MANAGING AN AGILE DEVLOPED IT-PROJECT-PORTFOLIO

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Abstract

This article clarifies the challenges in using classical portfolio management tools and methods on agile developed IT projects.

Based on a short introduction on agile development according SCRUM and a description of classical portfolio management, standard key performance indicators of such are collected grouped according project phases and briefly analysed.

After creating such a basic understanding of that matter, each and every single key performance indicator is investigated about suitability regarding the use in agile developed IT projects.

This investigation will show a large gap. Meaning, that nearly half of the identified key performance indicators are not really suitable for agile IT projects, due to many different reasons like lack of budget, timing and resource information.

Therefor new solutions are needed and postulated to close this described gap.

A brief qualified expert interview is used as scientific method to proof the effectiveness of the created new solutions and key performance indicators (short: KPIs). Also showing that needs of KPIs in project management can differ from those in portfolio management.

Keywords: *Agile Project Management, Agile Project Portfolio Management, Key Performance*
Indicators
JEL Codes: M15, H43, O22

Introduction

Agile development is getting increasingly popular and more technology projects are getting developed with an agile approach (Komus and Kuberg, 2015). Reporting and measurability for top management of those projects is often not as traceable as with a classic approach because some important classical portfolio management KPI's cannot be used.

Predictability and reliability are key factors for project- and portfolio managers, but those are completely subordinated topics in agile development methods, approaches and culture.

There are still some old mind sets deep-seated. Such as "widget engineering" – it is possible to analyze everything before starting to develop – or "order taker" – the IT has to do what they are told, saying no is not an option. (Thomas and Baker, 2008)

Those mind sets include the opposite of what agile development stands for. (Thomas and Baker, 2008)

Agile developed projects work from one sub-product or increment to the next and accept no detail planning beforehand at all. (Gloger, 2009)

This area of conflict brings up the question, whether agile developed projects are suitable for prioritization and monitoring within a portfolio of such. Other questions that will be answered in this article are: Which KPI's are needed in classical portfolio management and can they be used with an agile approach? Why can some not be used? And what has to be changed to close the gap?

To answer those questions each KPI has been individually analyzed and solutions to close the gap have been elaborated. Those results have been discussed with experts to substantiate the developed KPIs.

Research results and discussion

1) Agile developed IT projects

In 2001 the agile manifesto was created by a group of people, because they were unhappy with the process of developing software. They tried to find a better way of developing software and have come up with four values: (Waters Kelly, 2007)

"Individuals and interactions over processes and tools" (Beck et al., 2001)
"Working software over comprehensive documentation" (Beck et al., 2001)
"Customer collaboration over contract negotiation" (Beck et al., 2001)
"Responding to change over following a plan" (Beck et al., 2001)

There are many different approaches on agile development. (Oesterreich, 2008) One of the best known and most used is Scrum. (Komus and Kuberg, 2015)

The SCRUM process is small and easy to understand, it contains six roles and six meetings. At the beginning, there is a vision and the product owner documents and prioritizes the properties of a new or modified product in the product backlog. (Roock and Wolf, 2016)

One of the most important artifacts in Scrum is the product backlog. The items of the product backlog are never complete, they always can be modified. This happens especially after each sprint in a sprint review meeting. (Gloger, 2009)

The development is done in sprints which lasts a maximum of 30 days and the development team is responsible to develop the items of the product backlog. At the beginning of each sprint there is a sprint planning meeting where the product owner and the team is participating. Goal of the meeting is to decide how many of the prioritized product backlog items can be included in the upcoming sprint. (Roock and Wolf, 2016)

Right after the sprint planning meeting the development starts and the team is organizing itself. Scrum provides rules and principles which should help the team to self-organize. It takes time to develop a framework where the team can work most efficient. Teams need to get to know each other and how they can work together when problems and troubles occur. The organization should not give strict instructions but should provide experts to guide the team – such as the scrum master. (Gloger, 2009)

The scrum master supports the team at their self-organization and makes sure that the team can work without any interference. In a sprint there is a daily scrum meeting where the development team briefly present their progress. (Roock and Wolf, 2016)

At the end of each sprint the team delivers a shippable product increment and presents it at the sprint review meeting. Participants at this meeting are relevant stakeholder – customer, user, management – and they can give important feedback to the product. This feedback than will help to update the product backlog. (Roock and Wolf, 2016)

After the sprint review the sprint retrospective takes place. This meeting should help the team to grow. The operating process will be analyzed and improvements are defined to make the team more efficient. (Gloger, 2009)

2) Classical project portfolio management

It is important to distinguish between project portfolio, program and multi-project-management.

A project portfolio is the summary of all planned, approved and running projects within a company or an organization. (Seidl, 2011)

The program includes several individual projects and all with the same strategic goal and a common benefit. (Seidl, 2011)

Multi-project-management defines the planning and overall control of several projects. (Seidl, 2011)

It is also defined as the collective leadership and control with the goal to reach an overall result. (Knöpfel, 2000, p. 129)

The project-portfolio-management process consists of different phases.

First, ideas are collected and evaluated. The next phase selects relevant items/projects using consistent prioritization methods. After selecting the projects the portfolio-management governs all projects and at the end a review has to be done. (Alter et al., 2016)

At the first phase, it is assured that the ideas are consistent with the business strategy. Is it doable? Are there enough resources regarding including human and budget? Is the idea even a project? Also, a prioritization of under the different projects in the portfolio takes place at this point. This phase often takes place in the middle of the year for the year following. (Sterrer, 2014)

Project-portfolio-controlling is another important phase. Frequent status checks are a part of this phase. Those checks ensure that the portfolio-management knows upcoming delays, budget overshoots and other problems. With this information, it is possible to prepare a decision making process for the management. The portfolio is a dynamic structure and while controlling this portfolio it is often necessary to change. Like stopping running projects, including new projects to the portfolio and re-prioritization the different projects under each other. All this things can only be obtained, if the project managers deliver the right data. (Sterrer, 2014)

The last phase is the project acceptance and review. This is a very important phase for the company, a lot can be learned of already faced problems. The critical part of this phase is the documentation of the lessons learned – if no one has access to them, no benefit can be created. (Sterrer, 2014)

There are two important components of the project-portfolio-management – the PMO (Project Management Office) and the PSC (Project Steering Committee).

The PMO supports the PSC and the project managers. They build the portfolio and keep it up to date. Another task of the PMO is the organization of the PSC's – preparation, execution and postprocessing. The PMO is responsible for enhancements of the project management process and the training of relevant resources in project management matters. (Sterrer, 2014)

It is important that the PSC participants are allowed to make decision at the meeting, therefor relevant managers and resource-managers should attend. They are approving projects and help running projects when they are facing problem that cannot be solved within the project or with the project owner. To ensure a good committee everybody needs to know their duties and responsibilities. (Sterrer, 2014)

2.1.) KPIs in classical portfolio management

The following tables give a complete grouped view of classical KPIs being used in standard- non agile- portfolio management. This collection will be the basis of the suitability analysis regarding the use of portfolio key performance indicators in agile developed projects.

KPI's used when gathering the ideas: (Alter et al., 2016)

KPI	Importance
Profitable efficiency (ROI, NPV)	Does the project have a benefit for the company?
Prioritization	Necessary to choose the right/ most important projects

Table 6: KPI's used when gathering the ideas

Portfolio status KPI's: (Alter et al., 2016), (Kütz, 2012)

KPI	Importance
Number of projects in different status	What is currently part of the portfolio?
Number of changes in the portfolio	Is our planning good?
Earliest possible start	Is it possible to hold the timeline?
Latest possible finish	Is it possible to hold the timeline?
Level of capacity of bottleneck resources	Can we do the change/start a new project?

Table 7: Portfoliostatus KPI's

Budget KPI's: (Alter et al., 2016), (Sterrer, 2014)

KPI	Importance
Budget consumption (Plan, Actual comparison)	How good is our planning? Can we hold our budget goal? Do we have to stop projects?
Capital needs of all projects	Is our portfolio used to capacity?
How much of the total capacity is used?	Can we hold our budget goal? Can we start new projects, make change requests?

Table 8: Budget KPI's

Drill-Down KPI's: (Alter et al., 2016), (Kütz, 2012), (Sterrer, 2014)

KPI	Importance
Generated project performance	Are we working efficient?
Quality of the results	Are we working effective? Do we have to train our stuff? Change processes to ensure better quality?

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Risk status of the projects	Are we facing major risks? Is there anything we can do to prevent it?
Change status of the projects	Is our planning good?
Budget per project	Is our portfolio used to capacity?
Resources per project	Important for resource management? Can Person XY work at this project?

Table 9: Drill-Down KPI's

Schedule control KPI's: (Alter et al., 2016), (Sterrer, 2014)

KPI	Importance
Time overshoot	Are we reaching our goals/fulfilling our agreements?
Not reached deadlines	Are we facing troubles with our customers? Do we have to change the portfolio?
Extend of the overshoot	Do we have to change other parts of the projects (tied resources)?

Table 10: Schedule control KPI's

3) Hypothesis

When using agile approaches, there are some important characteristics missing to evaluate all of the above KPI's. Some of the most important KPI's – Budget, Timings and human resources – cannot be reported as easy as in a classic approach. Therefore, the management often does not support agile approaches, because they have problems monitoring certain things.

3.1.) Suitability of classical Portfolio KPIs for agile developed projects

In the tables below, each and every KPIs is assessed regarding suitability in for portfolio management under the premises of an agile development.

KPI's used when gathering the ideas: (Alter et al., 2016)

KPI	Suitable for agile approach
Profitable efficiency (ROI, NPV)	ROI: Yes – It is possible to generate a benefit when starting an agile project. NPV: No – At the beginning of an agile project the whole scope is unknown.
Prioritization	Yes – there is a vision. This vision can be prioritized.

Table 11: Suitable for agile approach - KPI's used when gathering the ideas

Portfolio status KPI's: (Alter et al., 2016), (Kütz, 2012)

KPI	Suitable for agile approach
Number of projects in different status	Yes – the development approach does not effect this KPI
Number of changes in the portfolio	Yes - the development approach does not effect this KPI
Earliest possible start	Yes - the development approach does not effect this KPI
Latest possible finish	No – when using an agile approach it is unsure when the end date of a project is
Level of capacity of bottleneck resources	Yes - the development approach does not effect this KPI

Table 12: Suitable for agile approach – Portfolio status KPI's

Budget KPI's: (Alter et al., 2016), (Sterrer, 2014)

KPI	Suitable for agile approach
Budget consumption (Plan, Actual comparison)	No – there is not an overall budget plan, only for the next iteration
Capital needs of all projects	No - At the beginning of an agile project the whole scope is unknown, therefor it is uncertain how much money is needed
How much of the total capacity is used?	Yes - the development approach does not effect this KPI

Table 13: Suitable for agile approach - Budget KPI's

Drill-Down KPI's: (Alter et al., 2016), (Kütz, 2012), (Sterrer, 2014)

KPI	Suitable for agile approach
Generated project performance	Yes - the development approach does not effect this KPI
Quality of the results	Yes - the development approach does not effect this KPI
Risk status of the projects	Yes - the development approach does not effect this KPI
Change status of the projects	Yes - the development approach does not effect this KPI
Budget per project	No - At the beginning of an agile project the whole scope is unknown, therefor it is uncertain how much money is needed

Resources per project	No - At the beginning of an agile project the whole scope is unknown, therefor it is uncertain what, when resources are needed

Table 14: Suitable for agile approach - Drill-Down KPI's

Schedule control KPI's: (Alter et al., 2016), (Sterrer, 2014)

KPI	Suitable for agile approach
Time overshoot	No - At the beginning of an agile project the whole scope is unknown, therefor the timeline cannot be created
Not reached deadlines	No - At the beginning of an agile project the whole scope is unknown, therefor the timeline cannot be created
Extend of the overshoot	No - At the beginning of an agile project the whole scope is unknown, therefor the timeline cannot be created

Table 15: Suitable for agile approach - Schedule control KPI's

3.2.) Gap-Analysis for agile project portfolio KPIs

As seen in tables 6 to 10, almost half the KPI's are assessed as not really suitable used for agile approaches without modifications.

Overall there is one main reason why – when using agile techniques not everything is planned beforehand.

The biggest gaps are with KPI's concerning budget (budget consumption, capital needs of all projects, budget per project), timings (latest possible finish, time overshoot, not reached deadlines, extend of the overshoot) and resources (resources per project).

4) Development of a suitable set of KPIs for agile developed project portfolios

Two solutions or methods are presented to help reducing the gap. Furthermore, four newly proposed KPI's will help creating a set of KPIs covering all important sections of a successful portfolio management in an agile develop environment.

Solution I: Agile fix price

With an agile fix price there is a budget maximum and a latest delivery date defined but the scope still stays variable. When using this approach, the customer still has a cost awareness and all the budget related KPI's can be reported and used for further management decisions. (Opelt, 2012)

Solution II: Slicing projects in deliverable increments

This solution restricts the agile approach a little because it is crucial to start your project using classical methods. You define the scope of the overall scope of the project and make a basic analysis to be able to slice the project in deliverable increments. Each of those increments can be reported individually and therefor, all the above KPI's can be reported.

KPI 1: Velocity

Velocity is a time estimation KPI – how many stories/story points can be completed in a sprint. Teams can complete a certain amount of user stories/story points per sprint. When taking

an average amount of story points a team finished in the last sprints you get the velocity. With this KPI you can estimate how long your project will take. For example in your product backlog are 500 story points and the team is able to finish 25 story points per sprint, your project will take 20 sprints to finish. (Rouse, 2013)

KPI 2: Capacity

The velocity shows how much a team can do in a sprint. Capacity shows how much a team can do considering holidays, other liabilities of a team member, sick leave and people are leaving or joining the team. This KPI can help the portfolio-management manage their resources. (Tatroe)

KPI 3: Work in progress limit

This is a Kanban KPI which should help preventing bottlenecks. Each swim lane in a Kanban board is only allowed a certain number of items. If the maximum is reached, the team is not allowed to start working on new items but must finish those already in. (Rouse, 2012)

KPI 4: Story points

To estimate the dimension of a functionality story points are used in scrum. The development team estimates the dimension of each item of the product backlog. A story point is a standardized size. (Gloger, 2009)

To estimate story points three things are essential. A reference story, a entity and a scale which should show the quantitative difference. (Gloger, 2009)

Often story points can be translated into money (1 Story point = 100€) and therefor KPI's regarding budget can be reported when using story points.

5) Expert verification for agile project portfolio KPIs

The interview for the expert verification has been divided into two parts. Fist part was a questionnaire of all the KPI's shown and evaluated for agile suitability in chapter 3.1. Then, the experts stated their opinion regarding the use the four in chapter 4 proposed KPI's in their company and if they agree with my opinion on the suitability with an agile approach?

All the experts agreed comprehensively supported the not only the evaluated KPIs but also the proposed 4 new agile suitable KPIs. Some mentioned, that you can report all those KPI's within the next sprint and at the end of the project. Which is true but was not the aim of the questionnaire.

Further, open questions were asked about their thoughts on the two proposed supporting solutions. The two new solutions are broadly, they just observed that parts of the agile approach are limited. For example, with the agile fix price you have a time and budget cap, which limits your agile development process.

The experts were not convinced that the work in progress limit is a benefit for project-portfolio-management. They all agreed that this is an important KPI within the project but it is not as valuable for the project-portfolio-management.

Three experts have been questioned to verify the solutions and new KPI's.

Expert 1: Martin Galanda, sales manager and general manager at rmData GmbH

He is responsible for all the communication of all customer projects, which are developed with an agile approach, to the customers. Therefor he has to know all the important issues regarding all projects at all time – to keep the customer up to date.

Expert 2: Besnik Hoti, portfolio manager at A1 Telekom Austria GmbH

He is responsible for the internal project portfolio in A1. He is also part of the Project Management Office and leads the Project Steering Committee.

Expert 3: Alex Bock, portfolio- and project management at ING-DiBa AG

Mr. Bock is responsible for IT project portfolio management and also acting as an agile project manager.

The following questions are shown as the four most important examples supporting the hypothesis:

Question 1: Are there any KPI's for the classic approach missing?

66% No

33% Yes

Additional relevant statement: "Additionally, to the earliest start and latest finish it would be nice to also have the planned earliest start and planned latest finish."

Question 2: Do you think the presented two new solutions could work and would you use it in your company?

100% of the experts liked the first solution (agile fix price) and would also use it in their company.

All the experts think that the agile approach gets lost a little bit with the second solution (slicing projects in deliverable increments) but that it would still be doable and helping closing the gap for a successful portfolio management. They are not convinced to fully implement this solution into their companies.

Question 3: What is your opinion on the four new proposed KPI's and would you use it in your company?

66% of the experts think that those KPI's can be used to close the gap in project portfolio management between classical and agile approaches.

33% think that three of them can be used as described above, one – the work in progress limit – is a very important KPI for the project but one expert was not convinced that it would have a great benefit for the project portfolio management.

Question 4: Are there any important parts missing?

100% No, nothing major is missing.

Conclusions

As anticipated, the use of an agile culture and development method challenges well established project portfolio approaches. Many classical KPIs focus on predictability and fixed scopes. These are exactly the areas, where agile methods demand freedom and empirical progress. That's why standard KPI's can fail in controlling these areas.

But just a view newly established and pretty easy to handle KPIs can facilitate the situation. With additional support of easy to use of methods like fixed pricing and establishment of major releases or "project slices" a portfolio of agile developed project can also be successful controlled and managed.

It's harder and requires a lot of attention and flexibility, but it also follows an agile trend instead of fighting it.

References

Alter, W., Demaria, A., Ehrich, S., Hilgers, P., Horlebein, M., Husemeier, S., Kämpfert, K., Kütz, M., Munz, A., Näder, H. G., Schmidt, T., Schneyder, W. v., Schnichels-Fahrbach, L., Schwarz, A., Sedlmayer, M., Spiegel, F., Stöcker, B., Süß, R. and Weber, M. (2016) *Erfolgreiches Projektportfoliomanagement: Wie Sie Projektportfolios systematisch gestalten und steuern* [Online], Düsseldorf, Symposion.

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., Grenning, J., Highsmith, J., Hunt, A., Jeffries, R., Kern, J., Marick, B., Martin, R. C., Mellor, S., Schwaber, K., Sutherland, J. and Thomas, D. (2001) *Manifest für Agile Softwareentwicklung* [Online].

Gloger, B. (2009) *Scrum: Produkte zuverlässig und schnell entwickeln*, 2nd edn, München, Hanser.

Knöpfel, H. (2000) *KBOB - Glossar* [Online]. Available at https://www.kbob.admin.ch/dam/kbob/de/dokumente/Hilfsmittel/Immobilienmanagement%20Glossar/glossar.pdf.download.pdf/Glossar.pdf.

Komus, A. and Kuberg, M. (2015) *Status Quo Agile: Studie zu Verbreitung und Nutzen agiler Methoden*.

Kütz, M. (2012) *Projektcontrolling in der IT: Steuerung von Projekten und Projektportfolios* [Online], s.l., dpunkt.verlag. Available at http://ebooks.ciando.com/book/index.cfm/bok_id/304759.

Oesterreich, B. (2008) 'Agiles Projektmanagement', *HMD - Praxis der Wirtschaftsinformatik*, no. 260, pp. 18–26.

Opelt, A. (2012) *Der agile Festpreis: Leitfaden für wirklich erfolgreiche IT-Projekt-Verträge* [Online], München, Hanser. Available at http://sub-hh.ciando.com/book/?bok_id=336933.

Roock, S. and Wolf, H. (2016) *Scrum - verstehen und erfolgreich einsetzen*, Heidelberg, dpunkt.verlag.

Rouse, M. (2012) *WIP limit* [Online]. Available at http://searchsoftwarequality.techtarget.com/definition/WIP-limit.

Rouse, M. (2013) *Agile velocity* [Online]. Available at http://whatis.techtarget.com/definition/Agile-velocity.

Seidl, J. (2011) *Multiprojektmanagement: Übergreifende Steuerung von Mehrprojektsituationen durch Projektportfolio- und Programmmanagement* [Online], Berlin, Heidelberg, Springer-Verlag Berlin Heidelberg. Available at http://dx.doi.org/10.1007/978-3-642-16723-2.

Springer Gabler Verlag (ed) *Key Performance Indicator (KPI)* [Online]. Available at http://wirtschaftslexikon.gabler.de/Archiv/326735/key-performance-indicator-kpi-v1.html.

Sterrer, C. (2014) *Das Geheimnis erfolgreicher Projekte: Kritische Erfolgsfaktoren im Projektmanagement - was Führungskräfte wissen müssen* [Online], Wiesbaden, Springer Gabler. Available at http://dx.doi.org/10.1007/978-3-658-04797-9.

Tatroe, I. *How to Do Agile Capacity Planning* [Online]. Available at http://smallbusiness.chron.com/agile-capacity-planning-80991.html.

Thomas, J. C. and Baker, S. W. (2008) 'Establishing an Agile Portfolio to Align IT Investments with Business Needs', *Establishing an Agile Portfolio to Align IT Investments with Business Needs.* Toronto, ON, Canada, pp. 252–258.

Waters Kelly (2007) *What is Agile?: 10 Key Principles of Agile* [Online]. Available at http://www.allaboutagile.com/what-is-agile-10-key-principles/.