

HIGH-VELOCITY INNOVATION

Making crucial design decisions early in the concept phase of a project, may lead to severe cost and time overruns when these decisions are based on assumptions and/or incomplete knowledge. This causes redesign, re-development, and re-testing plus frustration across development and management. Rapid Learning Cycles, a framework for knowledge-intensive projects in the early phases of development, provides a solution. It was tested by VDL ETG in a pilot project.

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Requirements

In 2023, VDL ETG started a pilot project with Rapid Learning Cycles, as it wanted to get more control and visibility of projects that include innovative design concepts and therefore come with a number of risks and unknowns. VDL ETG defined a set of requirements for the pilot project. The main objective was to get better grip on progress in the pre-concept phases of knowledge-intensive projects. The pilot was planned for a period of four months and involved the participation of a project manager, a system architect, and ten lead designers. An application called Targetprocess [1] was used to manage the project and provide visibility and transparency.

Pilot project

Rapid Learning Cycles (RLC) is an agile product development framework tailored to the development of physical products. It is an intuitive framework that can easily be adopted by a development team.

The pilot started with a 2-day training course in which the lead designers in the project team directly applied the RLC theory to kick-start the pilot project within VDL ETG:

- Learning the key elements of the RLC framework.
- Exercising with the key RLC elements on the project at hand.
- Using Targetprocess to capture the key RLC elements.

The key elements of RLC are:

1. The Core Hypothesis
2. Key Decisions
3. Knowledge Gaps
4. Learning Cycle Plan

Core Hypothesis

During the RLC training, the development leads collaboratively created the Core Hypothesis (Figure 1). By agreeing with the team what the *customer need* is, which *new technology* concept will satisfy this need and what the *business value* is, everybody shares the same understanding of what the aim is for the project.

Key Decisions

Based on the Core Hypothesis, the team started to brainstorm on which possible Key Decisions they might have to make. A Key Decision is a decision or choice that has a *high impact on the success of the product* (Figure 2), while the team does not have the knowledge to make that Key Decision with confidence. Key Decisions can be partly deducted from the Core Hypothesis. However, they can come from anywhere. They may be customer- or market-related (pricing, positioning, value), they may be technology-related (requirements, design, supplier, manufacturing), and also may be related to external circumstances (regulatory, intellectual property, competition).

Decisions that do not have a high impact on the success of the product are not regarded Key Decisions and do not follow the RLC framework. The team is free to make those decisions as they are used to.

At VDL ETG, a distinction was made between decisions in the concept phase on system level and module level.

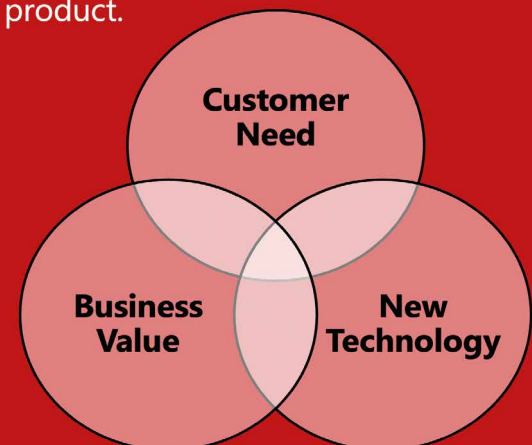
AUTHORS' NOTE

Lizet Bary (consultant) and Edwin Schumacher (managing partner) are experts in the area of lean-agile product development & innovation processes at Synergio. Both are certified Rapid Learning Cycles (RLC) advisors and guided the RLC pilot project at VDL ETG.

Synergio is a Dutch consultancy company located in Vught. It helps organisations to accelerate their product development & innovation processes with training, consultancy, and software.

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Core Hypothesis: The reason why your company believes in this product.



The Core Hypothesis.



2 Identification of Key Decisions using an assessment based on knowledge of the solution and impact on product success.

Decisions at system level were by definition Key Decisions. Module-level decisions that could not be made without affecting the concept, were also regarded as Key Decisions. All other decisions and choices were considered regular, non-key decisions.

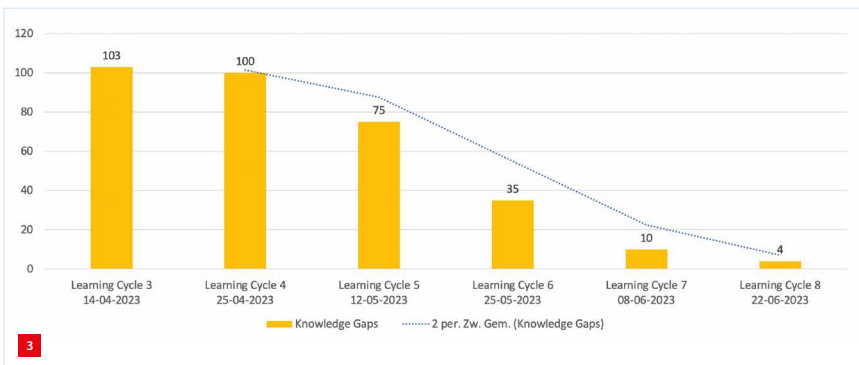
Knowledge Gaps

Knowledge Gaps are topics about which the development team needs to increase their knowledge, in order to make a Key Decision with confidence. Typically, a Key Decision has one or more Knowledge Gaps.

Knowledge Gaps are closed in one or more iterations of three weeks; the burn-down of their number in the pilot project is shown in Figure 3. After each iteration, finished Knowledge Gaps are presented and shared during a Learning Cycle event, a meeting with the team to share knowledge.

Typically, a team will have more Knowledge Gaps than they can close. Therefore, Knowledge Gaps are prioritised. For those Knowledge Gaps that cannot be closed, a Risk is created. The severity of each Risk is assessed based on Impact and Chance (Figure 4).

At VDL ETG, it became clear that not only were there many Knowledge Gaps, but that also a lot of Key Decisions had to be made; the burn-down of their number in the pilot project is shown in Figure 5.



3 Burn-down of the number of Knowledge Gaps. (Zw. Gem. = zwevend gemiddelde (moving average))

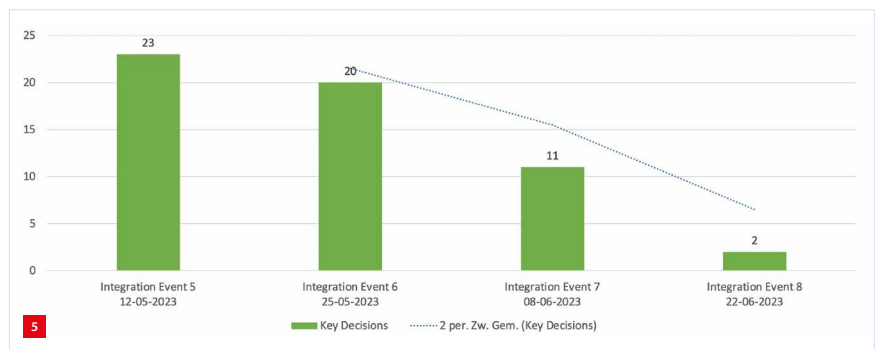
Impact "I"	Chance "C"						
	0,0	0,2	0,4	0,6	0,8	1,0	
negligible	2	0	0,4	0,8	1,2	1,6	2
marginal	4	0	0,8	1,6	2,4	3,2	4
critical	6	0	1,2	2,4	3,6	4,8	6
serious	8	0	1,6	3,2	4,8	6,4	8
catastrophic	10	0	2	4	6	8	10

4 Knowledge Gaps are prioritised using an assessment based on Impact and Chance.

VDL ETG feedback 1

"RLC helped the project in providing a structured approach to a normally fuzzy concept phase of a project", said Frank Romberg, project manager.

"Consciously considering Key Decisions and Risks and developing these into Knowledge Gaps that we prioritise, plan and each assign to a person that is in charge, helped the team a lot", said Gerrit Oosterhuis, system architect on the project.



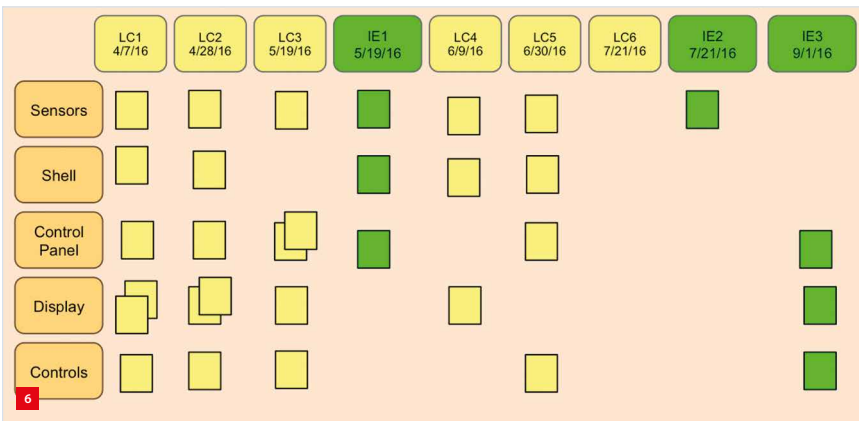
5 Burn-down of Key Decisions.

During the pilot project, some adjustments were made, within the boundaries of the RLC framework, to accommodate the dynamics in the project, as discussed below in the "Conclusions and observations" section.

Learning Cycle Plan

All identified Key Decisions and Knowledge Gaps are planned into the Learning Cycle Plan (Figure 6). This plan makes it visible when Key Decisions and Knowledge Gaps are planned and who is responsible for the work. The Learning Cycle Plan, Key Decisions, Knowledge Gaps and Risks are managed by Targetprocess.

The information in Targetprocess (Figure 7) provided real-time insight into the planning of the work for the pilot project. It also allowed for the plan to change. As a result,



Example (anonymous) of a Learning Cycle Plan (LC stands for Learning Cycle, IE stands for Integration Event).

the team was able to transparently show what work needed to be done, by whom, when it was planned and to which Key Decision it related.

This transparency made it easy to create a common understanding between VDL ETG and its customer about the challenges and progress in this phase of the project.

Conclusions and observations

Formulating Key Decisions and Knowledge Gaps

During the training the development team brainstormed on Key Decisions (KDs) and Knowledge Gaps (KGs) and

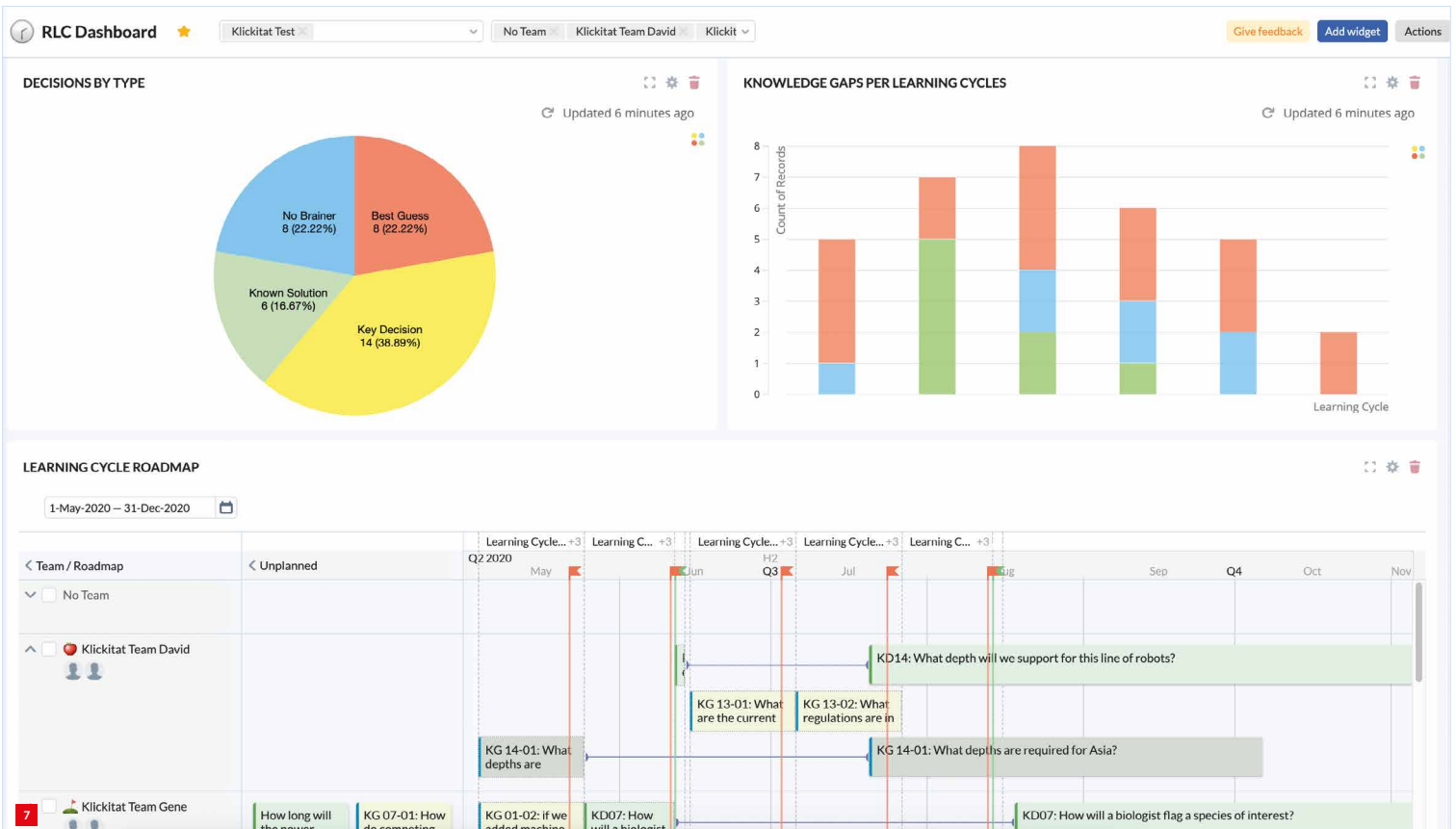
quickly wrote down one-liners for all of them. These were explained to the group to ensure a common understanding.

Although at first it seemed that the formulation of KDs and KGs was sufficiently clear, later there was discussion about the exact meaning of some of the KDs and KGs. It was learned that it is important to spend extra time with the development team on formulating KDs and KGs to avoid any confusions later in the project.

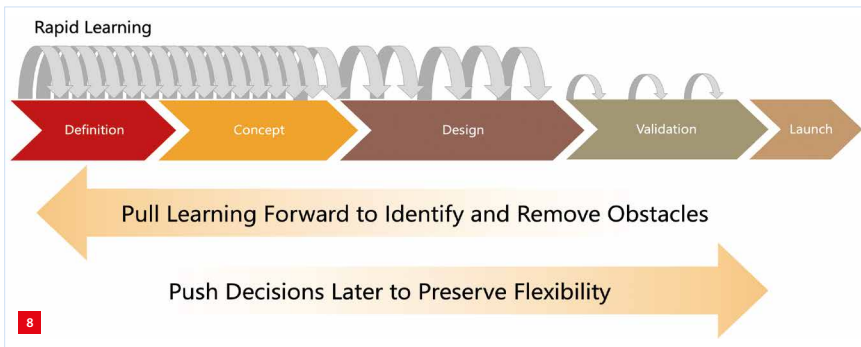
VDL ETG feedback 2

“The RLC framework is very intuitive and doesn’t require extensive training. This allowed the development team to focus most of its time on the content of Key Decisions and related Knowledge Gaps”, commented Frank Romberg. “The Learning Cycle Plan provided insight into who does what and when, but also if deadlines were feasible and realistic.”

“Having insights into the questions that must be answered first before a requirement can be enforced, was very important to both the customer and the VDL ETG development team. It prevented a mismatch in expectations and a common understanding that not all pieces of the puzzle were complete yet.”



Example of Targetprocess providing a Rapid Learning Cycles dashboard.



The focus of RLC is on the early, fuzzy phases of the product development process.

Explicit decision making

Making Key Decisions with confidence is what RLC is all about. That also means that Key Decisions must be made explicitly and are unambiguously formulated. Writing a Key Decision collaboratively with the team may seem overkill but does provide extra value; everybody has the same understanding and agrees with the Key Decision.

Iteration length

The project had tremendous pressure to deliver on time and live up to customer expectations. As a result, it was decided to have an iteration length of two weeks. The module teams worked extremely hard and delivered a lot of work every iteration. This created a challenge for the leads of each module team to be able to review Knowledge Gaps and Key Decisions before the meetings. This was solved by changing from a 2-week to a 3-week iteration length. The last week could only be spent on peer reviews, approvals and preparation for the Learning Cycle and Integration Event.

When to apply RLC?

RLC (Figure 8) is especially powerful in the early, fuzzy phases of the product development process. It differentiates itself from other product development methodologies as a learning & decision-making framework. It explicitly regards building knowledge as a work package, and it makes decision making a collaborative process that is visible and transparent.

Later in the product development process, an FMEA (failure mode and effects analysis) can be performed on the new product that has taken shape. Another popular tool is the Risk Register, which provides a more project-oriented approach, considering deadlines, costs, resources, etc. Some risks arising from the RLC approach could be included in the Risk Register.

RLC and Systems Engineering

VDL ETG is applying Systems Engineering (SE) from the design phase of their product generation process onward. The question arises, how do RLC and SE connect? Although this requires more investigation, it looks like the natural

connection between RLC and SE is on the decisions. In RLC, there are Key Decisions, and these can be translated to Design Decisions in SE. Design Decisions in SE will have associated requirements to specify the solution in detail.

When not to apply RLC?

RLC is especially useful in the early stages of product development when there is a lot of uncertainty. The other way around is also true. So, if all requirements are clear for a product and it is also clear how to develop the product, then a traditional project management approach is more appropriate than a Rapid Learning Cycles approach.

NOTE

[1] Targetprocess is an enterprise agile planning tool from Apptio (now part of IBM) for configuring and executing all kinds of lean-agile processes. Synergio, as a partner of Apptio for Targetprocess, has created a configuration for RLC in Targetprocess. www.synergio.nl/software/targetprocess

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