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Model for product focused solution evaluation

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This paper presents a model for evaluating solutions in a product focused way in research and development organisations where individual teams and developers add value to the product under development.

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1. Introduction

In modern product development, specialists work together to form the result: A good product design which is manufacturable, attractive to customers and useful to the end users and society as a whole.

Evaluating the “value[1]” of a product (whether fully designed or not) is a key to success in every product developing company and is done routinely in all aspects of the product life cycle:

- The potential of new ideas are evaluated: Are they valuable enough to be pursued?
- Features are added and removed during development depending on their impact on the final product and time to market.
- Technical solutions to problems are evaluated against their impact on the final product.
- Development processes are enhanced.
- Manufacturing keeps refining manufacturing processes, constantly searching for ways to reduce cost price, enhance manufacturing flexibility, thus improving supply, reduce stock levels and eliminate waste.
- Sales and marketing will work to spread out the product, thus improving it's value for both the owner and society as a whole, and constantly look for new and useful applications for the product.
- Recycling will look for ways to recycle the product and/or stretch it's life.

Evaluating a product's or innovation's anticipated value is difficult, sometimes even impossible. For example, it was impossible to evaluate the value of the American programme to race for the moon at the time when it was started. Today, we can with some precision evaluate the impact of the programme and thus evaluate the spending of resources and money, cost of human lives, cost of pollution etc, against the gains in technology development, social development and the impact on the American innovation-culture, but we can only do so because we can assume the historical perspective.

The historical perspective is interesting, but can't help the decision maker, who must decide whether an innovation is good or bad, valuable or invaluable, interesting or not, before the entire innovation diffusion process is complete [2].

In fact, experience shows that if the decision maker forces the “big perspective” upon himself, it is very easy to loose sense of reality and use abstract arguments from which anything can be deducted.

Thus, as individual developers project managers and leaders of development teams, we must focus on concrete and understandible goals, while still working together with our colleagues on reaching the common goal. This shows the need for a simple model that affords a goal even on the small scale. If we do not, then we will end up in one or more of the traps of design [5]:

1. The category trap, where we mindlessly transfer solutions from one problem domain to another.

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1 We shall use the term “product value” to denote a holistic view on a products values through it's entire value chain and life cycle.

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2. The puzzle trap, where we as developers get caught trying to solve “funny” or puzzleing problems instead of doing proper work.
3. The number trap, where we end up chasing a single parameter, forgetting the holistic view.
4. The icon trap, where we end up designing the design instead of the product.
5. The image trap, where we follow our own image of the end result instead of making that something that the user needs.

It is my experience that the value chain perspective is useful in evaluating solutions. A value chain can be complex and branch into a tree, but it can also be simple and one dimensional. No matter what, the value chain consists of elements that process something into something else, thus adding value. This value addition can be evaluated, and this article outlines a model that is useful for this evaluation.

2. The model

2.1 Development task as a filter process

In research and development, a 'task' can be perceived as being part of a larger value chain. This perception is useful to understand what happens with the result of the 'task' and from where the input comes. As pointed out in [1], this perception is useful for optimising research and development activities, as well as production activities, and it forms the corner stone of the “Lean Thinking” paradigm as well as most project management principles.

A 'task' thus processes 'something' into something else. In production, the 'something' that is processed are physical objects and the results of the 'task' are also physical objects. In a development project, the 'task' processes information into other kinds of information.

The processes are also different: In a production environment, the raw materials are processed by procedures that can be defined, whereas the processing that takes place in development (and research!) relies on human creativity and is thus undefineable[2].

But even if the processes and materials are different, there is a symmetry in the fact that processing and value adding takes place.

Examples:

1. A software developer is given the task to develop a component which interfaces to other components in a well defined way. The developer 'converts' the specification into a peice of software. This is by no means a trivial operation, but it can still be percieved as a transformation of one kind of information into another.

2. A specialist on optimising the power consumption of battery powered hardware is used as a consultant in a development project. At some point in the project, he is given the (perhaps incomplete) current design of the product. After making measurements, experiments, and finding solutions to problems that he identifies, he produces a refined design that he sends back to the client. He transforms the information into new information[3].

3. An architect is hired to design a home for a family. After meetings with the family during which he obtains an understanding of their everyday life, special needs and personal taste, and visits to the building site, he can draw on his experience and knowledge to design a good home. He delivers the design as drawings to the engineer

A filter process is illustrated as below:

2 This is a conclusion that can be reached from Gödels Theorem which is a mathematical sentence that shows that mathematicans does not use calculations to find proofs for theorems, which again indicates that the human mind does not work by mathematical calculations. This interesting fact is argumented by Penrose in [3].

3 In this example, the consultant does not transform the form of the information, since the output is of the same structure and form as the input.

Illustration 1: Development task perceived as a filter process.

2.2 Knowledge and technology as a foundation

The above examples miss something, namely the means required to do the processing described (the architect example, mentions it). As a production process requires tools and machinery to process goods into other goods, a knowledge worker uses knowledge and tools to transform information.

I regularly find it useful to divide tools used by knowledge workers into the following types:

1. Communication tools (e.g. e-mail software, telephone, white board)
2. Information processing tools (e.g. CAD systems, word processors)

I also find it useful to divide knowledge held by knowledge workers into the following types:

1. Knowledge and experience of solutions to known problems (procedure knowledge, exact knowledge, “how-to” knowledge).
2. Knowledge of how to find solutions and how to identify problems (creative knowledge).

This division leads to the model below:

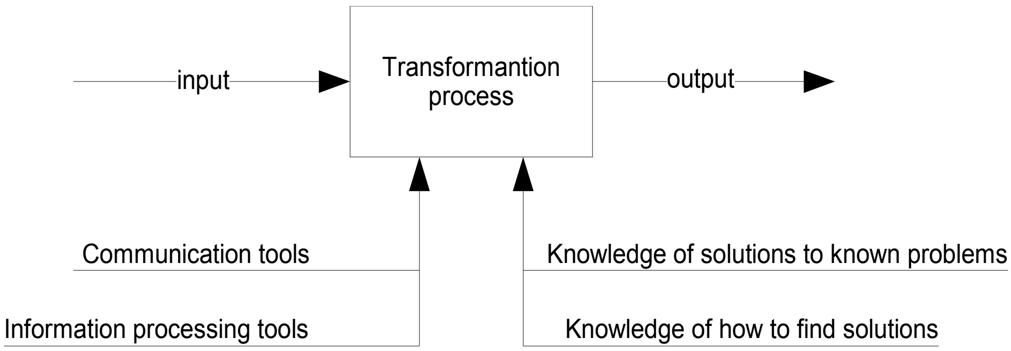

Illustration 2: Enhanced transformation model incorporating two types of tools and knowledge.

We now have a model of which entities of it can be bricked together with other enties to show the complete processing of ideas into a finished product design.

3. Discussion and conclusion

For the individual developer working in a research and development project, the model can be used in the process of maximising the impact of his or hers work. This is important in modern high-tech organisations, where employees are expected to “work smarter”, not just harder.

This follows the enormous technological development we have witnessed during the last 150 years, which has lead to the situation where a manager can no longer instruct their employees on how they should do their work, but must rely on their processional competence. Mintzberg calls the organisation type that works like this “The Adhocracy” [4], and we it has become increasingly popular due to its fittness for dynamic environments [4 p. 253].

But the individual professional in the adhocracy must be able to adjust his or hers work against the colleagues' work, and must thus be able to evaluate the role he or she plays in the concrete project in order to maximise its value.

The model I present in this article can, along with proper mapping of the value chain (or value *tree*), assist this evaluaton.

On a team level, this is just a true.

I expect to conclude further research into the evaluation of value additions in development projects and effective structuring of such projects. This will also include research into the applicability and usefullness of this model. Please contact the author for further information.

4. Appendix

4.1 References

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[5] B. Lawson: How Designers Think, Architectural Press 1997

4.2 About the author

Anders Dinsen is Master of Science of Engineering from the technical university of Denmark. He is the founder and managing director of ASYM APS, an independent research and development company. He has more than 9 years of experience with software development, both as a developer, designer, architect and project manager. His goal is to contribute positively to improving the quality of information technology products developed by ASYMs clients and thereby help increase their revenues.

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