Advances in Project Management Series[1]

An Introduction to a Typology of Projects

By Oliver F. Lehmann

Could it be that in its current self-conception, project management is much more similar to ancient alchemy than to a modern science or an art?

Alchemists were driven by the desire to find the philosopher's stone that could turn lead and other cheap metals into gold. They searched for panaceas, cures for all diseases, and while they developed various laboratory methods, some of them still in use today, their activities were mostly performed against a background of mysticism and magic.

There were several steps that took practitioners and scientists from old alchemists' approaches to those of modern chemists. A central one was the publication of the periodic table (Mendelejew, 1869), which allowed chemists to classify and typify chemical elements and improve the understanding of chemistry through the identification of an inner order in the diversity of elements. A similar step was achieved in biology with the development of the Linnaean taxonomy, which allowed scientists to classify species and understand their relationships but also their differences.

Typologies and with them classifications allow to better manage diversity. Another example is provided by burns. Burns happen on a continuum between a minor injury and the most dreadful damage to tissue that can happen to humans. Each burn is different, but a typology in the form of a system of degrees helps respond appropriately to them. Burns of a first degree are mostly treated by applying outpatient care and superficial methods. Burns of the third or fourth degree (depending on the system) will be treated in intensive care within a hospital. Despite the uniqueness of burns, the typology helps to better select the most suitable response.

One should note that the classification systems in chemistry and biology are open classifications, that can be expanded, when new knowledge has been explored and new elements or species, genera and so on should be added to the existing ones. This is different to the closed classification of burns; this classification is generally considered to be complete.

[1]*The PMWJ Advances in Project Management series includes articles by authors of program and project management books previously published by Gower in the UK and now published by Routledge or another Routledge publisher. To learn more about the book series, go to https://www.routledge.com/Advances-in-Project-Management/book-series/APM. See this month's author profile at the end of this article.*

"Best Practices" or Uniqueness?

In project management, the common belief in the existence of a "Best practice" approach is a concept comparable to Alchemy, and it is widely held. Many project managers believe that there must be a practice that is applicable to all projects that generally ensures success in all of them.

Interested in the question of how popular this concept is, the author asked project managers between April and August 2015, whether they believed in universal best practices. He received 189 responses, and the majority confirmed that they believed in best practices within the discipline. Figure 1[2] shows the results of the survey.

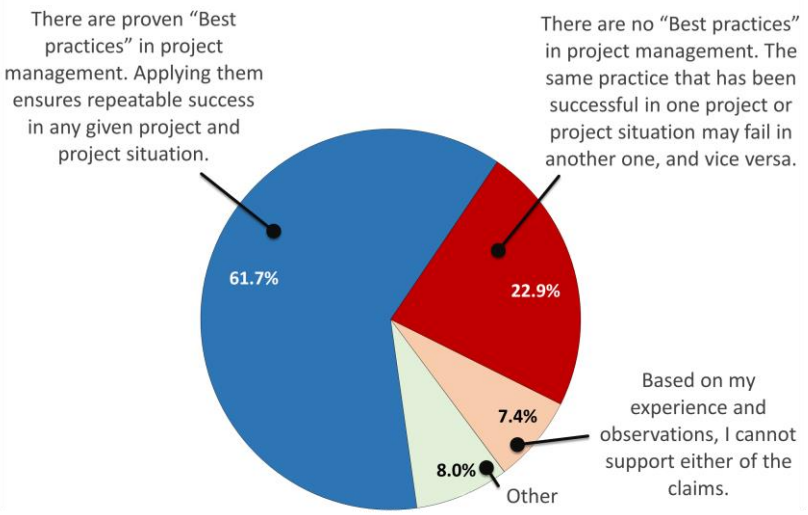

Figure 1: In a 2015 survey among project managers, more than 50% responded that they believe in the existence of universal project management methods as "Best practices".

In scientific papers and articles, any differences between project types are also commonly ignored. Searching in websites that provide links to published work on project management gives many results of research in project management generally, but the vast majority is not linked to specific types of projects. The questions that they raise would be similar to scientific papers and articles in chemistry asking "What is the boiling point of an element" or in zoology "How do animals survive?", ignoring the fact that boiling points are different from element to element and also depend on environmental conditions; and the same is true for the survival strategies of animals.

There are also "proven best practice methodologies"[3] promoted, that can be "applied to all types of projects"[4], which would be comparable to a description of the best treatment practice of all burns, ignoring their degree.

[2] Published in Lehmann (2016, p. 87)
[3] For example in the advertisement of a British government-supported method Prince2 within the Axelos portfolio (n.d.)
[4] The claim "PRINCE2 is designed to be applied generally to all types of projects, […]" can be found in various places, among them at ILX Group plc (2016)

This last point is very common in project management in organizations. When one talks with managers from the project governance functions, statements like "we are moving all projects to agile methods" (or any other methods that are considered cooking recipes for project management) is possibly good news for some of their projects, but may be bad news for others.

The claim of "Best practices" contrasts with the definitions of the term "project" used in the various international standards. Here are some examples:

- "A project is a temporary endeavor undertaken to create a unique product, service or [other kind of] result." (PMI, 2013)

- "Project: [A] unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements including constraints of cost, time and resources." (BSI, 2000, p. 10)

- "Projekt: [Ein] Vorhaben, das im Wesentlichen durch Einmaligkeit der Bedingungen in ihrer Gesamtheit gekennzeichnet ist."[5] (DIN, 2009, p. 11)

The International ISO standard 21500 (ISO, 2013) also emphasizes uniqueness as a main characteristic of projects and explains how differences between seemingly similar projects can arise due to the specific processes applied or may be affected by the unalike environments in which the projects are performed.

In reality, the same practice that has led to success in past projects may lead to failure in others, and vice versa. The principle may not only be relevant to entire projects and their lifecycles, but to situations during these times. Approaches that have led to success in certain situations may cause troubles in other situations still in the same project. Situational Project Management (SitPM) is then the application of those practices that are favorable in given project situations while avoiding other practices that are considered detrimental. Situational project managers are not just confident with the practices that they master but go through a lifelong learning process, adding new tools, techniques behaviors etc. to their existing capabilities as much as a craftsman or craftswoman adds new equipment and tools to their job shops to help them meet varying demands and requirements.

What happens if a project manager, believing in the comforting certainty of a best practice, avoids this continuous learning process? If a person only has a hammer to make a living, the person must convince the world that it is made of nails. Another person may only have a screw driver, and this person must tell the world that it is screwed.

An example of how a practice that has been successful in one place may lead another project into trouble is offered through the two central station projects in Germany, Berlin and Stuttgart. They can highlight the insufficiency of "One size fits all" approaches, that come with the postulation of universal best practices:

[5] An undertaking that is chiefly characterized by the uniqueness of the conditions in their entirety. Translation by the author

- **Berlin Hauptbahnhof:**
  Berlin Central station was a new construction, opened in 2006. In its overall appearance, it is mostly considered a successful project, a piece of modern traffic infrastructure, which meets functional purposes and aesthetically impressive.

- **Stuttgart 21:**
  Stuttgart Central station is a reconstruction of an existing station, turning the tracks by 90 degrees to convert a 16-track dead-end station to an 8-track through station. The project began in 2010 and planned to have the new station operational by 2016. Still in the first year, it was confronting massive resistance from local citizens, who took their rejection of the project to the streets and demanded a complete termination of the project. Their protests delayed the project and led to the resignation of the project manager in May 2011.

It is interesting to compare the two projects, as on the first glance, they are almost identical:

	Success Berlin Hauptbahnhof	Crisis Stuttgart 21
Industry	Railway	Railway
Application area	Construction	Construction
Deliverable	Main station	Main station
Organization	Deutsche Bahn, local and national government	Deutsche Bahn, local and national government

Figure 2: Comparison of the two main station projects – the crisis in Stuttgart 21 refers to the years 2010 and 2011, the project has since be led mostly back on a success path.

To make the difference even harder to understand, both projects were performed by the same project manager, in the Stuttgart 21 project until May 2011, using the same approach, which was obviously beneficial for the Berlin project but detrimental in Stuttgart.

On the surface, it is hard to understand why the project in Berlin was successful while the project in Stuttgart was not. The typology should help in making sense of the differences and lead to adaptation of approaches by project managers and other supervisors.

A Research Project

To better understand how projects have commonalities and differences that can influence the dynamics of success and failure, the author performed a research project with the intention to tap knowledge from experts.

He brought together a group of 17 project management experts, who have been practitioners in the past, but used their experience in the field in their new roles as instructors, authors of articles, books and blogs, in project governance or in volunteering in professional associations. The experts had between 7 and 36 years of experience, which

accumulated to 393 years of project management experience as practitioners and in the later roles. 12 of the experts held the PMP[6] certification from the Project Management Institute (PMI), one of them also held a Level B[7] certification from the International Project Management Association (IPMA).

In interviews, the experts were asked to answer two questions:

- **Dysfunctional question:**
  "During your time as a practitioner or as an expert, do you remember a moment when a practice, a method, a behavior or a tool for project management, that had led to success before, led to failure?"

- **Functional question:**
  "During your time as a practitioner or as an expert, do you remember a moment when a practice, a method, a behavior or a tool for project management, that had led to failure before, led to success?"

All experts had examples that answered the dysfunctional question, sometimes more than one, but not all had an example that answered the functional question.

During these interviews, the examples that the experts remembered were recorded and in a next step further investigated by applying the "Five whys" technique, a root cause analysis method used to dig deep into the underlying origins of problems in management and production (Adams, 2008). A further technique applied was "Affinity diagramming", which allowed to consolidate the thus far anecdotal stories and to identify underlying principles that finally resulted in the definition of project types that are relevant for the selection of project practices.

The Project Types

The project typology is considered open, which means that the following dimensions are not considered a complete description and that further exploration could identify many more. The dimensions that are described below were just those that turned up during the research. Figure 3 gives an overview of these dimensions. The column "occurrences" describes how often the dimension turned up among the answers. The column "mode" was introduced based on a discovery by one of the experts, that some dimensions describe dichotomies ("B/W" for black and white), while others describe continua ("Greyshades").

[6] Project Management Professional
[7] Certified Senior Project Manager

Types of projects and project situations identified				
Typological dimension			Occurrences	Mode
1	Mark 1 project	Mark n project	|||||||	B/W
2	Greenfield project	Brownfield project	|||	B/W
3	Siloed project	Solid project	|||	Greyshades
4	Blurred project	Focused project	||	Greyshades
5	High impact project	Low impact project	||	Greyshades
6	Customer project	Internal project	|	B/W
7	Stand-alone project	Satellite project	|	B/W
8	Predictable project	Exploratory project	|	Greyshades
9	Composed project	Decomposed project	|	B/W

Figure 3: The typological dimensions that were identified during the research.

Mark 1 vs. Mark n Projects

The terms are borrowed from British engineering, sports cars and Japanese cameras.

A Mark1 project is the first of its kind, at least for the people involved in it. As a breakthrough project, it has a high degree of novelty and cannot rely on existing processes and solutions; they must be developed during the course of the project. Mark n projects in contrast are similar to former projects, and the teams involved have a lot of experience with this kind of projects, they often have processes and readily developed solutions, on which they can rely.

This dimension has been identified and described before by Shenhar and Dvir (2007), who stated that a Mark 1 project has higher risk than a Mark n project, which seems generally plausible. However, the result of the author's research gave a different picture: In two out of seven cases where the dimension was influencing success and failure, it was the novelty of the project that caused the problems. In five out of seven cases, troubles came from the Mark n character of projects, from complacency and from the lack of attention to seemingly small issues that grew and became major crises later in the project.

Seven cases for an analysis may be too small a sample size to make a final statement on the risk exposure of Mark 1 projects versus Mark n project, and the topic would be an interesting one for further in-deep research. The example shows how a typology can open doors for future exploration and discovery that is more focused and more tightly connected to the realities in the projects of this world.

Greenfield vs. Brownfield Projects

The terms are quite popular in construction and infrastructure projects. A greenfield project is built on virgin ground, literally or metaphorically. The project managers do not have to take too much care of legacies, and the number of stakeholders involved is mostly small,

allowing project managers to focus on the project. In a brownfield project, there may be a lot of legacies that impact the project, often massively, and expectations, hopes, and fears raise high. Organizational and interpersonal issues add to that.

Berlin central station is an example of a greenfield project in a literal sense. The station was built on a green strip, which had left from the former "death strip" between East and West Berlin. The wall was dismantled, the barbwire and spring guns were removed, and crossing the city from its North to the South, a strip was left, wide enough to make space for a new and modern traffic infrastructure. The project team did not have to give much consideration to nearby residents, instead they focused on keeping too much political influence on distance to the project.

Stuttgart 21 is a brownfield project. Due to the hilly surroundings, it consists of vast tunnel drilling activities, and these need to be undertaken inside difficult geological layers (anhydrite), that can swell in contact with water, which can lead to massive damage to the houses atop. The owners of these houses asked the project manager to meet them and talk about their concerns, something he rejected. Repelled stakeholders often come back, bringing with them friends, lawyers and the press. The approach of isolating the project from its stakeholder environment, which was successful in the greenfield project in Berlin drove the seemingly similar project in Stuttgart into crisis. The project managers in Stuttgart have learned their lesson meanwhile the hard way and implemented a system to improve stakeholder involvement and engagement called the Bürgerforum 21 (Landeshauptstadt Stuttgart, 2011), where concerns and worries of citizens are discussed in a transparent and open fashion.

Siloed vs. Solid Projects

Projects can be siloed in various ways. There may be different organizations that work together as partners or distributed over complex and often highly dynamic supply networks, each of these organizations with own business interests and different ways of how they want to perform the project. Teams may be distributed over various countries, cultures, legal systems, etc. 'Siloing' may relate to age groups, genders and many more aspects. Siloing may also be a result of phase models, when a subteam has the responsibility for a project phase and, when this has been finished, figuratively throws the result "over the fence" to another team that will be responsible for the next phase. Siloing can make project management difficult, but it is often unavoidable.

Solid projects instead are like "bands of brothers"[8] and sisters that act tightly together, understanding that then the result will be more than just the sum of its parts. Solidifying projects can include measures like collocation and concurrent engineering, overlapping of phases with the intention to improve communications. There are limitations for the application of these measures, so project managers should be able to manage siloed projects as well as solid ones.

[8] (Shakespeare, 1599)

Blurred vs. Focused Projects

Following a major part of literature, each project has a clear start date and a clear end date, desired deliverables have also been specified and agreed upon, and the team is assigned to the project, so that people know if they belong to the project or not.

This organizational and interpersonal separation of the project from the performing organization(s) is often not more than wishful thinking. The internal requestor or paying customer has no clear understanding of the deliverables that would allow for specification, and if they have, this understanding is often open to change. The performing organization too often has not the resources at hand that it can dedicate to the project, so there is a continuous coming and leaving of human and other resources. And as much as the project has slowly grown from some kind of limbo into existence, there is also no clear point definable when it can be said that the project is over and closed. While focusing is desirable, project managers must also be able to manage the ambiguities and uncertainties of blurred projects.

High Impact vs. Low Impact Projects

High impact projects have commonly more management attention than low impact projects. The impact comes with opportunities, but also threats, and the higher these are, the more management attention that can be expected.

Management attention is often the scarcest, but most valuable resource in a project. While its presence does not guarantee the availability of other resources like funding, people or equipment, its absence is a sure reason that these other resources will also not be available for the project.

Customer Projects vs. Internal Projects

The most obvious typological dimension in SitPM.

An internal project, performed for an internal requestor, often called “internal customer” is a cost center. There may be future expectations that the deliverables of the project will give the organization monetary benefits, but the project as such costs money and does not earn it. Projects can be performed for a variety of future goals, including new income, cost savings, strategic benefits. Some are made to build a monument to an influential person or just for fun. Internal projects may have complex business cases or are initiated in an ad-hoc decision.

Customer projects are mostly profit centers. The organizations involved perform these projects for paying customers, and it is the job of the project managers to bring money home. Initiating these projects is far more complicated, as it involves a business development process jointly performed by a buyer and a seller, who will later become the customer and the contractor.

The author wondered, what percentage of project managers are responsible for each type and performed a survey among project managers. He received 246 responses, and Figure 4 describes the distribution of the answers.

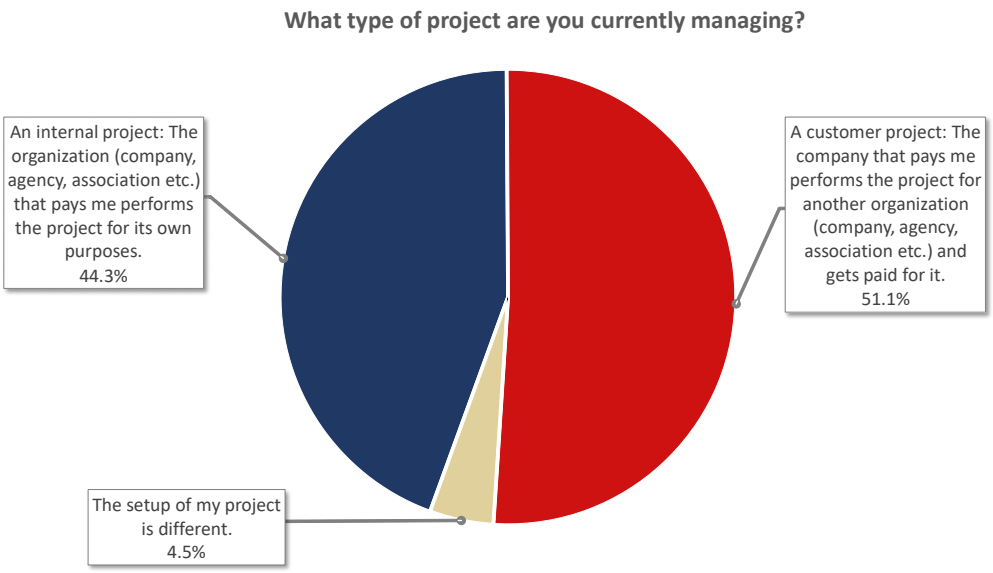

Figure 4: Responses from project managers to the question, what types of projects they are currently managing: Internal projects or customer projects.

One can say that the project managers are roughly divided 50%-50% among the two types. Figure 5 describes the differences between the two types of projects.

	COMMON DIFFERENCES	
	Internal projects	Customer projects
Are . . . for the performing organization	Cost centers	Profit centers
Project selection is mostly made as . . .	Internal decision	Bid/no-bid decision
Project work for the requester is based on . . .	Internal agreements	Legally binding contracts
Team's familiarity with the target environment at project start is . . .	High	Low
Project managers are mostly . . .	Rather weak	Rather powerful
Obtaining resources is mostly . . .	Rather difficult	Rather easy
Management attention for the project is mostly . . .	Rather low	Rather high
Project managers must consider . . .	The interests of the own organization	The interests of both the customer and the contractor
Staffing and procurement mostly managed by . . .	Functional units	Project management team
Reputation inside the own organization is mostly . . .	Rather low	Rather high

Figure 5: Differences in the environment and the requirements that project managers are facing.

While the distinction along this typological dimension is very obvious and easy to observe in practice, it is surprising that it has not been better elaborated in the literature and research. This is another example how a typology can help gain fascinating new insights.

Stand-alone Projects vs. Satellite Projects

Many projects do not stand alone, as is normally assumed in literature. Their project managers and teams perform projects "in the wake" of other projects (that the experts called "principal projects"), and the success of the satellite projects relies on the work of the project own team, but also on that of the principal project. A crisis in the principal project may swiftly translate into a crisis in the satellite project. The dynamics of success and failure can become very complex, especially, when there are more than two projects involved.

Predictable Projects vs. Exploratory Projects

The most significant discussion in project management during the last couple of years explores "Agile methods" versus "Waterfall methods". Agile was a hype in recent years, but looking at presentations in congresses and also observing publications, it seems that a renaissance of the predictive approaches is occurring at the moment.

The author also made a survey on this topic in the past, asking project managers how static and predictable requirements in their projects are. The responses from 140 respondents were distributed as shown in Figure 6.

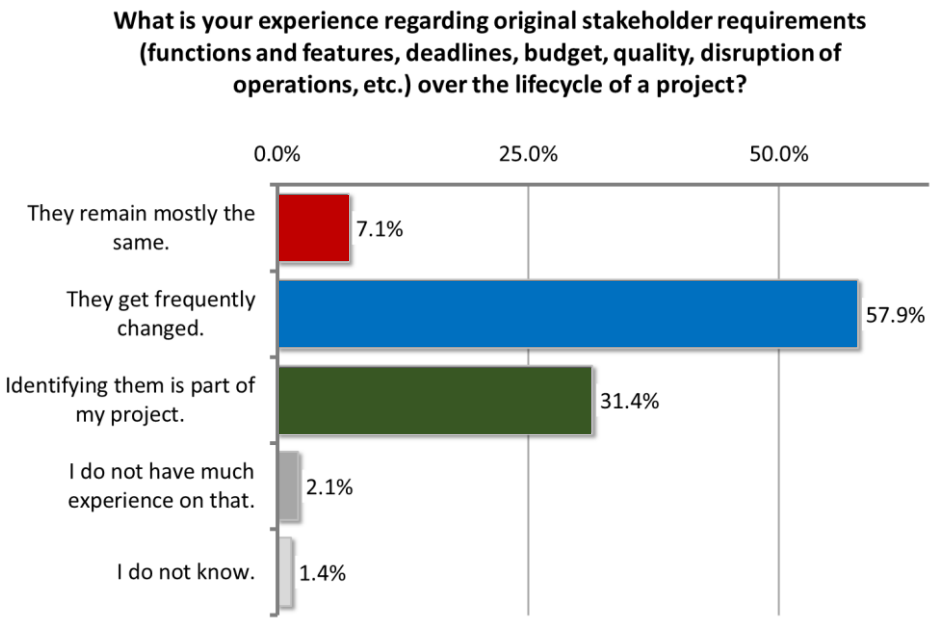

Figure 6: Predictability and dynamics of project requirements.

The first group of 7.1% is the group of projects that require predictive approaches with long-term forecasts and planning. The third group are projects, in which "the way is made by walking"[9], projects, for which agile methods have been developed.

Between these two groups that are best managed using waterfall or agile methods is another grouping, where requirements have been defined, but these are open to frequent change, and for which the teams should apply an approach, that is variously called "Progressive elaboration", "Iterative incremental", or "Rolling wave". A decision to perform all projects in a portfolio using highly predictive methods, or performing them all applying agile methods, is probably a decision that will benefit a minority of projects but will be detrimental to others.

Composed Projects vs. Decomposed Projects

A traditional approach to project management responds to probably the oldest definition of a project, written by Daniel Defoe in the late 17th century, who stated that "The true definition of a project, according to modern acceptation, is a vast undertaking, too big to be managed, and therefore likely enough to come to nothing."[10] In order to manage this undertaking, it is commonly decomposed into smaller, better manageable items along a tree structure called the Work Breakdown Structure (WBS), hoping that the re-integration of these items will lead to the complete set of results that the project is required to deliver. The last pieces of wood at this tree are commonly called work packages, and these work packages can then be performed either by the project's own team, by other business units as internal providers inside the performing organization, or by external vendors.

Some projects are developed using the opposite approach. Friends come together, or organizations that have a more or less vested interest in the project, or a customer organization requires contractors to work together. These organizations then come together, each offering a contribution to the project, and the WBS is then not developed by decomposing the project but by composing it from individual contributions. If the contributions are able to bring about a complete set of deliverables, and if the parties involved adhere with their commitments, such projects can become very powerful. They are also vulnerable to changes in the business situations of the contributors, and project managers must rather have great moderating skills than be traditional managers.

Further Types of Projects

In his book (Lehmann, 2016), the author adds further types of projects that he met in his practice or that he observed, but that did not turn up in the research project. The typology is not a closed one, postulating "the 18 types of projects, structured along the nine typological dimensions", but instead assumes that there are many more criteria that can be used and that will lead to identification of further types.

[9] A description that the author took from the Spanish poet Machado (2012)
[10] Abridged by the author (Defoe, 1697)

Conclusion

Project management is a highly heterogeneous field, and most projects undergo massive change during their performance. At a given time, a project may be highly exploratory and unpredictable. This may by due to basic research that needs to be made at the onset, and whose outcomes are not predictable – if they were, the research would not be necessary. Or the project begins with a creative phase, something, for which one can allow time but that is hard to plan. Later in the project, it may be necessary to book resources to ensure they are available when they are needed, or to request timely deliveries from the supplier. In other projects, predictive phases may be rather too early in the project to allow for subsequent exploration and creativity. It may also be that a project has several work streams performed in parallel, and while some of them require predictive approaches, agile approaches may be beneficial for others. While the typology above speaks of project types, projects can move between these types, when requirements on project managers and their teams are highly dynamic.

Understanding the dynamics of success and failure in project management comes with new requirements to both practitioners and researchers. Simple cooking recipes may not be sufficient to guide project managers, when these have been developed with a certain type of project in mind, but the current project or project situation is different. SitPM poses some difficult musts on project managers. They must develop situational intelligence, which means that they have to understand the specific situation, identify the approaches that are most favorable for it, then adapt their approaches to this situation and finally implement this responsive behavior in a way so that they do not appear erratic or unreliable to stakeholders. At any given time, they should be able and prepared to explain, why they have chosen a certain approach in response to a given situation, and why they applied alternative approaches to respond to other situations.

Situational Project Management is not a new method designed to replace waterfall type methods, or agile approaches, or other kinds of achieving styles and management behaviors. It is rather a meta-approach that gives each method, behaviour and approach its place in a continuously growing toolbox of practices that a project manager should acquire over time and confidently use when the dynamics of success and failure require them.

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