

Product Development Management

IAR061

2018-10-29, 14.00 – 18.00

Maximum 2 pages per question – 10 total

Please write your student code on each page

The exam result will be published in LADOK no later than after 15 working days. Reviewing of the exam takes place at the division of Innovation and R&D management on Friday November 16 at 12.00. Only obvious errors, such as errors in the summing of the result will be corrected later. When the student chooses to bring the exam home all possibilities for correction of the result ends.

Questions will be answered in the room around 15.30
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Product Development Management – IAR061

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1. Project portfolio management and R&D dilemmas

- a) What are the three basic goals with Project portfolio management? Describe one method or tool (per each) that you can use in order to achieve these goals respectively (5p)

Grading: *Description of the three goals:*

- 1) *A strong link to strategy.....*
- 2) *Maximize value of portfolio.....*
- 3) *Achieving a balanced portfolio.....*

+ *a description of three of the tools below, one from each group:*

A strong link to strategy

- *Top-down e.g. Strategic buckets*
- *Bottom-up e.g. Scoring models with strategic parameters*

Maximize value of portfolio

- *Net present value*
- *Expected commercial value*
- *Options pricing theory*
- *Scoring models*

Achieving a balanced portfolio

- *Bubble diagrams*
- *Portfolio maps*
- *Histograms*
- *Pie charts*

- b) Wheelwright and Clark outlines six obvious pitfalls that leads to disparity between promise (the plan) and reality (the outcome). Discuss these six common underlying problem areas. (5p)

Grading: *A detailed discussion about the six pitfalls:*

- 1) *“The moving targets”- companies misses a shifting technology or market, resulting in a mismatch.*
- 2) *“Mismatch between functions” – different views on the problem/project/product across the organization*
- 3) *“Lack of Product Distinctiveness” – the product end up not as unique or defensible as the organization anticipated.*
- 4) *“Unexpected technical problems” – overestimates of the company’s technical capabilities or simply to its lack of depth and resources.*
- 5) *“Problem-solving delays” – every new product development activity involves uncertainty and enough resources need to be allocated to handle these uncertainties.*
- 6) *Unresolved policy issues” – major policy decisions need to be articulated clearly and shared early in the process/project.*

2. The Development process and issues

Discuss, in short, the following five product development issues:

- a) What is the underlying thinking about the “Stage-Gate Process” set-up and who reports at the Gate meeting? (2p)

Grading: To fund the project gradually as the project delivers and fulfills stated targets at different gates. The project leader should report at the Gate meeting.

- b) What does “Success Assured / Verified Concept” mean within the “Lean development thinking”? (2p)

Grading: All relevant Knowledge gaps should have been closed (i.e. TRL6) (in the knowledge value stream) before you embark on a development project (the product value stream). Hence, the uncertainty has been reduced to an acceptable level.

- c) Within organizational theory there is a discussion about Mechanistic and Organic structures. What characterizes a Mechanistic Structure? (2p)

Grading: Mechanistic structures have high formalization and standardization, often existing in stable environments.

- A **Mechanistic structure** is an organizational structure that is design so that individuals and functions behave in a predictable way and can be held accountable for their actions
- **Mechanistic structures** have **high formalization and standardization**.
 - Good for operational efficiency, reliability.
 - Minimizes variation → may stifle creativity

- d) What is an “Analytical prototype?” (2p)

Grading: One key method/tool used in R&D is prototypes as discussed in the learning goals. However prototypes can be many different things:

- **Analytical prototypes** – represents the product in a non-tangible, usually mathematical, manner for analysis

- e) What is a “Product Platform”, outline a few alternative views? (2p)

Grading: Discussion about:

***Components** – The part designs of a product, the fixtures and tools needed to make them, the circuit designs, and the programs burned into programmable chips or stored on disks.*

***Processes** – the equipment used to make components or to assemble components into products and the design of the associated production process and supply chain.*

***Knowledge** – design know-how, technology applications and limitations, production techniques, mathematical models, and testing methods.*

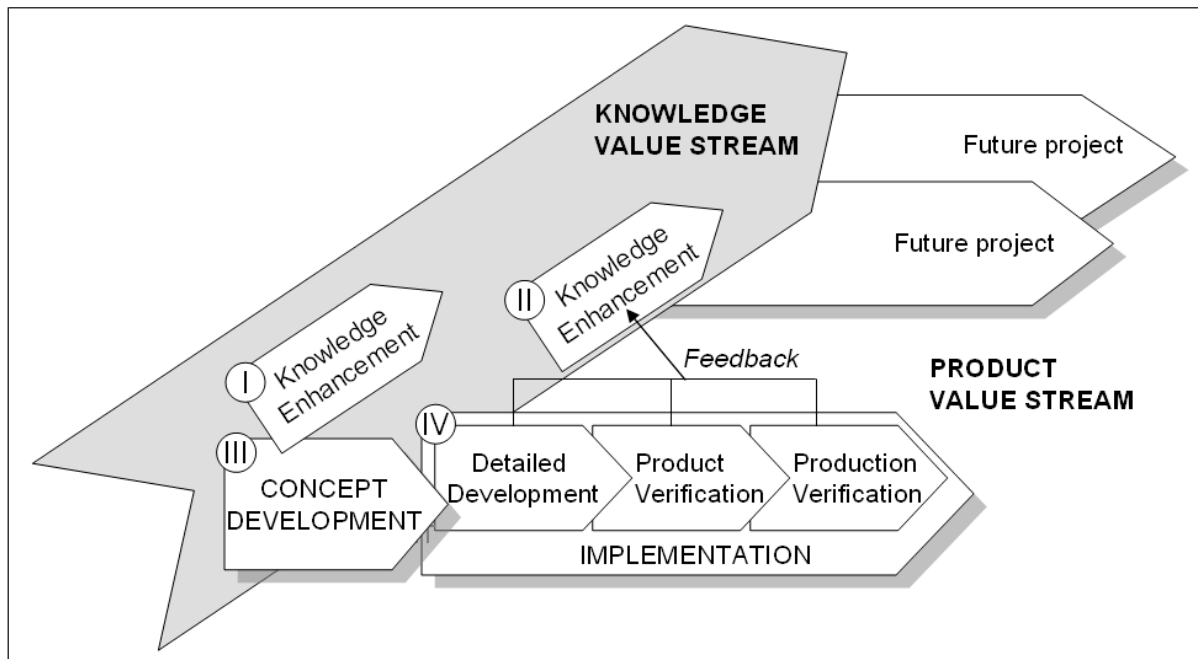
People and relationships – teams, relationships among team members, relationships between the team

3. Lean Product Development and Agile Development

- a) In “Lean Product Development” there is a clear distinction between the “Knowledge value stream” and the “Product value stream”. What does this mean, what is the difference between these two? (5p)

Grading: The Knowledge Value Stream. To capture and reuse knowledge (markets, customers, technologies, product & manufacturing capabilities)

Product Value Stream. The flow of tasks, people and equipment that create the drawings, BOM and manufacturing process for a product.



- b) Consider product development organized according to scrum. What is a backlog and what is the difference between a sprint backlog and a product backlog? (2p)

Grading: The product backlog, which functions as an alternative to a business case or demand specification, contains a list of features that may or may not be included in the final product. Initially, the product backlog is developed in collaboration with both external and internal stakeholders. The development process is then broken down into a number of sprints, high-productivity work cycles that may vary in length from two to four weeks. Each sprint works from a sprint backlog, which describes the set of priority features (or product increments) to be developed in the current sprint, selected because they are high priority and they can be completed within the defined period of the sprint. While a sprint is under way, the sprint backlog may not be changed.

- c) Consider a product development organization with multiple self-organizing agile teams within it. Describe the three informal balancing acts that a self-organizing agile team manages and discuss how communities of practice in the organization can facilitate for the team with the balancing of at least one of them. (3p)

Grading: Description of the three balancing acts; 1) Freedom-responsibility, 2) Learning-output and 3) Specialization-cross-functionality

Communities of practice can facilitate learning and specialization in multi-team organizations. Feasible reasoning around cop in relation to any of the two corresponding balancing acts will do.

4. Topic reports and Engineering tools

- a) Select two of the 10 Topic reports – **not your own topic** - that you think are related/overlap. Start by describing the learning outcome from each followed by: why and how you think these have a strong “connection”, hence relate. (5p)

***Grading:** The student is expected to clearly establish a link, which makes sense with respect to the course goals, between two of the ten topic reports and elaborate on that relationship. The answer is also supposed to include a discussion about relevant findings and learning outcomes from two selected reports respectively.*

- b) Describe the basic principles around the methods QFD and DFA, i.e. what the methods aim for and the basic working procedure. When, in a generic product development process, can these methods (QFD & DFA) come to play? (5p)

***Grading:** The main aim with DFA is to minimize the number of parts. You do that by answering three important questions in order to identify candidates for elimination or integration. The inspection is done in to steps, for handling and then insertion. The needed data is collected from two work sheets. DFA can be used during the “Build phase” when the product is being developed and designed.*

QFD is a way to translate customer requirements to design requirements where you identify important correlations between these in order to focus on those design requirements that are most important to the voice of the customer. You also compare or benchmark these requirements with competitor products in order to set relevant target values on the design requirements. QFD can be used early in the “Design Phase”.

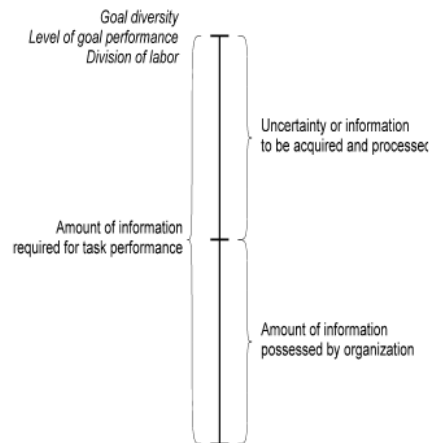
5. Organizing product development

- a) In *Organization Design* Jay Galbraith introduces/defines the “concept” of uncertainty. Elaborate/develop on how he defines uncertainty? Also, put this concept into an R&D setting where a company develops platform products as well as derivative products – how does uncertainty come to play in this setting relative to the definition? (5p)

***Grading:** A discussion about the meaning of the content from Galbraith chapter 3 and the PPT below regarding what uncertainty is in R&D and what is required, i.e. information exchange, to reduce it. In a platform project “most R&D” is new, unknown and therefore very uncertain requiring a lot of communication between decision makers. A Derivative projects “Builds up” an already developed platform and the content is therefore less unknown and uncertain, hence less information exchange is needed. This reasoning is related to the Contingency theory as highlighted in the learning goals.*

"Uncertainty is the difference between the amount of information required to perform the task and the amount of information already possessed by the organization".

Galbraith 1973



"The greater the task **uncertainty**, the greater the amount of **information** that must be processed among decision makers during task execution in order to achieve a given level of performance"

- b) Present/discuss the four "team structures" as introduced by Wheelwright and Clark. Focus on the varying role(s) of the project leader and the project members. Recall the 5000 project at Applied Materials, which of these team structures do you think could best describe the 5000 project? Motivate and illustrate your suggestion with clear examples from the case. (5p)

***Grading:** Organizational aspects of R&D with respect to efficiency in different situations is described in the learning goals as important. Here the answer is supposed to zoom in on the leadership role and team role in the different team structures: Functional Teams, Lightweight teams, Heavyweight teams and Autonomous teams.*

The 5000 project is a "clear" Heavyweight project according to definition but there are also elements of an Autonomous team, the answer needs clear examples from the case such as that Mayden as his crew now being really senior and experienced.

Good luck / Lars (currently looking for #701)