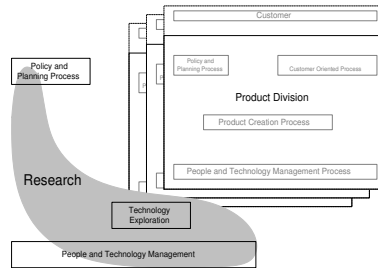


# The Position of Research



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## Abstract

This article gives a vision of the position of research in today's fast changing world, where knowledge plays a dominant role.

The process view in this article is based on the business decomposition as described in "The Process Decomposition Of a Business".

This article is triggered by a series of sessions initiated by Martin Schuurmans about the "backbone of the NatLab".

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# 1 Introduction

This article gives a vision of the position of research in today's fast changing world, where knowledge plays a dominant role.

The process view in this article is based on the business decomposition as described in [5].

This article is triggered by a series of sessions initiated by Martin Schuurmans about the "backbone of the NatLab".

It is my intention to rework this article in one or more articles of the Gaudí project, describing technology management and make versus buy considerations.

# 2 Research in Business Context

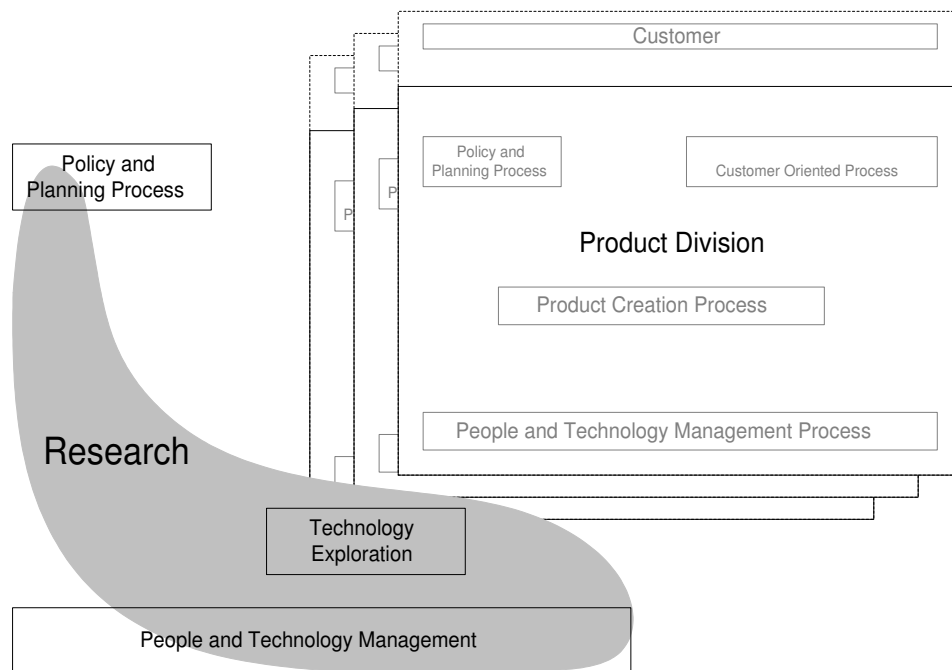


Figure 1: Research positioned in the business scope

Figure 1 shows the position of Research in the business scope. It is an extension of the Process Model described in [5], which is further detailed in [2], [3] and [6].

The main contribution of research is in the People and Technology Management Process, at corporate level. The means to work on technology is by execution of technology exploration projects, for instance by building demonstrators, proof of concept prototypes, et cetera. The advanced know how and the overarching overview of research should be used to support the corporate level strategy processes.

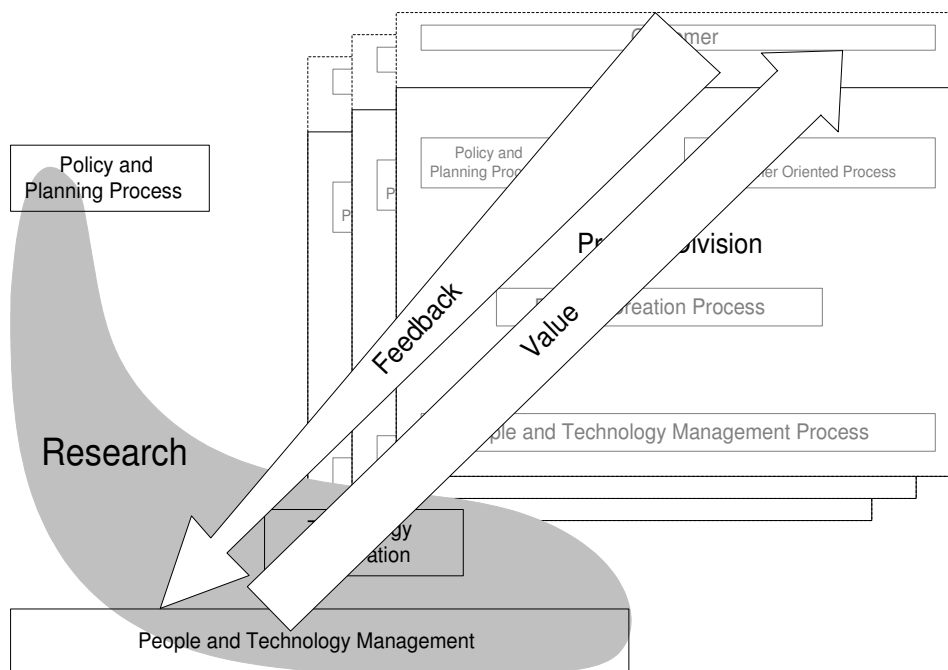


Figure 2: Research in the value chain, and the opposite feedback flow

Figure 2 shows the position of research in the value chain, as well as the opposite flow of feedback information.

### 3 Value of Research

1. Creation of Technology Options
2. Creation of Intellectual Property position
3. Corporate wide body of know how
4. Source of knowledgeable People

Table 1: *The Value of Research from business point of view*

The value of research is in technology and people. Table 1 shows the contributions of research to the business. These contributions are the value of research from Product Division point of view.

Note that both types of contributions are not very tangible nor measurable.

Benchmarking is an attempt to make (relative) measurements of the technology contribution.

The transformation of these intangible assets into hard cash is a long chain of activities, as explained in section 2. The measure of relevance is the same value chain, traversed in reverse order. Assessing the relevance of the research contribution is a difficult job! Determining the research direction is handicapped by the same length of the value chain.

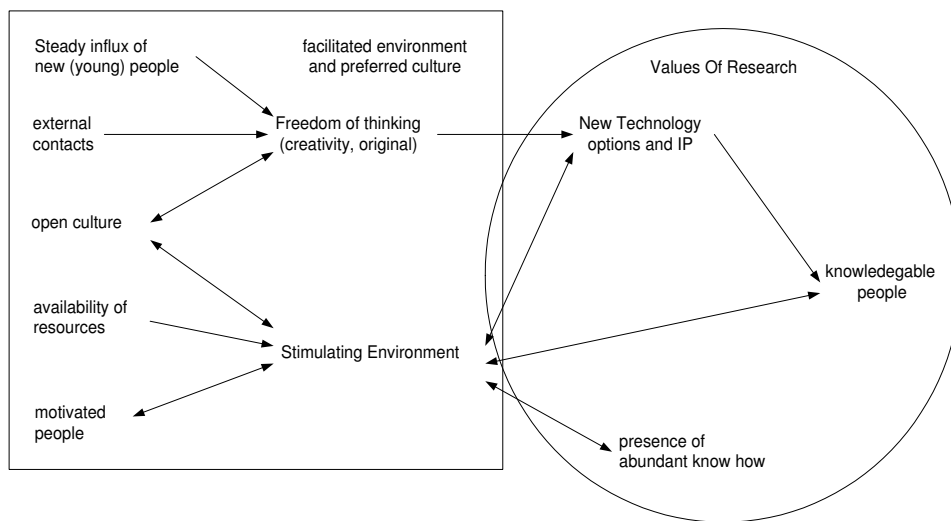


Figure 3: The relation between the desired environment characteristics of research and the value of research

Figure 3 is an attempt to show the relation between the environment of research and the business value. The research management facilitates this environment and nourishes the underlying culture.

## 4 What is Technology Management?

Technology Management is one of today's popular buzzwords, where many different meanings are associated with it.

In the context of this article technology management is the combination of:

- The strategic direction (**Which** technologies are required, and **Why**)
- The tactical decisions (**How** do we obtain and maintain the required technologies, **Who** is involved)
- The operational implementation (**Do** Assess, create, acquire, try-out et cetera)

## 4.1 Core/Key/Base technology

One of the basic strategic questions is which technologies do we require and why. Classification in **core**, **key** and **base** helps to get insight, see table 2 for the definitions.

**Core** technology brings the added value to the products, in other words it is the right of existence of this product.

**Key** technology is critical for the performance of the product, however when partners can supply the technology this is welcome. Due to the critical nature of the technology this partnership needs active management.

**Base** technology is from this business point of view a commodity, which should be acquired from third parties. Active participation should be avoided, however sufficient know how must be present for selection and application.

Table 2: *Definition of Core, Key and Base Technology*

For instance the technical and application know how of imaging for cardio catheterization is core technology for Philips Medical Systems. The Image Processing Hardware is key technology, while the computer, operating system and networking is base technology.

## 4.2 Active Technology Management

A strategic choice is the type of technology management: active or passive. Active technology management is required for technologies, which are to be actively employed in products. Employment requires know how of the technology, but also the skills to apply them and the processes and tools to apply them. Skills and know how are mostly present in humans, consolidation in electronic or paper form is a very limited capture of the actual know how and skills<sup>1</sup>. Hence technology which is to be actively deployed requires the application of that technology.

## 4.3 Passive Technology Management

The strategic choice for passive technology management is mostly made in case of Intellectual Property management and sometimes in case of standardization. Table 3 shows a number of different strategies which are applied for passive technology management.

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<sup>1</sup>By example: giving someone a booklet describing the skills to fly an airplane, does not yet enable that person to actually fly an airplane.

- Offensive
- Negotiation directed
- Defensive

Table 3: *Strategies for Passive technology management*

In case of passive technology management active application of the technology is not necessary. Of course it is possible to use active managed technology in IP and standardization.

## 5 How to do Technology Management?

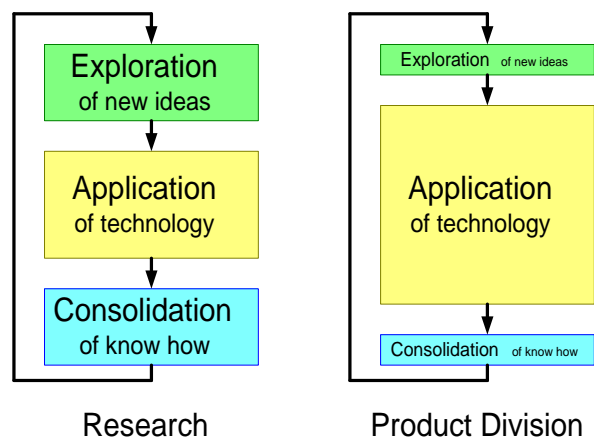


Figure 4: The Technology Management Cycle

Figure 4 [1] shows the technology management cycle.

This simple model emphasizes the actual application of a technology as the core of technology management. True understanding of a technology is only obtained by active application.

However application only is not enough, because the experience needs to be made explicit, accessible and transferable. The consolidation phase after the application is performing these actions. Note that this reflection is the basis of learning processes.

When the experience is consolidated the time is ripe for the creative phase: exploration of new opportunities, generation of new ideas.

The cycle is closed by selecting the most promising ideas and put them to the proof by applying the technology again.

For research the emphasis is on consolidation and exploration, although application is indispensable. The product divisions emphasize the application of technology, although an investment in consolidation and exploration is also required.

## 6 Threats with respect to the desired research environment

The existence of the working group was triggered by the perception that some trends threaten the current environment. Table 4 summarizes the perceived risks, although completeness is not claimed.

- Budget driven decision making
- Annoying formalisms (bureaucracy)
- Conflicting personal incentives and collective interests (open culture versus "prestatie belong")
- Challenging technology companies
- Lack of reward, due to long value and feedback chain
- Too many managers and bosses, too few leaders
- Too much passive technology management
- Contribution and recognition of individual in large organization

Table 4: *Summary of threats for the current environment*

Note that all of the threats are generic for large organizations. **Working Group "NatLab Backbone"**

The following people have been participating in the working group "NatLab Backbone": Peter Slikkerveer, Pierre Woerlee, Reinder Coehoorn, Stan Baggen, Derk Reefman, Gerrit Muller, Albert van der Werf, Martin Schuurmans, Aart van Gorkum, Rick Harwig, Ed Huijbregts.

## 7 Acknowledgements

The members of the working group provided a lot of stimulating input. Discussion with Eric van Utteren improved some of the figures and sharpened the reasoning.

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## History

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- minor changes

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- abstract added

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- Created, no changelog yet