

From Performance to Value: Measuring in Agile

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1 Summary

Faster delivery of business value is often cited as a reason for adopting agile. However, measuring the value achieved through IT development is challenging. For those relatively new to agile, measurement is not straightforward, as traditional project and portfolio metrics are often hardwired into management report requirements and are hard to change. During agile adoption it makes sense to start by measuring team performance, as this can aid learning. From small beginnings, an agile measurement approach can iteratively be developed to meet the requirements of the business.

This white paper presents the case of a department within a multinational organization in the insurance sector that adopted Dynamic Systems Development Method (DSDM) in the first quarter of 2013. One of the issues they faced was how to shift from a traditional approach to measuring IT development to one that is compatible with agile development. We present the challenges they asked us to investigate along with suggestions from the published literature about how to overcome them, and a summary of proposed mitigation strategies. Their primary challenge was '*understanding and measuring value in agile projects*'. In order to do this we were asked to investigate the three levels of performance measurement that the department already used, and explore how they may be adapted to be more suitable for agile working. The three levels we looked at were:

- 1 *Personal performance*: how to gauge individual contribution to the success of a project;
- 2 *Project performance*: how to identify, track and report on project progress and delivery in a meaningful way in order to demonstrate strong delivery of benefits, along with improvements compared to more traditional projects; and
- 3 *Department performance*: how to use the information in existing KPIs at departmental level.

The department already had a well-established measurement process at all three levels for their waterfall projects. As they started adopting agile processes they wanted to shift their measurement practices in order to ensure that they were capturing the right management information as well as driving the right behaviour. Three types of recommendation for how to approach these challenge areas are identified from the literature:

- 1 Guidelines and frameworks for measuring business value and agile processes in agile projects
- 2 Specific measurement techniques
- 3 Approaches for dealing with individual, team and portfolio measurement in agile environments.

2 Introduction

The measurement of IT products and development processes is a well-established practice, and is a core part of the traditional project manager's job. As software development is a complex process, some sort of measurement is necessary in order to understand what is going on and to improve. The agile approach to measurement is to focus on improvement and to ensure that value is achieved. Metrics can be devised to assess different aspects of an agile project, for example aspects of team

learning, process improvement, product quality, and stakeholder satisfaction. The main point is that in agile, measurement is a tool and not an end in itself.

In this case study we (the Agile Research Network¹) worked with a department that was undergoing a transformation from waterfall to agile IT development. They wanted to know how best to measure the success of that transformation to ensure that the new approaches they were adopting were delivering value to the company.

Value in the context of Agile IT projects often refers to the delivery of 'business value', which includes any benefits that maintain the general health of a company. It is closely linked to economic value, and ultimately may be assessed by measures such as return on investment (ROI). In order to justify an IT investment, a calculation may be required to show that the income generated or the cost savings made will be greater than the cost of producing the software. However, economic value is also embedded in many features of a business. Information technology does not exist in a vacuum; it is a complementary system that works with other factors in the business [1]. Value can accrue, for example, through knowledge production, brand awareness, loyalty, customer satisfaction, and trust. Some IT developments may only yield economic benefits over time and may not show immediate gains. For some projects, such as infrastructure projects, it may be very difficult to measure their precise economic value to the business. A long-term perspective may be required for some developments, such as those aimed at gaining competitive advantage, improving supplier relationships or achieving strategic alignment.

In the rest of this paper we report our investigation, which starts by looking at the story of agile adoption in the department. We explore when, how and why they started using agile, their existing performance measures, and how these relate to project and personnel management. We identify the specific challenges they face in the current context, and we make suggestions about performance measurement from the literature. Finally we come back to the issue of value, and we propose an approach they can adopt for identifying and measuring value.

3 The Company and the Context

The company is a UK section of a large multi-national organization working in the insurance sector. Some parts of the UK operation were already using agile, but the section we collaborated with had only recently started to use an agile approach.

They began to adopt agile approaches for their projects in March 2013, with the support of a DSDM consultant. They chose DSDM because they regarded it as a corporate-strength framework that would work in their regulated environment, could be adapted for different projects, and could accommodate a spectrum of software development processes from very agile to almost waterfall. The desire to have a common framework for all projects was an important part of this decision. They did not want to use one project framework for waterfall projects, and a different one for agile projects. At the same time they expected that some of their projects would

¹ The Agile Research Network (www.agileresearchnetwork.org) is funded by the DSDM Consortium Board. It comprises a group of academics from the Open University and the University of Central Lancashire who research agile methods in industrial settings. The model operated by the network is that DSDM members propose a challenge they'd like to investigate, and then work closely with the research team to understand the causes and consequences of the challenge and to identify alternative ways of working from published research and other literature.

remain waterfall-like, so whatever they chose had to be adaptable. Another rationale for choosing DSDM was that they wanted to adopt an approach that gave full life-cycle coverage, so they could use a consistent process framework across all projects.

The move to DSDM started with Project R (see Box 1), and was soon followed by two others, B and Q (see Table 1). DSDM projects had been running for nearly a year when we started our collaboration. Agile teams are all based in a large open-plan office space. Members of each project team work in a semi-circular workspace divided from other groups by desks and low-level room dividers. They each have their own whiteboard on which they keep progress information, and which they use as the focus for stand-up meetings. All the teams have some members who are not geographically collocated, as the business functions are not on the same site as the development teams. Contact with the business is made primarily by phone or email and occasionally by face-to-face visits.

Table 1: Summary of First Three DSDM Projects

| | Project R | Project B | Project Q |
|---------------------------|---|--|---|
| Domain | New business function | Management Information development | Rework of an existing business function |
| Team size | 10 (core) | 8 (core) | 3 core |
| Team make-up | Dedicated resource; minimal dependencies | MI project with more than 60% Musts | Small team plus outsource development High profile |
| Team distribution | Dev team and Business team separated Tester in India | Wide business stakeholder group | Dev team outsourced |
| Anticipated length | 1 st 2 increments within 9 months | 12 months | 5 months |
| How far through | 1 st 2 increments were delivered within 9 months; Now in Delivery of 7 th increment (24 months in) | Delivery of 5 th increment (20 months in) | Complete within 12 months pilot started within 7 months |

The first agile projects were selected from upcoming projects. They were chosen because they were not the most important projects and they were assessed as being suitable projects for agile development. The first was the R project, which was chosen because it was a stand-alone project with an appropriate scope and a screen-based interface. The team for this project was handpicked; choosing staff it was believed would have the right behaviours to adopt the method. Managers were aware that adoption involved a big learning curve for everyone. The move from a command-and-control project management style was found to be particularly challenging. The department already had a well-established measurement process at individual and

project levels for their waterfall projects. However, waterfall governance was not imposed on the agile projects. As they started adopting agile processes they wanted to adapt their measurement practices to the new agile way of working in order to ensure that they were capturing the right management information as well as driving the right behaviour. These first agile projects were successful and the decision was made to commit to rolling out agile more widely over time.

Box 1: Example from Practice - The First DSDM Project

The R project was the first DSDM project in the company. In this project each increment consists of three, three-week timeboxes. High-level planning is done at the start of each increment and, in each timebox, stories are checked for the next timebox. Increments end with paperwork production and sign-off.

The team run stand-ups every day. There is no stand-up leader, but control passes around the team members. There is a whiteboard on which the team captures the current state of stories being worked on. This is the focus for the daily stand-up. Retrospectives are run a few days after the end of a timebox. In the early days they were very action-based, but over time the team relaxed and started making more suggestions. Retrospective comments are circulated to the team after the meeting.

The team have noticed a number of improvements since adopting DSDM. Work is completed more effectively because the project is broken down into manageable chunks and working software is delivered frequently. The project has had no reported defects. The team likes making decisions about process improvement. Communication between the developers and the business is easier. The Business Visionary takes away blockers and the Business Ambassadors are decision makers.

Some issues remain. As most of the organisation is waterfall, documentation production and releases have to fit into a waterfall schedule. Some developers find the tight time scale stressful. Business Ambassadors and Business Advisors are not collocated with the development team. The developers felt that the BAs sometimes make impossible demands, for example 'they want everything as a Must' or 'they throw 200 stories at you'. Communication with the tester who is based in India is not as easy as it is with the rest of the team because they are not collated and are therefore not able to take part in the informal discussions that aid decision-making during development and testing.

4 The Challenges

We worked with the *Head of Business Change* and the *Capability and Delivery Manager* to identify a primary challenge that we would investigate. As relatively new adopters there were many areas they wanted to investigate, and choosing one was not easy. We discussed a range of challenges they were interested in, including knowledge sharing within the organisation, re-organising the workspace, business engagement, and evidence of agile success.

After discussions we agreed that the primary focus of our study would be to investigate how the department could show that their newly adopted agile processes were delivering real benefit for the organisation. This was summarised from the organisation's point of view as:

Understanding and measuring value from agile projects

However, they were not yet in a position to start measuring value from agile projects. First, as new adopters they were still in a transition period. Their teams were finding their feet and exploring ways of adapting to agile within their context. Second, they had a well-established set of measures and processes already. These were designed for use with waterfall projects and focussed on performance and deliverables rather than value and assessed at three levels: personal, project and department. It therefore made sense to start by exploring how to introduce measures of agile performance so the department could transition their measures to accommodate the new agile way of working.

The managers identified three areas in the primary focus:

- *Personal performance* – how to gauge individual contribution to the success of a project
- *Project performance* – identifying, tracking and reporting on project progress and delivery in a meaningful way so that we can demonstrate strong delivery of benefits, along with improvements compared to more traditional projects
- *Department performance* – identifying how we use the information in our key performance indicators at department level

We investigated these focus areas by visiting the department numerous times during the summer of 2014 to do observations and interviews with members of the three agile development teams, business ambassadors and a range of managers. Below we summarise the current practices of the organisation, and identify the particular challenges for moving to agile that were identified through our investigations and discussions with staff.

4.1 Personal Performance

Within the department capability managers and change managers (project managers) work closely to assess personal performance of all employees. Capability managers write role descriptions and undertake personal performance reviews within their capability area. Change managers collect and assess information about the performance of members of their project teams that feed into personal performance reviews. Capability areas are based on functions. Examples include business analysis, development, environment, and testing. Each job role has a profile that describes what tasks and objectives the role is accountable for and how they are

measured. These role profiles are reviewed and adapted each year so they keep pace with changes. The capability review procedure involves a half-year and end of year performance review in which the generic set of objectives are developed into a person-specific profile, which is assessed, measured and used to plan training, development and support. In the IT department there are also interim monthly performance reviews in addition to the twice-yearly reviews. The primary issue for moving to agile is that current role profiles do not take account of the increased team working that happens in agile projects.

The organisation has already learnt from experience that if they measure performance outcomes they may drive the wrong behaviour. For instance, if they measure timely project completion, they may receive project plans that under-estimate activities and achievements in order to guarantee successful completion to target. This has the unintended consequence of slowing down delivery of features to the business. Hence they are more interested in measuring activities, roles and accountability within projects.

The challenge areas for personal performance monitoring in agile projects that were identified during our discussions with staff, are:

- 1 Gauging individual tasks in agile projects is more difficult than it is in traditional projects. Individuals often undertake a wider set of tasks. Task-allocation is no longer done by the project manager, but happens less formally as part of working in a self-managing team.
- 2 DSDM introduces new roles and changes existing roles. Roles that change include that of the Project Manager and Business Analyst. New roles include the Business Ambassador, Business Advisor, Technical Co-ordinator amongst others.
- 3 Focussing on personal performance is somewhat anti-agile as it focuses away from the self-managing team.

4.2 Project/Team Performance

Existing project performance measures were devised for waterfall projects, and many are not appropriate for agile projects.

The existing measurement process focuses on collecting data for Key Performance Indicators (KPIs). Using electronic data collection, project managers create a project schedule including phase duration estimates and checkpoints. Actual data for task completion and task duration are input during the project by members of the team and the project manager. Measurement is driven by KPIs and includes:

Valuable (= the business benefit - the total project cost);

Days of Effort by project life cycle stage (feasibility, initiation, solution definition, delivery, closedown);

Timely (= elapsed days per stage) and (% of time spent in each stage) and (elapsed time from request to deployments)

Controlled (RAG (red-amber-green) values measured against schedule checkpoints)

OTOBOS = On Time, On Budget, On Scope (RAG values measured at project end)

Some agile-specific measures are currently being collected, but these are out of the standardised system. They are:

Effort – *how many hours are being put into projects*

Outcomes – *Must-haves, Should-haves and Could-haves completed in time-boxes*

Managers and project managers are aware that measures need to be adapted to the agile approach whilst still being focussed on delivering better outcomes for the business. New agile measures being considered include: velocity, cycle time, boomerangs (defects in delivered software), business value, risk, quality, customer involvement, and customer satisfaction.

The challenges for measuring agile project performance that were identified in our discussions with staff, are:

- 1 There are currently no agreed project measures for agile teams
- 2 Many current measures are based on waterfall checkpoints which will be gradually phased out as agile is more widely adopted
- 3 New agile project measures must not drive the wrong behaviours

4.3 Department Performance

The department covers two areas: IT and Operations. Measurement at the department level focuses on the KPIs described in the section above. Project data is collated into a department-level report for each KPI. At the moment there are no specific department-level KPIs. Generally about 50 projects run at a time, but data is not collected for infrastructure projects or projects that involve less than 40 days of effort.

The IT Quality Manager would like to develop measures and KPIs that will drive beneficial change in the department. One of the main issues discussed is that not all the data being produced are being used. This is a waste of effort. A new measurement approach is needed, which will produce useful outputs. As well as measuring performance and business value, metrics have been suggested that assess the success of the transition to agile. Current proposals include collecting data on the number of users of agile tools and methods and the number of people trained or coached in agile methods, but other measures are needed.

The challenges identified during discussions for measuring department performance when more projects are agile are:

- 1 Ensuring that data is only collected if it is useful and that reports are only produced if they are read.
- 2 Developing appropriate departmental-level metrics that help with decision making
- 3 Developing metrics that measure the uptake of agile methods through the department

5 Mitigating the Challenges

Having spent time in the company understanding their existing practice and the detail of the challenges they faced, we turned to the literature to find guidance on how to address the challenges in their context. A key lesson that emerged from the literature is that agile project measurement needs to be tailored to the business context.

Our findings break down into two main areas. We look first at measuring performance at the three levels identified. Second, we focus on guidelines for developing agile metrics and give examples of some agile metrics used in practice.

5.1 Measuring Personal, Project and Department Performance

The ultimate value of adopting agile for software development projects is the effect it has on the business as a whole. In the context of our collaborators, this translated into an initial focus on performance measurement. Below we compile some guidelines on performance measurement at the three levels identified in the challenges.

5.1.1 Agile Personal performance

Measuring personal performance is regarded as somewhat 'anti-agile' as it defeats the spirit of collaboration in agile teams. However, as most organisations insist on assessing the performance of individuals, some practitioners have proposed metrics that minimise the threat of personal performance measurement to the agile ethos. Gautam [2] suggests an appraisal backlog for individuals with prioritised goals and acceptance criteria for each goal. Sutherland [3] suggests the replacement of performance appraisals with a self-evaluation followed by a conversation between appraiser and appraisee, while Coens and Jenkins [4] go further in their challenge of personal appraisal and suggest a complete rethink of the assumptions underlying appraisal, and of the roles of managers and employees. In the context of our collaborators, personal performance is still linked to waterfall performance objectives as role profiles assume that individuals will only work in a very tightly-specified job role.

5.1.2 Agile Project/Team Performance

The literature on agile teams and their performance is extensive. There are some peer-reviewed publications on agile performance measurement [5-7], but much of what can be found is anecdotal and to be found on websites and blogs. Hartman & Dymond [5] looked at sources for agile metrics and compiled a checklist to help measure a team's performance.

- Identify a clear question
- Clearly state what is being measured
- Identify assumptions
- Indicate intended target audience
- Capture actual against expected outcomes
- Review and adapt

As our collaborators are undergoing an agile adoption process, we considered that team performance is the most appropriate level to start measuring agile performance in the department. These metrics can be developed iteratively, and each team can experiment with what works for them. The guidelines discussed in 4.2 are a good starting point for teams to decide on the metrics that best fit their context

5.1.3 Agile Department Performance

As the department moves towards more comprehensive agile adoption we suggested a series of guidelines for developing department measures, based on Thomas & Baker [8]. Adopting this approach will aid a smooth transition from measuring traditional projects to measuring agile projects, and developing new department performance measures:

- Introduce change gradually
- Move from 'control through data' to 'enable and ensure'
- Introduce fact-based measures that give insights but don't force a comprehensive suite of metrics on all projects
- Maintain a light touch – don't collect data for the sake of it
- Prioritise and manage projects in progress over whole the department

The department we worked with in this company is cross-functional, and the move to agile will require buy-in from all stakeholders. This will take time.

5.2 Guidelines for agile metrics

In order to maintain a light touch, it is generally accepted that agile teams should design and use their own metrics in response to identified needs, rather than using pre-defined metrics. Some of the literature therefore provides suggestions for designing good agile metrics.

Agarwal and Majundar [7] suggest that optimal metrics should be:

- Simple, precisely definable – so that it is clear how the metric can be evaluated;
- Objective, to the greatest extent possible;
- Easily obtainable, (i.e., at a reasonable cost);
- Valid – the metric should measure what it is intended to measure; and
- Robust – relatively insensitive to insignificant changes in the process or product

Hartmand and Dymond [5] characterise a good agile metric as one which:

- Affirms and reinforces agile and lean principles
- Measures outcome, not output
- Follows trends, not numbers
- Answers a particular question for a real person
- Belongs to a small set of metrics and diagnostics
- Reveals, rather than conceals, its context and significant variables
- Provides fuel for meaningful conversation
- Provides feedback on a frequent and regular basis
- May measure value or process
- Encourages *good-enough* quality”

With these two sets of criteria and taking into account the context, we suggest that metrics should:

- Be at the right level – just enough;
- Answer a question for a real person;
- Link to high level goals; and
- Be used for a specific purpose.

5.3 Agile metrics in practice

The academic literature and agile blogs provide numerous examples of metrics that have been used by companies in different contexts. Table 2 shows some of these metrics.

Table 2: Agile Measurement Practices

| Practice | Aim | Based on | Beneficiary | When |
|-----------------------------|--|--|------------------------|----------------------------------|
| Software size [6] | Estimation of size/effort | User stories | Project Manager | At start of each iteration |
| Velocity [6] | Productivity of team | User stories | Project Manager | At end of each iteration |
| Burndown [6] | Progress monitoring | User stories | Team | At end of each iteration |
| Cumulative Flow [6] | Observation of lead time and WIP queue depth | Work in progress | Top managers/customers | At end of each iteration |
| Responding to change [6] | Ability of team to handover quality | Defects fixing cost | Project Manager | At end of each iteration/project |
| Earned business value [6] | Monitoring by delivered to customer | Business value | Top managers/customers | As each feature is delivered |
| Total estimation effort [6] | Planning and budgeting | User stories and reworks | Top managers/customers | At beginning of project |
| Story estimation | Time spent on story estimation | User stories | Team | Beginning of iteration |
| Requirements ambiguity | Misinterpreted requirements | User stories | Team | End of iteration |
| Unfinished stories | Identify problems with stories | User stories | Team | End of iteration |
| Number of impediments | Identify impediments team faced | Impediments identified in retrospectives | Team | During retrospectives |

| | | | | |
|-----------------------|--------------------------------------|------------------------------|-------------|------------------|
| Work-in-progress | Items being actively worked on | User stories on kanban board | Team | During iteration |
| Unplanned changes | Changes able to process in increment | Changes to user stories | Team | During increment |
| Employee satisfaction | Individual satisfaction | Questionnaires/Surveys | Individuals | End of iteration |

6 The next steps

Our proposals for moving forward are to start introducing agile measurement at project team level. At this level, the focus can be on performance improvement and value.

First, teams can adopt their own measures for improving performance by identifying and analysing problems they encounter. The teams already run retrospectives. It would only be a small step for each team to discuss appropriate metrics in retrospectives, using the approach suggested in 4.1.2.

Second, project teams can adopt measures to ensure they are delivering value through their project. Jeff Patton outlines the business-goal approach [9] through which this can be achieved. In this approach project stakeholders meet at an early stage in the project and:

- Brainstorm on business goals/values
- Merge goals (cluster and categorise all goals suggested)
- Distill clustered goals
- Vote on priority
- Identify metrics
- Create metrics

Table 3: Example Business Goals and Values

| Category | Business goals and values |
|-----------------------------------|--|
| Responding to business needs | Increasing customer base Providing quicker service Freeing up staff time |
| Delivering a good user experience | Customer satisfaction Well-designed products Easy to use interface |
| Delivering return on investment | Early ROI |

Table 3 shows an example of categorised business goals and values that we suggested may be used as a starting point for a business goals stakeholder meeting. References

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