Managing software development programs of Agile methodology, with middle-out Balanced Scorecard (BSC) approach

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PMI Project Management Institute
PROJECT MANAGEMENT CONFERENCE, INDIA
A PMI Team India Event
MUMBAI
19th, 20th & 21st November
2010
Leveraging project management for excellence, growth and transformation

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1.1 Abstract

In this paper, we describe a BSC approach for managing an Agile mode of software development, at Tata Consultancy Services Ltd. (TCS) India, with one of its valuable customers, a leading Healthcare Services company. During the growth of business relationship, there was a need to manage a critical portfolio of projects by Scrum mode of code development, with special reference to customer feedback and management of Key Performance Indicators (KPI).

We chose BSC approach to manage and control this flagship program, for ease of design and for clarity of communication amongst its stakeholders. Our focus in this attempt has been to use the BSC dashboard as a link in corporate communication amongst business, IT-program and IT-project teams. The design characteristics for the scorecard are highlighted in this paper.

1.2 Keywords

Agile methodology, Scrum team, Sprint Backlog, Velocity and Burn-down, Balanced Scorecard (BSC)

1.3 Introduction and background

The Balanced Scorecard (BSC, henceforth) has been in practice for Corporate Performance Management and for strategy deployment purposes since early 1990s (Kaplan and Norton, 1992; 1993; 2000). Since then numerous cases of its usage, both as success and as failure abound the corporate case history. From the example of a corporate scorecard getting cascaded to individual teams' level, there are cases where BSC had also been used for 'Project focused IT Organization' (Alleman, 2003). From the design point of view, there are many organisations that exist specialising both in BSC tools and in training (2GC, 2009).

Agile mode of software development has been in practice actively within the last decade, with the focus on adaptive teams in close collaboration with business users. There are references on metrics for Agile mode of software development (www.agilealliance.com). Sliger (2007) has compared the traditional Project Management (PMBOK-PMI) with Agile Project Management and has identified special note for Program Management Offices (PMO). Rawsthorne (2004) has introduced the idea of Earned Business Value Index for managing work in an Agile project. Thus, specific metrics are available for evaluating performance in Agile mode of code development, but these metrics are not understood in larger audience in corporations. For corporations with multiple IT projects we need a common dashboard metaphor for comparison of Agile projects with that of waterfall mode.

In this paper, we describe our attempt to design BSC, which can be a 'middle-out' approach compared to the traditional top down way of arriving at scorecards.

1.4 Project highlights

Tata Consultancy Services Ltd, (TCS, henceforth), is India's largest IT Services firm, a US$ 5.7 billion global software and services company and is part of the well known Tata Sons group; it has many Fortune-10 and Fortune-100 organisations in its customer base. The customer is one of the largest companies in Healthcare Services industry (Customer, henceforth). In this paper, we will be describing our experience in designing BSC for the purpose of moving up in the value chain of Vendor – Customer Relationship, (Relationship, henceforth), for this specific customer.

During the year 2009, a new portfolio of projects for existing Healthcare Services systems was launched with the following objectives: -

- To optimize the software development and control through Scrum methodology;
- To arrive at a management dashboard for better communication, visibility and control.

1.5 Balanced Scorecard Implementation – The Challenge

There were multiple practices in existence on project monitoring and in-house tools were in vogue at individual Scrum teams' level; but these were not used for communication to larger audience, wider and above the current program level and it was felt that a BSC based dashboard would fit the bill. But the challenge was related mainly to designing scorecards for the Scrum sprints and implementing it successfully across the overall projects' horizon.

1.6 Prevailing Agile Methodology for Software development

1.6.1 Release Plan

The well known phases and activities of Scrum (Advanced Development Methods, Inc, 2003) are the Planning, Staging, Development and Release. These were modified here for this big initiative with a Phase-0 for establishing the larger Program Management governance, software development rules of the engagement and exit strategies. In Phase-0, there were also 'Proof of Concepts' (POCs) for architecture, interfaces and data points. This has helped the Relationship to 'pilot' the actual Scrum methodology with an added flavour of onsite – offshore teams. This would be followed by 'waves' of development and releases under Phase-1. Individual Sprints with Scrum teams would form the structure of individual 'wave', from the Release Plan view point (Fig. 1).

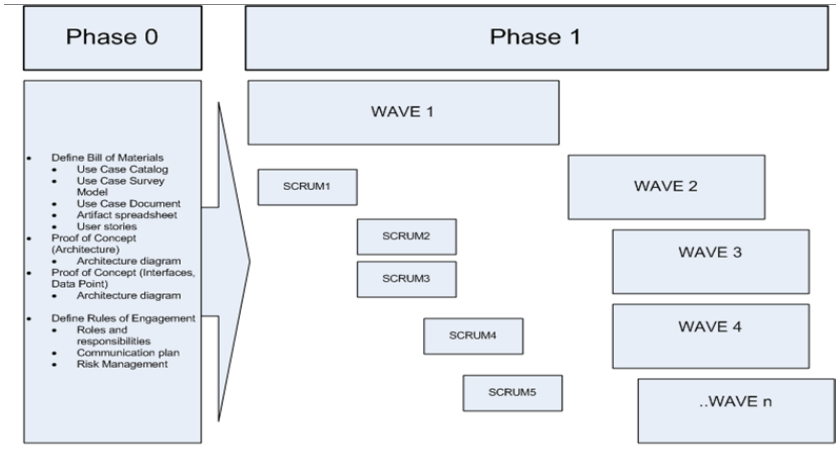

Fig 1: Release Plan in Scrum Methodology of software systems development

1.6.2 Sprint Execution

While each Sprint in Phase-0 typically ran for 2 weeks due to its piloting focus, for Phase-1 it was planned for Sprints of 4-weeks duration. Scrum teams were formed to share the starting inventory of Product Backlog. Typical Sprint execution activities are given in the diagram below (Fig. 2).

This program also has the development and delivery teams (Scrum teams) spread across onsite and at offshore. The Scrum teams followed the spirit of Scrum methodology in being self actuated teams with no specific 'manager' to direct and control the activities they share.

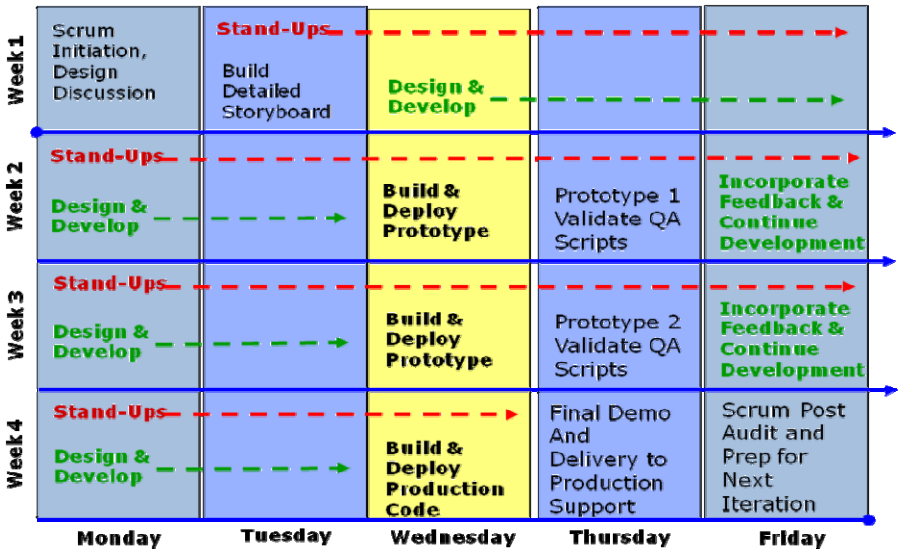

Fig 2: Sample Sprint execution with weekly review focus

The initial team structure of onsite – offshore execution has a Core Program Management team that has Scrum masters, Uber Scrum master from the customer

organization and Program managers from TCS for onsite and for offshore Scrum teams. This structure was supported by Data modelers, DBAs, System engineers, Integration testers and various SMEs from TCS and Customer organization. The diagram below (Fig. 3) gives a snapshot of the team structure for this program.

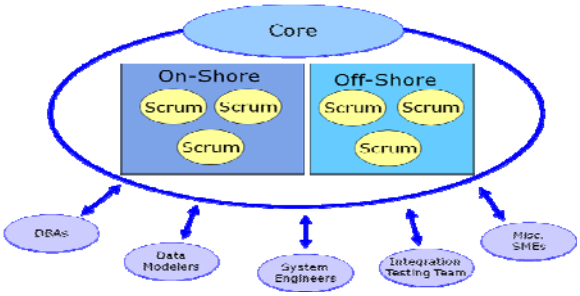

Fig 3: Snapshot of Team Structure

1.7 Prevailing Governance mechanism

As is done normally (Pannone, 2009), a three level planning and monitoring had evolved for what we call, "Application groups governance", while to focus on the Relationship, there was an additional "Relationship-wide governance" layer as well. The following table (Table 1) gives these details.

Frequency	Participants	Agenda
Monthly	• Vendor Management team • TCS Relationship team	***Relationship-wide governance*** • Review overall program progress and set directions • Review overall program Key Performance Indicators (KPIs) • Review exit criteria
Bi-weekly (Sprint Review)	• TCS Steering Committee • Core Team	*Application groups governance* • Review overall program progress and set directions • Review overall program Impediments • Scrum metrics for performance review (Sprint Retrospective, Sprint Burn-down, Sprint Burn-rate, Ave. Velocity)
Weekly	• Program Management Team • Uber Scrum Master • Scrum Masters	• Overall progress indicators (Daily Burn down chart, Ave. Velocity) • Plan updates, Resources Required • Roadblocks / Issues that need escalation
Daily	• Stand up teams (individual scrum masters) • Uber Scrum Master	• Progress review at scrum team level • Discuss sprint backlog • Discuss Roadblocks / Issues

Table 1: Governance mechanism

1.7.1 BSC design – the 'Middle out'

There are cases in literature (Alleman, 2003), where BSC was used as a pure Project Management element, complementing the traditional project management and control mechanism. But the design of BSC was attempted from a top down approach. Goold et al. (1994), describe three types of 'Parenting Styles', viz. strategic planning, strategic control and financial control, for the roles and responsibilities between corporate and organisational units. These types of styles also influence the role the corporate would adopt in the design and usage of BSC across corporate and business units (De Waal, 2007). We have adopted a method that has parallel to 'strategic control' style in our situation, wherein the corporate (the Relationship, in our case) would influence the design of scorecard, but it would be the Scrum teams that influence the usage of it.

When the program was sanctioned, there were two scrum teams with their own measures to monitor, but they existed as disparate systems. After having discussions with the program steering committee, the stakeholders and the Scrum teams, a first cut BSC was designed for the program, much akin to a Corporate BSC, but with the focus aimed at customer service levels and KPIs. In fact, we found that a financial measure was more of a derived benefit (Sprint Burn Rate) rather than a starting point as in a typical BSC!

In this approach, the program core team would work out multiple iterations, to arrive at individual scorecards across the scrum projects (re-using many prevailing measures) and connecting them to the Program BSC, to arrive at a consensus that was aligned with the proposed governance requirements. We would be able to retain many measures that were used at individual scrum teams' level, while choosing the ones that would get 'aggregated' at program level scorecard. Thus, Relationship expectations were typically 'cascaded' downwards as BSC measures (from Program BSC to Scrum Teams' BSC), while re-using typical Scrum measures for 'aggregating' upwards.

1.7.2 Characteristics of BSC design – the 'Middle out'

The design process is typically recursive at each time when a new Scrum team is added to the program portfolio and that the participating Scrum contributed to the design more, by way of carrying forward their set of measures; and thus we would prefer to call the design approach the 'Middle-out', compared to top down mode of designing scorecards.

The following steps would describe the process of this design approach:

1. <u>Start up / or from a previous steady state phase</u>: Existing islands of projects in the Relationship portfolio, (with independent Service Level Agreements (SLA), Key Performance Indicators (KPI) and measures) focus on their operational efficiency, project management and control, besides monitoring for Risk management.
2. <u>Coalescence phase</u>: When a new program is sanctioned, driven by the goals and changes in the objectives of the Relationship, coalescence comes into play. The steps in this phase are –
   a) Select pilot projects that have similar and comparable SLAs and KPIs.
   b) Derive 'tactical themes' as opposed to Corporate Strategic Themes. (the example is - "Move maximum number of projects to 'Lower Burn Rate' while keeping the 'Ave. Velocity' and 'Ave. Burn down' rates near constant).

c) Develop Strategy Map from the new business goals, and the identified program benefits and derive the new set of KPIs and measures.

d) Assign targets with tolerance ranges (Green / Amber / Red) for the finalized measures that would drive the SLAs to fruition.

e) Analyse new risk/impediments profiles and mitigation plans.

f) Derive the new governance model and get approval for the same.

3. Communication Phase: Publish the Scorecard to stakeholders and draw up communication and change management plans. (Town hall meetings, Training, Kiosks for Demonstrations, etc. as required).
4. Implementation Phase: Go Live and monitor. (Closure / start steady state phase)
5. Iterate from 'Coalescence', when new projects join.

The following figure (Fig. 4) depicts the design elements.

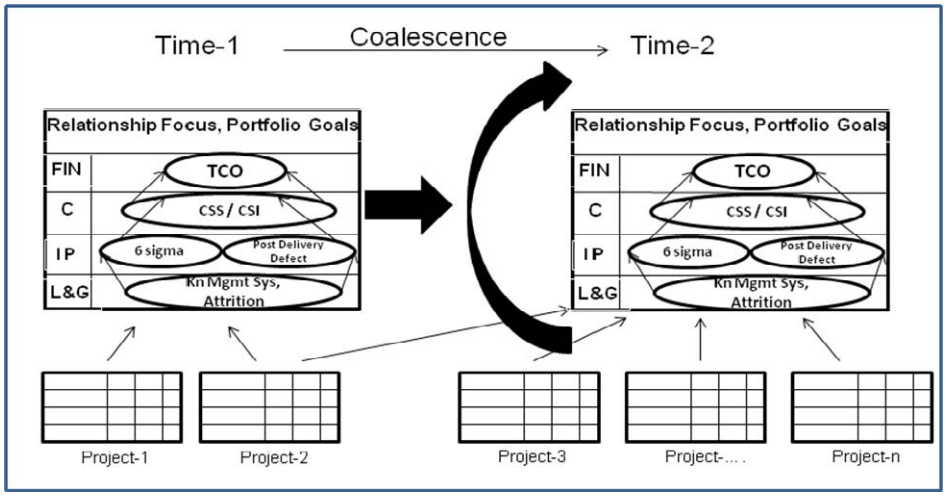

Fig 4: Strategy Maps for BSC Design Middle-Out

We can compare the traditional Balanced Scorecard approach (the first generation) with the middle-out approach in the following way (Table 2).

BSC Top Down	BSC Middle-Out
Starts at Organisational top; Corporate Vision driven SLAs / KPI	Focus on Customer – Vendor Relationship, Portfolio / Program Objectives; Benefits driven SLAs
Long Term planned (3-5 years)	Short Term focused (1-2 years)
Start from Financial goals (Perspective) and derive other Perspectives. Identify Strategic Initiatives (as relevant).	Start from Customer Expectations on Portfolio Benefits and distribute SLAs across relevant BSC Perspectives
Usually top-down approach to BSC design	'Middle-out' design'; iterative process of top-down (from Portfolio SLAs) and bottom-up, where the quantum of contribution is more from Projects' level (operational parameters for arriving at measures and targets).

Strategy Maps are enablers for BSC design; they validate the Strategic Themes.	Strategy Maps drive the design
Changes to Dash board measures are generally minimal at Corporate level BSC.	Flexible to changes to measures or their targets both at Projects' level and at 'Internal Processes' Perspective of individual Scorecards.

Table 2: Comparison of BSC Design approaches

Thus, the Program Scorecard can evolve from the vendor – customer relationship to individual projects' level easily. Also, the scorecard structure (parent – children scorecards) can be extended to more projects / Scrums, at different 'coalescence' phases, as the maturity of vendor – customer relationship grows.

1.8 Performance Index

For the purpose of monitoring performance, as well for the purpose of rewards recognition, the individual measures were given 'weights' (though, during the time of piloting, the weights were set to a value of 1) and their performance deviation was measured at regular intervals. The individual measures' performance values were then aggregated for specific BSC (4) perspectives, as well as at individual scorecard levels. Thus we had various 'weighted performance of measures', which were called Performance Indices (PI) on the scorecards. This idea helped the program in a significant way, by comparing PIs across various perspectives, across scorecards as well as across individual Scrums.

1.8.1 Recommendation for BSC Implementation

The launch preparation phase would typically last about 4 weeks, when internal marketing campaign should be conducted. The Scrum teams, Scrum Masters, and the program core team would then freeze the scorecard elements (that include the measures, negotiated targets and their target deviation zones) and address the program roadblocks and issues. The key elements for scripting a success story of BSC implementation are the town hall meetings with individual teams and stakeholders, content-rich collaterals for internal marketing purposes and self-running demonstration kits from the program portal for the user groups.

In the final mode of governance, we should superpose the new BSC based Scrum-Program review, while retaining the existing review mechanisms at the Scrum / Sprint level, wherever required. This would help the program to track important program specific measures, while facilitating the need-driven data drill down at individual projects' level. Also more importantly, the adoption of BSC dashboard would facilitate better corporate communication on business, program and project specific audiences, without losing the essence of the Agile / Scrum mode of software development.

1.9 Some closing thoughts

Our focus in this paper has been that BSC dashboard will be the link in corporate communication amongst business, IT-program and IT-project teams that have both Agile based and non-Agile based projects, given Agile framework's specific terms and their interpretations.

Given below **(Fig. 5)** is an example of Program BSC (for the sake of confidentiality, we have masked the actual numbers; data points from April-09 onwards were re-constructed for display).

Sr #	Performance Measure	Unit	KPI	Target	Frequency	Apr '09	Trend	May '09	Trend	Jun '09	Trend
	Finance										
1	TCO Savings (Direct / Indirect)	$	N		Half yearly						
2	Sprint Burnup rate	$	Y		Monthly						
	Customer					**0.80**		**0.80**	⇔	**0.80**	⇔
3	Customer Satisfaction Index (Overall)	%	Y	90%	Half yearly	84%		84%		84%	
4	CSI - Most important parameters rated low	%	Y	10%	Half yearly	50%		11%		11%	
5	CSI - Most important Service & Business Goals parameters rated high	%	Y	80%	Half yearly	86%		86%		86%	
6	Customer Appreciations	#	N		Monthly	8		9		6	
7	Customer Complaints	#	N		Monthly	0		0		3	
8	Quality of Service (from annual survey)	#	N		Yearly						
	Process & Delivery					**0.54**		**0.54**	⇔	**0.66**	⇧
9	Post Delivery Defects	#	Y	5	Monthly	2		4	⇧	4	⇔
10	Sprint review Meeting attendance	%	Y	100%	Monthly	100		100		90	
11	Monthly Governance	%	Y	100%	Monthly	33%		67%	⇧	60%	⇩
12	Velocity (per Sprint) (Total)	#	Y	15	Monthly	14		14	⇔	14	⇩
13	Velocity (per Sprint) (per Scrum team)	#	Y	3	Monthly	3		3	⇔	3	⇩
14	Burn down deviation (per Sprint)	%	Y	5%	Monthly	8.0%		8.0%		9.0%	
15	SLA compliance to response time (Resources SLA)	%	Y	95%	Monthly	99.7%		99.6%	⇩	99.4%	⇩
16	SLA compliance to resolution time (Resources SLA)	%	Y	95%	Monthly	97.0%		96.6%	⇩	96.7%	⇩
	Learning, People & Competency					**0.40**		**0.90**		**0.90**	
17	Compliance to minimum competency level	%	Y	100%	Monthly	80%		80%	⇧	80%	⇔
18	Unplanned Attrition in critical phases	#	Y	0	Monthly	1		0		0	
19	Upload activity of assets into KM system	#	N		Monthly	0		0	⇩	0	⇔
20	Reference activity of assets in KM system	#	N		Monthly	0		0		0	
	Portfolio Performance Index					**0.58**		**0.58**		**0.72**	

Fig 5: Agile – BSC Program scorecard

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1.11 Author Profile

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