

**ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF COMPUTER AND INFORMATICS**



BLG448E

PROJECT MANAGEMENT IN ENGINEERING

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What is Agile/Iterative Project Management? Which are its main features and principles?

Agile Project Management is a **set of methodologies for project development which need a special speed and flexibility**. Most of the time these project are projects related to software development or computer engineering projects. Agile Project Management is built around a flexible approach. **Team members work in short bursts on small-scale but functioning releases of a product**. Then they test each release against customer's needs, instead of aiming for a single final result that is only released at the end of the project (Traditional Project Management).

The end product of an Agile Project may be different from the initial one. This is the main feature of Agile PM: **Products and work strategies are changing constantly**. However, thanks to this, we can be sure that the product or the final result of the project is the one that customers want, because we have been doing the checking process thinking about it.

This makes Agile PM particularly appropriate for new or fast-moving businesses, for those in a fast-changing environment, or for highly complex situations, where managers are looking forward to find the optimum business model. It is also helpful with urgent projects that cannot wait for a full, traditional project to be set up.

Principles and Methodologies of Agile Project Management.

Agile Project Management follow the following principles:

1. It has to adopt an **incremental development strategy** (scrums), rather than complete product planning and execution.
2. It has to base the quality of the result more on the tactic knowledge of people in well-organized teams than on the quality of the processes employed.
3. Overlapping of the different phases of development, instead of performing one after another in a sequential or cascade cycle (Traditional PM).
4. Welcome changing requirements, **even late in development**. Agile processes harness change for the customer's competitive advantage.
5. Business people and developers must work together daily throughout the life of the project.

Some Methodologies related to Agile PM:

- **DSDM. (Dynamic System Development Method)**. Is the original agile development method. DSDM was around before the term "agile" was invented, but is based on all the principles we have come to know as agile PM.
- **Scrum. It is an iterative and incremental agile development framework for managing product development**. It defines "a flexible, holistic product development strategy where a development team works as a unit to reach a common goal". Scrum is the most popular and widely adopted agile method, thanks to the fact that is relatively

simple to implement and addresses many of the management issues that have plagued IT development teams for decades.

A key principle of Scrum is its **recognition that during product development, the customers can change their minds about what they want and need** (often called *requirements volatility*), and that unpredicted challenges cannot be easily addressed in a traditional predictive or planned manner.

- **Sprint.** A *sprint is a set period of time during which specific work has to be completed and made ready for review*. Each sprint begins with a planning meeting. During the meeting, the product owner and the development team agree upon exactly what work will be accomplished during the sprint. The development team has the final say when it comes to determining how much work can realistically be accomplished during the sprint, and the product owner has the final say on what criteria need to be met for the work to be approved and accepted.

At the end of the sprint, the team presents its completed work to the project owner and the project owner uses the criteria established at the sprint planning meeting to either accept or reject the work.

- **XP (Extreme Programming).** Is a more radical agile methodology, focusing more on the software engineering process and addressing the analysis, development and test phases with approaches that make a substantial difference to the quality of the end product.

Give an example of Agile Project Management.

Almost all projects related with software development and new mobile applications are done under the framework of Agile PM. Moreover, we can find **other fields where Agile PM is also used**. For example, let's imagine a project about the calculation, determination and control of 21 new satellites for the **Global Navigation Satellite System (GNSS) Galileo (Real project of European comission and ESA)**, which nowadays has 9 satellites in orbit. The system is scheduled to reach full operation in 2020 with 30 in-orbit satellites.



- **Scope of the project:** Calculation, creation and launching of 21 new satellites for the GNSS Galileo system.
- **Budget:** 7.000 M€
- **Life of the project:** 3 years (the system is scheduled to reach full operation in 2020)
- **Departments:**
 - Computational Aerodynamics department. (CA)
 - Structural engineering department. (SE)
 - Management and financial department. (MF)
 - Electrics and Electronics (and informatics) department (EE)
 - Numerical analysis department. (NA)
 - Human resources department. (HM)
 - Manufacturing processes department. (MP)
 - Transportation department. (T)
 - Propulsion department (P)
- Working strategy: Agile project management. Different tasks will be given to the different departments, and they must handle their work before a determined time (sprint). After that, a new meeting will take place and new work (or the same one if it could not be finished) will be given.

Since we have to create and launch 21 new satellites, **new problems and new requirements will appear**, so Agile PM is the most suitable way to face a project like this one. We will do meetings once in a month or two months (It depends of the current phase of the project), and then we will do a new sprint until the next meeting, working under the frame of scrums (iterative and incremental work).

CHARTS

<i>Task Name</i>	<i>Duration</i>	<i>Department/s</i>	<i>Cost (M€)</i>	<i>Responsible</i>
SPRINT: Calculation of a new satellite	60 days	CA, SE, NA	24	Responsible of each department
<i>Aerodynamics Lab.</i>	<i>60 days</i>	<i>CA</i>	<i>5</i>	<i>CA head</i>
<i>Stability and control Lab.</i>	<i>35 days</i>	<i>CA, NA</i>	<i>6</i>	<i>CA head</i>
<i>Structural design.</i>	<i>45 days</i>	<i>SE</i>	<i>12</i>	<i>SE head</i>
<i>Mission Programming</i>	<i>55 days</i>	<i>EE</i>	<i>5</i>	<i>EE head</i>
Meeting	1 day	ALL	----	Project Manager
SPRINT: Satellite Manufacturing	95 days	HM, T, SE, MP	67	Responsible of each department
<i>Main parts manufacturing</i>	<i>80 days</i>	<i>SE, MP</i>	<i>35</i>	<i>MP head</i>
<i>Lateral plates manufacturing</i>	<i>60 days</i>	<i>SE, EE, MP</i>	<i>11.5</i>	<i>MP head</i>
<i>Transporting and assembly</i>	<i>55 days</i>	<i>T, MP</i>	<i>20</i>	<i>T head</i>
<i>Digital circuits implementation</i>	<i>15 days</i>	<i>EE, MP</i>	<i>0.5</i>	<i>EE head</i>
Meeting	1 day	ALL	----	PM

SPRINT: Test and final calculations	21 days	CA, MP, SE	500	SE head
<i>High temperature tests</i>	<i>7 days</i>	<i>CA, MP, P</i>	<i>200</i>	<i>CA & MP head</i>
<i>Stability tests</i>	<i>4 day</i>	<i>CA, NA</i>	<i>55</i>	<i>NA head</i>
<i>Structural Endurance tests</i>	<i>1 day</i>	<i>SE</i>	<i>200</i>	<i>SE head</i>
<i>Velocity tests</i>	<i>9 days</i>	<i>CA, NA</i>	<i>45</i>	<i>NA head</i>
Meeting	1 day	ALL	----	PM and MF
SPRINT: Satellite launching	7 days	(P)	470	P head
Meeting	1 day	ALL	----	PM
SPRINT: Analysis of the project (new objectives, perspectives,....)	3 days	MF	----	PM and MF head
SPRINT: Calculation of a new satellite	78 days	CA, SE, NA	30	Responsible of CA, SE, NA
Meeting	1 day	ALL	----	PM and MF head

After a satellite launching, we have some time to check **if everything is well done, if the GNSS system is working as planned**, we can study **the reaction of people with this new improvement** and see if costumers (in this case big aerospace companies) are interested in the system or not.

As we can see, with this iterative process, we can improve the work already done by giving new objectives (changing the previous objectives of the project) in order to achieve more quality in the work and improve the construction of new satellites (we have to create 21 new satellites, so we can increasingly improve each of them). **Is it clear that a satellite which has been launched today will not have the same features (materials, programming, mechanical strength) that one which will be created in two years.**

This project has been thought under a **frame of incremental development strategy**, because we follow a work way for one satellite, but if something is wrong or need to be changed, we can do it easily simply by changing the working strategy. In agile PM this frame of **incremental development is called scrum**.