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Project Management: How to Overcome the Limitations of the Traditional Methods from the Industrial Age

Today more and more activities are carried out in project mode. However, the traditional project management approaches developed in the second half of the 20th century show strong limitations related to the complexity of the systems where projects take place. Well-identified practices related to complexity can be implemented to improve strategic piloting and project delivery management.

This paper is a translation from a position paper developed for [Welcome Complexity](#), a Non-Profit organisation based in France and focused on accounting for increased complexity in all human activities.

Definitions

A project is defined here as a 'set of activities with a beginning and an end and aimed at producing a defined deliverable or achieving an explicit objective for one or more users within a defined timeframe'. It is achieved by mobilising a team and resources (usually devoted to other tasks) for the same objective and for a fixed period of time, under the authority of a project manager. The simple resolution of problems, even in a team, is excluded from this definition of 'project'.

Responsibility for the project is carried by two closely linked bodies. On the one hand, the strategic pilot of the project, often referred to as a sponsor, or Owner. It is the body that carries the strategic objectives, sets out the aims and objectives of the project, and provides the means for its implementation. It is responsible for its strategic management, i.e. the alignment of the project's implementation with the strategic objectives, and the possible evolution of the objectives as the project gets implemented. The sponsor can be supported by a governance organisation that brings together a subset of particularly relevant stakeholders. On the other hand, the operational pilot, often called project manager, is responsible for managing the project's implementation.

Projects can be of very different sizes and can be part of a specific organisational framework or cross-functional to several organisations. They can aim to deliver concrete objects (industrial installation, software) or abstract objects (organisational, or process change). They can be development projects as well as exploration projects.

A number of stakeholders are always involved in the implementation of the project, again within the organisation or completely outside it, and to varying degrees (for example, from the customer who is very interested to the neighbour disturbed by the work).

The ordinary usage of project management

Project management formalisation is set in the rationalising thought of the 20th century

Project management, even if it has always existed, is a discipline formalised in the middle of the twentieth century, particularly within major defence projects, which required the coordination of multiple contributors (PERT

approach: Program Evaluation and Review Technique). During the 1980s and 1990s, formal bodies of project management methods were institutionalised (Project Management Institute, International Project Management Association, etc.) with certifications based on standard project management approaches. Today, there is a profession of project managers around these standards, thus creating a "consensual professional ontology" (basic principles stabilised and not questioned), even though more and more activities are carried out in project mode.

Formalisation of the conventional approach in tools and organisations

These standard project management approaches are particularly applicable to the execution of a project with a purpose that is considered well defined in advance (development project). In this context, the notion of the triangle cost - planning - scope (or quality) is essential: one cannot change the objectives on one dimension without affecting the others. The traditional project management approach then aims to develop a complete and detailed hierarchical breakdown of the activities to be carried out ("Work Breakdown Structure"). These primary tasks are then placed in a logical sequence and linked together over time, producing a schedule often shown as a "Gantt chart", a visualisation invented at the beginning of the 20th century in the context of industrial mass production. It is then possible to identify the "critical path", i.e. the longest sequence of tasks that determines the completion date. This critical path must be the subject of a particular focus to control the implementation of the project. In the control phase, the progress of the necessary tasks is measured, and measures are taken in case of deviation.

IT tools have been developed to support this rational or linear planning approach, which was initially carried out by hand, particularly in terms of planning and cost control. As is commonplace in this situation, these tools now condition project management approaches by their structure and the way they are used, creating a framework that is difficult for practitioners to challenge. The way in which the entities involved in project implementation (project managers) are organised and the increasingly standardised forms of contractualisation with project

Complexity requires new approaches to Project Management, beyond the traditional process-driven approaches

managers also contribute to fixing the profession's thought framework.

Recent evolutions in the field of traditional project management

The most significant aspect is the development of the industrial approach of Front-End Loading. This approach consists of putting more time and resources into the project definition phase in order to obtain a sufficiently detailed definition and increase the probability of success, while maintaining maximum stability during implementation. This practice is correlated with an improvement in the success rate of major industrial projects.

The capacity to influence the implementation of the project is indeed greatest at the beginning when no commitment has yet been made. It then gradually decreases during the implementation of the project. At the time of the project definition phase, the intention is to create a temporary bubble around the project in progress, which can last until delivery. The aim is to take into account as early as possible all the needs of all stakeholders and to set very precise specifications after the most complete possible project definition phase. An in-depth analysis of risks and opportunities is also developed to make the implementation plan more robust. This project definition is developed in great detail to avoid improvisation during implementation. The specifications are validated and agreed with the relevant stakeholders, and the project strictly complies with them. Any subsequent changes are examined with suspicion. Any changes in the views of stakeholders during the implementation are not accepted in principle, as they are assumed to have had the opportunity to express themselves beforehand. A rigorous Management of Change process is applied.

Some developments have recently been added to these corpuses that focus more on aspects related to stakeholder management, and specifically change management in the implementation of the project outcome; as well as on more systematic measurement of the actual benefits provided by the project. Some aspects related to the management of the project team have also been developed.

Discussion points to account for complexity

Notwithstanding the formalisation of the approach and the increased professional development of project management specialists, all studies show that more than the majority of development projects, and often up to two thirds, significantly fail to deliver the expected benefits. They often cost much more or last much longer than expected; and sometimes deliver a facility that does not meet the initial production targets at all. This statistic applies to projects of all types and sizes and has not improved significantly in recent decades. It applies even when the context or measures of success of the project have not changed: the problem is intrinsic to the implementation of the projects.

However, the successful implementation of projects is essential to our quality of life: the non-performance of infrastructure, energy and industrial, IT, organisational and social transformation projects creates significant effects in our daily lives. This propensity not to deliver the expected benefits therefore represents a significant loss of efficiency for our society and can even sometimes lead to a loss of confidence on the part of citizens. It is an important issue to improve the effectiveness of the effort devoted to these projects. It should be noted, however, that in some cases, projects that appear to be economic or implementation failures may significantly improve quality of life or social relationships even if resource use may not have been optimal (a common example being high-speed rail lines or many large infrastructures). Therefore, the notion of success of a project requires a multi-criteria evaluation and often can only be measured after the fact, whereas the context may have changed.

Deviations from the initial expectation are classified, for didactic reasons, into two main areas:

- Deviations of execution: the execution did not go as planned, causing additional costs and delays, or did not produce the expected object, for example in terms of performance,
- Strategy deviations: the object finally produced by the project no longer meets the expectations of the sponsor and stakeholders, which have evolved or been misunderstood.

These deviations are also much more significant when the project involves a large number of contributors and active stakeholders interacting with each other; this is often correlated with the size and ambition of the project. In this case, the deviations, if they exist, are generally very significant: major projects succeed or fail significantly. This observation highlights the role of complexity in the project deviation rate: complexity of the project system and the system around the project.

The traditional project management approach is based on the centralisation of project control and a rational, analytical approach to planning by breaking down and linking activities within a time frame considered linear. The coordination and synchronisation of the various sub-projects is centralised by the project manager, a rational actor who guides himself towards his final goals and thinks from the future to the present in a regressive manner by evaluating in advance the consequences of the actions he undertakes on the goals he pursues and starts from the desired consequences to the actions that produce them. This analytical approach, which involves a simple cause-and-effect relationship between activities, quickly reaches its limits as soon as the project involves many stakeholders in an evolving environment, and in a non-linear time frame. The problem is then to get multiple agents to cooperate in a distributed framework, in a context of events that are difficult to anticipate. The traditional project management framework does not address this issue.



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This traditional framework, which has strong limitations in the context of traditional development projects, is even more unsuitable for exploration or innovation projects. These observations are directly related to paradigm shifts in complexity.

Elements of complex design and action

Respond to deviations in realisation

Facing the perceived complexity of the project

A traditional but less and less common approach is to split the project into components with the minimum number of interfaces and manage each sub-project independently with less complexity.

However, this approach is increasingly irrelevant because it does not allow the emerging properties of the complex system to be taken advantage of. It can only be applied to complicated¹ systems with few emergence capacities, which can be split into sufficiently independent parts.

Keep execution flexibility

In most projects, especially large projects, nothing happens as planned. Unexpected events disrupt the execution of the project and its context, and this is the normal course of the world. It is therefore appropriate for the project to maintain flexibility in its planning. It is thus important not to have pushed traditional project management approaches beyond reasonable limits, especially in terms of planning details: for example, a too detailed task breakdown or planning will not allow adaptation and flexibility to circumstances, with the risk of losing control over project implementation. Another way of saying this is that the traditional planning approach is mainly tactically effective, but its extension to the strategic level must be done carefully.

Eisenhower's well-known quote, based on his military and political experience: "Plans are never worth anything, but planning is indispensable" reminds us that value is in the (collaborative) process of understanding the events to be achieved and their sequence, rather than in the elaboration of overly detailed plans.

The project control system must allow adaptability and flexibility, the focus should be on process efficiency rather than the accuracy of deliverables. Capacity reserves are desirable to cope with unexpected events. The objective of the project can remain well defined, while the path to achieve it must remain flexible. To a certain extent, the project must be able to reschedule itself along the way, sometimes in a very significant manner, taking into account, however, the commitments already made.

Beyond reverse engineering and linear thinking, formally introduce project requirements into the system engineering process

A systemic design of the object to be designed and built makes it possible to better take into account its complexity. It also allows to benefit from emerging properties of the system. It should be noted that this systemic approach (system engineering), while it has become common in some industries such as aeronautics or automotive, is not yet implemented in many industrial settings such as energy or construction; therefore, the practices identified in this section are not immediately applicable to all industries. However, it can be expected that the systemic approach will become more widespread because of the benefits it brings.

System engineering provides a method for formalising the needs of the various stakeholders, which is then converted into functional analysis and solutions or components. The core of this design approach is the formalisation of requirements and their follow-up; and subsequently, the management of the (re)configuration of the product object throughout its lifespan. Systematic activities to verify that requirements are taken into account and to validate the final object are also very important steps in this approach.

The key to the success of project management in this context is to know how to introduce into the process, from the outset, the right needs and requirements in terms of cost, planning, supply chain, constructibility, capacity to test and operate that effectively allows the project to be carried out. At the same time, it is also necessary to be able to control the effort made at the various stages of the design process through the application of advanced project control techniques.

Facing the complexity of project execution organisation

Another family of approaches addresses the complexity of the organisation that is carrying out the project. The implementation of the project requires close coordination between the project owner, possibly assisted by a supporting owner's engineer, one or more main contractors, as well as their subcontractors and suppliers. Each of these entities is also made up of departments and other sub-entities that do not always have the same objectives.

In this family of practices, the aim is to reduce the number of actors required as much as possible, and to ensure their alignment with the project's operational and strategic objectives.

The contractual strategy approach aims to minimise the number of entities involved and their interfaces, giving

¹ The distinction between complexity and complication is fundamental. Complication refers to an interweaving of entities and devices of all kinds, which can nevertheless be overcome with time and expertise. Complexity, on the other hand, refers to everything that escapes, completely or partially, our understanding and control. You can have an overall perception of a complex system, you can name and qualify it, but you can never understand

its organization in all its details, nor can you predict all its reactions and behaviours. A complex system is open. New qualities, innovations, can emerge from it. A complicated system is closed, it does not bring innovations.



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priority to integrators who in principle have the ability to understand and take into account the complexity of the elements they integrate. However, this approach only works if integrators really have this capacity, which is often acquired through experience.

Co-located project teams in open space are another approach that has proven to be effective. It aims to bring together all the main contributors to the project, regardless of their origin, in the same place. This place is if possible distinct from the usual places of activity of the contributors. This approach allows the development of a team spirit around the project and for very intense informal communication between contributors, which ensures excellent coordination and alignment with the project's objectives and goals. This approach is sometimes even extended to representatives of major subcontractors and suppliers to ensure broader alignment. This practice of the transverse project platform is recommended from the project definition phase until its delivery. It is increasingly complemented by the use of graphical information sharing methods in project spaces (such as Oobeya). This integrated team approach can be expanded even to very large organisations involved in a concrete project such as a military invasion project (team concept).

Accounting for resource constraints and overall project portfolio management

A number of practices concern the management of the use of resources that may be shared between several projects: this is called project or programme portfolio management. First of all, we favour the full-time assignment of resources to a single project. If this is not feasible, then particular attention is paid to making scarce resources available at the right time for the project that needs them.

The "theory of constraints" developed around 1970 for manufacturing industry showed in its application to projects the decisive role of resource constraints on the success of projects and on meeting deadlines. As part of project portfolio management, this approach shows the need to regulate the start-up of new projects to promote the faster completion of ongoing projects. In many organisations, the exercise of identifying all ongoing projects usually brings a surprise: there are always many more than you think! A systematic approach, a good understanding of what a project really is, and an identification of bottleneck resources are needed.

Include upfront the requirements related to implementation

A variant of systemic design applies to all projects, even those designed using traditional methods. It is a question of taking into account very early on the specific requirements related to implementation: construction, testing, commissioning, operation, implementation of organisational change, etc. The recognised good practice is to integrate representatives of these disciplines into the co-located project team, from the definition phase and more intensively from the beginning of the project implementation. Although the related requirements are

not systematically verbalised in a requirements management process, these practices allow to influence design and planning to take them into account.

As a minimum, formal design reviews are planned with representatives of users, operators and manufacturers to ensure that their needs are properly taken into account.

In the specific field of organisational transformation projects, this practice has been formalised through the discipline of "change management", which consists in including in the project team from the outset a specialist who formalises and speaks for the requirements expected during the implementation of the transformation.

Responding to strategy deviations

The traditional project management approach has an inherent contradiction: good implementation practices lead to a precise and irremovable definition of the object to be produced at the beginning of the project and rigidity in the face of changes in order to succeed. However, ideally it should also allow for the management of possible changes in strategy regarding the object to be produced.

This irreducible contradiction is at the heart of the project's paradox. The longer and more substantial a project is, the greater the risk that the object finally produced will in fact be obsolete or no longer meet the needs. For multiple infrastructure or industrial projects, the launch of a project is in fact a bet on the future as it will be at the end of the project.

Implementing the "agile" approach

In a number of situations, the object to be produced by the project cannot be well defined at the outset. This is often the case in innovation situations, or in start-up projects. In fact, this project is then a succession of small, better defined projects. It can be seen as a macro-project.

A first widespread practice is to firmly frame the execution of each small project; these are the successive "runs" of the agile approach, where precise deliverables must be delivered quickly; when they are, the situation is re-assessed, and the specifications of the next iteration are defined. The key is then to coordinate resources and contributors – and stakeholders as well - around a tight and strict schedule for each run. The discipline of periodic meeting points also allows for high productivity.

A second parallel practice has been made popular by the lean start-up approach. It applies when future users and stakeholders do not have the capacity to properly define their needs. The aim is to produce as soon as possible a "minimum viable product" that can be exposed to the scrutiny of these stakeholders and thus better define their expectations. The next iteration can then be launched on the basis of a clearer understanding of these expectations, based on the observation of the interaction with a product. A large number of iterations may be necessary to achieve a satisfactory final deliverable.

The main pitfall of the agile approach is the need to have clearly defined in advance the objective sought, even at a high level and in the form of principles. If this is not



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ultimately achievable, a clear and formal process must be implemented to change it.

Implementing multi-scale approaches

Especially in the context of exploration projects, research (notably C.H. Loch and S.Lenfle) shows the relevance of implementing multi-path, multi-time scale approaches. In these highly iterative approaches, the project path and environment are gradually built by the project team. On a short time scale, rapid iterations are performed within a longer time frame; while parallel paths are explored at the same time in order to manage risk. Approaches such as the C-K method (Concept - Knowledge) allow simultaneous iterations between concepts and knowledge, on an intermediate time scale. In the long run, we move away from task-based project management to issue-based project management.

Implementing an efficient governance

Project governance operates on two legs: operational and strategic. This articulation, unfortunately too underestimated, is an essential element of success. It is a matter of effectively setting up the strategic management of the project, and effectively articulating strategic management and operational management. Without disrupting the course of implementation at any time, it must be possible to provide the necessary impetus to realign the project with its objectives and strategic objectives in order to take into account important developments, both exogenous (evolution of the context) and endogenous (evolution of the project's reasons for being).

Good practices include regular meetings of a strategic steering committee, which can take decisions to substantially modify the objective of the project, coupled with sufficient flexibility in the implementation of the project.

Using new different tools for project management and governance

The tools used by management format the action. Any process or deliverable used is referred to here as a tool, from the way coordination meetings (rituals) take place to detailed steering processes and tools. This observation leads to two modes of action:

- The use of traditional project management tools formats the way it is done. Depending on the case, some of these tools may need to be replaced in order to change behaviour. An example is the use and dissemination of the "convergence plan" in addition to traditional planning in large projects (refer to our White Papers [2012-04](#) and [2015-17](#)),
- If you want to change the approach, a good method is to change the tools used. Above all, the aim should not be to replace everything, but to identify the few

key tools, rituals or processes that need to be modified to better adapt the implementation of the project to the circumstances and difficulties.

The introduction of new tools or the modification of existing tools must be carried out at the necessary level (tactical, strategic, governance) according to the problem to be addressed.

Implementing systemic design at the strategic level

The development of a systemic design at the higher level of system engineering for project implementation is also a way of addressing the subject of strategic steering. However, this approach is still not widely used in practice. It can be implemented profitably in cases of project dysfunctions. It is intended to be developed on the basis of implementation system engineering.

Bibliography

Traditional project management approach: « *Project Management Book of Knowledge* » (6th edition), by the Project Management Institute (PMI)

« *Megaprojects and risk: an anatomy of ambition* », by Bent Flyvbjerg. This professor at Oxford University is particularly interested in why major public infrastructure projects rarely deliver the expected benefits. From the same author: « The Oxford Handbook of Megaproject Management »

« *Industrial Megaprojects: Concepts, Strategies, and Practices for Success* » by Edward Merrow. This founder of Independent Project Analysis provides in-depth and up-to-date statistical analysis on the success of industrial projects, and the reasons for failures. From the same author, « *Leading Complex Projects: A Data-Driven Approach to Mastering the Human Side of Project Management* », a book that looks at the profiles of project managers among project owners.

« *Project Risk Quantification* » by John K. Hollmann. A project practitioner for several decades, this project estimator describes the most important risk elements for industrial risks.

« *Team of Teams: New Rules of Engagement for a Complex World* » by General McChrystal. Describes the extension of the co-located team concept to an entire invasion force.

« *Managing the Unknown: a new approach to managing high uncertainty and risk in projects* » by C.H. Loch, A. DeMeyer, M.T. Pich, 2006

And on a more theoretical level : « *La modélisation des systèmes complexes* » (in French) by Jean-Louis Le Moigne, Dunod, 2002



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