THE HYBRID PROCESS MODEL
AS A LINK BETWEEN CLASSIC AND AGILE CONTROL ELEMENTS

de.cgi.com

Introduction

The pace at which markets and technologies change or newly emerge is rapidly accelerating. In this rapidly changing environment, companies are forced to rethink established ways of working. The challenges could not be greater, as changing markets constantly place new demands on companies and their products. To remain competitive in the long term, however, companies are equally forced to work economically, with planning reliability and following legal and regulatory requirements, and to develop innovative solution concepts in this context. This has a direct impact on processes and working methods within companies and their performance-providing units. More and more, companies try to establish modern and agile working methods within their organizational structure. However, this one-size-fits-all approach does not always make sense, as the agile world cannot be introduced to the same extent in every area. Not every divisional unit and every project can be organized in an agile way, which is why companies should choose hybrid process models.

The degree of agile working methods depends just as much on the respective discipline, for example in mechanics, electronics, software, and production.

In sum, however, this does not mean that time, budget, and quality are secondary objectives in a partially agile project. These aspects, as well as the needs of the customer, must form the framework of the project and cannot be neglected.

Even if a project is defined for years and has a fixed budget, this does not mean that the overall planning should be done in an annual cycle.

Critical for the project start is the definition of the scope of the project. The more well-defined requirements are identified for the project, the easier it is for the subprojects to handle the implementation of the requirements. Requirements in our example are regulatory requirements that influence the development or provide a framework. This has a considerable influence on the approach to be chosen (agile or linear) in the project. Requirements from the regulatory environment must be evaluated in advance.

Hybrid models are particularly suitable for projects in which fixed framework conditions must be adhered to, but sufficient flexibility must be guaranteed to respond to changing market or customer requirements. They support the reduction of time-to-market and the design of innovations, while still taking into account fixed framework conditions, in order to achieve competitive advantages.

Hybrid Organizations

A hybrid organization brings the advantages of two worlds together: the classic plan-driven organization, which is often a waterfall model, and the agile world. It is characterized by communication and transparency in the foreground. In addition, a lot of information about the project is visualized so that it is available to all participants. In this context, a hybrid process model was developed, which is described below.

Case Study

The company considered in this case study deals with the production of complex components in the manufacturing industry.

Within the environment, there are clear deadlines, such as Start of Production (SOP). This date is the starting point for all activities in the project and thus represents the unchangeable basic condition. From this point, backward planning begins in each sub-project to be supplied, based on the previously defined milestones.

Requirements for the product are defined by continuous development. Furthermore, the product should also deliver business value, meet regulatory requirements, use new technologies, in addition to other requirements. The requirements are known from the beginning or crystallize over the development period.

Agile and classic working methods are used along with the existing structural and process organization (see Figure 1).

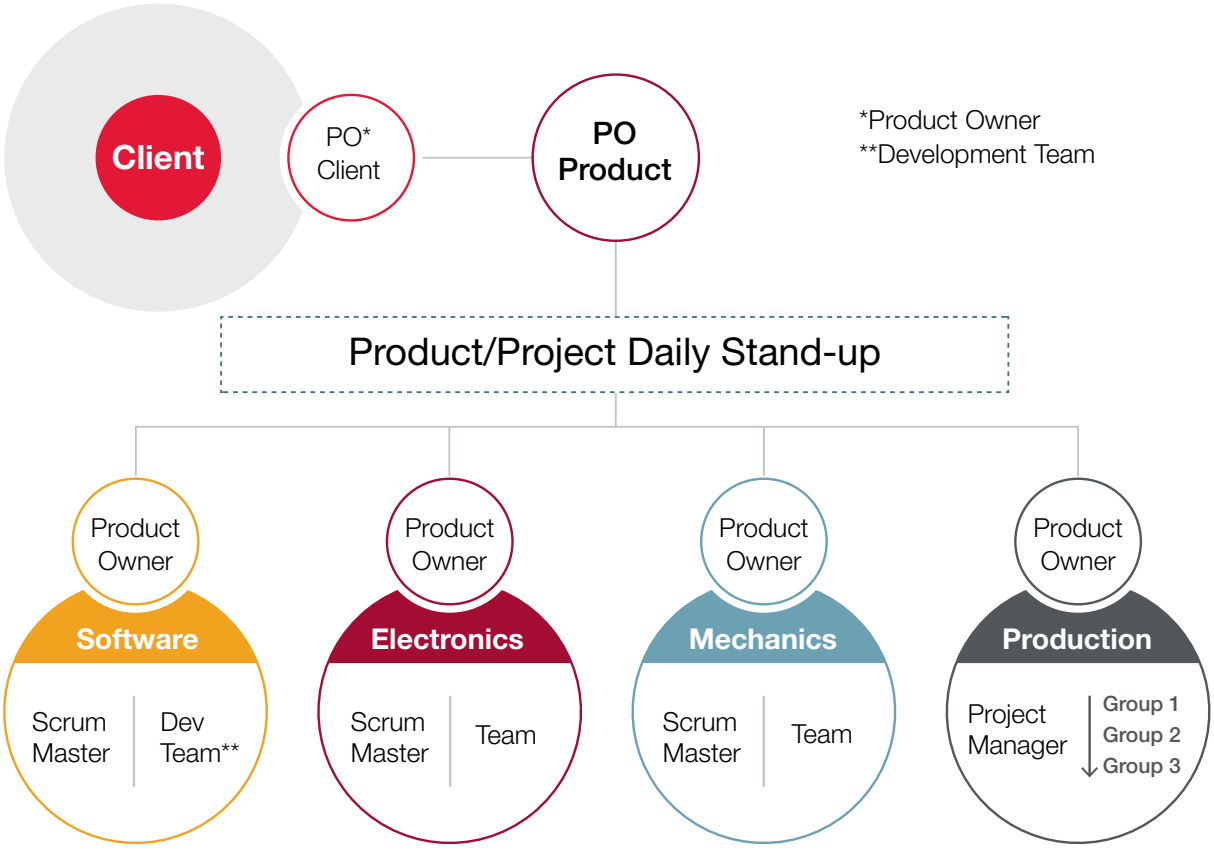


Figure 1: Hybrid Project Organization with product owners to control individual project teams.

In the respective disciplines of software, electronics, mechanics, and production, project teams are controlled by a product owner who is responsible for the respective subject (see Figure 1). The degree of agility depends on the respective disciplines. The product owner coordinate their work results and goals with an overarching product owner instance via regular meetings in the form of Product/Project daily stand-ups. This overarching product owner in direct exchange with the product owner on the customer's side. Through this channel, the customer can directly influence the prioritization of the work results and address new and changed requirements without having to intervene independently in a coordinating capacity.

While subject areas such as "Project Controlling", "Portfolio Management", and "Project Management Office" (PMO), which follow classical and firmly defined guidelines, the development area should create room for flexibility and agile approaches. This means that companies need governance that defines and combines both firmly regulated and agile processes. In the following, the disciplines of communication and transparency are in particular focus.

Hybrid Project Planning

First, we will have a deeper look at the platform development of the component to be integrated in a later stage.

Due to the given time constraints, an approach must be chosen that allows for changes, provides decision-making space, promotes transparency both inside and outside the project, and strengthens communication. If necessary, new lines must also be built in the plants for production. Purely agile implementation is not feasible under these circumstances!

Therefore, the classic way of project planning is chosen first, in which phases, milestones, and quality gates are defined and adapted to the project. Due to the necessary flexibility, planning is not as detailed. The management promotes this approach, with the goal in mind to develop a high-quality product by focusing on a defined catalog of requirements.

In addition to planning, the aim is to produce a (product) increment that can increase the customer benefit.

To create the basis for later flexibility in the development process and yet still meet the requirements for planning reliability and management reporting, the essential components for providing the work field in the "preparation phase" must be provided.

As shown in Figure 2, this is executed in the steps “Project start” to officially start the work order, “Scope defined” to fulfill predefined conditions and “Team kick-off” to assign responsibilities.

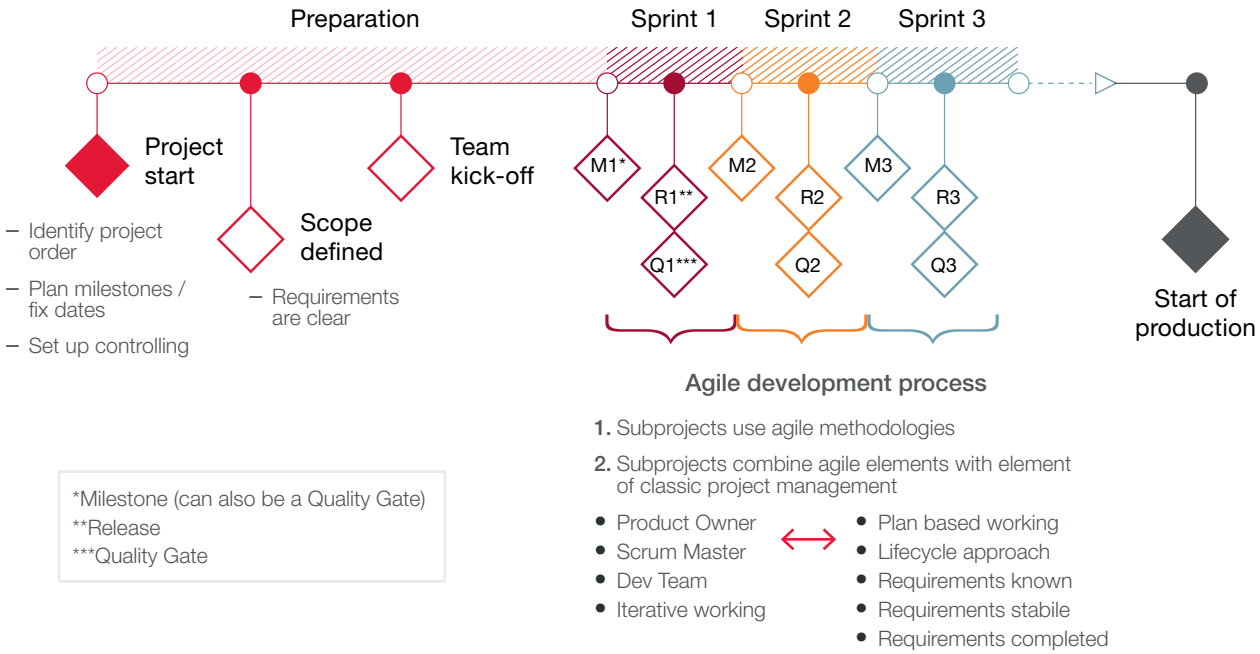


Figure 2 - Hybrid Project Planning Scheme including preparation phase, planning, and implementation within the agile development process

The project scope forms the product backlog, in which all requirements identified for the project are collected. A release backlog is then created for each sprint in a sprint planning meeting (see Chapter 3 - Sprint Planning and Workload). This means that the requirements to be developed in this sprint are taken from the product backlog. This also means that the requirements become more concrete throughout the sprints and are enriched with more knowledge. This is the so-called refinement of the backlog for each sprint.

The requirements are prioritized in the planning meeting. The backlog also creates the necessary transparency in a project. Each team member can see how much and what is still in the backlog.

When the first milestone (M1) shown in figure 2 is reached, the preceding preparation phase is completed. Then, the first sprint can begin with the planning of the requirements to be implemented and the subsequent actual implementation. Planning and implementation lead to the first usable and presentable intermediate result, the first release (R1). It can only be released after the previously defined quality criteria of the quality gate (Q1) have been checked.

The following Retrospective ends the first sprint and the following milestone (M2), marking the start of sprint 2, is reached.

From a regulatory point of view, it is important that the planning and implementation of the requirements are linked to each other, a concept defined as traceability. It should be traceable how the requirements have been implemented and where. Furthermore, this also promotes a later impact analysis, if requirements change over time, which are brought about by “change requests.” The product backlog also offers new team members overview and insight into existing and already implemented requirements. It also serves to illustrate project results and to make actions and solution decisions comprehensible. The product backlog, therefore, plays a central role in development.

Sprint Planning and Distribution of Work Packages

The product owner presents the requirements to be implemented in the sprint as a team. The team estimates the effort and the sprint goal is defined. The project work for the sprint is thus defined and the sprint backlog is filled.

One goal of sprint planning is to decide together and determine which new tasks are to be handled in the current sprint and which ones still have to wait. This results from the existing framework conditions, prioritizations, and additional factors. The team has to know its limit in order to work, therefore the maximum possible effort must be defined for each sprint. Otherwise, the team is overloaded, cannot reliably keep its promises, and cannot concentrate on the execution of tasks. Overloading blocks potential efficiency and effectiveness-enhancing effects. It is important to understand that the effects that reduce efficiency and effectiveness can also be caused by a workload that is too low. Limiting the workload in a sprint and the retrospective perspective at the end of the sprint are effective tools to mitigate this risk. At the beginning of the sprint, for example, individual tasks are estimated in the sprint planning process and reflected and checked during the retrospective. The retrospective is a meeting that takes place at the end of a sprint (further components of the retrospective are discussed in chapter 5.2 - Review Meeting & Retrospective). The application of the kanban pull principle helps to select the number of tasks that can be processed. All these instruments contribute to increased transparency of the currently distributed work packages.

Dependencies Between Projects – Backlog Transformation

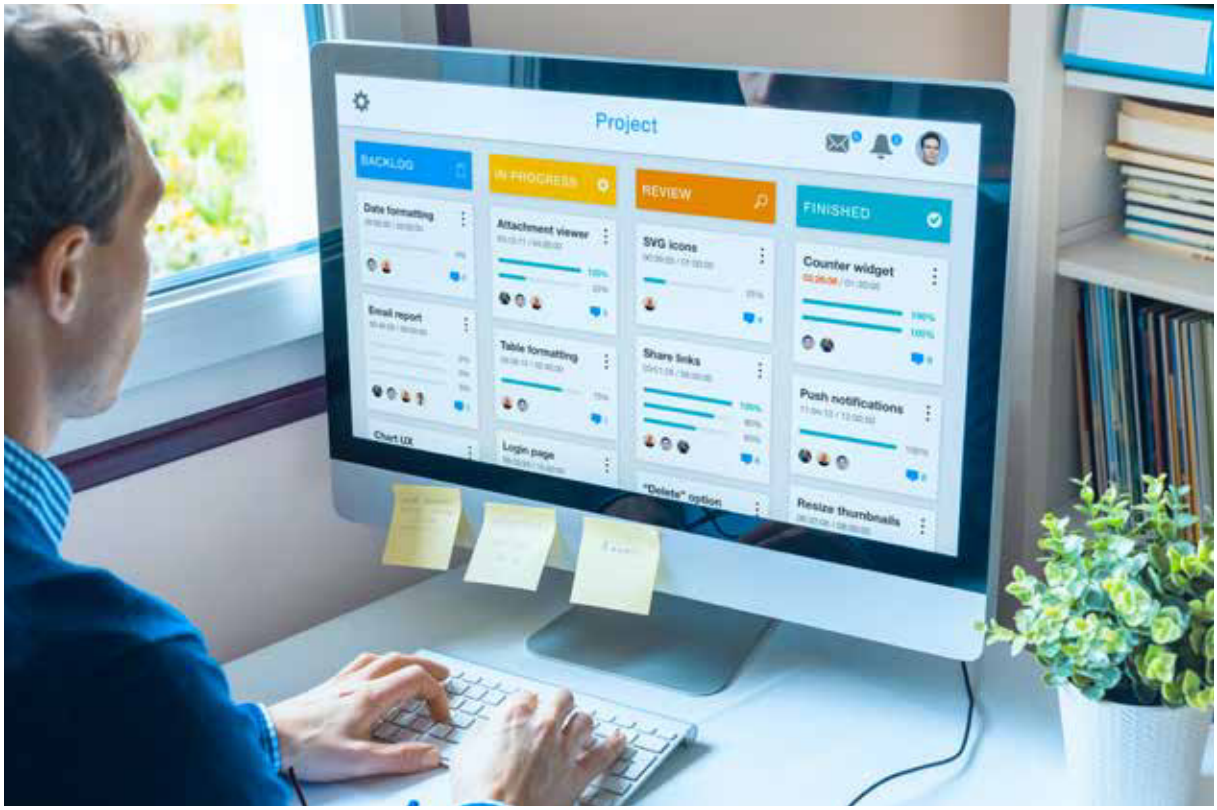
It is quite common that, in addition to the overall goal of developing a high quality product, there are also sub-goals in other departments of the organization (Project Matrix Organization). This means that sub-targets slow down the highest goal and can become a pawn in the game if no process for mutual goal achievement is defined.

The necessary transparency can be created if the backlog in a project is divided and the dependencies are shown. In this case, there is an inactive part where results are waited upon. These results are delivered to the project slowly or quickly, depending on the willingness of the other department(s) and whether there are other goals in this department besides the project goal to be achieved together. It is important to understand that inactivity does not mean lack of any progress.

The goal of the sprint is to deliver a part of the overall product; this goal can be different for software and hardware development. In any case, it is important to set realistic goals.

Interdependent projects require a risk assessment. If, for example, a particular test can only be carried out when other requirements have been implemented, it must be prioritized accordingly and communicated in advance. Obstacles must be identified at an early stage and known as a risk.

To completely dissolve dependencies is unrealistic. Rather, the question arises as to how goals can be sensibly distributed across the organization.



As an example, figure 3 shows the dependencies between different user stories. User stories 1, 2, and 3 represent the product backlog, i.e. the total sum of the requirements of the project scope. To specify the overall and general user stories, they are divided into individual releases, which in turn represent the result of a sprint and the tasks implemented in the sprint. If you now imagine that each user story is worked on by a separate team, but the work results build on each other, it quickly becomes clear that there are large dependencies. By transforming the backlog into a board, these dependencies can now be displayed visually more clearly and waiting times can be reduced. The activity of individual tasks is also important in this context. If they are at the top of their respective user story, they are active and are processed with priority. If you now look at user story 2, the two releases 2.1. & 2.2. and the associated task groups in the following figure, the logical sequence, and processing of the tasks of all user stories become visible. Only when all active tasks of all three user stories have been completed in sprint 1, the tasks listed as inactive in sprint 1 can be implemented in sprint 2, to create the prerequisites for the final tasks 2.2.1. & 2.2.2

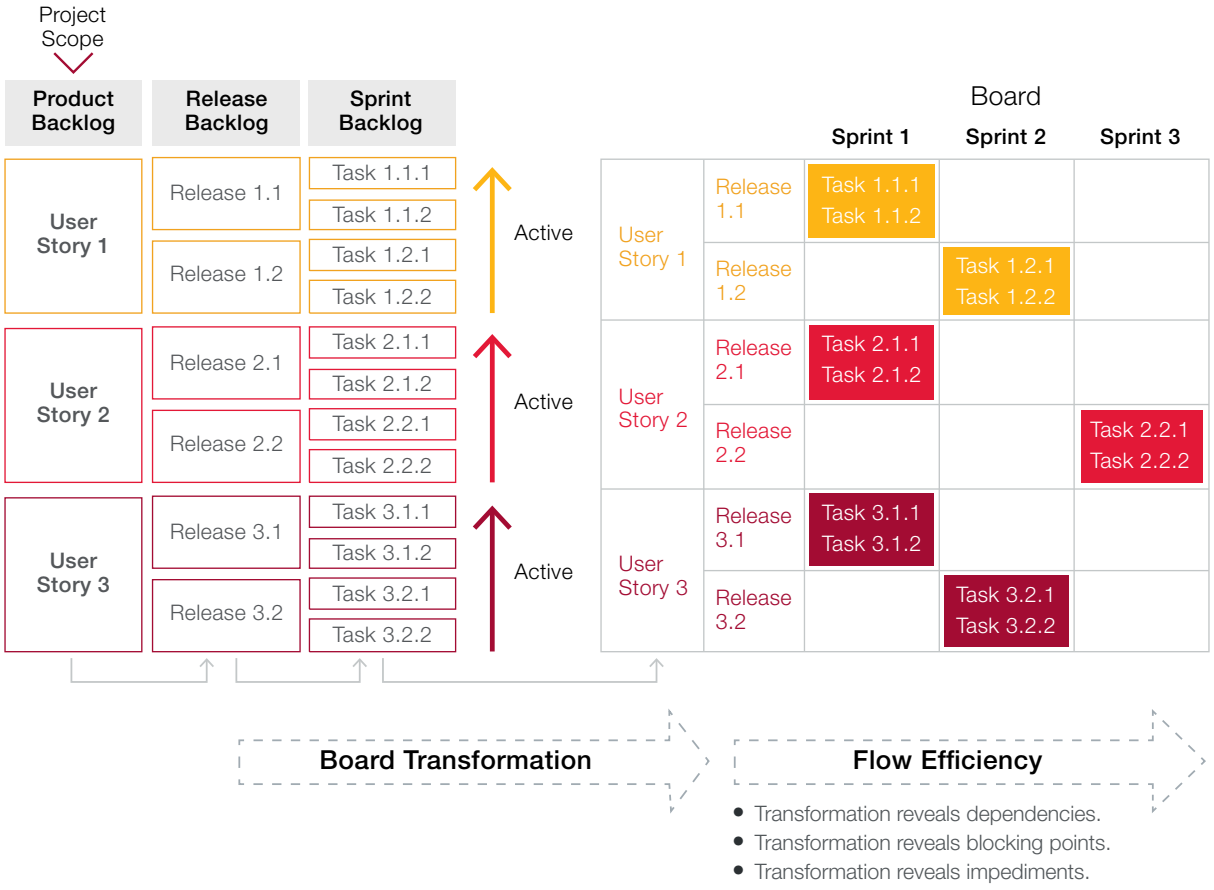


Figure 3 - Backlog to Board Transformation to visualize dependencies between different user stories

Forms of Communication

Communication is an essential factor for the success of a project. However, it should follow some basic rules to be able to fulfill its purpose in a targeted manner. Thus, the exact orientation towards the target group in question plays just as important a role as its content design.

Bottom-up Communication

Dailies are held in the teams - these are short and informative to provide the development team with up-to-date information about the progress and obstacles. Thus, the team is always up to date.

The product to be created in the project can be seen as a system. This, in turn, is composed of various subsystems, which in turn can consist of one or more components. The development of the components is partly heterogeneous and can be carried out across subsystems.

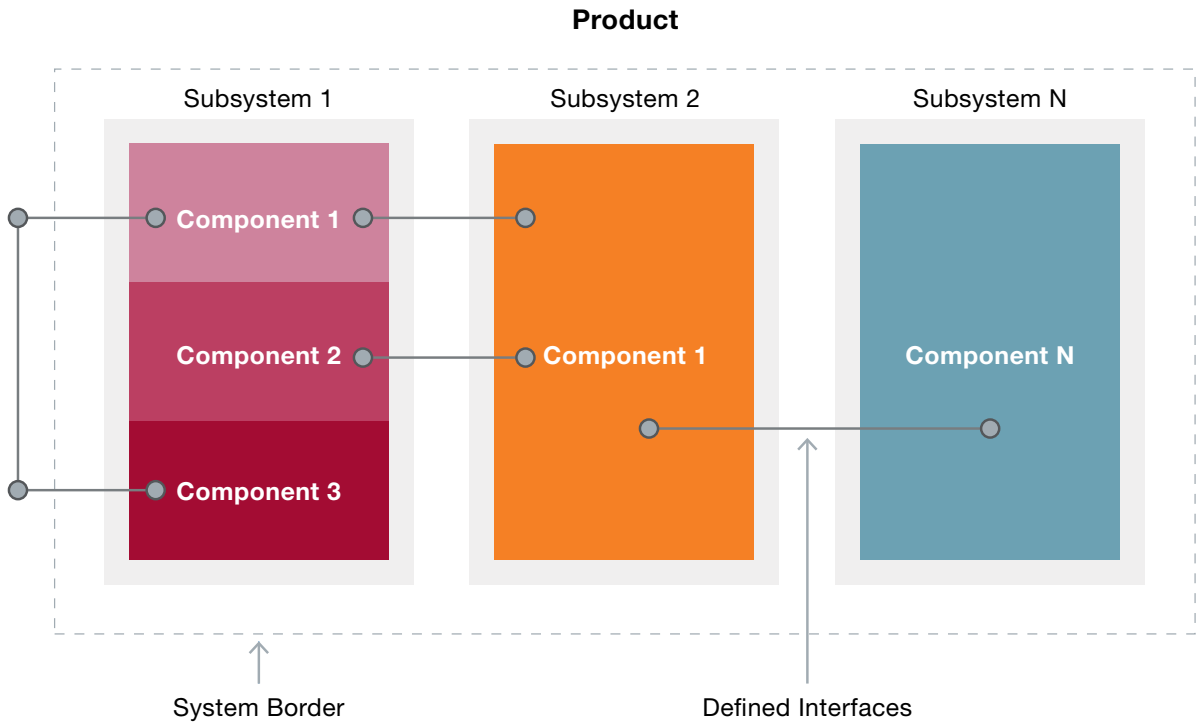


Figure 4 - Interdisciplinary subsystem and component development scheme for cross-disciplinary product development.

The illustration in Figure 4 shows a project organization structured according to various disciplines, in which various subsystems are developed for the product. These deal with the development of different components. Within this model, it is possible to develop the subsystems and the associated components in interdisciplinary cooperation.

Communication in the teams of the disciplines and at the component level has the advantage that all necessary information is passed on in a targeted manner at an operational level.

If the product owners participate in the dailies, they receive all the necessary information and are informed of the respective progress. The product owners and the team work together on the same board (see chapter 4) and therefore have the work progress directly at hand. This procedure creates enormous transparency for all involved.

It is important to mention that the respective teams work together, if possible at the same location. However, as soon as the management is involved in the information flow, the necessary and decision-relevant information must be prepared in a different form, aggregated, and passed on in separate meetings.

Review Meeting and Retrospective

The review meeting is intended to inform the product owners about the current status of the work. For this purpose, the team presents the newly developed functions in this meeting.

In the case of the development of hardware components, however, the presentation of the achieved results can be difficult. For example, new properties of designed components cannot always be assessed by all participants in the context of purely functional analysis. For electronic developments, the presentation and justification of specific solutions or the implementation of special requirements can be a valid approach to present the progress of the project. The medium “feedback” offers various stakeholders, teams as well as management, and other stakeholders the possibility to incorporate feedback. In the case of mechanical components, the presentation of sample parts can be a way to make the progress of the project tangible for all parties involved.

The aim of the joint exchange within the feedback cycles is to improve the quality of the product. The Retrospective allows the participating parties to capture the current atmosphere, analyze processes, and continuously improve productivity throughout the project.

Conclusion

To select the appropriate process model, it is crucial in how it supports the organization in implementing projects efficiently. To be able to react to dynamic market developments and technological changes at any time and to ensure efficient project management, a process model is required that enables reliable coordination of the various service delivery units (e.g. product owner instances) and their tasks.

Our process model offers organizations the possibility to establish classical control mechanisms via project tracking with milestones for progress measurement and to use existing decision and reporting bodies. Iterative procedures also enable the continuous development of the product as well as regular control and fine-tuning of the increments produced. This approach allows changing internal and external requirements to be taken into account at any time.

With the parallel use of established and proven forms of communication, such as daily stand-ups as well as planning and feedback loops in the form of sprint planning, sprint reviews, and retrospectives, the current work progress can always be measured within the product's delivery units.

In connection with the underlying concept of an overarching hybrid project organization, as described in chapter 2.1, even complex products with various interdisciplinary dependencies can communicate with each other via the respective product owner instances. This forms the framework for making optimal decisions for the product and thus ensures the overall success of the product.

Our hybrid process model combines the classic control elements with additional agile elements such as the "Backlog to Board Transformation" and the "Hybrid Project Planning Scheme", described in chapter 2.2.3 and chapter 4. By using these tools, the challenge is mastered of creating a balance between fixed defined goals or milestones and the dynamic further development of increments, depending on the orientation. In addition, these elements enable the flow of information in the project organization to be transparent and efficient even beyond the subsystem and component boundaries (see chapter 5).

Glossary

Product Backlog	A list of things that need to be done to create, maintain, and further develop a software product.
Refinement	An activity by which the Product Owner and the development team refine the product backlog and add details during a sprint.
Daily (Scrum)	Daily, time-limited event to plan the development work during the sprint. It is used by the development team to check progress and update the sprint backlog.
Product/Project Daily Stand-up	Daily, time-limited event to plan the coordination work between the Product Owner.
Product (Increment)	Potentially deliverable software that represents a further development of the last product increment.
Product Owner	The role is responsible for incremental management and defining business and functional expectations of the product.
Development Team	The role is responsible for performing incremental development work to produce a deliverable product increment.
Scrum Master	A role that coaches, trains, and supports the team and its environment in the correct application.
Scrum Team	Team, which consists of a Product Owner, development team, and Scrum Master.
Sprint	Time-limited event that serves as a container event for the other scrum events.
Sprint Backlog	A list of things that must be implemented to achieve the goal of the current sprint.
Sprint Planning	Temporary event with which a sprint starts. It helps the team to identify the most valuable things to do next and refine them in the sprint backlog.
Sprint Retrospective	Time-limited event at the end of a sprint. It enables the team to review the last sprint and adjust the process for the next sprint.
Sprint Review	It allows the team and stakeholders to review the resulting (potentially deliverable) product and get an impression of the overall progress and to update the product backlog.
Stakeholder	A person who is outside the scrum team and has a special interest in or knowledge of the product that is necessary for incremental development.
Quality Gates	Points in the course of a development project where a decision is made on the release of the next project step based on previously defined quality criteria.

About CGI

Founded in 1976, CGI is among the largest IT and business consulting services firms in the world. Operating in hundreds of locations across the globe, CGI delivers an end-to-end portfolio of capabilities, from strategic IT and business consulting to systems integration, managed IT and business process services and intellectual property solutions. CGI works with clients through a local relationship model complemented by a global delivery network to help clients achieve their goals, including becoming customer-centric digital enterprises.

de.cgi.com