METRICS DRIVEN CONTINUAL SERVICE IMPROVEMENT USING AGILE CONCEPTS

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Abstract **- Strategic alignment of business with the IT is a mandate for success in an enterprise. The services provided by the IT need to align with the needs of the business. However, focus of organizations tends to get lob sized with the day to day operations side of the services and lose focus on the alignment to the strategy and hence the business needs. Industry best practice frameworks emphasize on a measurement driven Continual Service Improvement to overcome this issue and to maintain the feedback loop from operations to strategy and vice versa. A robust metrics framework and measurement system forms the backbone of any Continual Service Improvement initiative. This paper proposes an agile approach to setup a metrics framework for continual service improvement for IT Services Organization. This research paper addresses the practical difficulties in implementing the metrics framework for a services environment in the IT space and an agile solution that is practical and realistic to overcome these difficulties. The implementation of this framework involves innovative techniques towards execution phase. Agile concepts and Quality Management Systems are proven techniques for software development solutions and have yielded great results. This paper looks to extend these concepts towards strategic domains such as metrics and hence Continual Service Improvements in the execution phase.**

Keywords **- Metrics Framework, Continual Service Improvement and Agile Methodology, Scrum implementation**

I. INTRODUCTION

Continual Service Improvement (CSI) is concerned with maintaining value for customers through the continual evaluation and improvement of the quality of services and the overall maturity of the ITSM service lifecycle and underlying processes. CSI combines principles, practices and methods from quality management, Change Management and capability improvement, working to improve each stage in the service lifecycle, as well as the current services, processes, and related activities and technology.

CSI is not a new concept, but for most organizations the concept has not moved beyond the discussion stage. For many organizations, CSI becomes a project or a series of projects that are ill formed into an initiative with a very reactive objective when something has failed and severely impacted the business. When the issue is resolved the concept is promptly forgotten until the next major failure occurs. Discrete time-bound projects are still required, but to be successful CSI must be embedded within the organizational culture and become a routine activity.

All established frameworks and industry best practices call for CSI as an endless journey with an evolving and far stretched objectives tracked by intermediate definitive goals. These goals are measurement driven and need to be ably supported by a robust metrics framework.

Thus a metrics framework forms the backbone of a CSI. A metrics framework is concerned with the process, procedures, tools and templates that integrate to provide the benefits to the organization.

The aim and the objectives of using metrics for CSI are:

1. To align business objectives with IT.
2. To help achieve compliance requirements for business operations.
3. To drive operational excellence of IT services

The ITSM framework professes a seven step metrics based improvement approach for effecting Continual Service Improvements in a Service Management Organization.

The 7-step improvement process shown in Figure 1 covers the steps required to collect meaningful data, analyze this data to identify trends and issues, present the information to management for their prioritization and agreement, and implement improvements. Each step is driven by the strategic, tactical and operational goals defined during Service Strategy and Service Design.

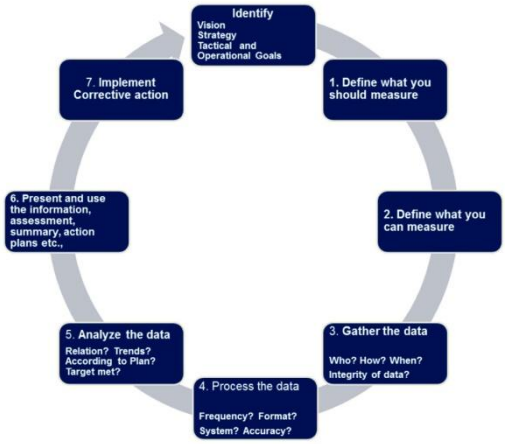

Fig. 1. Seven Steps Continual Service Improvement Process

A] METRICS FRAMEWORK –BUILDING BLOCK FOR CSI

A Metrics Framework plays the critical role of bridging the strategy and concepts of improvements with operational activities. It encapsulates the process, people, tools and techniques that result in seamless reporting and the governance of the metrics to the required stakeholders including the executive leadership that eventually owns and directs Continual Service Improvement in an organization.

A metrics framework is established through three phases:

- Plan – Assessing where we are and planning where we want to go
- Define – Building the infrastructure and the processes to generate metrics
- Implement – Executing the defined metrics model

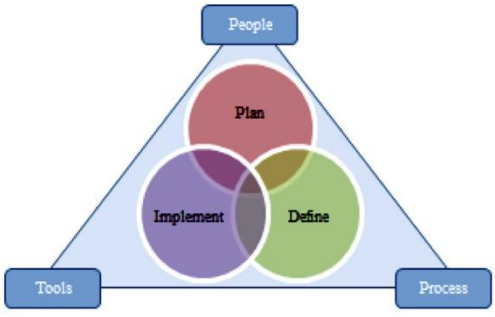

Fig. 2. Metrics Framework

B] GQM – GOAL - QUESTION – METRICS TECHNIQUE

There are several metric design techniques available in the industry to establish a metrics framework. The GQM technique [1] suits the requirements for establishing a metrics framework that implements CSI better.

The Goal Question Metric (GQM) approach is based upon the assumption that for an organization to measure in a purposeful way it must first specify the goals for itself and its projects, then it must trace those goals to the data that are intended to define those goals operationally, and finally provide a framework for interpreting the data with respect to the stated goals. Thus it is important to make clear, at least in general terms, what informational needs the organization has, that can be quantified whenever possible, and can be analyzed to whether or not the goals are achieved.

The resulting measurement model has the following three levels:

a] Conceptual level (GOAL): A goal is defined for an object, for a variety of reasons, with respect to various models of quality, from various points of view, relative to a particular environment. Objects of measurement are

- Products: Artifacts, deliverables and documents that are produced during the system life cycle; e.g., specifications, designs, programs, test suites.
- Processes: Software related activities normally associated with time; e.g., specifying, designing, testing, interviewing.
- Resources: Items used by processes in order to produce their outputs; e.g., personnel, hardware, software, office space.

b] Operational level (QUESTION): A set of questions is used to characterize the way the assessment/ achievement of a specific goal is going to be performed based on some characterizing model. Questions try to characterize the object of measurement (product, process, resource) with respect to a selected quality issue and to determine its quality from the selected viewpoint.

c] Quantitative level (METRIC): A set of data is associated with every question in order to answer it in a quantitative way. The data can be

- Objective: If they depend only on the object that is being measured and not on the viewpoint from which they are taken; e.g., number of versions of a document, staff hours spent on a task, size of a program.
- Subjective: If they depend on both the object that is being measured and the viewpoint from which they are taken; e.g., readability of a text, level of user satisfaction.

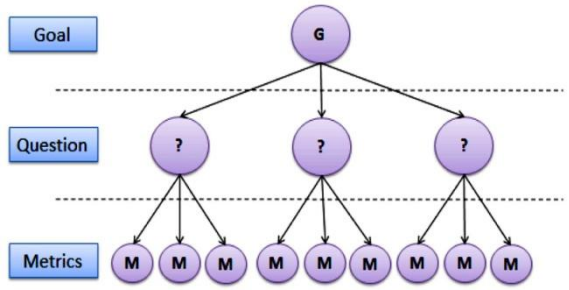

Fig. 3. Goal Question Metrics Model – A Hierarchal Structure

A GQM model is a hierarchical structure (Fig. 3.) starting with a goal (specifying purpose of measurement, object to be measured, issue to be measured, and viewpoint from which the measure is taken). The goal is refined into several questions, which usually break down the issue into its major components. Each question is then refined into metrics. The same metric can be used in order to answer different questions under the same goal.

C] THE CHALLENGES IN SETTING UP A METRICS FRAMEWORK FOR CSI

An IT Service Management organization needs to be transformational in nature to support its demanding business. The executives are always in need of the right combination of the key performance indicators that track the operational effectiveness as well as those that support identification of areas for marked improvements and changes needed to seamless align with the changing business needs.

An IT Production management is a dynamic system where the IT organization needs to be constantly in touch with the business executives to support their daily affairs as well as align themselves towards the business strategic goals that are likely to be introduced as new changes. Additional criticality is added when the applications that they support are end user facing where the "quickness" of the resolution is given highest priority and every minute lost in resolving issues equates to opportunities or business lost.

Conceptually, a metrics framework that can support the operational effectiveness while quickly adapting and aligning to the changing business requirements is the need of the day.

A metrics framework by itself is a cyclic process where the results of the operational outcome loop back as inputs into the strategic planning process that designs more robust metrics aligning with the strategic direction of the business. The dashboard of key performance indicators need to dynamically evolve where the executives get to "see" the measurement results more than once before they can agree on the effectiveness of the suggested Key Performance Indicators. In effect, the dashboard of Key Performance Indicators needs to be constantly re-base-lined before the executives agree that the recommended metrics deliver value and that the Key Performance Indicators are indeed indicating improvements and can be used for decision making.

This inherent agility in the measurement goals and the ever increasing need to engage executives in the metrics process poses serious challenges in designing key performance indicators and dashboards using the traditional software development techniques for a service management environment.

This in turn impacts the ability of service management organizations to exhibit Continual Service Improvement and align their services to the needs of the business

D] A PRAGMATIC SOLUTION FOR DESIGNING THE METRICS FRAMEWORK

Agile is a widely accepted method of software development in the present era of Information Technology. Agile way of software development thrives on incremental, iterative working pattern which is widely referred to as sprints. This very aspect of Agile, particularly, the Scrum technique bodes well with the requirements for an incremental development technique to establish the metrics framework for CSI. CSI involves a lot of dynamism and Agile embraces incremental environment that provides this dynamism.

Also, the agile paradigm of engaging business throughout the initiative, not as a customer but as an active partner is designing solutions serves as a perfect fit to design the metrics framework for CSI

E] SCRUM AS AN STRATEGIC DESIGN SOLUTION FOR METRICS FRAMEWORK

Scrum is one of the most popular agile development techniques that involve cross-functional teams to work in collaboration to develop the desired end product in an incremental and iterative fashion. The iterations in Scrum termed as Sprints.

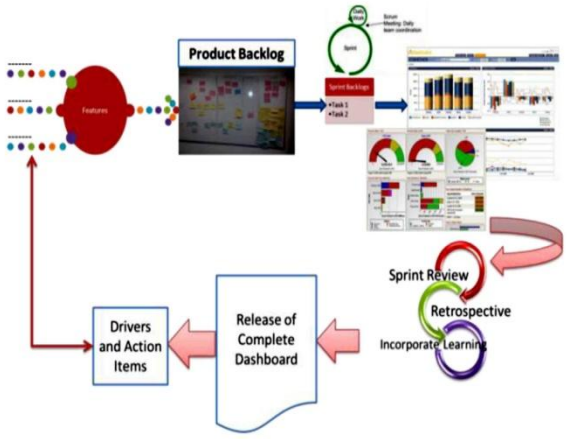

Fig. 4 Scrum Reference Model Level 1

The Scrum Lingo:

- Scrum Team - includes Product Owner (here Project Manager), Scrum Master and Project team.
- Product Backlog – Customer centric features. In the case considered product backlog is prioritized list of customer requirements.

Following are the product backlog criteria:

- Briefed appropriately
- Estimated
- Modifiable
- Prioritized

- Sprint Backlog – Pending work item of a particular sprint.

Typical Scrum Checkpoints

- Foremost Agenda – Role delegation: Project Manager, Scrum Master and project team
- Sprint duration – The assigned team convenes to estimate on the sprint duration based on the total Man-days effort
- Product backlog Categorization based on the identified requirement.
- Product Backlog prioritization: Requirements need to be collected well in advance to the project Execution.
- Daily Scrum
  - ✓ Meeting time need to be finalized - should mandatorily occur only for 15 min
  - ✓ Check on product backlog and sprint backlog
  - ✓ Agenda
    - What did you do yesterday?
    - What will you do today?
    - Are there any impediments in your way?
- Retrospective meeting should happen at the end of the Sprint +1day

F] ADAPTING SCRUM SOFTWARE DEVELOPMENT METHODOLOGY FOR GQM BASED METRICS FRAMEWORK DESIGN

A strategic roadmap that establishes alignment of the metrics framework with the organization's measurement objectives is setup. The roadmap is setup to have intermediate milestones that denote the maturity level of the metrics framework. The maturity of the metrics framework is measured as its ability to closely integrate and support the organization's stated measurement objectives and business needs.

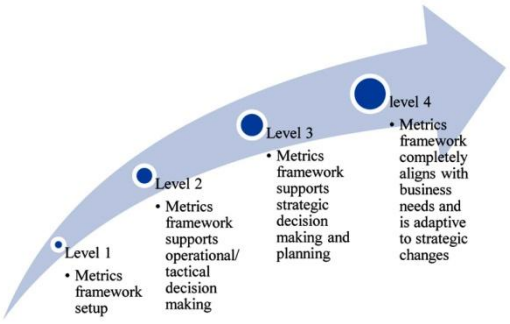

Fig. 5. Metric Framework Maturity Model for CSI

The standard Deming's PDCA cycle [2] is adapted as the Plan – Define – Implement phases as shown in Fig. 2. to continually design and implement the metrics framework that aligns and supports the Service Management organization's Continual Service Improvement. As the metrics framework matures it is able to align with the organization's measurement objectives and able to support the CSI goals.

The metrics framework improvement initiative is executed as a series of projects that continually iterates towards the milestones of the roadmap drafted aligning to the maturity model stated in Fig. 5.

Each iteration of the Plan-Define-Implement is executed as an Agile Scrum project with clearly stated goals and planned number of sprints. The GQM model is used to drive the story boards to identify the measurement objective and the metrics that best supports these objectives. Executive dashboards are then designed with the metrics identified from these story boards and iteratively refined based on inputs from the product owner till the product owner is comfortable that the dashboards can support the organization's decision making towards CSI

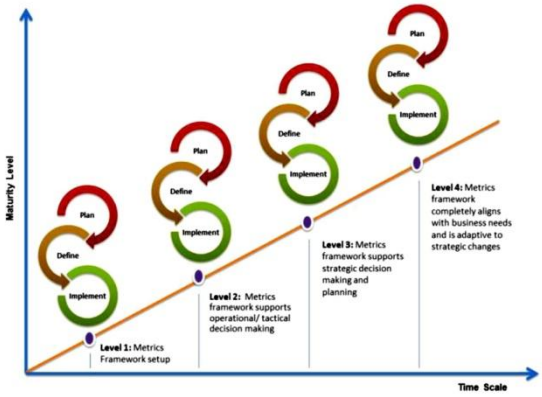

Fig. 6. Scrum driven roadmap for CSI metrics framework

G] THE SCRUM TEAM

A representative from the client organization is identified as the product owner to provide requirements and the features of the metrics framework and the executive dashboard. Care is taken to identify the product owner to have enough rights to make decisions on the metrics dashboard design and possess access to the executive leadership to support any clarifications and inputs needed from the Scrum team.

The consulting organization assumes the role of the Scrum team encompassing the developers, project leads and the scrum master.

TABLE I

TYPICAL SCRUM TEAM FOR CSI METRICS FRAMEWORK DEVELOPMENT - ROLES & RESPONSIBILITES

Role	Key Responsibilities
Product Owner	• Provides features of the dashboard • Provides decisions on metrics framework design and dashboards • Reviews the metrics alignment to the stated measurement objectives
Scrum Master	• Ensures that the process is followed, including invitations to daily scrums, sprint review and sprint planning. • Facilitates the daily scrum , creativity and empowerment for the project team • Communicate the project progress, challenges, success to all stakeholders including the team itself on a recurrent basis.
Project Lead	• Manages the project • Accountable for maintaining alignment of the project with the roadmap • Provides regular project status to management
Project Team	• Accountable for their individual Sprint commitment and participation • Demonstrates Sprint deliverables to the product owner

H] DELIVERABLES

The Table II summarizes the typical key deliverables from the Scrum project. The deliverables listed below are the deliverables in additional to the typical Scrum project deliverables such as backlogs and metrics.

TABLE II

KEY DELIVERABLES FOR CSI METRICS FRAMEWORK DEVELOPMENT

Phase	Key Deliverables
Plan	• Measurement objective story boards • Metrics aligning to the objectives • Dashboard design
Define	• • Dashboard • Metrics data • Measurement Operational procedures
Implement	• Dashboard • Executive reports

Sample metrics from the execution of the Scrum project is provided for reference

TABLE III

SAMPLE STATISTICS OF A SCRUM AGILE PROJECT FOR METRICS FRAMEWORK

Executive dashboard illustrating Operational & Service Delivery Metrics	
Item	**Description**
Number of Story Boards	50 story boards
Number of sprints	25 sprints
Velocity	5 completed story boards per week

I] BENEFITS FROM THE AGILE APPROACH

The Agile Scrum approach for designing the metrics framework scores over the traditional development approach in the following aspects

- The requirements for dashboards are usually very fluid and many a times the executives are able to provide their feedbacks only after "seeing" the dashboards. Scrum development is both progressive and iterative and supports feature based requirements gathering
- The business need to be engaged throughout as against the traditional techniques where the business engagement peaks only in the beginning and the end stages of the development. Scrum development looks at the business as an active participant of the project and ensures active engagement throughout the project cycle
- Being strategic in nature, the initiative is bound with uncertainties in terms of timelines, scope and direction. This calls for an agile technique to navigate the project and Scrum is a perfect answer for these uncertainties

II. CONCLUSION

Agile techniques have moved a long way from being a technical solution specific development methodology. As teams get innovative they are applying agile concepts for strategic initiatives where uncertainties are abundant. This approach discussed above is one of such initiatives to apply agile techniques into the strategic space of metrics framework design.

Agile techniques can be extended much beyond the Implement phase where metrics reports are designed. The plan phase which is very critical in deriving roadmaps for a metrics framework has all the characteristics to implement agile techniques. The project structure of executing the roadmap bodes well to the requirements for an agile driven improvement program.

III. ACKNOWLEDGMENT

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IV. REFERENCES

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