

Empirical Management Explored

Evidence-Based Management for Software Organizations

Gunther Verheyen

The complexity and the creative nature of software development make it a highly fascinating, yet quite unpredictable business. Scrum employs empiricism, systematic inspection and adaptation, to deal with the unpredictability typical to software development. The empirical process is a much better fit for the work than the traditional, predictive approach.

Empiricism is also a pillar of 'Evidence-Based Management'. Inspired by the proven results in medical practice, managers in product-development organizations are making the shift from predictive management, where plans and predictions prevail, to empirical management, where evidence is used for better decision-making.

Scrum.org, which has Scrum as its DNA and empiricism as a guiding principle, provides guidance for 'Evidence-Based Management' for software organizations.

Scrum Employs Empiricism

A disciplined implementation of Scrum is a gateway to unlock business opportunities given today's fast changing markets and fierce competition.

In empiricism, experience is seen as the primary -if not only- source of knowledge. In a context of high unpredictability and considerable change, information and insights gained from having actually performed some work are infinitely more valuable than any upfront theory, assumption or prediction. In the absence of observable work, all preliminary information is to be considered a *hypothesis*, not knowledge or evidence. Without knowledge no informed decision about the future can be made. Knowledge is gained when an actual working result can be compared against a stated hypothesis and the observers capitalize on the findings that emerge from the comparison.

Repeated cycles of (1) stating a hypothesis, (2) working on the hypothesis for a limited time and (3) subsequent verification on the doing is

a highly dynamic and safe way to gather evidence of what does and does not work. It enables learning and improving while effectively making progress.

Scrum has the principles and rules that help ingrain this incremental way of working in an environment of software development. Scrum builds on this cyclic view on time that is very different from the traditional lengthy phases and black-box stages.

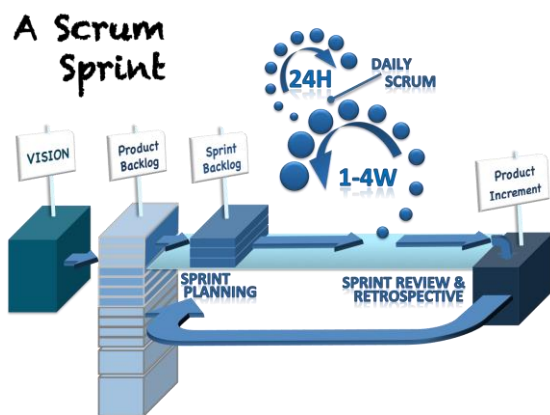
In Scrum all work is organized in time-boxed iterations, called 'Sprints':

- The first activity of every Sprint, called 'Sprint Planning', serves to state a hypothesis, made up of a forecast of work for achieving a business objective, the 'Sprint Goal'.
- At the end of every Sprint an actual working result, called an 'Increment' (of product), is weighed against expectations, objectives and changed circumstances. Time-boxing a Sprint limits the risk of needlessly accumulating unidentified variations in the outcome. It takes away the usual blindfold for reality, yet still allows focus for the people doing the work. Within the Sprint all attention



goes to working on the hypothesis, although the actual implementation is open for evolutions through daily optimizations against the Sprint Goal.

- To assure that the reality check at the end of the Sprint (a 'Sprint Review' event), results in reliable findings and learning, Scrum requires the delivery of a "Done" Increment. This means that each Increment should have the qualities of releasable software to be fit as reliable evidence; no unknown work that is still to be performed some time for the product should remain hidden. *Undone work is a major unknown variable that strongly degrades the value of the evidence.*



Every Sprint is a 'project', an investment in a workable and observable outcome, leaving the option to change course and direction. The Sprint length, 1-4 weeks, determines the frequency of the appraisal of the evidence, and the resulting learning and adaptation.

A rigorous implementation of Scrum as software development process may seem difficult, but provides a great foundation for Agility, the flexibility to respond to any type of change while still producing workable results. A disciplined implementation of Scrum keeps an organization continuously in sync with reality, even when discontinuity and flux are the only constants.

A Matter of Managerial Culture

Evidence-based decisions are of higher quality, save lives and lead to a more sustainable business with higher chances of survival in turbulent markets and businesses.

The roots of the evidence-based school of

thinking lie in medical practice, known as 'Evidence-Based Medicine'. This thinking has in the meantime also taken root in social care, criminal justice and education. In medical practice it was found that patient health and even patient lives were needlessly at stake due to a lack of systematic sharing and use of existing research and data by and for medical practitioners. Before that, decisions were typically based on conventional wisdom, experts' assumptions, theoretical studies, laboratory-only experiments and personal beliefs. This resulted in suboptimal care and inexplicable variations in the outcome of provided services. The effectiveness of treatments was under-considered or not considered at all, as a cause-effect relationship could not be substantiated or validated against comparable cases.

An important new form of evidence for the medical practice was created when real patients needing real treatment started receiving such treatment. This happened in a strictly controlled way with a lot of attention to human values and ethical concerns. The results were documented, reviewed and shared, and proved to be a much more sound base for medical decisions. It led to better decisions, to a better uptake on the effectiveness of practices and treatments, and -in the end- to saving lives.

SYSTEMATIC USE OF EVIDENCE OUTPERFORMS EXPERT-ONLY JUDGMENTS.

Decision-making in medical practice improved much through the continuing integration of best evidence with practical experience.

This is no different in other knowledge-intensive domains and complex activities, where knowledge and information might be crucial and a competitive advantage.

Scrum adoption can be considered a great litmus test for the existence of such a managerial culture.

In a culture of plan-driven, command and control management, where nobody moves until all is completely known and planned, after which the plan is blindly executed, the benefits gained from Scrum are real, but limited. If the plan has priority over the changing reality, and Scrum is only used to

iteratively deliver according to a preset plan, the gains in terms of business opportunities are limited.

Scrum thrives best in an environment where well-considered experimental discovery is combined with fact-based decisions. Scrum thrives best in an organizational culture characterized by the courage to act in the moment, to change direction as needed, supported by knowledge and evidence reflecting reality, no matter what that reality or the hard truth is. Scrum thrives best in a culture that values knowledge from actual experience more than a predictive plan and self-generated or imaginary 'facts'.

Empowering the Scrum process fully might be an indication that management understands that time-boxed efforts deliver more valuable information regarding what has or has not worked, why that happened, how expectations may have changed, than any prediction is able to. Such managers might embrace the possibility to act and decide upon proven results, evidence, and actual facts. In return for preferring this to an over-predictive approach they get a high level of flexibility, while risks are controlled from having releasable work, every 30 days or less. Such managers, maybe unknowingly, have taken on evidence-based management.

'Evidence-Based Management' is the variant of the evidence-based paradigm, where evidence is considered the best-suited base for informed decisions, in the managerial domain. Evidence-Based Management aligns greatly with the empirical foundations of Scrum, but does not in itself require Scrum. It covers the principles of the overall *managerial culture* within an organization, not its choice for a specific product development process.

Even in organizations depending on software, the actual product development is only one organizational area where evidence-based decisions are a better fit. Using Scrum for product development, with its "Done" Increments at the end of every Sprint, is obviously a great way to draw learning from providing real 'patients' with a real 'treatment'. The knowledge gained from such 'treatment' is irrefutably high.

However, managerial decisions informed by the best available evidence matched with practical experience and appraisal of context, ethics and human values plainly works better.

IN ALL DOMAINS OF AN ORGANIZATION.

Evidence-Based Management

Evidence helps managers instill patience, move away from firefighting, achieve company objectives and avoid fads.

Management sets company goals and provides and promotes organizational practices, strategies and tactics to best achieve these goals. Their decisions impact the internal organization, users and customers, and -indirectly- an organization's market position. Career opportunities, internal and external satisfaction over the organization and its services, revenues, promotions, incentives, employees' incomes and their well-being are all subject to the effectiveness of managerial decisions.

Evidence-Based Management improves the quality of managerial decision-making through the integration of current best evidence with practical experience and human values. The gathering, appraisal and application of evidence permit to better forecast the likelihood of business success and of achieving company goals. It permits organizational optimizations through the on-going discovery of better practices and the removal of dysfunctional practices.

Evidence is more reliable than dreams, hopes, and fears. Evidence helps managers justify decisions about how to organize, structure, invest in and deliver services. Feedback loops offering updated evidence help managers redesign organizational practices to better suit changing needs and circumstances. Evidence increases the legitimacy of decisions in the organization and the value a manager represents for the organization.

Evidence-Based Management requires managing knowledge, decision support systems, and artifacts to hold verifiable information.

The possible sources of 'evidence' are diverse:

- **Internal:** organizational data, metrics, internal research, reviews, surveys, measured effectiveness of processes and procedures. *Internal evidence requires an unbiased, scientific approach to gather it.*
- **External:** books, public research, studies, documented practices, experiments, benchmarks and industry comparison. *External evidence needs appraisal to the organization's specific context and values.*

Evidence in the managerial domain primarily serves to support or to reject a managerial hypothesis, an assertion that certain organizational practices are beneficial to the organization, and that other practices hinder or limit the organization.

The strength of evidence stretches between 2 extremities:

- **Direct evidence**, or primary evidence, is the strongest type of evidence. It contains direct, clear and indisputable proof or contradiction of the truth or validity of an assertion.
- **Circumstantial evidence**, or secondary, supportive evidence is much weaker. It might show consistency with an expected result but does not necessarily rule out other, possibly contradictory assertions. Circumstantial evidence might point to alternative explanations.

Evidence is created and accumulated through observations in *controlled* conditions. It takes a consistent, principal and structured approach. Evidence-based thinking must be embedded in an organization's culture, and creates additional expectations for a manager.

In general a manager is primarily expected to be pragmatic and action-oriented, even in times of high stress. This leaves little room, and does not incentivize, a more reflective approach. An evidence-based manager will integrate such pragmatism with evidence to take decisions. An evidence-based manager observes and verifies the outcomes of delivered work against assumed results to adapt and improve managerial decisions.

Evidence-Based Management does not inhibit a manager from using experience and

intuition; it rather *frames* it, provides structure for otherwise seemingly arbitrary decisions and gut-feel opinions. Evidence-Based Management values and rewards validated learning. An evidence-based manager has skin in the game, takes responsibility over taken decisions, but limits the risks with a cyclic approach in which evidence is regularly revisited and updated, so decisions can be revised.

Evidence-Based Management embraces an empirical approach to managing, and has the same grounds as 'empirical management'.

Evidence-Based Management Applied

Evidence-based managers of software organizations use evidence about the value the organization actually delivers, and its ability to deliver value and to innovate.

It takes rigor and persistence to consistently collect, appraise and apply evidence in the management practice and reap the benefits. A structure, a framework, and decisions on evidence help grow an evidence-based culture with its systematic reflections embedded.

There is no widely spread and accepted external evidence on the effectiveness of organizational practices in software organizations. Each organization picking up on Evidence-Based Management identifies the right **internal evidence**, at home, from the inside of the organization. Upon such evidence, informed management decisions are possible about the addition, revision and removal of organizational practices that will influence the organization's success, survival and prosperity.

Evidence is captured at an organizational, departmental or product level. Evidence in software organizations is often and wrongly collected at individual team level; via productivity, burn-down charts, velocity or similar derivatives, and other team parameters that are no direct evidence of value of the delivered services of the organization.

For an organization depending on software products to deliver services to the market,

survival and success highly depends on the delivered value.

The total organizational value is captured through metrics in 3 areas:

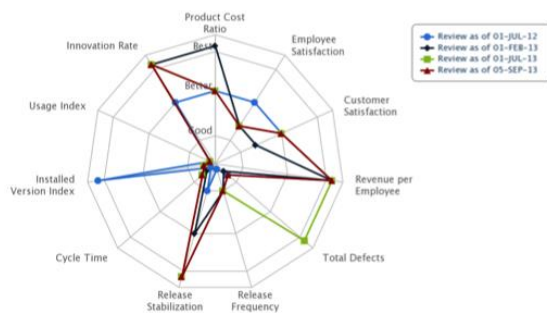
- Current Value.
- Time to market.
- Ability to innovate.



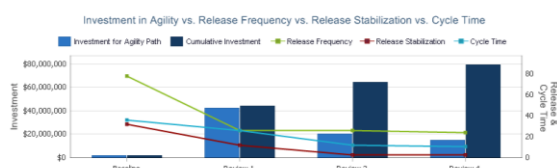
These metrics make out **primary, direct evidence**.

Human decision makers can only process a limited amount of information at any point in time. There is no need for hundreds of metrics or 'Key Performance Indicators'. A limited, but cohesive set of numbers suffices.

The metrics should not only be seen as individual data points but also be represented as holistic sets.



Trends and patterns should be observed, not only for the individual data but also for the cohesive sets.



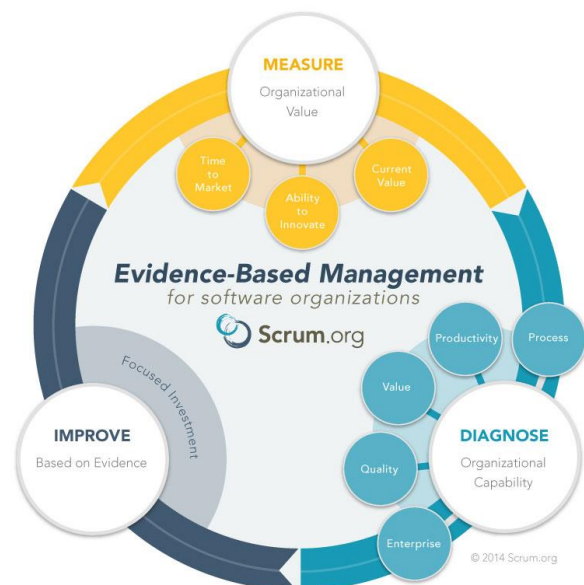
The metrics are consolidated in an overall indicator of organizational value, called the 'Agility index™', a speed indicator of an organization's current and future ability to deliver value.

An organization's outcome, over which direct evidence is gathered, is impacted by managerial decisions and the application of organizational practices. The adoption and use of practices across all teams is **circumstantial, supportive evidence**. It is assembled by appraising the application of practices in 5 organization-wide domains: "Process", "Productivity", "Value", "Quality" and "Enterprise".

The overall adoption of practices should ultimately have a positive impact on the outcome, and be reflected in the direct evidence. The relationship between practices and metrics however is not one-on-one.

Assumptions on improving the delivery of value lead to decisions on addition, improvement or removal of organizational practices. The direct evidence is monitored to validate the assumptions, knowing it often takes time before practices get hold.

All knowledge is imperfect and incomplete. In a context of high unpredictability and considerable change, Evidence-Based Management works better with active learning in short cycles. All evidence needs to be updated and checked regularly against the assumptions for improved adaptability.



Our Scrum.org mission is “improving the profession of software development”.

Evidence-Based Management adds to this mission in promoting wise leadership, respecting human science and adding evidence to intuition. Managers can stop managing the same, arbitrary way that they have been educated and managed. Evidence helps them maximize the value of software to the organization and improve the workplace.

Our DNA is Scrum. Where Scrum employs empiricism in product development, Evidence-Based Management embraces empiricism in the managerial practice. The foundation is the same, the potential of improving the profession of software development is unmatched by any other combination.

About Gunther Verheyen



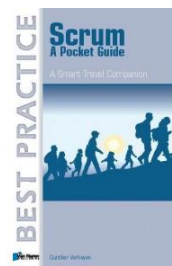
Gunther Verheyen (gunther.verheyen@scrum.org) has been in IT and software development since he graduated in 1992. His Agile journey started with eXtreme Programming and Scrum in 2003. Years of dedication followed, working with several teams and organizations using Scrum in varying circumstances. Building on the experience gained over these years, Gunther became the driving force behind some large-scale enterprise transformations.

Gunther partners with Ken Schwaber, Scrum co-creator, at Scrum.org. He is Professional Scrum trainer and directs the 'Professional Scrum' series of Scrum.org. He shepherds classes, trainers, courseware and assessments for PSD, PSM, PSF, and PSPO. He co-created the framework for Evidence-Based Management of Scrum.org.

In 2013 Gunther published a 'smart travel companion' to Scrum, the highly appraised book "Scrum – A Pocket Guide."

Gunther lives in Antwerp (Belgium) with his wife and their 3 children.

Find Gunther on Twitter as @ullizee.



About Scrum.org



The mission of Scrum.org is to improve the profession of software development. Scrum.org leads the evolution and maturity of Scrum by providing tools and resources for Scrum practitioners worldwide to maximize value using Scrum.

Scrum.org hosts the Scrum Guide, the acknowledged body of knowledge maintained by Scrum co-creators Jeff Sutherland and Ken Schwaber, in 30 languages. Scrum.org provides Scrum assessments for people to evaluate and improve their knowledge. Community forums and webcasts are hosted to foster discussion and knowledge sharing. Industry-leading Scrum trainings are defined for practitioners with different needs.

With its tangible Evidence-Based Management framework, Scrum.org helps organizations in applying the embedded managerial principles to increase the value of their software to the organization.

Scrum.org was founded in 2009 by Ken Schwaber, co-creator of Scrum, out of extreme dissatisfaction with the state of the art of software development.

Scrum.org is based in Boston, Massachusetts (USA).