Innovation Scan for Product Service Systems

Open your eyes to the power of your company to create value!

A manual for the development of new Product Service Systems for companies and intermediaries for the SME sector

MANUAL

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Foreword

Services are an increasingly important component of the economy. Companies that develop and provide customer-driven Product Service Systems (PSSs) rather than simply trying to sell a product often perform better than their competitors. Why? Because they think about what the customers really needs, provide them with customised service and often have more frequent contact with customers. Innovative Product Service Systems can also often be introduced quickly and cleverly without high costs. Finally, selling product service systems is often better for the environment.

Well-known examples of PSSs are the business models of companies like Océ, Xerox and Douwe Egberts. These are companies that used to sell products but now instead install the equipment for the customer who then pays for each unit purchased (a copy or print-out, a cup of coffee) and receives a complete package of accessories, service and support. The result is that these companies now have an interest in extending the useful life of their equipment and:

- the Douwe Egberts coffee dispenser produces a cup of fresh coffee to 'specification' and with no waste. No coffee has to be kept warm (the major aspect of energy consumption with a traditional appliance) or thrown out;
- Océ and Xerox take back their old equipment and recycle the useful parts. And they were doing so long before the introduction of disposal charges or other regulations designed to discourage the landfilling of electrical equipment.

Many companies are still not used to thinking in terms of PSS. This scan is intended to provide them with a quick introduction to this powerful new concept and help them to discover the added value of PSS business models. The PSS scan was designed by TNO and PricewaterhouseCoopers, both pioneers in the field of strategy and innovation with respect to Product Service Systems. The scan was developed on behalf of, and with financing from, the Ministry of Housing, Spatial Planning and the Environment. During the development of the scan the interim results were assessed by the following parties:

- the project's advisory committee, which was made up of representatives of the Ministry of Housing, Spatial Planning and the Environment, the Ministry of Economic Affairs, Syntens, employers' organisation VNO-NCW and the Netherlands Agency for Energy and the Environment (NOVEM);
- companies that took part in a workshop organised in Utrecht in May 2002 (FME, Syntens, Willett, Philips Consumer Electronics, Pearson and Bravilor Bonomat);
- companies that were kind enough to help us to test a draft version of the scan in practice (Tetterode, Ahrend, and a company recently taken over by a competitor).

We would like to sincerely thank these organisations for their input. We hope that this scan will provide an impulse for the development of eco-friendly Product Service Systems.

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PART 1 AN OVERVIEW OF THE INNOVATION SCAN

How to use this manual

Companies can run through the procedures in this manual independently or with the assistance of an external facilitator. The manual has three parts:

PART 1 AN OVERVIEW OF THE INNOVATION SCAN

This general section describes:

- the aims of the scan and this manual;
- the target groups of the scan;
- the estimated time required to carry out the scan;
- the scope of the scan and a brief description of the basic principles of the scan;
- the follow-up to the scan (positioning in the development and implementation process).

PART 2 THE STEPS: procedure and content

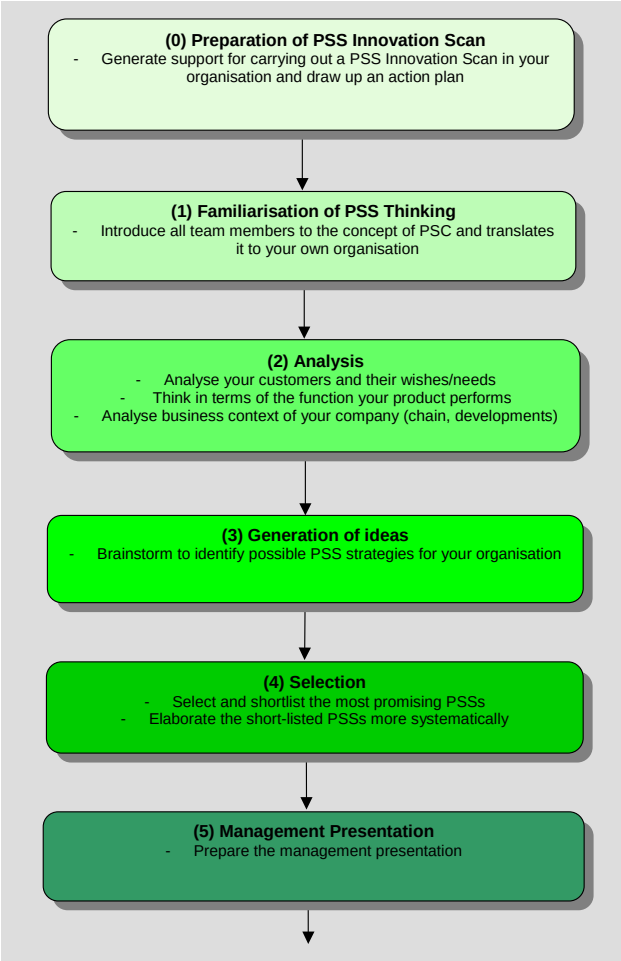
There are six steps (0-5) in the innovation scan. They are illustrated in figure 1. Part 2 starts with a brief introduction, which is followed by a two-page description of each step. Although the steps in this scan naturally focus on the development of Product Service Systems, the structure is fairly general and is often used in methods devised for product development, new business development etc.

PART 3 APPENDICES: Tools for each step of the scan

The appendices include tools or references to tools which will help you to answer the questions. The numbering of the appendices corresponds with the step in which the tool can first be used.

The last section of the manual contains forms in which all the information collected and the choices made at each step of the scan can be entered. This document includes regular to guide you quickly to the forms to be completed.

Figure 1 The six steps of the innovation scan



What is the purpose of this scan?

Is providing a product service combination (PSS) in addition to more traditional products a worthwhile option for my company? Could it also generate environmental benefits?

The purpose of this scan is to provide an answer to these questions quickly and easily. The scan will provide insight into:

- the contours of new PSSs that are appropriate to your company, customers and products;
- the (market) potential of these PSSs and the factors that will determine the success or failure of their introduction.

In helping you to identify promising PSSs for your company the scan will challenge you to change the way you look at your company and its customers. The scan will take you step by step through this voyage of discovery, during which the focus will be on finding your own answers to the following questions:

1. What PSS(s) can I think of (or compile) that would perform the functions or meet needs of my customers better than traditional products? How can I distinguish myself from my competitors? *(exploring ideas)*
2. How successful is the market introduction of these PSS(s) likely to be? What is the market potential (existing and new customers) and how quickly can this market potential actually be realised? *(market analysis)*
3. Is my company organised in such a way that these PSS(s) can be successfully marketed? What added value or obstacles will my customers encounter? (*implementation phase)*

The scan should preferably be carried out by a team whose members share responsibility for your company's innovation strategy. They may be assisted by external facilitators. The scan will take several days to complete, but a more general scan can be completed in one or two sessions of a half a day each.

- ➔ *It is important to carry out the scan in a team in order to generate a dynamic interaction and to allow ideas and knowledge to be exchanged and assessed.*
- ➔ *An interdisciplinary approach is essential if all the aspects of innovation are to be addressed, so we advise including members of management as well as development and marketing experts in the team.*

The scan will produce an overview of potentially interesting PSSs for your company. The output from the scan will allow the management to decide on whether or not to start with one (or more) specific PSS development projects (see Figure 2).

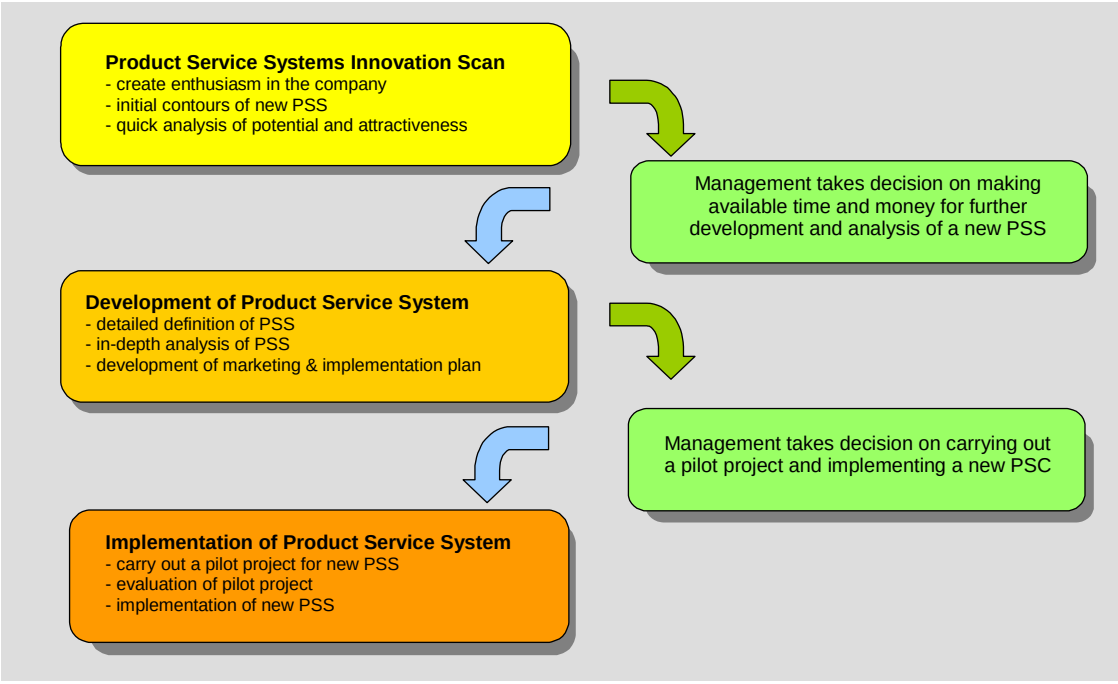


Figure 2: Positioning of the innovation scan in a complete PSS development and implementation process

For whom is the manual written?

This manual is written for two target groups:

1. The first target group includes people in (larger) companies who are engaged in developing new products and services. For example:
   - business developers;
   - marketeers;
   - product developers;
   - but also people who are 'close to the customer' and therefore sometimes have a position in market development, such as managers of service departments.

   They will often be in a position and have the knowledge and skills needed to organise and supervise the process of performing this scan, assembling the relevant team, claiming the time needed for it, etc. However, even for this target group there can be added value in requesting external advice for someone with a lot of experience in supporting the process of market and strategy development in companies.
2. The second target group are intermediaries (for example trade associations, consultants) that assist companies, especially smaller SMEs, in this field.

What is the added value of the scan, does it produce much that is new?

The added value depends on the company's specific circumstances. When the draft manual was tested with companies it proved useful to make a distinction between two types of companies:

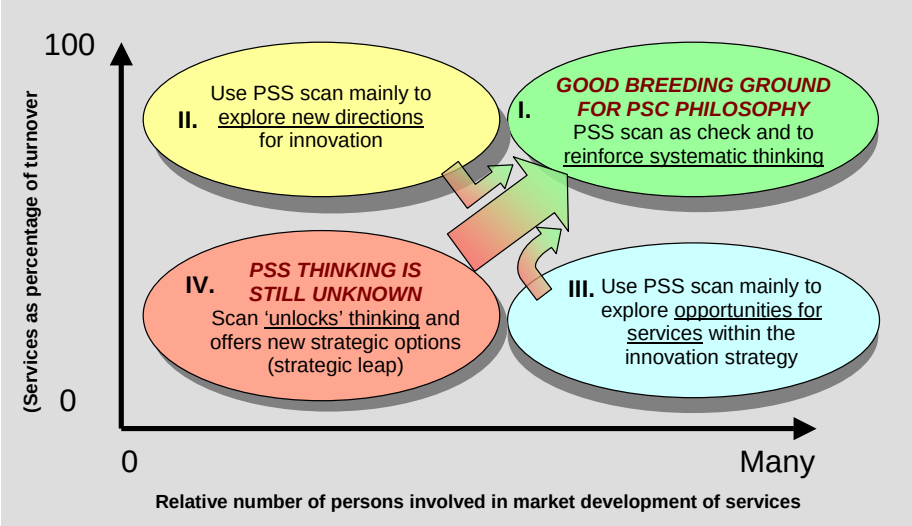
- For *product-driven organisations* the scan offer considerable potential for changing the way they think.

  If your company secures most of its turnover from products and 'new business development' is either weak or driven mainly by product development this scan will probably produce many ideas and opportunities for innovation (see figure 3).

- For *customer-driven organisations* the value of the scan lies mainly in affording a chance to evaluate or review the range of products and services, deepen knowledge and explore possibilities for creating additional value through the smart integration of products and services in a systematic approach.

  If a lot of the turnover of your company is secured from services or consumables and there are a fairly large number of people in your company involved in market development from the perspective of the needs of the customer, the scan will occasionally throw up ideas that had already been thought of. This is no surprise, since otherwise these people had not been doing their job properly. In those cases the principal added value of the scan is that the team can investigate in a logical and step-by-step process whether ideas have been missed and examine whether the link between the products and services is optimal.

Figure 3: Estimating the potential of the PSS innovation scan for four types of companies (I – IV)



How much time will it take to carry out a PSS scan?

The time needed for the scan depends heavily on:

- The level of ambition of the person carrying it out (quick scan or a thorough analysis), as well as the time and resources that can be made available for it;
- The volume of information already available and the depth (or level of detail) with which the scan is carried out;
- The type and size of company, and hence the number of people from the company that should ideally be actively involved in the PSS development team;
- Whether or not external consultants are hired (group facilitator, process management, expertise in the subject matter, market analysis).

Time needed for the PSS scan

The table below gives an indication of time needed to complete the scan (the cumulative time devoted to it by all the participants). A distinction is made between the time involved for the person who is supervising the process (as already mentioned this can be an employee or an external adviser) and the amount of time involved for the company, in other words the people who take part in the team.

Estimated cumulative time needed for PSS scan	*SME (< 50p)*		*SME (>50P) or Business unit of large company*		*Complete scan for large company*	
	*Company time**	*Leader /Adviser*	*Company time **	*Leader /Adviser*	*Company time **	*Leader/ Adviser*
Global scan	1.5	1.5	3	2	5	3
More detailed scan	3	3	6	4	8-20	4-10

*) If it is decided not to use an external adviser the amount of the company's time needed should be increased by around 100% (since the company will perform the scan and handle the process management itself).

Complete performance of the scan by a complex company or business unit

The table below provides a general outline of the schedule and the time needed for the innovation scan for a larger SME or a business unit of a large company. The estimate is based on carrying out each step completely. The column with the estimated time required shows the cumulative time required in days of all the individuals involved, both the company's own employees and any intermediaries that are hired.

The time required for the scan will be different for each of the four types of company that we defined in figure 3:

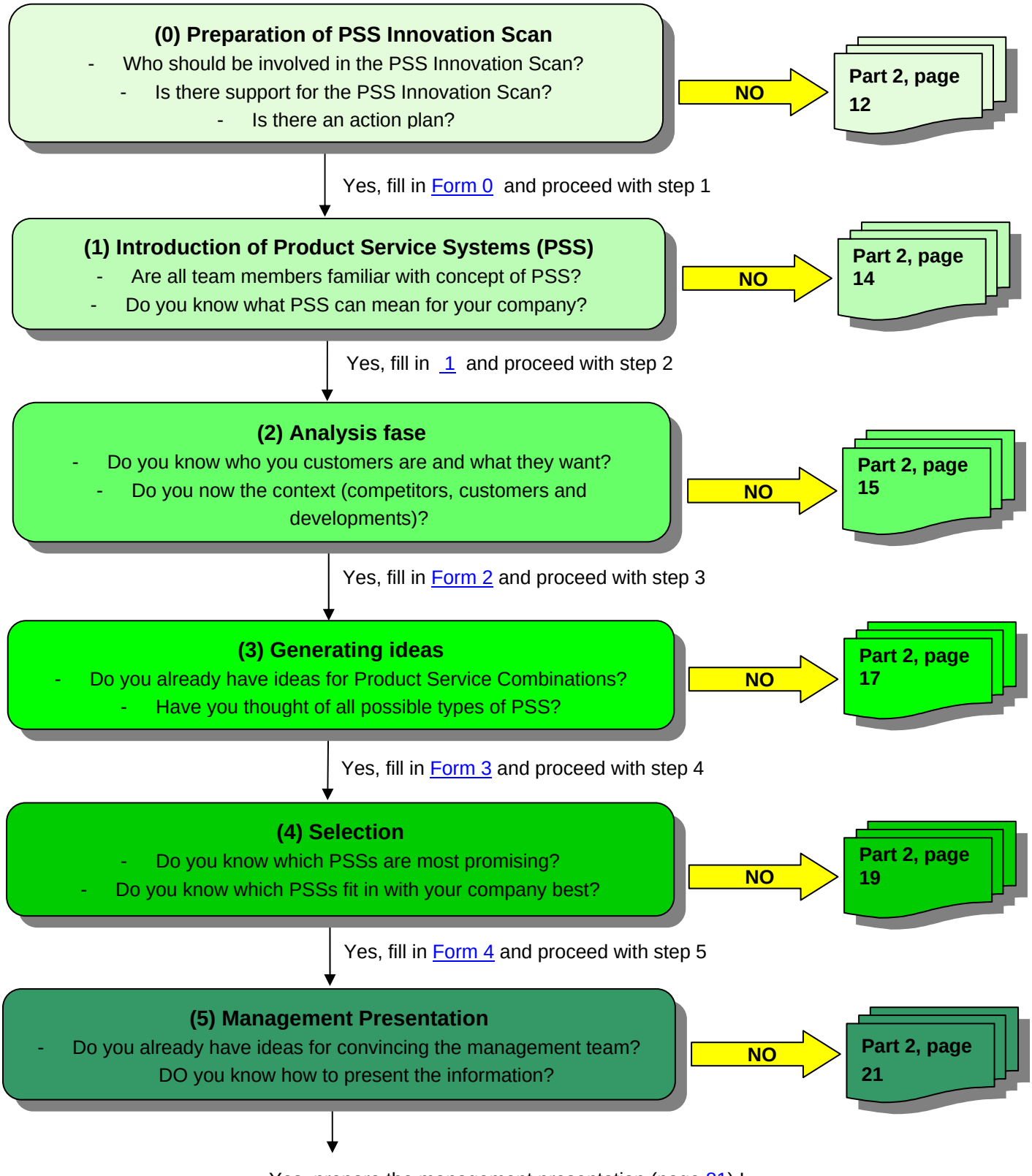
- *Companies of Type IV will need relatively more time to get used to thinking in terms of PSSs (in the initial phases of the scan).*
- *Type I companies I (with a lot of prior knowledge) will probably need less time in the initial phases of the scan, but this will probably be made up for in the later phases since they will want to explore more deeply in the selection phase of the scan since they will have more relevant information about customer behaviour and the market.*

Step	Performance in week	Time involved* (days)	Meetings
0 Preparation	1-2	0,5-1	
1 Introduction	3	1-2	1st meeting of half a day
2 Analysis	3-4	2-6	
3 Ideas	5	1-2	2nd meeting of half a day
4 Selection	5-6	1-3	
5 Presentation	7	0,5-1	3rd meeting of 2 hours
TOTAL		6-13	

* This is the cumulative time spent by the company itself and any intermediaries for a more detailed scan. The company accounts for roughly 60% of the time involved and the external intermediary or adviser for 40%.

PART 2 THE STEPS: procedure and content

Figure 4: Detailed step-by-step plan of the PSS innovation scan



Introduction

Figure 4 on the previous page outlines the six steps in the innovation scan. This section devotes two pages to each step.

How do you use the step-by-step plan?

1. Start at step 0 and do not skip any steps since each step uses results that were generated earlier.

2. Depending on how in-depth you want your scan to be and the amount of information already available you may be able to complete some of the steps quickly. You can investigate whether this is the case using the questions posed for each step in the boxes in Figure 4 .
   - If you can answer all the questions for a step on the basis of what you already know you can enter the result of this step immediately in the appropriate form (see forms 0 to 4 in the appendices). You can also skip the procedure for this step in the relevant section of Part II.
   - If you cannot definitely answer all the questions in a step with 'yes' you *should* go through the whole of the corresponding section of Part II. The section refers where necessary to tools in the appendix.

3. Each step is concluded with a complete overview of the result achieved.

For all six of the steps in the innovation scan there is:

- a brief explanation of its purpose or purposes;
- an indication of what (prior) knowledge/information is needed to complete the step;
- an indication of the time is will take to complete;
- a description of the end product;
- a description of the activities that have to be carried out.

In the appendices (see Part 3) you will find valuable background information as well as tools which can be used while carrying out the process.

(0) Preparation of PSS Innovation Scan

Introduction

Purpose:	To prepare to carry out a PSS Innovation Scan
What you need:	-
Result:	A project team has been assembled and a project plan has been drawn up
Duration:	Half a day

The goals for this phase are:
1. to rally sufficient support within the organisation to carry out the innovation scan;
2. to assemble a project team and generate enthusiasm among team members (they must be committed to helping perform the innovation scan);
3. to draw up a timetable for carrying out the PSS innovation scan;
4. to send out invitations and arrange the rooms needed for meetings.

Actions

The activities to be carried out are:
1. select the members of the project team;
2. approach the prospective members and convince them of the importance of the PSS innovation scan;
3. draw up a timetable with one or two enthusiastic team members;
4. organise the kick-off meeting.

1 Assembling the project team

Developing a new PSS will require input from a number of areas of expertise within the organisation, including for example:
- marketing and communication;
- product development and design;
- environment;
- research & development;
- management and operations.

To achieve the best results from the innovation scan it is advisable to find participants from each of these areas of expertise. Representatives of each of these competences should therefore be invited to take part in the project.

2 Approaching and convincing individuals

Use the materials in appendices 0.a, 0.b, and 0.c in trying to convince these individuals.

3 Drawing up a timetable for implementation

Prepare a first draft of the action plan together with the most important team members. This manual is in fact the framework for the action plan. Other decisions that the team doing the preparations have to make are:

- identifying those steps for which the forms can be completed immediately on the basis of existing knowledge and which steps will have to be followed completely;
- how detailed the scan should be.

The conclusions can be translated into an action plan setting out the most important dates, estimates of the time involved and the meetings to be organised. This plan will be discussed, and if necessary changed, at the first meeting. The example in Appendix 0.d can be used. The example is based on three meetings, for which sample agendas are given in Appendices 0.e, 0.f and 0.g. Form 0 can be used to record the project plan.

4 Organising the first meeting (kick-off)

- reserve a room for the meeting;
- send out the agenda (see Appendix 0.e.), action plan and other documents that have to be read (one or more of Appendices 0.a, 0.b, and 0.c.) to all team members.

Return to the figure with the step-by-step plan

(1) Introduction to PSS [1st meeting]

Introduction

Aim:	To generate enthusiasm among all team members and ensure they are all equally familiar with PSS and the innovation scan
What you need:	Everything is included in this folder
Duration:	1 hour preparation and 1 hour for meeting
Result:	All members of the project team say they want to proceed with the project

The purpose of the introductory meeting is to familiarise all team members with Product Service Systems and the PSS Innovation Scan.

Every member of the team must therefore be able to answer the following questions:
1. What is a PSS?
2. What benefits can a PSS bring to our organisation?
3. What is the aim of this project?
4. What are the most important steps in the PSS Innovation Scan project?
5. What are the most important potential problems for this project?

Agenda for first meeting
See the example in Appendix 0.e.

Activities
Carry out the following activities:
1. start a discussion about the five questions listed above and ask the team members to answer them on the basis of the available information;
2. present the draft project plan and allow everyone to express their opinion of it;
3. draw up a definitive project plan;
4. allow everyone to fill in the mindmap (see Appendix 1.a) and then raise and discuss any differences that arise;
5. if necessary revise the project plan and write the project team's joint answer to the above five questions in Form 1.

Return to the figure with the step-by-step plan

(2) Analysis [1st meeting]

Introduction

Aim:	To establish the current and future needs (values/wishes) of customers in relation to the current and future function of the product.
What you need:	Knowledge of: marketing (customers and products), customer needs, strengths and weaknesses of the actors in the chain and potential partners, impact of the product on the environment, company strategy, the context in which it operates and the internal organisation
Duration:	Two hours for preparation and three hours for the meeting
Result:	- Company's current strategy is clearly expressed or defined - The market and its segments have been defined - Product functions, customer needs and factors in purchasing decision have been identified - Market opportunities have been prioritised on the basis of customer needs - Critical success factors have been identified - Strengths/weaknesses and opportunities/threats (SWOT) have been analysed

Actions

The analysis phase involves the following steps:

1. select a product or product group for which the PSS Innovation Scan will be carried out;
2. analyse customers, product, market, the company and its context.

Step 1 Select a product or product group

Use the following questions to choose the most suitable product. The product for which the most questions are answered 'yes' is probably the most suitable.

Question	*Product 1*	*Product 2*	*Product 3*	*Possible weighting factor*
Is the product becoming a ' commodity'?				
Do you face intense price competition?				
Are major changes taking place in the market context of the product?				
Do you want to respond better to the needs of your customer with the product?				
Do you want your product to stand out from others?				
TOTAL				

If necessary you can also include scores (0 – 5) for each question in the above matrix and/or use weighting factors. The product with the highest score is probably the most suitable product for the PSS Innovation Scan.

Step 2 Analyse customer, product, market, company and context

Answer the following questions as comprehensively as possible, including arguments in support of the answers. Fill in the answers in Form 2. The information in this step is needed to successfully complete the following steps. The questions are explained in more detail in Appendix 2.a, which also includes references to instruments and methods that can be used to help answer the questions.

Questions for the analysis:
1. **Market segmentation.** What market segments/customers do you serve and where, how and why are your products bought? Do you supply to other companies or directly to the end consumer? Describe your customers or groups of customers and where applicable your customers' own customers (explanation in Appendix 2.a)
2. **Function/value for the customer.** What functions does the product perform for the customer (there may be different ones)? What value does your product represent for the customer? (see explanatory notes in Appendix 2.a)
3. **Your own position in the value chain and potential competition from outside the branch.** Answer the following questions on the basis of your product's function: • What is your product's position in meeting the ultimate needs of the customer? What other parties play a role in meeting those needs? Where is the greatest added value and potential profit? • What potential competition is there from other branches (in other words, are there other parties that can perform the same function for your customer with entirely different 'hardware' or business models than yours)? (see explanatory notes in Appendix 2.a)
4. **Critical success factors and SWOT* (now).** What are your critical success factors (from the perspective of value, the customer, internal organisation and learning)? In what aspects are you strong and are there opportunities for you (or vice versa)? Can you give arguments why customers come to you and not to another supplier? (see explanatory notes in Appendix 2.a)
5. **Trends/developments and SWOT* (future)**. What important trends and developments can you see that could affect your SWOT in the future? What is it absolutely essential for you as a company to be good in to be able to continue selling your products? (see explanatory notes in Appendix 2.a)

*N.B. SWOT is the abbreviation of 'Strengths, Weaknesses, Opportunities and Threats'.

Return to the figure with the step-by-step plan

(3) Generating Ideas [2nd meeting]

Introduction

Aim:	Thinking of possible PSSs
What you need:	An open mind
Duration:	1.5 hours
Result:	You have thought up potential new PSSs and mapped each option from the customer's perspective.

The results of the analysis phase can be used to come up with new product service combination. Above all, this calls for creativity. It is therefore important to come up with new ideas without at first considering the constraints.

To get everyone in the right frame of mind it is useful to organise a game or activity which allows the participants to forget briefly about work before carrying out this part of the scan. A number of suggestions for the format of the brainstorming session are given below.

Agenda for 2nd meeting

See example in Appendix 0.f.

Actions

The following activities must be carried out:

1. On the basis of the findings from the analysis phase select the most relevant market segments and for each segment the three most important elements that can add value for your company and your customer (see Appendix 3.a). Fill in the answers in Form 3;
2. Think creatively (without considering possible constraints) about solutions (PSS options) that could create this added value. You could use any of the following instruments:
   - *A creativity session (Appendix 3.b).* The most extensive approach, which often combines a number of the other methods. It is essential to use experienced facilitators with this method.
   - *The classical brainstorming session (Appendix 3.c).* This is especially suitable for a group where the atmosphere and interaction is such that all group members will (and can) express their ideas without inhibitions. The facilitator must have some experience with brainstorming.
   - *Brain writing (Appendix 3.d).* This is particularly suitable for a group and when anonymity is an advantage. Does not necessarily need a facilitator.
   - *The progressive abstraction tool (Appendix 3.e).* This is particularly suitable for a small team (1 or 2 persons). A facilitator who can keep asking critical questions is crucial.
   - *De Bono's Six Thinking Hats (Appendix 3.f).* This method is a specific type of brainstorming session: De Bono consciously tries to get people to look at a problem from different perspectives. This method ensures that individuals and groups are not

dominated by preconceived notions. The method also links perspectives separately from the individuals who express them. The facilitator should have some experience with the method.

- *The PSS matrix (Appendix 3.g).* The size of the group is unimportant. The method is particularly suitable for people who need more structure in order to produce ideas. A disadvantage can be that the structure provided curbs creativity. This method can be used without a facilitator.

3. Use the PSS matrix (see Appendix 3.g) to check that all the ideas have been recorded (except of course if the matrix was used to generate ideas). The entire group should then see whether they can come up with any other ideas. Fill in all the ideas generated in Form 3
4. For each idea decide whether it represents an innovation in what the company supplies and/or involves entering a new market (the so-called Ansoff matrix, see Appendix 3.h.). Fill in the result for each PSS option in Form 3.

Return to the figure with the step-by-step plan

(4) Selection [2nd meeting]

Aim:	To select 1-3 of all the ideas for PSSs which will then be worked out in detail on the basis of specific criteria
What you need:	- Description of new PSSs - Information from the analysis phase - Additional information about the product, market and company
Duration:	2.5 hours
Result:	1-3 detailed PSSs whose attractiveness (market potential) and business fit have been assessed

In the selection phase the ideas that have been generated are critically reviewed. The PSS that will be developed must meet a number of conditions and the project team has to show with a certain degree of robustness that the selected PSS will actually be a success. This means that the PSS options must be evaluated against a number of criteria.

Broadly speaking, these criteria are the attractiveness (market potential) of the new PSS and the degree of business fit.

The team can make a quick analysis with the four-axes model, which can serve as a framework for the evaluation of the prospects for an idea for a PSS for your company (see Appendix 4d)

For a systematic analysis we suggest using a broad set of assessment criteria that will play a role in the selection. The relative importance of a criterion will differ from one company to another, and this can reflected by using weighting factors.

Attractiveness of the PSS (external):	*Business fit (internal):*
• Market and market potential are large	• Fits in with current market position
• Market growth / potential growth are high	• Considerable knowledge of the market
• Large potential profit	• Fits in with the company's image
• Low threat for new entrants/high barriers to entry	• Corresponds closely with the strategy (mission)
• Low threat from substitute products	• Fits in with the image of the company
• Price sensitivity among customers is low	• Fits in with the current production and sales channels, expertise of employees, etc.
• 'High potential for loyalty of customers'	• Fits in with the results of SWOT
• High quality of the product	• Adequate capacity to adapt in order to handle any changes that are needed
• Short pay-back period/profit margin	• Low switching costs
• Minor financing problems (pre-financing, costs frequently charged)	• Good cooperation with (possible) partners in the chain
• Less environmentally damaging	
• Few uncertainties (costs, revenues, etc.)	
• Few problems with respect to legal aspects	

Actions

The following activities must be carried out:

1. Study the strategy matrix for 'Business fit' and 'Market attractiveness' in Appendix 4a
2. Assess the proposed PSSs in terms of these two main aspects using:
   - the score table (Appendix 4b). This method is particularly suitable if several PSSs have to be compared and most of the criteria are important.
   - the pragmatic differential (Appendix 4c). This method is particularly suitable if only a few PSSs need to be compared or to decide whether the PSS is better than the current business model.
   - the quick four-point evaluation (Appendix 4d). This is in fact a pragmatic differential in which four aspects are quickly considered: economic potential, environmental potential, market acceptance (aspects of market attractiveness) and business fit.
3. If some of the criteria assessed under 2) are absolutely critical or essential employ a somewhat more extensive evaluation method (for example, the quick eco-efficiency scan, Appendix 4e, or a more extensive eco-efficiency assessment with the Ecoscan, Appendix 4f). Use the above criteria to assess the 'Business fit' and 'Market attractiveness' of the PSS and plot the result in Appendix 4a.
4. Plot the assessment in the Strategy matrix and work out the strategy for the most attractive PSSs (Form 4);

Return to the figure with the step-by-step plan

(5) Management Presentation [3rd Meeting]

Aim:	To prepare and deliver a management presentation on the best PSSs to secure permission to investigate them further (and possibly implement them).
What you need:	All the knowledge and information that has been collected and generated
Duration:	3 hours
Result:	A solid management presentation

Once the entire Innovation Scan has been completed there is one final step and that is to present the new innovation or product service combination to the management. The management team has to give permission for further research into the PSS.

Convincing the management team and clearly explaining to them the decisions that have to be taken is a skill in itself. It is therefore important to prepare a presentation carefully.

Important points to consider for the management presentation are:
- the need to generate enthusiasm;
- the need to clearly explain both opportunities and threats in the existing situation and the new one.

Agenda for 3rd meeting
See the example in Appendix 0.g.

Actions
The following activities must be carried out:
1. Prepare a presentation for the management team using the framework in Appendix 5 and any standard formats for a business plan or presentation that are used in your company.
2. Give the presentation.

Return to the figure with the step-by-step plan

PART 3 APPENDICES: Tools for each step of the scan

In the appendices you will find tools or references to tools that you can use while carrying out each step of the scan. The tools are grouped according to the step in which they will be most useful. Part 2 shows where these tools are used as you go through the scan.

0) Preparation of PSS Innovation Scan

0.a Introduction to PSS Innovation Scan for industry

Product Service Systems Innovation Scan

the first step on the way to higher added value

Is your product becoming a commodity?
Do you face intense price competition?
Are major changes taking place in your market context?
Do you want to respond better to the needs of your customer?
Do you want your product to stand out from others?

If you have answered yes to one or more of these questions a PSS is the solution for you.

What is a PSS and what could it mean for your company?

More and more companies are changing their strategy. The concept of selling individual products that a customer himself has to put together into a single package is steadily being replaced by offering customers the most integrated and complete solution to their needs. For example, supermarkets sell not only the ingredients for the evening meal but nowadays also sell complete meals. More and more cars are hired or leased. Many companies today no longer buy a photocopier but pay the supplier for each copy they make. In other words, it is not the customer but the supplier that arranges for a piece of equipment to installed, ensures maintenance is carried out and that toner cartridges are supplied.

A product service combination (PSS) is a combination of products and services. The purpose of a PSS is to meet an integrated, defined need of a customer.

The possible benefits for a company are: -
- higher added value, and hence increased sales;
- usually less environmental burden;
- focus on customer needs.

Odin offers its customers a subscription to a range of organic vegetables. Customers can collect the standard package from a shop affiliated to Odin for a fixed price. Because the customer cannot choose, each pack includes recipes for the vegetables supplied. The advantages for customers are that they no longer have to choose, recipes are supplied, the vegetables can be collected from a permanent address, they receive organic vegetables of a high quality at a reasonable price. The advantages for Odin are: a fixed number of customers and delivery addresses.

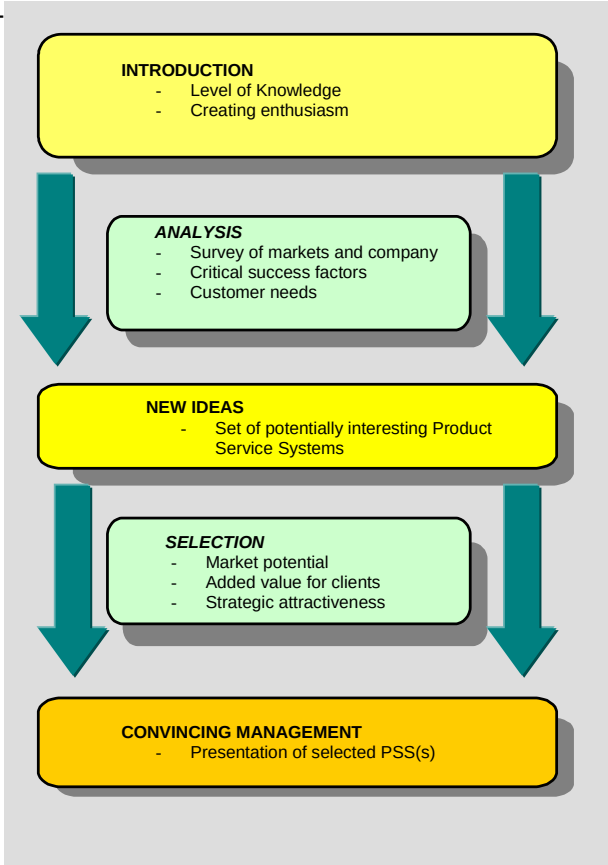
PSS Innovation Scan for industry; the first step on the way to higher added value

The purpose of the PSS Innovation Scan is to initiate a process within the company that will lead to new Product Service Systems. The PSS Innovation Scan offers companies a quick and easy way to learn about:

- the potential of PSSs,
- a specific description of a PSS (in terms of market, customer, partners, internal fit, etc.)
- instruments for selecting a PSS
- a format for the presentation to management

Product Service Systems Innovation Scan –

The figure alongside shows the five phases in the Product Service System Innovation Scan.



Product Service System Innovation Scan – the target group

The target groups are all business organisations, SMEs and multinationals, regardless of their product range or type of customer (business-to consumer or business-to-business).

Duration, costs and estimated commitment of time

The PSS Innovation Scan requires an active commitment from the company for which it is carried out. The PSS Innovation Scan requires the involvement of various individuals/departments, including marketing, environment, R&D, Production, Business Development and Design.

The PSS Innovation Scan will involve several workshops. Representatives of different departments will have to attend these workshops. Depending on the amount of information already available, two employees of the company will have to spend an estimated 1.5 – 6 days on the project. Supervision of the project takes up around 1.5-4 days. The supervision can be provided by external advisers but also by an internal employee (if they have sufficient experience with the process of strategy and business development). The duration of the project can vary from one to three months.

Return to Part 2.0: Preparation of PSS Innovation Scan

0.b Examples of successful Product Service Systems

Reference: Goedkoop, M., van Halen C, te Riele, H, Rommes P., Product Service Systems, Ecological and Economic Basics, report 1999/36,iVROM, The Hague, 1999.
A digital version of the report is available from cees.van.halen@nl.pwcglobal.com, or http://www.pre.nl/PSS .

1 Odin, Example of a PSS in the food sector: Odin fruit and vegetable subscription

A good example of a Product Service Combination is the Odin fruit and vegetable subscription service. Subscribers to this service receive a bag with freshly picked fruit and vegetables each week. The bag is left each week at a collection point in their neighbourhood. The bag contains a newsletter with easy to prepare and surprising recipes, tips and interesting facts about organic food and agriculture. The newsletter also describes who grew the vegetables. For the growers the Odin subscription provides an assurance that they can sell their produce and hence provides an extra stimulus to grow food organically. The environmental benefit comes from the fact that the produce is grown organically without pesticides and fertilisers but is also due to the fact that less transport and less packaging is required. From an economic perspective eco-food is a niche market in which Odin has a competitive advantage because it has close and direct contacts with suppliers and customers.

2 Xerox

Xerox clearly understood what product it was supplying. Instead of selling photocopiers to its customers Xerox sells the function of photocopying. Consequently, it retains ownership of the photocopier and can maintain control over every stage of its life cycle. When a machine is replaced it is stripped and any parts that are still in good condition are revised and used again. The company makes considerable savings in this way, both financially and in materials. Xerox keeps its customers informed about this and it is one of the reasons why the customers choose Xerox as a supplier. At the end of the day the customer only wants photocopies; the costs of managing the photocopier remain with the manufacturer, which in turn reaps the benefits.

3 Koppert - integrated pest control

Koppert B.V. is a family company that was founded in 1967 and produces and sells natural enemies for biological crop protection and bees for natural pollination to be used in professional horticulture, which leads to minimum dependence on chemical agents. Koppert B.V. is market leader in its field.

The PSS component lies principally in the extensive advice that Koppert provides for the application of its product. Advice to the user is important for the success of integrated crop management and natural pollination. The advice is provided by the supplier who sells the Koppert products or by Koppert itself if necessary. Koppert trains employees of its customers and its resellers to provide the advice.

Koppert B.V. has its own research department to develop new products and production methods. Researchers from this department participate in international professional working groups and the company has contacts with a network of research institutes around the world.

Koppert's head office is in the Netherlands, where it has more than 300 employees engaged in research, production, sales, advice and logistics. It also has branches (for sales, advice and logistics) in England, France, Italy, Spain, USA, Canada, Mexico and Turkey and branches which also handle production, in New Zealand and the USA.

It sells its products through regular suppliers of horticultural products or, in very exceptional cases, directly.

4 Greenwheels

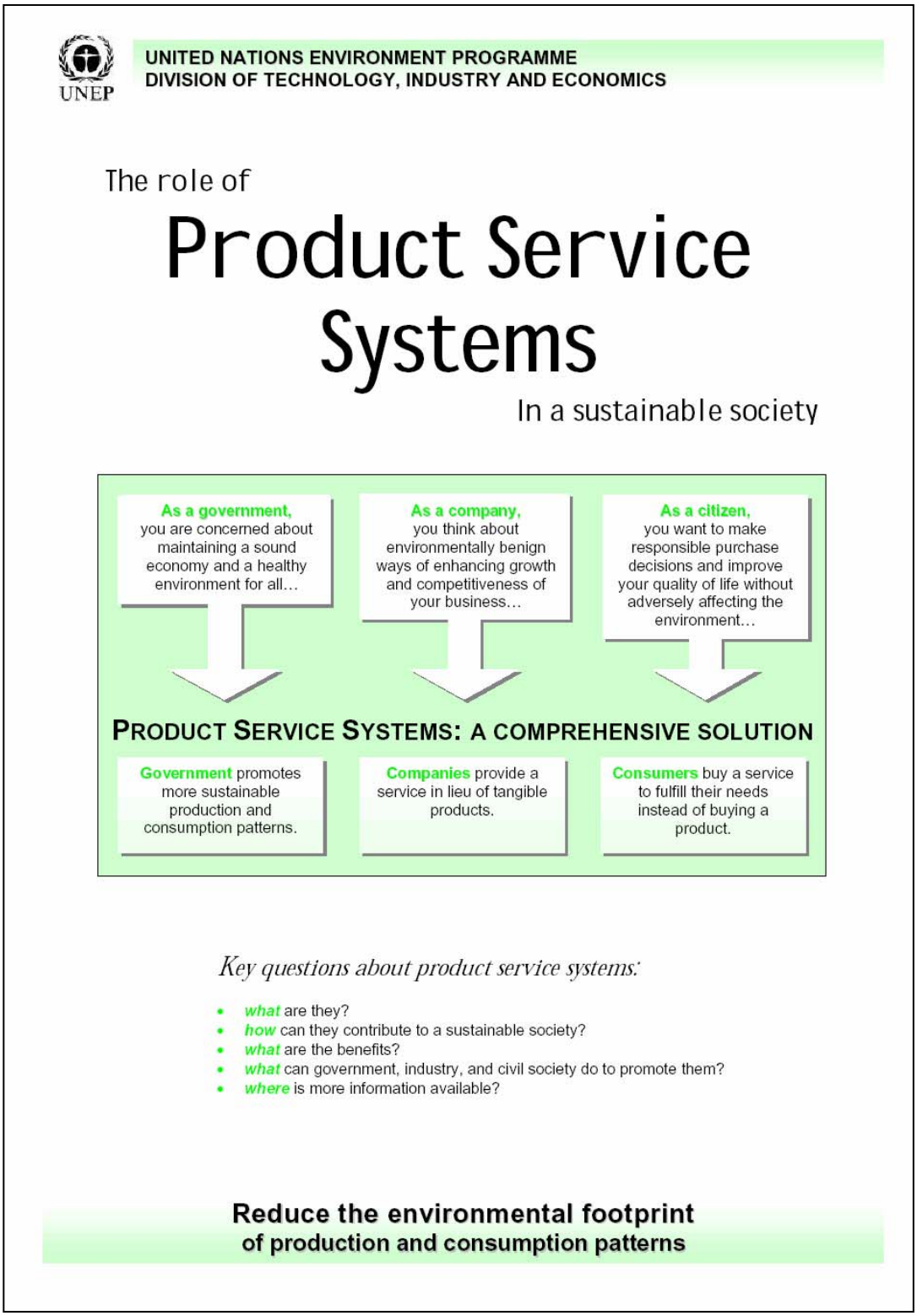
Greenwheels is a product service combination that provides the service of mobility by allowing customers the use of a car. Greenwheels cars can be ordered 24 hours a day, 7 days a week with a simple telephone call. Reservations can even be made just before the car is needed. The receptionist handles the reservation and informs the caller of the location of the nearest car. As soon as they take out a subscription with Greenwheels users of the service receives a chip card which enables them to enter the car and identify themselves to the on-board computer which registers the use of the car. At the end of the month the subscriber receives a computer-generated bill and the amount is automatically debited from their bank account. Cars can now be ordered from Greenwheels in 16 cities in the Netherlands and the organisation has around 5000 subscribers.

5 Voicemail

Voicemail is a service that is provided in the Netherlands by KPN Telecom. Voicemail is a centralised answering service. Rather than having a physical answering machine in each home KPN provides the answering service via a large central computer. If a person is called but is not at home or is unable to answer the telephone the call is automatically switched through to the central computer where a message can be left. The user can later call the central computer to listen to the messages. Obviously this service means there is no need to produce a lot of answering machines, which is good for the environment. But the most important thing is that in this way KPN provides better service to its customers and so can also sell more services.

Return to Part 2.0: Preparation of PSS Innovation Scan

0.c UNEP brochure on Product Service Systems



The global problem

Our society is using more resources than the planet can sustainably supply. In many situations the major part of these resources end up as wastes or rejects rather than in the products we use. The energy efficiency of many processes we rely on in our domestic and industrial life is well below 50 percent.

Recent studies indicate that a *sustainable society* in the future should use only about 10 percent of the resources that industrialised societies are using today (per capita). A radical change is needed to move from the prevailing economic system of manufacturing goods and inducing customers to buy them towards one based on *dematerialised* consumption patterns. Product service systems are one of the elements in such a future.

Material use figures:

 Efficiency of converting primary fossil fuel into usable energy	30%
 Efficiency of converting gasoline into motion in an internal combustion engine	2%

(from Fussler, Claude. Driving Eco-Innovation, 1996.)

What are product service systems?

The key idea behind product service systems is that consumers do not specifically demand products, per se, but rather are seeking the utility these products and services provide. By using a service to meet some needs rather than a physical object, more needs can be met with lower material and energy requirements.

A product service system is a competitive system of products, services, supporting networks and infrastructure. The system includes product maintenance, parts recycling and eventual product replacement, which satisfy customer needs competitively and with lower environmental impact over the life cycle.

Meeting consumers' needs with a mix of products and services is not a new concept. House rentals, hotels, taxis and restaurants are good examples based on economic interest. However, there are other new and innovative applications of product service systems that have developed as a response to make business more sustainable.

The main difference between product service systems and the classic examples is that the preference of consumers is influenced by environmental, as well as economic interests. The example below further explains the essential differences between these two similar concepts.

Characteristics of selling a product vs. a function

Traditional product sales (selling tangible goods)	**Innovative alternatives: product service systems** (selling functionality)	
Consumer **buys** a vacuum cleaner to clean house/office.	Consumer **rents** a vacuum cleaner to clean house/office.	Consumer **buys a service** from a company to clean house/office. (Company determines best equipment and methods based on consumer's needs.)
The consumer owns, uses and stores vacuum cleaner. Consumer is responsible for maintenance and the 'quality' of the cleaning.	Company retains ownership of vacuum cleaner and is responsible for maintenance. Consumer is responsible for use and 'quality' of cleaning.	Company owns, maintains and stores the cleaning equipment including vacuum cleaner. Company is responsible for 'quality' of the cleaning.
Initial investment for consumer could be considerable.	Consumer costs are spread out over time.	Consumer costs are spread out over time.
Consumer ultimately disposes of vacuum cleaner and buys replacement.	Company responsible for disposal and has incentives to prolong use and product recyclability.	Company responsible for disposal and has incentives to prolong use and recyclability of cleaning equipment.

Who are agents of change?

Product service systems require a co-ordinated approach by several groups of stakeholders. Industry, government and civil society need to work together to create and to facilitate the establishment and smooth functioning of such systems as part of a more sustainable economy.

Industry is particularly well positioned to take the lead and implement new strategies by using 'out of the box' thinking. It is constantly re-evaluating how best to meet consumer needs at the lowest cost and it has increasing pressure to take into account the environmental impacts of its activities (from ISO 14000 standards, public scrutiny or governmental regulation, for example). In addition, the consumers of many products and services are, in fact, other companies operating within similar contexts.

Government's role is to set a policy framework conducive to change. Among other possibilities, it can establish new laws, regulations and/or market-based incentives that encourage establishment of services. Examples could include higher sales taxation for products as opposed to services or mandating product take-back systems to promote recycling of products. Public procurement can also be used to stimulate the market for product service systems.

Individual consumers can use their purchasing power to demand product service systems. They can exert pressure on government and the private sector to support sustainable systems of production and consumption.

In the United States…

'Servicizing' in the chemical industry has begun to change the way chemical manufacturers do business and the way their clients use chemicals. Traditional business practice of chemical manufacturers is based on generating profit from selling increasing volumes of chemicals. But we are also seeing other patterns such as "fixed-fee per part" cleaning contracts which focus on the function of the chemical, not the chemical itself. For example, Raytheon contracts a company to manage the chemicals in fifty of its facilities. Raytheon can focus on its primary business of producing high-tech electronics while the chemical service company focuses on ways to reduce the amount of chemicals used in the production process. In addition, strong incentives to improve environmental performance were included in the contract. The result: near elimination of solvents and VOCs, 71 percent reduction in paint waste, and annual operating savings of at least $400,000.
General benefits of this type of arrangement include:

- reduced need for resources, human and financial, for monitoring, tracking, reporting, training, handling, storage, special equipment and final disposal associated with chemicals;
- reduced liability and vulnerability to public relations problems; and
- greater incentive to reduce volume of chemicals used.

(From Votta, Thomas J. "Transitioning from Product to Service-Based Chemical Procurement", 2001)

In Germany...

The car manufacturer Volkswagen has built partnerships with some apartment complexes in Germany to offer the service of mobility to building tenants. The two programmes, 'Mietermobil' in Wolfsburg and 'Wonh mobil' in Hamburg, offer a fleet of cars of different sizes (including an electric powered Golf) maintained by a Volkswagen dealer, washed by local filling stations, and used exclusively by residents of the buildings. Benefits of these programmes include:

- lower overall living costs for consumers due to elimination of the need for each to purchase a vehicle;
- reduction in environmental impact since cars are well-maintained by local dealership;
- reduction in land used for parking since less vehicles are present;
- upgrade to rental housing makes it a more attractive option; and
- more efficient way to meet mobility needs through different sizes of available vehicles.

(From Volkswagen Annual Environmental Report, 2000)

Benefits for all

If employed on a global level, product service systems can lead to reduced resource use and waste generation since fewer products are manufactured. The increase in sales of services can offset initial reductions in tangible goods sold. Employment lost in manufacturing can be balanced by jobs created in services. As a business concept, product service systems have the potential to improve standards of living worldwide; however, this change will require a cultural shift to new values which focus on *quality* and *utility*. With product service systems, consumers worldwide have less need to buy, maintain, dispose of, and eventually replace a product. In fact, the quality of the service, and thus consumer satisfaction, may improve with product service systems because the service provider has the incentive to use and maintain equipment properly, increasing both efficiency and effectiveness. The incentive also exists for producers to design closed-loop systems for equipment based on designs for higher durability and recyclability.

In developed countries, which already have a large environmental footprint arising from a high rate of per capita resource consumption, product service systems can facilitate the transition toward a more service-oriented, sustainable society. The service industry can find new and increased market opportunities. Other benefits include reduced dependence on externally produced resources and reduced load on waste disposal facilities.

For developing countries, product service systems may represent a more promising and environmentally sound path to economic development since it enables them to bypass the development stage characterised by individual ownership of goods. Realising that many product service systems already exist as a result of economic considerations, it may be interesting to examine ways of improving the range and environmental quality of such existing systems.

Environmental benefits of product service systems can be combined with other advantages:

Benefits for governments

- *Fewer waste management concerns from the domestic and manufacturing sector*
- *More sustainable economy based on higher levels of service*
- *Increased employment, particularly in the service sector*

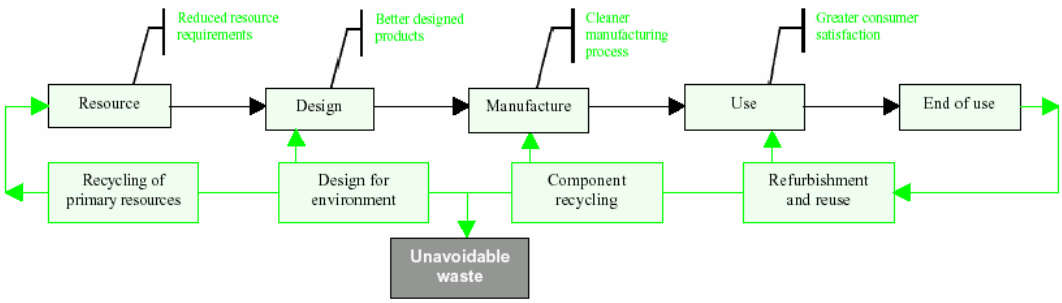
Benefits for companies

- *More opportunities for innovation and market development*
- *Increased operating efficiencies*
- *More and longer-term client relationships*
- *Improved corporate identity*
- *Better feedback on consumer needs*

Benefits for civil society

- *Lower costs and problems associated with buying, use, maintenance and eventual replacement of products*
- *Improved environmental quality*

The influence of product service systems over the product life cycle



The bottom line

Product service systems can benefit the environment – but it requires a deliberate consumer choice to take this route. The vacuum cleaner, itself only one small element in a consumer society, demonstrates this clearly. Most families in western society will normally buy a vacuum cleaner. In traditional terms, this would be viewed as having a positive effect on the national economy and indicates increasing affluence and quality of life. However, families do not consider the amount of resources required to build all the required vacuum cleaners, and of course, their end-of-life fate in a disposal site.

A more sustainable lifestyle is one where consumers prefer to buy a service which gives them the same clean floor. Imagine if vacuum cleaner manufacturers had offered a cleaning service from the start, instead of trying to sell vacuum cleaners to every citizen. One can only imagine the savings in material inputs and waste generation over the decades that vacuum cleaners have been in use.
If this example could be repeated for other commonly purchased consumer products, it would make a significant contribution to the environmental agenda.

Challenges ahead

- Clearly, one of the main challenges to adopting product service systems is the **cultural shift** necessary for consumers, including industry, to prefer having a need met by a service to owning a physical product. Around the world, lifestyles promoted via Internet, international advertising and other media, stress personal material accumulation, individualism and luxurious comfort. This can send a mixed message to consumers or adversely influence sustainable purchasing decisions by discouraging product service systems, or even dismantling existing ones.

- Within a company, barriers can include the lack of **experience and know-how** to design service methods and management systems, the **shift in tradition** from judging and measuring performance based on the quantity of goods sold, and a lack of **skilled service personnel**.

- A product service system must be designed, developed and delivered on a case-by-case basis. Not all product-service mixes will outscore the current product from an environmental point of view nor always from the performance aspect. Some product service system changes could result in unwanted side effects, or **rebound effects**. For example, a consumer may spend the time or money saved in an unsustainable way such as by buying other goods, thereby offsetting any environmental benefits.

- Assessment tools are needed to reveal when product service systems have a clear environmental benefit. Consumers also need the right information to influence their purchase decisions in favour of product service systems where the benefits are apparent. Adapting life cycle assessment and product labelling are two existing possibilities to meet these needs.

A final word…

More work needs to be done to identify how the potential of product service systems can be maximised and answer the many remaining questions: What is the potential for product service systems from a global perspective? What lessons can be shared from experiences to date? How is this experience best shared? Who should be involved? What is the affect of the increasing global pressure on individual consumerism?

Clearly, different products offer different chances for a remix of products and services. For many current consumer needs, the time is ripe to rethink how they can be met. New product service systems continually appear and can be used as models for the applications which will be developed and applied for the first time. As consumers become aware of the practical and environmental benefits, and producers see business opportunities growing, product service systems will play an increasingly important role in a sustainable society.

For more information:

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Fax: + 31 15 278 7316
Internet: www.io.tudelft.nl/research/ambition

About UNEP

Since 1989, the United Nations Environment Programme (UNEP) has been working to improve current production patterns through its Cleaner Production activities and has been a key contributor to the international discussion arena since UNCED in Rio di Janeiro (1992) in the debate on how best to reach sustainable production and consumption. These activities have focused on influencing the supply side – how goods and services are produced and delivered. In 1998, Sustainable Consumption activities were established focusing on the demand side of the economy – on what drives and defines consumption and how to shift to more sustainable production and consumption patterns. Initiatives include: developing business opportunities, engaging youth in the development of sustainable consumption strategies, assessing the role of the advertising and media sectors in changing consumption patterns, and enhancing understanding of life cycle "thinking".

*"It is becoming more and more evident that consumers are increasingly interested in the '**world that lies behind**' the product they buy. Apart from price and quality, they want to know how and where and by whom the product has been produced. This increasing awareness about environmental and social issues is a **sign of hope**. Governments and industry must build on that."*

Klaus Toepfer, UNEP Executive Director

Return to Part 2.0: Preparation of PSS Innovation Scan

0.d Timetable for implementation of PSS Innovation Scan

Companies can draw up a project plan of their own on the basis of the accompanying imaginary timetable.

Project team for implementation of the PSS Innovation Scan at *[company name, division]*

Team member	Department	Telephone	Abbreviation
Mark Eting (project manager)	Marketing & PR	1234	ME
E. N. Vironment	Environment	2345	EN
De Sign	Product design	3456	DS
Mana Gement	Management and business operations	4567	MG
Ex Ternal	Advisor to X	012-3456789	ET

Timetable and schedule of activities

Step	Carry out in week	Persons involved	Role	Time (days)	Use of tools from Part III	Meetings
0 Preparation	1-2	ME ET	coordinator -	0.5 0.5	0a, 0d, 0e, 0f, 0g	
1 Introduction	3	ET ME MG DS ML	facilitator - - - -	1 0.5 0.5 0.5 0.5	-	1st meeting on Saturday 12 July from 1-6 pm including lunch
2 Analyse	3-4					
3 Ideas	5	ME MG DS ML ET	- - - - facilitator	0.5 0.5 0.5 1	3c, 3f	2nd meeting on Sunday 13 August from 9 am – 1pm including breakfast & lunch
4 Selection	5-6					
5 Presentation	7	ET ME	preparation by presenter	1 0.5	5	3rd meeting on Monday 1 September 10am – midday
TOTAL				**8.5**		

[Return to Part 2.0: Preparation of PSS Innovation scan]

0.e Agenda for 1st meeting: Introduction and Analysis (4 hours)

Sample draft agenda:

1. Opening

2. Adoption of the agenda

3. Embedding the project: initiator/project manager explains the reasons for starting the project.
   - Personal motivation
   - Explanation of the PSS innovation scan (see Appendix 0.a)

4. Project plan
   - Explanation/Presentation of key points in the draft project plan
   - List of questions and discussion of project plan
   - Joint adoption of final project plan

5. Implementation of Step (1), see Part II.1

   - Construction of common frame of reference; on the basis of a discussion of the answers to five basic questions:
     - What is a PSS?
     - What advantages can a PSS have for an organisation?
     - What is the aim of this project?
     - What are the main steps in this project, the PSS innovation scan?
     - What are the main potential problems for this project? Allow the team members to answer these questions using the available information;
     - Optional: get everyone to complete the mindmap (see Appendix 1.a) and present and discuss the differences.

   - Complete Form 1.

6. Implementation of Step (2), see Part II.2

   - Select a product (or product group) on the basis on the following questions:
     - Is the product becoming a 'commodity'?
     - Do you face intense price competition?
     - Are major changes taking place in the market context of the product?
     - Do you want the product to respond better to the needs of your customer?
     - Do you want your product to stand out from others?

- Analyse your customers, product, market, company and context on the basis of the following questions:

Questions for analysis:
1. **Market segmentation:** What market segments / customers do you serve and where, how and why are your products bought? Do you sell to other companies or direct to the end consumer? Describe your (groups of) customers and where applicable your customers' own customers (explanation in Appendix 2.a).
2. **Function/value for the customer.** What functions does the product perform for the customer (there may be different ones)? What value does your product represent for the customer? (Explanation in Appendix 2.a))
3. **Your own position in the value chain and potential competition outside the branch.** Answer the following questions on the basis of the function of your product: • What place does your product have in meeting the ultimate needs of the customer? What other parties play a role in meeting these needs? Where is the greatest added value and potential profit to be found? • What potential competition is there in other branches (in other words are there other parties that can perform the same function for your customer with entirely different 'hardware' or 'business models') (Explanation in Appendix 2.a)
4. **Critical success factors and SWOT (now).** What are your critical success factors (from the perspective of value, customers, internal organisation and learning)? On what points are you strong and do you see opportunities (or vice versa)? Can you give any arguments why customers come to you rather than another supplier? (Explanation in Appendix 2.a)
5. **Trends/developments and SWOT (later)**. What important trends and developments do you see that could affect your SWOT in the future? What is it absolutely essential that your company is good in to continue selling your products? (Explanation in Appendix 2.a)

- Complete Form 2.

7. Draw up an action list for the following meeting

8. Any other business and close

Documents to be read in advance:

- Brochure on PSS Innovation Scan (Appendix 0.a)
- Examples of successful PSSs (Appendix 0.b)
- UNEP brochure on Product Service Systems (Appendix 0.c)
- Tools for Analysis (Appendix 2)

Return to Part 2.0: Preparation of PSS Innovation Scan — **To Form 0**
Return to Part 2.1: Introduction to PSS Innovation Scan — **To Form 1**
Return to Part 2.2: Analysis — **To Form 2**

0.f Agenda for 2nd meeting: Generation of Ideas and Selection (4 hours)

Sample draft agenda:

1. Opening and adoption of the agenda

2. Recapitulation of results of the Analysis phase (Form 2), focussing on the prioritised product market combinations

3. Implementation of Step (3), see Part II.3

   - For each priority market segment select the three most important elements that could add value for your company and your customer (see Appendix 3.a).
   - Think of PSS solutions using one of the creativity tools (see Appendix 3)
   - Check whether the list is complete using the PSS matrix (see Appendix 3.f)
   - Plot all the ideas that were generated in the Ansoff matrix (see Appendix 3.g).
   - Fill in all the results (Form 3)

4. Implementation of Step (4), see Part II.4

   - Select the most important criteria for assessing 'market attractiveness' and 'business fit' and if necessary assign a weighting factor to them.
   - Evaluate the PSS options against the selected criteria using the appropriate tools (see Appendix 4). *Note:* For a more extensive version of the scan some 'homework' will have to be done and an extra meeting will be needed to compete this step.
   - Position the PSSs you have come up with in the strategy matrix using the two overall scores (see Appendix 4.a)
   - Work out the strategy described in Appendix 4.a for the most attractive PSSs.
   - Fill in all results (Form 4)

5. Draw up an action list for the following meeting (above all, think of additional 'homework' to provide information that will support the provisional results of the selection phase).

6. Any other business and close

Return to Part 2.0: Preparation of PSS Innovation Scan	**To Form 0**
Return to Part 2.3: Generation of Ideas	**To Form 3**

0.g Agenda for 3rd meeting: Preparation of management presentation (2 hours)

Sample draft agenda:

1. Opening and adoption of the agenda
2. Recapitulation of results from the generation of ideas and selection phase (Form 3 and Form 4)
3. Discuss any further analyses in the selection phase carried out since the previous meeting (see the tools in Appendix 4)
4. Prepare management presentation (see Appendix 5)
5. Any other business and close

Return to Part 2.0: Preparation of PSS Innovation Scan Return to Part 2.5: Management presentation	To Form 0 To Appendix 5 Management presentation

0.h Sample presentation for PSS innovation scan

A sample presentation has been designed that you can use for all meetings concerning the PSS Innovation Scan. The presentation is enclosed as a PowerPoint file on the CD Rom.

(1) Introduction to Product Service Systems

1.a Mindmap

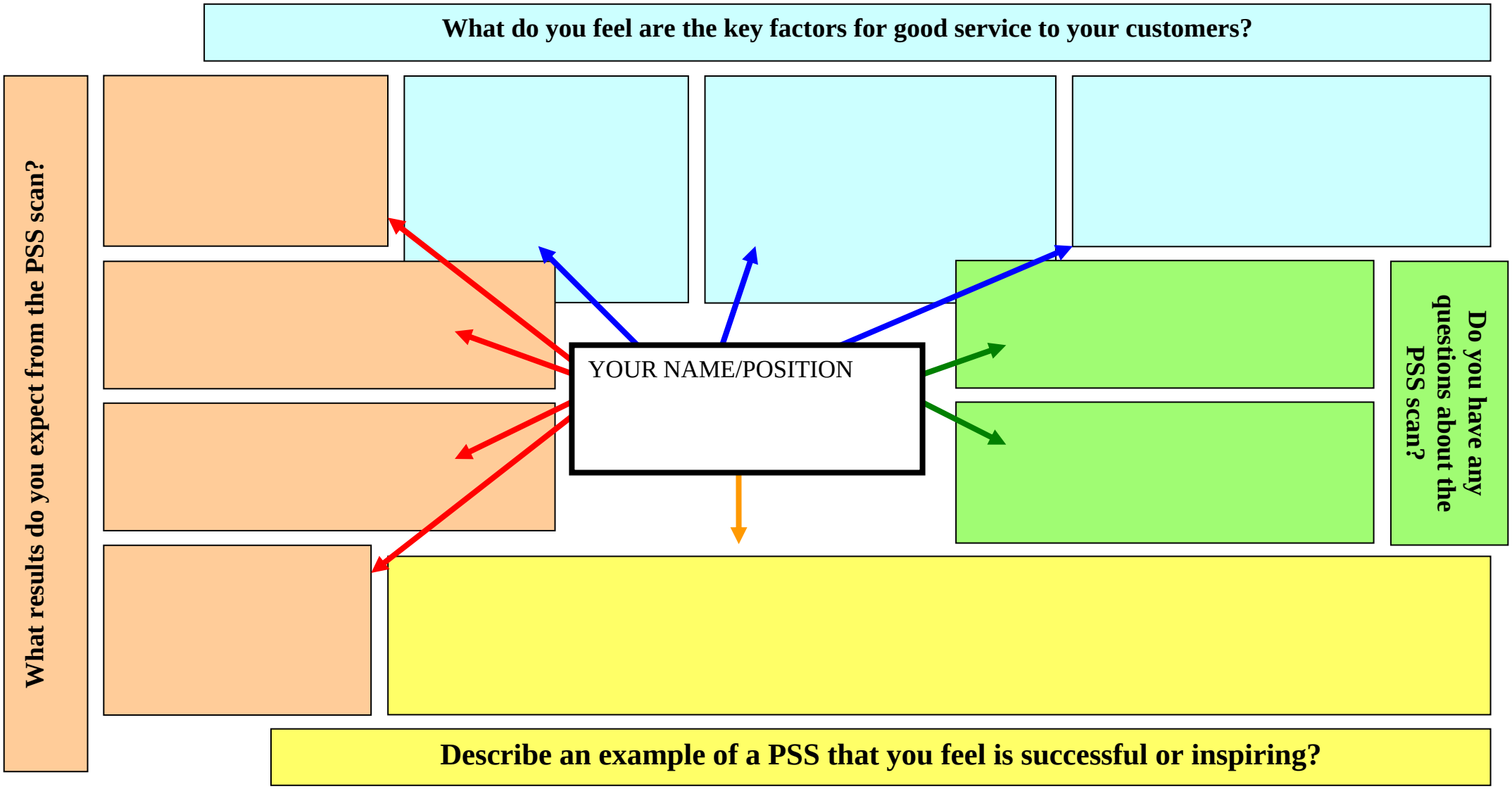
The Mindmap can be filled in during the introduction phase in order to gain an impression of where the participants stand and what they want to achieve in the workshop with the innovation scan. The introduction phase is also used to find out how much experience they have with PSS and to bring the knowledge of each of the participants up to the same level. If participants are still unsure about anything you can refer back to the introductory materials on PSS in this folder:

- Brochure on PSS Innovation Scan (Appendix 0.a)
- Examples of successful PSSs (Appendix 0.b)
- UNEP brochure on Product Service Systems (Appendix 0.c)

There is a diagram showing how to fill in a mindmap on the next page. This page can be copied for each participant.

Return to Part 2.1: Introduction to PSS Innovation Scan	To Form 1

MINDMAP 'START-UP PSS INNOVATION SCAN' - Briefly describe your personal associations in key words



(2) Analysis

2.a Explanation of questions in analysis phase, step 2

The following table explains each question and its importance.

Question	*Explanation*	*Why it is important*
1. Market segmentation: What market segments/customers do you serve and where, how and why are your products bought? Do you sell to other companies or direct to the end consumer? Describe your (groups of) customers and where applicable your customers' own customers.	Give a description of the (groups of) customers you serve. If necessary use Appendix 2b to assist in making this market segmentation.	Different customers (segments) have different characteristics, and probably different needs. These differences have to be responded to in different ways in developing a PSS.
2. Function/value for the customer. *What functions does the product perform for the customer (there may be different ones)?*	The same product can fulfil different functions for different customers and, depending on the situation, even perform different functions for the same customer (for example, chocolates may be bought to make up for an argument, to round off a fine dinner or to satisfy a craving for something sweet). Where necessary use the persistent questioning technique in Appendix 2c to describe these functions.	The function that a product performs will be central to the development of a new PSS. It is important to properly understand the conditions under which the product is purchased and what (emotional) value it has for the customer.
3. ***Own position in the value chain and potential competition from outside the branch.*** On the basis of the function of your product answer the following questions: • *What place does your product have in filling the ultimate needs of the customer? What other parties play a role in meeting these needs? Where is the greatest added value and potential profit?* • *What competition is possible from other branches (in other words, are there parties that can fulfil the same functions for your customer with entirely different 'hardware' or business models?)*	Once you are clear about the function of your product for your customer via Appendix 2c, it is often reasonably simple to identify the competition from other branches (e.g. if the function of chocolates is to apologise for an argument, florists could be competitors). It will also be clear what other needs of the customer are related to the function that your product performs and whether there are other areas where it might be worthwhile expanding your product range (see for example the profit pool concept in Appendix 2d).	By answering these questions you acquire: 1. insight into the role of your product in meeting the wider needs or functions of your customer and especially whether there are opportunities for providing extra added value. 2. insight into possible competition from an unexpected quarter.
4. Critical success factors and SWOT (now). *What are your critical success factors (from the perspective of value, customer, internal organisation and learning)? On what points are you strong and do you have opportunities (or vice versa)? Can you give any arguments why customers come to you and not to another supplier?*	Are you good in: Marketing, sales, after sales, product quality, price, etc.? If necessary use Appendix 2e 'Critical success factors', Appendix 2f "SWOT" and/or Appendix 2g "Porters model"	It is important to understand why your customers currently appreciate your product. These factors must be safeguarded (for a particular customer segment) as far as possible.
5. Trends/developments and SWOT (later). *What important trends and developments do you see that could affect your SWOT in the future? What is it absolutely essential that your company is good in to continue selling your products?*	What future developments will your company have to respond to? Which of them present opportunities and which pose threats? If necessary use Appendix 2e 'Critical success factors', Appendix 2f "SWOT" and/or Appendix 2g "Porters model"	It is still important to respond to future developments when developing new PSSs. Because of its intangible component a PSS also offers the possibility of innovating quickly and hence responding to these developments.

Return to Part 2.2: Analysis | **To Form 2**

2.b Market segmentation

This section suggests alternatives for segmentation into markets for 'Business to Business' (B2B) and 'Business to Consumer' (B2C).

Most important criteria for segmentation for B2B

DEMOGRAPHIC ASPECTS

1. *Sector: Which sectors do we want to target?*
2. *Size of company: What size of company do we want to target?*
3. *Location: What geographical areas do we want to operate in?*

ASPECTS OF USE

4. *Technology: On what practical technology should we focus?*
5. *Intensity of use: Do we serve intensive, average or non-intensive users?*
6. *Customers own skills: Should we target customers who require little service and/or support or precisely those who need a lot?*

PURCHASING STRUCTURE

7. *Form of the purchasing organisation: Should we target customers with a highly centralised or decentralised purchasing structure?*
8. *Power structure and culture: Should we target customers that are dominated by engineers, by financial specialists etc.?*
9. *Existing relations: Should we always go for the most promising customers or focus mainly on customers with whom we already have a good relationship?*
10. *General purchasing strategy: Should we focus mainly on companies with a preference for leasing? maintenance contracts? turn-key purchases? purchasing via tender procedures?*
11. *Purchasing criteria: Should we focus on companies that regard quality as important? Or service? Or price?*

OTHER FACTORS

12. *Urgency: Should we target companies that demand rapid and sudden delivery of the product and/or service?*
13. *Specific application: Should we focus on certain specific applications of our product rather than on all applications?*
14. *Size of contracts: Should we focus on small or large orders?*

CUSTOMER CHARACTERISTICS

15. *Match between supplier and buyer: Should we focus on companies that have similar values and a similar culture to our own?*
16. *Attitude towards risk: Should we target risk-adverse or risk-taking customers?*
17. *Loyalty: Is loyalty important in a customer? Or do we serve anyone?*

Source: Thomas V. Bonoma & Benson P. Shapiro " Segmenting the Industrial Market", 1983

Suggestions for segmentation for B2C

GEOGRAPHIC	**PSYCHOGRAPHIC**
1. *Urban/Rural*	4. *Personality traits: character, nature, risk aversion*
2. *Regional*	5. *Lifestyle: workaholic, yuppie status seeker, social climber, etc.*
3. *Climate*	6. *Social class*
DEMOGRAPHICS	**BEHAVIOUR**
7. *Age*	15. *Place of purchase: supermarket, petrol station, Internet, etc.*
8. *Sex*	16. *Benefit segmentation: quality, service, economic benefit, ease, status*
9. *Size of family*	17. *Use and frequency of use: heavy / medium / light / non / potential / regular user.*
10. *Nationality*	18. *Attitude: positive, negative, etc.*
11. *Race*	19. *Purchasing opportunity*
12. *Religion*	
13. *Income*	
14. *Profession*	

Return to Part 2.2: Analysis | **To Form 2**

2.c Persistent questioning as the means of identifying function for customer

As with the progressive abstraction tool (see Appendix 3e), persistent questioning is crucial to discovering the function that your product performs for a customer. Keep repeating the question: "What does the customer want?" Ultimately you will come to understand what the product's function is for the customer at a higher level of abstraction. This can be a useful step before reviewing and considering the problem from a different perspective in the generation of ideas phase (step 3). However, it also provides clues to help you clearly identify what competitors you may have for this customer segment in other sectors. An example is given below.

The function of chocolates

1st round:
Question: 'What does the customer want?'
Answer: 'A box of chocolates.'

2nd round:
Question: 'What will the customer do with those chocolates?'
Answer: 'Give them to his girlfriend.'

3rd round:
Question: 'Why does the customers want those chocolates for his girlfriend?'
Answer: 'To make up for working overtime for the third evening in a row.'

By continuing to ask questions you discover the real function of the chocolates: it is an aspect of the management of the relationship between two partners. Competitors are the florist (a bunch of flowers), restaurants (an evening out), or perhaps even a relationship counsellor. In another example you might well arrive at an entirely different function (for example, to eat them in front of the television to overcome boredom).

Return to Part 2.2: Analysis | To form 2

2.d The ‘profit pool’ and ‘eco pool’ concept

Gadiesh and Gilbert described the profit pool concept in an issue of the *Harvard Business Review* (1998). The idea behind the concept is as follows:

1. Determine the ultimate function that a product or set of products and services performs for a user.
2. Determine what individual products and services make up this function throughout the entire life cycle (e.g. for transport by car this means the production of the car, the sale of the car, the use of petrol, repairs, insurance, maintenance, etc., and ultimately the disposal of the car wreck).
3. Each of these activities generates a certain turnover and profit margin. For each activity the turnover is plotted on the x-axis and the profit margin on the y-axis. The surface area of the square that is produced indicates the total profit in that link of the chain.
4. The figure therefore shows at a glance whether there are activities associated with your own activity (e.g. sale of cars) with high margins and/or large profit volumes.

The eco pool concept is a variant of the profit pool concept, in which the environmental burden (calculated using the Eco-scan for example, Appendix 4f) is plotted on the y-axis and the surface areas of the squares hence show the environmental burden for each link in the chain.

A combination of these two concepts is the E2 vector. This vector describes the ratio of valuation creation at each step in the chain to the additional environmental pressure caused by that step in the chain. This figure at once makes it clear which steps in the chain are relatively ‘dirty’ per unit of added value (see figure).

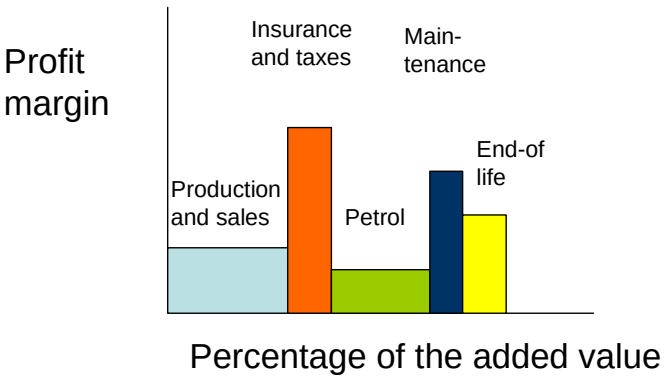


Figure: Fictive profit pool of a car (source: Severijn, internet)

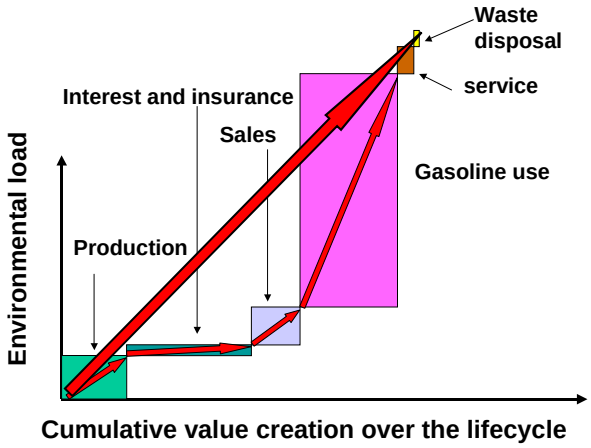
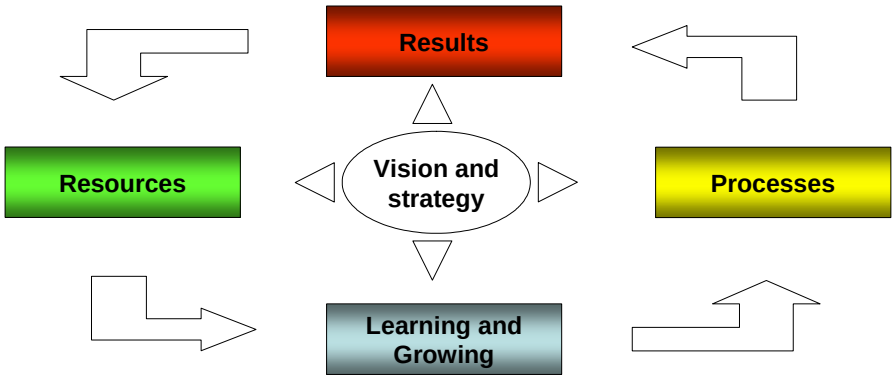


Figure: E2 vector (source: Goedkoop et al., 1999)

Return to Part 2.2: Analysis | To form 2

2.e Balanced scorecard and critical success factors (Key performance indicators)

A Balanced Scorecard (BSC) produces a 'snapshot of the business' for your company. The Balanced Scorecard is a strategic management instrument for companies devised in the early 1990s by Robert Kaplan and David Norton. It was based on a study into performance measurement and has meanwhile evolved into a widely used instrument for analysing and implementing strategies for improvement in organisations.



Originally developed for companies the BSC emphasises four perspectives:

- Financial (or more broadly, 'value') results: achieving good financial results (for shareholders).
- Customers: strengthening (or consolidating) the market position by continually and optimally meeting the needs of the customers.
- Internal processes: monitoring the effectiveness and efficiency of internal processes.
- Learning and growth: to guarantee its long-term viability the organisation must continue to learn and renew itself.

Every organisation has its own unique strategy and market, and hence its own set of key factors. With the BSC you can look at your own organisation from the four strategic perspectives listed above and then go on to look for new PSS options.

The combination of the four perspectives produces coherence and balance in the strategic development of the company. It also clarifies the assessment criteria (first qualitative for initial embellishment, then quantitative for a deeper analysis) for a new PSS.

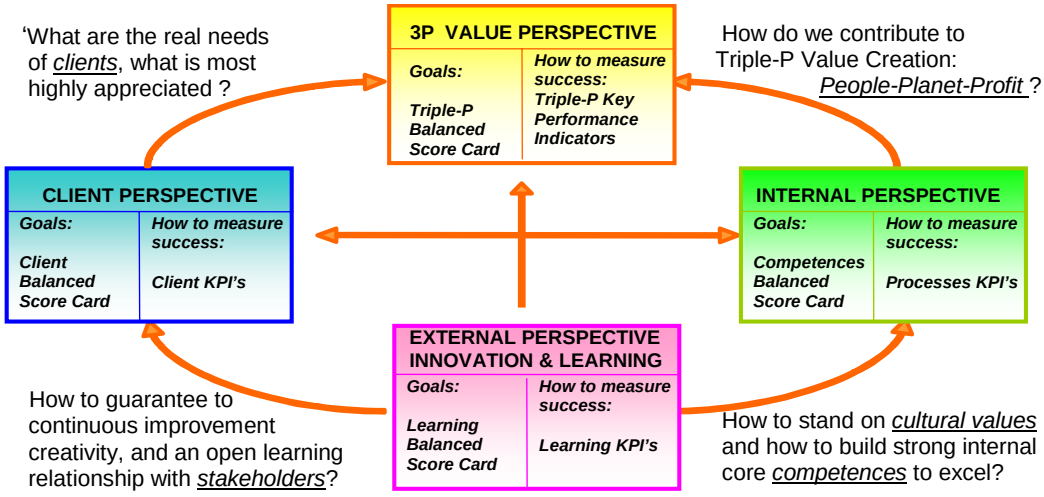
BSC method in the PSS Innovation Scan

In the PSS Innovation Scan you use the BSC to look for the most crucial success and failure factors for an organisation from the four perspectives.

Step 1: Key factors are identified for each perspective.
By drawing up a Balanced Scorecard for your company the key factors for your business can be identified for each of the four strategic perspectives. You can do this by answering the questions in the text box on the next page.

Step 2: Making targets measurable and identifying indicators of 'success'
Clear targets and key performance indicators (KPIs) can be established for each of these key factors so that the organisation's progress in meeting these targets can be monitored.

In this way the Balanced Scorecard method gives you a 'snapshot of the business' of your company within a broader strategic context. When both of the above steps have been completed you can enter your company's targets and indicators in the following figure.



PSS Question tree
Questions for producing a BSC designed to identify PSSs
The value perspective o *What are your company's values? How does the PSS philosophy fit in with them? (This includes traditional financial performance parameters, but social and environmental parameters are also becoming increasingly important?)* o *What business are you in? Redefine you business in terms of performance and fulfilling social functions. What services could improve your performance?* o *What added value does your organisation provide in the chain (or 'market pool')? What parts of the chain (or 'market pool') would you like to integrate or expand in your organisation?*
The customer perspective o *How does your company respond to the expectations of its direct and indirect customers?* o *What do your customers expect from you? (This includes existing customers but also the targeted prospects). How can the PSS philosophy help you to improve the quality of your response to these expectations?* o *How does your organisation secure customer loyalty? What would intensification (more often, more easily, with a lower threshold) of customer contacts with PSSs signify for your business?*
The internal perspective o *What are your company's special competences? What additional competences would you like to possess in the future? (This includes core competences, skills of the staff and unique selling points).* o *Does your company deal effectively and efficiently with the resources that are available to it?* o *How powerful are your internal processes? Is your organisation, with its structures and working methods, equipped to achieve its objectives and pursue its strategies (and underlying vision)?*
The learning perspective o *How does your organisation prepare for the future?* o *To what extent can your company learn quickly and adapt quickly?* o *Does your company have access to external sources of knowledge, is it capable of forming strategic alliances with other parties and is it open to innovation?*

Return to Part 2.2: Analysis | **To form 2**

2.f SWOT analysis

Objective of SWOT analysis within the PSS Innovation Scan

SWOT is short for Strengths, Weaknesses, Opportunities and Threats.

A SWOT analysis is a tool that enables companies to identify external variables and the internal strengths and weaknesses of the organisation. This analysis can then be used as a basis for the discussion of the organisation's objectives and strategies for improvement.

- Strengths and weaknesses describe the intrinsic internal strength of the organisation.
- Opportunities and threats are mainly concerned with external developments and their implications for the organisation.

The following text box shows how the analysis of these four domains can be carried out.

SWOT Analysis
Strengths o *What are your organisation's internal strengths? List them.* o *On what does your organisation rely to defend itself against potential external 'threats'?* o *On what points does your organisation perform better than its competitors?*
Weaknesses o *What do you see as the weak points in your organisation?* o *Where would you like to make improvements?* o *On what points does your organisation perform worse than its competitors?*
Opportunities o *What developments/factors are occurring that provide your organisation with the chance to expand or improve its strategic position? (Examples might be market trends, new products or technology, disappearance of competitors, etc.)*
Threats o *What developments/factors are occurring that could weaken your organisation or are a threat to the continued survival of the organisation.*

SWOT method in the PSS Innovation Scan

Fill in the internal strengths and weaknesses of the company in the matrix below. Give an assessment of the relative importance of each specific strength and weakness and briefly describe the implications.

Strengths	How important is it? 1	2	3	4	5	Implications
Weaknesses						

Fill in the external opportunities and threats in the following matrix. Give an assessment of the impact these external developments could have on the company. Briefly describe the implications of the external trends.

Opportunities	Impact on the company 1	2	3	4	5	Implications
Threats						

Proceed:

- The strengths and weaknesses and the opportunities and threats provide an important basis for deciding on the possibilities for a company to introduce a new PSS and of its chance of success.
- The results of the SWOT analysis should be interpreted as a whole and used to investigate promising PSS options. Precisely because it provides a clear understanding of the interaction between external influences and the competences of the organisation the most promising PSS strategies will emerge.

Return to Part 2.2: Analysis | To form 2

2.g Porters five-forces model and value chain theory

The main question addressed by Porters five-forces model is: "What are the determining factors in your market from the perspective of supply and demand structures?" The model is to a large extent based on 'thinking in terms of the environment'.

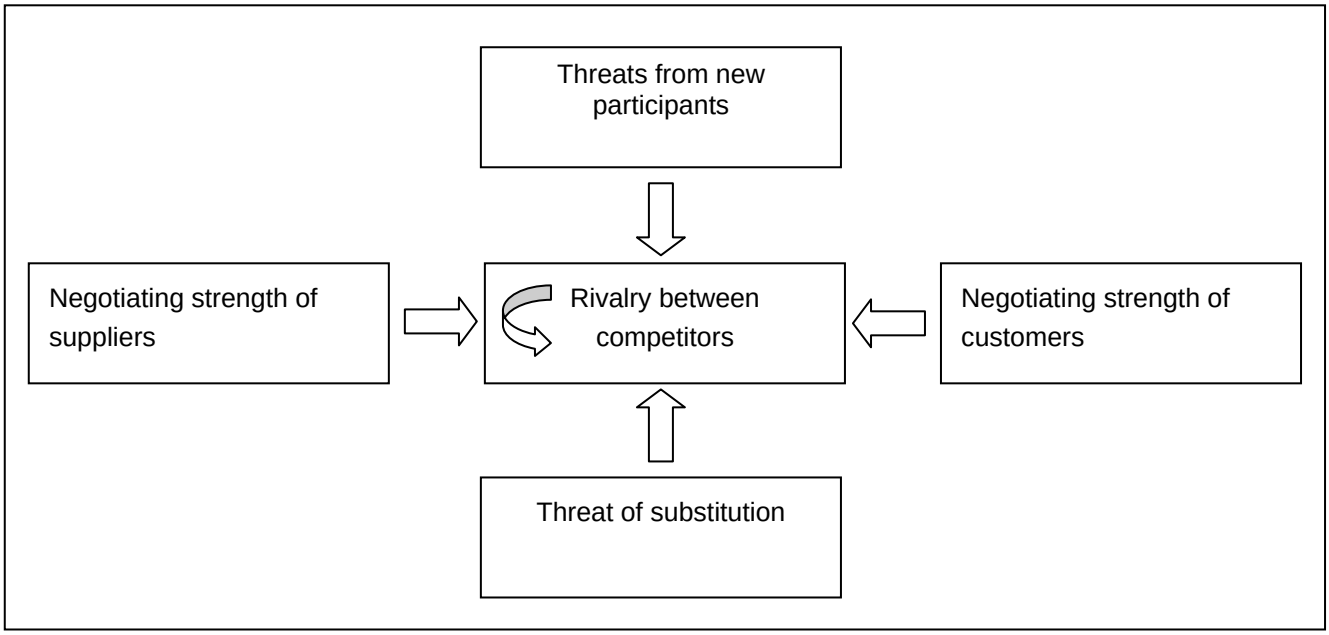
Porters 5 forces model
New entrants o *(Likely) number of new entrants to the market.* o *Benefits of scale, capital requirements, product differentiation.*
Competition in the sector o *Assess the rivalry between existing companies in the sector.* o *Indicators of intense rivalry are:* ▪ *Mature product with intense price competition* ▪ *Large number of suppliers* ▪ *Little product differentiation* ▪ *Low switching costs*
Negotiating strength of customers o *Depends on the degree of product differentiation and the switching costs involved in changing supplier.*
Negotiating strength of suppliers o *Depends on the degree to which the product is unique/superior.* o *It is important to establish the extent to which the supplier would be able to achieve forward integration (can) and whether this would fit in with his existing business model (will).*
Threat of replacement (by substitute products) o *Depends on the switching costs for buyer.,* o *Estimate and compare the appreciation for the substitute product*

The Porter Five-Forces Model provides your organisation with a tool for analysing its market environment and choosing a position in it based on its own capacity (according to 'outside → in', 'strategy as fit'). The activities of an organisation should produce products or services that even in the longer term are seen as distinctive and valuable within the chain. This is decisive for a party's negotiating strength (and hence its profit margins) within the chain.

Using the Porter five-forces model in the PSS Innovation Scan

In any case hold a group discussion to define the main points of the five-forces model. For a deeper analysis a brief desk study could also be carried out.

Group discussion	*Desk study*
Analyse the five forces of the model in a group. Consider the following questions: - *Who are the important (potential) players? (Start by drawing up a list of the top 5 parties in each of the above contexts: the leading participants, suppliers, customers, competitors and expected substitutes)* - *What are their mutual dependencies?* - *Who has the best alternatives?* - *What are the barriers to entry and switching costs?* - *What are important competitive factors?* - *What influence does innovation have on the relative competitiveness of the participants?* Draw a diagram with the results of the analysis (for example on a flip chart). Use the figure below, which has not been filled in, as a starting point. Enter the results point by point in the five boxes.	The desk study involves a deeper analysis of the competitors and players in the chain. The Internet is an important source of information, as well as annual reports and sector analyses (often free of charge) from banks and consultancy firms etc. The results are reported to the team in a short memo which could include the following sections (one page for each) 1. Executive summary 2. Outline diagram of a completed five-forces model 3. Analysis of new entrants 4. Analysis of competition in the sector 5. Analysis of negotiating strength of customers 6. Analysis of negotiating strength of suppliers 7. Analysis of promising substitutes 8. Conclusions 9. Recommendations



Return to Part 2.2: Analysis | To form 2

(3) Generation of ideas

3.a Forms of adding value

The development of a new PSS calls for maximum creativity. The basic principle is that the additional services for a product create added value for the purchaser.
This added value can be achieved on six different themes. The themes for 'PSS innovation'[1] are:

- Customer productivity: does the PSS increase the productivity or lower the costs for the customer by removing significant bottlenecks?
- Comfort (comfort & simplicity): does the new PSS make the product easier to use for the customer?
- More easily available (convenience): does the new PSS make the purchasing process easier?
- Reduction of risk: does the new PSS reduce perceived risks or uncertainties for the customer?
- Amusement value and image: does the emotional value or image of the new PSS increase the pleasure felt by customers?
- Adjustment to standards and values of the customer: does the PSS, for example, reduce the environmental burden caused by the product?

This list can be used to help identify the three most important elements of the creation of added value. A word of caution: the results of the analysis must be incorporated here.

Return to Part 2.3: Generation of ideas	To form 3

[1] Research by INSEAD and Siderius (1992) shows that there are six themes that companies can use as point of departure to develop innovations in the area of products and services.

3.b Tools for generating ideas 1: Creativity session

There are several ways of arranging a creativity session. An important factor is that the participants must feel free to think 'out-of-the-box'. In the first round, therefore, ideas must not be judged or criticised.

A creativity session can start with a round of individual brainstorming or brainstorming in small groups. The results are then shared and discussed.

Tools such as a white board, a flip chart and large post-it stickers are very useful for writing down ideas and then arranging them later.

To help the participants to shake off preconceived notions a creativity session could be stimulated by asking groundbreaking and challenging questions such as:

- Identify the crucial technological trends for the future and explain how they can be translated into PSS opportunities for our customers and our company?
- What important social developments are occurring at the moment; extrapolate them to the future? What could they mean for our customers and our company?
- Think in terms of polarities in scenarios (opposite extremes in potential developments for key characteristics of our business model) and consider them in relation to smart PSS reactions from our company.
- What special efforts (PSS) could we make to bind our customers closer to our company?
- What (unexpected) alliances with other companies could provide unthought of synergy?

The questions asked should preferably have a close fit with the activities of the company.

Return to Part 2.3: Generation of Ideas	To form 3

3.c Tools for generating ideas 2: Classical Brainstorm

Brainstorming is one of the oldest and best-known creativity tools. Its advantages are:

- it is cheap;
- it takes little time;
- it stimulates communication.

As a rule, brainstorming sessions involve groups of 5 to 7 people together with a facilitator. The problem, issue or aim is described in a brief introduction. If necessary, participants can ask questions to clarify anything they are unsure about. The group then enters the creative phase, possibly preceded by an exercise designed to get participants to think about something totally different to clear their minds. In the creative phase each participant must come up with as many solutions to the problem as possible: it is almost literally a question of saying the first thing that comes into your head. There are absolutely no inhibitions in this phase.

- Rule 1: Criticism is NOT permitted. Every idea is a good one. There are no such things as stupid ideas.
- Rule 2: The more the merrier. Quality is not important at this stage; ideas will be sifted through later.
- Rule 3: Every idea is from everyone. Everyone may (or rather, must) discuss someone else's idea to turn it into something else. The result is the product of the entire group.

This process, which does not need to last much more than 15 minutes, often leads to a long list of ideas. After the session there is a first rough weeding out of ideas to remove those that are clearly unfeasible and to highlight the ideas that are worth working out in more detail or could at least be considered in a more thorough selection.

Return to Part 2.3: Generation of ideas	To form 3

3.d Tools for generating ideas 3: Brainwriting

The advantage of this method compared with the classical brainstorming session is that people who are shy and reluctant to express their views are also able to get involved in the process, since it is more anonymous. A brain writing session starts by forming groups of four to eight people. The problem or issue is then presented and described. Each participant is given a worksheet containing a table with three columns and as many rows as there are participants. Each participant is asked to write three suggestions on the first row in the three columns. Everyone then gives their worksheet to the person on their left who then writes three ideas in the second row. This goes on until everyone has received each worksheet. This method stimulates the participants to look at the ideas that have already been written and to derive inspiration from them. The result is that a large number of ideas are produced in a very short space of time. The participants evaluate the worksheets and each participant marks three ideas that they feel are promising. In this way the number of ideas are reduced and only the most interesting ideas are left.

Worksheet for Brainwriting

Description of the problem:		
The suggested solutions:		

Adapted from: How to do EcoDesign? by U. Tischner, E. Schmincke, F. Rubik, M. Prösler et al., Birkhäuser Verlag Basel, 2000

Return to Part 2.3: Generation of ideas | **To form 3**

3.e Tools for generating ideas 4: Progressive abstraction tool

Progressive abstraction is a creativity technique that can help people to distance themselves from existing (or the most obvious) solutions. Progressive abstraction enables people to look at functions of a product at a higher, more abstract, more general level.

- From these higher levels of abstraction one has a broader view of the role of a product (or service) for the user. This makes it easier to think of alternative ways of meeting the needs of this user.
- It has to be borne in mind that the future development of solutions found at a higher level of abstraction will usually require greater investment in terms of time and money. On the other hand, the innovative potential is often also greater.
- The advantage of this approach is that it produces strategies for solutions at different levels whose practical feasibility and potential can be compared.

Method in the PSS Innovation Scan

Progressive abstraction is an excellent tool for use in teams. An effective way of using the progressive abstraction tool in a team is to start by posing the question:

"What do we want to achieve for our customers?"

After the team has formulated an initial answer to this question, and hence set a clear objective, the team discusses (brainstorms) possible strategies for achieving this goal. This second discussion can be introduced with:

"How can we best reach the goal that we have just formulated together?"

By constantly repeating these two questions the team may gradually arrive at a different level of abstraction of the problem since the team members have to forget about the existing product that is marketed and are encouraged to adopt a new perspective. As the first question is repeated the tone could become sharper. For example:

"Yes, but what do we really want to achieve for our customers?"

Return to Part 2.3: Generation of Ideas | To form 3

3.f Tool for generating ideas: Bono's 6 hats

The '6 hats' approach was developed by Edward De Bono. The aim is to get people to consciously look at a problem from different perspectives in order to find solutions. Each 'hat' stands for a particular perception. In the process all the members of the group can be asked to put on the same 'hat' at a given moment (so that everyone is thinking from the same perspective) and then all change it together at the same time; but the process can be organised in such a way that the participants are all wearing different hats at a particular moment (so long as everyone is actually wearing the different hat). Here is a brief description of the method.

What do the Six Hats represent?

The six hats stand for six ways of thinking about a particular idea or problem, or six types of questions that can be asked about it:

- Red Hat: Thinking on the basis of feel and intuition. What do I feel about the problem or idea? What is my initial reaction? How do I intuitively want to deal with it?
- Yellow Hat: logical, constructive and positive. What is the good news? What objective advantages do I see? What will they yield?
- Black Hat: logical, critical and negative. What is the bad news? Where are the risks (actual, logistical, ethical)? What logical reasons are there for not doing it?
- White Hat: neutral and detached. What are the facts? What does the person dealing with the problem need to know?
- Green Hat: creative, uninhibited. What are the possibilities? What opportunities are there? What alternatives do I see (they can be wild ideas if necessary)?
- Blue Hat: procedural. What perception ('hat') should I adopt now? What are we supposed to do now? Is it time for a summary? Is it somebody else's turn?

What are the strengths of the method?

- The method leads to Parallel Thinking®. Participants will not attack each other's ideas but rather come to share the same views. This is the key to a successful creativity session.
- It makes thinking less chaotic. In classical brainstorming sessions the different perceptions are uncontrolled and unstructured. The Six Hats method ensures that each different perception is raised in a structured and orderly manner.
- It separates ideas and thoughts from their 'owners'. De Bono calls this the separation of 'egos and performance' because each participant is asked to look at the problem from every conceivable perspective and not only from the perspective that they (often implicitly) prefer.
- It increases the awareness of the thinking process involved. Because it is a simple way of highlighting different perceptions people are aware that they often only look at things from one or two perspectives:
    - "According to me I've only looked at the problem with great detachment, in other words with the white hat".
    - "And now there has to be some positive logic in it. The yellow hat please!
- This awareness makes it possible to reflect on how one thinks and how others think. It is also far easier to encourage people to approach the problem from another angle.

How do you use the Six Hats in a meeting?

The chairman/facilitator figuratively – or even literally – puts on his blue hat. . He does four things:

1. he presents a problem or an idea;
2. he indicates which hat the participants should put on first as they think about the idea (note: all participants can be asked to wear the same hat at the same time so that participants are forced to think along with each other. Alternatively, the participants can all be asked to wear different hats at the same time so long as each participant changes hat at specified times and each one wears each hat at least once; see below);
3. he gets the participants to change hats at prescribed times and makes sure that each participant wears all of the hats;
4. he collects all the ideas for clustering, analysis and further elaboration.

The facilitator writes everyone's ideas on five different whiteboards or flip charts (one for each perspective or hat with the exception of the blue hat). The participants can also write their ideas on Post-Its and stick them on the five flip charts. The advantage of this latter option is that everyone's ideas can be clustered more easily. Finally, a special computer progam, such as the Six Thinking Hats® program, might be used; either the program used by the De Bono Institute or the program supplied with the 'Serious Creativity' package (http://www.debono.org and http://www.sixhats.com/software.htm).

Note that every participant can tell the facilitator that he/she wants to wear the blue hat, that the group should change hats or that he/she wants to go back to a previous hat. In other words, although the facilitor controls the process in the beginning, every participant can assume this role and so ask the facilitator to put on one of the other hats.

De Bono strongly recommends that the facilitator is well trained in his method and discourages organising a session on the basis of descriptions of his method. For detailed information, see for example: The six thinking hats / Edward De Bono; Toronto: Key Porter Books, 1985. See also
http://www.edwdebono.com/index.html

Return to Part 2.3: Generation of Ideas | **To form 3**

3.g Tool for generating ideas and testing whether they are complete: the PSS matrix

The procedures described in the previous appendices (3.a-3.f) will have generated a great many ideas for Product Service Systems. This appendix 3.g provides a tool which will allow you to check whether any obvious ideas have been missed. The tool can also provide inspiration for generating new ideas.

PSSs can generally be divided into seven categories (Source: Zaring (ed.) (2001) "Creating eco-efficient producer services"). These are:

a) **Product-related services:** supplying additional services closely related to the products sold (maintenance contracts, agreements to take back products, etc.).
b) **Advice and consultancy:** providing advice about the optimal use of the products supplied (e.g. how to organise related business process to increase efficiency, set-ups that will save space, lay-out of production halls, etc.).
c) **Product lease or hire**: providing a service based on the existing product as an alternative to selling it (hire or lease of cars, expensive equipment, etc.).
d) **Activity management/outsourcing**: the integrated performance of an activity that is not one of the core tasks of a company and which it wants to outsource (care of the offices, catering, but nowadays also internal logistics, etc).
e) **Functional result**: supplying a functional result rather than a product (creating a pleasant indoor climate rather than selling energy carriers, minimising the loss of crops due to pests instead of selling pesticides, etc.). The difference with example f) is that here the agreement with the customer is central, and that sometimes but not always an alternative service is provided.
f) **Service that performs the function of a product:** marketing a service that competes with traditional products which is based on entirely different materials (video conferencing instead of transport equipment, print-on-demand instead of a fixed number of books).
g) **Wheeling and dealing**: acting as an intermediary, e.g. to bring supply and demand together (waste market, virtual market for used car parts, etc.).

In combination with the six forms of added value creation that a PSS can signify for the customer (see Appendix 3.a), you can now produce a so-called *PSS innovation matrix* (see figure 5). The two axes of the matrix are made up of seven typical types of PSS option and six drivers for innovations in products and service.

The figure can be used in two ways:

1. *Generation of ideas*
   a. Select the two to three forms of added value that the customer finds most important for the selected market segment (x-axis).
   b. Think of specific PSSs for each of the seven categories of PSS option (y-axis), possibly using the techniques illustrated in the previous appendices.
2. *Test of completeness*
   a. Plot the ideas that the team had already generated in other ways (for instance, with the tools in appendices 3.b-3.d) in the matrix.
   b. Decide which cells are empty and analyse whether there is any good reason for this (for example, this form of added value is unimportant to the customer or the type of PSS is not feasible for your company in this market).
   c. If there is no good reason why a cell is empty think some more about PSSs that would fit in this cell.

Drivers (customer perspective)

PDC-options

	Productivity increasing or cost reducing	Comfort-increasing	Lower purchasing thresholds	Risk - reducing	Better emotional perception & image	Better fit with standards & values
Product-related service						
Advice and Consultancy						
Product lease or hire						
Activity Manag-ement/Outsourcing						
Functional result						
Service that fulfills the function of a product						
Wheeling and Dealing						

PSS options

Figure: PSS Matrix: An instrument for creating a structure for potential new PSSs

Return to Part 2.3: Generation of Ideas | **To form 3**

3.h Characteristics of PSS options and growth strategy (Ansoff matrix)

A company can in principle grow in two ways: by introducing new products or by conquering new markets. Ansoff was the first person to place these two strategies in a matrix (see figure 7), which. produces four types of growth strategies:

- Existing market, existing product (try to gain a larger market share)
- Existing market, new product (provide existing customers with something new)
- Existing product, new market (enter new market segments)
- New product, new market (enter a new market with something new).

A new PSS is more likely to be thought of for existing markets. The reason is that the company knows these markets best and has more experience in them, which makes it easier to estimate the needs of and developments in those markets. The process of coming up with a new PSS for an existing market is illustrated by the thick black arrow in the figure below. It is also possible to target new and existing markets with a new product service combination on the basis of function. However, this is significantly more difficult. These developments are illustrated by the dotted lines.

We should not be distracted by these limitations in thinking creatively about new Product Service Systems. They only play a role in the phase of evaluating PSSs. However, to assist in the selection phase it is important to show which cell of the Ansoff matrix each idea belongs in at the end of the generation of ideas phase.

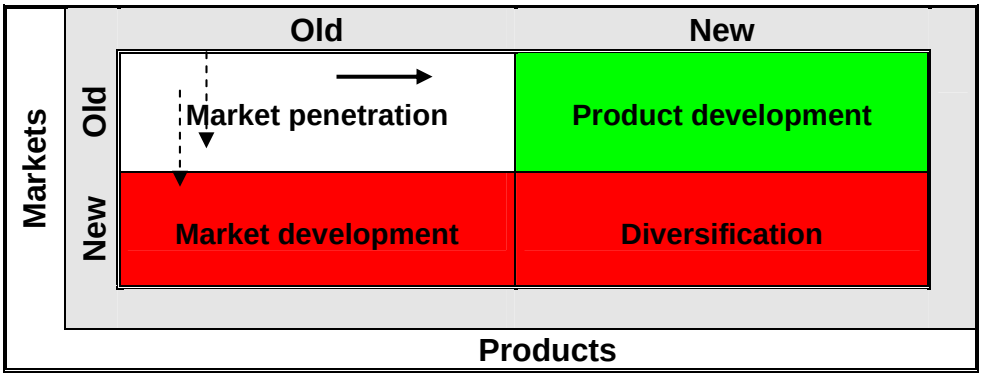


Figure: Ansoff Matrix: The growth strategies of an organisation

Return to Part 2.3: Generation of Ideas | To Form 3

(4) Selection Phase

4.a Strategy matrix

The matrix below shows which strategies should be followed when it comes to working out the details of a PSS once it has been conceived. The most attractive PSSs are in the first quadrant. The strategy for further development of a PSS depends on which quadrant it is in.

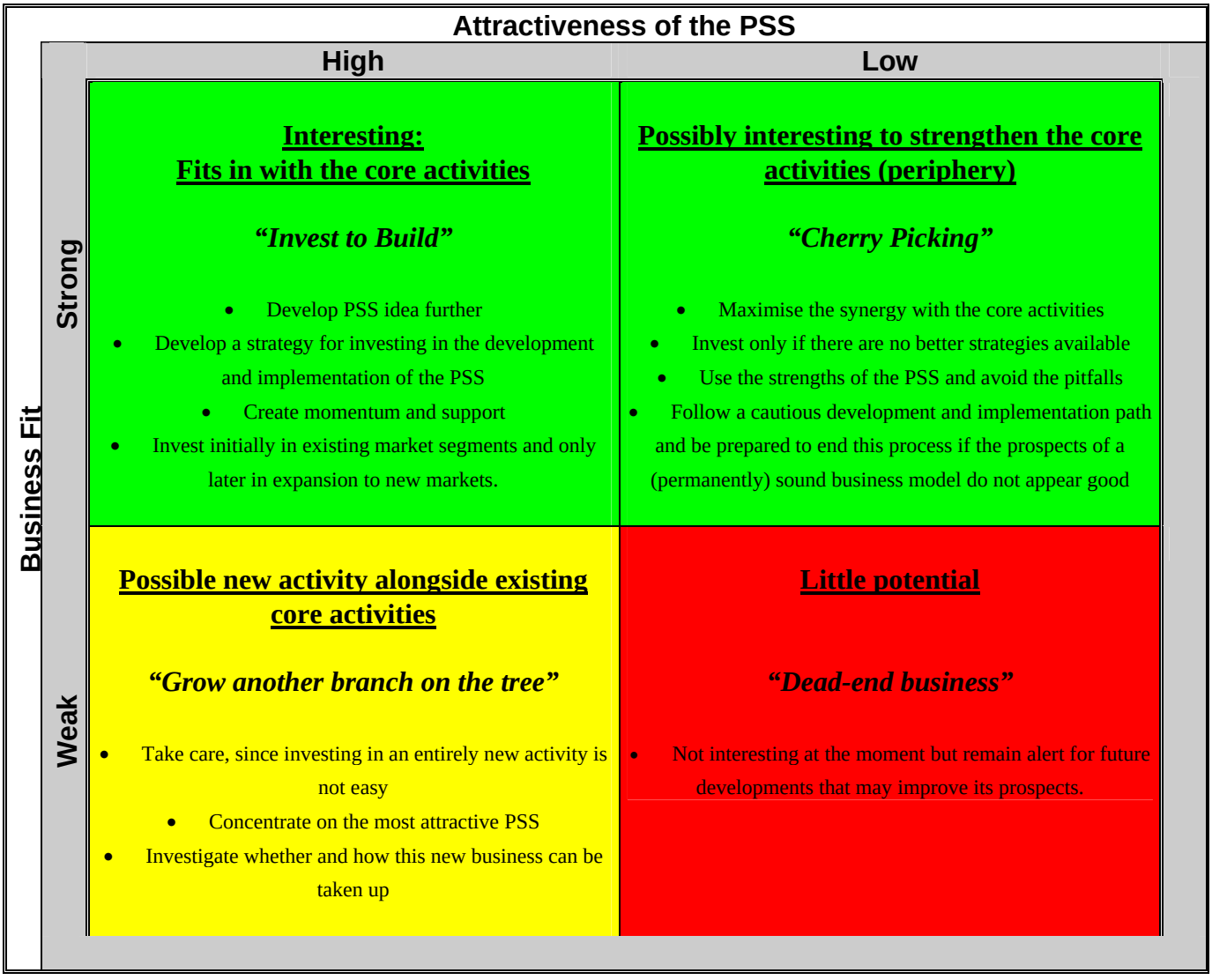


Figure: Strategy matrix

Return to Part 2.4: Selection Phase	To form 4

4.b Ranking of PSS Options 1: Score table

A relatively simple way of ranking PSS options is the multi-criteria analysis. Start by drawing up a list of criteria to be scored and then assign a weight to each criterion. Each option is then scored on each criterion, initially on the basis of the personal opinion of each of the participants. The weighted scores then show the ranking of the options. Table 9 presents the criteria and weighting factors. Table 10 is a form which can be filled in to give the overall rankings of the PSSs. Use them as follows.

Quick method

1. convene a brief session with all team members;
2. use only table 10, adding new criteria if necessary
3. quickly assign scores to the various PSS options in the entire group; if necessary, immediately skip any unimportant criteria;
4. determine which criteria seem the most important, which option is consequently the best and whether it matches the ‘gut feeling’ of the group.

A more formal method

1. convene a brief session with all team members;
2. if necessary add new criteria to table 9;
3. each team member can divide a maximum of 10 points among the criteria, with between 1 and 3 points for any one criterion;
4. the total number of points for each criterion is the weighting factor;
5. then go to table 10 and as a group decide on a score on each criterion for each PSS option;
6. using the weights in table 9, calculate the weighted scores for ‘market attractiveness’ and ‘business fit’;
7. this produces the ranking of options.

If necessary the score for certain criteria can be established on the basis of a more in-depth analysis. This will naturally take more time, but it can have benefits in the case of highly critical criteria that are more difficult to assess solely on the basis of an individual’s immediate views. For more information about the more in-depth method of analysis, see Appendix 4d and further.

Attractiveness of the PSS (external):	Weighting factors
• Large market and potential	0
• High market growth/growth potential	0
• Substantial potential profits	0
• Little threat from new entrants/high barriers to entry	0
• Little threat from substitute products	0
• Low price sensitivity among customers	0
• 'High potential for loyalty of customers'	0
• High quality of the product	0
• Short payback period/profit margin	0
• Low financing problems (prior financing, regular invoices)	0
• Less environmental burden	0
• Low uncertainties (costs, revenues, etc.)	0
• Few problems with respect to legal aspects	0
Business fit (internal):	
• Fits in with current market position	0
• Considerable knowledge of the market	0
• Fits in with the company's image	0
• Corresponds well with the strategy (mission)	0
• Fits in with the image of the company	0
• Fits in with the current production and sales channels, expertise of employees etc.	0
• Fits in with the SWOT results	0
• Sufficiently adaptable to make any necessary switches	0
• Good cooperation with (potential) partners in the chain	

Table: Evaluation criteria and weighting factors

CRITERION	Weighting factor	PDC 1	PDC 2	PDC 3	PDC 4
• Large market and potential	0				
• High market growth/growth potential	0				
• Substantial potential profits	0				
• Little threat from new entrants/high barriers to entry	0				
• Little threat from substitute products	0				
• Low price sensitivity among customers	0				
• 'High potential for loyalty of customers'	0				
• High quality of the product	0				
• Short payback period/profit margin	0				
• Low financing problems (prior financing, regular invoices)	0				
• Less environmental burden	0				
• Low uncertainties (costs, revenues, etc.)	0				
• Few problems with respect to legal aspects	0				
TOTAL Attractiveness of the PSS (external)					
• Fits in with current market position	0				
• Considerable knowledge of the market	0				
• Fits in with the company's image	0				
• Corresponds well with the strategy (mission)	0				
• Fits in with the image of the company	0				
• Fits in with the current production and sales channels, expertise of employees etc.	0				
• Fits in with the results of SWOT	0				
• Sufficiently adaptable to make any necessary switches	0				
• Good cooperation with (potential) partners in the chain	0				
TOTAL Business fit (internal)					

Table: Evaluation matrix

N.B. the following scores are possible for the PSSs:

9= very good
7 = good
5 = average
3 = poor
1 = very poor

Return to Part 2.4: Selection Phase | **To form 4**

4.c Ranking PSS options: Pragmatic Differential

The pragmatic differential is particularly suitable for comparing a PSS option with the current situation or an alternative PSS option. The tool illustrates the profile and combines different factors such as environment, economic feasibility, customer-related issues, social backgrounds, technical feasibility.

The tool consists of a simple matrix in which a number of success and failure factors are given as parameters. The exercise does not take much time and the results are suitable for a presentation and discussion, but depend very much on subjective views of the assessor. The following table gives an example. It works as follows:

- Each member of the assessment team evaluates the PSS option in relation to the benchmark. For each parameter a value of between +3 and –3 is awarded;
- Every member can add additional assessment criteria if necessary;
- The points are then connected in a single line, which will zig-zag. The more the line tends to the right the better the alternative and/or solution is.
- The assessments of the various different members are compared;
- If the results differ greatly the differences in the assessments should be discussed.

Title of alternative and or solution:					Assessor: Date:			
Negative value	-3	-2	-1	0	1	2	3	Positive value
Rising costs			•					Declining costs
High environmental burden						•		Low environmental burden
Negative for customer				•				Positive for customer
Technically unfeasible						•		Technically feasible
A lot of competition					•			Little competition
Illegal							•	Legal

Adapted from: How to do EcoDesign ? by U. Tischner, E. Schmincke, F. Rubik, M. Prösler et al., Birkhäuser Verlag Basel, 2000.

Return to Part 2.4: Selection | **To form 4**

4.d Ranking of PSS options 3: Quick analysis with four-axes model

AIM: a qualitative comparison by the team to gain a rough insight into the prospects for a suggested PSS *(refinement of the Pragmatic Differential method)*

The four-axes model was developed as a quick method of measuring the strength of an idea for a PSS in relation to the existing product that is already marketed. In this method of analysis a comparison is made on four axes, an ecological axis, an economic axis, a company identity/strategy axis and a customer (acceptance) axis.

This section briefly explains how to use the four-axes model in the selection phase of the PSS scan.

Step-by-step description of the four-axes analysis:

1. Assemble a multidisciplinary panel
2. Describe the idea for a PSS
3. Define a benchmark, already in the market, which is similar in terms of functionality
4. Conduct individual analyses on each of the four axes
5. Compare the results within the team, discuss and evaluate them
6. Final assessment: conclusions and consequences for follow-up

Steps 1-3: Establish a useful benchmark for the comparison

Start by investigating whether the existing product can be used as a benchmark for assessing the idea for a PSS. After all, it is possible that the idea focuses on entirely different functionality for the user, in which case a suitable basis for comparison needs to be found, preferably the current market leader which provides a 'more or less' comparable functionality. The following questions may be helpful in selecting the benchmark:

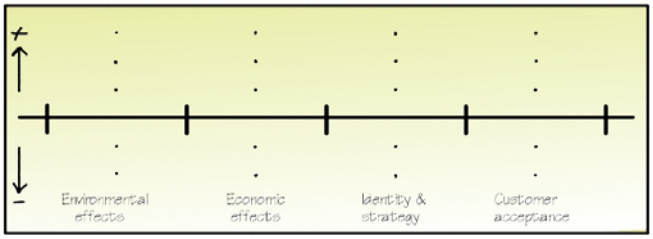
– From the demand perspective: *' What choices does a customer have in meeting a need (mobility, hunger/thirst, communication, enjoyment, etc.)?'*
– From the supply perspective: *'What market parties are seen as existing or potential new competitors?'*

Steps 4-6: Assessment on the basis of the four-axes model

Then investigate whether your idea for a new PSS provides sufficient added value in relation to the benchmark on four axes:

1. The 'Environmental axis': to what extent does the PSS yield benefits for the environment?
2. The 'Economic axis': what financial opportunities does the PSS yield for your company?
3. The 'Identity and Strategy axis': Does the PSS fit in with your strategy and corporate culture?
4. The 'Customer axis': Does the PSS offer advantages for your existing customers and will your customers accept it? Will the PSS give you access to new customers?

The comparison of the idea for a PSS with the current benchmark on these four axes quickly provides insight into the relative strengths and weaknesses of the idea for the PSS.



Graphic representation of the outcome of the four-axes assessment:
A score is given on each axis ranging from negative (-3, -2, -1), via neutral, to positive (1, 2 or 3).

- A positive score represents a basis for further elaboration and introduction of the idea for a PSS.
- A negative score signifies that there are objections or disadvantages to the idea, which will generally have to be resolved by further improving the idea before it would be worth developing further and implementing.

Several ideas for PSSs can be scored in this way, so the idea with the highest scores can be further developed first.

To compensate for the absence of a detailed quantitive analysis, it is advisable to get a multidisciplinary team with a sound knowledge of the business to fill in the four-axes model.

The most practical approach is to start by asking each team member to give their own score for each axis and then to collect the scores and discuss them as a team. The final score for each axis should preferably be arrived at by consensus. On the other hand, the absence of consensus could be an indication that there are still uncertain factors or differences of opinion about the market.

The advantage of such a ‘panel method’ is that the available knowledge is specifically included in the analysis and discussion. In discussing the axes strategy/identity and customer acceptance there is also room for ‘soft’ arguments such as intuition, support within the company and a feel for the market.

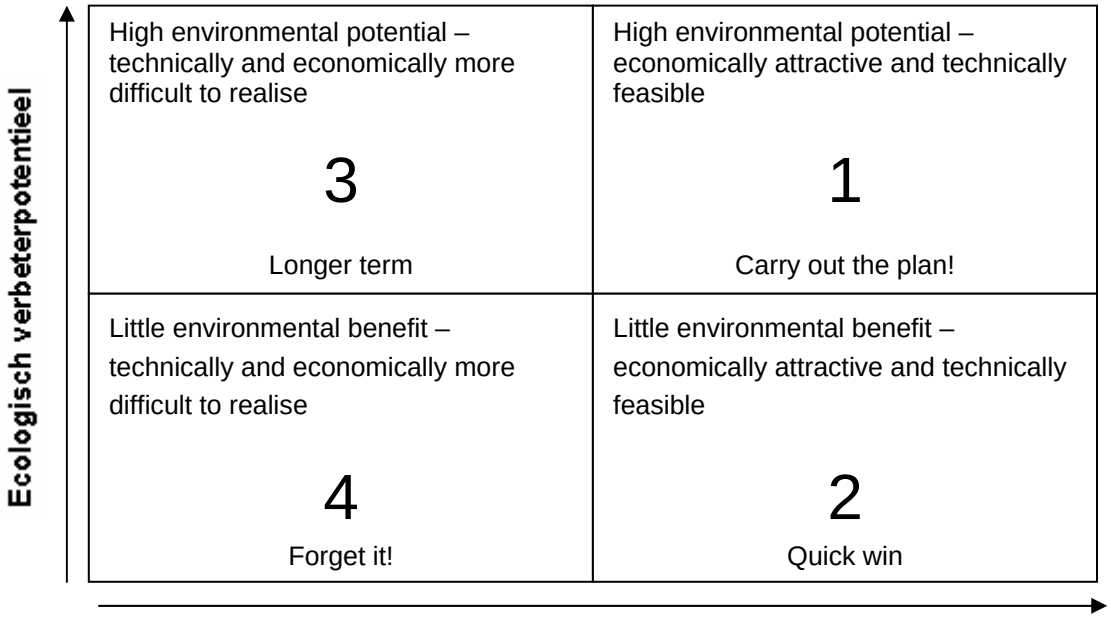
The scores on the four axes cannot be added together to form a single cumulative score since each of the axes has an entirely different character. But the graphic representation of the four-axes analysis gives a clear impression of the potential and the pitfalls of an idea for a PSS.

For background information and further instructions for the analysis of each axis, see ‘Goedkoop, M., van Halen C, te Riele, H, Rommes P., Product Services Systems, Ecological and Economic Basics, report 1999/36, Ministry of Housing, Spatial Planning and the Environment, The Hague, 1999’. Digital version of the report is available from cees.van.halen@nl.pwcglobal.com, or http://www.pre.nl/PSS.

| Return to Part 2.4: Selection | To form 4 |

4.e Quick eco-efficiency scan: Ecodesign Portfolio

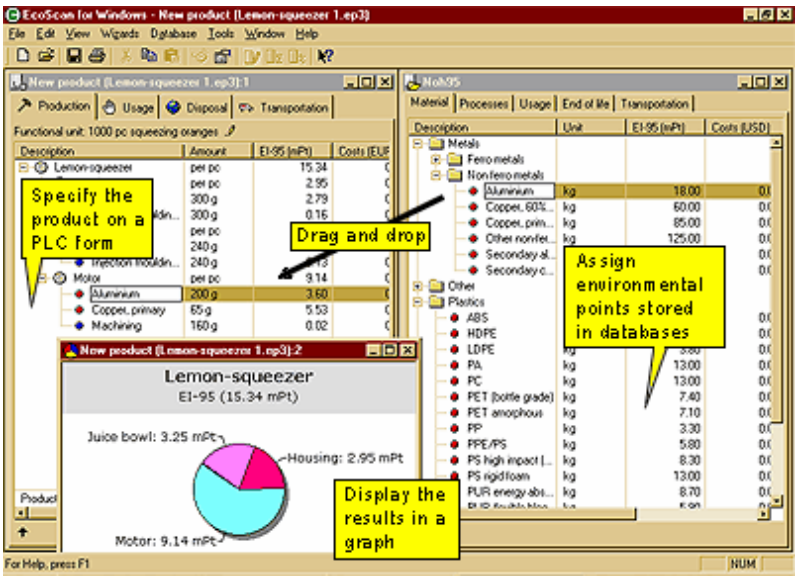
The aim of this tool is to compare alternatives, eliminate the less suitable solutions and select the best alternatives. The tool combines ecological and economic aspects with technical feasibility. In general it does not take a lot of time, but at the same time the participants must know the background to the alternatives being presented. The portfolio diagram is used to answer questions in the areas of ecology, economy and technical feasibility. Alternatives are placed in the appropriate position in the diagram. The alternatives in the top right section of the diagram are the alternatives that produce the greatest win-win situation. Alternatives in the bottom right segment of the diagram are alternatives that produce a quick-win result with the emphasis on economic factors and technical feasibility. Solutions in the top left column are solutions of a strategic nature that focus on the long-term and ecological factors, in part because these solutions are less focused on economic factors and technical feasibility. Alternatives in the bottom left of the diagram should be discarded. This type of diagram can be used in a wide range of different situations. For example, it could also be used to select materials for a product that is to be developed.



Adapted from: How to do EcoDesign ? by U. Tischner, E. Schmincke, F. Rubik, M. Prösler et al., Birkhäuser Verlag Basel, 2000.

Return to Part 2.4: Selection	To form 4

4.f More extensive eco-efficiency scan: Ecoscan 3.0

Purpose	To calculate the environmental burden of products in order to understand the harmful phases in the life cycle
Result	Identification of the environmental items in the life cycle of the product. Performance of product comparisons. Immediately review results of draft initiatives.
Information needs	Knowledge of the Eco-indicator method.
Duration	It takes some time to learn how to use the software properly. The time needed to deliver the necessary product specifications depends on how much of the information is already available. The actual entering of the data and calculation of the environmental performance does not take long.
Prior knowledge of the tool	Learning to use the software program
Method	Performing an Ecoscan involves the following steps: - Gathering of data - Input of data - Generation of results - Interpretation of results
Example	A simple life cycle analysis of a lemon squeezer 
Information	TNO Industrial Technology Sustainable Product Development PO BOX 5073 2500 GB Delft Telephone: 015 269 62 73 fax: 015 260 87 56 Internet: www.ind.tno.nl

Aim

Ecoscan is a software tool for calculating the environmental burden caused by products based on the Eco-indicator method. It is a very user-friendly tool: calculations of the environmental burden of products can be made very easily. Ecoscan is extremely suitable for use by companies themselves.

Results

Once the data for a product are entered in Ecoscan the environmental burden of the product in the chain can be presented in various ways. For example, Ecoscan can be used:
(a) to determine the environmental problems during the life cycle of the product;
(b) to carry out product comparisons;
(c) to immediately review the environmental burden of new designs.

Information required

The principal information required is:
(a) product specifications (list of materials, energy used);
(b) chain aspects (energy consumption during use);
(c) waste scenario;
(d) eco-indicators of the materials used.

Duration

It takes time to learn to use the software properly. It also takes time to enter the product specifications. The actual entry of the data and calculation of the environmental performance does not take long (one or two hours for a simple product), assuming that the product specifications and associated eco-indicator values are available.

Studies may have to be carried out to discover the eco-indicator values or they may have to be requested from other companies. This can take a lot of time.

Method

An Ecoscan involves roughly the following steps:
(e) gathering of data;
(f) entry of data;
(g) generation of results;
(h) interpretation of results.

Practical guide

The following text comes from Ecoscan's help function (tutor). It explains how to calculate the environmental burden of a simple product, using the example of a lemon squeezer.

This guide explains the following steps:
- Step 1: enter a product;
- Step 2: enter parts;
- Step 3: add a material;
- Step 4: add a process;
- Step 5: complete product tree;
- Step 6: define aspects of use;
- Step 7: program functional unit;
- Step 8: calculate energy consumption;
- Step 9: entry of aspects of use completed;
- Step 10: program disposal;
- Step 11: programming of disposal completed;
- Step 12: add a card;
- Step 13: enter transport;
- Step 14: calculate transport distance;
- Step 15: entry of transport completed;
- Step 16: show graph of results.

Step 1: Enter a product

When you start up Ecoscan an empty PSS form automatically appears. On this form you specify the product that you want to analyse. You start by entering the production phase.
- Select the *Production* chart by clicking on the tab *Production.*
- Click on the shortcut button *Add new part or sub-component:* A new product is added on the *Production* chart. 
- Click on the new name and give the product a name by immediately typing: Lemon press.

- **Step 2: Entering parts**

You can then break the lemon squeezer down into parts.
- Select the product *Lemon squeezer* by clicking on the line with the mouse.
- Click on the shortcut *Add new part or sub-component* to add a part to the *Lemon squeezer.*
- Click on the new name and give the product a name by typing: *Housing*
- Select the product *Lemon squeezer* by clicking on the line with the mouse. Click on the shortcut *Add new part or sub-component* to add a part to the Lemon squeezer.
- Click on the new name and give the product a name by typing: *Juice holder*.
- Select the product *Lemon squeezer* by clicking on the line with the mouse. Click on the shortcut *Add new part or sub-component* to add a part to the Lemon squeezer.
- Click on the new name and give the product a name by typing: *Motor*.

Step 3: Adding a material

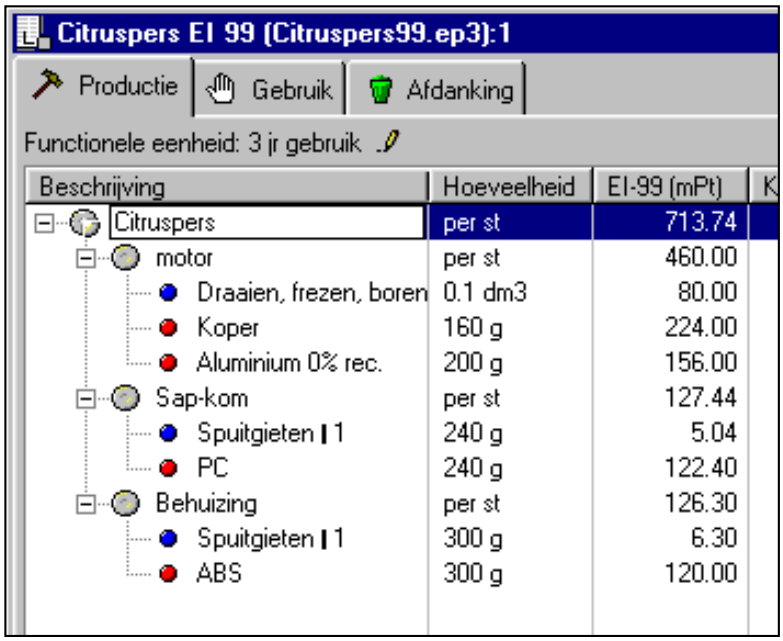
You are now going to specify the materials that make up the housing of the lemon squeezer.
- In the Database menu select the command NOH Eco-indicator ’99.
- In the database open the folder *Plastic granulate* by clicking on the plus sign for the folder.
- Click on *ABS* and (holding down the left mouse button) drag it to the PSS form and drop it on the component *Housing.*
- Type *300g* to set the quantity of ABS for the housing of the lemon squeezer at 300 grams.
- Press Enter.

Step 4: Adding a processing step

You are now going to specify the processing steps by which the housing of the lemon squeezer was made.
- In the database select the chart with processing methods by clicking on the tab *Processing*.
- Open the *Plastics* folder by clicking on the plus sign for the folder.
- Click on *Injection moulding 1* and drag it (holding down the left mouse button) to the PSS form and drop it on the *ABS* for the component *Housing.*

Step 5: Completing Product Tree

You can repeat the above steps for the parts *Juice holder* and *Motor*. Use different materials and processes for them. The result will be presented as follows:



Step 6: Defining aspects of use

You are now going to specify the aspects of use of the lemon squeezer. You do this on the chart Use.

- Select the chart *Use* on the PSS form by clicking on the tab Use.
- Click on the shortcut button *Add new part or sub-component*.
- Type *Energy consumption* and press *Enter*.
- In the database select the chart with aspects of use by clicking on the tab *Use*.
- In the database open the folder *Electricity* by clicking on the plus sign for the folder.
- Click on *Electricity LV Netherlands* and (with holding down the left mouse button) drag it to the PSS form and drop it on *Energy consumption*.

Step 7: Programming Functional Units

Before the correct quantity of energy consumption can be calculated you must program the functional unit. This is the framework within which the analysis will be placed.

- Click on the shortcut button *Change functional Unit* at the top of the PSS form.
- Select the option *Automatic* in the tab page that appears.
- At Quantity type: *1000* (instead of 3);
- At Unit select: *Other*... . A dialog window appears.
- Select *General*. (Top of the list).
- Select *Unit* and click on OK.
- At Action type: *pressing oranges* (instead of use).
- Click on OK.

Step 8: Calculating energy consumption

You then calculate the total energy consumption for the entire life cycle with the Consumption wizard. Assume that you have to squeeze each orange for 1 minute.

- On the *Use* card of the PSS form select the line *Electricity low voltage.*
- In the menu Wizards select the command *Consumption wizard*.
- Click through to the page *Consumption- frequency*. Change the frequency to 1 minute per unit.
- Change Product current to 200 Watts.
- Click through to the last page and click on Complete.

Step 9: Entry of aspects of use completed

You have finished filling in the aspects of use. The result appears as follows:

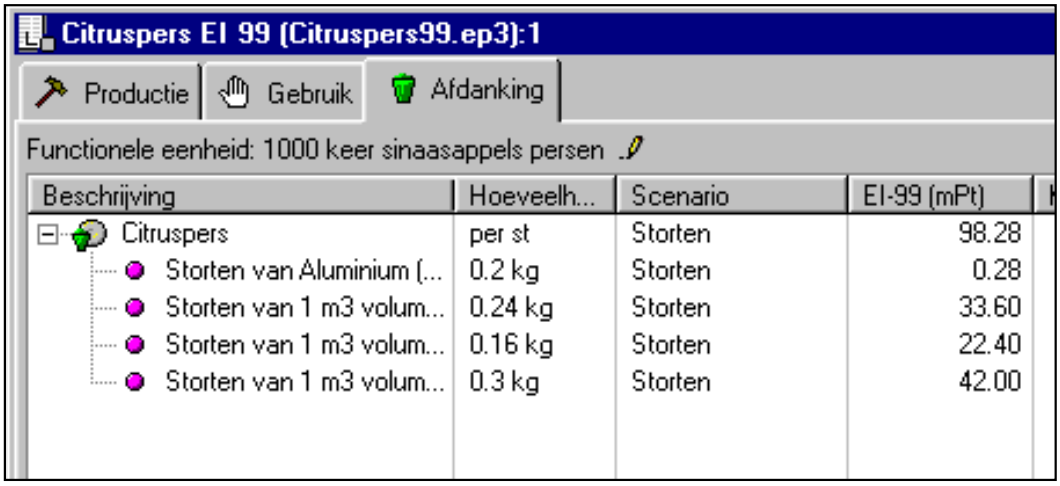
Step 10: Programming Disposal

On the chart Disposal you can program the method of disposal of the product.

- Select a part or item by clicking on it with the right mouse button. A quick menu appears.
- Select the command *Automatic-disposal* and the option *Automatic disposal (Display fractions)* from the submenu that appears.
- On the PSS form select the chart *Disposal* by clicking on the tab *Disposal*.
- Click on the plus sign for *Lemon squeezer* to display all materials of the lemon squeezer to be discarded.
- Click on the line for Lemon squeezer in the Scenario column. A box appears for *Municipal waste*.
- Click again in this box.
- Select the disposal scenario *Landfill*.

Step 11: Programming of disposal completed

You have finished programming the disposal aspects. The result appears as follows:



Step 12: Adding a chart

You are now going to add an extra chart to define a mode of transport.

- Select the PSS form.
- Click on the shortcut button *Properties* 
- Select the chart Charts and click on the shortcut button *Add*.
- Type: Transport and press Enter.
- At Icon select the icon with the van.
- Click on OK.

Step 13: Entering Transport

On the transport chart you can now enter aspects of transport such as the transport from factory to wholesaler.

- On the PSS form select the new chart *Transport* by clicking on the tab *Transport*.
- Click on the shortcut button Add new part or sub-component.
- Type *Transport from factory* and press Enter.
- In the database select the chart with aspects of transport by clicking on the tab *Transport*.
- Click on *Truck (28 ton)* and drag it (pressing the left mouse button) to the PSS form and drop it on *Transport from factory*.

Step 14: Calculating Transport Distance

The transport is expressed in kilogram-kilometres. Use the Transport wizard to calculate the correct volume.

- On the chart *Transport* in the PSS form select the *line Truck (28 ton)*.
- In the menu *Wizards* select the command *Transport wizard*.
- Click on Next until you reach the page Place of departure.
- On the *Place of departure* page select the place of departure of the transport. Open the map *Europe*, open the map *Italy* and choose the city *Milan*.
- Click on *Next* until you reach the page *Destination*.
- Open the map *Europe*, open the map *Netherlands* and choose the city *Rotterdam*.
- Click on *Next* until you reach the page *Distance and load*.
- For the weight enter *1 kg* and for the detour factor *1.5x*.
- Click on Next and Complete.

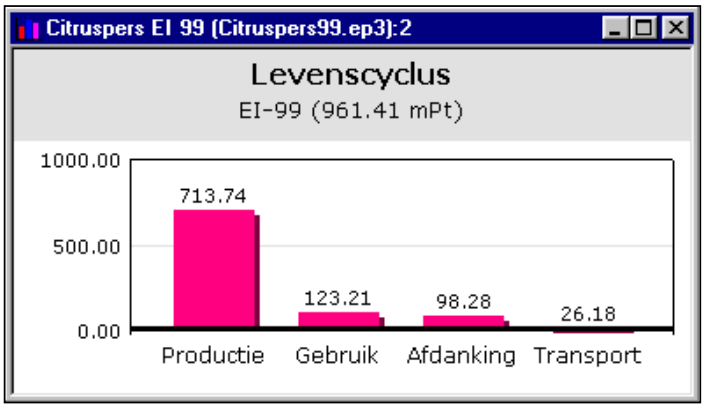
Step 15: Filling in transport complete

You are now finished filling in the transport. The result appears as follows:

Step 16: Graphic Representation of Results

All charts have been filled in. You can present the results in a figure.

- Select the PSS form.
- In the menu *Extra* select the command *Bar Chart*.
- Select the command *Select parameter* from the quick menu under the right mouse button.
- Select the option *EI-99* from the submenu.
- Click with the right mouse button on the figure.
- In the fast menu select the command *Life cycle*.
- Click in the figure on the bar that represents the production phase.
- With the right mouse button click on the bar and select the command *Zoom in on 'Production'.*
- Click in the figure on the bar that represents the Lemon squeezer.
- Click with the right mouse button on the bar and select the command *Zoom in on 'Lemon squeezer'*.
- Click on the figure on the bar that represents the motor.
- Click with the right mouse button on the bar and select the command *Zoom in on 'Motor'.*



(5) Management Presentation

Strategic PSS option: Name of strategy
Give the PSS an original, striking name

Brief description of strategy (1 paragraph)
- Description of the context of the strategy (including the following points to consider)
- What is the purpose? (a new PSS meets a need)
- Which customer segment?
- Why the change? What will it yield?
- Why does it fit in with the company, what policy does it fit in with?

Expected result
What do you expect from this strategy in terms of:
- turnover, profit, market share, value creation, Return on Investment,
- customer loyalty, brand awareness, promotion, positioning, etc.

(as far as possible give specific and concrete results)

What are the main advantages and disadvantages of the new PSS?

Segmentation, Focus and Positioning
- *Customer segment:* at which customer segment is the strategy aimed
- *Primary target group:* Briefly describe the primary target group in the customer segment
- *Positioning:* What Unique Selling Points does the PSS add
- *Creative Approach*: In what creative way will you target the market (what is the key to success?)

Marketing Mix (practical implementation of strategy)
- *Product-service description:* Brief description of PSS
- *Price:* What pricing strategy will you adopt to reach the customer segment?
- *Promotion:* How are you going to let customers know what you are supplying?
- *Place (sales channels):* How are you going to sell the PSS (via Internet, directly to the customer, call centers)

Conditions
- What does the success of the strategy depend on
- What are the bottlenecks and uncertainities

Investments
- What is needed to implement the strategy and to neutralise uncertainites and bottlenecks in terms of money, people, resources, time, R&D, strategic alliances, etc.
- Demonstrate what the new strategy will mean for the company.

Return to Part 2.5: Management Presentation

Recommended Literature

There is a great deal of literature about the development of (sustainable) product service systems. The following list is a selection of sources that we feel are most important and/or which have inspired us most in producing this scan.

- Brezet, J.C. et.al. The design of eco-efficient services; Method, tools and review of the case study based 'Designing Eco-efficient Services' project. Ministry of VROM, Delft University of Technology (NL), 2001
- Goedkoop, M., van Halen C, te Riele, H, Rommes P., Product Services Systems, Ecological and Economic Basics, report 1999/36, VROM, Den Haag, 1999
- Kathalys - Vision on sustainable product innovation, 2001, ISBN 90-6369-013-4, te verkrijgen via www.kathalys.com
- Tischner, U, E. Schmincke, F. Rubik en M. Prösler.How to do EcoDesign ? Birkhäuser Verlag Basel, 2000
- UNEP, Product Service Systems and Sustainability: Opportunities for sustainable solutions, July 2002 (zie http://www.uneptie.org/pc/sustain/design/design.htm)
- Zaring Olof (ed.) - Creating eco-efficient producer services (main report); Research report, Gothenburg Research Institute, 2001, which includes: James, P., Slob, A., Nijhuis, L. - Sustainable Services - An Innovation Workbook (to be published by Kluwer Academic Publishers, Dordrecht, at the end 2003/beginning of 2004)

We also used materials that were being developed at the same time as this scan in two major EU projects, the Sustainable Product Development Network (SusProNet) and Methodology Product Service Systems (MEPSS). Both projects have easily accessible websites with an extensive overview of experts and literature (often directly downloadable) in the area of Product Service Systems. See:

- www.suspronet.org (SusProNet)
- www.PSS-info.com (MEPSS)

PART 4: FORMS

Product Service Systems Innovation Scan for industry

Introduction

This document is part of the manual for the ‘Product Service Systems Innovation Scan for Industry’. At each step of the scan in these forms you have to fill in information and/or findings which is required to complete the innovation scan and to recording the information that is used and the choices that are made.

The numbering of the forms corresponds with the numbering of the steps in the innovation scan.

Return to the figure with the step-by-step plan

Form 0

Project plan for the PSS Innovation Scan at ……

Project team

Team member	Department	Phone	Abbrev.
(project manager)			
	(external)		

Table: Project team

Timetable and schedule of activities

Step	Carry out in week	Persons involved	Role	Length of time (days)	Use of tools in part III	Meetings
0 Preparation						
1 Introduction						
2 Analysis						
3 Ideas						
4 Selection						
5 Presentation						
TOTAL						

Table: Schedule

Return to the figure with the step-by-step plan
Return to Step 0: Preparation of PSS Innovation Scan
Proceed with Step 1: Introduction to PSS

Form 1

Joint answers to questions

Question	Answer
What is a PSS?	
What is the aim of this project?	
What advantages can a PSS have for our organisation?	
What are the most important steps in this project, the PSS innovation scan?	

Table: Aims of the project

Identified bottlenecks and actions

Bottlenecks	Actions	When	Who

Table: Bottlenecks

Return to the figure with the step-by-step plan
Return to Step 1: Introduction to PSS
Further with Step 2: Analysis

Form 2

The following questions must be answered for the product selected and the relevant (groups) of customers:

1. Market segmentation. What market segments/customers are you serving and where, how and why are your products bought? Do you supply to other companies or direct to the end consumer? Describe your (groups of) customers and, where applicable, your customers' customers.
2. Function/value for the customer. What functions does the product perform for the customer (there can be different ones)? What value does your product represent for the customer?
3. The company's own position in the value chain and potential competition from outside the branch. Answer, based on the function of your product the following questions:
   - What place does your product have in the overall needs of the customer? What other parties play a role in this value pool? Where is the greatest added value and potential profit?
   - What competition is possible from other branches (in other words, are there parties that can perform the same function for your customer using entirely different 'hardware' or business models than your own)?
4. Critical success factors and SWOT (now). What are your critical success factors (from the perspective of value, the customer, internal organisation and learning)? In what aspects are you strong and do you have opportunities (or vice versa)? Can you give arguments why customers come to you and not to another supplier?
5. Trends/developments and SWOT (later). What important trends and developments are apparent that could affect your SWOT in the future? What is it absolutely essential that you as a company are good in to continue selling your products?

Fill in the following matrix with key words.

Product description					
Business to Consumers and Business to business					**Business to Business**
Market segmentation/ customer (groups)	**Function and value for the customer**	**Position in profit pool and competitors outside the branch**	**Critical Success Factors Strengths & weaknesses now**	**Trends, Opportunities & threats later**	**Functions at customer of customers**

Table: Product, market and customer

[Return to the figure with the step-by-step plan]
[Return to Step 2: Analysis]
[Proceed with Step 3: Generation of Ideas]

Form 3

Select a maximum of three ways in which value can be added that are important for the customer/consumer and briefly explain why. In Part III, 3a there is an explanation of the forms of adding value.

Forms of value addition	Explanation
Customer productivity	
Comfort	
Convenience	
Risk reduction	
Amusement value and image	
Standards and values	
…	

Table: Value addition

PSS options conceived by individuals

Name of PSS option	Explanation

Table: Conceived PSS options of

Adapt the following matrix and fill in the PSSs you have thought of. As a group think of new PSSs to fill in the blank spaces.

PDC-options	Drivers (customer perspective)						
		Productivity increasing or cost lowering	**Comfort increasing**	**Lower purchasing thresholds**	**Risk reduction**	**Better emotional appeal & image**	**Fits in better with Standards & Values**
	Product-related service						
	Advice and Consultancy						
	Product lease or hire						
	Activity Manag-ement/Outsour cing						
	Functional result						
	Service that performs the function of a product						
	Wheeling and Dealing						

Table: PSS Matrix

Name of PSS option	Explanation	Classification according to Anshoff

Table: Full list of ideas for PSS options

Return to the figure with the step-by-step plan
Return to Step 3: Generation of Ideas
Proceed with Step 4: Selection

Form 4

Assess the idea for a PSS for ‘Business fit’ and ‘Market attractiveness’ with the help of the criteria in Table 10. For example, fill in this table (for the selected criteria) and determine or estimate the two total scores for attractiveness and business fit.
On the basis of the two total scores in Table: fill in the PSSs in the matrix below and then formulate a strategy for the most attractive PSSs. For an explanation see Part III, Section 4a

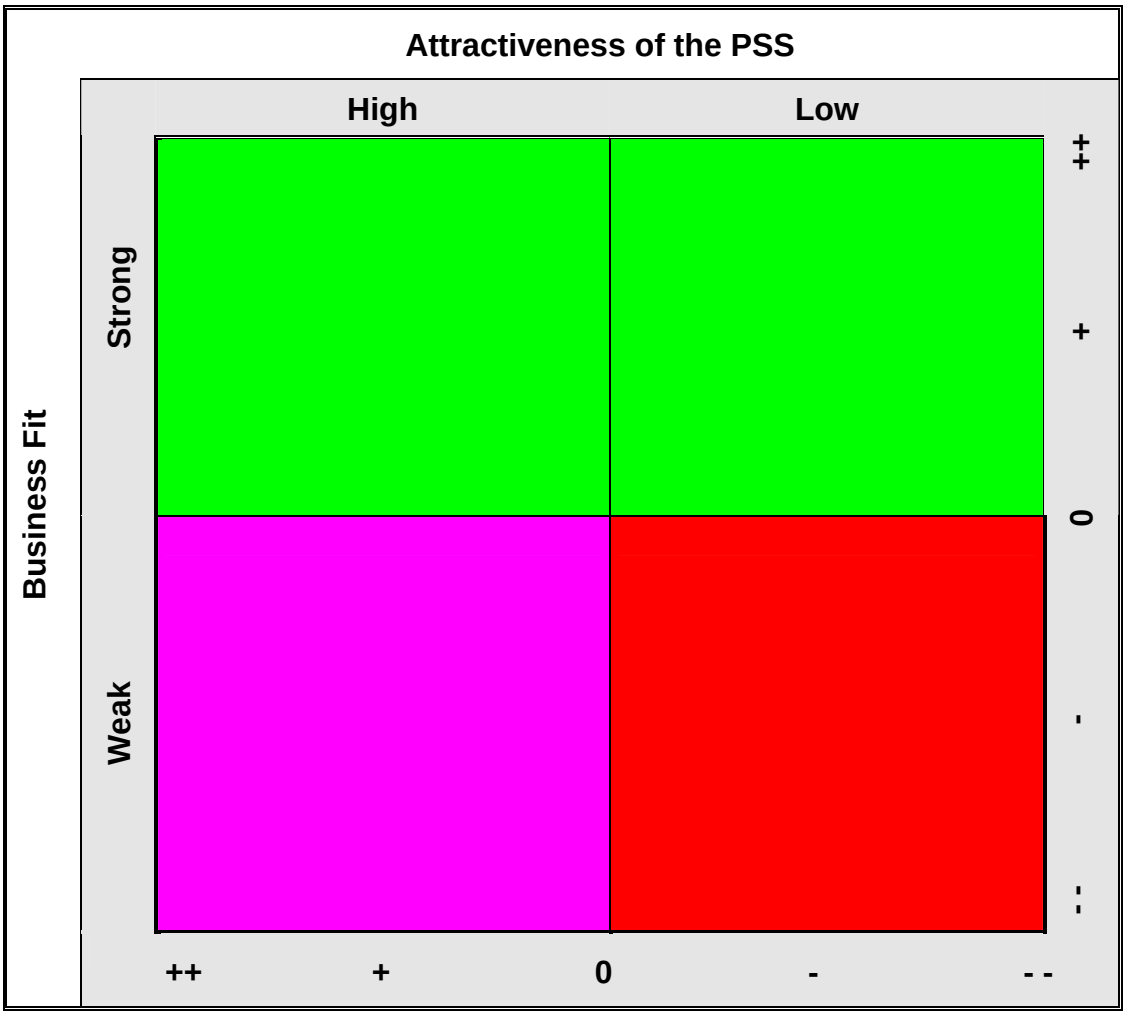


Table: Strategy matrix

CRITERION	Weighting factor	PSS 1	PSS 2	PSS 3	PSS 4
• Large market and potential					
• High market growth /growth potential					
• Substantial potential profits					
• Little threat from new entrants / high barriers to entry					
• Little threat from substitute products					
• Low price sensitivity among customers					
• 'High potential for loyalty of customers'					
• High quality of the product					
• Short payback period /profit margin					
• Low financing problems (prior financing, regular invoices)					
• Good cooperation with (potential) partners in the chain					
• Less environmental burden					
• Few uncertainties (costs, revenues, etc.)					
• Few problems with respect to legal aspects					
TOTAL Attractiveness of the PSS (external)					
• Fits in with current market position					
• Fits in with results of SWOT					
• Corresponds well with the strategy (mission)					
• Sufficiently adaptable					
• The new PSS fits in with the company's image					
• Little price competition					
• Considerable knowledge of the market					
• Low switching costs					
TOTAL Business fit (internal)					

Table Evaluation matrix

N.B. the following scores are possible for the PSSs:

9= very good 3 = poor

7 = good 1 = very poor

5 = average

Return to the figure with the step-by-step plan

Return to Step 4: Selection

Proceed with Step 5: Management presentation