three questions to be asked(Done, plan and Obstacles).NIP 6)Updated Sprint Burndown Chart(Done).NIP 7)Updated Release planning schedule. NIP	1)Demonstration of the Sprint(Sprint review meeting).NIP 2)Validation of the Sprint.NIP 3)Retrospect Sprint Meeting(Agreed actionable Improvement)NIP 4)ESVP exercise.NIP 5)Agreed Actionable improvements(For next sprint).NIP	1)Retrospect Project Meeting(Determining ways for team collaboration and Effectiveness in future projects).NIP	Scrum board. Updated Scrum sessions, Release planning schedule(Driven by date).	Release(functionality) planning sessions, Release planning schedule(Driven by date).	Sprint Backlog, Length of Sprint. Software for tracking(Jira), Sprint Deliverables(Tested functionality). Three questions to be asked(Done, plan and Obstacles). Updated Sprint Burndown Chart(Done). Updated Release planning schedule. Demonstration of the Sprint(Sprint review meeting). Validation of the Sprint. Retrospect Sprint Meeting(Agreed actionable Improvement). ESVP exercise. Agreed Actionable improvements(For next sprint).Retrospect Project Meeting(Determining ways for team collaboration and Effectiveness in future projects).	
QUALITY	1) Definition of Done(Shippable).NIP 2)Criteria for user story. NIP	1)User story acceptance criteria(Objectivity,Done). NIP	1)Deirables should meet the acceptance criteria or Reject it.SW	1)Validation of the Deliverables.D 3)Accepted Deliverables.D 4)Rejected Deliverables(Subsequent Sprint). NP	1)Organizational Deployment Methods(process to ensure compliance with the standards and quality assurance measures).NP	Validation of the Deliverables. Accepted Deliverables.	Deirables should meet the acceptance criteria or Reject it. Rejected Deliverables (Subsequent Sprint).	Definition of Done(Shippable). Criteria for user story. User story acceptance criteria (Objectivity,Done).	Organizational Deployment Methods(process to ensure compliance with the standards and quality assurance measures).
MEASURE/CHANGE/IMPROV EMENTS			1)Team velocity(Story points completed).NIP 2)Estimation Effectiveness(On Task and story).NIP 3)Feedback ratings.NIP 4)proposed non-functional items(response time,capacity limitations).NIP 5)Retrospect Logs(details., issues, problems, and resolutions).NIP		1)Metrics and Measuring tools for Project Retrospect.NP 2)Agreed actionable improvements.NP			Team velocity(Story points completed). Estimation Effectiveness(On Task and story). Feedback ratings. Proposed non-functional items(response time,capacity limitations). Retrospect Logs(details, issues, problems, and resolutions).	Metrics and Measuring tools for Project Retrospect. Agreed actionable improvements
RISK	1)Risk Identification and Assessment .NP 2)Project/Product prioritization based on the risk and uncertainity. NP	1)Risk Prioritization.NP 2)Risk mitigation activities included in sprint. NIP	1)Impediment(Barriers) log in Sprint.NIP 2)Mitigating and updating the risks.NP					Risk mitigation activities included in sprint. Impediment(Barriers) log in Sprint.	Risk Identification and Assessment(Methods defined). Project/Product prioritization based on the risk and uncertainity. Risk Prioritization. Mitigating and updating the risks.

3.4.2 MAPPING OF SBOK WITH IPMA PEB MODEL:

The areas and Criteria, described in the basic IPMA PEM remained the same, as these are the essential enablers for the excellence of Project approached by any process or procedure.

The sub criteria are modified and adjusted according to the standards of the Scrum, Agile approach to have the appropriate mapping of the process.

PEOPLE AND PURPOSE:

A1. LEADERSHIP AND VALUES:

A1. a: SERVENT LEADERSHIP:

Leaders in agile environment should Serve first and then aspire to Lead. Servant leaders employ listening, empathy, commitment, and insight while sharing power and authority with team members. Servant leaders are stewards who achieve results by focusing on the needs of the team.

A2. b: Emotional Intelligence:

The capability of individuals to recognize their own emotions and those of others, discern between different feelings and label them appropriately, use emotional information to guide thinking and behavior, and manage and/or adjust emotions to adapt to environments or achieve one's goal.

A1. C: Empathy:

Good servant leaders accept and recognize individuals for their special and unique skills and abilities. They assume workers have good intentions and accept them as individuals, even when there are behavioral or performance issues.

A1.d STEWARDSHIP:

Stewardship demands a commitment to serving others. They prefer persuasion over control to ensure that they gain the trust of others in the organization.

A1. E CONCEPTUALIZATION:

The ability to view and analyze problems (in an organization) from a broader
conceptual and visionary perspective, rather than focusing on merely the immediate short-term goals, is a unique skill of good servant leaders.

A1.F THEORY Y:

Theory Y leaders assume employees are self-motivated and seek to accept greater responsibility. Theory Y involves a more participative management style.

A2. OBJECTIVES AND STRATEGY:

A2. A PROJECT VISION CLEARENCE:

Defining and developing the objectives and strategies for the project in alignment with stakeholders' needs and requirements.

A2. B CONTINUOUS VALUE JUSTIFICATION:
Perform continuous updates of the value monitoring and justification.

A2. C CONTINUOUS REPORTING:
Confirms and communicates project benefits to stakeholders.

A2. D VALUE DRIVEN DELIVERY:
Prioritize requirements based on business value delivered to customers and users. Realizing value by creating shippable product increments at the end of every phase.

A3. PROJECT TEAM AND OTHER STAKEHOLDERS

A3	Project team and other stakeholders
A3.a	Project team scrum taining before and during the project
A3.b	Srcum team meetings collaboration and Efficiency
A3.c	Self-Performance improvements of the team.
A3.d	Self-organizing and empowerment of the team.
A3.e	Recognition of Innovative and Effective communication approach
A3.f	Creating the Social Capital both internally and externally

B1. PROJECT MANAGEMENT PROCESSES AND RESOURCES.

B1	Project Management processes and resources
B1.a	Identification, guidance, facilitation and teaching of the Scrum Practice. (Sprint review, retrospective, etc..)
B1.b	Resources-other than people-office infrastructure, meeting space, work equipment, and Scrum boards.
B1.c	Collaboration plan between Scrum core team members, stakeholders and others involved (tool and technique to be used for the meeting and issue discussion)

B2. MANAGEMENT OF OTHER KEY PROCESSES & RESOURCES.

B2	Management of other key processes & resources
B2.a	identification and Management of other key processes and resources (APQP/stage and gate in our case)

B2.b	Innovation and application of tools, Methods and resources that aligns with the strategic goals of the project
B2.c	Optimizing and sustaining the processes that helps to achieve the project objectives in the most effective and efficient way, based on a good understanding of organizational capabilities.

C. PROJECT RESULTS

C	Project Results
C1	Customer satisfaction.
C1.a	Customer Perception
C1.b	Indicators of customer satisfaction
C2	Project Team satisfaction
C2.a	Perception of the project Team
C2.b	Indicators of Project Team satisfaction
C3	Other stakeholder satisfaction.
C3.a	Perception of other stakeholders
C3.b	Indicators of other stakeholders satisfaction
C4	Project Results and impact on the environment
C4.a	Realization of results as defined in project objectives
C4.b	Realization of results beyond project objectives and impact on environment

IPMA Project Excellence Baseline Model (Modified)							
A	People and Purpose	Plan	Do	Check	Act	Avg. Score	Feedback	Recommendations
A1	Leadership and Values					0		
A1.a	Servent leadership (Serve first and then aspire to lead)							
A1.b	Emotional intelligence(Self management and relation with others)							
A1.c	Empathy(Accepting and Recognizimng individuals for their special and unique skills and abilities)							
A1.d	Stewardship (Persuation rather than forcing to gain group consensus and make decision)							
A1.e	Conseptualization (ability to view and analyse problems(in organization) from a broader conceptual and visionary perspective rahter than short-term goals)							
A1.f	Healing (Motivation and potential to heal oneself and ones relationship with others)							
A1.g	Understanding of the Hierachy of needs and pushing the team up for self-organizing and motivation(Maslows Theory)							
A1.h	Theory Y (leaders assuming employees are self motivated and seek to accept greater responsibility , Participative Management style)							
A2	Objectives and Strategy							
A2.a	Project vision statement (Define and develop the objectives and strategies of excellent projects in alignment with stakeholders' needs and requirements.)							
A2.b	Continuous Value justification(Perform continuous updates of the value documentation)							
A2.c	Confirms and communicates project benefits to stakeholders(Monthly sprint reporting)							
A2.d	Value-driven delivery(Prioritize requirements based on business value deliverd to customers and users.) Realizing value by creating shippable product increments at the end of every sprint(Phase)							
A3	Project team and other stakeholders							
A3.a	Project team scrum taining before and during the project							
A3.b	Srcum team meetings collaboration and Efficiency							
A3.c	Self-Performance improvements of the team.							
A3.d	Self-organizing and empowerment of the team.							
A3.e	Recognition of Innovative and Effective communication approach							
B	Process and Resources							
B1	Project Management processes and resources							
B1.a	Identification, guidence, facilitation and teaching of the Scrum Practicce.							
B1.b	Resouces-other than people-offce infrastuctue,meeting space,work equipment,and Scrum boads.							
B1.c	Collaboration plan between Scrum core team members, stakeholders and others involved(tool and technique to be used for the meeting and issue discussion)							
	Total Avg.Score							
C	Project Results							
C1	Customer satisfaction.							
C1.a	Customer Percention							
C1.b	Indicators of customer satisfaction							
C2	Project Team satisfaction							
C2.a	Perception of the project Team							
C2.b	Indicators of Project Team satisfaction							
C3	Other stakeholder satisfaction.							
C3.a	Perceptiom of other stakeholders							
C3.b	Indicators of other stakeholders satisfaction							
C4	Project Results and impact on the environment							
C4.a	Realization of results as defined in project objectives							
C4.b	Realization of results beyond project objectives and impact on environment							

CHAPTER#4 CONCLUSIONS AND DISCUSSIONS.

4.1   CONCLUSIONS

From the general Gap-Analysis done in previous chapter we found the gaps between the Standard Agile practice (Scrum) and the actual Pilot program practice, that is carried out in the Platform.

Finally, we conclude the challenges with Literature so far and with the Observed data collected from the Platform.

These challenges are mapped with the main areas/aspects/body of the agile practices i.e ,

- Leadership
- Value
- Individuals
- Team
- Customer
- Uncertainty
- Context

	Agile/Scrum Practices	Challenges from Literature.	Challenges from Data
Leadership	Applying Servent Leadership approach.	Project Management Incompetence.	Unclear Roles (PM and Srcum Master)
Value	Prioritising feature list for ROI/Value creation.	Poor planning.	Lack of Prioriization, Multitasking.
	Continuous Value Justification.	Poor quality.	Metrics not defined.
	Value-driven delivery.		Lack of prioritization.
	Creating simple Project vision statement.		Not shared with team.
	Sharing open information.		Distributed teams.
	Using right tools	Lack of tools	Lack of proper ICT tool.
Individuals	Training/Process know how.	Project Management Incompetence.	Distributed teams, lack of training, lack of understanding of tools.
	Team Work Motivation.	Lack of Integration.	Lack of team spirit/integration.
	Decentralizing Control.	Issues related to Organizational culture.	Not clear.
Team	Emphasing Commitment and Leadership.	Lack of Accountability.	Multitasking, Team resistance to new Leadership.
	Coaching and Mentoring.	Insufficient team skills.	Not in place.
	Building a self-organizing Team.	Cross-functional team.	Distributed Team.
	Collaboration and Communication (Transaction memory system).	Projectized structure.	Lack of accountability and Responsibilty.

Customer	Engaging Customer Participation.	Lack of customer involment.	Poor communication(Mainly with PP).
	Customer preference.	Lack of Customer perception	Unclear communication/Loss of info.
Uncertainty	Applying Incremental product development strategy. (Iteration)	Scheduling issues	Product in different phases and Team members dedication problems.
	Observing and assessing Practices.	Lack of Metrics.	No Metrics defined.
	Taking adaptive actions.	Resistance to change.	No incentives/Motivation.
Context	Keeping simple rules.	Lack of proper processes.	Agile with non-agile team, Scope changes/ Roles not defined.
	Builiding customer value organization.	Lack of orgnizational support.	Lack of platform environement implementation, Lack of Proper processes.

ISHIKAWA DIAGRAM

METHODS
- Project vision unclear
- Task dedication instead of project dedication
- Scheduling issues
- No continuous value justification
- Lack of coaching and mentoring/Training
- Team leadership

ENVIRONMENT
- Resistance to new leadership
- Ineffective RASI
- Resistance to change/Platform

MEASUREMENT (Metrics)
- Workload conflicts/Unclear
- Resource Allocation unclear
- Lack of Project/Task prioritization

DISTRIBUTED TEAM/LACK OF INTEGRATION

MATERIAL
- Lack of Access to right information
- Information Loss
- Reporting issues
- Lack of proper ICT

PEOPLE
- Multitasking with diff. Platforms and
- Lack of Team Work Spirit/motivation
- Lack of
- Resistance to new
- Individual decision power unclear
- Team work Process know-how

4.2   DISCUSSIONS:

The challenges that we face in the literature and most importantly with the Pilot Program can be tackled down by implementing efficiently some Agile practices.

We observed that the team were making use of Agile practices in many of their activities without even knowing the standard procedure and methodology. So, it is not difficult to implement the practices that can fill the gaps observed.

a) DISTRIBUTED TEAM:

As the organizational culture of SumiRiko was based on the Pipeline structure and the company has been shifted to Platform just an year back, so they are still struggling with the adaptation to the projectized structure and team integration. The team can be integrated using,

- Training and pair programming
- Motivating and Building self-organizing team.
- Sharing the open information about the Project and team members tasks
- Using the right tools for information sharing i.e. access to the right information to right person at right Time.

b) INSUFFICIENT TEAM SKILLS:

As the Platform structure is new to employees and they need proper training and skills development for working effectively and efficiently in the team.

- They team should emphasis on commitment of their tasks and taking the leadership of their job with great accountability for the Platform/Team success rather than the individual responsibility.
- The team should be coached and mentored before and during the processes defined for the Project management, team collaboration and communication.

c) RESISTANCE TO CHANGE TO NEW PROCESSES:

As discussed, its normal for an organization shifting from a Pipeline structure to Platform facing the difficulties in adaptation to new structure. The organizational culture that is developed since its foundation is ingrained both internally and externally in the organization design.

- Hiring new people can bring the require change that is needed for the value creation and for the success of the platform. As new people bring new knowledge and ideas that can be shaped and trained to gain higher flexibility. Hiring the RIGHT people is crucial for the success and desire change in the processes.
- The firm must take adaptive actions to create the awareness about the changing needs and requirements of both, the firm and most importantly the customers.

The basic source of understanding the needs is information, and for that the platform team integration is the only possible way of having the true understanding of the requirements.

d) UNCLEAR SCOPE OR VISION:

Clear understanding of the project scope, needs, vison and purpose is one of the key source for creating excellence in the project throughout its life. It makes the team proactive for facing and solving any challenges and striving for achieving the goals.

    a) Creating a simple vision statement and sharing it with the team during the planning phase make it easy for the team to understand the scope of the project. It clarifies the doubts in the very early phase of the project.

       The vision statement should be regularly reviewed and updated to track the team on the right path and achieve the project goals as defined.

    b) Along with the team the customer should be engaged in defining the vision and setting a strategy to approach the target needs of the customer. Unclear vision can create confusion, resulting unsatisfactory product for the customer and stress within the team.

IS-IS NOT ANALYSIS:

To analyze and understand the actual problem clearly, we used Is-Is Not analysis tool. It is a strong analysis tool that leads to the potential root causes of a problem and help to avoid the irrelevant and misleading causes of a problem before making of any solution plans.

Blow is the observed Is-Is Not table,

Problem: Lack of Integration/Team Work		
	IS	**IS-NOT**
What (Object) Deviation	Team Standard Processes/Procedures	Individual Individual Performance/Behaviour
Where	Policies.	Responibilities.
When	Multi-task Assigning with no Prioritization.	Task Execution
How Big	Medium Impact on overall Performance and Productivity	High impact on Project Deliverables.

RECOMMENDATIONS:

Following the Deming cycle, as the Platform has been CHECKED for the problems they have been facing and the gaps with the standard process has been analyzed, it's time to ACT and put in place the first loop of the implementation cycle.

5.1   PLATFORM FRAMEWORK DEVELOPMENT:
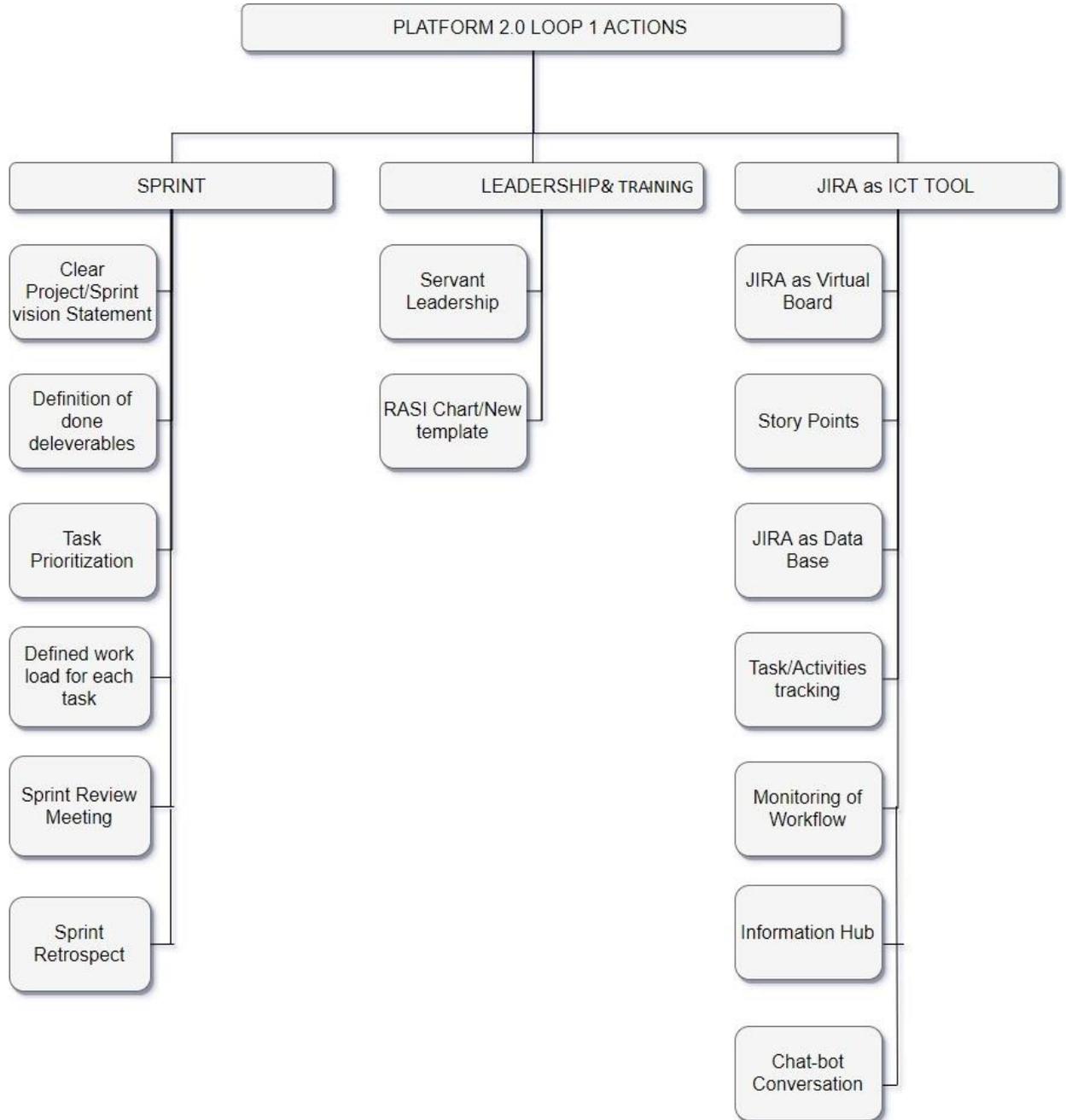
Using the bottom-up approach, starting from the project management to program and then the Portfolio management, the first loop recommendations are specifically for the project/Platform improvements.

5.1.1 SPRINT (TIME BOXED PRODUCT DEVELOPMENT):

As defined in the introduction chapter, sprint is the core process of scrum methodology. the product backlog are the deliverables that has been defined in APQP of the product development and specifically in the GANTT chart for the new product. On the Platform, most of the projects are in the phase 2(Product design and development) and phase 3(Process design and development) of the APQP which has the definite deliverables of 3D designs, Tooling release, off-Tooling release, early Prototypes, Process validation etc.

From the GANNT chart the deliverables (User stories) of pre-defined milestones can be taken in a Sprint for each project, let say 4 weeks. All the activates/tasks in that Sprint with specified deadlines can be put on scrum board to be 'Done' in a Backlog (sprint backlog). The aspects that must be addressed before and during the sprint are,

a) Clear Project vision statement about the focus, need, outcomes, and all the details about the customer requirements for the product should be defined and SHARED with the team (JIRA data base) in the planning phase of the sprint. Also, a clear strategy should be defined for the sprint deliverables execution (Definition of DONE deliverables) during the sprint planning meeting.

b) Along with the deadlines, a clear prioritization for each task should be cleared to the assignee, ranging from very high priority to high, medium and low priority. (Can be shown on Jira).

c) Work load for each task can be decided among the team member through mutual consent using user story estimation method. (First of five method).

d) Sprint review meeting at the end of sprint duration, to identify the accepted and rejected deliverables (Shifting in the next sprint), any issues or risks identified, and to report the continuous value justification (Earned value analysis result).

e) Sprint retrospect can also be done at the time of sprint review, to identify or modify the actions to be taken that can improve the process and the product for the next upcoming sprint.

5.1.2 LEADERSHIP & TRAINING:

As discussed in the previous sessions the Platform structure is recently been introduced in the company and the teams face problems of adjusting to this new form of the organization design.

One of the major problem observed is the Leadership conflict. Previously the employees were accountable to and report only to the departments heads. Since they have been projectized and a cross-functional team from all the departments is brought into one platform, the team resist to new leadership(PM) which creates the accountability and responsibility issues. These issues can possibly be addressed through,

a) An effective and implementable RASI chart at the planning meeting of the Sprint. While putting all the tasks and activates on the Sprint, at same time a RASI chart template will be updated clearly mentioning and accountability and responsibility of members for each task. The RASI chart will be evaluated in the sprint review meeting for the conformance with the planned and assigned RASI chart.

b) The resistance to new leadership can be resolved through the Servant leadership, a concept that was discussed in the Scrum methodology. the leadership concept should be framed into the 'Servant-Leader', where leader serves first, facilitate the team, understands their problems and try to resolve the issues that hurdle the productivity of the team and ultimately the project outcomes. Then conscious choice brings one to aspire to Lead. The concept is different from the Leader first to mitigate or relieve an unusual power drive within the team and to create self-management and flexibility in the team nature.

5.1.3 JIRA AS AN INFORMATION SYSTEM:

JIRA can be used as an ICT tool for the reporting, communication, information access/sharing, coordination and collaboration within the Platform team members. some of the problems observed can be resolved by JIRA through,

a) JIRA provides the virtual board view for the Sprint deliverables. The scrum board of each sprint can be customized into portions as the one for the Kanban board in the platform. It will help the team to have access to the board any time on their PC. Using JIRA features each task/activity in the sprint can be scheduled, assigned and Prioritized.

b) In JIRA story points can be assigned to each task/user story to have a clear work load of the activities. The points can be considered as the number of hours or days an activity takes to be completed. This will help the team to have a clear vision of their occupancy on the Platform and to will allow them to **Plan/Self-manage** their work load distribution and to ovoid the **Stress**.

c) JIRA can serve as a Data Base for all the relevant files (Reporting, strategy, vision statement) and uploading the files/Deliverables for a common access to all the team members.

d) Thanks to JIRA for its advanced features and tools, JIRA can track all the activities on Sprit starting from the doing till the done phase. This will help the team to know the status of each relevant activity. Activities can also be prioritized based on the importance and urgency.

e) One of the most important feature of JIRA is to monitor the work flow. JIRA has hundreds of chart and graph options to see the work flow status and the statistics of the process and activities. Some of the useful graphs/charts are, Burn up/down chart, cumulative work flow chart, control chart, etc.

f) JIRA as Information Hub, the team members can have access to any relevant information they are seeking for on the JIRA server. This will reduce the confusion and loss of important information. Also, it can reduce the needless meetings and emails which often ends up with time waste and low productivity of the team.

g) Using JIRA chatbot the team members can have online chats and conversation clearing any doubts, issues and why not FUNNY chats.

5.2 PROGRAM AND PORTFOLIO MANAGMENT (FUTURE STRATEGY):

Moving up from project to the program and Portfolio m
Management, all the platforms needs to be put in place on a single board to have the adequate resource (Specifically human) allocation and facility management.

PROJECT MANAGEMENT OFFICE:

The primary goal of a PMO is to achieve benefits from standardizing and following project management processes, policies and methods. For the office to be most effective, it should embody the organization's culture and strategy.

ROLES AND RESPONSIBILITIES:

A PMO is generally responsible for guidance, documentation and metrics related to the practices surrounding the management and implementation of projects within the organization. A PMO may also get involved in project-related tasks and follow up on project activities through completion. The office may report on project activities, problems and requirements to executive management as a strategic tool in keeping implementers and decision-makers moving toward consistent, business- or mission-focused goals and objectives.

Compile the project portfolio by classifying, selecting and prioritizing projects based on the company strategy and available resources, preparing decision-making and facilitating decision-making for the portfolio board

- Plan resources at the portfolio-level, optimize the use of resources and solve resource conflicts.

- Maintain current employee data, especially in terms of capacity, project allocations and skills.

- Standardize methods and processes in project management.

- Select, implement and train employees on applicable tools and software.

- Increase transparency of current and planned projects through up-to-date, reliable project data.

- Promote information flow and communication.

- Create a knowledge base with Lessons Learned and Best Practices from past projects to avoid repeat errors.

- Monitor project progress and control the dependencies that affect resources, budgets, and schedules (project portfolio tracking).

- Train and coach project leaders and stakeholders.

- Administrative and operational support for project managers and project teams (e.g., conflict management, workshop moderation, etc.).

REFERENCES

[1] PMBOK® Guide – Sixth Edition | PMI

[2] The Axelos PPM Benchmark study 2017 Edition. The value of Project Management Excellence.

[3]https://www.pmi.org/-/media/pmi/documents/public/pdf/white-papers/pmo-strategy implement.pdf

[4] www.ipma.world

[5] IPMA Project Excellence Baseline (IPMA ICB). Version 1.0.

[6] Agile in Automotive –State of Practice 2015May Kugler Maag Cie.

[7] Agile & Kanban In Coordination ,Ryan Polk WMS Gaming Inc. rpolk@wms.com Blog: www.spryyeti.com 2011 Agile Conference.

[8] Project & People Management school 2014 Comali, February 24th Turin.

[9] Automotive Process-based, New Product Development: A Review of Key Performance Metrics. Komsan Sanongpong Proceedings of the World Congress on Engineering 2009 Vol I WCE 2009, July 1 - 3, 2009, London, U.K.

[10] PRODUCT DEVELOPMENT IN THE AUTOPARTS INDUSTRY Pedro Leal; Duarte Trindade; Elsa Henriques AgilTec – Engenharia e Tecnologia para a Produção Ágil e Eco-eficiente, Portugal IST – Instituto Superior Técnico, Portugal.

[11] Building the Vision and the Strategy for a PMO Implementation. Mauro Fenzi, Alexandre Sörensen Ghisolfi, Valerio Crovasce (Comau Corporate).

[12] Actionable Agile Metrics for Predictability. Daniel S. Vacanti.

[13] FROM PIPELINES TO PLATFORM: How platforms' innovation creates a new business model and how they bring companies to success. Giulia Ursano, ANNO ACCADEMICO 2015/2016

[14] Analysts to Explore Analytics Capabilities at the Gartner Business Intelligence & Analytics Summit 2014, October 21-22 in Munich, Germany.

[15] What is Top Down Project Portfolio Management? www.innotas.com/solutions.

[16] Managing Capacity and Workload 7 Or How to Finally Acknowledge that You Can't Fight the Universe. Medinilla A. 2012.http://www.springer.com/978-3-642-28908-8.

[17] Measures of Project Management Performance and Value. 2005 Center for Business Practices.

[18] The Project Management Office: Aligning Strategy & Implementation. White Paper April 2014.

[19] Establishing a Successful PMO. www.pmsolutions.com

[20] Kanban Metrics in practice @ SNS @BattistonMattia.

[21] 7 LEAN METRICS TO IMPROVE FLOW. https://leankit.com/learn/kanban/lean-flow-metrics/

[22] Performance evaluation of new product development from a company perspective Helen Driva; Kulwant S Pawar; Unny Menon Integrated Manufacturing Systems; 2001; 12, 5; ABI/INFORM Global

[23] Measuring international NPD projects. Article in Journal of Business & Industrial Marketing · March 2005

[24] Measuring Transactive Memory Systems in the Field: Scale Development and Validation Kyle Lewis University of Texas at Austin

[25] The Scrum Guide™ Developed and sustained by Scrum creators: Ken Schwaber and Jeff Sutherland.

[26] Metrics in Agile and Kanban Software Measurement Techniques K A R T H I K B KyARUNANITHI Karthik Karunanithi California State University, Fullerton.

[27] SCRUM BODY OF KNOWLEDGE (SBOK™ Guide) 3rd Edition.

[28] Automotive Product Realization; A Process-Based Management Komsan Sanongpong. Proceedings of the International MultiConference of Engineers and Computer Scientists 2009 Vol II IMECS 2009, March 18 - 20, 2009, Hong Kong.

[29] Mapping Agile Project Management Practices to Project ManagementChallenges for Software Development Saya Poyu SoneCollege of Business, Argosy University.

[30] The Blending of Traditional and Agile Project Management~ By Kathleen Hass.

[31] An Agile Implementation of SeRUM Michele Gannon John Hopkins University Applied Physics Laboratory.

[32] Trello Guide http://help.trello.com/customer/portal/articles/891970-adding-attachments-to-cards.

[33] JIRA Guide. Atlassian Suite

[34] The Ultimate Guide to Project Management by the Zapier Team.

[35] https://ec.europa.eu/jrc/sites/jrcsh/files/JRC61541.pdf

[36] http://passthrough.fw-notify.net/download/235066/http://bth.divaportal.org/smash/get/diva2:1153569/FULLTEXT01.pdf

[37] http://bth.diva-portal.org/smash/get/diva2:829173/FULLTEXT01.pdf

[38] http://liu.diva-portal.org/smash/get/diva2:555780/FULLTEXT01.pdf

[39] http://www.scaledagileframework.com/agile-teams/

[40] https://www.collab.net/sites/default/files/uploads/CollabNet_scrumreferencecard.pdf

[41] http://www.innovationmanagement.se/2016/08/09/integrating-agile-with-stage-gate/