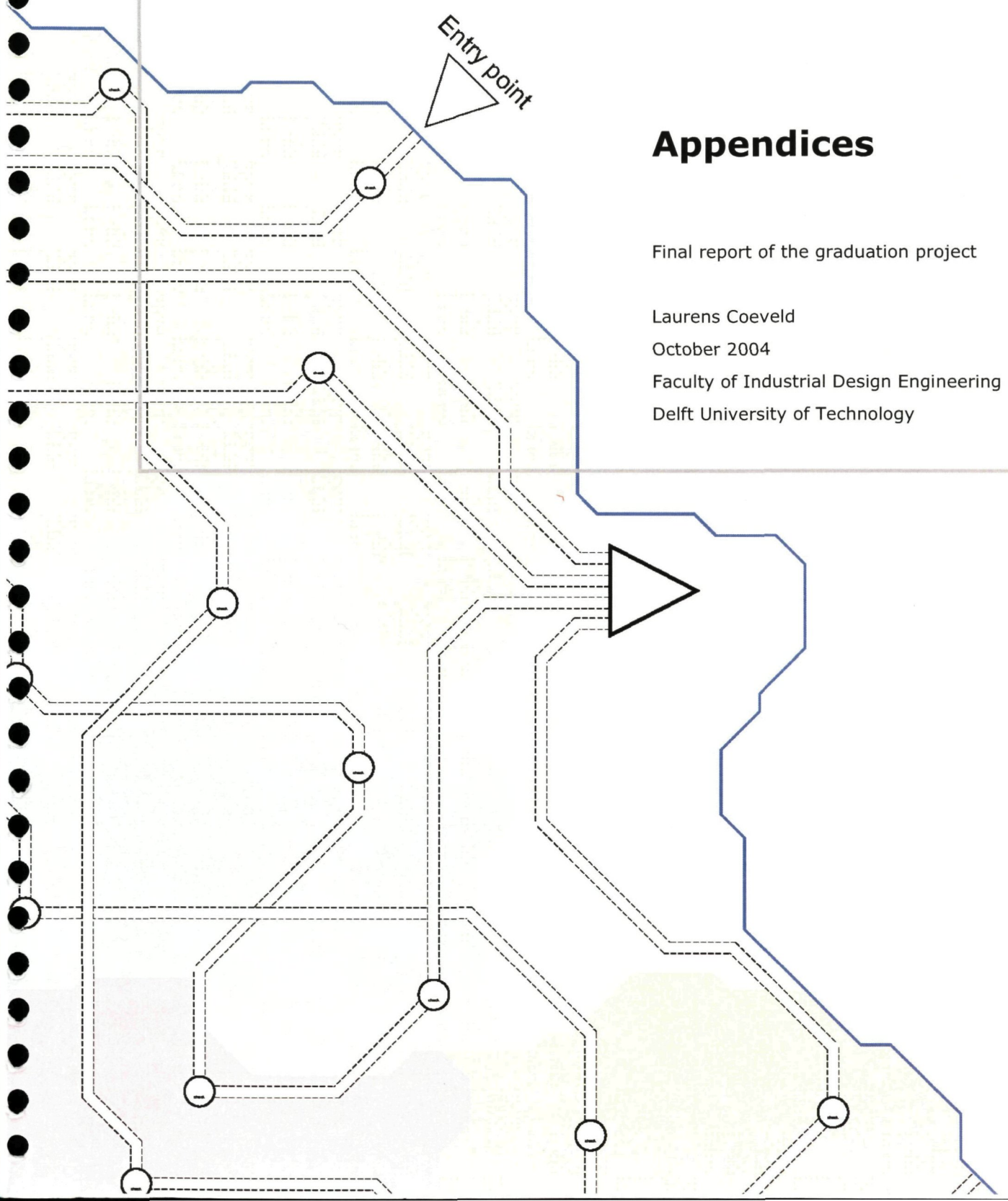
Exploring Philips Medical Systems
- a tool for creative designers -



Appendices

Final report of the graduation project

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October 2004
Faculty of Industrial Design Engineering
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TUDelft PHILIPS

Exploring Philips Medical Systems
- a tool for creative designers -

Appendices

Final report of the graduation project

Laurens Coeveld

October 2004

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Introduction

This document contains all the appendices of the report '*Exploring Philips Medical Systems – a tool for creative designers*'. This report presents the results of the graduation project for the study Industrial Design Engineering at the Delft University of Technology, the Netherlands. The project is done in the context of the Bottom of the Pyramid (BoP) program at Philips Medical Systems (PMS).

In the text of the main report are references to the appendices in this document. Relevant documents are also included on the CD-rom that comes with this report.

1. Chronological progress of project

decisions, actions, results and evaluations

Initial assignment: Describe what Philips Medical Systems does and is in order to support creative designers to generate BOP ideas. The underlying reason is twofold: The designers need to know the company they design for, and the description should have the effect that the design proposals match PMS business, or, in other words, are more interesting for the company. The description will have to be communicated in some form to designers and its' use should be tested in a follow-up project.

Action: Literature analysis on functionalities, functions, core competences and other sorts of company information describing what a company is and does. Analysis of Philips Medical Systems by means of all sorts of documents and a couple of interviews. Understanding designers by presenting information and asking what their desires towards company information are. Study of the innovation process to determine when in a project what information of a company is needed.

Result: The literature analysis leads to exploring many aspects of PMS. The company information is documented in a report and visualised in maps. The use of the information is determined and related to the innovation process.

Evaluation: PMS is a big and multidimensional company. Designers need different sorts of company information and want to be free in selecting and using the information. Interesting information has been found and mapped, but it is 'flat' and designers do not know what to do with it.

Decision: Focus on the development of a tool offering the company information with which the designers can work. Do not test the tool yourself, because that takes too much time.

Graduation assignment: Develop a tool to inform designers about the company Philips Medical Systems in order to support them to generate ideas. The output of the design projects should improve when using this tool, because having company knowledge enables the designers to generate ideas that help the poor people in their healthcare needs ánd that fit into the company's portfolio and strategy.

Action: Development of three product directions and prototypes.

Result: Three prototypes of the ideas called Bookie, Phil and PMS-Idea. Plans of how to use the information divided into sections of Inform, Generate (Stimulate), Categorize, and Evaluate and Elaborate.

Evaluation: Concept testing with groups of designers reveals that the concept of offering company information is good and new. In their opinion a tangible, physical tool triggers (inter)activity, provides more direct and easy access to the information and it leads to a group understanding of the company (instead of an individual understanding). But how exactly is the tool supposed to be used?

Decision: It is decided to continue with the directions of Bookie and Cards, and to focus on the inform part.

Action: Literature study on learning and modern forms of education. Determining use scenario and tasks for the users, with a team session based on learning in 'a community of practice'. Making of program of requirements. Development of three concepts and prototypes.

Result: Three prototypes of the concepts called Store, Foldable, and Company guidebook, with more visual elements and more interactivity (than the first ideas) and a use guide.

Evaluation: The concepts are presented to and evaluated by the graduation committee. The guidebook and its metaphor of travelling is most attractive and clear, fits the BoP program in terms of exploring new countries and markets, and has a lot of opportunities to create an interactive and 'fun' tool.

Decision: It is decided to continue with the guidebook and the map of the 'country of PMS'.

Action: Elaboration of the concept into a more detailed concept and prototype with graphical design of the elements. Making of production plans for a null series, finding printer via PMS and buy-in parts. Determination of financial budget.

Result: Prototype of Xplore, the company exploration tool with a guidebook, a map, cards, an introduction brochure, gadgets offered in a briefcase with foam. Production and financial plan.

Evaluation: The prototype of the tool is evaluated by the committee and a team of designers. It needs improvement on interactivity and usability. The metaphoric elements (specifically the map) do not have a strong and clear meaning. What should the team do with this? The designers have too much freedom. Define a team session with sharing of knowledge.

Decision: It is decided to optimise the tool, and to produce two tools. There is uncertainty about the direction of the BoP program. However, there is one design team going to India, with students of TU Eindhoven, who will be the first users of the tool.

Action: Organizing a creativity session with designers leads to ideas for improvement. Graphical design of the elements, validating and finishing the texts, and finding new buy-in parts. A reflection with Peter Lloyd and individual designers leads to the final design of the map and defining the process of using the tool. Delivering all materials to printer and production of packaging elements (tool holder and card holder). Assembly of all elements.

Result: A finished tool for design teams on the BoP program called Xplore, providing company information. A team learning session in an interactive game format helps the designers to explore the company they design for. Suggestions to apply this knowledge (or use the information) are added in the guidebook.

Evaluation: The tool is tested by IndiAction, the design team that is currently in India. And is tested in the Netherlands with a team of design students. The tool meets the objectives to enable the design team to generate a basic and shared understanding of the company, which supports them in their innovation process.

2. Planning graduation project

The planning has been adapted a number of times. The end date was initially set at the 24th of September. Main reasons for the delay of 6 weeks are the RSI that obstructed me (Laurens) to work at full speed from August onwards, and the fact that the end result was a launched product instead of a prototype of the product concept, which was initially planned for. Inexperience with graphical design programmes and making posters and books caused for an extra delay.

Phase	Task	Time	Start	Finish
Analysis - Determination of development objective	Literature research on describing companies	3 weeks	16th February	5th March
	Analysis of Philips Medical Systems: technologies, products, services, clinical segments, core business and competences, current maps. Including interviewing employees, 'map designers'. Including visualising information.	6 weeks	8th March	...
	Explorative testing with designers	1 week	...	23rd April
	Reflection and writing working report of analysis	1 week	26th April	29th April
Analysis - Product development	Determination of main and sub functions of product		3rd May	...
	Exploration of comparative products	3 weeks	...	...
	Defining target group and numbers		...	...
	Listing specifications for development: criteria		...	21st May
Product Development - Ideation and concepts	Generation of ideas, basic principles and models		24th May	...
	Evaluation of ideas on feasibility and users' feedback	6 weeks	...	...
	Elaboration into concepts and prototypes		...	2nd July
Product Development - Concepts and elaboration	Elaboration of metaphoric concept		5th July	...
	Plan production and distribution of the description	6 weeks	...	...
	Explain way of using		...	...
	Create a working prototype		...	27th August
Product Development - Optimising	Testing and adapting concept		30th August	...
	Final design of all graphical elements	6 weeks	...	...
	Preparing printing and making elements		...	...
	Assembly of all material into tools and extra books		...	8th October
Ending project	Final product testing	1 week	11th October	...
	General evaluation		...	...
	Report and presentation	4 weeks	...	10th November

3. Innovation process and Product Creation Process

Innovation process of TU Delft

The innovation process that is described here is a combination from the theories of several authors based at the University of Technology Delft (sources: Roozenburg and Eekels (1998), Buijs and Valkenburg (1997), Smulders, Kiers and Van Engelen (2001)).

The process is divided into phases, leading from an abstract thought to a concrete product. They are described as being subsequent phases, but in reality they could, to a certain extent, be addressed concurrently or for example with multiple, iterative loops. Clearly, not all the phases will be necessary in every project. The total process shows six phases prior to market introduction.

A recurrent aspect in all the phases is the diverging-converging problem solving process. Solving a problem is generally done by diverging to generate multiple solutions, and converging to creatively combine alternatives and work towards the optimal solution. A second important aspect is the distinction between the internal and external scope; the continuous exploration of the company in relation to its' environment.

As can be seen in the figure on the next page, another distinction can be made between the product planning phase and the product development phase. The main objective of the product planning phase is to find new potential directions and product ideas, by creatively combining knowledge of the market and the company. In the development phases three main areas of interest are concurrently developed: the production, the market, and the product itself. The internal and external focus is divided into three main areas of interest.

Product Creation Process of PMS

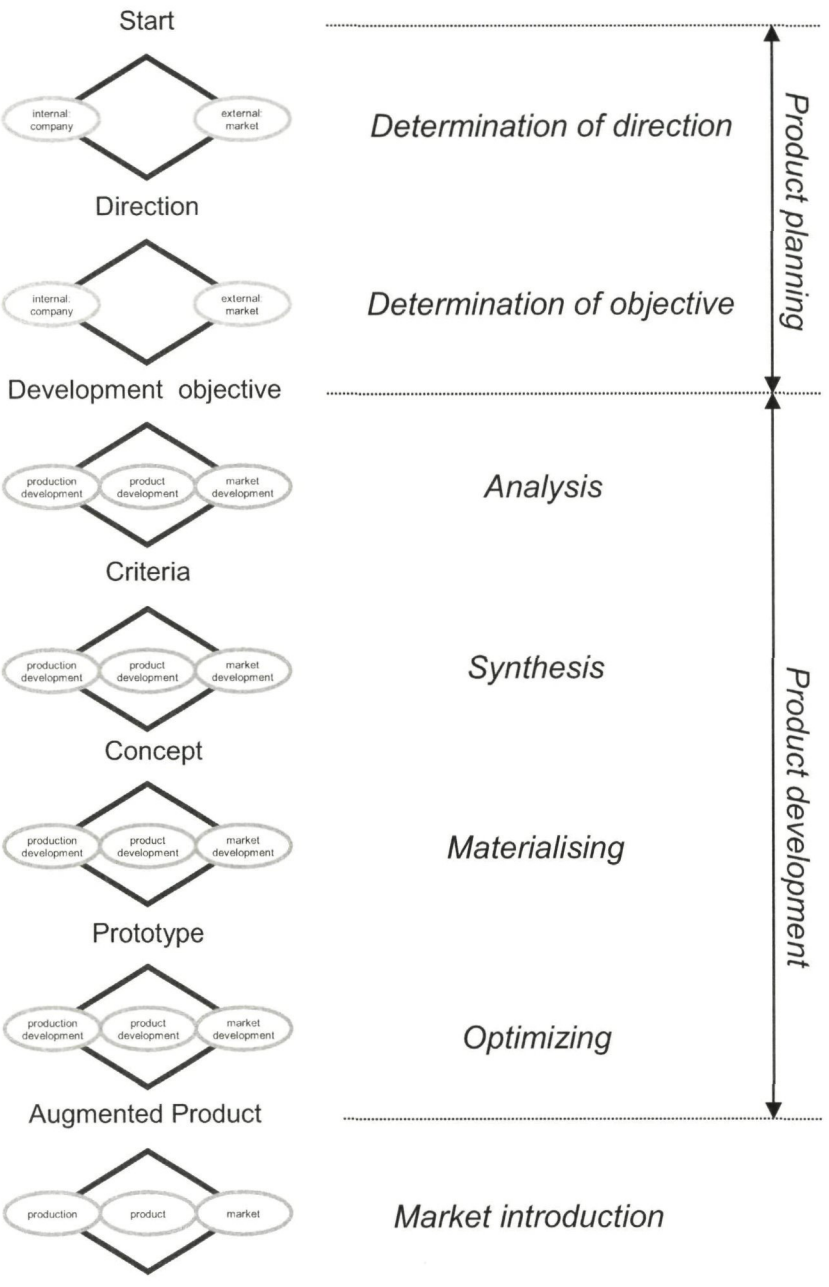
Since the recent acquisition of new medical business activities, an internal project started to ensure that PMS has a standard process in developing a new product or service and for the redesign of systems, components and documentations. Especially the initial stages of the product development process ("the fuzzy front end") are different for each BU and not structurally linked. The Product Creation Process framework that has been developed is a conceptual model, describing the required ways of working on a high level. Currently every BU is analysing how their processes fit the PCP framework. (Brochure Product Creation Process, 2001)

The Product Creation Process requires an overall structure as shown in the figure on the second to next page. Each of the arrows symbolizes a key process that must be in place. The yellow oval (top) is an ongoing activity, the blue arrow (centre) is a periodic activity, and the red arrows (bottom) are typically project activities. PMS believes that the real breakthrough in the reduction of Time to Market is achieved by careful planning and preparation of the future products, technology and skills (the 'fuzzy front end') and by controlling the throughput time and sequence of projects. "Only then will we be able to deliver our products timely and reliably while rework is kept to the minimum." (Brochure Product Creation Process, 2001)

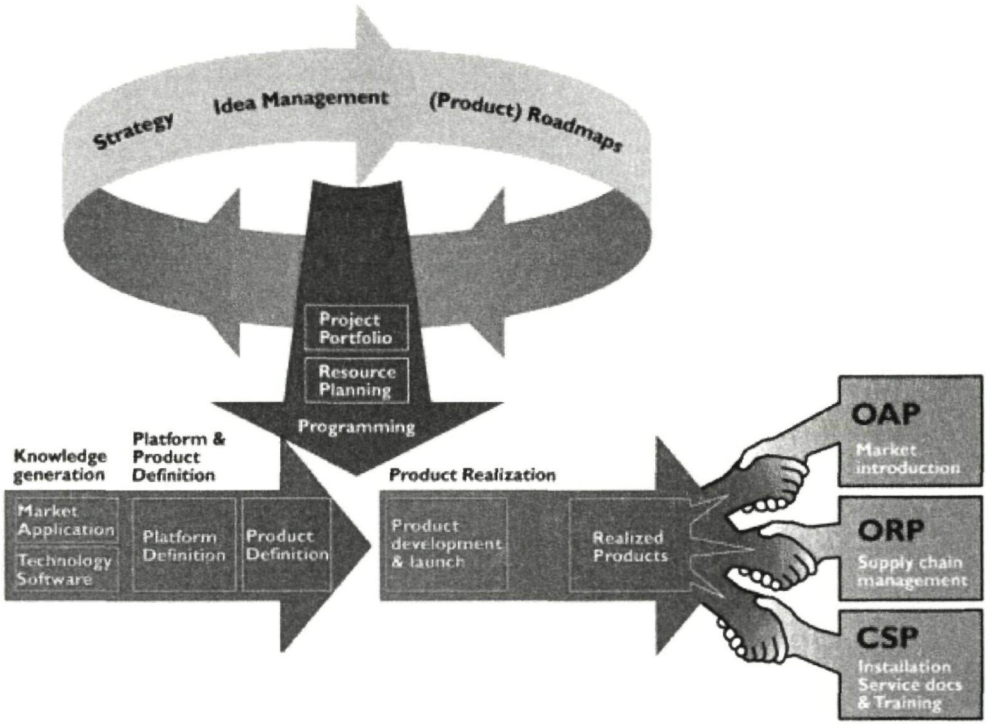
Because the PCP framework is a high level model, it can easily be compared with other development or innovation processes. In comparison to a more simple innovation process, one can identify the 'extra' element of Business and Product Planning (the yellow arrow). Program management and the overall strategy and planning are essential aspects that direct and control the 'bare' innovation process.

New business ideas originate in constant surveillance of the world and from within the company. These ideas are translated into a Product Roadmap, which is a document that describes aspects like the product idea, its target group, and what needs to be done to realize a product (resources and planning). Product Roadmaps are the final results of the business planning as well as the starting point for Product Realization. This phase of Product Realization can be preceded by Knowledge Generation and Platform & Product Definition phases. The Knowledge Generation phase, where market and company information is generated and collected, is a crucial and continuous activity to leverage company knowledge. (Brochure Product Creation Process, 2001)

Innovation process



Model of innovation process of Faculty IDE at TU Delft



Product Creation Process of PMS

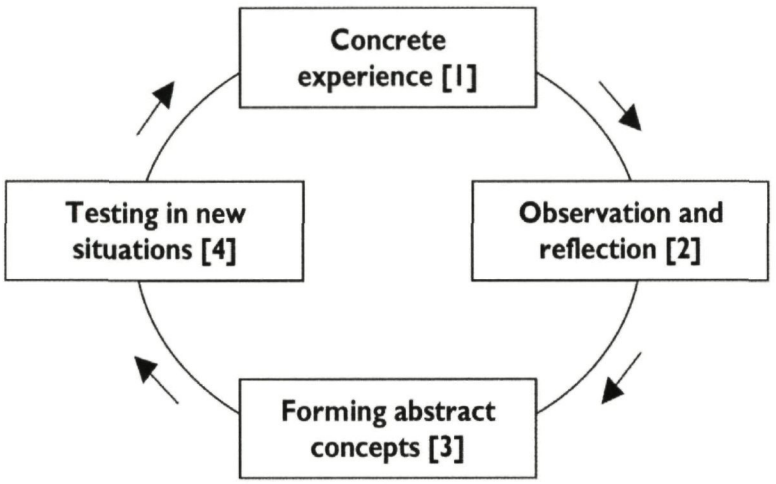
4. Education theories

Experiential learning

(Source: Smith, *David A. Kolb on experiential learning,* first published July 1996, last updated February 2004, on http://www.infed.org/biblio/b-explrn.htm (visited 25th June 2004))

David A. Kolb's model of experiential learning can be found in many discussions of the theory and practice of adult education, informal education and lifelong learning. His model has inspired many new forms of education.

Kolb (with Roger Fry) created his famous model out of four elements: concrete experience, observation and reflection, the formation of abstract concepts and testing in new situations. He represented these in the famous experiential learning circle (after Kurt Lewin, who created the "unfreezing-changing-refreezing" cycle):



Kolb and Fry (1975) argue that the learning cycle can begin at any one of the four points - and that it should really be approached as a continuous spiral. However, it is suggested that the learning process often begins with a person carrying out a particular action and then seeing the effect of the action in this situation. Following this, the second step is to understand these effects in the particular instance so that if the same action was taken in the same circumstances it would be possible to anticipate what would follow from the action. In this pattern the third step would be understanding the general principle under which the particular instance falls. It is acknowledged that there may be difficulties about the transferability of the learning to other settings and situations. When the general principle is understood, the last step, according to David Kolb is its application through action in a new circumstance within the range of generalization. In some representations of experiential learning these steps, (or ones like them), are sometimes represented as a circular movement. In reality, if learning has taken place the process could be seen as a spiral. The action is taking place in a different set of circumstances and the learner is now able to anticipate the possible effects of the action.

Two aspects can be seen as especially noteworthy: the use of concrete, 'here-and-now' experience to test ideas; and use of feedback or reflection to change practices and theories (Kolb 1984: 21-22).

In relation to the *knowledge flow* (see paragraph 4.4 of the report) the first three steps of Kolb's experiential learning are about acquiring new knowledge. In step 4 the new knowledge is applied or exploited. In this model there is no room for sharing or diffusion of knowledge.

Community of practice

(Sources: Downes, *Learning in Communities,* March 2004, on (visited 11th June 2004): http://www.learnscope.anta.gov.au/learnscope/golearn.asp?category=11&DocumentId=5249

Penuel and Roschelle, *Designing learning: cognitive science principles for the innovative organization,* April 1999, SRI International)

The concept of learning in communities emphasizes the need to learn in collaboration and discussion with others. Learning in a group, for example in a design team, has important advantages.

The idea

- Learning is a social activity
- Knowledge is inseparable from practice – learn by doing

Most important implications

- Empower the learner
- Let him create something new
- Let him feel part of a whole

Why the emphasis on community?

First, because collaboration and discussion expose people to new ideas and outlooks, and therefore supports improved learning. The collaboration supports the process of 'shared cognition', the idea that a group of people can create a more complete understanding than a single person working on his or her own.

Second, a community generates a sense of commitment.

Third, learning in communities teaches a person more, it can teach him how the content may be applied in a wide variety of situations, because others in the community can provide examples of use. Communities of practice are typically groups of people with the same or similar expertise and work ('practice').

And fourth, learning communities help reduce the workload of those providing instruction by allowing students to help each other and by allowing an instructor to help many students at once.

What makes a community successful?

First, a community needs a "distinct focus", it has to be about something in particular.

Second, there must be a creation of the sense of the whole. Members need to feel that they belong to something larger than themselves.

Third, content and communication must form a seamless whole, that is, the two must be integrated. The possibilities of online communities on this aspect can facilitate this.

Fourth, there must be an appreciation of participant contributions. The use of incentives is a topic frequently discussed.

Fifth, a community is sustained only through ongoing communications.

Sixth, a successful community empowers its members. They must be encouraged and supported in the creation of something new. ".

Seventh, a learning community in particular must have an educational orientation.

And finally, eighth, a successful community will have a sense of history. A community should have an archive, created by earlier students, on which later students can build. In this way reuse of knowledge is encouraged.

Constructivism

(Source: http://www.funderstanding.com/constructivism.cfm (visited June 2004))

Constructivism is a philosophy of learning founded on the premise that, by reflecting on our experiences, we construct our own understanding of the world we live in. Each of us generates our own "rules" and "mental models," which we use to make sense of our experiences. Learning, therefore, is simply the process of adjusting our mental models to accommodate new experiences.

The idea

- We construct our own understanding and mental models

- Learning is the search for meaning

Main implications

- No standard curriculum
- Instruction focuses on making connections between facts and mental models
- *No standard assessment*

Guiding principles of constructivism:

Learning is a search for meaning. Therefore, learning must start with the issues around which students are actively trying to construct meaning.

Meaning requires understanding **wholes** as well as parts. And parts must be understood in the context of wholes. Therefore, the learning process focuses on primary concepts, not isolated facts.

In order to teach well, we must understand the mental models that students use to perceive the world and the assumptions they make to support those models.

The purpose of learning is for an individual to construct his or her own meaning, not just memorize the "right" answers and regurgitate someone else's meaning. Since education is inherently interdisciplinary, the only valuable way to measure learning is to make the assessment part of the learning process, ensuring it provides students with information on the quality of their learning.

How Constructivism Impacts Learning

Curriculum--Constructivism calls for the elimination of a standardized curriculum. Instead, it promotes using curricula customized to the students' prior knowledge. Also, it emphasizes hands-on problem solving.

Instruction--Under the theory of constructivism, educators focus on making connections between facts and fostering new understanding in students. Instructors tailor their teaching strategies to student responses and encourage students to analyze, interpret, and predict information. Teachers also rely heavily on open-ended questions and promote extensive dialogue among students.

Assessment--Constructivism calls for the elimination of grades and standardized testing. Instead, assessment becomes part of the learning process so that students play a larger role in judging their own progress.

Learning organization

(Source: Calagan, *The future of the profession formerly known as Training*, December 2003, ASTD)

Organizational learning is the utopia where people are helped to learn about the company, the culture, the industry, the market and all other topics relevant to do their job as good as possible. Blending several forms of learning is a modern approach to achieve organizational learning, difficult but challenging to manage. Blending involves a planned combination of training such as coaching, participation in online classes, delivery via asynchronous classes, as well as reading on the beach and collegial relationships.

The ideas

- Evaluation and reflection are vital
- Make knowledge explicit and shareable
- Results in sustainable learning and knowledge

Implications

- Share lessons learned

Personalized learning

(Source: Calagan, *The future of the profession formerly known as Training*, December 2003, ASTD, on http://www.astd.org/NR/rdonlyres/6D3A9759-DCA4-4627-B2E1-0CEF6B4D28AC/0/76031226.pdf (visited June 2004))

Personalized learning is all about bringing the right information and the right people together at the right time. Learning is a continual process. The technology is there to fit learning to the individual so that he can do what is necessary at the time he wants to. The future holds exciting possibilities. A somewhat scary example is provided in The Matrix, where Neo can be trained or 'programmed' to handle weapons or learn new fighting techniques in a simulation environment. According to the new generation learning "had better be interesting or we are not going to do it." (Calagan, 2003, page 37). And: "Training in the new millenium is all about interactivity – simulations, game-based training and experiential learning."

The ideas

- Right information for the right people at the right time
- Technology is really important
- New learner: "It had better be interesting!"

Implications

- Try new forms and use technology
- Interactive simulations and game-based training work

Self-reflection

(Source: Dobrovolny, *Learning* Strategies, October 2003, on (visited Jun 2004) http://www.learningcircuits.org/2003/oct2003/dobrovolny.htm)

Metacognition is the process of self-assessment and self-correction. It includes evaluating progress, correcting errors, and implementing and perhaps changing learning strategies. Adult learners typically have a set of strategies for how they learn. For example, some learners believe that repetition is critical but other believe that they learn best when they just dive in and try a task or a procedure. Meanwhile, other learners rely heavily on visuals or pictures. Reflection is an interpretive process. Learners use reflection to:

- visualize using what they learned by solving a problem or improving something with their new skills
- understand the big picture
- compare their use of the information with how others use the same information
- recall a section in the course

The ideas

- Monitoring one's own learning by collective feedback and re-reading

Implications - Techniques to help learners use reflection (from article on Learning Strategies)

- Provide examples to use the content
- Let them create their own material
- Use rhetorical questions on implications of use of information
- Use a building block visual to understand the big picture
- Create personalized job aids
- Include notes about other approaches to achieve same results

Brain-based learning

(Source: http://www.funderstanding.com/brain_based_learning.cfm (visited June 2004))

This learning theory is based on the structure and function of the brain. As long as the brain is not prohibited from fulfilling its normal processes, learning will occur.

The ideas

- Every brain and learner is different

Implications

- Allow learners to customize learning environment
- *The big picture cannot be separated from the details*
- Create a personally meaningful challenge
- Let the learner try new things safely – create trust

Principles of brain-based learning

People often say that everyone **can** learn. Yet the reality is that everyone **does** learn. Every person is born with a brain that functions as an immensely powerful processor. Traditional schooling, however, often inhibits learning by discouraging, ignoring, or punishing the brain's natural learning processes.

The core principles of brain-based learning state that:

- The brain is a parallel processor, meaning it can perform several activities at once, like tasting and smelling.
- Learning engages the whole physiology.
- The search for meaning is innate.
- The search for meaning comes through patterning.
- Emotions are critical to patterning.
- The brain processes wholes and parts simultaneously.
- Learning involves both focused attention and peripheral perception.
- Learning involves both conscious and unconscious processes.
- We have two types of memory: spatial and rote.
- We understand best when facts are embedded in natural, spatial memory.
- Learning is enhanced by challenge and inhibited by threat.
- Each brain is unique.

The three instructional techniques associated with brain-based learning are:

- **Orchestrated immersion** Creating learning environments that fully immerse students in an educational experience.
- **Relaxed alertness** Trying to eliminate fear in learners, while maintaining a highly challenging environment.
- **Active processing** Allowing the learner to consolidate and internalize information by actively processing it.

A few other tenets of brain-based learning include:

- Feedback is best when it comes from reality, rather than from an authority figure.
- People learn best when solving realistic problems.
- The big picture can't be separated from the details.
- Because every brain is different, educators should allow learners to customize their own environments.
- The best problem solvers are those that laugh!
- Designers of educational tools **must be artistic** in their creation of brain-friendly environments. Instructors need to realize that the best way to learn is not through lecture, but by participation in realistic environments that let learners try new things safely.

5. Explorative literature research

At the startup of the project, I (Laurens) have analysed numerous methods and theories that had anything to do with functionalities and describing a company. Another starting point for this exploratory research was finding a common language or denominator which can be understood by

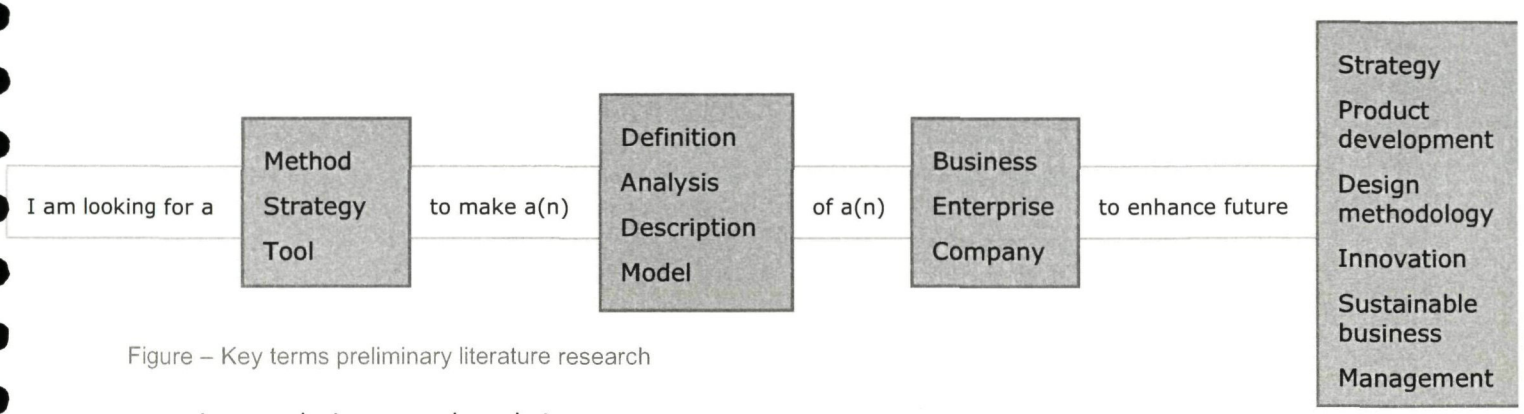


Figure – Key terms preliminary literature research

engineers, designers and marketers.

The theories and methods that were studied

This has led to me to study a list of theories, methods and principles (inspired by numerous researchers and publishers). The ***theories*** or ***methods*** are in bold and the subjects are very briefly touched here:

The **design problem** and the core design process of transforming function into attributes and attributes into a materialised form (inspired by Roozenburg and Eekels, 1998).

Design methods in general, and dividing the ill-defined design problem into sub-problems that have their sub-solutions and an overall solution (inspired by Cross, 1994).

Objectives and function tree can be used to clarify design objectives and sub-objectives, and the relationships between them. The same method can be used to clarify functions and means and their interconnections.

The **Function Analyis Method** can be used to determine the functions required, and the system boundary, of a new design.

There are many ways to capture the **Voice of the Customer** (VOC): surveys, focus groups, one-on-one interviews, contextual inquiry, field reports, conjoint analysis, complaint logs and more. To process the input and document, organise, anad analyse the information again, project teams have a wide variety of tools (Brue, 2003)

Product attributes are the customer's expectations of the performance of the product (Kano, 1980's).

The **Performance Specifications Method** can be used to make an accurate specification of the performance required of a design solution.

Requirements are necessities that can be derived from several groups of people or from processes and are normally named accordingly, for example customer requirements, manufacturing requirements and process requirement.

Managers and marketeers focus on the desirable attributes of a new product, that are derived from the customer's viewpoint, whereas designers and engineers concentrate more on a product's **engineering characteristics** (in terms of its physical properties).

Quality Function Deployment is a well-known method. Literally translated from Japanese it means strategic arrangement (deployment) throughout all aspects of a product (functions) of appropriate characteristics (qualities) according to customer demands.

The house of quality (HOQ) is the nerve center and the engine that drives the entire QFD process. Its aim is to set targets to be achieved for the engineering characteristics of a product, such that they satisfy customer requirements.

The **Morphological chart** is used to generate the complete range of alternative design solutions for a product, and hence to widen the search for potential new solutions.

Customer-oriented product concepting (COPC) is an integrated model that combines: (1) applied behavorial science and stake building philosophy to initialize the process, and (2) a matrix incorporating value measurement, function definition, competitive analysis, a function-technology morphology, and elements of QFD (inspired by Shillito, 1994).

The development of new products is not an isolated activity. **Concurrent Engineering** means teamwork and is therefore all about people (inspired by Buijs en Valkenburg, 1997)

Function Analysis Systems Technique (FAST) diagrams are used to produce function characteristics and product requirements.

Design for Six Sigma (DFSS) is a systematic methodology using tools, training and measurements to enable the design of products, services, and processes that meet customer expectations at Six Sigma qualty levels (Brue, 2003).

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Second round of exploratory literature research

After a round of comments, more exploratory literature research aimed on competences, strengths and weaknesses, the theory of company analysis taught at TU Delft, and graphical representations. Studied subjects:

In general, core competences are part of the research area of **strategic management**. Mintzberg (1987) lists four fundamental aims of strategic management: to set direction, to focus effort, to define the organisation and to provide consistency.

The process of strategic management starts with crafting a **mission statement**, and there are two schools of thought about what this mission should express: the strategic and the psychological school.

The concept of a **competence** is also broadly discussed in literature. There exist three tests to check the validity of a core competence. Apart from core competences, there exist non-core competences, dynamic and static competences (Inspired by Prahalad and Hamel).

The **Buijs innovation method** and the method used at the Faculty of Industrial Design Engineering at TU Delft, called **IDE method** are also studied. Many sorts of company information are gathered and translated into strengths and weaknesses.

Scenario planning is a model for learning about the future in which a corporate strategy is formed by drawing a small number of scenarios, stories how the future may unfold and how this may affect an issue that confronts the corporation.

A **SWOT analysis** is an instrumental framework to identify the Strengths, Weaknesses, Opportunities and Threats for a particular company, and to react upon these with new activities.

Lehmann and Winter (1997) identify four **levels of competition**.

In her thesis on Human-Product interaction in minimally invasive surgery, Van Veelen uses a **interaction scheme** to represent the interaction between the human (surgeon) and the product, and the relevant external and internal factors included. The different types of products used during MIS were clustered according to surgery function, surgery task, product type or solution and product form or design solution.

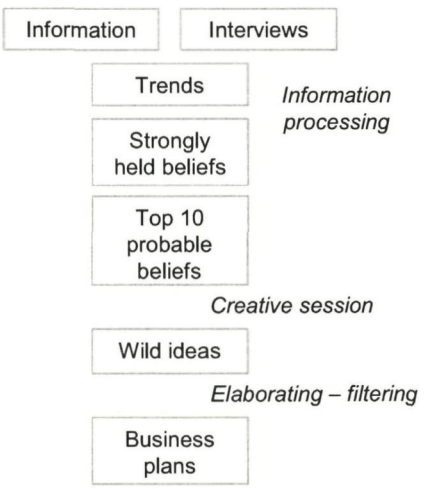
6. Philips Design

Philips Design is the independent design company related to Philips. Most of their projects are for the divisions of Philips. PMS also uses the services of the designers. Together they have achieved to win many design prices for medical equipment. Mission and vision of Philips Design (source www.design.philips.com) show the ambition of improving the quality of people's lives. Design, expertise in human sciences, technology help to create innovative applications that answer people's existing and latent needs, that are relevant for people and that give a human touch to the client's brand experience.

Applied and Strategic Design

Philips Design has two main groups within the organization called Strategic Design and Applied Design. This latter has an entire team devoted to Medical Systems. Every individual in this team is appointed to a certain business unit. They run projects for Medical Systems that are specifically focused on applying the human touch to the high-tech, and scary machines. An recent project, called Ambient experience, gives patients a comforting environment in the examination rooms, by using visuals and sounds selected by the patient himself. The Strategic Design department is more into general research of markets, consumers and trends, and these designers work towards innovative strategies that solve identified problems. I have interviewed a designer from each group, who works for the Medical Systems division.

An idea of the strategic design process



Projects from Applied Design follow processes that depend on the business unit they are for. They are linked to a variation of the Product Creation Processes used by that business unit. Since the BoP project is considered to be strategic, it is more useful to describe their process for innovation as explained to me by Mili Docampo Rama. The process for a project named Cardiology Innovations will probably be used as an example for the BoP project, on which Philips Design is starting to work.

In strategic design projects Philips Design is used to a market-oriented approach. They start with an extensive analysis, consisting of reading information and interviewing involved people, to come up with a list of trends, organised by type of trend (Political, Economic, Social, Technological, Demographic etc.). These are then translated into a number of so called strongly held beliefs, which combine several trends. Field specialists are asked to rate these beliefs (scale 1-3-5), so that a top 10 is selected.

That top 10 of trends-drivers is used as input for the idea generation session, held with employees from all different disciplines of PMS, in which out of the box thinking is encouraged. What follows is a filtering process with multiple steps in which small groups of people are asked to elaborate an idea on a number of criteria. Questions have to be answered like: What are the benefits for the patient, the hospital manager, physician, PMS? On what trends is the idea based? What knowledge is necessary? What could be a business model for the new product-service combination? In this way the ideas are formulated and changed into business plans that suit the problem and the company.

Main comments on the information

What is noticeable from the process described above is that no specific company information is used as input to generate ideas. It is indeed a strongly market-driven approach. However, they do use a lot of company knowledge to make sure the ideas and new business plans satisfy PMS, knowledge that is apparent in the employees who work as team members on the project. As I have mentioned in the introductory chapter using multidisciplinary teams is an alternative or complementary direction to solve the problem of inappropriate business proposals. Would the BoP program consist of just one innovation project the description would not be necessary, but it does not. Also the description can support the designers ánd employees who are unfamiliar with áll the activities of Philips Medical Systems.

In this way the information is useful as an orientation to the company. Mili Docampo Rama, senior strategy consultant of Philips Design, further suggested to let the description be accompanied by a list of questions, which would guide the designers in finding more company information needed in a specific project. An example is to find the strengths and weaknesses of the business unit Ultrasound.

Also, part of the information can be used in the filtering process as arguments as to why an idea would fit current business. The comment that depending on the level of abstraction company information should be used earlier in the process, implies that ideas based on market information can be more innovative and futuristic than ideas based on company information, and that company information restricts the designers to thinking in realistic short term solutions. As in many situations, a balance has to be found between the two extremities, both market-driven and company- or technology-driven information are necessary as input in the process.

Descriptive information already in use

The group of Philips Designers who are dedicated to working on the BoP project are asked to help in making inventory and order into the ideas currently suggested by the different parties. They have categorized according to the clinical workflow I created in the healthcare map. As assumed, this type of information can be used to categorize thoughts and helps to identify gaps and areas that are considered interesting because numerous similar ideas are suggested. This is a first validation of the usefulness of (part of) the information.

An extra dimension is added in the area of training people. In all the phases in the workflow patients and clinical users need training to work with the systems. This provides for a whole area of clinical training aids which can also be designed.

7. Brazil research session

As part of the research trip to Brazil in June and July 2004, students of the Faculty of Industrial Design Engineering of the University of Technology in Delft will develop new product concepts for PMS. These new products will be targeted to serve the poor people of the rural and sub-urban areas of Brazil and are aimed to solve healthcare-related problems.

After a brief research on the medical issues and the circumstances in which the Brazilians live, a creative session is held to start the idea generating process. This session serves as the starting point of the idea generation process of the Brazil group. For my graduation project it serves as an explorative test to see what kind of information about PMS can be used by designers in their process. To structure this explorative research I have set up research questions and methods to analyse the results.

General research question

What sort of company information of PMS can support a designer to generate ideas that fit the BoP and are in line with PMS current business?

Two ways to use the information can be identified. Firstly, the information can be stimulative, or in other words it can be used for the generation of ideas. It can stimulate the creativity process and support the designer in his or her creative problem solving process. Secondly, the information can be used for the evaluation of ideas; it can be used to evaluate the ideas and select the ones relating to PMS current business.

Objectives

The objective of the creative session is to get a feel of what the designers pick up on, what they use in their idea generating process and what information they use to base their choices on. I would like to find out what information they find stimulative and what they can use to evaluate their ideas. It would be interesting to see if one of the two stimuli results in more and/or better remarks.

The information presented is meant to be comprehensible for designers. To improve the descriptions (whatever form they have at the moment of the session), I would like feedback on the quality of the descriptions. The descriptive character can be evaluated on how well the information is understood and remembered. The amount of visual or textual stimuli can be evaluated.

Sub-questions

What elements of the information do the participants consider to be useful in their idea generation process?

What elements of the information do the participants consider to be useful in their idea evaluation process?

What type of description leads to more and/or better remarks?

Is the information comprehensible and complete? What do they lack? What is abundant information?

Method

The descriptions of PMS are presented to one group of designers. These students from the faculty of Industrial Design Engineering are considered to have the same kind of background knowledge on:

- *Designing (experience from their study)*
- Living in Brazil (general aspects)
- Healthcare system in Brazil

The participants are confronted with the two presentations. First the 'abstract' presentation is held, followed by the more product-oriented presentation. The designers are asked to write down anything they notice during the presentation. These remarks can be ideas, things they don't understand, things they lack, interesting things, questions, things they consider to be very useful. They are asked to write down the slide number of the slide the remark belongs to.

Then, in an open discussion, the main remarks of the participants are shared and discussed. The group is asked to state what they think they could use to generate ideas or new directions, and what they think they could use to evaluate the ideas/directions to make sure that these relate to Philips Medical Systems business.

This process is repeated during the second presentation.

After the discussion, I have showed the group two presentation boards containing most of the information of the presentation. I have asked them to write down what type of information they consider to be the most valuable in generating ideas. They were asked to select the three slides or types of information they would personally use to generate ideas.

As a final exercise the results from the sharing and structuring session are linked with the information of Philips Medical Systems, to find directions for new products. As a supporting aid, the two presentation boards are used. The process of this linking is not yet clear. For my research, the arguments used to select directions, which are interesting for PMS are extremely interesting. These provide a rough insight as to which elements of the presentations are remembered and used for the evaluation of ideas/directions.

Method of analysis and results

The session is analysed in several ways. First of all, I have handed out forms on which the participants are asked to write down their remarks during the presentations. These remarks are read and summarised.

The second method of analysis is the open discussion after both the presentations. I have written down the most notable items of these discussions.

Thirdly, the most valuable types of information as selected by every participant are analysed.

The results from the session in which the potential product-service directions for PMS are selected provide input to analyse the question as to which information is remembered and used for evaluation.

The fifth method is to analyse the results from the session: flipovers, clusters, ideas and drawings. It can be interesting to map the ideas onto the axes of newness/innovativity and matching with PMS. This can be done by me or by the group of participants, and I favour the last to finally see what they consider to be relating to PMS.

The follow-up result of the Brazil project will be interesting. The final concept choice, how well it is received in Brazil and whether the concept still is interesting and close enough to PMS core business.

The two descriptions

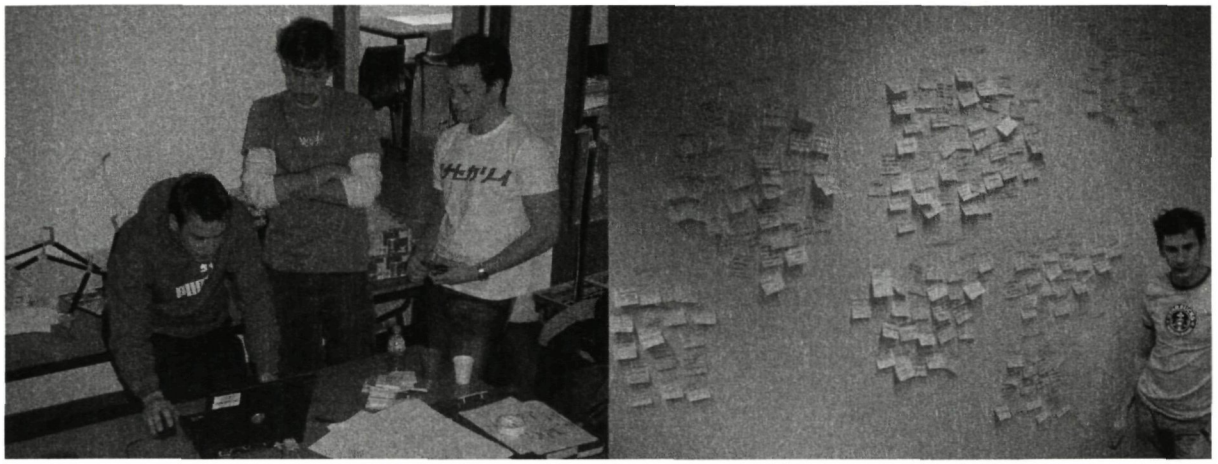
I have described what Philips Medical Systems does and is about in two different ways. These descriptions were verbal presentations of approximately 10 minutes, using PowerPoint. Afterwards, the most important elements of the presentations are presented on two big white boards.

The first description is more abstract, describing the core of the company. It includes: mission and vision of Philips and PMS, the scope of capabilities of Philips and PMS, and finally the strengths and competences of Philips Medical Systems.

The second description is less abstract. It will include: the major product categories, an explanation of the different imaging modalities, a brief description of the other systems, the services, and the functionalities provided in the two main product categories. These are called functional modules. Also, brochures and product and services booklets will be available.

Results

All the remarks that have been written down by the students are read and grouped and presented on the next page. The main remarks are discussed in the discussion with the designers after the presentations. They will be addressed in the section of 'Discussion with the designers' further in this paragraph.



Preparing test session with Brazil group and clustering information

Remarks on the content of the presentations

Presentation 1 – Abstract presentation

General response: information is good, form of presentation is less.

1. Give examples of products

Give examples of products and what they do per clinical area, per area of activity, and per competence.

2. Show how PMS is positioned relative to competitors

Competences and strengths and weaknesses should be relative to competitors. Show where the competitors are. Position of PMS relative to competitors. What are PMS' advantages over competitors.

3. *Provide sources of information*

Give sources for the information. Who made the SW-overview? Philips or external party? Objective or subjective?

Trends global or European? Identified by Philips or other sources?

4. Quantify to show relative importance

Make strengths tangible. Give quantifications or examples. Or give more background information on every strength or weakness.

Give quantifications with areas of activity: sales, profit, grow, r&d budget.

5. Give direction by showing targets of PMS

Target groups. On what kind of people or customers does PMS target their systems. Where are the products sold? Target areas in the world.

To which of the trends does PMS want to respond? Maybe direction, strategy?

Where in the healthcare process is PMS active?

6. Consider the use of external information

Trends and competitors is considered as external information, interesting but maybe not mention in (internal) description of the company. "it's for the designer to find out!"

7. New ideas for information

Areas of activities, show what the overlaps mean. What kind of areas are those? And give examples of these areas.

Insight by explaining strengths: How do doctors buy? Maybe information on type of customers and why they buy what (their reasons to buy)?

Abstract presentation is my favourite, I just miss which diseases can be treated with Philips' systems.

8. Extra remarks

Important is to show what PMS can do. What does that mean? [red.] Marieke and Robert

Another word for imaging and scanning is "Looking into bodies"

Presentation 2 – Product-oriented presentation

General response: a little boring, information is good, form of presentation is less.

1. Consider level of detail of information

Too much detail on imaging modalities, or show better where you are. "You go really deep into present technologies." Take a more superficial approach. Further in the design process, more information might be needed

for a chosen technology. Too many pictures. But also: "Explanations about technology is extremely useful! This speeds up idea generation."

2. Quantify and give numbers to show relative importance

Quantify the product categories in terms of profit maybe or sales.

Product portfolio: Quantify which of the products is most important or biggest, in PMS but also relative to competitors for strong or weak categories.

3. Improve functional modules

On functional modules: where or what is the connection between the modules. It is easier to give this on hand out. "Very good approach! Provides black boxes for design."

4. Give more attention to services

Service gets little attention, but is very interesting and important for PMS. Who provides these services, what kind of people? Give examples of these services.

5. New ideas for information

Special characteristic like radiation danger, can be solved? How dangerous is this for the user? Is not an insurmountable problem. Mention limitations, like US can't go through bones.

We want to know the prices of the systems, where and how many are sold?

A designer wants to know size/weight/energy use of the products.

The examples of type of images for all the systems are illustrating. Tell what you are seeing or what can be treated in that area.

Visualize physical principle of modalities. Use presentations of Favie to explain physical principles of modalities.

6. Extra remarks

The first general background slide shows too many facts: "Of no use for the design project".

Relation of product categories and flowchart is good and valuable.

Business units and product categories are less interesting and not so clear.

On functional modules: Use prausize i.s.o. figure. I can not read what Roeslan has written there, I have asked him to clarify.

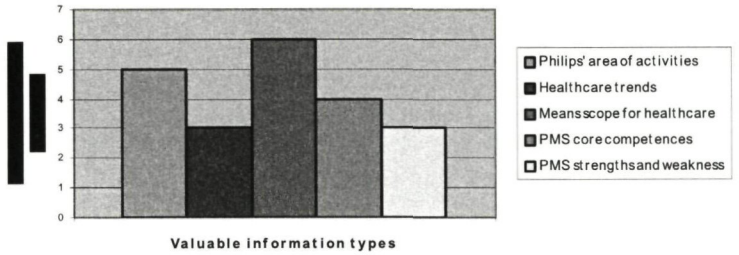
Remarks on the form of the presentations

1. Although, specifically asked to focus on the content of the presentations, the students could not resist to comment on the form in which the information was presented.
2. Less information on slides, less text
3. If you want to show a lot of information, let information appear sequentially per slide
4. Hand-out is useful, for example for means scope for hospital.
5. Text at the bottom of the slides is too small.
6. Show where you are in the presentation, by showing slide number and total number of slides or by showing the index of the presentation.
7. Use colours and sizes of figures to show quantity or focus. For example to show what area of activity provides the main income for Philips. And for functional modules.
8. Use figure as reference, when explaining details. Show where you are in relation to the whole in the presentation but also in product category or other things. For example connecting flowchart and product categories.
9. If explanations are on the same topic, use these topics to increase readability.
10. Abbreviations are not understandable.

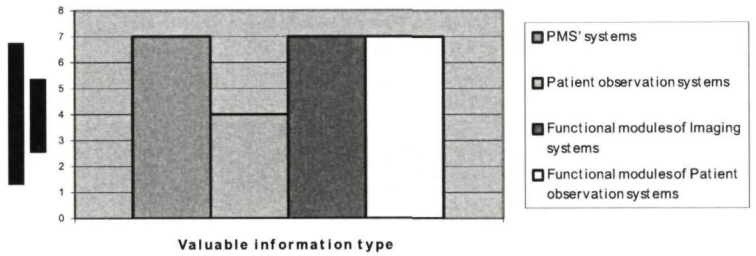
Other remarks

- Notedop is nutshell
- Wellness is well-being?
- Mission is mission statement
- Idea: Minimal invasive is better hygiene, or maybe less risk of infection.
- Question: Is PMS good at IT?

Most valuable information for generating ideas, selected by design students from abstract presentation



Most valuable information for generating ideas, selected by design students from product-oriented presentation



Dicussion

Number of remarks

I have counted the number of remarks made by the participants made per slide and per whole presentation, as was done by Molendijk in her master's thesis (Molendijk, 2003). This provides the following results:

More remarks were made on presentation 2 (55 remarks) than on presentation 1 (42). This could suggest that the approach of the presentation, namely the product-oriented approach, triggers more in designers. However, too many factors make this result not interpretable in this way. For one thing, the second presentation (37 slides) had more than double the number of slides than the first presentation (16). Secondly, an effect of becoming acquainted with the method could be accounted for, since the participants got used to writing the remarks and the discussion afterwards during the first presentation. Thirdly, I have not made a difference between the sort of remarks that were made. Remember that the remarks could be ideas, things the participants don't understand, things they lack, interesting things, questions, things they consider to be very useful. A bad slide (in format) can account for many remarks of all the designers, whilst not saying anything about the usefulness of the information.

To conclude: I consider the total number of remarks made not useful for concluding on which sort of presentation is more valuable for designers.

Most valuable information for idea generation

After presenting the information and having discussed the presentations with the design students, they were asked to select which of the information they would find most valuable for generating ideas. They were allowed to select the 3 most valuable types of information. The results are shown in two graphs. The graphs only show the most selected types and the number of times they were selected. Other slides have also been selected a couple of times but not by more than 2 participants.

A couple of interesting things can be identified:

Firstly, the results validate the assumptions made earlier about which type of information would be useful for designers. We assumed that the strengths and weaknesses and the core competences of a company would provide valuable input for the generation of ideas, which is validated by the participants. The functional modules are also selected as very valuable.

Secondly, the overview I have made on the means in healthcare and the categorization of the products provides valuable information for generating ideas. In my opinion, this information is valuable because they give the designer the possibility to identify directions or strategic gaps for new products. On the other hand they give designers the possibility to give new ideas a place in the current healthcare world and PMS portfolio. The overview of Philips' areas of activities also provides these to types of uses.

The two remaining types of information regarded as valuable to generate ideas are the trends in healthcare and surprisingly, the product category of patient observation systems. The trends have the clear aid to provide direction in generating ideas. The patient observation systems are selected because the students considered this group to be particularly useful for the BoP project. In this way, this information also provides direction, or focus, in the generation phase.

Discussion with the designers

The discussions after both the presentations helped to clarify the remarks made by the participants. Five issues that were discussed were particularly interesting:

- Provide the sources of the information

The design students lacked or were interested in knowing the sources of the information, which seems logical. It does matter to academic designers that information can be decently referenced or 'just' reflects an opinion of an individual. In my experience with designers, or at least students, it is often so that they are rather opinionated. Generally, they display a need of being free to do what they consider to be right. That is why they tend to not take information for granted or should be given the freedom to verify and interpret the data as they want it.

- Do not intend to give external information

The students pointed out that they needed some form of benchmarking of the information. If PMS does this, how are competitors doing? The trends in the healthcare market were also considered interesting, but both sorts of information are external or market information and should not be part of an internal description of the company. However, this information puts the information of PMS into perspective and they form the basis for example the vision and strategy of PMS. Obviously, there is a relation between the company information and information of its' environment. It is disputable whether this benchmarking information should be provided. In discussion afterwards we agreed that information on trends and competitors is considered to be external, and therefore should not be part of a presentation about the internal side of an organization.

- Give examples and quantification

The designers expressed their need for examples during the first presentation, and they were provided satisfactorily in the second. The need for quantifications was also a recurrent one. If giving an example or explaining a strength it is insightful if numbers or details are given to again provide a reference. In the case of the product categories it was suggested to show sales of every group and modality to show their size. If retrievable I do consider this information to be an added value.

- Elaborate services and functional modules

Both the service portfolio and displaying the product categories in terms of functional modules were considered very interesting and useful, but the information given did not seem finished yet. Give more attention to these two sorts of information.

- Level of detail – give the designer freedom to select whatever he or she wants

Some of the students considered the second presentation rather boring and long (while it just lasted 15 minutes and was about the portfolio of the company they work for!). The comment was that the presentation showed too much detail. Others did not agree, one actually considered this information the most interesting. This triggered a participant to the following statement (derived from a flagstone from his grandmother's kitchen):

Er is nog nooit een kok gevonden die koken naar alle monden.

Freely translated, this means:

Never there was a cook, who could cook for every mouth.

Or, in terms of the subject at hand:

It is not possible to give such a description of a company to designers that is appreciated or considered valuable by every one of them.

So, instead of trying to find what type of information of a company a designer would find most valuable to generate ideas, it is better to provide the most interesting types of information and provide these in such a way that the designer can pick whatever triggers him most. Considering this, the idea was discussed to develop a creative tool, containing the most valuable types of information about Philips Medical Systems. The tool should support the idea generation process of the designer and should let him or her free in selecting whatever information he or she could use in this process.

Conclusion

I consider the try out research session quite fruitful. It validated a couple of assumptions, numerous new ideas for information were generated, a selection of most valuable information was made, and an idea for the description came up. Furthermore, numerous comments were made on the form of the presentation.

Important insight was the fact that the 'independent' and opinionated designer needs to feel free in deciding what company information he or she should use. This leads to three important conclusions. First of all, there is not one sort of information, which can support every designer to generate ideas. Secondly, provided I have gathered more than one sort of valuable information, the designer needs to be free in selecting whatever he or she finds useful. Thirdly, the designers have a need for references of the information to ascertain validity. This aspect of free and independent designers also implies that it is not very likely that there will be one innovation method or process they are able or willing to work with.

On behalf of what sort of information is considered valuable, the following can be concluded. The competences, strengths and weaknesses, functional modules can support the designer in generating ideas, they give information with which the designers can play and which they can combine with market information; this can be called extendable information, used to build new solutions on. The healthcare map, the areas of activities and the product categories support the designer by giving overviews in which he or she can place his ideas and find new opportunities; this can be called categorizing information. The trends and the category of Patient Observation Systems (later called Clinical Monitoring Systems) give direction for solutions. External information, including BoP related information, should be the basis for the innovation, but it is not considered part of my project to provide this information.

The extendable information is more stimulative than the categorizing information. The evaluative function of the information lies in the idea that all the information can be used to argue that a match between the new proposal and PMS exists. A designer could for example 'defend' his idea by explaining upon which competence or strength it is based and how it relates to the current product categories or portfolio.

Descriptive information already in use

The Brazil group continued their process to generate ideas using their market information and my company information. In a matrix they have been looking for possible combinations between the groups of identified market opportunities or problem groups and the technological core competences. A second validation of the usefulness of the company information.

In a way similar to a SWOT-matrix an attempt to combine the results of the analyses resulted in interesting areas and finally in product ideas. The exact link between the matrix and the ideas it not clear. Also, the ideas are not described verbally to explain which problems they solve ánd why they are suitable for PMS. A third comment is that most of the ideas match with the competences of connectivity, storage and data processing, which are also competences of Royal Philips. Few ideas match with the true medical competences of medical image acquisition and monitoring vital signs. As a suggestion to myself I should stress the importance of these two competences better.

Company information and its application

The interviews and test with designers have led to an insight into which company descriptors (sort of company information) can be used to do what. Every company descriptor can have more than one application and function. The table shows the four possible applications, the functions, and the company descriptors. The designers of the Brazil research session were asked to select what company information they consider to be most valuable to generate ideas. These company descriptors are highlighted (in bold).

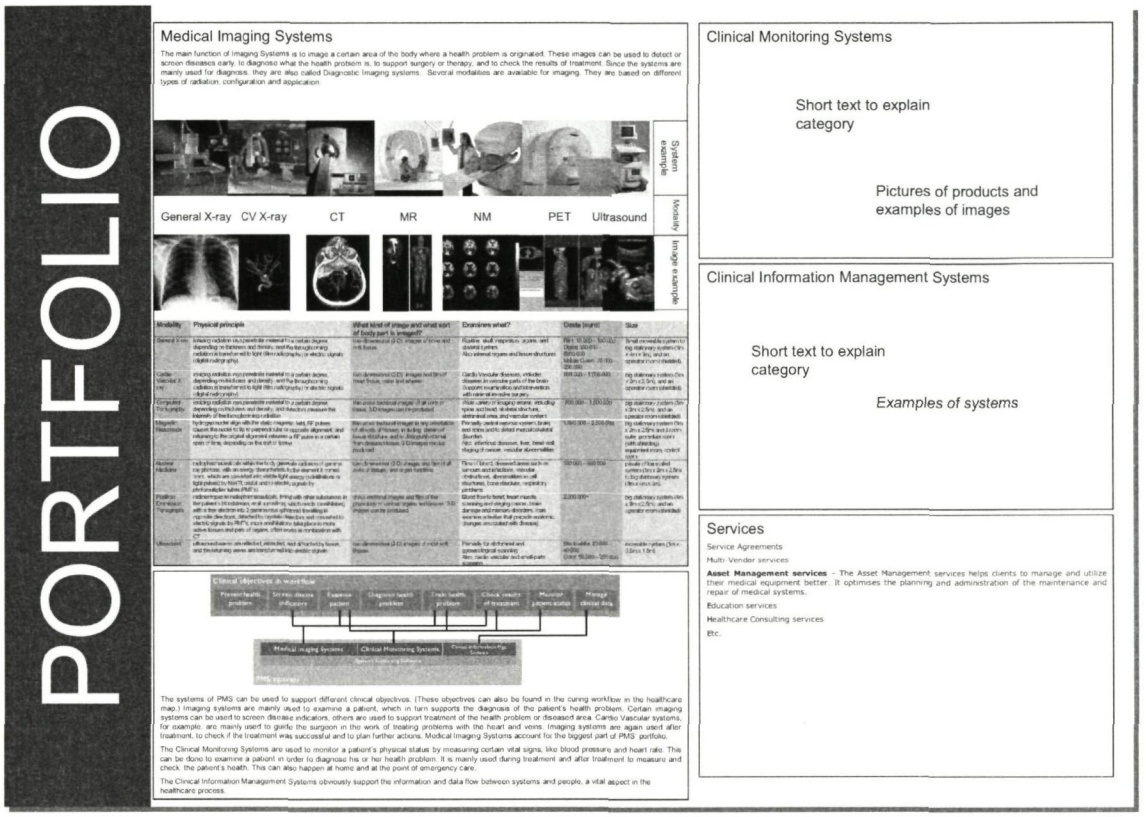
Table 7.1 Sorts of information per function

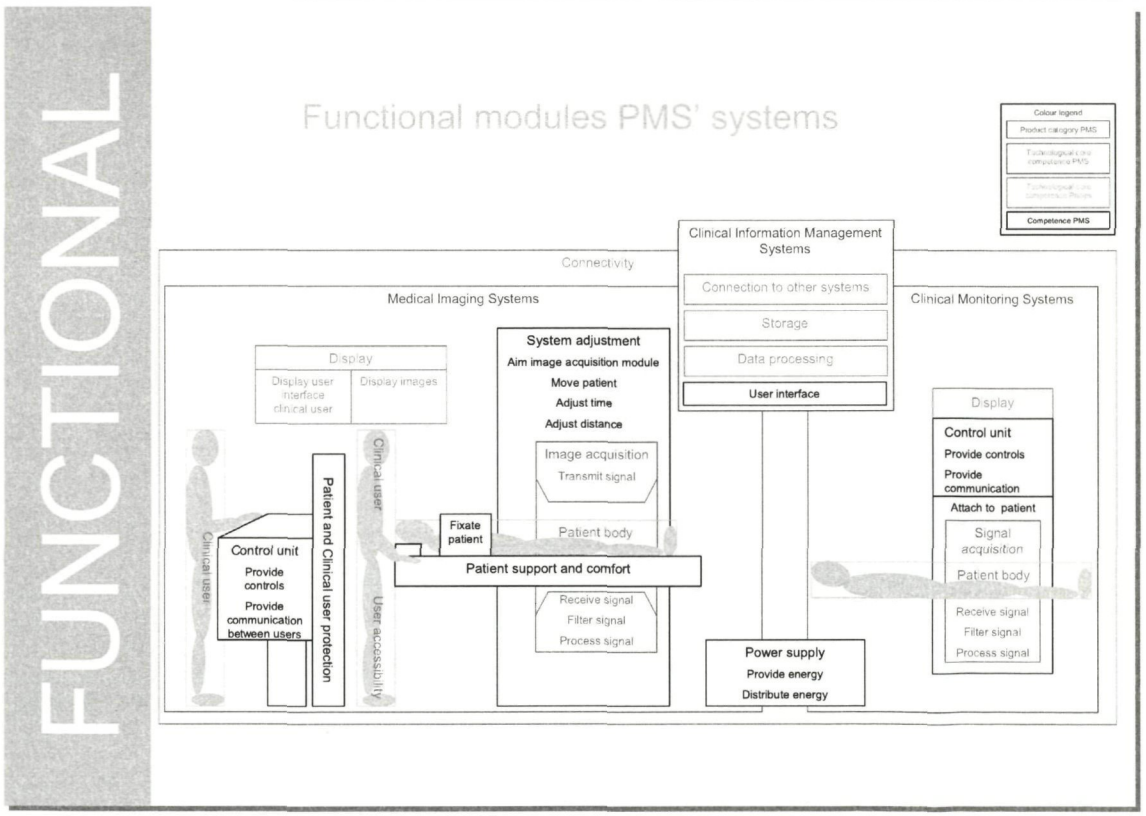
Application of information	Function of information	Sorts of information
Scope	Informative	all the information sorts can be used for orientation on the company,

		specifically portfolio information and strategic direction are informative
Ideate	Stimulative	**competences, strengths & weaknesses, product categories, functional modules**
Categorize	Categorative	**areas of activities, healthcare scope, product categories**
Evaluate	Evaluative	all the information sorts can be used as evaluative arguments, specifically it can be explained upon which the ideas are based (competences, strengths & weaknesses, product categories, functional modules) and where they fit in the scope (areas of activities, healthcare scope, product categories)

8. Posters of the company information

After the company analysis a first attempt has been made to make a 'description' of the company. The result were four posters or maps of the most important information.





CORE

Strategic direction

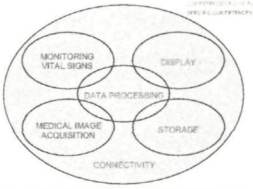
Mission
To help save, lengthen and improve people's lives
We will be our customers' first choice technology partner
We will be our employees' first choice of companies to work for

Vision
Healthcare Without Boundaries
We are looking to the future of healthcare and we believe we have a unique role to play. A future in which Philips - through collaborative relationships with its customers and applying ingenious technology - eliminates the barriers and constraints to improving health and well-being.

Strategy
Deliver, Grow, Innovate, Satisfy, and Differentiate
We intend to become the first choice healthcare solutions partner by doing business differently. Beyond outstanding technology, the Philips experience is about creating strong, collaborative relationships. Every PMS employee has a role in delivering this experience through our passion and commitment evident in every customer touch point.
We want to:
Follow a path of quarterly cost and productivity improvements
Be the leader in the Cardiology and Critical Care markets
Drive continuous market share grow in Radiology, Oncology and Women's Health
Win in Molecular Medicine
Provide solutions that enable clinical and operational excellence
Drive a differentiated brand position in the market

Strategic objectives
Efficient innovative leader
Achieve 14% EBITA in 2004 and go beyond that in 2005 and 2006
Maintain and grow market share in our key markets
Grow service contract penetration across all modalities
Continuously refresh our product lines
Expanding Healthcare IT offerings

Values of Philips
Delight customers
Deliver on commitments
Develop people
Depend on each other



Strengths and weaknesses

Strengths
- High rated service support
- Good reputation in cardiology
- Good technological quality of products

Weaknesses
- Non-market driven development of new products
- High prices
- Poor perception of performance in APAC countries
- Far behind on GE in huge market of USA

A strong engineering focus results in extensive testing for quality and good technological features. The reputation of Philips Medical Systems is solid, the brand is established and well accepted in the healthcare industry. Especially in the area of cardiology, the reputation of PMS is good. The broad product line and quality of cardiologic products result from years of experience and contact with cardiologists.

The focus on quality and technology leads to high prices. Philips' objective to transform into a truly market-driven company (Annual Report 2003) is definitely necessary to overcome the technology push strategy that results in high-priced products that do not completely fit consumer needs. There is a tendency under employees to exaggerate the superiority of PMS. Market research indicates that competitors GE and Siemens perform at the same level and sometimes better. Competitors seem to be better in launching products that are not over-featured.

Geographically, it is noticeable that PMS doesn't perform well in the Asia-Pacific countries, an area of interest for the BOP project. In the USA, still the biggest and a growing market, GE is far ahead. PMS does not have good coverage within the big groups of hospital, which buy large numbers of equipment and services.

Competences

Technological core competences Philips Medical Systems
MEDICAL IMAGE ACQUISITION is most definitely a core technological competence of PMS. Acquisition of medical images can be done with a variety of technologies, also called imaging modalities. They will be explained in more detail in chapter 4. After acquiring the images they are processed, displayed, shared and stored. Medical Image Acquisition delivers the input for the Medical imaging systems, and finally leads to all the different images and films of the human body that can be made today.
MONITORING VITAL SIGNS is about measuring vital signs like heart rate, blood pressure and heart characteristics. This is an important aspect in hospitals to check the status of patients, but can also be used in other areas like sports with watches displaying the heart rate, or identification of patients or people with biosensors.

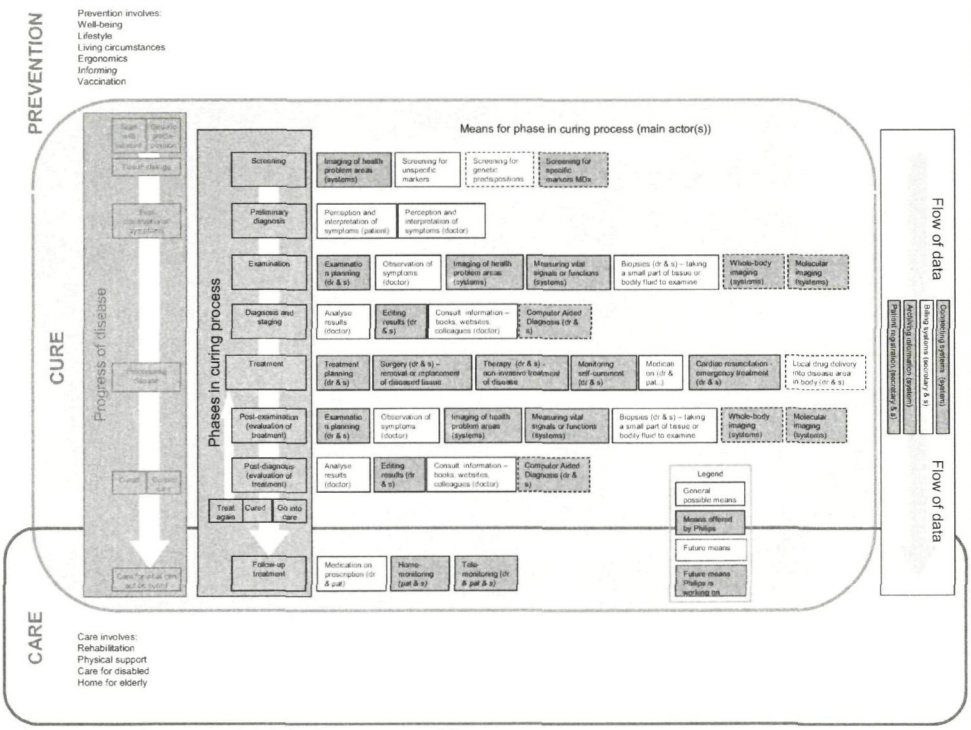
Technological core competences Philips
DISPLAY comes straight from the initial creation of light bulbs and is apparent in all sorts of products: screens, TV's, interactive products, user interfaces, and small displays on consumer products.
STORAGE of data is applicable in many of the sectors of Philips. A couple of major inventions of Philips lie in this area, like the video and the compact disc. Also storing and archiving of for example digital music and X-rays images is an application of this competence.
DATA PROCESSING is a competence that is recurring in many of the systems of Philips. Input information needs to be processed in order to get the required output.
CONNECTIVITY is an answer to the trend of the more information exchange and communication between people and systems, the idea of a connected planet. Wireless connection is a new direction in this area. It is important to connect all of the elements of systems to each other and provide the user access to the output of these systems anywhere and anytime. This competence provides the connection between the gathering of data, the processing of the data, and the storage and display of the information.

Technological competences
PATIENT SUPPORT: Patient tables and accessories are used to support the patient or parts of his or her body. Ergonomic necessities and mechanical characteristics are combined.
PATIENT FIXATION: To improve the outcomes of examinations patients are fixed to systems or systems are attached to patient (for example a fetal monitor).
PATIENT COMFORT: A close relation with the previous two competences exists. This is also the area of mental comfort, with an example of the ambient experience project, providing a personal comforting environment for the patient.
PATIENT PROTECTION: The patient is protected for too high doses of radiation and 'collision' with the systems.
CLINICAL USER PROTECTION: Accessories and separated rooms are used too protect the operator from negative influences from the systems.
CLINICAL USER ACCESSIBILITY: The operator is provided good access to the patient during examination or treatment.
SYSTEM ADJUSTMENT: The system can be adjusted to a specific task depending on the patient, the health problem and the surroundings. Height, distance, size and time can be tuned automatically and manually with controls and suspension systems.
CONTROLS: Controls are used for adjusting the system to get the best outcomes. Emergency and easy to use handles are examples of this competence.
USER INTERFACES: All the displays and interaction screens use user interfaces to support control, and to give access to the results.

Service-related
CONSULTANCY: This competence is used to inform the clients which systems can best be used and how. PMS makes an effort to think with the client and to come with complete solutions.
INSTALLATION OF SYSTEMS: Systems are installed by technicians, and are ready to use. Updates and new components can also be installed later.
TECHNICAL SUPPORT: Local support is given to make sure the systems work properly.
EDUCATION AND TRAINING: Education and training is given to the intended users of the systems.

Corporate
GLOBAL NETWORK: PMS and Philips have a global network of offices, production plants, customers, and partners. There are contacts in every country.
PHILIPS: EXPERTISE IN LIFESTYLE PRODUCTS: Philips has experience with consumer products and aiming products at specific target groups with a certain lifestyle, via its' product divisions CE, DAP, and Lighting.
DESIGN: EXPERTISE IN CULTURES AND TRENDS: Philips Design has experience with analysing and describing cultures, religion and trends, and their implications on products.
ESTABLISHED BRAND: Philips is an established, global brand. The brand is carried out by lots of different products and by other means of communication. It is important that the good reputation is spread in emerging and developing countries.

HEALTHCARE



9. Program of requirements

Before making a program of requirements, the phases in de lifecycle of the product have been analysed using a so-called process tree. This tree, together with a summary of a list of Pugh (Roozenburg en Eekels, 1998), has been used as a checklist for listing the requirements. The main purpose of the program of requirements is to define the attributes of the final product and to form a basis on which a proposal can be evaluated.

Throughout the project a set of criteria or requirements has been changing and developing along with the product. What is presented here is the end result. The criteria can be divided into demands and desires, where the demands are criteria which have to be explicitly met, and desires are requirements which have to be met as much as possible. In case criteria are conflicting, an optimal solution has to be found. Because this exploratory project is in a sense a feasibility study to a new form of company information input, objectives regarding the introduction are also added.

Important aspects of the tool are:

Group activity - Using the tool must be a group activity, instead of an individual learning process.

Active learning - The tool must enable the designers to (inter)actively create company knowledge.

Attractive - The tool must be appealing to designers to trigger its use.

Usability - It must be clear how the tool should be used and it should be easy in use.

Supportive - The tool must support the designers to use the information in their innovation process.

Manufacturability - The first version of the tool must be simple; it must be produced for a low budget with use of facilities at PMS and TU Delft.

Program of requirements

11. Objectives of new activity
    a. The product must, depending on the format of the BoP program, minimally be used by 10 groups in the year 2004-2005.
    b. The tool must enable the design team to have a basic and shared understanding of PMS in maximum 6 hours.
    c. The tool must support the designers to use the information in their innovation process.
    d. The tool does not need to generate direct profit.

12. Life span and target group
    a. The first version of this tool must be usable for at least two 2 years (2005 and 2006)
    b. The product must function well during one design project, which can last from 2-8 months.
    c. The product is intended to be used by a team of four designers.
    d. The product is intended to be used by design teams in the BoP program.
    e. (Desire) It is desirable that teams of different size can use the product as well.
    f. (Desire) It is desirable that teams of different compositions can use the product as well.
    g. (Desire) It is desirable that teams in other disciplines or programs can make (partial) use of the product.

13. Production and distribution
    a. The total development costs have a maximum of 3000 euro. (These are the costs for an intern for 3 months and costs for extra resources.)
    b. The time for development has a maximum 6 months.
    c. The total production costs for the first prototype should not exceed 200 euro.
    d. The tool must not cost Philips Medical System more than 125 euro per piece, when made in a series of 15 tools.

e. Assembly of one product should, depending on the status of the sub-assemblies, be possible in half an hour when made in a series of 20 products.
f. The product must stay intact during transport on plane, bicycle bus and walking.
g. The product must fit into a regular suitcase.
h. The product should not weigh more than 2 kg..
i. (Desire) It is desirable that the product can be send around the world for low costs. For example: for 2 kg. it can cost up to 60 euro at UPS.
j. (Desire) It is desirable that the lose elements of the tool can be carried around easily.
k. (Desire) It is desirable that few special components need to be made or bought.
l. (Desire) It is desirable that components can be made easily. For example: the physical components for the prototype can be made by an employee in a few days.
m. (Desire) It is desirable that components that need to be bought are as cheap as possible.
n. (Desire) It is desirable that the volume of the product is limited to 5 liter, which is for example an A3 book of 4 cm thickness.

14. Appearance
    a. The product must fit in the style of Philips Medical Systems.
    b. Upon unpacking of the product, the user should be triggered to explore the product. The appearance of the product should appeal to designers.
    c. A modern font must be used in the text.
    d. (Desire) It is desirable that the texts are as comprehensible as possible. Few questions should arise and few should remain unclear.
    e. (Desire) It is desirable that many visuals are used in the tool, because they give good insight, they are better memorized than text, and designers are visual-minded.
    f. (Desire) It is desirable that visuals have a clear and inspiring appearance.

15. Usability
    a. The instruction that is included must be brief and to the point.
    b. The purpose of the tool must be clear and easy communicable.
    c. (Desire) It is desirable that the components and use cues should make use implicitly clear.
    d. (Desire) It is desirable that navigation through the information section is as fast an insightful as possible.
    e. (Desire) It is desirable that navigation through the use guide, the information section and the maps shows a relationship.

16. Content
    a. The information offered by the product must describe what the company does and is about to someone unfamiliar with the company.
    b. The information offered by the product is general. More detailed information must be accessible via links to persons and other resources.
    c. Confidential information must not be open for third parties.

17. Use
    a. The team members must have the opportunity to make a selection of the most valuable information for their project.
    b. The product must provide for a means to store findings and new information.
    c. The product must trigger group discussion and interaction.
    d. (Desire) It is desirable that the product offers the possibility to the tool maintainer to add project-specific information (e.g. the assignment, region-specific information, related projects).
    e. (Desire) It is desirable that the understanding of the company is physically present in the design office to remind the team of the company.
    f. (Desire) It is desirable that the design team can create her own cards or information material.
    g. (Desire) It is desirable that a digital version of the information is included to ease reporting and to enhance using the information digitally.

18. Extra functionalities
    a. (Desire) It is desirable that the product contains an introduction paper with checklist of components.
    b. (Desire) It is desirable that, for internal promotion of the product and the BoP program, a promotional expression is made.
    c. (Desire) It is desirable that the product includes a warning that the validity of the information is not 100%, because of its' dynamic character and the 'first version' - status of the tool.
    d. (Desire) It is desirable that the project manager of PMS is able to answer questions about the product. An instruction aimed at the manager should be made.

19. Evaluation and upgrading
    a. The design team must have the opportunity to evaluate the general usability of the product, the quality of the information (depth and sorts), and the appearance of the product.
    b. The evaluations and feedback of the users must be gathered and used to improve the product. An evaluation format would ease this process.
    c. The project manager and 'tool maintainer' must be able to easily adapt the content of the tool.
    d. The tool maintainer must be able to update changes easily and communicate them to the teams that are using the product.
    e. It is desirable that the tool maintainer is able to reassemble the product incorporating improved information.

20. Removal
    a. After use of the product, it must be dismantled and separated into reusable and recyclable components.
    b. Upon removal of the product confidential information must be dealt with carefully.
    c. The paper information components can be discarded as paper waste material.

10. Testing of idea directions

The idea directions were tested with a number of designers.

Objectives:

(Inspired by Van Raay et al., *Product en consument*, Utrecht: Lemma, 1999, blz. 375-380)

Concept screening - filtering of the three idea directions into one

Concept development - generating ideas for improving and developing of the tool

Method - Focus group

(Source: McDaniel and Gates, *Qualitative Research*, in Marketing Research Essentials (Third Edition), South-Western College Publishing, 2001, chapter 5.)

A focus group consists of a couple of participants who are led by a moderator in an in-depth discussion on one particular topic or concept. It is a well-known form of qualitative research. Qualitative research leads to research data that are not subject to quantification or quantitative analysis. Characteristic to qualitative research is:

- Exploratory type of research
- Small sample size (number of respondents)
- Much information per respondent
- Subjective, interpretive type of analysis
- Low ability to replicate

In concept testing qualitative research can result in much information of a small group of target consumers or specialists. This can be used in the development phase of a concept. The advantages of focus groups are:

- Interaction among respondents can stimulate new ideas and thoughts that might not arise during one-on-one interviews.
- Groups pressure can help to keep thinking realistic.
- The energetic interaction provides for consumer information in a short amount of time and in a more interesting way than do individual interviews.
- Observing focus groups from behind one-way mirrors helps any employee to better understand the consumer.
- Focus groups can often be executed more quickly than other research techniques.
- Findings from groups tend to be easy to understand and have a compelling directness (comments from talking consumers are much more persuasive than graphs or charts).

Set up of focus group discussion

I have made the set up in Dutch, because all the respondents were Dutch.

(Inspired by McQuarrie and McIntyre, *Focus groups and the development of new products by technologically driven companies,* Journal of Product Innovation Management, Vol. 3(1), p. 40-47, 1986.)

Introduction (5 minutes)

Inleiding, welkom, doel (=mening over idee richtingen, het is nog in het begin van de ontwikkelingsfase, dus alle reacties zijn waardevol)

Voorstellen, rondje met namen, achtergrond en specialisme

Opzet van groepsdiscussie met thema's en tijdwaarneming

Orientation - collecting and using information (5 minutes)

-> Voordelen en nadelen van de genoemde manieren, behoeftes voor alternatieven

Manieren om informatie over een bedrijf vergaren

Manieren om die informatie vast te leggen

Manieren om die informatie te onthouden

Manieren om die informatie te gebruiken, mee te nemen in je ontwerpproces

Exposure – presentation of ideas (10 minutes)

De presentatievellen laten zien, uitleg van het concept en van de verschillende richtingen.

Evaluation – product ideas (15 minutes)

Eerste reacties van de respondenten, 'Nou, wat vind je ervan', let op tijd en iedereen

Eén voor één de ideeën evalueren per productaspect, gebruik lijst met productaspecten

- Kan iemand in eigen woorden zeggen hoe hij het idee begrepen heeft
- Productaspecten:
    - Structuur

    Bruikbaarheid van het idee in ontwerpproces (hun en algemeen)

    - Functies

    Bruikbaarheid om informatie te vergaren en onthouden

    Bruikbaarheid om informatie te gebruiken, mee te nemen in ontwerpproces

    Bruikbaarheid om ideeën te categoriseren en evalueren

    - Presentatie

    Aantrekkelijkheid voor ontwerpers

    Interactiviteit van het idee

Kies een van de richtingen met argumenten

Product modification (10 minutes)

Suggesties om ideeën te verbeteren/ontwikkelen/uit te breiden

- Per idee:

    Structuur

    Functies

    Presentatie

Summarize (5 minutes)

Belangrijkste conclusies en suggesties samenvatten, check, open staan voor verbeteringen

Bedankt iedereen

The respondents

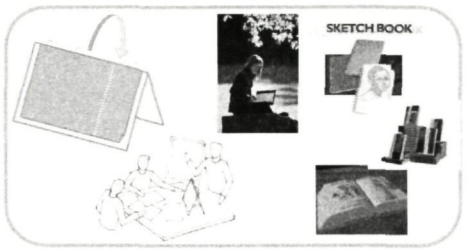
It was decided to test the idea directions with groups of designers. Two groups of three design students, one from TU Delft and the other from TU Eindhoven, evaluated the ideas. Another respondent was a designer from Philips Medical Systems.

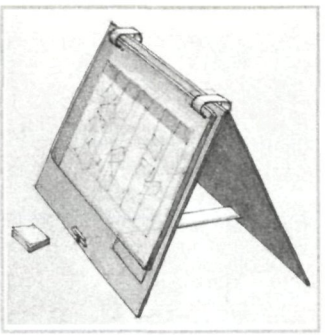
The presentation boards of the ideas that were used

The following presentation boards were used to test the idea directions and determine the need for company information of the respondents:

a tool offering company information to support designers in generating innovative ideas

- Bookie paper format -

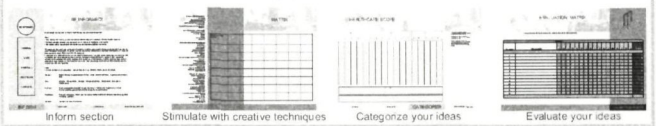




A paper format tool, with which the information can be accessed by use of different tabs and transparent layers, and can be used to inform, stimulate, categorize and evaluate ideas

Bookie

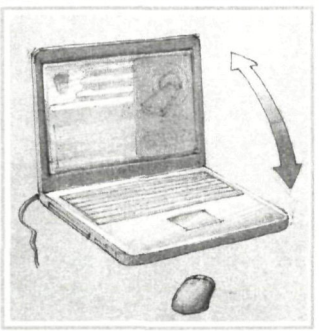
Example pages of book format:



Inform section | Stimulate with creative techniques | Categorize your ideas | Evaluate your ideas

a tool offering company information to support designers in generating innovative ideas

- Phil interactive -



An interactive computer program, that informs and gives access to more information, stimulates, and helps to categorize and evaluate ideas

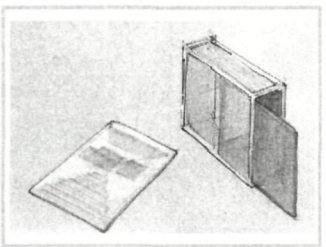
ask Phil

Example screens of a website or CD-rom:

Welcome intro | Inform section | Form to elaborate idea into PMS proposal

a tool offering company information to support designers in generating innovative ideas

- PMS-IDea cards -



A set of cards with stimulative PMS information 'force' the designers to combine the stimuli with their market information to generate creative solutions that fit both ends

PMS-IDea cards

'PMS-IDea' challenges the generation of ideas with an PMS-identity. The format consists of cards with stimulative information. The general idea is to 'force' the designers to combine their market information (be it the most important needs, trends, problems, or opportunities) with information of PMS. This can lead to creative solutions that fit both ends. The creative method is called 'forced-fitting', and can be done by a group of designers in a drawing session.

This format focuses on the stimulation to generate ideas. However, the terms need to be explained, and accompanying information that can inform the designer will therefore also be part of this idea.

Example cards with competences and strengths

Method of analysis

The focus group discussions with the two groups of designers are filmed. Notes were made during the discussion. The films were analysed to make sure no important remarks were missed. A couple of interesting were written down. The results are written down per group of designers and according to their topic.

Summary of the results

Results - the need

A tool with these functionalities is very useful!

Gathering, internalising and using information

- It eliminates the often difficult activity of gathering and filtering information with a group, and generates a common understanding
- Gathering information is done by browsing the internet, calling people and receiving material from the company
- The information is not documented, but saved for later reference
- Individual team members can have a personal mental image of the company
- Company information is initially used in an unstructured way as boundary conditions of the project
- Later, information is necessary to answer questions on details

Main results - the need

"Ja, ik zie wel echt het nut van het systeem, ik heb het nog nooit eerder gezien."

"Nou ja, je leest het [bedrijfsinformatie] en je hebt het in je hoofd zeg maar, en je maakt aantekeningen van dit is interessant, dit is interessant, maar je legt het niet echt vast."

"...waar het bedrijf moet passen in het project [is] toch het saaie gedeelte." (Laughter)

"...als je dadelijk in India bent, dat je heel gauw Philips' visie kwijtraakt."

Results - Evaluation of PMS-IDea Cards

Cards is a dynamic and fun tool for designers

Known examples exist from Philips Design and IDEO

It is very useful to generate ideas by challenging and triggering creativity

They can also work as little memory supports

Extra information is needed, but a users' manual will not be read

"[Het concept van Cards] is echt beproefd... als die niet creatief werken dan ben je vastgeroest."

"[Cards] Deze nodigt echt uit om te gebruiken."

"...je krijgt niet echt het hele beeld"

Results - Evaluation of Bookie

Bookie is a handy and useful tool for designers

It is a central, shared point of information

Being tangible it triggers to make information and mental images explicit

Reading the information could better been done individually or by one person, but it should not be so much text

Bookie is less useful for stimulation and creativity techniques

Schemes and categories should be clear and adaptable for the team

Bookie is very useful to answer first questions when elaborating and the evaluation function is also appreciated

"[Bookie] Die werkt wel creatiever, omdat het allemaal niet zo definitief is."

"Ik zie dit niet echt als een idee genererend iets, maar het maakt de dingen wel bespreekbaar"

Results - Evaluation of Phil

Phil is an individual and very informative tool for designers

It is especially useful to get to know the company

If the structure is good, it is handy to find detailed and specific information

It is not appropriate for creativity and group processes

It is the future and has the potential to enable a lot of very useful extra functionalities, like: documentation, communication, linking to more information sources, e-learning, e-coaching, online (BoP) communities

"[Phil] kan heel nuttig zijn.... maar het is in elk geval niks creatiefs"

"Digitaal.... is wel de toekomst."

Conclusion

Concept screening leads to choosing to continue with Bookie and incorporate the Cards idea

Because:

- Most designers and mentors favourite Bookie and Cards
- It triggers activity and leads to a group understanding of the company
- It provides a tangible reminder of the company
- It provides a direct access to primary information
- I have the capability to make a first version of this tool

Considerations

Phil, a computer version with extended functionality, can be introduced later, when the BoP program and the company tool are evaluated

Visual information and a clear navigation greatly influence the usability

Results of group 1 (TU Eindhoven)

Gathering and using information

Gathering information about a company is necessary in a design project to define the context or frame work. "Yes it is necessary, but is the boring part of the work!" Currently, they start gathering information by browsing the website of a company. Thereafter, the designers take whatever documents and presentations they can find or that are given to them. The gathered information is not documented in a specific way, but is saved digitally or in hard copy dossiers.

What is often frustrating and time-consuming, is to filter the useful information from all the material offered. Apart from the documents, talking with experts and employees is also used to gain insight in the company. It is common to appoint someone of the project team to be the 'expert' of the company.

By reading the material a couple of important or striking aspects are remembered and used in determining the frame work of the design project. Especially overall goals and visions, represented in words and schemes, are used to give the project form and define the design opportunities, be it implicit or explicit. Also, parts of the information about the company are remembered in the long term memory and used in the end of the project, when reports and presentations need to be made. This is done individually, which results in a different mental image of the company for each person involved.

The process of collecting and using company information seems random and dependent from the available material.

Evaluation of the ideas

PMS-IDea cards

The cards are useful as a memory support. They can be taken anywhere, and can support to not forget about Philips Medical Systems. Cards is challenging and fun, and attracts the designers to use. This tool is useful in the design process, especially for remembering information, by being a memory support. However, having just terms on the cards does not seem enough. You need something to explain the company and the terms. If that 'manual' gets too big, the students will not use it. It is attractive to designers and can be used in the group, which is considered positive, because it helps to create a common understanding. Another comment is that the information is offered in an unstructured way, which is not handy for creating a clear image of the company.

Cards is selected by two of the designers, because it is an easy accessible and fun tool.

Bookie

Bookie is considered to be useful. If the information is appropriate the designers do not have to gather and filter so much information anymore. However it still has to be read, which does leave each person with a personal mental image. And, indeed, not every one is as much interested in the company information as the other, so they will not read everything, only if forced to (or triggered! red.) Bookie also works as memory support, because it is tangible and present in the office. One design student finds it specifically useful in validating/evaluating the ideas according to PMS criteria.

What is considered as being unhandy is the fact that if people interact individually with the product, comments or actions are personal and might not be understood by the rest. "I can hardly read my own notes, even worse are those from him! (Laughter.)" Also, post-its on the pages will fall off while travelling, writing is better.

Bookie is selected by two of the designers, because it is a handy tool, which can really support in the process. One actually wants a combination of the two, because they serve different purposes. "The ideas are on a somewhat different level."

Phil

The name Phil generates laughter. Phil is also considered useful, especially in the beginning of the process, when learning about the company. The students do not consider the tool to be useful in a group process, and therefore it is less easy to use the information. And because it is an individual interaction, it is not so attractive and generates distinct images of the company. The tool can be useful to describe and communicate the project's results to others.

A big advantage is the ability to update the information easily. Also links to other design projects can be easily established.

The idea is not selected, especially because of the individual character of the interaction. Also, "I personally do not like to work with computers all the time. Especially when reading and learning, I prefer being able to make notes and discuss using hard copies."

Product modification – suggestions for improvement

PMS-IDea cards

Cards is already quite interactive. It is necessary to develop a good accompanying manual or instruction of use. Directly it is suggested to combine the cards with Bookie: "Yes, Laurens, you will have to make a card tray in Bookie.". Another idea is to have plastic holder in which the most important cards at that moment can be displayed or carried around. This helps to remind everybody of what is important.

Bookie

Suggestions for Bookie are to use different colours for every person to separate everybody's notes. And to make sure that somehow the designer is triggered to write very clearly. It is questioned how the information can be updated, no suggestions are made, but responses are very positive on my suggestion to see Bookie as a first product and to eventually also have a site or knowledge management tool accompanying it. The combination with cards can be made by using a holder or tray

and incorporating the cards into pages. Inspired by calendars it is suggested to have a moving red square over the text or schemes, which prevents all the writing.

Phil

To make Phil more attractive, it needs to be made much more interactive. When asked to name an example of an interactive site, a designer comes with the system of the museum Boijmans van Beuningen. (That is indeed a wonderfully interactive interface (touch screen) which helps you to navigate through all the information about their collection (red.)) Also, it must be very easy to navigate through all the information, and should not be presented sequential. What would be a very interesting extension to this tool is to make it a working platform, where the team can store all their project information and documents, and where they can communicate with each other. As an example, the team currently uses a post-it program, with which you can leave messages to the whole team or individual. It works with tabs.

Results of group 2 (TU Delft)

Gathering and using information

Company information is gathered by use of the internet and calling people. Most information is already digital and is stored by use of folders. This can cause problems in groups, because it is often difficult to give insightful titles and meaningful folder names. A structure for this would be helpful. The gathered information is used throughout the process. A lot of, at first sight interesting, information is abundant in the end. One respondent immediately saves all her hand-written notes into a word-document and summarizes important findings from several sources into this one document. Another respondent is used to keeping all the information as boundary conditions in his head and putting it down in the final presentation stage of a project.

Evaluation of the ideas

PMS-IDea cards

Cards gets an enthusiastic response, because it has a creative and stimulative input in the process and uses a dynamic, group interaction form. A respondent names the IDEO – card system. IDEO is a famous design company, known for its' creativity. They use a card system that really works. It is questioned what information the cards offer.

Cards is selected by one designer, who really needs to be free in the beginning of the process. She wants little information in the beginning of the process.

Bookie

Bookie is useful for elaborating ideas that are chosen and it serves as a central point of documentation and communication in a group. Bookie is quite helpful and is "definitely interactive". The designers consider it to be less useful to generate ideas, and are not clear on the inform function. When asked a designer agrees that he would read 30 pages if he was really in such a project, but what would be remembered remains a question. They ask what sorts of categories are used, and if they are free to determine their own. It is difficult to understand what a certain category means and to which one an idea fits best, but they have done the same exercise and it is a necessary activity.

Bookie is selected by one designer, who argues: "I can make the cards myself and I would like to ask questions to more people than Phil." Also he feels that for his personal style of working, where he keeps all his thoughts to himself, it is helpful to be triggered to share work centrally.

Phil

Phil is very helpful as a source of information, especially because everybody is already used to interacting with this kind medium. The students feel that it is "more difficult to deliver input in this tool than in a hardcopy version", and more difficult to save information. What is interesting, is the *combination with a communication function.*

The last designer selects a combination of all three tools. He wants to select information from an easy-to-use Phil, print it out in the Bookie format, use the cards for creativity sessions, and finally use Bookie to elaborate the ideas.

General

In general, the designers seem to feel that the tools restrict them in their creativity. When confronting them with this notion, they reply that they are hired for their fresh and broad input, and that for some designers only very little information about the company is needed. They agree that they should also be able to creatively work with the context and 'restrictions' of the company they work for, but would want this to happen after having generated ideas freely.

Product modification – suggestions for improvement

PMS-IDea cards

Several sorts of cards can be used: First stimuli of PMS are used to diverge and generate ideas, and then restrictions can be introduced which trigger creativity in converging by elaborating ideas. These restrictions and other stimuli should be unambiguous. It would be nice if the used or selected cards can be grouped easily and tied together, so that groups (categories) can be shared and reviewed easily.

Bookie

For Bookie it is suggested that one person should be responsible for the product and that not everybody should have to read it. It should have an easy index, so that you can quickly check a certain question you have. A contact list to call people for further questions is really appreciated by this group. It is fine to get information directly from a person. Also, it is necessary that the person(s) who have created the document and who are mentioned in the contact list are indeed available on their numbers and email.

Phil

Phil as an information source requires a real interactive set up. Navigation through the information could be improved by using information chunks that are accessible in various ways. It is suggested to let the designer create his own set of information chunks, to let him have a personal information set. Like with Bookie, it is suggested to appoint a single chief or monitor responsible for the system. In projects it frequently happens that something needs to checked, and one person could be appointed to search the information tool.

To make it better possible to use the information, hardware could be added to the system. "It would be ideal if Philips delivers not only the software tool, but also computers or sketching tablets with which the designers can draw and interact together. Information could be displayed in the background while sketching.

A comment on Phil was that because information and ideas cannot be added as input, bad or less good ideas are lost. A solution for that would be to save the ideas, which are not selected, in a temporary trash box. They could be somewhere in the background and retraceable on a later moment.

Results of PMS designer (Karin Prins)

Gathering and using information

Because Karin is a designer at Philips Medical Systems she already knows a lot about the company. If she needs information about the company in a certain project, she will start to check the intranet. Secondly, calling people is quite helpful, and colleagues can help her to find the right persons.

Evaluation of the ideas

The concept of the tool

A first response is that all the elements offered in the tool do support the designer, but they are already existing. That is, a designer already knows the techniques that you suggest and ways to categorize and evaluate. The only added value seems to be, that they come all in one. What is new is the part of the information, which is gathered and offered in a clarifying way. She has the idea that the information chunk was the most important part of the work, and the other sections would be a useful addition if they have a nice link with the inform section. She pictures herself to be in a design project having a certain design problem and would then want to search for information with a key word or entry.

General response

If you look at the future of designing, she thinks the computer tool Phil would make the best chance. In design meetings and sessions at PMS they work with a computer and beamer. (Brainstorm) Information is written down on post-its, which can be clustered on the walls, but are also immediately entered in the computer and made visible with the beamer.

She can imagine that designers and design students will quite quickly need specific detailed information related to their project. I cannot provide all this information, but a really valuable addition to the tool would to provide a structure with links to PMS information systems and people. Every department or Business Unit has its' own systems. It is questionable if you or design students can get access to all these systems.

PMS-IDea cards

The cards are a nice tool. Philips Design has also developed a set of cards for general product development (article in Items). They are useful as a trigger and are definitely effective in group use. She questions if the tool can be used by the same people more than 2 or 3 times, because you become too familiar and less triggered. A user manual and explaining information are needed, but probably will not be read by the designers.

Bookie

The different sections can be really supportive in the design process. The inform section should be really insightful by using tabs and make room for links with creativity and other sections. She does see how it can be interactively used in a group process. As already mentioned, she thinks that in reality you will not write things down on paper and later in the computer. Also, she suggests that the forms for categories might be too small and it would give the designers more freedom if you could do this on a wall or bigger paper.

Phil

The idea of Phil can be very useful to provide access to the information in various ways. A selection can be made by using key words or entries. Also the results could be directly typed into the system. And, she sees a big advantage in being able to link the designers to systems and sites with more detailed information.

Choice

When asked to make a choice, she comes with a combination of the three ideas. She would like to have Phil to search for information, to process (type in) results and for links with more information. Then selected information should be printable in Bookie format, so that you can easily read it and discuss it with others. If you go for Bookie, it would be really handy to provide digital formats as well, so that you can 'copy-paste' what you have done to the computer. Finally, cards can be made and printed in Phil, but could also be already present.

Final remark is that the actual usefulness of the tool, depends for 100% on the content, the information that is offered in the tool.

Evaluation of concept testing

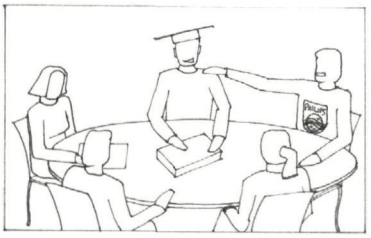
Qualitative research and focus groups in particular provide valuable feedback on premature ideas and concepts. Some evaluative remarks are:

- A focus group discussion results in a lot of valuable information
- Obviously, it takes quite some time to process the information
- The sessions can lead to quite different responses
- A focus group is a nice form of interaction, where the respondents are open and constructive
- During the discussion, time is very manageable; 45-60 minutes is enough
- Having a decent set up is essential and I had a good one - try and follow it more precisely
- Recording with a camera gives me ease of mind for not having to write everything down
- The open question is okay, but try and let them response to the concept first and then ideas to give the concept form

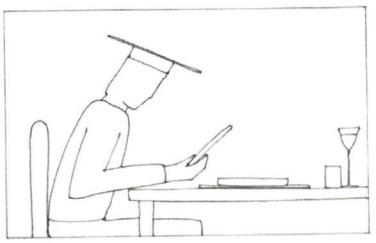
11. Concepts - storyboard

The scenario of use is presented in the form of a storyboard. The storyboard shows a design team using the tool for different purposes. From the four functions of the tool that were used for the idea directions; inform, stimulate, categorize and evaluate; the inform function is emphasized. The design team needs to be informed about the company; the designers need to learn about the company together.

Storyboard – Learning about the company

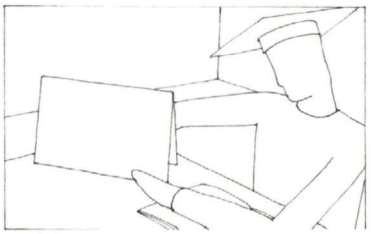


Project briefing – appointing expert



Expert explores the tool, reading use guide

Group session – expert explains goal

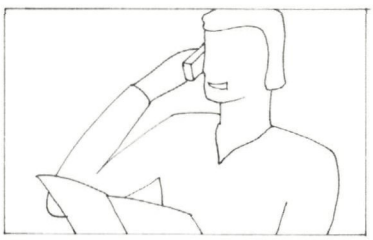


Expert shows and explains maps – discussion on PMS

The team constructs their own visual with use of elements from the tool

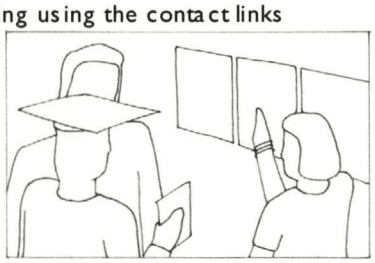
Storyboard – During the project

Better understanding of the company by reading



Getting more information by calling using the contact links

Creativity session – using cards while generating ideas



Evaluation role play – expert judging as advocate of PMS

12. Concepts - Task flow and ideas

The tasks are the actions that the designers will need to do to learn about the company. For every task in the task flow several ideas were generated. The ideas are either skecthed or described in words. Central question: How can the designer learn about the company and use the information?

Task 1 – Have a group learning session

Have a group learning session.

Aim

To learn about the company and generate a shared understanding of the company.

Outcome

A visual map of the company.

Subtask A) Instruct the expert [expert].

Methods – ideas

Read a use guide or instruction manual.
Explain use verbally.
Explain use with an instruction video with examples.

Subtask B) Individually learn about the company [team member].

Methods – ideas

Read through the information section.
Go through the maps.
Let the designers make personal notes along the information.

Subtask C) Prepare team session [expert].

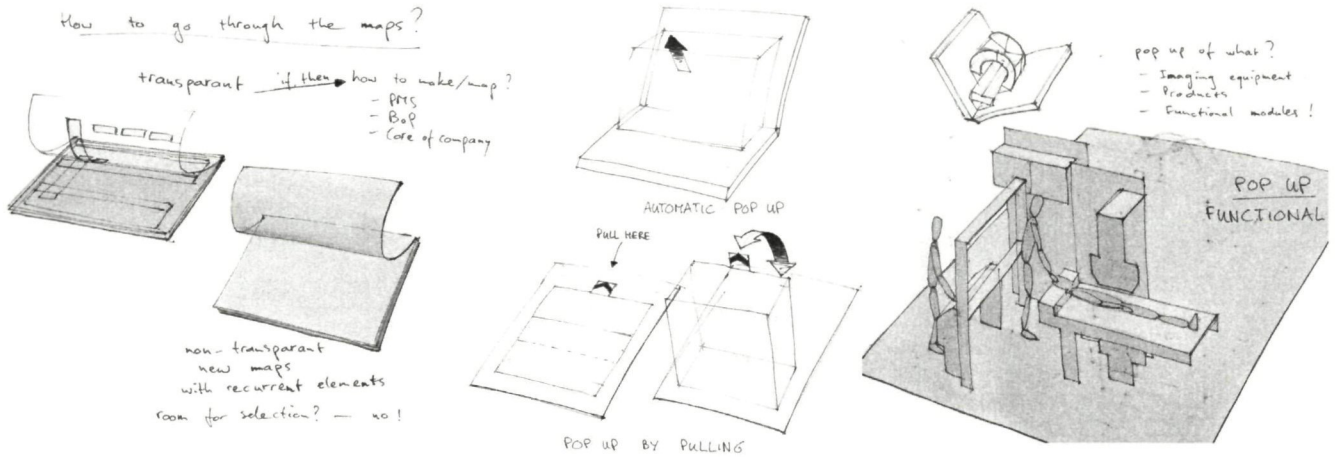
Methods – ideas

Include a guideline for the team session.
Let the expert make notes and personal changes.

Subtask D) Present company to team [expert].

Methods – ideas

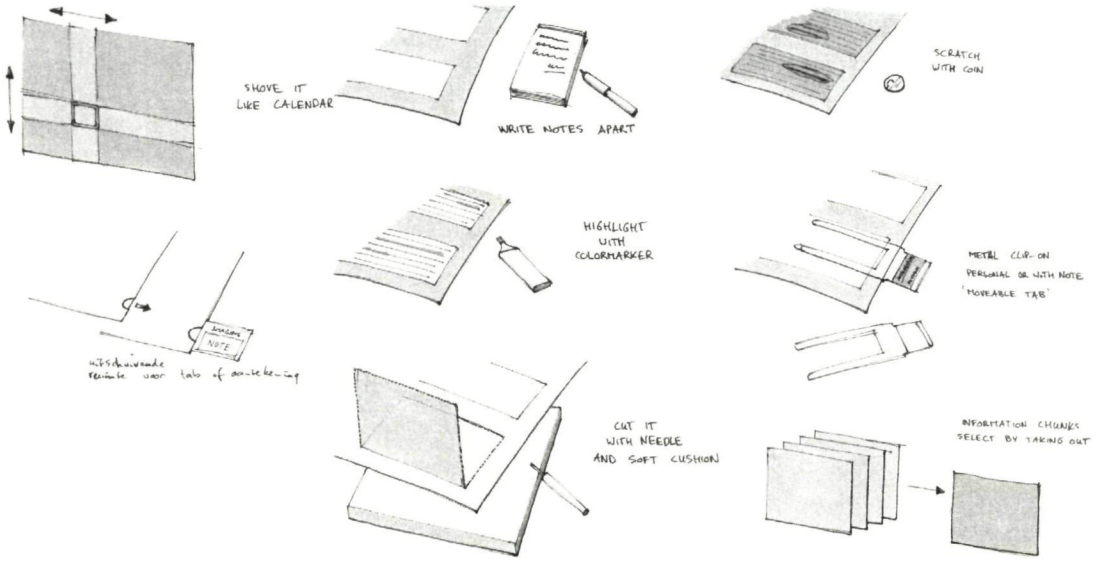
Have a display for the information.
Use a couple of visual maps.
Make a digital presentation of the company.
Use an attractive visual to ease learning, like pop-ups.



Subtask E) Discuss and select interesting elements for the project [team].

Methods – ideas

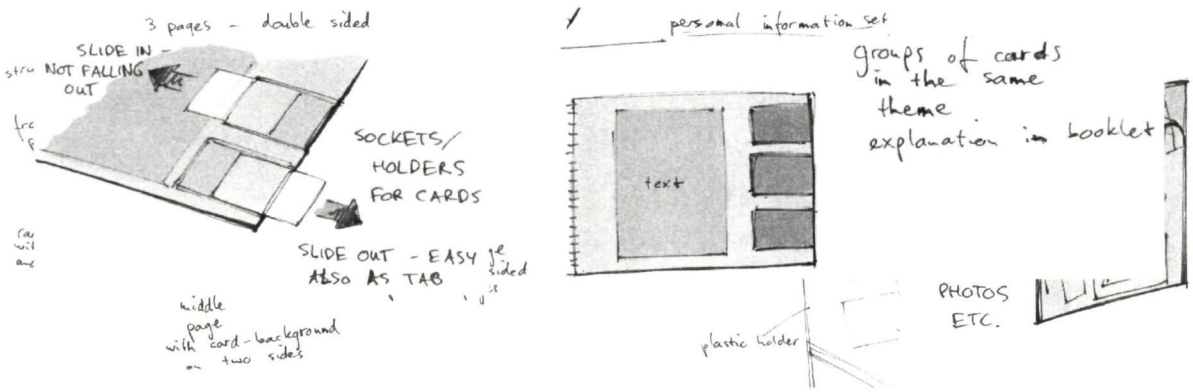
Shove a square like a calendar.
Use a hidden element which can be shoved out like a tab.
Write notes apart on a notebook.
Highlight information with a marker.
Cut information chunks with a needle and a soft cushion.
Scratch off stuff with a coin.
Use clip-on tabs to indicate interesting areas.
Take an information chunk apart from the rest.



Subtask F) Gather elements to make visual map [team].

Methods – ideas

Let the designers take out elements of the information section.
Let the designers take out elements that can also be used as cards.
Simply tear off pages and parts of pages.
Take out whole pages.
Gather elements from other sources, like leaflets, booklets, photo's etc..
Provide (digital) copies of all the elements, that can be (printed and) used.



Subtask G) Make visual map [team].

Methods – ideas

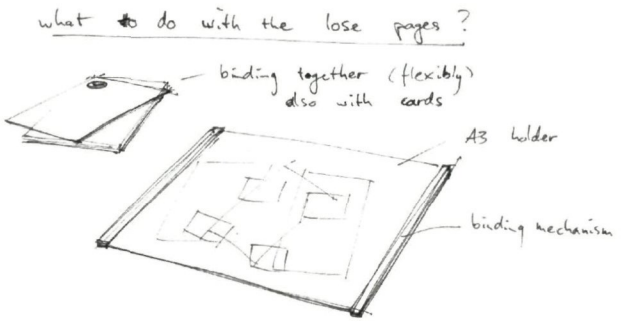
Use a file or folder to contain all interesting elements.

Provide transparent compartments for personal information sets.

Group interesting elements with a pin.

Cut, compose and glue elements to an under layer page.

Cut, compose and sandwich elements between two sticky transparent pages. This 'collage holder' can be re-used to adjust visual map to status of the project.



Subtask H) Display interesting elements and visual map [team].

Methods - ideas

Hang up the visual map on the wall.

Use a display holder to put the visual map on the table.

Task 2 [team] - Have a group creative session

Have a group creative session.

Aim

To generate creative solutions to identified market problems and opportunities.

Outcome

A couple of potential ideas, that create value for the consumers and the company.

Methods - ideas

Make cards with company stimuli and market aspects, and try to combine them in discussion.

Write the company stimuli and market aspects along two axes of a matrix (like a SWOT-matrix) and generate ideas that combine two terms.

Write interesting combinations of company stimuli and market aspects on drawing papers and start a brain drawing pool, in which you continuously exchange papers to elaborate on ideas from others.

Write demands from the company on cards and introduce them gradually during the idea generation process to challenge creativity.

Task 3 [team member] - Find more company information

Find more information.

Aim

To answer questions of the team about the company in relation to team's ideas and activities. For example: To compare engineering characteristics of current products with a new similar concept, to find out what manufacturing techniques can best be used, or to check if research activities exist for an identified product direction.

Outcome

More detailed company information and knowledge on a specific topic.

Methods - ideas

Ask an employee of PMS.
Ask the direct PMS project manager of the team.
Use the intranet of PMS to search for answers.
Use Yellow Pages, an internal, informal knowledge sharing platform of Philips.
Use a contact list with interested people that form an entry to more people.
Check the website of Philips and PMS.
Check the documented information that is given.
Check the tool containing the company information.

Task 4 [team] - Categorize the ideas

Categorize the ideas.

Aim

To create an overview of the ideas, and cluster them according to categories that are also familiar to other parties involved. This can lead to insights and new ideas as well as a selection of the ideas.

Outcome

An overview with clusters of ideas.

Methods - ideas

Write all ideas on sticky memo's and cluster them on the wall, based on constant discussion between team members.
Write or sketch all ideas down on small papers and cluster them on a big table or on the ground, based on constant discussion between team members.
Use existing categories when discussing the appropriate clusters.
Use an existing format wit categories on A3 and give all ideas a place, by writing them in columns.
Write existing categories on a paper or board and give all ideas a place, by writing them down or by placing the sticky memo's.

Task 5 [team] - Evaluate the ideas

Evaluate the ideas.

Aim

To select the best idea or best combination of ideas to elaborate into a new business proposal.

Outcome

A ranking or rating of the ideas and an argued choice.

Methods - ideas

Test the ideas with the target group and let that support the decision making.
Ask the company to make a selection of the ideas.
Generate a list of important criteria and rate every idea on to those criteria.
Use a list of criteria given by the company and rate every idea on to those criteria.
Within team) select on gut feeling.

Task 6 [team or member] - Elaborate an idea

Elaborate an idea.

Aim

To turn a potential idea into a strong concept or business proposal for the company.

Outcome

A proposal for a innovative new business activity, that creates value for the consumers and the company.

Methods - ideas

Generate a list of important elaboration aspects, and elaborate the idea accordingly.
Use a list of elaboration aspects given by the company, and elaborate the idea accordingly.
Use a format to describe the proposal.

Task 7 [team and member] - Share the ideas, evaluate and share the lessons learned.

Share the ideas, evaluate and share the lessons learned.

Aim

To make innovation efforts of distinct teams more effective by sharing knowledge and building upon previous results.

Outcome

Brief descriptions of best practices and ideas.

Methods - ideas

Write down the most important things you have learned.
Document the work logically and store it digitally and physically.
Put your knowledge into a knowledge based system.
Be involved in the follow-up of the project.
Use an evaluation format and write down the comments and lessons, individually or with the team.
Use a presentation format and present your ideas according to this format.

13. Metaphoric comparsion of travel and company guide

The conceptual model used for the company guidebook is the travel guidebook in general and the Lonely Planet guidebook in particular. The conceptual model helps the user to "readily understand *basic operations and accurately predict functionality*" (Baxley, 2003). As *Lonely Planet puts it*: "The main aim of a travel guide is to help travellers.....to explore and better understand the world [or one country]." (Chile guidebook, 2000, p. 10). In that line of thought the company guidebook has the aim to help designers explore and better understand the company.

Travel guide	Aspect	Company guide
A travel guide provides the traveller with information on his destination. The information enables travellers to make informed choices and to make the mechanics	Function	The company guide provides the user with information on the company. The information enables designers to make informed selections of opportunities and ideas

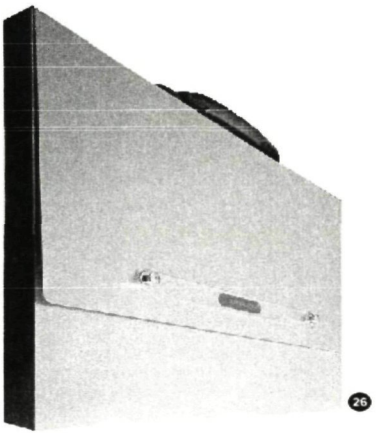
of a journey run smoothly. The guide enriches the travel experience by providing background information and allows for the travellers to understand and respond to cultural issues.		and smoothens the design process. The guide enriches the design project by providing background information and allows for the designers to understand the company in a basic way so that they understand how to deal with employees and information.
Facts for the traveller – general figures History and culture How to get there, around and away Details per region and location Activities – what can be done at a location Maps from the whole country, regions and cities.	Content	Facts & figures of PMS History Organizational structure, and contacts Details per theme What can the designer do with the information – Use guide A fictional map of the company illustrating the content of the company guide.
"The best way to use a Lonely Planet guidebook is any way you choose." (Lonely Planet Chile guide, 2000, p. 12) The travel guide is used at home, while preparing the trip. The travel guide is consulted during the trip for more background information, to check details, to orientate oneself with maps, and to explore interesting opportunities. During the trip it is transported in a backpack and it can be used on the bus, plane, and at the table. Travellers exchange information by sharing guidebooks and by discussion.	Task flow	The designer is to a high degree free in deciding how to use the company guide. The company guide is used at the home country, setting up the design project. The company guide can be consulted during the trip for more information, to check details, to explore interesting opportunities, and to see what more can be read. During the trip it is transported in a backpack and it can be used on the bus, plane, and at the table. The company guide should encourage designers to discuss the information.
The regions seem to be ordered on most likely importance (e.g. capital first) and then from North to South.	Organization of information	The themes in the guide follow a certain logic. It starts with the general company information. Then follows the strategic information addressing scope and core activities of the company. More concrete is the portfolio description. The link is made with the healthcare environment the company is in. And finally information on the BoP program is given.
Navigation can be done by use of the maps, which show locations and corresponding page numbers. Other entry points are the table of contents and an alphabetical index. Dark elements (tabs) at the side of the pages help to navigate and find sections.	Viewing and navigation	Similarly, navigation can be done by use of the company map and maps of the themes/chapters. The company guide has a detailed table of contents. Coloured elements (tabs) at the side of the pages help to navigate and find sections.
The travel guide can not be edited. Travellers do make notes in the guide.	Editing and manipulation	The company guide can not be edited. It does contain enough white and blank pages to make notes.
A travel guide does not offer direct user help.	User assistance	The company guide does not offer direct user help, but the author or PMS project leader can be contacted for general questions regarding its' use and content.
The travel guide has a simple lay-out with page number and location at the top, two columns of text and the region on the side in	Lay-out and style	The company guide has a simple lay-out with page number and location at the top, two columns of text and the region on the side in the

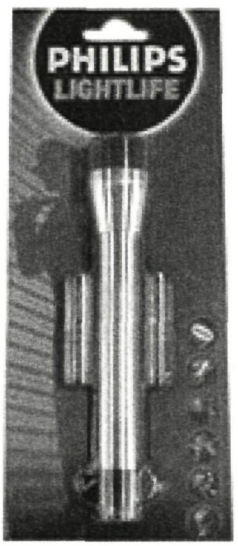
the dark element. Style is quite sober. Few images, and a lot of informative text. Texts are to the point, with a subjective joke here and there. Fun under titles lighten things up.		dark element. The style is simple. Plain texts accompanied by coloured illustrations. Texts are to the point, and are easy to read. Fun under titles lighten things up.
'On the road' travel tales are stories from travellers about what they have done. Travel guides are updated regularly based upon new research and input from travellers. Special glossy colour photo pages are incorporated for inspiration and to indicate highlights. City guides sometimes have folding out maps to show greater detail.	More interesting metaphoric elements - EXTRA	Other BoP design projects can be explained, and are preferably written by the design teams themselves. The company guides are updated every 2 years. Every designer is asked to evaluate several aspects of the guide. Two folding out coloured pages with illustrations visualize the company, and by doing that they serve inspiration and indicate highlights. Every chapter (theme) in the company guide starts with a folding out and removable page showing the fictional geographic region. The designer can take it out to show, see and draw what he has read and what not.

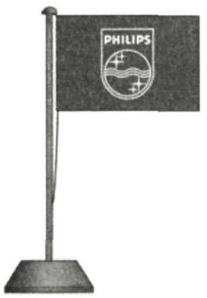
14. Briefcase and gadgets

A briefcase is used as packaging of the tool. The briefcase that is chosen for the tool is easy to carry (in size and weight), and all the components fit in nicely. Another important reason to choose this briefcase is that fifteen briefcases were readily available for free at PMS.

The extra gadgets are meant to trigger the positive feeling of receiving a gift. Ideas were to include a little compass, a pocket knife or a special 'Philips hand torch'. This appendix shows a couple of alternatives for the briefcase and the gadgets.







15. Product concept testing

At 31 August 2004 a session was organized in which the product concept was evaluated by a group of designers. In the second half of that afternoon the group of designers were asked to help improve the tool. A creative session resulted in ideas for improvement.

Note for this appendix: The set up of the session and its results are presented in once. That means that per step in the set up, the results are described.

This appendix presents the results of the concept test.

Objectives

What do I want to achieve with this session?

Concept testing by means of focus group discussion and observation

Idea generation to improve the concept by means of group discussion and creative session

The group of respondents and creative designers

I have been looking for designers with a graphical interest and a positive and open mind:

Ir. Olaf Wit

Pim van Gennip

Ir. Miguel Bruns

Arn van der Pluijm

Concept testing

Set up - Introduction (5 minutes)

Word of welcome, followed by purpose of session (= opinion on concept, all responses are valuable). Introduction of participants, and explanation of set up of discussion with themes and time.

Set up - Questions on main topic - learning about the company you design for (10 minutes)

(Advantages and disadvantages of answers and solutions. Need for an alternative?)

To analyse the company by gathering company information - (how) do you analyse a company and gather information?

To memorize this information by documenting and discussing it - (how) do you memorise, document and discuss the company information?

To design appropriate products by using the generated company knowledge - (how) do you design products that are appropriate for the company and use company information?

Results - Learning about the company you design for

A company is analysed in several ways. Designers use briefings and conversations with employees on company visits to find out more about the company's scope and culture. Websites, promotional materials, annual reports and objective sources are used to explore facts and figures and to learn about the products and services that are used.

The gathered information is documented by means of a structured map system on the computer. In this way specific information can be easily consulted in later stages. Digital photos and videos can be used to store impressions of products, people and locations. It is important to interpret the information according to its' source. 'Subjective' information from promotional materials is verified if possible or written in one's own words.

There is not always a strict use of the company information. In the start-up phase of the design project knowledge on the company is used to define the context, scope or vision of the project. The information is also used to construct the program of requirements of the new product or service. In the evaluation and selection stage(s) of a design project, knowledge on the company is used to justify decisions. When asked, the designers seem to differ in opinion about if and how they use company information for the generation of ideas. Some say that, for a matter of creativity, they do not incorporate company information in the diverging idea generation process. It is only used afterwards, in the converging process of selecting the best ideas. Others mention that the perception of the company is always apparent in one's mind and thereby implicitly used to give direction to the generation of ideas. One known structured way is translating the company analysis into strengths and weaknesses and generating potential direction and ideas by means of a SWOT-matrix.

Set up - Response to the tool (25 minutes)

Presentation of prototype

This prototype is a tool that will be given to every design team on the BoP program. Its' main purpose is to help them to learn about the company they design for by providing company information, which in itself has the aim to enable them to generate innovative proposals that really create value for the company (as well as the market). Since it should be used by the design teams themselves, I would like you to unwrap and explore it. Speak out loud please!

Observation (10 minutes)

What do they understand? What not?

What works and what not?

What is the opinion on the design?

Questions (5 minutes)

What do they understand? What not?

What works and what not?

What is the opinion on the design?

Results - Response to the tool - Observation

Upon presentation the design team opens the briefcase with curiosity. All the elements are taken out quickly and are examined individually. "Ah, this is a briefcase with a little book and a couple of folders". The introduction brochure is overlooked and when someone opens up the company map (A1 black and white) everybody's attention is focused on that element. "It is some form of mindmap, or map from the company!" "Okay, and we can swim in the innovation pool!"

The coloured company (A3) makes the distinction between regions more clear. One designer does not understand the composition of the regions. "Does it mean something that this region is next to that one?" They identify the form of the pyramid after having read the name of the lowest region ('Bottom of the Pyramid'). One designer later mentions that he wondered why healthcare is at the top of the pyramid.

The cards are explored with enthusiasm. They read a couple of the texts on the back. The 'design for the poor'-card is clear and interpreted as an explanation to the design assignment. The designers together recognize the little cards on the map and see a relationship, that is reflected in the colours.

The company guidebook is just opened briefly by one of the designers. After reading the instruction on the map, they find out that the regions on the map correspond with chapters in the book. And the function of the map becomes more clear, "Aha, it is some form of information overview!".

After pointing them towards (the back of) the introduction brochure, they read about the elements of the tool. "Okay, now it becomes a little more clear. This is only about company information." "It is good to know about the content of the briefcase. This should be visible more early. When you open the tool, or maybe on the outside."

When asked how they think they should use the tool, the answer is vague. "That depends on the assignment, what kind of project are we supposed to do?" "We can read the cards and possibly read the book." "This map is useful, it provides an overview and it could help to divide the work amongst team members."

Set up – Plus Minus Interesting

Plus, Minus and Interesting (10 minutes) (write down on flipover)

What is good about the idea? Advantages

What is less good about the idea? Preferably: What can be improved? Limitations

Why is the idea interesting? Unique elements

Results – PLUS – What is good about the idea?

I would be really happy if I was given this tool.

It reduces the work of analysing a company.

The map is useful for an overview and to divide the workload.

The cards are useful as summaries of the information from the guidebook.

"The cards are superhandy, if something is important for your project, you can grab it easily."

Results – MINUS – What is less good or can be improved?

The map is perceived to be a model.

The unknown areas could be in white to imply that findings can be written there.

The colours should be more differentiating.

The map and the numbers of the chapters imply a certain hierarchy in the importance or order of chapters.

Following the metaphor a starting point and a route could be included in the map.

You cannot quickly find the right card in the deck of cards; tabs might help to solve this.

Consider including blank and folding out cards.

The numbers of the cards can be adapted to 2.1 and 2.2 if they relate to chapter 2.

The design team itself can update the guidebook and the cards.

Important is the opportunity to find or search for more detailed information.

A list of contacts should be included to ask more questions to the people that are expert about a certain topic. Designers are sceptical about the sources of the information.

"We need a 24hrs service, an alarm line."

"What is offered is quite complete. It remains the same as always; it is up to the designer to determine what information is valid or not."

Results – INTERESTING – Why is the idea interesting or unique?

The tool offers the freedom to find information yourself.

The structure of the tool follows the way in which you normally consult information sources; it provides a quick overview of all the information so that you can see all the information that is available, and it offers the possibility to consult detailed information at the time and place you want to.

This tool, and especially the map and cards, trigger group discussion, which is good.

16. Idea generation for optimisation

At 31 August 2004 a session was organized in which the product concept was evaluated by a group of designers. In the second half of that afternoon the group of designers were asked to help improve the tool. A creative session resulted in ideas for improvement.

Note for this appendix: The set up of the session and its results are presented in once. That means that per step in the set up, the results are described.

This appendix presents the results of the creative session.

Objectives

What do I want to achieve with this session?

Concept testing by means of focus group discussion and observation

Idea generation to improve the concept by means of group discussion and creative session

The group of respondents and creative designers

I have been looking for designers with a graphical interest and a positive and open mind:

Ir. Olaf Wit

Pim van Gennip

Ir. Miguel Bruns

Arn van der Pluijm

Idea generation

Set up – Brainstorming H2's (15 minutes)

("Hoe kun je's" are questions that start with How to ... solve this problem?)

Results – Brainstorming

Hoe kun je een onbekend land goed leren kennen?

Speak the language

Visit the country

Have local friends

Read about it

Study local history and literature

Be open-minded

Talk to people who have been there

Hoe kun je met een groep samen iets leren?

By discussion

Speak the same language

Have the same goal

Test or question each other

Reward the team effort

Throw them into the unknown - forced learning

Make mistakes

To support each other

Hoe kun je ideeën genereren (die passen bij een bedrijf)?

Complement to other's ideas

Use metaphors

Have knowledge

To not have knowledge

Use customers' opinion

Work with an employee

Use company's vision

Set up - Problem explanation (5 minutes)

I have a concrete problem: I have this designed this tool to support design teams in getting to know the company they design for and to generate ideas that are interesting for the company. It is almost finished, but needs to be optimised. You identified several problems and interesting opportunities. What I consider to be positive about the concept is the travel metaphor, the company guidebook containing the information and for personal use. PMS is satisfied about the content. The cards and the map trigger responses and activity. But they do not convey the message of how they should be used. Also, the relationship between the elements is not clear or does not have a special meaning. The introduction brochure does not seem to render things more clearly.

What do I want today?:

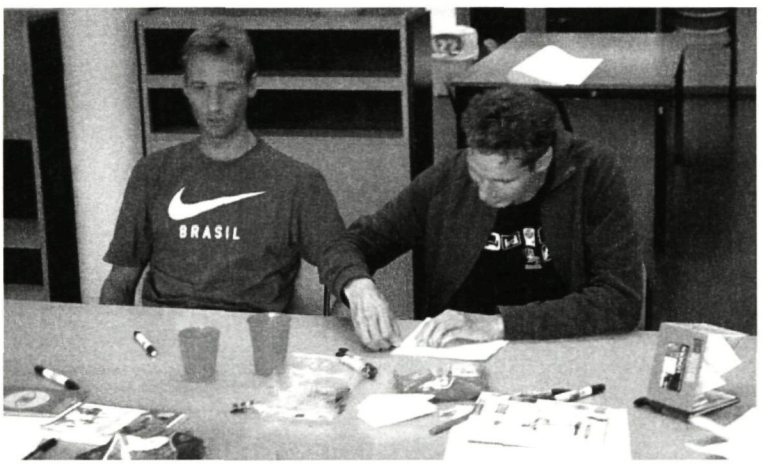
To have a couple of alternative ideas to optimise the tool.

Decision-making: preference or selection of the best idea.

Set up - Braindrawing and writing pool (25 minutes)

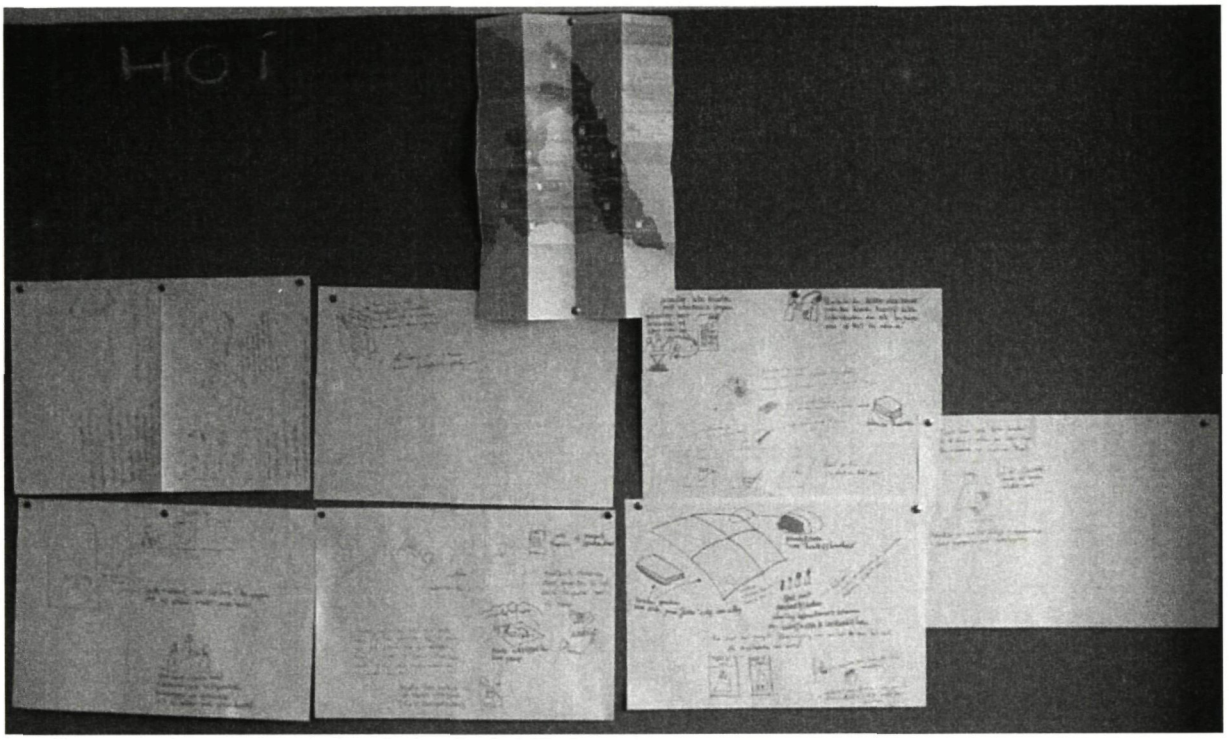
Select interesting opportunities from the brainstorming results and the evaluation results (PMI) that can help to redesign and improvement of the tool.

Use these selections freely and explain ideas in words or sketches. Move your ideas around on the table and continue designing upon ideas from others. Get out as much as you can. Use other interesting items from the lists if necessary.



Two designers in the creative session

Results – Braindrawing and writing pool



Overview of the ideas that were generated

Set up – Elaboration of 1-4 ideas (65 minutes)

Hang the results on the wall and discuss these with the group. Ask questions and explain ideas. Goal is to select the best 1-4 ideas to elaborate. Consider using the PMI technique again. (5 minutes)

Elaborate the ideas into details. Decide with the group how to do this. Divide the work or do it together. Use all your graphical and presentational skills. (60 minutes)

Per alternative/idea I would like to have:

- sketches of the map
- sketches of the cards
- sketches the intro brochure and its' content and location in the tool briefcase
- sketches of fun extra's of the company guidebook or different if other elements are necessary

To be considered:

- the function or purpose of the elements
- the design of the elements
- graphical design details
- links between the elements
- use cues – implying how the designers should use it

Set up – Selection of best idea (15 minutes)

Evaluate the session and the ideas. Select the group's favourite with arguements. Consider using the PMI or ALU again. It should be so that the selected idea can be elaborated into a final prototype by Laurens for his graduation.

Results - Ideas and recommendations

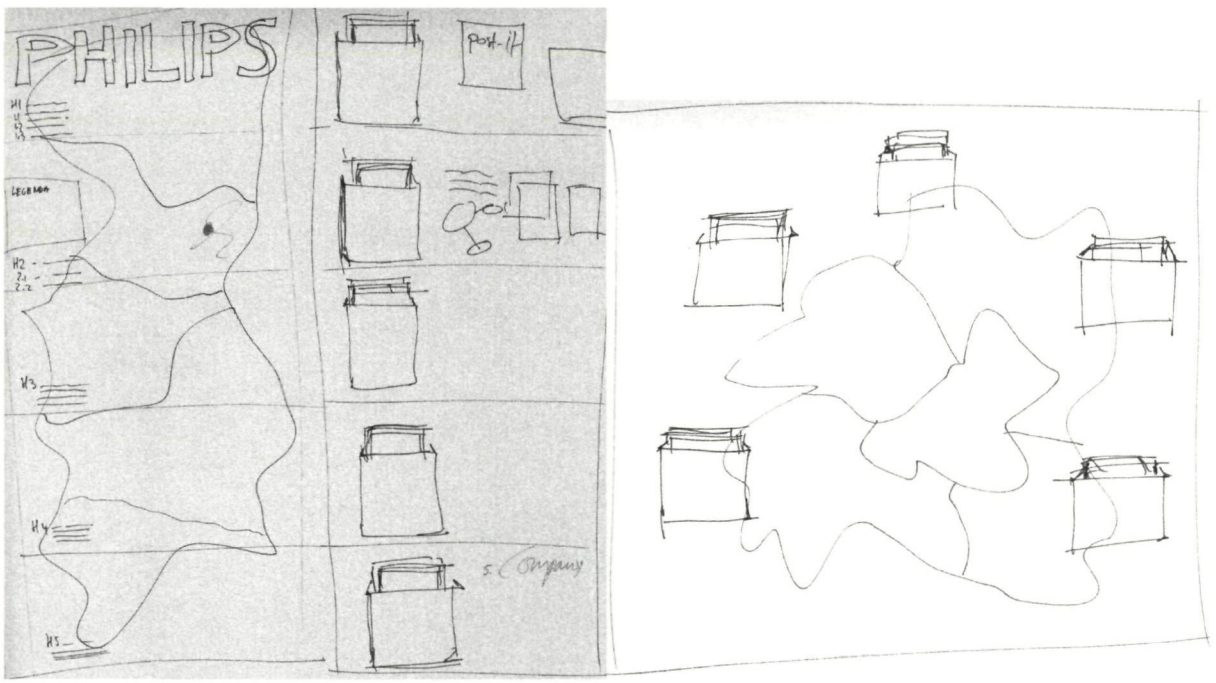
The braindrawing and writing pool results in a couple of ideas and quick sketches for details and total concepts. It turns out to be quite difficult to enforce the group to make a selection of the best ideas. The last phase of the creative session turns into an open discussion amongst the designers. Again, a couple of sketches are made. Looking at all the sketches and in a final discussion, a couple of important suggestions for improvement prevail:

- Include a clear use instruction or make it self-explaining.
- Arrange for more interactivity, the designers need to be able to add or create something themselves.
- Elaborate the idea that the map can be used to display who has read what and knows what.
- Include more blank areas on the map to imply interactivity.
- The healthcare scope seems important and should be upfront in the guidebook.
- Let the designers create their own cards.

Two different ideas have come up:

Stretch and strict

The information and regions follow a more strict structure. The map is a long fold-out where the regions are ordered under each other in the same order as the guidebook. The countries of Philips and the competitors are gone, because they do not add meaning.



Sketches of the strict idea and the round idea

Round and geographical

The 'round' concept organizes the information on the map in a more central way. The designers can travel through the country using different routes. From every location a user can send a postcard with a picture and information about that particular place (paragraph).

17. Final design of the tool

The map, guidebook and cards are redesigned by means of sketching and graphical design with the computer.

The final design modifications of the map, guidebook and cards are described in this Appendix. Additionally, it describes the fabrication of the components.

Final design modifications

The final designs of the map, the book and the set of cards have been made with the graphical programs Adobe Illustrator and Quark Xpress.

The map needed to most improvement mostly. A more fictional country was designed with straight lines and angles for the contours of the country and the regions. This angular design has also been used in other components. Regions have been given less bright colours to express the idea that the paragraphs can be read by choice, and do not necessarily need to be read in a specific order. Locations on the map have been redesigned as a checkbox, which the designer can colour to show he or she has read the paragraph corresponding to this location.

Two versions of the map have been made. The preliminary version (checl the CD-rom for a pdf-document called 'Strict') was so strictly organized that it lost attractiveness. A couple of respondents perceived that the information should be read top-down. In the final version of the map a scheme of the innovation process has been included to clarify that the tool supports the generation of company knowledge. This knowledge should be used together with market knowledge in an iterative innovation process. Finally, routes have been added to give (a random) structure to the exploring session and to trigger interactivity and discussion.

The ideas for the lay-out of the guidebook have been adapted to fit the PMS Design Guidelines for brochures by a desktop publisher of PMS Marcom, the department responsible for marketing and communications. Being at the level of the presentation layer of the model of Baxley (2002), meant that the actual content needed to be determined and refined. Texts have been written and checked and illustrations have been designed and improved. Finally, the content and lay-out were combined into the company guidebook.

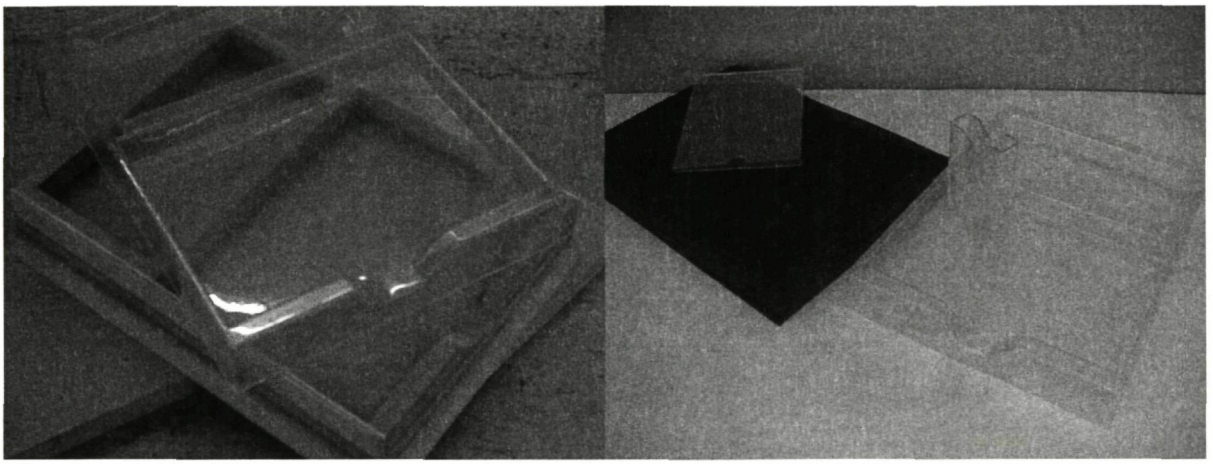
The cards are redesigned to a considerably smaller size. Some of the cards therefore are folded once or twice to fit all the content. Also, blank cards are designed that can be used in the exploring session and throughout the rest of the process. Three types of cards exist: Information, Question or Idea. Besides the redesigned information cards, a couple of question cards have been added to provide an example of how these cards can be used to trigger group learning.

Another improved component is the pop-out map that is included on the first pages of the guidebook. The healthcare scope is combined graphically with the product categories and functional representations of these categories. Texts explain the overview that is given by this pop-out. To add interaction and relation between the guidebook and cards, fold-out pages are included in every chapter. On these pages notes can be written, and it provides more blank cards that can be cut out.

Fabrication of components

The graphical components are all properly prepared and printed at a professional printer. The two pop-out maps and five fold-out cards are folded and glued into the guidebook. This is done for ten guidebooks. Card holders are cut and glued to the map, which is folded. All the cards are cut to the right size.

The originally white briefcase is painted in grey to give it a better look. The tool holder is remade using a transparent material called PETG. It is produced by making a mould of several layers of MDF wood. The compartments in the tool holder are sized to fit the components of the tool. A little card box is made of the same transparent material by folding a piece of the material through heating.



MDF mould and tool holder - old rubber foam holder and new holders

18. Price of the tool

The costs for the fabrication of the first series of the tool are presented in the two tables below. Prices are without BTW (taxes).

Costs

Total first series	2 Tools plus 8 extra guidebook	**€ 656,59**
Per tool	Company guide, map, cards, briefcase, tool holder, card box, markers	**€ 100,53**
Per company guide	Company guide, pop-out pages, fold-out pages and design	**€ 50,56**
Per design team	1 Tool plus 3 extra guidebooks	**€ 252,22**

Parts	Number	Per tool	Total (euro)	
Guide		10	36,42	364,22
Map		5	17,01	85,04
Cards		2	2,55	5,10
Extra cards		2	2,81	5,61
Pop-out maps		10	1,39	13,93
Fold-out pages		10	3,75	37,49
Tool holder		2	15,00	30,00
Card box		2	1,00	2,00
Markers		2	3,60	7,20
Card holders		2	5,50	11,00
Briefcase		2	0,00	0,00
Inside of briefcase		2	2,50	5,00
Design		10	9,00	90,00
	Total		100,53	656,59

Specifications

Parts

Part	Number	Specs	Where/how	Who	Costs per piece	Total costs
Guide	10	80 Pages 120 grs, full colour, A5 size, laminated cover 250 grs	Digital printing	Sieca Repro	36,42	364,22
Map	5	1 Page, full colour, A1, 170 grs	Digital printing	Sieca Repro	17,01	85,04
Cards	2	Set of 15 full colour cards, double sided, 55x85 mm	Digital printing	Sieca Repro	2,55	5,10
Extra cards	2	Set of 40 full colour extra blankcards, double sided, 55x85 mm	Digital printing	Sieca Repro	2,81	5,61
Pop-out maps	10	Set of 2 full colour pages, 266x266mm	Digital printing	Sieca Repro	1,39	13,93
Fold-out pages	10	Set of 5 full colour pages, A4, double sided	Digital printing	Sieca Repro	3,75	37,49
Tool holder	2	PETG 500 x 500 x 2 mm, MDF wood	Buy, produce	Laurens at PMP IDE Delft	15,00	30,00
Card box	2	PETG 150 x 150 x 2 mm	Buy, produce	Laurens at PMP IDE Delft	1,00	2,00
Markers	2	Set of 4 markers	Buy-in	HEMA	3,60	7,20
Card holders	2	Set of business card holders	Buy-in	Kantoorboekhandel	5,50	11,00
Briefcase	2	Cardboard storage-case 240x340x50mm from Ribblebox	Arrange	At Marcom	0,00	0,00
Inside of briefcase	2	Piece of 'plakvilt'	Buy-in	Kantoorboekhandel	2,50	5,00
Design	10	Design of lay-out of company guidebook	DTP'er	PMS Marcom	9,00	90,00
				Total		656,59

19. Response of PMS

The response that was given by employees of PMS was not planned and therefore happened in an unstructured way. However, the comments are quite valuable, since they were given by senior employees of PMS and Philips Design, who know the company through many years of working experience. Plus, they are all familiar with the BoP program and (some of) its results. Five employees gave their opinion on the tool (one group of three and one group of two people).

Respondents:

Franklin Schuling, director of corporate strategy at PMS CTO (Corporate Technology Office is the BoP program sponsor)

Carmen van Vilsteren, program manager at PMS CTO

Dirk Vananderoye, senior design consultant at Philips Design

Christine Muzel, research project manager CTO

Jan Roes, BoP program manager at PMS CTO

Content

The respondents are surprised about the content. It is very broad and informative. One of the senior respondents states: "this is a good attempt to describe the company". Xplore saves the designers a lot of time in analysing the company. The respondents consider the tool a valuable introduction to the company.

Presentation

The quality of the tool and its elements is high, and this attracts people to explore the tool. One respondent states that the tool looks good and is very fun (during the evaluation the exploring session is tried shortly), which suits the target group.

The exploring session was explained to be some sort of a game, but one of the respondents comments that it does not seem to be an attractive game to play. There is nothing to win and it lacks game-like elements. Actually the exploring session is not a game, but a playful way to create company knowledge with the whole design team.

Usability

Upon a short try out of the tool, the respondents speak out loud and ask questions like: Where do I start? Which card should I pick? Do we all read at the same time or on at a time? These are all questions that can be answered (partly) by preparing a little better, for example by reading the instruction.

One respondent states that the session should be done once. After that the information will be explored individually and more in relation to the project and specific information need at hand.

A respondent suggests appointing a discussion leader, to facilitate and guide the discussion, and to be the time-keeper. A suggestion is to include a little hourglass or clock.

Two respondents quite appreciate the fact that the tool is tangible. That makes learning about the company much more interactive and therefore the knowledge that is generated is more sustainable.

One respondent has trouble getting a card out of a holder.

Suggestions for improvement and the future

All respondents see other uses of the guide and the exploring session. It should be an introduction to the company for every new intern or employee.

The information or paragraphs can be put on separate cards. In this way, you can easily access any information you find relevant and new cards can be added.

If you really want knowledge sharing between design teams and universities, the cards should be available in digital format. Adding cards makes the system grow and self-sustaining.

Either optimise the 'game' or the information; whatever you want to emphasize most.

Response at PMS

20. Final product testing

This appendix describes the results of testing of the tool with a team of designers in Delft in the DIM-lab at the 21st of October.

Method

Two tests

The tool is tested and evaluated by two design teams. One tool is send to India and is currently being used by a BoP design team. This team, called IndiAction, consists of four design students of the Eindhoven University of Technology. They have already analysed PMS and have spent months writing and improving the project plan. Due to a busy schedule and a delay of sending the tool to India, the team is not able to provide feedback on the tool before this report is printed and delivered. Nevertheless, the results of their evaluation will be incorporated in the final presentation of this project. An evaluation form similar to the one used in the second group has been sent to the designers.

The second test group consists of one freelance designer and three design students from Delft University of Technology. This group is not familiar with PMS and the BoP program.

Objectives

Main objective of the test is to evaluate the usability of the tool. Does the exploring session work as it was designed? Is the function of the elements clear and are they easy to use?

Test session

The group of designers were asked to use the tool and do the exploring session. During the test they were not interrupted; the tool should be self-explanatory. The team was observed, observations were written down, and the designers' actions were filmed. The film was made for presentational matters and is a back-up to review particular situations.

The respondents were asked to give feedback by completing an evaluation form. This form contains questions ordered by important topics. Lastly, a group discussion was held to discuss the most important comments from the designers.

Set up of test session

Respondents for test session

Lara van der Veen, student Industrial Design Engineering

ir. Kamiel de Leur, freelance designer

Kobbe Pas, student Industrial Design Engineering

Sanne Schaapman, student Industrial Design Engineering

Results from observation

Observation has led to this chronological description of remarkable actions or comments from the design team. The process has also been filmed so that important events can be checked later or shown to others in presentational form.

The test session

After the introduction, the team opens up the briefcase. The appointed person responsible for the tool (who will from here on be called session leader) unfolds the map. They look at it, and the session leader folds it back as it was to read the instruction. They recognize that the instruction is also included in the guidebook and all start reading it.

It is remarkably quiet while everybody is reading. [This might be due to the fact that they are not a real team, they do not know each other.]

They seem to understand the instruction, because nobody asks a question and they start throwing the die to determine who is to start.

They question whether they should read together or one at a time. They decide to read their first paragraphs together.

One of the respondents is prompted to check an information card and a question card. They look at the cards in the holders and think that "these are the cards that should be used when you throw 4" [This is wrong.]

They recognize the right information card and the respondent concludes that it is "a summary of what I have just read in the book".

She also recognizes the question card and reads the question out loud. Nobody knows the answer and they start reading the paragraph in which they find the answer. When one respondent reads aloud the answer from the guidebook, another finds out that the answer is also on the back of the card, but he does not tell this to the group. There is confusion about what the word 'paradigm' means. They discuss the information in the paragraph of the information and question card.

This is the only I (Laurens) interfere in the test. I tell them that they are not doing anything wrong, but the session should go a little faster. The session leader picks it up by saying: "Okay, let's move on then. I will start with throwing the die to determine my action!"

He throws a 3, meaning the team should decide which of the paragraphs that have been read is most relevant for the project. They decide that everybody should explain briefly what he or she has read. A good discussion starts about what information can or can not be used and what should definitely be incorporated in the project. They pick the BoP paragraph. The respondent who read that paragraph says: "Oh, I guess I win then!"

The second respondent also throws a 3. The session leader improvises that they should pick the second most relevant paragraph.

The third throws a 1, which means he has to stay and read it again. This triggers another to say: "Oh, you are going to lose! That means you will have to get us coffee. [Laughter]".

The fourth respondent throws a 5, which means she has to make up a question. She is confused: "I have to make up question, and the answer, ask the question to the team and provide the answer? That is a lot!" They understand she has to use a question card to write it on. They pick out the right card by means of the colours. The question action turns out to be easier than the respondent thought. She makes up a question and explains the team the answer. She writes down her name in the right corner on the card and puts it in a card holder.

Meanwhile, the other respondents glance through the guidebook. They discover the fold out cards, and they say: "Oh, here are some extra cards! Every chapter has it! Are they also in your book?" "Yes!" They do not use these cards in the whole test.

The next round starts again with reading in silence.

The first respondent (the session leader) needs to inform the others (he threw a 4). He is convinced the competences are very interesting: "we should this in our design project!"

The second throws a 6, meaning she has to generate an idea. "That is difficult! What is the idea for? I have read about the organizational structure, what idea can come from that?" They improvise: "Well, you all continue without me so that I can think of an idea." The session leader suggests to: "make up an idea for our project in general." And literally: "We are designers, we do not like rules so much, just do something different."

The third throws a 3, again they have to choose. This action works out really fine, because they need to explain what they have read and discuss the information and its relevance for the project.

Then a 2 is thrown, two of the respondents swap routes. One of the respondents is confused about how to continue now. Do I move one up to the next paragraph? Is it your turn now?

Intermezzo: One of the respondents asks if the other have understood the scheme/illustration in the middle. Where does the market knowledge come from? The session leader explains that: "we are working towards company know-how now, here see [points at the scheme], and later the market know-how will be included in the project". The other agree.

Another intermezzo: One of the respondents is confused about when to colour your route, when to move your pawn up to the next location, especially when you have to swap. The session leader suggests to: "colour or check the location to show what you have read, otherwise we lose the overview."

Extra observational comments:

People explore the pop-out map and other chapters and paragraphs when they are done reading. They do not say anything about them, however. It is my (Laurens') estimation that after finishing the exploring session, they will understand the pop-out map, from having read the elements and texts in the paragraph.

It would be very useful to have an appointed discussion or session leader. He or she should prepare the session by reading the instruction and going through the guidebook. Then he or she will better understand what the session is for and guide the process. The appointed person responsible for the tool in the test, performed this role of session leader quite well. He made suggestions and improvised solutions to mentioned problems and in this way kept the session going.

End

The rest of the session nothing remarkably new happened.

Finally, after approximately an hour and ten minutes I (Laurens) interfered for the second time to stop the test session.

Results from evaluation form

The evaluation form and the responses of the respondents are presented in this one document. The questions or aspects of the evaluation form are in *italic and have an indent.* The responses are in regular font.

> *Hello, thank you for taking your time to fill in this form! All comments are very valuable, feel free.*

This format can be used to evaluate Xplore, the company information and exploration tool, of which this guidebook is a part. Answer the questions and feel free to give more feedback.

Respondents

Lara van der Veen, student Industrial Design Engineering

ir. Kamiel de Leur, freelance designer

Kobbe Pas, student Industrial Design Engineering

Sanne Schaapman, student Industrial Design Engineering

Overall

Quote: "A good way to interactively process a lot of information in a short time!"

The tool suggests that you have a solution at the end. Make it clearer that this is a part of the design process, i.e. to generate company know-how, and does not lead to product ideas. The action to '*ideate*' is therefore difficult, since you do not have a problem to solve, and you do not have market knowhow.

General comment on the way of testing was that the group lacked a clear idea of the context. Where are we working towards, why are we doing this? I (Laurens) have briefly explained the situation, but it would have been better to give them a case-study, or a fictional design problem.

The test was aimed at evaluating the clarity of the tool and its function, and the usability. Time was limited, and therefore the respondents have not had the chance to go through the book individually and to read for example the introduction or to explore the pop-out map. The test stopped when they were halfway the exploring session, after approximately one hour and fifteen minutes. For this reason, some of their comments are As one respondent explains: "It is a little hard to tell, because we have not gone through all information and have not had the time to get a complete overview of the book".

Content

What do you think of the content? Is it complete? What information do you consider to be useful for a design project, what is not useful and what do you miss?

There is a lot of information, and different sorts of information. It seems to be complete and enough information. One respondent comments that it might be too much information for a first introduction. Another respondent states that by reading random paragraphs she could not grasp the total overview, and thus does not know if the information is complete. The textual information is supported by good visuals.

Suggestions:

Include more examples to show how the information can be applied. [This is an important learning aspect, to learn whilst examples of real practice are shown.]

"Make more of these summary information cards, they are useful."

Presentation

Is the tool attractive? What do you think of the graphical quality of the elements? Is the text comprehensible? Are the visuals clear? What do you think of the travel and explore metaphor?

The tool is attractive. The map provides a good overview and the book is really clear. The graphics and visuals are nice. The colours are used well to provide structure and show relations. The cards are also clear, because of their symbols and colours.

Some words are not so comprehensible, but generally the texts are good. The colours on the map can be more bright, and its use together with the markers is a little confusing. One respondent mentions that the metaphor is suitable.

Usability

Is the use instruction clear? Do you understand what you should do with the tool? What works well and what should be improved in the exploring session?

The instruction is clear, but can be improved. Suggestions are to use more visuals in the instruction, or to provide thick cards on which the objective of the game and the rules are explained [as in the board game called Kolonisten]. Some rules of the game are not always clear, for example when do you move your pawn, when do you colour your route, when are you finished with 'choose'?

"I lacked a real design problem, and it was therefore a difficult to get into the process. It took some time to learn the steps of reading, throwing, sharing and moving." (See general comment on the lack of context.)

Usability second part

Is it easy to navigate through the guidebook? Is the information structured well? Do the pages and map fold out easily? Do the cards have enough blank space? Do the card holders work?

It is easy to navigate through the book; the use of colours supports that well. The information structure seems fine. The pages and map fold out easily and the cards have enough blank space. The card holders work less smoothly, it is sometimes difficult to get the cards in the holders. It is good that the cards are visible and present at all times.

Function

Do you understand the function of the tool? Is the relationship between the elements clear? Is the function of the elements clear?

The function of the tool is understood, as is the relationship between the elements. The fold-out cards in the guidebook are not used; it is easier and faster to use the extra blank cards that are provided in the card-tray. One respondent therefore comments that she does not how these cards should be used in the process. Another respondent states that she does not understand the function of the pop-out healthcare map. [This map has not been evaluated in the test, but the respondents have checked it regularly.]

Objectives

Do you think this tool can help you to get a good (complete) and basic understanding of the company?

Yes No Rate from 1-10:

All respondents think that the tool can help them to get a good (complete) and basic understanding of the company. On a range from 1-10 they rate this effect to an average of 8.

Has the interactive way of learning helped your team to get a shared understanding of the company? (Shared understanding means that all the team members have a similar idea of what the company does or is about.)

Yes No Rate from 1-10:

All respondents think that the interactive way of learning helped the team to get a shared understanding of the company. On a range from 1-10 they rate this effect to an average of 7.

Do you think that Xplore makes it easier for you to get access to the (company) information that is necessary in your design project?

Yes No Rate from 1-10:

All respondents think that Xplore makes it easier for them to get access to the (company) information that is necessary in the design project. On a range from 1-10 they rate this effect to an average of 7.

Would you use the information from the tool in your design process? Why or why not?

Yes No

All respondents would use Xplore in their design process. However, they would use for different purposes. One would use parts of the information, mainly the visual models and strategies. Two of the

respondents would use it for the reason that Xplore provides a good overview of the company. Yet another respondent would use the information mainly in evaluation stages of the design project.

Estimation: do you think that the company knowledge you generated from using Xplore can result in a better output from a design project for PMS? (That means a result that helps the poor people in their healthcare needs ánd fits into the company's portfolio and strategy, and is thus an interesting opportunity.)

No, not at all

Yes, a little

Yes, just yes

Yes, a lot

I can not estimate this.

All respondents estimate the effect of the tool on the output of a design project to be positive. Out of the options 'No, not at all', 'Yes, a little', 'Yes, just yes' and 'Yes, a lot', they all chose 'Yes, just yes'. One of the respondents comments that it will only lead to a better result if the company knowledge is combined in a good way with market knowledge. Another goes further in saying, that using the tool will lead to a result that will better fit the company, but that this does not say anything about the quality of the final design output: this depends on much more factors.

General ideas for improvement

Include an explaining list of words.

Include information on the country that is the focus of the project.

Less books, or let the books be different.

Add more structure to the session.

Improve the explanation of the game (exploring session).

Improve the card holders.

Add more examples in relation to the information.

Less organisation structures; they are not relevant.

More balanced portions of text; they are quite different in size.

I am colour-blind, I need more contrast between the colours.

More comments

One respondent questions how interesting it would be to play this 'game' a second time.

Add an extra chapter about designing for another culture. That is an essential aspect of these kind of projects. It is difficult to understand other cultures for Western-minded designers.

Thanks a lot! Eat a cookie!