

## Agile in ERP Projects<sup>1</sup>

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### ERP Implementation Projects

Implementing an ERP system is a major project requiring a significant level of resources, commitment and changes throughout the organization. Often an ERP implementation project is the single biggest project that an organization has ever launched (Moon 2007) and very often performance is less than expected.

The performance analysis of ERP implementation projects is probably the most discussed aspect in the literature on this topic.

For example, McNurlin (2001) found that only 34% of the companies were satisfied with their ERP system. Loonam & McDonagh (2005) found that 90% of the ERP systems implemented were late and more expensive than the companies had expected. In addition, 25% of the money invested in ERP system was considered as wasted and less than 75% of the ERP system's effectiveness was utilized (Ettlie, 1998). Betts (2001) indicated that 80% of the ERP system failed to achieve the business objectives expected from the system. Notwithstanding this, many companies have implemented ERP systems, but few are effectively used (Yu, 2005).

Panorama Consulting Solution carried out a research where 215 respondents were collected.

YEAR	COST	% COST OVER RUNS	DURATION	% DURATION OVERRUNS	% RECEIVING 50% OR LESS BENEFITS
2015	\$3.8M	57%	21.1 Months	57%	46%
2014	\$4.5M	55%	14.3 Months	75%	41%
2013	\$2.8M	54%	16.3 Months	72%	66%
2012	\$7.1M	53%	17.8 Months	61%	60%

Table 1. Project performance of ERP projects. Source: Panorama Consulting

According to Panorama Consulting, overall project cost has decreased while the percentage of respondents experiencing cost overruns has increased. Another issue that can be discussed is the sharp increase in the average duration from 2012 to 2015. However, this figure should not

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be interpreted as a negative trend, according to Panorama Consulting, this may be the acquisition of greater awareness of implementation timing by estimating longer and more realistic than the past.

The authors of the Panorama Consulting report, however, conclude this analysis with an observation that will be crucial to the analysis of ERP implementation projects: "The majority of organizations do not have the internal expertise needed to achieve ERP success. When they do not hire an experienced third party, they limit their level of benefits realization and reduce their potential ROI."

To support the data reported with concrete examples of failures that have marked, and in some cases ended, the history of large organizations, it is convenient to cite some examples:

- Unisource's Worldwide, Inc., a \$7 billion company that produces paper-based products. The company's management has decided to abandon a national SAP implementation project after having spent \$168 million;
- FoxMeyer Drug the former \$5 billion drug distributor went bankrupt in 2006 and has completed a \$500 million lawsuit against SAP (Monk & Wagner, 2006). The company identified the ERP system vendor as one of the key reasons that led the company to bankruptcy;
- Dell Computer Corp has abandoned SAP implementation after months of delays and extra costs;
- Dow Chemical, after spending half a billion dollars over seven years of implementing SAP ERP R / 2, decided to start all over again on the new SAP R / 3 platform (Soh & Sia, 2007).

According to Kremzar & Wallace (2001), the implementation of ERP system revolutionizes the way a business operates. However, in order to grasp the highly positive aspects of using these software, management and organization as a whole must be ready to appreciate and accept the great change that implementation will have on enterprise and on day-to-day operations. All the data reported and the real cases of failed investments of big company in ERP system urge a need for better understanding of ERP implementation process.

### **ERP projects life cycle**

Different authors define the sequence of phases differently by using different names to define a set of activities.

The initial phases are, for example, the initiation and requirements definition (Kurupparachchi et al 2002), project chartering (Markus and Tanis 2000) and initiative and selection (Makipaa 2003). Phase after the ERP system is put into use are described as termination (Kurupparachchi et al 2002, Makipaa 20003), onward and upward (Markus and Tanis 2000), exploitation and development (Makipaa 2003) enhancement (Parr and Shanks 2000a)

acceptance, routinization, and infusion (Rajagopal 2002) and stabilization, continuous improvement and transformation (Ross 1999).

The table below summarizes the main phases cited in the literature.

Author(s)	ERP implementation phases
Bancroft et al. (1998)	(1) Focus, (2) Creating As – Is picture, (3) Creating of the To-Be design, (4) Construction and testing and (5) Actual Implementation
Kuruppuarachchi et al. (2000)	(1) Initiation, (2) Requirement definition, (3) Acquisition/development, (4) Implementation, and (5) Termination
Markus and Tanis (2000)	(1) Project chartering, (2) The project, (3) Shakedown, and (4) Onward and upward
Makipaa (2003)	(1) Initiative, (2) Evaluation, (3) Selection, (4) Modification, Business process Reengineering, and Conversion of Data, (5) Training, (6) Go – Live, (7) Termination, and (8) Exploitation and Development
Parr and Shanks (2000a)	(1) Planning, (2) Project: a. setup, b. reengineer, c. design, d. configuration and testing, e. installation (3) Enhancement
Ross (1999)	(1) Design, (2) Implementation, (3) Stabilization, (4) Continues improvement and (5) Transformation
Shields (2001)	Rapid implementation model of three phases and 12 major activities
Umble et al (2003)	(1) Review the pre-implementation process to date, (2) Install and test any new hardware, (3) Install the software and perform the computer room pilot, (4) Attend system training, (5) Train on the conference room pilot, (6) Established security and necessary permissions, (7) Ensure that all data bridges are sufficiently robust and the data are sufficiently accurate, (8) Document policies and procedures, (9) Bring the entire organization on – line, either in a total cutover or in a phased approach, (10) Celebrate, and (11) Improve continually
Verviel and Halington	(1) Planning, (2) Information search, (3) Selection, (4) Evaluations, and (5) Negotiation

Table 2. A review of the ERP project phases according to the literature

As is clear from the table, it is possible to grasp a basic logic in all the ERP projects phases presented: all of them seem depicting waterfall life cycles.

## **Agile and ERP**

The use of Agile for the implementation of ERP systems is not a very popular topic: while in Google scholar there are 29400 articles that include both the words Agile and ERP, a more detailed analysis shows that theoretical contributions and cases studies are just a few. However, based on the available papers, it is possible to depict some challenges and solutions in ERP implementation using Agile.

A new way to manage projects: Agile is first of all a new approach and this aspect alone can be considered a challenge. Changing the working method can bring to light all the dysfunctions present within the team or the organization. Low-quality or defective outputs will be delivered sooner and projects thus conducted may fail in less time, reducing response times. Finally, members of the team or organization could adapt their activities to the required mechanisms without sharing the underlying logic.

People work better with what they know: team members who are used to working in a traditional environment will have a natural "attachment" to the waterfall life cycle that will make learning of different concepts more complex and involve change. Furthermore, in most cases there is no valid incentive for team members to increase delivery speed because the related benefits are not easily and immediately visible to them.

ERP configuration is not programming: a critical point lies in the fact that this environment is not the environment in which the Agile approach was born and therefore an adjustment is necessary to be able to use it effectively.

Managing dependencies: ERP systems are the result of integrating functions related to different tasks at company level (procurement, HR, finance, etc.) that must be implemented trying to follow the internal processes of the company. To manage additions it is necessary to have a deep understanding of all activities and their functional intersection. This feature can create a problem for an approach that tends to create clear divisions between different iterations.

Despite the many challenges, in the literature it is possible to find some authors who propose "best practices" that allow the adoption of Agile in the implementation of ERP systems.

For example Wells & Williams (2003) discuss in their article how to adapt Agile to the implementation of ERP system. The authors develop their reasoning by identifying some principles to follow in order to adopt Agile.

Maximize stakeholder value: stakeholders invest time and money to develop a system that meets their expectations and it is a priority that the work of the team also meets their expectations.

Embrace change: it is necessary to help project stakeholders to understand and accept change as a necessary element to achieve improvement.

Multiple project views: effective communication with the client must be a priority for the project team, which through multi-format presentations and communications through multiple channels must make the activities for the client as comprehensible as possible.

Working software is the primary goal: it is good to remember that the implementation of an ERP that works and is useful remain the real objective of the project. All activities that are not directly related to its achievement should be analyzed to define whether they bring value to the final output.

Assume simplicity: the most effective and efficient solution is often the simplest. Every superfluous part should be avoided to keep the focus on the main objective.

Incremental change: instead of proceeding with the delivery of the system and all the planned project features, the incremental delivery of individual functionalities should be envisaged.

Manage with a purpose: the management of each phase of the project should be guided by a specific purpose that should be the satisfaction of the stakeholders.

Enabling the next effort: it is necessary to ensure that the system is not only well-functioning but that also allows future developments and improvements.

Rapid feedback: a critical success factor lies in minimizing feedback times after the end of a sprint. This is possible through frequent and effective communication with the customer.

Travel light: the need for maintenance of the delivered system should be in line with the value this has for business functions.

### **Practical Cases**

What is described in the previous paragraphs shows that, despite a few resources focused on Agile ERP implementation, it is still possible, at a theoretical level, to find some ideas on if and how Agile can be applied to ERP implementation projects. The same cannot be said for the study based on real cases. Some authors, such as Faliski W. (2012), Fair J. (2012), Dois C. (2015), Coe J. (2017) and Meszaros G. (2007) have written articles arguing that the Agile is a possible solution to fix problems afflicting ERP projects. Although these articles analyze in detail the differences compared to the classical approaches, often highlighting the advantages of Agile, they are poor of practical examples. Although the authors cited are all professionals in the field of ERP systems and expert implementation consultants, only one of them (Fair J, 2012) reports clear references of practical case studies in his work. However, the material available online is not very detailed.

## Research questions and methodology

Given the fact that the literature on Agile ERP implementation is mainly based on theoretical speculations, it has been decided to carry out a research project based on feedback of people involved in ERP projects.

The research tries to answer to three main questions:

- Can Agile be adopted effectively in ERP projects?
- What is the added value of Agile in ERP projects?
- Overall, is the Agile approach better than “traditional” ones?

One important choice to be made in the research methodology is the sample for data collection. After evaluating various options, it was decided that the most relevant qualitative information would come from professionals in the ERP systems sector who had already experience in Agile. The choice of a very specific sample was suggested by the desire to gather information that was specific to the topic and not generic information on Agile and ERP. This choice, if on the one hand allows to collect specific information, involves the problem of finding the subjects that are part of that small group identified as a target.

In practice, most of the authors cited in the bibliography were contacted via LinkedIn or email, furthermore some posts were made on LinkedIn with a brief explanation of the research project. Other contacts were achieved through professional links created as part the work experience of the authors and through co-workers. The main output of this step was the direct contact with about 30 professionals who had used Agile in ERP projects. Semi-structured interviews were used to gather data.

In addition, during the data collection phase emerged the need to integrate qualitative data with quantitative data in order to have a broader view of the topic and to improve generalization of the results.

All respondents, both for qualitative and quantitative research, responded voluntarily after being informed in advance of the purpose of the research and the type of use of the data within the thesis. Every interviewee in qualitative research was assured of anonymity if they did not want their name to appear within this work. Therefore, the persons whose personal data appear have given express consent.

## Results

Of the 30 people contacted directly only 10 responded to a first contact and only with 5 of these agreed to perform a semi-structured interview. Of these 5, an interview is not reported in the results because it was evident that the system he was working on was not an ERP. The four professionals who supported the semi-structured interview are: Matteo Quagini - Sap Project Manager/CIO/CFO/Change Manager – Ethica Group Spa/ICM.S srl, Michele Paolin –

Partner at Deloitte, Aldo Antonante – Project Manager at BGP Consulting and Jason Coe – Project leader at Accenture.

As far as quantitative research is concerned, a total of 44 valid answers were collected. The respondents to the questionnaire work in 14 different companies, 80% of them are consultancy firms while the rest are companies of different sectors that took on the role of clients in ERP implementation projects. Almost 70% of responses came from employees in companies with more than 500 employees and roughly 40% from multinational companies. 24% of the people respondents identified themselves as Project Managers, 26% in the role of senior consultant, 31% in the role of Junior Consultant and 19% in the role of client. Finally, 56% state that they used Agile while the remaining part declares that they never used it. However, even the answers of those who never used Agile can be useful to understand the potential reasons for that choice.

### Can Agile be adopted effectively in ERP projects?

For a more understandable discussion of this question, it is necessary to introduce the reader to some key concepts of ERP systems. ERP systems are integrated systems that allow companies to manage even very complex processes at centralized level. It is therefore possible to state that the right granularity in the outputs of ERP systems are business processes. If the output is "smaller", there is the risk of having an output with a low added value and difficult to test. The second concept is integration and regression tests. Usually after having tested the operation of a single process, it is well established, especially in large processes, to test the impact of the single process on the whole system by testing the integration between the tested element and the rest of the system. This activity is essential to ensure the full integration of the system.

To reply to our question is better to divide it into two parts. Part 1: is it possible to implement ERP systems with Agile? Part 2: is it possible to do it effectively?

The first part is the simplest to answer. All the theoretical sources and the information gathered agree that it is possible to adopt an Agile approach in ERP projects. The fact that the answer is affirmative is easily deduced from the fact that otherwise it would not have been possible to carry out interviews with experts who had used this methodology in their projects. However, to be sure that the interviewed people had actually used real Agile approaches and not just some agile practices, during the interviews, it was asked what Agile values, principles or practices were used. The answers received confirmed that all the interviewees used Agile approaches in their projects and confirmed their profound knowledge of the topic. All respondents listed similar practices. Paolin, for example, listed some basic points of Agile such as: user story, stand-up meetings, 3-4 weeks long iterations and Kanban boards. Antonante, in addition to retracing what has already emerged from the interview with Paolin, added that he used a lesson learned approach that led to the development of some internal best practices, such as the production of a daily report on the activities of each member of the team, the



continuous updating of a file on open points to close and the use of software such as Jira for the management of activities. Also interesting is the statement by Quagini that, in addition to the classic Agile practices, declared to have already used the SAP Activate methodology (which can be considered Agile) as a guideline for the management of a project in which it took part. Also Coe confirmed the use of a real Agile approach. It is therefore possible to state that all respondents used the Agile approach in some of the projects in which they took part, confirming an affirmative answer to the first part of the first question.

The answer to the second part of the first question is probably one of the most important results of this research. First of all, not all the interviewees gave a unanimously agreed response, but each one gave their own view on how Agile can be effectively adopted in ERP Projects.

Interesting to notice that none of the respondents started to reply with short answers (Yes/No) and then elaborated them but all of them started to set some boundary in order to better understand the conditions that make Agile work in ERP projects.

According to Antonante, the type of projects characterized by a large component of developments fit particularly well with an Agile approach. While Paolin reported that he found Agile useful and appreciated by the customer in the ERP upgrade projects".

Again, Antonante and Paolin stated that Agile is not easily applicable to projects where all the phases of a "typical" project are present. Paolin affirmed that: "Agile is applicable where the requirements and objectives are not well defined [...] In the ERP world, given the maturity of the solutions and processes that are covered, objectively these two aspects (unclear requirements and objectives) are rarely present". Aldo Antonante, on the same logic as Paolin, states: "The main problem of Agile is its applicability. In some projects with many developments, Agile is used and it is also effective but in some typical phases of ERP systems is not easy to operate according to Agile".

Slightly different answers came from other two respondents who maintained that Agile can be used effectively for an entire implementation project. Quagini also stressed the availability of a detailed framework (SAP Activate methodology) which helps managing the project in Agile.

However, all agree that, it is better to manage some phases or activities according to the classic waterfall life cycle. This is due to the characteristics of ERPs and especially the native integration. Especially integration tests turned out to be a phase where Agile is hardly applicable as it requires the interaction of outputs belonging to different iterations. As stated by Coe, for example, "Doing an ERP project still requires a lot of pieces to move together. Thus, doing Agile is a principle, but we still need some level of waterfall to hit testing cycles and deployments. The whole must move together in certain phases".

Another issue mentioned by Paolin is that sometimes it is really hard to have short iteration cycles in ERP projects since the real value comes from implementing processes that may



requires many weeks to be implemented. And again, when it comes to integration tests Agile does not fit very well.

To conclude and arrive at a clear conclusion based on the answers gathered, it is possible to state that Agile, with particular reference to iterations, can be applied effectively in some phases or activities of a project. It is therefore necessary to specify that some elements of the waterfall logic must remain, which allow to manage the high degree of integration typical of ERP systems.

### What is the added value of Agile in ERP projects?

To answer this question, the interviewees were asked to talk about the strengths and weaknesses of the Agile methodology, in the end trying to make a final assessment of the advantage of adopting this methodology.

Strengths:

- **Marketing:** "There's a bit of fashion effect that there is always behind the managerial aspects, but there are some concepts that I think are self-evident" (Quagini). What Quagini affirmed is an important concept, and it is moreover a basis of reasoning that with some nuances was shared by all the interviewees. First of all it emerged from all the interviews that Agile, in the ERP and beyond, is influenced by a fashion effect that amplifies its visibility as a great sounding board. "Surely Agile was promoted a lot, bought a lot because there is also a fashion factor that helps to sell" (Paolin). The fashion effect can be positive to amplify the knowledge of some valid concepts but it should not be a mere element to increase the sales of projects labelled as Agile without having a basic logic to support this innovation in the implementation of an ERP system.
- **Flexibility:** flexibility is the most important advantage of agile. Obviously, other important concepts are included under the concept of flexibility. Agile allows intercepting any changes with respect to the "scope" in advance of traditional methods (Antonante).
- **Trust:** this point is both strength and a requirement for an effective management of the Agile methodology. As Paolin clearly stated, "between the customer and the supplier trust is needed. [...] Agile is a lot of discipline and a lot of trust". It emerged that trust allow to create a more informal, leaner and less bureaucratic work environment where the typical documentation of ERP projects loses the importance and this greatly simplifies relations and management of activities. The lack of this element can create important problems and lead to the failure of the project: "the biggest failure was in \*\*\*\*\* because the customer relationship was very traditional with strong barriers and they want to maintain this condition" (Paolin).
- **Timing:** according to Quagini "The greatest added value is that sprints define the rhythm the team has to follow. It is maybe more stressful for some resources but it brings better results, especially from a schedule perspective."

- Risk: the last strong point of the Agile methodology is certainly not the least important. In most literature sources, risk reduction is cited as one of the main advantages of this methodology. This aspect also emerged in semi-structured interviews. In particular, Quagini expressed this concept clearly and logically in the course of his interview: "in the waterfall there are no short cycles and so the user gets to the tests on functionalities "blind". If they are involved as soon as possible, they have the opportunity to produce feedback first and therefore greatly reduce the risk". It is good to specify that the type of risk that is reduced is to arrive at the final stages of the project with features that are not validated by the customers.

Respondents were quite agreeing on all the strengths of the Agile methodology. Some have focused more on some concepts but others have focused their attention on other points but it is possible to say that all the respondents were in agreement.

On the other hand, it is interesting what emerged from the weaknesses:

- Change: Quagini at the beginning of his interview stated "The application is not simple because it is a change in the change [...] Agile is accompanied by processes of change and therefore it is necessary to combine technological change with a management change".
- Applicability: this concept has been already addressed in the paragraph dedicated to the first question. Some of the respondents cited this feature in weaknesses because an approach that is not universally usable can create some problems. Using Agile where it is not possible can lead to big problems as Paolin said, "Agile created us big problems with a client because the benefits were not well defined initially and the initial documentation was missing to prove what was initially agreed".
- Risk: While it is shared by everyone that a risk component is reduced thanks to the application of Agile, the potential increase of a different risk component has emerged. This concept was well summarized by Antonante: "There is another component of the risk that is due to a potential selfish and irrational behavior of the user. When testing in advance a certain feature often happens that users tend to widen their requests with requests that can make a positive contribution to their personal activities but to the detriment on the overall project. It is true that additional requests can turn into an extra payment compared to the initial contract but this may still entail the dilation of one or more sprint and all activities connected to them".

To conclude the discussion of strengths and weaknesses, the results of quantitative research are briefly presented. As it can be noticed, the same statements have been used both for strengths and weaknesses. This structure permitted to highlight something peculiar: flexibility is both considered the biggest strength and also the biggest weakness. Our understanding is that flexibility, if properly managed, can support the effective implementation of an ERP system, while, if wrongly communicated to the customer (like: you can change the

requirements whenever you want) it can be detrimental to project performance. Interesting also to notice that cost increase is mentioned as the second biggest weakness. Also here there could be a link with flexibility that, if not managed properly, can create cost increase.

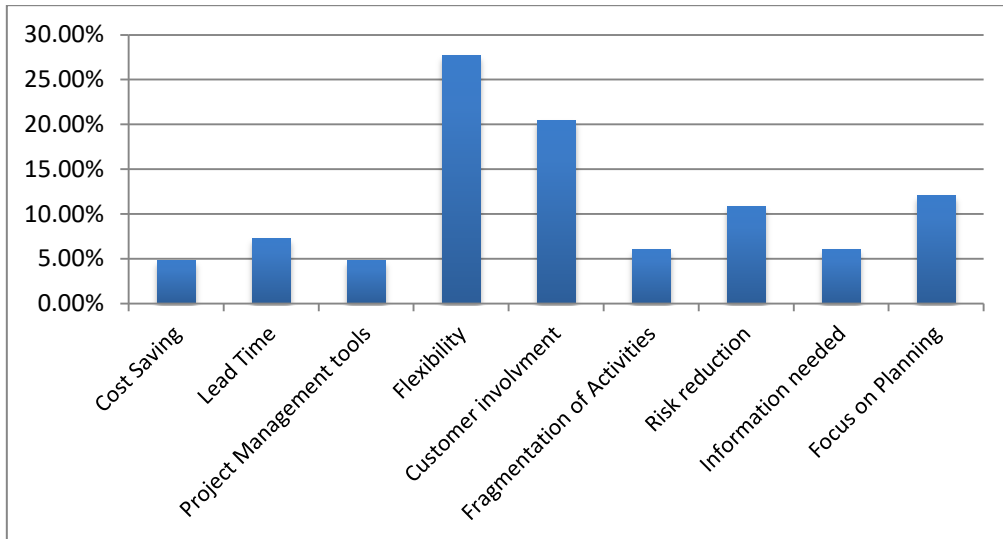


Figure 1. Strengths of applying Agile in ERP projects

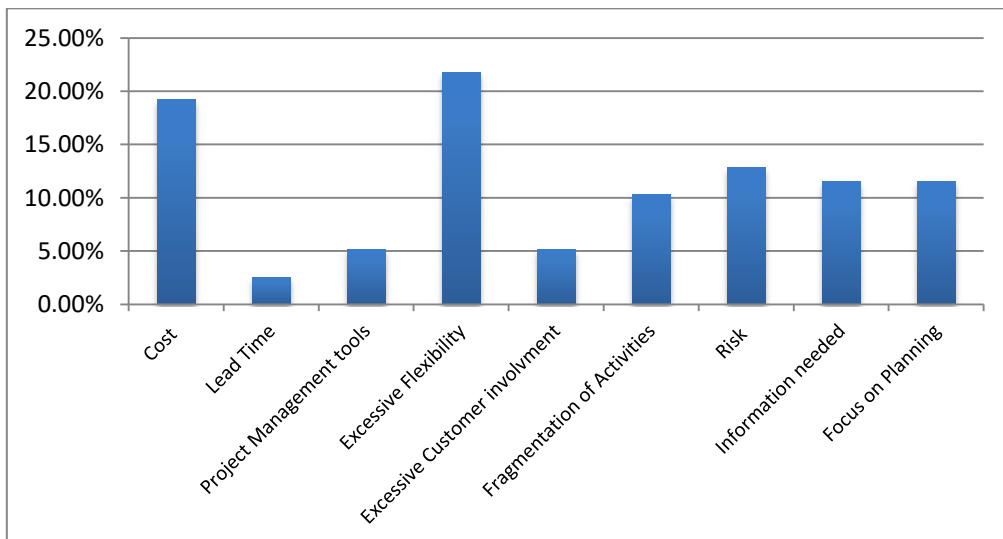


Figure 2. Weaknesses of applying Agile in ERP projects

In the end, it seems that is not possible to provide a clear answer to this question. As the people interviewed remarked, the answer depends on variables such as the specific project (upgrade versus new system, amount of customization, trust with the customer, competencies of the team and of the customer etc.).

### Is Agile better than other more traditional approaches?

The goal of the last question is to pull the strings of what was discussed in the previous paragraphs. The interviews touched numerous concepts that are often strongly linked to each other, which can make the thread of the discourse and the final objective of this research lose. After analyzing whether Agile is applicable to ERP implementation projects and having described the pros and cons of Agile, it is necessary, for completeness, to ask whether overall this approach is considered better than the traditional ones.

No one of the people interviewed responded with a strongly positive or strongly negative answer but according to what was previously expressed, everyone gave a more articulate answer trying to enclose in a few words their opinions. For example, Antonante stated: "Where it works is certainly an effective approach that ensures higher levels of performance in terms of quality and release timing", that is, under certain conditions, Agile can benefit ERP projects. According to Coe: "I think certain principles apply, but there will always be waterfall components in ERP deployments [...] Since you are typically testing processes and business functions in ERP, it is more challenging to put them into an Agile approach". Quagini added that "Agile makes you better in managing a project but it is not the solution to all the problems".

The data collected through the quantitative methodology also show that the interviewees were not able to clearly balance out positive or negative answer. The two options obtained a very similar number of responses, confirming again the uncertainty that even "insiders" demonstrate in drawing conclusions.

### **Conclusions**

What emerged in our research could leave some readers disappointed because different perspectives emerged and Agile in ERP projects cannot be summarized with a simple "it works or it does not work".

During the interviews, many times respondents mentioned that probably ERP projects could benefit from a hybrid approach, which contains the best part of the waterfall approaches and the best parts of iterative approaches. The development, application and management of a hybrid approach is not simple and requires the necessary experience to understand how to use it in order to improve the performance of the project.

The topic of hybrid approaches is frequently mentioned in the current literature and probably more research is needed to make the idea more practical.

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