Software Measurement Services Ltd

Painting by numbers: Using visible measures for lean management

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Lean management is about maximising the value delivered to customers by reducing waste and rework. Lean processes cannot be implemented effectively without judicious use of objective measures, visible to the creative and customer-facing staff. The purpose of gathering metrics is to inform decisions – so, to be useful, measures must be visible to those in a position to react to the feedback provided.

Grant Rule, pioneer of the application of Lean techniques to software process improvement, explores what measures can be used to inform decisions and behaviour at all levels; how to go about getting them in place; and how to make sure they are visible - and therefore applied.

"Measure, Assess, Calculate, Compare, and Commit to victory"

(Sun Tzu c.500 BC)

The principles of good generalship, identified by Sun Tzu over two and a half thousand years ago, apply equally to software projects.

- If it matters................. measure it
- If it's worth measuring ... it's worth analysing
- Analysis of variation ...... helps calculate causes
- Comparison of causes ... demands action
- Commitment to action ... requires visibility

So the first essential is to define what ***really*** matters to you and your organisation.

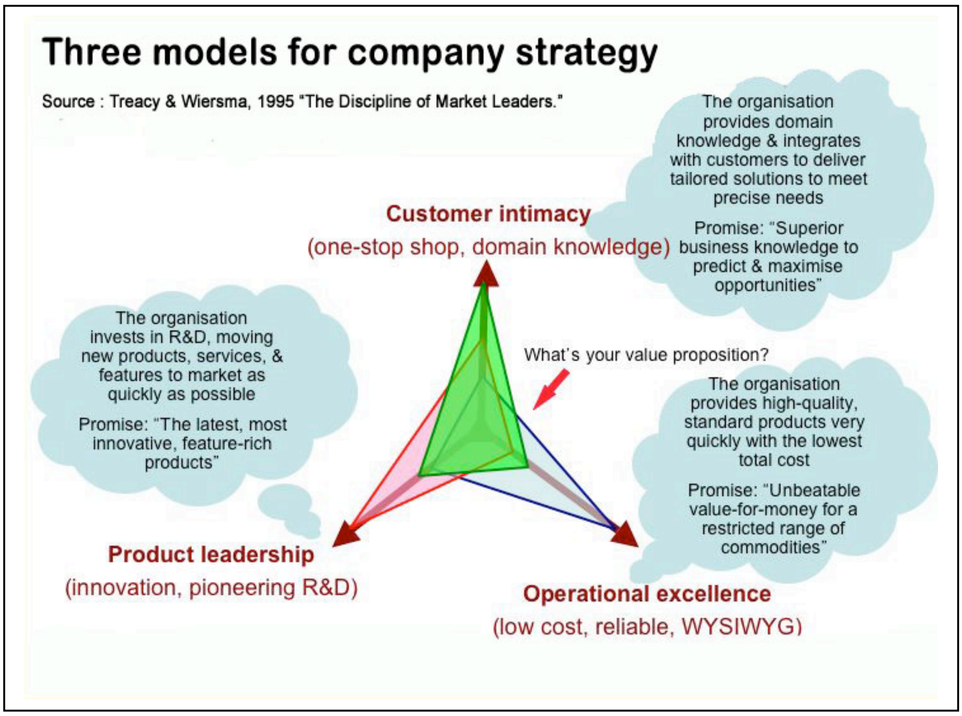
- Executing defined processes, irrespective of the results?
- Delivering more code, and more defects, faster?
- Quick completion of a set of regression tests?
- Keeping a backlog of Change Requests below a threshold?
- Releasing products on time, by reducing the scope?
- None of the above?

The answer to this question is likely to depend on the organisation's corporate strategy. It is useful to analyse this in the terms proposed by Treacy and Wiersma when they analysed the disciplines of market-leading organisations in the early 1990s. Their findings suggested that every market leader has to commit to one primary discipline: **Operational Excellence**; **Product Leadership** or **Customer Intimacy**. Organisations that attempt to excel at all of these three disciplines achieve only mediocre performance and are out-competed everywhere.

Organisations following the Operational Excellence model differentiate themselves from their competitors by providing high-quality, standardised, commodity products or services very quickly at the lowest total cost. Dell and EDS would be good examples of this approach.

An organisation taking the Product Leadership approach would position itself at the forefront of new technology, rapidly researching, developing, and moving to production new products, services, and features. Sony and Apple are excellent examples.

A Customer Intimate organisation promises superior business knowledge to predict and maximise opportunities for its clients. It needs to be able to offer a high level of domain knowledge and to integrate with its customer's processes to deliver tailored solutions to meet precise needs. A customer intimate organisation will work closely with its customers to determine what products and services deliver the optimum value to meet their particular needs. Examples include KPMG and Accenture.



Value is always defined with respect to the customer or end-user. So each of these market-leading strategies is designed to respond to a different type of customer, by delivering the kind of value desired by that customer-type. It is crucial to align the behaviour of managers and staff with the organisation's chosen strategy, to deliver the kind of value expected by the organisation's chosen market.

Aligning staff behaviour requires that the corporate strategy is communicated clearly and unambiguously. The behaviours of creative and customer-facing staff

"Results?! We don't judge ourselves by results!

We judge ourselves on our activities!"

Sir Humphrey, BBC TV's 'Yes, Minister'

naturally will align to managers' interests… i.e. to the things about which managers ask questions.

In the absence of strategic goals, middle-management will optimise local processes, on the understanding that it is upon the efficiency & effectiveness of those local processes that they themselves are judged. This local optimisation often can be at the expense of the end-to-end performance of the overall value stream. Incentive schemes and management structures must be designed to support the organisation's strategic approach, and the products and services valued by its customers. Often, incentive schemes are seen to encourage contradictory, indeed, dysfunctional, behaviour. It is only through alignment of all sub-ordinate objectives and incentives with the strategic business goals and the customers' perception of value, that such dysfunction can be avoided.

Returning to the value proposition to which the IT department is working, it becomes apparent which factors are key to the organisation's success. Priorities should be arrived at by determining which factors contribute value directly and immediately to the business strategy.

How should we measure success?

Sir Humphrey's exclamation - "Results?! We don't judge ourselves by results! We judge ourselves on our activities!" - may make us smile, but his response is based on close observation of reality; and that behaviour hasn't really changed.

Recent news stories reported on a government study which had been analysing the evidence for a given approach over a number of years. The conclusion of this extensive study was that the evidence showed the approach to be costly and ineffective. However, it was perceived as a popular and accepted policy, and the proposed course of action, therefore, was to continue as before, despite the cost and proven lack of effect. The news report quoted the response of the relevant official as: "...but we have to do something".

"Doing one's best is not good enough… one has to achieve that which is necessary".

Winston Churchill

By which we can see that what is **popular** is not necessarily **successful**. "Doing something" is not good enough; "doing the right thing" is what is required to make a difference.

Objective measures of success must be applied to the decision-making process if the decisions made are to be of any value.

Alignment of behaviours and achievements with strategy and goals can be created by defining the organisation's 'True North' direction: a simple, pungent phrase that expresses the critical success factors that characterise the desired outcome.

e.g.
'speed – margin – market share'

e.g.
'accurate budgets – fast on-time delivery – effective standards – quantified capability'

"... it is crucial that managers and staff do not mistake the measures of progress as the desired outcome i.e. as the goal."

An organisation's 'True North' direction takes into account the needs of all stakeholders and exerts a 'pull' toward which everyone in the organisation, whatever their rank or role, can align themselves and their activities. Targets are set as a basis for establishing direction, measuring process performance and evaluating achievement. But it is crucial that managers and staff do not mistake the measures of progress as the desired outcome i.e. as the goal.

Deployment of 'True North' strategy alignment has to start from the top-down and be interpreted in measurable terms, e.g.

- Build in-house capability (reduce staff turnover) = average number of months staff retained increased by 20%
- Quality performance (satisfied users) = predictable, on-time, in-budget delivery of the expected functionality (variations ≤ 5%)
- Quality performance (releases) = zero critical faults in post-release month#1
- Reduce cycle-time = 'demand to deployment' time of ≤ 9 months
- Manage costs = reduce rework by ≥ 20% and increase productivity by ≥ 10%

These top-level strategies can be refined further into 'daughter' strategies for each focus area:-

Strategy	'Daughter strategies'
Build sustainable capability by leveraging proven standards (Human Development)	Review lessons learned at project start All projects tailor & use the defined standards Train independent estimators Employees not contractors
Agree requirements. (Quality Performance)	Joint Application Development Workshops Function Point Analysis Functional Decomposition User Acceptance Tests defined early
Prevent defects. (Quality Performance)	Test-first design Introduce inspections Make defects detected during development visible
Reduce cycle-time (Delivery+Cycle-time)	Reduce 'demand to deployment' time by ≤ 50% Reduce schedule variance to ≤10%
Manage costs (Cost & Productivity)	Reduce budget variance to ≤15% Prioritise projects - select only those with ROI ≥ 1:3 in 2 years Improve productivity by ≥ 10% through increased re-use

To ensure success, the senior management team has to take responsibility for implementing the strategies it has chosen.

It is the responsibility of the senior management team to *implement* the strategies it has chosen. The board should appoint Implementation Managers to deploy the policy and implement the vision; agree targets; keep them visible; and act upon them. The organisation's goals and 'True North' metrics can be mapped to a Lean Balanced Score-Card based on the achievement of cycle-targets within the areas identified as key indicators of success. Typically, the strategy areas will be: Human Development; Quality Performance; Delivery & Cycle Time; Costs & Productivity. Sustainable financial results are dependent on achievements in these dimensions.

In "Competing Against Time: How Time-Based Competition Is Reshaping Global Markets" George Stalk cites research that shows that reducing lead time by 75% enables 2-4x growth compared to the average for an industry. So it makes sense for organisations to adopt a strategy to achieve such a reduction in lead time over two cycles, each of around 12-18 months:-

1st Cycle Goal: "Reduce total lead time by 50%"

2nd Cycle Goal: "Reduce total lead time by half again"

Implementation Managers can use the 'Plan-Do-Check-Adjust' approach to strategy deployment, developing an explicit A3 Plan for each strategy area. An A3 Plan is a storyboard, which uses graphs, illustrations & data to tell the story of what the work is, how it is progressing, and its status. It provides a useful tool for monitoring the work-products needed and the activities required to deliver the strategy. Each Implementation Manager should be accountable for their A3 Plan, coordinating work across functions as necessary

Value Stream Managers are the 'customers' of, and in tension with, the Heads Of Function (i.e. departmental line-managers) and it is up to the CEO to ensure this tension is balanced. Both kinds of manager need their own A3 Plan linked to the organisation's 'True North' strategies so that they can clearly see how their area of responsibility contributes to the overall delivery. However, while each Value Stream Manager's plan will paint the story of how the value stream will deliver value to the organisation's customer(s), the plans managed by the Heads Of Function will illustrate how their function will develop its capabilities, efficiency and effectiveness. All of these plans need to address the following questions:

- What is the system of work - the process?
- How does each process step contribute?
- What value is added for the customer?
- What value is added for the organisation?
- What data must be collected to inform the work?

Critically, organisational success must be seen as a characteristic of the **entire value stream**. The performance of the end-to-end process depends on all the steps (both those that add value and those that don't). Workers must quantify the performance of each process step in terms of its outputs, as well as its inputs, and managers need to track trends over time – i.e. to compare repetitive steps – and pounce on the variations. The managers role is to understand the root causes; to take corrective action; to fix the product; then to fix the system so that errors of known type are not repeated.

...organisational success must be seen as a characteristic of the ***entire value stream****.*

Consider how a chef watches & measures his pots & pans, guests, staff, etc. To do his/her job, the chef constantly enquires:-

- When was the pot put on the stove? - timestamp
- When did the guest arrive? - timestamp
- What ingredients do I need for this dish? - inputs
- How long will this item take? - historic data
- Where shall this guest be seated? - ask preferences
- How should I check readiness to serve? - test it

Detailed measures of progress help achieve the clockwork coordination necessary across all affected groups. Software product development tasks vary in effort & duration, but they can be normalised with respect to the functional size of the required outputs. The project manager should maintain an A3 Plan to track progress against with respect to the objectives: schedule, budget, product-burndown, etc

Conclusion

- Alignment throughout an organisation is critical to avoid dysfunction
- The organisation's 'True North' direction must be explicit and visible
- Senior management set the example by aligning their plans to the 'True North'direction, by using visible A3 Plans, and by tracking & publishing progress
- A balance must be maintained between delivering value to the customer across functions, and building capability and expertise within functions
- Work proceeds as a series of projects within a continuous flow of value … and can be optimised by those involved once they choose to make progress data visible… and to act upon the messages it provides.

Finally - a job worth doing is worth doing well – and worth doing better next time.

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Author Biography

Grant Rule is founder and current Managing Director of Software Measurement Services Ltd. With over 34 years experience in IT, Grant is a recognised authority in using quantitative methods to continuously improve the quality of the software process and its products.

He is in the forefront of applying lean engineering principles to the software improvement process to deliver business value.

Grant worked with Ken Dymond to introduce the Software Engineering Institute's 'Capability Maturity Model' into the UK, and helped bring to Europe the first public 'Introduction to the CMMI®' training. He has contributed to structured methods and to ISO standards, and helped improve the inter-counter consistency of counting practices for IFPUG and Mk II Function Point Analysis. He is a member of the COSMIC core development team.

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Software Measurement Services is a specialist, independent UK consultancy working with decision-makers in blue-chip companies and government departments to improve the results delivered by the development of software and computer systems. Our consultants are at the forefront of developing and supporting best practice in managing software process performance.

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