Taking Innovation to Scorecard: A Czech Perspective in the Area of IT and Software Development

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Practical application of what should work in theory, and can be expected to work in practice, in Red Hat, Brno, Czech Republic: what has happened so far…

First there was the concept of what is generally known as Balanced Scorecard. Over the years, a new theory emerged that took the original concept to new levels: Innovation Scorecard. Its main focus was on innovation which also formed part of change management, and its strength lay in being a performance measurement and management control framework that had been developed to cope with 'all

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things innovation'. It appears that the two concepts of Balanced Scorecard and innovation fit together well for a number of reasons. Balanced Scorecard, on its own, is considered useful in areas where, for example, measured returns on innovation investment are not aligned with company strategy, where it is difficult to deploy appropriate financial indicators
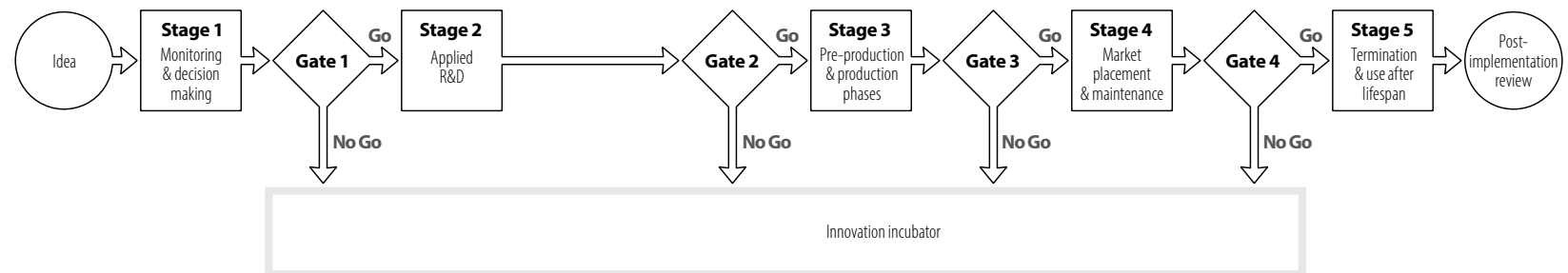
and where there is a lack of definition of strategy as far as the planning of innovation is concerned. Combining Balanced Scorecard with innovation brings distinct advantages that enable companies to cope with and manage better the accelerated scale of changes that have taken place recently across industries (Li and Dalton, 2003). According to Žižlavský (2016), the rate of growth in the size and scope

of R&D departments has been spectacular and rapid, to the extent that problems of visibility are being generated. Managers feel that the basic decisions that were taken relatively easily years ago have now become extraordinarily difficult. In addition, Li and Dalton (2003) suggest that a lack of visibility from the top down develops serious problems that emerge from the bottom up. It is very difficult for people who work at operational level to have a thorough understanding of the strategic vision of the company they work for.

In this context, it should be noted that the Czech business environment is idiosyncratic due to its prevailing cultural differences in terms of its modus operandi (Žižlavský, 2016). The developed Innovation Scorecard, specifically designed for this unique working environment, is based on 'the needs led' considerations by Kaplan and Norton (1996), the 'audit led' procedures considered by Dixon et al. (1990) and the 'consultant or facilitator led' approach suggested by Niven (2014). It is based on a Balanced Scorecard approach where balance is considered to be the equilibrium between operative and strategic (short-term and long-term) goals, required inputs and outputs, internal and external performance factors and lagging/leading indicators. This includes financial and non-financial performance indicators. Each measurement is an inherent part of a chain of 'cause and effect' links. According to Žižlavský (2016), most medium and large Czech companies, monitor

performance of innovative activities by using specific financial and non-financial measures, but without any logical link between them. It appears that only few companies, especially large ones, and those having different perspectives, actually understand the importance of the cause-effect relationship between metrics, within this context. As a result, innovation evaluation proved to be most appropriate in favour of applying financial performance indicators.

The bringing together of the concepts of innovation and Balanced Scorecard all started with the outcomes of a primary research project that was supported by the Czech Scientific Foundation during 2013 – 2015. One of the main objectives of this research was to establish if organisations in the Czech Republic were actually measuring how effective and efficient innovations were. In addition, there was a desire to confirm what performance metrics were used, how these were applied and how effective these were. The outcome of this research confirmed that those companies who managed innovation effectively, were also obtaining valid and reliable innovation performance data, including evidence of the realised benefits arising from the application and management of innovation. When applied appropriately and in accordance with existing company strategy, marketing drives and HR/corporate policies, processes and procedures, innovation metrics provide managers and employees with opportunities to 'plan, organize, monitor and control'

Fig. 1: Applied Innovation Scorecard Process (Žižlavský, 2016).

all innovation activities for the benefit of the organization they work for.

Taking into account the key concepts of the afore-mentioned Balanced Scorecard, the next logical step was to implement the developed concept of Innovation Scorecard in practice in order to verify its suitability and functionality. This initiative resulted in the current project called "Innovation Scorecard: A Management Control Framework for an Innovation Project within the IT/Software Development industry", supported by the Technology Agency of the Czech Republic. The duration of the project is 3 years during which best current practices in the IT/Software Development industry will be identified. Several associated theories and practice based case studies will be designed, tested, developed and rolled out in a live working environment.

Putting theory into practice in a fast-moving software development competitive environment in the Czech Republic proved to be a real challenge that was worth following up on. To overcome the usual scepticism and suspicion associated with the introduction of changes how people work and perform at work, our team took the conscious decision to be authentic and genuine right from the word 'go' with all involved parties. Collaboration and consultation were key approaches. Some pushes from our side were necessary to instil in key stakeholders the value of deploying an innovation scorecard system within Red Hat Czech s. r. o. This organisation is a research and development subsidiary of Red Hat, settled in Brno. It was formed in 2006 and has around 1 200 employees. It is a private limited company that operates in the software industry. The parent company, Red Hat, founded in 1993 and headquartered in Raleigh, North Carolina, chose to set up this subsidiary in the Czech Republic in favour of other locations due to the Czech Republic's position to increase the awareness and improve the perception of open-source software advocacy. The application of our suggested Innovation Scorecard process (Fig. 1) is not limited to IT or software development projects or initiatives. Subject to taking prevailing local cultural differences into account and modifying the process 'as required', it is considered fit for purpose for use across the industries project managers operate within.

"Control is not a sign of distrust but wisdom. Collaborating with Red Hat but not imposing…"

We considered that Red Hat was an ideal candidate for our project. They appeared to have a high innovation potential considered a suitable characteristic of the company's existing innovation environment (create, develop and implement something new). It is an essential feature that includes change, development, learning, flexibility, adaptiveness and creativity. Now it was up to us to focus our attention on doing rather than talking to ensure that Red Hat achieved maximum return on their innovation scorecard investment. We had to make sure that a high performing innovator like Red Hat allowed us to apply the usual project management skills: plan, organise, monitor and control the full cycle of our innovation scorecard process. Not an easy task when you work in an Agile/SCRUM sprint-based work environment where doing is of paramount importance and planning appears to be taking a secondary position!

We developed two smaller sub-projects deemed most appropriate for the start of this initiative: Atomic Host (completed in 2019) and Continuous Integration (completion in 2020), details to follow. Our aim was to keep the change momentum going so that Red Hat could ultimately implement and maintain some leading-edge innovative work approaches over a longer period of time once the initial innovation projects had been completed. The main and overall Innovation Scorecard project commenced at the beginning of 2019 and will finish by the end of 2021.

The main considered objectives for the Innovation Scorecard project were:
1. Increase profitability through the overall value of innovation from a market and product perspective
2. Maximise the Return on Investment (ROI)
3. Achieve higher staff productivity levels through business change including improved organisational alignment and modus operandi
4. Improved streamlining of software development processes through the roll-out of an Innovation Scorecard System across a number of associated projects such as Atomic Host and Continuous Integration

	Round 1 RHEL Atomic Host version 7.6.2	**Round 2** RHEL Atomic Host version 7.6.3	**Round 3** RHEL Atomic Host version 7.6.4
Early build	January 8th 2019	February 19th 2019	April 2nd 2019
Final build	January 22nd 2019	March 4th 2019	April 16th 2019

Table 1: Time Schedule of Container Rebuild Innovation Process.

5. Improve timely internal and external communications

"What is Atomic Host and what did we actually achieve?"

Red Hat Enterprise Linux Atomic Host is a secure, lightweight, and minimal-footprint operating system optimised to run Linux containers. A member of the Red Hat Enterprise Linux family, Red Hat Enterprise Linux (RHEL) Atomic Host couples the flexible, modular capabilities of Linux containers with the reliability and security of RHEL in a reduced footprint, to decrease the attack surface and provide only the packages needed to power hardware and run containers.

With this offering, Red Hat combines:
- An enterprise-class container-specific host
- New container capabilities in the world's leading enterprise Linux platform
- A certified program for containerized applications

"Ondřej and Eddie comment: 'You have to take this approach in change initiatives sometimes in order to gain sustained and committed support in the long run!'"

This project's main focus was on resolving container build issues and their potential solutions. It delivered, amongst other things, an automation solution within an existing container-build process and served as a pilot implementation for our innovation scorecard project. We applied a lot of common sense rather than stick to our process rigorously. **Ondřej and Eddie comment: "You have to take this approach in change initiatives sometimes in order to gain sustained and committed support in the long run!"** Plenty
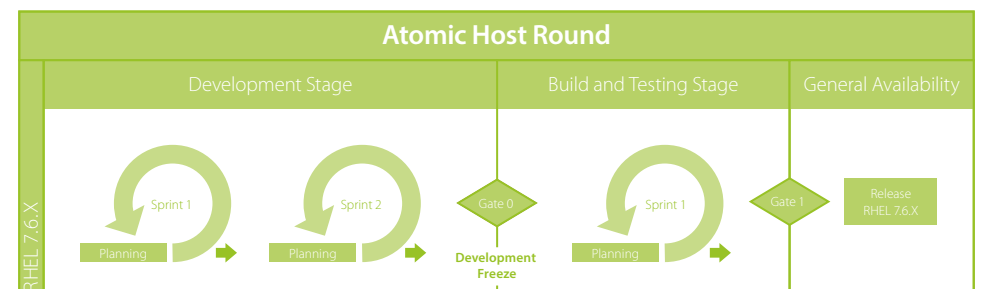
Fig. 2 Innovation Scorecard in Agile.

of knowledge and practical experience was applied during this process to improve future implementation of the associated projects. The defined project goals and associated critical success factors (CSF) were:

- Goal 1 Introduce an Innovation Scorecard System for Atomic Host: Container Build Process
  - CSF1 Produce high level project documents
- Goal 2 Container Automation Build Process
  - CSF1 Develop/buy automation tool and implement it
  - CSF2 Improve modus operandi
  - CSF3 Improve Design and Container Build process reporting to improve communication flow
  - CSF4 Effective Dependency Management during Container Build Process

The implementation of the automation tool was planned to be completed in three rounds. The early build in Round 1 was going to be done manually in order to ensure that, overall, the RHEL Atomic Process would not be interrupted. The final build was completed non-manually (automatically). Red Hat suggested to build containers in upcoming rounds using an automation tool and in accordance with metrics developed by the Innovation Scorecard team. Automation was subsequently achieved by Round 3 (Table 1).

Following the establishment of the Atomic Host project's goals and CSFs we designed a metric solution as an information support for decision making. It was necessary to modify the Innovation Scorecard system and approach to make it fit for the intended purpose and use within an Agile Software Development work environment (Fig. 2).

Within three rounds of the Atomic Host project the Innovation Scorecard was designed, implemented and has been verified that it works in practice. Its viability and reliability have been established. We achieved the following benefits as a direct result of the inaugural implementation of the Innovation Scorecard within the first project, using appropriate simple metrics to measure our claimed success:
1. Improved communications leading to improved development and build of innovative products and services

2. Container build process reduced by 13 hours, opening up new opportunities to reassign resources to other areas of the business without affecting Container Build work
3. Significant reduction in duplication of errors and reworks
4. Innovation Scorecard aligned with existing Agile Methodology without disrupting 'business as usual'

"So what comes next? We don't hang about… the second innovation scorecard project has already started…"

Continuous Integration is the next project that forms part of our innovation scorecard roll--out project and has just started. Continuous Integration is a practice used within IT and software development. Developers integrate codes into a shared repository frequently, preferably several times a day. Each integration can then be verified through automated

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build and test processes. Automated testing is applied regularly in Red Hat. One of the key benefits of integrating regularly is that it is possible to detect errors quickly and locate these more easily. As each change introduced is typically small, pinpointing the specific change that introduced a defect can be done quickly and efficiently. Developers who work on code modification, do not get distracted. When integration is combined with testing,

continuous integration can enable codes to become dependable. It is anticipated that the implementation of the Innovation Scorecard will contribute to improving the efficiency, economies of scale (operational level) and the ultimate competitiveness of organisations such as Red Hat.

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Part of his active research consists of studying the innovation process in a company and its performance measurement. He combines financial and non-financial metrics to set up complex innovative performance measurement systems for Czech businesses. A second area of Ondřej's work studies innovative potential and its development. His work has been published in three monographs, in a number of scientific peer-reviewed journals indexed in Thomson Reuters, Scopus, etc., and book chapters.
Ondřej's interest in above mentioned areas has resulted in original management control framework called Innovation Scorecard (www.iScorecard.org).

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