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A sustainable course for higher education

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Abstract

This thesis analyses the inclusion of sustainability issues into higher education curricula. The thesis describes the concept of sustainability in higher education, analyses the university system and structure this information according to chosen system theory. The results of the thesis are recommendations of how to intervene in a university system, in this case Lund University, in order to *institutionalise the inclusion of sustainability into curricula.* Also, conclusions applicable to other universities trying to achieve the same objective as the underlying thesis are stated.

Executive Summary

In this thesis it is believed that the educational system can contribute to a more sustainable development. Higher education is a big part of that system; preparing people for decision-making professions and producing the research results that shape many of our beliefs about the world. The thesis at hand will provide input to Lund University in forming and implementing a new strategy for their environmental work.

Initiatives meant to move a university towards more sustainable practices often achieve initial success but very few can show a longer period of continuous progress. This can be seen in university cases around the world.

This is also the case at Lund University. Environmental issues were fairly highly prioritised in 1998. The first environmental strategy was launched this year, bold policy statements were made, 42 ambitious environmental goals were set and an environmental officer was employed. Six years later the environmental concern is low, the president states in the local paper that the goals were set too ambitiously and an external evaluation shows that many institutions do address the environmental issues at all, neither in education nor in their operations[1].

Becoming a more sustainable university concerns several, each quite different areas of activity, typically formulated as university processes, curricula, research and outreach.

The focus of this thesis is towards *sustainability inclusion in curricula.*

Reason for this focus is that in the specific case of Lund University, the implementation in this area has *not worked out very well.* Also, a university can in a sense be seen as a company producing students as their products. As in any company, it is likely that their environmental impact is closely linked to their products. The future impact caused by students leaving the university is most probably *the most significant environmental aspect of a university*. This aspect is intimately linked with curricula.

Consequently, the objective of this thesis is the following:

How can the inclusion of 'Sustainability' into university curricula be institutionalised?

The research method of the thesis can be labelled action research, in which the objective is typically to *improve what* is happening (as opposed to *understand what* is happening). This results in seven recommendations for how to intervene in the Lund University system, in order to improve conditions for sustainability issues to enter all curricula. The thesis author deliberately developed recommendations that intervene in the places of highest leverage in a system, as defined by Meadows (1999).

The recommendations and a brief explanation of each are listed below.

Sustainability stakeholder dialogue

How to more actively engage in a structured dialogue regarding the university's sustainability progress, with the stakeholders of LU. This recommendation suggests a methodology for doing so and possible criteria for how to categorize the potential participants of this dialogue.

[1] Ernst & Young evaluation report (2004)

Strengthening student involvement

LU was found to have a fairly favourable climate for student participation. Reasons for low involvement were found also outside the scope of LU (such as new, less favourable terms for student loans, making students eager to cut down extra curricular activities). However, a number of recommended actions aimed to further facilitate student involvement regarding sustainability issues at LU were made in this recommendation.

New sustainable curricula indicators

In the cases analysed in this thesis, and several of them were pioneering universities with regards to sustainability reporting, the indicators regarding sustainability incorporation in curricula generally measured *sustainability content in curricula.* This motivated the recommendation to develop a questionnaire to assess the *Awareness, Willingness and Ability* of students to contribute to sustainability after leaving the university.

Multidisciplinary students meeting single disciplinary teachers

This recommendation involves using the "strengths model" (McKeown 2002) to assess current curricula content through a sustainability perspective and possibly add new items such as examples, cases and tools through engaging in inter curricula development together with students at a multi disciplinary masters program with clear sustainability links.

Making sustainability a widespread university goal

It was found that incorporating sustainability issues into curricula had *not entered as a recognized, prioritized goal* at LU. It was also found that the transformative function, as described by Sterling (2001) "To encourage change towards a fairer society and better world" was not recognized in the educational function of LU. This motivated recommended actions for how this could be achieved.

Deliberate paradigm shift

A recommendation to consider and evaluate the existing university paradigms.

The thesis author also drew conclusions that are applicable to other universities.

Table of Contents

LIST OF FIGURES

1 Introduction

This chapter will provide an introduction to the thesis. The background to sustainability in higher education and at Lund University will be presented as well as the process of formulating the problem to address in this thesis. Finally, the objective, research questions, scope and limitations of the thesis are presented, as well as an overview explaining the structure of the thesis.

Some of the things that humanity's long-term health depends on are in trouble: climate stability, nature's ability to adapt to changes, the availability of natural resources, equal possibilities to meet our basic human needs.

This is not the work of ignorant people. Rather, it is the opposite. As pointed out by Orr (1991), it is the result of work made by people with BAs, BSs, MBAs, and PhDs.

We all influence the state of the world; you and me, supply and demand, elected decision-makers, company CEO's. But undoubtedly, many key decisions are made by people with know-how or in management positions, and it is most certainly so that many of these decisions are made by people who have studied at universities. They were once consumers of the higher education product. They are now reselling that product, making informed decisions that influence the world. The question that makes it relevant to address sustainability in higher education is: How were they informed? Will their choices hinder my grandkids from meeting their basic needs? Will they pollute ground water for many generations to come? Will they cause run-off that ultimately ends up in the food chain? Will they disrupt the ecological system and eliminate species in the park nearby my house? Is this information a part of the well-educated decision?

When I graduated from business school almost ten years ago I was a highly educated man. I was ready and immediately got a job as market manager of a company. The problem was that, just like many students today, I didn't meet the most obvious requirement – to make choices that are good for us, both today and in the future (a concept known as sustainability). The educational system *could be* a great leverage point to change the world to the better and higher education is a big part of that system; preparing people for decision-making professions and producing the research results that shape many of our beliefs about the world.

It would be great if this thesis inspires you, as a reader, to use the influence that you have or might have on the educational system. So that education is used actively, as a tool, to make the world more environmentally healthy and socially just.

Background

This thesis is meant to provide input to Lund University in forming and implementing a new strategy for the environmental work. The background and current situation are interesting.

A complete history of the sustainability related issues at Lund University (LU) is beyond the scope of this thesis but a look in the rear view mirror of some initiatives specifically related to sustainability inclusion in curriculum can be attempted. It goes back at least to 1968, when the

first course dealing with environmental issues and problems was introduced[2]. This first five credit course evolved into a 40 credit course, open for all applicants to the university. Since then, a number of initiatives have evolved towards inclusion of particularly the environmental side of sustainability into curricula. The above mentioned environmental course has evolved into a complete environmental science program that since the end of 1980's is given at a department of its own[3], also undertaking research and providing eight, 5-10 credit courses related to the environment, such as waste management and life cycle analysis. In more recent history, 1994, the International Institute for Industrial Environmental Economics was established at Lund University, introducing a multi disciplinary master program in environmental economics. In 2000, the Centre for Environmental Studies (MICLU) was established. Its role is to be a centre for environment related activities in basic education and post-graduate studies as well as research. This centre also works with information and contact activities with respect to the environment and sustainable development. To mention a very recent event related to the social side of sustainability is the introduction of a multi disciplinary human rights course. The background to sustainability in curriculum on a more international level is not elaborated upon in this thesis. For those interested in a more general background to sustainability in curriculum, a recommended reading is Education for Sustainability (1996)[4], a collection of articles that goes through some of the development from 1990 and forward.

In relation to this thesis, a centrally initiated initiative is of particular importance. 1997 the Swedish government assigned the university the role of trial agency for implementing an Environmental Management System (EMS) together with 25 other government agencies[5]. In 1998 the Lund University board decided on an environmental policy and on no less than 42 environmental goals that were to be achieved before 2005. An external audit of the environmental work was carried out by well known audit company Ernst & Young in 2000, stating that environmental work was proceeding to slow, the main reason mentioned was the lack of local commitment (i.e. at institution and faculty level). As an answer to this the environmental diploma concept was launched, a "light version" of an EMS that contains a few environmental performance criteria and a few environmental management criteria that must be fulfilled in order to achieve the diploma. This has achieved a certain level of success; almost 10 departments have, completely voluntarily, embarked upon and 6 have received the diploma (equalling at least 350 employees and 700 students).

The long-term effects of this diploma work cannot yet be measured but as one criterion is that the entire staff of the awarded department undergoes environmental training, it is likely to produce some second order effects. However, the same auditor conducted a new external evaluation of the progress as late as February of 2004. That report showed what the hard working but small environmental group at LU[6] already knew; half of the environmental goals ambitiously established, were not being met. Already, the year before, the university had received some bad press in the local paper after the student coalition, "Sustainable University" had made a similar evaluation, reaching basically the same conclusion; Even though some progress has been made, many environmental goals are not being met and environmental concern, in general, is low at the university.

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[2] Created by a student, who is now director of the institute at which this thesis is written. Thomas. B. Johansson at IIIEE.

[3] Department of Environmental and Energy Systems at the Institution of technique and society.

[4] Huckle & Sterling, Earthscan Publications Ltd, London.

[5] Jarnung (2004)

[6] Throughout this thesis, Lennart Olsson of MICLU, and Kerstin Gustavsson and Carola Jarnung of the environmental department are termed the environmental group.

Top management of LU decided that a new environmental strategy, including policies, goals and actions was needed. This leads us to the current situation, which is interesting both locally and globally.

In December 2002, the United Nations General Assembly adopted a resolution declaring a "Decade of Education for Sustainable Development" to begin on January 1, 2005 and last until December 2014. The UN Educational, Scientific, and Cultural Organization (UNESCO) is the lead agency. Nations are encouraged to establish their own Decade-oriented initiatives. This together with the high awareness and information exchange that will take place due the Decade-initiative means that it already acts as a driver on universities.

As if this wasn't enough here is what Swedish prime minister Göran Persson stated in a speech at the conference for sustainable education in Gothenburg May 4, 2004: "The government in Sweden has appointed a committee to come up with proposals as to how sustainable development should be given a stronger role in our country's education system. I would like to state here and now that the time is ripe to include sustainable development in the Swedish Higher Education Act."

At LU, the situation is the following: The review has been undertaken and the president of LU has promised a response, in the local newspaper. A re-formulation of the environmental work with a likely re-orientation is expected to take place over the next semester. The people initially involved in the process of developing this strategy held the meeting that started their work the very same day that this thesis author started his work.

Problem definition

This thesis revolves around institutionalising sustainability inclusion in university curricula. Why are the chosen problem areas curricula and systemic changes rather than for instance all university activities and how to get a good start regarding a university's environmental work? The text motivates how the problem area to be approached in this thesis was chosen. The overall ambition was to find a problem area that was relevant for LU but not only for LU.

Initiatives meant to move a university towards more sustainable practices often achieve initial success but very few can show a longer period of continuous progress. This can be seen in university cases around the world.

This is also the case at LU. Environmental issues were fairly highly prioritised in 1998. The first environmental strategy was launched, bold policy statements were made, 42 ambitious environmental goals were established and an environmental officer was employed. Six years later the environmental concern is low, the president of LU states in the local paper that the goals where set too ambitiously and an external evaluation shows that many institutions do not address the environmental issues at all, neither in education nor in their operations[7]. The International Journal of Sustainability in Higher Education, in volume five this year (2004), published stories of transformation at universities. In the editorial of this volume, Lotz-Sisitka concludes that basically all the papers indicate that while innovative individuals and groups can make a difference, especially in the local context, there is a need for changes in the architecture of higher education institutions *to make real change last*.[8]

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[7] Ernst & Young evaluation report (2004)

[8] Lotz-Sisitka, in International Journal of Sustainability in Higher Education (2004)

The fading of environmental concern at LU six years after initiating the environmental plan and the summarisation by Lotz-Sisitka both point to a potential problem area that seems crucial to address: To make sure that momentum is maintained even if key people leave or if top management start showing less commitment, what can be done to achieve long-term success and maintain momentum after the initial enthusiasm fades?

A number of factors that are crucial in achieving this are mentioned in cases of university greening initiatives internationally and by interviewees at Lund University. Top management commitment is crucial, you need devoted people at different levels, finding and promoting change agents are key, the internal responsibility structures regarding environmental issues need to be clear etc. etc. The problem here is that after having made an initial overview of cases and performed 6 interviews with Lund University staff (including the president and university director), the number of crucial factors keep getting bigger and more scattered. This reflection points to another potential problem area, closely related to the one stated earlier: What can be done to achieve a clearer picture of what is crucial in achieving long term success in moving towards more sustainable practices?

In the case of LU, initial interviews and literature review showed that the university curricula seemed to be an area with a built in resistance towards embracing sustainability issues and the implementation in this area has *not worked out very well in the case of LU*. The environmental diploma concept "The Frog", that is currently used to certify departments at Lund University according to environmental criteria, has received some initial success. It does not contain any requirements to include sustainability in curricula (for an overview of 'The Frog', see appendix 3). The reason mentioned by the environmental group for this exclusion is that it is meant for institutions, and they do not have autonomous decision-making control over curricula. To exemplify, the economic faculty have some level of control over curricula at the institution of business administration. This exclusion of curricula in a potentially successful university greening concept ('The Frog') means that in the local setting, this is likely to "fall between the chairs", as we say in Sweden. A final peace of information that lead to focusing on curricula, as this thesis does, is the following: A university can, in a sense, be seen as a company producing students and new knowledge through research, as their products. As in any company, it is likely that their environmental impacts are closely linked to their products. In the ISO-certification process of both IIIEE (that failed because of difficulty in measuring this issue) and of Gothenburg University it was concluded that the future impact potentially caused by students leaving the university was *the most significant environmental aspect of a university*.

This discussion leads to the objective below.

Objective

The thesis has the following objective:

How can the inclusion of 'Sustainability' into university curricula be institutionalised?

Research questions

In order to fulfil the above objective this thesis author sought answers to the following research questions.

1. What are the currently perceived barriers to achieving this objective?

2. What are the leverage points in the Lund university system – where will it make most sense to intervene in order to achieve this objective?

3. How could these leverage points be used in order to achieve the objective - how will it make most sense to intervene in order to achieve this objective?

Scope and limitations

Object of analysis

Becoming a more sustainable university concerns several, each quite different areas of activity, typically formulated as

- Campus operations (University processes)

- Curriculum

- Research

- Outreach (Co-operation with the surrounding society).

There are clearly synergies for a university in approaching all areas in an integrated manner (for example, knowledge gathered in environmental research can be used by a researcher to educate students and other teachers, knowledge gained in addressing the internal environmental aspects can be used to teach students and teachers how to address these environmental aspects in any organisation) and LU has some work to do in all of them. However, the focus of this thesis is towards *sustainability inclusion in curricula.* The motivation for this scoping was provided in the problem formulation; it is believed that this is where a large part of the problem area is located, both at LU and at universities in general. It is also believed that the students leaving a university can be a source of leverage in moving towards sustainable development.

No aid for teachers on how to include sustainability in curricula

The term to "include sustainability into curricula," is used throughout this thesis. It is described in chapter three how this can be defined. In this thesis the authors seeks to make recommendations that will hopefully help LU work towards achieving their goals. It is however, important to stress that how to actually *DO* it is not addressed in this thesis. How should a teacher in architecture address sustainability issues in his/her course on interior decorating, how could the department of osteoporoses translate sustainability inclusion into a method of choosing future bone replacements that are good for the environment as well as for the human getting the artificial bone injected? This is not addressed in the thesis and it should also be said that this is a complex chore. Regarding many subjects, there are no widely tested methods available for doing this and trade-offs are likely to occur during the development. Having said that, numerous sources exist that can be of aid for teachers, course responsible and management of universities in performing this task and the number of supporting organisations and networks is also large. For instance, Alvarez and Kyle, (1998); Second Nature (2002); Education for Sustainable Development Toolkit (2002); and Swedish only Miljöhandboken (2000) are some support resources that provide suggestions of methodology and also point to where further help can be found.

No testing of results

It should be noted that the value of action research often benefits from testing of the actual result and attempting to draw conclusions from this test. This implies evaluating the implementation of the results of the work. This is not possible within the scope of this thesis for the following reason: The objective of this thesis is related to achieving long term results. To test and evaluate the outcome of recommendations provided by the thesis author will not be a valuable exercise until a number of years have passed. Does this mean that the focus to provide "recommendations for long-term improvement" rather than simply "recommendations for improvements" is unnecessary? Sharp (2002) based on investigating environmental initiatives at 30 universities in Europe and USA, argues that it is essential to know the goal in undertaking a greening initiative of a university. This goal, he argues, should be either a project success or a systemic transformation, as the approach to achieve the two differs completely. He exemplifies: "*The road to succeed in building a showcase green building at your university is a very different journey to successfully institutionalizing a university-wide commitment to have all future buildings built green, even though each journey can support the other"* (Sharp 2002 p.130). He continues by stating that once we set our sights on the goal to achieving systemic transformation we can learn many lessons from our past efforts to "green" universities, such as understanding what approaches are effective in ensuring the survival of such initiatives and understanding the nature of universities in order to make long-lasting changes in their structure.

2 Methodology

This chapter describes the methodology used in the thesis, such as the structure and gathering of primary data. Action research is described, as this is a way to categorize the methodology used. Specific methodologies used during different phases of the work are described. Finally, the main assumptions this thesis rests on are depicted as well as the researcher's relation to the object of analysis, Lund University.

Action Research

> "A unique aspect of action research is that both the research focus and the methodology may change as the inquiry proceeds." (Small, 1995 p. 941-955)

The methodology of this thesis can be defined as action research. Mirata, in turn, defines this, as a family of research methodologies that *"pursue action (for change) and research (for understanding) at the same time"* (Mirata, 2003, p.3). Eden and Huxham (1995 p.527) add to this that there should be "*an intent by the organisation members to take action based on the intervention*". This is accurate for the thesis at hand. In action research, the practical label is put on one of three types; within this the main goal of the researcher is to understand, practice and assist in solving immediate problems. Further, in the practical type "the problems and their underlying causes and possible interventions are identified collectively…between researcher and practitioner" (Mirata 2003, p.8). This is also the case in this thesis. .

Mirata continues that instead of common research questions like "what is happening here?" or "how is it happening?" a typical question in AR will be "how can I (we) improve what is happening here?" manifesting the action orientation of the research. The main outcome of this thesis is suggestions for improvement, aimed at *institutionalising sustainability inclusion in curricula in a university setting*. These suggestions are designed to improve what is happening at LU.

The role of the researcher in Action Research

In recommendations to the researcher, on how to act during the research, two quite different approaches are prevalent in the literature on action research. One is to initially develop a number of assumptions, preferably with a base in theory and initial understanding of the system of study. These assumptions guide data collection and analysis during the research. The other is to repress any pre-understanding or assumptions until a very late stage of the research, thus opening up the frame within which the data are explored and not shutting off alternative ways of exploring[9]. In this thesis, the approach is a combination of the two. A number of initial assumptions of how to address the problem area were formed, based on initial interviews with key staff at LU (among them the president and the environmental co-ordinator) and an initial literature review. These assumptions were

- Stakeholder dialogue is one way to address the problem area (first assumption).

[9] Mentioned for example by Eden and Huxham (1995)

- Student involvement is another and conditions for this could be improved at LU (second assumption)

- Indicators can be used to monitor the progress of inclusion of Sustainability into the diverse curricula throughout LU (third assumption)

- The certification of an Environmental Management System can have a unifying purpose and serve to institutionalise sustainability at LU.

The above assumptions were tested during interviews within LU and successful implementations of them were sought in studying cases. However, new and alternative ways to address the problem area were also actively searched. The modified assumptions + new ways to address the problem area were finalised into the recommendations on how to intervene at LU.

Methodology in different phases of the work

The processes of writing this thesis and some of the main activities during each phase are displayed in figure 1.

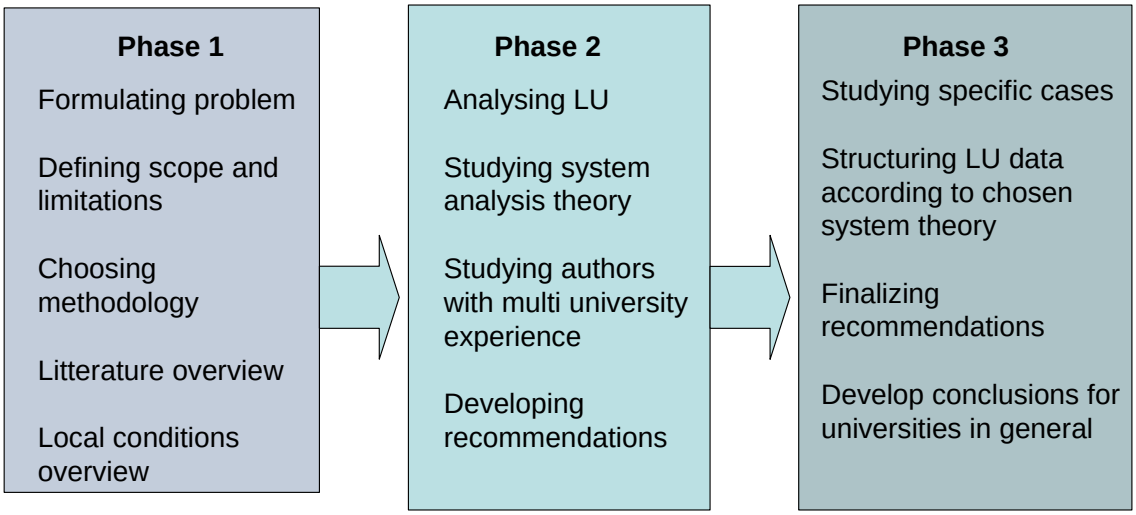

Figure 1. Picture describing the research methodology used for this thesis. Source: Author

Phase 1

After this phase the problem was formulated, an idea of what literature to use was developed and a basic understanding of local conditions was achieved. The selection, structuring and analysis of data can further be divided into three types for this phase:

1. Local information, related to LU.

To formulate a problem that was feasible to tackle during this thesis an early overview of local circumstances was sought. Data related to the environmental work at LU was one source of information. Two reports evaluating the environmental work, the environmental report produced by the environmental group, the assessment and recommendations that led up to the current environmental strategy were some of the secondary sources. Primary input was primarily obtained through interviews with the president, university director and the environmental group of LU. Early interviews were also made with the authors of the

evaluation reports and the main author of the current environmental plan, to seek their opinion of research areas of interest in relation to the environmental work at LU.

2. Sustainability in higher education, what has been done?

Three main sources of academic papers were utilised at this stage: The International Journal of Sustainability in Higher Education, which is the first fully academic journal for the analysis of environmental and sustainability programs and initiatives at universities worldwide. This journal is published by Emerald Group Publishing Limited in conjunction with University Leaders for a Sustainable Future (http://www.ulsf.org), an organisation that provided a second source of papers. The third source was collected from a recently held conference in Monterrey, Mexico, specifically on sustainability in higher education[10]. To select from the vast amount of papers that this amounted to, many of them showing single initiatives and approaches to achieve sustainability at universities world-wide, some selection criteria were needed. The following selection was done:

Primarily, papers drawing on knowledge from Europe, North America or Australia were chosen, the reason being that among the developed, these countries have similar conditions to Sweden, making lessons learned from these countries more likely to fit LU. The remaining papers were scanned as to their general content and filed under some 15 sub-areas, such as Student involvement, Swedish Universities, Declarations of sustainability, Indicator initiatives etc. Going through these papers, most of them related to specific cases served the specific purpose to understand and exemplify the problem area, i.e. as an aid in setting objectives.

Secondly, papers related to any of the four chosen assumptions[11] and any papers drawing general conclusions based on numerous universities were actively sought after and studied in further detail at this stage. The reason being that the assumptions were meant to be tested and developed in relation to existing knowledge and conclusions from several universities were believed to be applicable for LU to a larger extent than single university case descriptions.

3. Sustainability in curricula.

At the end of phase 1, after deciding to focus on curriculum as opposed to the processes or any other area of a university, theory meant to provide an overview of the topic were sought. Orr and Sterling's Sustainable Education: Re-visioning learning and change (2001) provided their understanding of the current education paradigm and the steps needed to move to a more sustainable one.

Phase 2

After this phase a model for structuring data and recommendations to LU was set. More recommendations were developed and most of the interviews were carried out. The three main types of work during this phase included:

1. Local information gathering. During this phase, interviews were widened to staff at institutions with varying degree of maturity in their environmental work so far, certification of an environmental management system's role at universities and the

[10] International Conference on Environmental Management for Sustainable Universities June 9 - 11, 2004 http://campus-sostenible.mty.itesm.mx/EMSUIII/index.html 2004-09-14

[11] as described in sub chapter 2.2 "The role of the researcher"

applicability for LU was assessed in three interviews. Analysis of secondary data was extended to include not only environmentally related data. LU annual reports, strategic plans, organisational data, various evaluations and surveys were some of the data that was used.

2. System understanding to achieve change. This phase realised the need for theory on how to handle resistance towards change and how to structure the local data in order to give recommendations for change. Senge's "The fifth discipline" (1990) and Moss Kanter's "Change Masters" (1984) were some of the literature that was evaluated. Another was Meadows (1999) and "Places to intervene in a system". The latter seemed to provide a tool to both structure the data and turn the knowledge gathered in papers and literature into recommendations for change in the university setting. In order to better understand the field of system analysis, a historic detour on the topic was undertaken and some systems analysis exercise books were also used.

3. More papers were chosen. At this stage, the formulation of a number of final recommendations began. Out of the previously selected papers, initiatives related to these seven recommendations were sought.

Phase 3

This phase covered the finalisation of the thesis. . Three main types of work were accomplished:

1. Sorting and analysing results of interviews other than LU-related data, in relation to Meadows' (1999) "Places to intervene in a system". This was the main methodology to analyse the system, and also provided a way to structure the recommendations for this thesis; where "…to test and apply such knowledge by introducing purposeful changes into organizations…" (Katz and Kahn 1966 p. 86).

In finalising recommendations on how to intervene in the LU system,

2. Specific studying of theory in relation to the recommendations in the thesis. For instance, theory on indicator development, examples and general methodology to perform stakeholder dialogue, ways to improve student involvement were sought after and studied. Also, best practice examples related to each recommendation were sought.

3. Drawing general university conclusions. One of the specific attempts to make sure this thesis has research properties is to make an attempt to draw some general conclusions out of it, applicable to other universities than LU.

Gathering and structuring of primary data

Local conditions play an important part in what finally turns out to be good and feasible ideas or simply nutty suggestions. Mirata (2003 p.3) emphasise the importance of this in action research: "Input of practitioner participants, who possess higher familiarity with the situation, enable the hypotheses to be better grounded in the context". In this thesis, an effort has been made to also use primary data, interviews, to study the local conditions. 14 interviews are directly or partly related to understanding the conditions at LU. The interviews were semi-structured in the following sense: A number of questions were prepared specifically for each and the following issues were addressed with every interviewee

- Success and Hindering factors in implementing sustainability issues in higher education

- How to keep momentum of this work

A full list of interviews and the main topics that were addressed in each interview is included in appendix 6. It has been a conscious attempt throughout this thesis, not to use quotes as a number of interviewees specifically asked not to be quoted in writing (a reason for this could be that LU, in general, has received a fair amount of negative press recently).

Measures taken to ensure research properties

Action research has been criticised as being used loosely in order to cover a range of approaches. Eden and Huxman go so far as saying that action research is unfortunately often used as an excuse for sloppy research. They have defined fifteen characteristics of action research meant to summarize the features which separate it from being a consultancy-type intervention and makes it research oriented. A number of these are summarised below in relation to how they are approached in this thesis. The full list is presented in Appendix XX.

- Action research must have some implications beyond those required for action or generation of knowledge in the domain of the project. This means that it must be possible to talk about the results in relation to other situations, at least by way of suggesting areas for consideration. In the sub-chapter *Conclusions for universities in general* it is explained how the results in this thesis are applicable in a general university setting.

- Action research demands valuing theory as in elaborating on and attempting to develop existing theory. This is attempted throughout the thesis, one example is in the sub-chapter on indicators, where it is attempted to develop sustainable curriculum indicators further using management control theory.

- The process of exploration of the data - rather than collection of the data – must be, at least, capable of being explained to others. Systems theory is used to structure the data in the thesis. It should be relatively easy for someone to replicate this structure.

- Triangulation should be exploited. The research question should ideally be approached from as many angles as possible, the idea being that if different approaches lead to the same conclusions the validity is increased. During interviews, attempts have been to find people with an active approach to the environmental issues as well as those who haven't done much in the area.

- Presenters of action research should be clear about what they expect the consumer to take from it and present it with a form and style appropriate to this aim. This is the reason why the recommended interventions are presented in a LU specific context, i.e. how these recommendations could specifically be implemented at LU.

Assumptions

Some of the papers and literature used in the thesis are related to the greening of universities, in which cases this is expressed in relation to the source. It is assumed that lessons can be learned from these greening efforts and used in achieving the wider concept of sustainability at

LU. The motivation for this is the following: The resistance to the concept of sustainability will differ from that of achieving environmental progress. Nevertheless, the type of resistance is likely to be similar, as both concepts are…

…outside the staff's regular field of expertise

…multidisciplinary by nature.

…based on a concern for the long-term survival of mankind.

The researcher

The background brought into the picture by the researcher matters in any type of research, but maybe particularly significant in the thesis at hand. Personal interviews are a large part and both problem specification and solutions have surfaced during the interaction between researcher and the researched system. In the light of this, it might be of interest for the reader to understand my background in relation to LU.

I have a BSc. in business administration from LU. I also studied English at LU during one semester. My father is an orthopaedic surgeon at the university hospital and a medical professor at the university. He is also dean at the institution of osteopherosis. My sister studied at LU to become a social worker and my mother worked for some ten years as a student counsellor, giving advice to people that wanted to go to the university. My uncle, an economics professor, founded IIIEE. My wife currently studies architecture at LU and among my friends; I know at least one that has studied at one of each of LU's eight faculties. I clearly have a pre-conceived and as it turned out, ill conceived image of the university. This image has surely influenced the way I approached the system, most of my prejudice assumptions have been completely re-evaluated but probably guided my direction nevertheless. To at least let you in on these assumptions, they are described them here.

Before writing this thesis I considered Lund University to be

- Slow. The organization reacts slowly to trends in society.

- Closed. Many teachers are researchers with little experience from the real world and they don't like to teach. They haven't worked in a company, they just sit in their office and do research that nobody reads…

- Inspiring. Some teachers had the ability to open your eyes to a subject, or to see it in a different way.

3 Incorporation of 'Sustainability' into Academic Curricula

Monterrey Tec is a university with 95000 students located in the city of Monterrey in Mexico. The university, which has a pro-active approach to sustainability issues in general, phrases its policy in this field almost poetically; they have the ambition to "weave the golden thread of sustainable development" through courses and curricula (http://campus-sostenible.mty.itesm.mx 2004-09-14). This chapter provides the means to better understand and appreciate phrases such as the above. The terms sustainability and sustainable development are described. The chapter also describes how these terms can be included in university curricula.

Definitions of Sustainability

The most utilised definition of sustainability is that of the Brundtland Commission: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development 1987). This commission states that environmental protection and development are not contradictory to each other and initiates the three dimensions of sustainability: social, economic and environmental. As pointed out by the chairman of the Swedish Association for protecting the Environment (Karlsson, 2003), a definition of this term is not aided by the fact that it consists of two terms that each are difficult to interpret. Karlsson points to some questions that have arisen in the public debate regarding the term. Is it development in itself, defined in terms of growth that should be sustainable? Should development only be allowed to proceed within some sort of sustainable limit, defined based on availability of resources and the carrying capacity of the human and natural environment? As stated by Karlsson, the commission has been criticized for not providing any clear answer to this. However, it was most likely necessary to deliver a definition that was not made too explicit in order to achieve international acceptance.

As can be understood from this, the above definition is quite general and needs to be broken down further, in relation to education in general and ultimately in university education.

A definition of what sustainability in education means is provided by the Sustainable Development Education Panel of the United Kingdom (September 1998), stating: "Education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually and collectively, both locally and globally, that will improve the quality of life now without damaging the planet for the future."[12]

The University Leaders for a Sustainable Future (ULSF) is an association that "*assists colleges and universities in making sustainability an integral part of curricula, research, operations and outreach*" (http://www.ulsf.org 20040830). It is also the secretariat for signatories of the Talloires Declaration (1990), one of several declarations in support of the environmental, economic and

[12] As quoted by Fatimah Mohamad (2001)

social development of universities, signed by more than 300 university presidents and chancellors around the world.

ULSF state that sustainability implies that the activities of a higher education institution are (at minimum) *"ecologically sound, socially just and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curricula and research, preparing students to contribute as working citizens to an environmentally sound and socially just society. The institution would function as a sustainable community, embodying responsible consumption of food and energy, treating its diverse members with respect, and supporting these values in the surrounding community."* (http://www.esd-j.org/english/ 20040529)

In this thesis, and with regards to the incorporation of sustainability into curricula, the above definitions or descriptions of sustainability were found to be useful for this thesis. However, in the less convenient real world and particularly the application of this thesis, the meaning of sustainability will largely depend on how it is defined by the organisation trying to achieve it, in this case LU. At a university it may well be that different definitions of sustainable development are appropriate for different institutions and actors. Imagine students of a Philosophy class vs. Technology design. In the University of Delft, technology design students found that they needed a very concrete definition that they could make operational in order for it to serve as a basis from which to develop sustainable technologies (Kamp 2004). They use the IPAT formula I = P * A * T

In which

I = Impact (Total impact of mankind on the planet)

P = Population (Total population size on the planet)

A = Affluence (Total number of products or services consumed per person i.e. GDP/person)

T = Technology (impact per unit consumed; this factor is often called technology efficiency)

Even though they realise that this definition is subject to a lot of critique, it is still one they find useful for them to sketch the problems in a way that is applicable for their field of work.

Philosophy students at a Swedish university found that sustainability could be defined from several perspectives, and found it most useful for them to keep this definition open to debate rather than set a definition according to one perspective.

The Natural Step is a framework for defining and working to achieve a sustainable development of any organisation is (http://www.naturalstep.org 2004-09-01). The framework was initiated by Swedish cancer scientist Karl Henrik Robert, who invited fellow scientists from various disciplines to develop a consensus definition of what constitutes a sustainable society. Companies such as IKEA, McDonalds, Electrolux and Starbucks have used it to engage in and work to achieve a more sustainable organisation. This thesis author wrote a case study of Canadian ski resort Whistler where this framework was found particularly useful in creating a common goal by providing an agreed upon vision of a sustainable future. The Natural Step framework is based on four conditions that determine what constitutes a

sustainable society and the principle of back-casting from a future scenario of success (in this case the future success scenario being a sustainable society)[13].

To backcast from a sustainable future scenario you obviously need to know what this sustainable future should look like. As a response to not finding any commonly agreed upon definition of it, the four sustainability "conditions" of the Natural Step were developed after using the help of some 50 Swedish scientists. The strengths that are sometimes mentioned regarding these system conditions is that they are *complementary and non-overlapping*. The critique that has been heard is for instance in that this definition seems to assume that we have reached the earths' carrying capacity and that further environmentally damaging development can not take place.

First revealed to the public in 1989; the system conditions are as follows:

In a sustainable society, nature is not subject to systematically increasing:

1. concentrations of substances extracted from the earth's crust;

This condition indicates that toxic metals, minerals, greenhouse gases etc. shouldn't be allowed to systematically build up in nature.

2. concentrations of substances produced by society;

This condition refers to persistent human-made substances such as DDT and PCBs Freon etc that can remain in the environment for many years, causing unexpected (or expected for that matter) negative effects.

3. degradation by physical means

This means to avoid taking more from the biosphere than can be replenished by natural systems and to not systematically destroy the habitat of other species.

and, in that society. . .

4. human needs are met worldwide.

Meeting basic human needs is a necessity to make the changes required to satisfy the first three conditions.

As can be understood from the above, there is not one description, but many of what sustainability means. For this thesis purpose, I find the definition of sustainability in higher education made by the University Leaders for a Sustainable Future particularly useful. Two reflections can be made after providing these definitions of sustainability. One is that defining the meaning of this term is not to be taken lightly. The way it is defined will greatly effect how it is turned into concrete actions that will hopefully move an organisation towards this goal; a sustainable society. The other is that the meaning of the term will largely depend on the

[13] The concept of back-casting basically means to place the organisation in a desired sustainable future and then go back from that future and decide which actions will make you achieve it. The concept is not unique for the Natural Step.

people involved in the sustainability related work as the exact definition is still a moving target, which as was explained in the university examples above, maybe it should be.

Ways to include sustainability in academic curricula.

Thomas (2004), drawing on experience from Dyer (1996) and Woods (1994), has listed the ways to include environmental issues into different curricula according to the categories listed below. For further clarification I have listed examples of how to do it under each.

1. Having a separate course that deals specifically with the matter.

This is typically what is done first. At LU, already in 1969, when a 10 credit environmental course was developed, open for all students at the university, dealing with environmental issues on a level that can be understood by everybody, regardless of disciplinary background.

2. *The inclusion of some environmental issues and materials in an existing course of the programme.*

This can be done by adding courses on the environment to curricula across the university or by adding modules including environmental issues into existing courses. Some examples would be courses in Environmental Policy in the School of Public Administration, Green Chemistry in the Department of Chemistry, and CSR in School of Business Administration.

3. *Integrating environmental issues and discussion into all courses so that environmental understanding is developed in the context of the discipline, the programme and the course material.*

This can be done in existing subjects and courses and is specifically aimed at teaching students how they as lawyers, economists, designers and architects *in their future work of any kind* can achieve a more sustainable world. This means studying how eco-labelling can achieve market differentiation, using acidity in lakes as an example when teaching numeric analysis to future mathematicians, introducing bio-mimicry as a possible tool for which to design better materials to civil engineers, teaching students of English as a foreign language the terminology of environmental issues. Another way of doing it is to develop a degree program, which can be single (Master of Marine Management) or multidisciplinary (such as the Master of Environmental Management and Policy at IIIEE).

Although originally developed by Thomas (2004) to regard environmental issues, this categorisation is also relevant for the inclusion of sustainability issues, for reasons mentioned in the methodology section. Naturally, the borders between the above mentioned groups is not a straight line , however in an assessment of what a university is currently doing regarding these issues or in considering how to approach these issues in curriculum, they are useful. Thomas' research indicates that the first two appear to have been used: *Having a separate course that deals with the matter* and *inclusion of some environmental issues and materials in an existing course of the programme*. He also states that the third approach still is largely reserved for the specialist environmental programmes. This third approach being *to integrate environmental issues and discussion into all courses so that environmental understanding is developed in the context of the discipline, the programme and the course material.*

Thomas also states that the advantage of introducing a separate course that deals with these issues is that it is relatively easier than introducing it across and into existing courses and programs. The reason being that it causes less change and therefore less disruption for the teachers and course responsible. The disadvantage, he states, is that students may view the

environmental issues as additional to their core studies. Broman (2004)[14] states the contrary; the resistance is smaller when including it into all courses, as that way the developed course content i.e. the knowledge that the student should take from that course can contain the same basic ingredients.

For this thesis, it is sufficient to say that which one of the above defined approaches to emphasise, or start with, will depend on local circumstances. In this thesis, it is assumed that they complement each other and that each serves a purpose. However, it is also assumed that the ambition to offer separate courses that deal with environmental issues, without the context of a specific discipline, is not enough. It is undoubtedly needed, both as introduction and for those who wish to explore these issues further, but doesn't remove the *need for students to learn about these issues in relation to their future professions.*

Another assumption that is made in this thesis is of course that sustainability *should be* included into university curricula. The motivation for this assumption is done with two quotes. One by Bill McDonough who works to achieve design and architecture that actually improves environment instead of deteriorating it. The IIIEE in Lund is one of several environmental institutes in the world that prescribes pollution preventative solutions to solve environmental problems; in that it is better to prevent negative environmental impacts from occurring at their sources than to for example use filter technology to try and filter out the pollution at the end-of-the-pipe. . McDonough's quote as a motivation for sustainability in higher education should be seen in the light of this.
"We must take the filters out of the pipes and put the filters in our minds." (McDonough 2000)[15].

And one by David Orr that motivates the need to direct the development of knowledge.

"Science on its own can give no reason for sustaining humankind. It can, with equal rigor, create the knowledge that will cause our demise or that necessary to live at peace with each other and nature" (Speech given at The University of Vermont 18 March 2003[16]

[14] Göran Broman is a professor at Blekinge Technical University in Sweden. He was interviewed after he received the Swedish Environmental Leadership prize for his efforts to include sustainability in higher education curricula

[15] Bill McDonough is former Dean of the School of Architecture at the University of Virginia, active in green design and architecture; he is Co-Author of Cradle to Cradle. As quoted by Cortese (2000)

[16] Full speech available at http://www.uvm.edu/giee/SNR_seminar 200409

4 Analysis of the university system

This chapter starts with an introduction to the object of analysis; a university. It continues by introducing LU and moves on to describing particularly the LU system, through the use of six places that can be used to intervene in any system.

To successfully include sustainability in university curricula means changing the way people think and behave. Teachers are likely to have spent a lot of effort in developing their courses and curricula into what they are today. Even new subjects that are in high demand by employers or that receive strong single disciplinary support can have a hard time being introduced into the mainstream of academic curricula. No wonder then that the resistance towards including sustainability is strong; it is notoriously hard to define, it disrupts a well defined and appreciated curriculum and forces people to think in ways they didn't have to before. How do you approach such strong barriers to change? How do you turn it into a fun and challenging journey instead of a continuous struggle? In this thesis it is believed that system understanding is crucial in order to manage change and thus meet the objective: *How can you institutionalize sustainability inclusion into university curricula?* This section describes systems thinking and analysis and uses this knowledge to describe the system of LU. In developing an understanding of the system, primary data from interviews and secondary data such as the annual report and strategic plan were used. Authors with a lot of experience in working with universities have presented findings that are applicable to many university systems, this literature served a complementary purpose of presenting university system descriptions that were less evident to the thesis author in studying LU.

An introduction to the university system

Universities in general

One of the major characteristics of a university organization is that of complexity. They tend to be highly decentralised and governed by deeply settled yet unwritten rules. Sharp (2002), in working to implement environmental programs at universities in USA and Australia, argues that universities exist without any single observation point or control centre from which university wide changes can be programmed and implemented. Universities are also often challenged with growth as most universities are currently expanding, meaning that administrators and faculty experience heavy workloads. At LU both observations are relevant. The university is growing, and the organisation has become more decentralised over the last years, resulting in that the workloads of heads of departments has increased over time as their responsibilities have grown to include more personnel responsibilities (as well as new environmental responsibilities) quite often performed together with research

Another observation that is made by many practitioners in higher education, valid for most universities, is that higher education is increasingly competing on a world market. The competition map has grown. It is no longer a race between just the neighbouring universities in the same country; students and researchers are comparing them on a wider international scene.

Lund University

LU is the largest unit for research and higher education in Sweden, with 34,000 undergraduates, 3,200 postgraduates and 6,500 employees. All numbers show a continuous increase over the last years, particularly the number of students. A potential student can choose from some 50 educational programs and more than 800 separate courses (Jarnung 2004). After a number of years with continuously improved economic results, LU encountered a loss of 84 MSEK in 2003. In relation to their turn-over of 5 047 MSEK, this is perhaps not particularly worrying, however , economy has been somewhat loosely handled by some institutions and stricter control combined with saving efforts have recently been imposed on many institutions. In 2003, 3 775 students obtained some sort of degree at the university in 2003, which is probably only slightly higher the number of people leaving the university that year.

To find out what core competences it was perceived that LU had, internally and externally, a survey was conducted in 2000. Phone interviews with a number of target groups were done, there among 400 presumptive students17 and 300 teachers at Lund University (Gallup, 2000). The results were the following:

The four parameters that came up most often when students thought of Lund University were:

- Broad assortment of courses and programs

- The student life

- A well known university

- The capacity to deliver high level of education and research

The potential students were also asked what they considered most important parameters in choosing a university. The following four came up:

- Broad assortment of courses and programs

- The student life

- Availability of housing

- Ability to think in new and innovative ways

This leads to the conclusion that more weight was given to the last two parameters by the potential students than what was delivered by LU. Another interesting finding was that also the teachers at Lund University where of the opinion that *Ability to think in new and innovative ways* was an important characteristic for a university to have and also in this group it was not something that came up when they thought of Lund University.

Finally, the group "company decision makers" were asked to define what they thought were important. Equal to the other groups they defined *Ability to think in new and innovative ways* as

[17] Last year students at secondary education institutions were used as a sample.

one of four desirable parameters for a university to have and one that didn't come up when they thought about the university.

The organisational structure of LU is presented in appendix 1.

System thinking – A theoretical base

Introduction to the subject

To many, *'system thinking,'* still has a combined aura of fuzziness and mystique, around it. In light of this and before trying to apply some of this thinking to the LU system, it might be useful to take a step back in the history of this particular area in an attempt to define and describe it.

The term *'system,'* is used in different ways to describe different things. We speak of control systems, technical systems, digestion systems, and solar systems, to mention a few. Attempts to provide definitions are made by many authors. A definition that the thesis author finds both useful and scary is that "every system is a part of a bigger system" (unknown source). First published in 1969, Emery put together a selection of readings on Systems Thinking. The selections of articles were written between 1941 and 1967. One purpose of publishing the selection was to shed some light on a subject that was then in relatively early days of academic interest. Another reason was to describe the relevance of applying the subject to organizational management. In it, Angyal describes system analysis as "the structure of wholes". In another of the selected readings, he writes "In a system the members are, from the holistic viewpoint, not significantly connected with each other except with reference to the whole" (Angyal 1941 p.8). As a motivation for the use of *'systems thinking,'* in relation to organizations he states: "Human organizations are living systems and should be analyzed accordingly".

In another of the selected readings, Ackoff of the Society for General Systems Research, provides a broad, and for this thesis sufficient, definition of a system. According to him, a system is…

"any entity, conceptual or physical, which consists of interdependent parts" (Ackoff, 1960, p. 332).

Systems thinking and more specifically system analysis are attempts to describe this entity.

Katz and Kahn (1966), describe systems analysis as a way "...to understand human organizations, to describe what is essential in their form, aspects and functions".

These authors also point out that the organization as a system has a product, an output, which is not necessarily identical with the individual purposes of the group members. Hence, it is plain wrong and quite often misleading to view an organization as "a social device for efficiently accomplishing through group means some stated purpose" (Ibid p.88). Some of the factors often assumed in such design are meaningless in practice while *unforeseen and unformulated establishments* may dominate the organizational structure. This, to this thesis author, is motivation for gathering primary data to understand most organizations. You can't rely on the mission statements, organizational charts and policies that are given to you by the information department. You have to do your own homework.

Causal loops

One way to describe systems is through the use of causal loops. It is a way to trace the chain effects of a cause, through a set of related variables, back to the original cause (Kambiz and Roberts 2000). The origins of causal loop modelling can be found in feed-back theory, which is not surprising, as the casual loops are describing feedback systems, acting through a series of events. An example of a causal loop, as used by Kambiz and Robert is presented below.

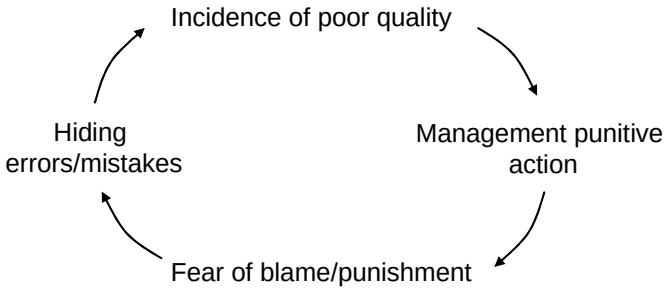

Figure 4.1. Example of declining action downward spiral of quality. Source: Kambiz and Robert (2000)

Causal loops, like any feedback system can be self-limiting or self-enforcing. Kambiz and Robert use the terms Balancing or Reinforcing and offer three methods for identifying which loop-type you are dealing with.

1. Use your intuition. 2. Starting with a variable, state that an increase in this variable will lead to an increase (decrease) in the next, and so on until you reach the starting variable. If you end with the same verb you started with, you have a reinforcing loop. 3. Count the number of – signs in the loop. If this number is zero or an even number, you have a reinforcing loop.

The thesis author made an exercise of trying to find loops that foster or hinder the introduction of sustainability into LU curricula, after having made a majority of the interviews. It was then repeated with Kerstin Gustavsson, environmental manager and Lennart Olsson, head of MICLU and after their input was evaluated, it was slightly modified again. Evidently, it is not easy to find the precise relationships between variables, which is why only one out of several possible feedback loops has been incorporated in this thesis. It is presented in the next sub-chapter.

Leverage points

Meadows (1999) describes leverage points as "places within a complex system where a small change in one thing can produce big changes in everything" (1999 p.1). As you might have guessed from this quote, a lot of effort has been made by the system analysis community to identify and to study leverage points. Senge believes that "the bottom line of systems thinking is leverage – seeing where actions and changes in structures can lead to significant, enduring improvements"(Sharp (2002), p. 140).

Meadows has attempted to structure interventions in any system. She has worked out twelve potential leverage points, and ranked them in order of effectiveness. Meadows herself states some words of caution in another systems intervention related article in the Whole Earth Magazine (2001), namely that self-organizing, nonlinear, feedback systems are inherently unpredictable. They are simply not controllable, and understandable only in the most general

way. It should therefore, be made clear that the goal of using the leverage points developed by Meadows is not to foresee the exact implications of a potential intervention in a university system but rather to provide a set of ways to describe and intervene in this system. The leverage points, as developed by Meadows, are displayed in the figure below with a brief explanation of each[18].

Places to Intervene in a System
(In increasing order of effectiveness)

12. Constants, parameters, numbers

11. The sizes of buffers and other stabilizing stocks, relative to their flows

10. The physical structure of balances and inputs and outputs

9. The length of delays, relative to the rate of system changes

8. The strength of negative feedback loops, relative to the impacts they are trying to correct against

7. Gains from driving positive feedback

6. The structure of information flows

5. The rules of the system

4. The power to add, change, evolve or organize the structure

3. The goals of the system

2. The mindset or paradigm out of which the system arises

1. The power to transcend paradigms

Figure 4.2. Places to intervene in a system. Source: Meadows (1999)

12. The "parameters" of the system. An intervention at this level could be setting air quality standards or allowing a certain amount of annual clear-cutting of forest area. Meadows argues that these numbers are usually not worth the sweat put into them, as the goal of the parameter will have its origin on a higher level on this list.

11. This determines how sensitive the system is to changes. An example is the buffers of calcium in soil that neutralize acid, making some areas less sensitive to acid rain than others. Meadows argues that these are hard to change which is basically why she has them low on the list.

[18] The paper "*Towards Sustainable Consumption in the Czech Republic - A Systems Approach*" by Alexandra Tsitsia, Carolina Frías, Daniel Wilson, Yusuke Matsuo (IIIEE 2004) provided additional understanding of the leverage points.

10. "The plumbing structure". Example: When the Hungarian road system was laid out it was structured so that basically all traffic crossing the country had to go through Budapest. Naturally, this determines a lot regarding air pollution regardless of speed limits or air quality standards.

9. Delays in the system as compared to the intervention. To exemplify with an annoying example is when you turn the hot water faucet and it takes minutes before the water turns hot. You constantly over or under-shoot when you try to correct such a system.

8. A negative feedback loop self-corrects a system that is drifting away from the goal. To do their work the loop needs a goal (example: the thermostat setting), a monitoring device to detect excursions from the goal (the thermostat) and a response mechanism (the furnace). The negative feedback loop needs to be as strong as the impact it is trying to correct.

7. A positive feedback loop is self-reinforcing. A popular example is money in the bank. The interest will give you more money, which means more interest, which means more money and so on. Usually a negative feedback loop will kick in sooner or later, as an unchecked positive feedback loop tends to destroy itself. Meadows argues that the greatest leverage here lies in slowing the positive feedback loop down, so that the many negative loops, usually with limits and delays, have time to set in. She compares this with driving a car. Better to slow it down when you are going too fast, than calling for better steering or more responsive brakes.

Top 6 leverage points and their current status at LU

Leverage points 6 – 1, i.e. the most effective ones according to Meadows, are described below together with a description of the current state of the LU system on the respective point. Implementing sustainability into curricula can be seen as a sub-system of the university and it would seem natural to describe this separate from that of the entire university. However, this system is quite immature at LU (little systematic work to incorporate sustainability into curricula has been done), which is why the information regarding curricula feeds in to the bigger picture of LU if and when it exists.

1. The power to transcend paradigms

This means to reach the insight that there really is no true paradigm. Everything is a tremendously limited understanding of a universe that is far beyond human comprehension. This means real empowerment, Meadows argues, in that you can do whatever you want. ?????? Interestingly, Ways pointed to the very same leverage point to achieve change in an article some 35 years earlier. "A society committed to radical and unending change has a deep-seated need, previously almost unknown, to develop a sense that it is able to choose its own path by the light of its own values" (Ways 1969 p. 387). This ultimate leverage point is a philosophical one, and perhaps less useful as a means to analyse the current situation at LU. Nevertheless it is concrete and one of the recommended interventions is partially meant to intervene on this level.

2. The mindset or paradigm out of which the system arises

The great, big, unstated assumptions – unstated because everybody already knows them – are the system paradigms. They constitute the beliefs about how the world works. The earth is round; growth is good and it creates jobs; education matters. Paradigm shifts have the power to completely transform the way a system functions, which is why societies will usually resist them fiercely. At the same time, on an individual level, a paradigm shift can take place in a

millisecond, Meadows argues, sometimes all it takes is a click in the mind, and one has a new way of seeing.

What are they at LU and at universities in general?

- *Miles deep, inch wide.*

This is the general approach at universities and also at LU. To narrow the scope. To drill miles deep and inch wide into a subject in order to achieve a better understanding of that particular issue. This is reflected in numerous ways in the university system. Both research and educational subjects are typically arranged on a disciplinary basis. Educational subjects, have throughout history, undergone multiple divisions into smaller, more specialized subjects during their life-span. This single-disciplinary arrangement has some negative consequences. It doesn't apply to some of the world's problems. Environmental and social issues for instance, span over many disciplines. Attempts to counter-act this typically include developing multidisciplinary courses, such as the one I am attending, at IIIEE. Here, environmental issues are addressed through the lens of numerous disciplines.

- *Knowledge should be delivered by experts.*

It is the norm at LU that teachers know the subject better than any of the students they are teaching. Often they do research that is related to the area they teach[19]. Natural as this fact may be, it makes it hard for something that is new and not at the core of a subject to enter.

- *Knowledge evolves through criticism.*

Research, being the main source of new knowledge for a university, tends to develop through being scrutinized and criticized by other researchers. This scientific work-methodology means that attempts to create new knowledge, i.e. research hypotheses are meant to be criticized. Within academia, this quite often provides the fuel for creativity. In developing the Natural Step principles for sustainability, cancer researcher Karl Henrik Robert used this paradigm to tap into the brains of professors and researchers within different fields, by sending them a proposal in which he claimed to have found general principles of what constitutes a sustainable society. Naturally, the academic community responded with criticism, reasons for that criticism and suggestions for improvement. A majority of teachers at a university are also currently or formerly doing research. This paradigm is therefore, likely to influence the way teachers behave also regarding incorporating sustainability issues into their subject. Teachers are likely to expect criticism for how and what they include (weather this expectation is fulfilled is another issue). This might have a deterring effect against making attempts to incorporate sustainability in their curricula. However, this paradigm can also work to improve such courses over time.

- *A university is an institution of rationality.*

Sharp (2002) came to understand this paradigm that he believes is valid to universities in general. He states that fundamentally, the university sector relies on appearing rational. This is deeply rooted in the mental models of university staff. The reason is that to survive, universities need to uphold their position as the premier provider of higher education and research. To maintain this position it needs to be the great upholder of supreme rationality. After all, who would trust or fund research to an irrational institution or to and irrational researcher? The negative consequences of this paradigm are, according to Sharp, that it inhibits systemic transformation in a number of ways. Most notably it is a great barrier in becoming a more learning organization. Why? It strengthens the

[19] Out of 6,500 in total staff (including admin.) LU has some 3 200 PhD candidates.

assumption that universities have achieved the highest possible level of functionality and that whatever is lacking is an inevitable limitation of the system. As a consequence of this, the "rationality myth", as Sharp calls it, prevents institutional analysis and reform as a solution to problems since the political pay-off for accepting dysfunction in the system is much greater than for dealing with the root causes.

3. The Goals of the system

All the levels above on this list will be influenced if the goal of the system is changed. Therefore, changing the goal unleashes large shifts. Meadows argues that this is why top level decision makers can have great power; they can sometimes change the goal, by articulating, standing up for and insisting on new system goals. Regarding sustainability in academic curricula, the goal stated in the environmental policy is that "All education at Lund University shall implement those environmental issues that are relevant for that subject or educational program". However, this goal does not seem to have been communicated throughout the system, and cannot be said to be currently serving as an agreed upon goal.

The LU Strategic Plan is meant to serve as the guideline for priority decisions throughout the university. The extent to which it is followed hasn't been assessed by LU, but according to LU President it is fairly well known. The central goals of LU, as stated in the plan, are quite generic and need to be broken down further in order to actually constitute goals. For instance it is stated as an objective: "The education offered shall meet the needs and demands of the students and of society". To determine an overall goal for the university was therefore, not an easy exercise. However, the goal is closely related to the function or the role of the system. This was addressed in most of the interviews, it was also studied in the way the university defines itself. When trying to boil it down to the essence, the main function seems to be two-fold[20]:

- To produce educated students.

- To produce research results.

Both functions can be described as producing knowledge. In the student case the knowledge is delivered when it is implemented in his or her brain. In the case of research, the researcher is a distributor of knowledge and the final product is delivered when it is exhibited in an understandable way, typically through articles in scientific journals and/or presentations at seminars and other gatherings. Consequently, to understand the goal of LU we need to understand how knowledge is defined by the system. In terms of changing curricula it seems most relevant to define the knowledge that students are meant to take with them. As it turned out, this definition changes over time and is in part determined by external factors. Three attributes can be singled out:

- *To prepare for future employment.* This is particularly evident in some curricula such as business administration.

- *To deliver the essence of the subject at hand.* There is a "subject content" that has been determined over history. This should be passed on.

[20] Outreach is often stated as a third function. At LU and most Swedish universities this is prevalent but less prioritized and therefore not described further.

- *To help the student develop themselves.* This involves developing studying skills, critical thinking etc. in a belief that knowledge is a good thing that can help you help yourself.

Stephen Sterling is currently completing a doctoral thesis on systems thinking, education and sustainability at Bath University in England. He has been involved in introducing environmental and later sustainability issues into education for almost 30 years, recently as responsible for WWF-UK's programme on education for sustainability. As an aid in unlocking the values of any educational system he states three central questions:

What is education for?

What is education?

Whose education?

The first of these questions is closely related to the function or the output of the system. In Sterling's own attempts to answer this question, he concludes that any educational system tends to be multi-functional, reflecting a mix of aims and objectives but he sees at least four main functions that are potentially valid for all types of education:

To replicate society and culture and promote citizenship – the socialization function.

To train people for future employment – the vocational function.

To help people develop their potential – the liberal function.

To encourage change towards a fairer society and better world – the transformative function.

Sterling states that sustainable education is ultimately about reconciling all four views but is particularly concerned with the last two. As can be seen, the role of LU does not include the transformative function.

The current environmental policy and goals do not seem to have been incorporated into the overall goals of the university. Most notably the strategic plan does not show any signs of it, the annual report has no evidence of it and on the homepage and in the catalogue marketing the university it is not mentioned. (Of course, the environmental policy and goals appear on the homepage but not as a central part that is being communicated to visitors). The annual report provides a means to communicate if goals have been achieved. It is notable that in the 2003 annual report from LU, not one word relates to sustainability neither in curricula nor in any other LU processes. This further implies that sustainability is not a priority goal.

4. The power to add, change, evolve or organize the structure

This ability; the systems ability to self organize, Meadows argues, is largely dependant on the diversity of the system. Diversity means more possibilities for self-organization to occur. In nature, biodiversity means that an eco-system has more possibilities to self-evolve if something disrupts it. The source of diversity in a human system can for instance be creativity.

To be relevant to sustainability in curriculum, this leverage point can be translated to: How can the LU system self-organise to make sure that sustainability issues are incorporated into curriculum? According to Meadows, rules of self-organisation means how, where and what the system can add onto itself. The big questions here, it seems, are: How is curriculum changed?

Who has the power to do it and what is likely/allowed to be added/withdrawn from curriculum?

The official person determining course content is the course responsible, who is quite often the dean of a faculty. In reality, however, it seems that the actual mandate to make curricular changes is in some cases decentralised so that each teachers has a large portion of individual freedom to make changes/add new things. But this is perhaps less interesting than what determines their priorities, i.e. what influences course responsible and teachers on all levels to make changes in curriculum? This was addressed in many interviews and can basically be derived from the goal. Whatever is sought after by employers tend to enter curriculum, either because the teachers see it themselves or because the students see it and ask for it in evaluations etc. On the other hand, new subjects can enter from within the subject itself, i.e. as new scientific knowledge emerges that is seen as core to the subject. A causal loop regarding employee demand emerges, and a cause and effect chain regarding new inter-subject knowledge. These are attempts at finding possible barriers that could be addressed in ideas for interventions i.e. they are by no means to be seen as "the full story". They are displayed in the figure below. Both, unfortunately, work against the inclusion of sustainability into academic curricula.

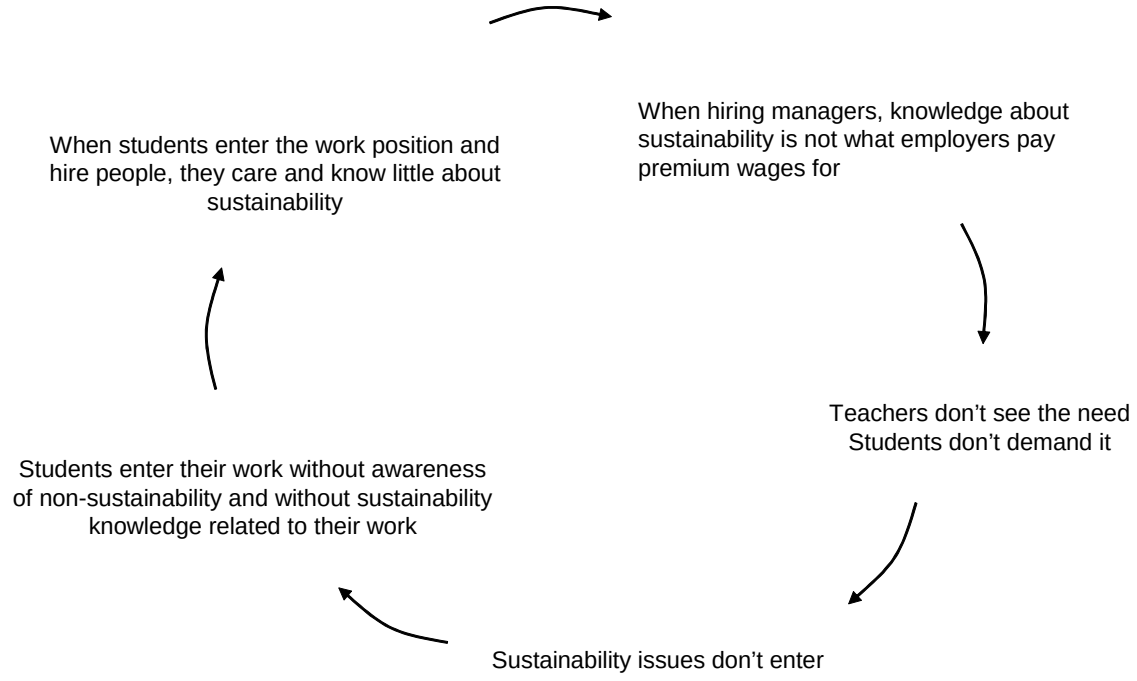

Figure 3.3 Causal loop – Part reason why sustainability issues don't enter the curricula at LU. Source: Author

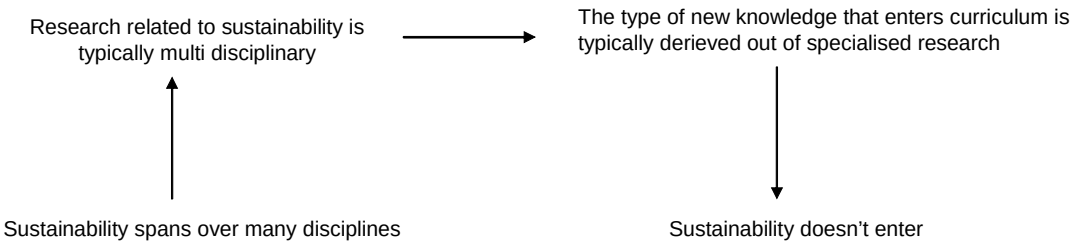

Figure 3.4 Cause and Effect – Part reason why sustainability issues don't enter curricula at LU
Source: Author

Another aspect that influences the systems ability to adapt is student involvement. Students have influence over curriculum and if they would take an active stance in pushing sustainability, the system might organise thereafter. As stated before, students today have no clear incentive based on future employment to push for sustainability inclusion. This does not mean that student involvement in these issues have to be low. It is certainly so that these issues are near the heart to some students. Why then does student association "Sustainable University only have some 20-30 members (where of around 10 are currently active)? To try to find out, root causes were sought in interviews. The main findings are displayed at the end of this chapter.

5. The rules of the system

This level defines the scope, boundaries and degrees of freedom in the system. Thou shall not kill. If you do, you go to jail. Contracts are to be honoured. This is what determines rewards and punishments. The rules in the way they are set up influence the way the system works. Meadows uses an example related to this thesis subject; consider what would happen if students were graded as a group instead of as individuals to understand the power of setting the rules.

The organisation of LU is highly decentralised in its overall structure. However, some basic rules and a chain of command exist that are intended to tell people what to do in relation to the environmental work. These rules are set up in a command and control manner. The methodology to achieve this type of management control is described for example by Emanuel and Govindajanan (1996).

1. Determine what result is desired.

2. Measure if it gets done compared with the pre-set standards.

3. Reward for achieving desired results or punish for not "so as to encourage the behaviours that lead to the desired result" (Emanuel and Govindajanan 1996 p. 112).

The above-mentioned approach is labelled Result Control and is one of the most common types of trying to achieve the desired organisational behaviour. This has also been the main approach to the environmental work at LU. This intervention in the system of LU has had some time to do its work (since 1998). It is analysed below.

What result is desired?
Forty-two goals were set and clear responsibility was assigned showing "what result is desired" of people; this means, for example, that the university board is responsible for setting an environmental policy to guide the long-term vision. At the end of this chain of command stands the head of the institution, responsible for translating the goals to an institutional level;

for developing and implementing the routines that ensure the goals are met by the institution; to delegate work assignments necessary to achieve the result. However, if the dean does not have the ability to perform the above tasks, he may delegate this responsibility further. Regarding greening of curricula much responsibility is placed upon the faculty level (LU has 8 faculties with several institutions "underneath" each of them). As stated in the plan, somewhat shortened and freely translated: *"The faculty is to assess the faculty's environmental competence in the form of courses and educational programs, and also support the respective institutions environmental initiatives"*. (Policy for integrating environmental issues in education and research, LU 1998)

Measure performance and compare with goals.
This type of environmental performance feedback is given in an environmental report produced by the environmental group once a year. External audits of the environmental work are carried out by Ernst & Young approximately once every third year (2 audits since 1998). Fulfilment of some goals is not easy to measure. For instance, regarding greening of curriculum, the goal is: "All education at Lund University shall implement those environmental issues that are relevant for that subject or educational program"[21].

Provide rewards for the desired results.
This element of management control is missing in relation to the environmental work at LU. No rewards/incentives exist for successfully including sustainability in curriculum. No punishment for not doing so either. This doesn't necessarily mean that no rewards exist. A common way of doing it in companies is simply to highlight desired behaviour and let personal control do the rest, meaning that since people tend to want to do a good job they will try to behave as desired. In the case of LU it seems that achievement of the environmental goals has not entered as highly desired employee behaviour and therefore no rewards related to personal control are in effect at LU.

The environmental diploma concept was launched in 2003 in an attempt to increase local ownership of the environmental work. The diploma concept tries to provide some reward for the institutions that achieve desired result. A signed diploma that can be framed and hung up for everyone to see is handed out and the president attends a ceremony where the diploma is officially handed over. The university paper attends and writes an article about the ceremony. These built in rewards might explain the initial success achieved by the concept (some 6 institutions have received the diploma since its introduction in 2003). Other factors, that are mentioned by the environmental co-ordinator are local empowerment and clear and obvious instructions.

As can be seen, the command and control approach has been tested at LU. The result so far is, as described earlier in this thesis, in some ways discouraging. The reasons for this might be several; three are stated here:

- LU has no tradition of managing through goals, or of measuring goal fulfilment. Traditionally, the university has been governed by rules[22]. Opposite to USA, where this is more common, orienting the organisation through working to achieve goals, this has not been practiced at LU, i.e. staff does not understand what is expected of them and the goals are not fulfilled.

[21] LU-Policy for integrating environmental issues in education and research (1998)

[22] This was stated in nterviews with university director and president (2004)

- A lot of issues land on the head of division's table (economy, administration). A dean that may also do his or her own research at the same time. Environmental issues are seen as "one more" thing they are supposed to do and as it a) doesn't mean any more money for the institution to do this work and b) seems very complicated and quite frankly boring to achieve the 42 goals, it doesn't really get done.

It should be noted that several other reasons were brought forward during interviews that are not necessarily less likely. The two most in common were:

- *The environmental goals were set too ambitiously; the organisation doesn't have the capacity to fulfil them.* This is of course always true if a goal hasn't been met but it doesn't seem to be the case that the goals at LU should be that difficult to meet, if only staff had acted upon them. The most difficult to achieve is actually the greening of curriculum but as the measurement of this goal's fulfilment is quite forgiving, even this could have been fulfilled.

- *Lack of time and resources.* This is the same as saying that these issues are not prioritised highly enough, which is more of a pre-requisite for not achieving success than a reason. The institutions that are working actively with environmental issues do not seem to have less workload than others. Both the interviewed institutions that did engage in the environment also stated the reason *"because they prioritise it"* as why they found the time and resources to engage in environmental work.

6. The structure of information flows

To intervene in the information structure means adding a new piece of information causing an entirely new loop. The example used by Meadows is that of moving the electricity meter to the front hall from down in the basement, where it was previously hidden, or putting the city water intake pipe directly downstream of its waste water outflow.

Today at LU there is no leading indicator, i.e. one that shows how the environmental progress is proceeding in a way that means you can pro-act as opposed to re-act. However, evaluations are done once every year internally and once every second year externally. No direct feedback is given to the institution on how their environmental work is going. One might assume that many institutions do not know if they are doing bad on the environmental side and do not see the incentive in doing well. This is pointed out in the previously mentioned evaluation carried out by Ernst & Young.

Root causes

Root cause analysis is a means to find the real cause of the problem and deal with that rather than simply continuing to deal with the symptoms. It basically means asking the question Why? As can be understood from this, it can go on almost forever but typically ends when reaching the borders of the system of analysis. Root causes were sought for one of the basic problems at LU and many other universities. Why is difficult to include sustainability into curriculum? In trying to find an answer before interviewing people at the university, one of the explanations I thought was likely was simply that it is too difficult to do. There are no resources on how to go about it. Obviously, this explanation was not sufficient and as it turned out, it was of course also quite inadequate. The root causes that were eventually found for this question can be seen in the figure below. The recommended interventions of this thesis should deal with these root causes. Some clearly do; for instance the recommendation "*making sustainability a widespread university goal"* deals with the root cause that sustainability is not

seen as 'core business'. The recommendation "*multi disciplinary meeting single disciplinary"* suggests new input for teachers on how to change curricula. It deals with the research related root cause and is also likely to deal with the lack of understanding regarding the anthropogenic disruption on life supporting natural systems.

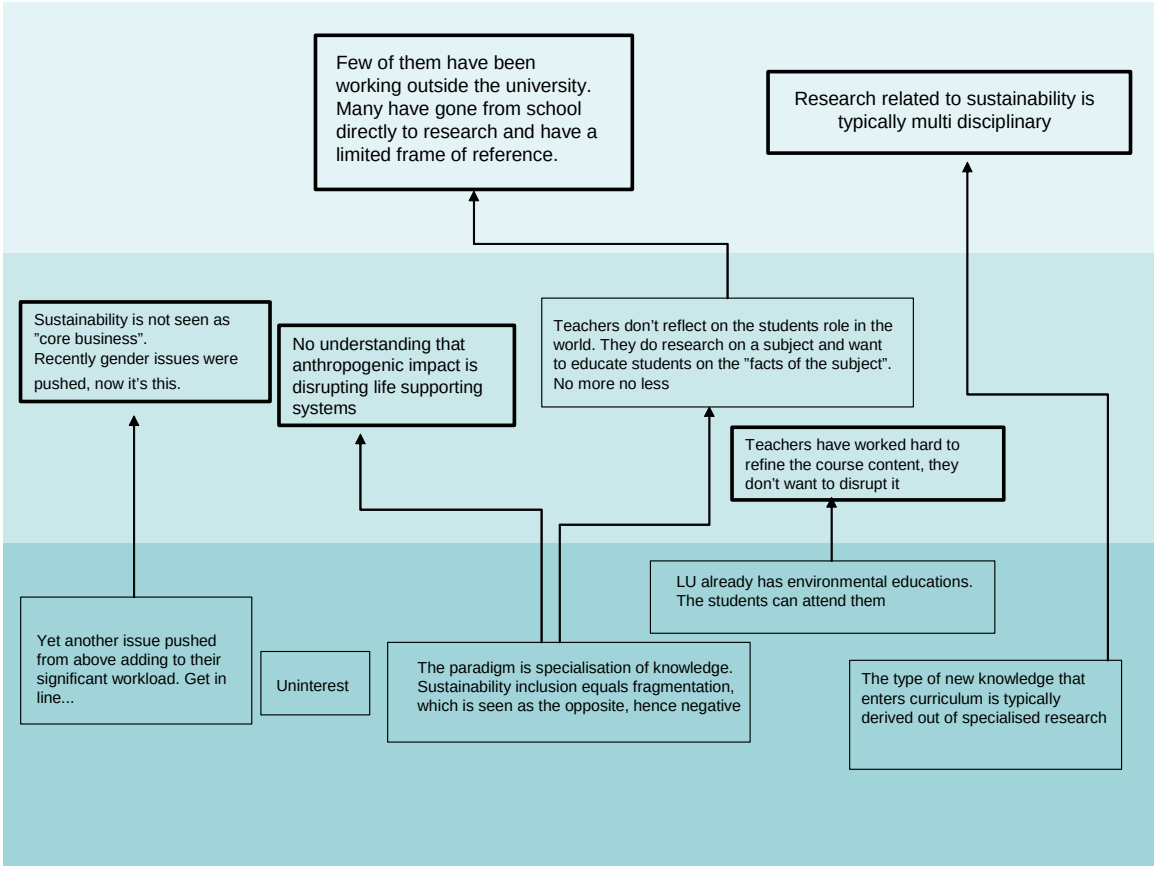

Figure 3.5. Root causes. Potential barriers against including sustainability in academic curricula Source: Author

5 Recommended interventions at LU

This chapter contains recommendations of how to make parts of the LU system work towards inclusion of sustainability into its curricula. . These recommendations are interventions in the LU system. Focus has been on developing recommendations that might guide interventions in the places that are highly valued leverage points; where most difference can be made, as defined by Meadows (1999).

It is shown how these recommendations may be positioned in relation to these system leverage points. In the actual presentation of them, they each contain three parts:

- The current status at LU regarding this specific recommendation. Answers questions such as: Has it been tried before? To what extent is it being done today?

- Motivation for implementing it.

- Description, drawing on existing knowledge and applying this to the LU setting.

In what order and who should be responsible for implementing the ideas?

As is presented in the descriptions, some of the ideas add value to each other and therefore, some would benefit from being implemented earlier than others (which ones are stated in the description of that idea). However, each idea should be possible to be implement separately from the others and it is a conscious move not to suggest any chronological order from which to execute them. Sharp (2002) argues that the most successful University Greening initiatives come from not structuring them in an overall plan. Due to the nature of universities[23], it makes more sense to make these initiatives stand ready to embrace emerging opportunities and shift priorities and resources. This conclusion is similar to that made by Lennart Olsson at the Centre for Environmental Studies at LU, in claiming that it makes more sense not to rely on the implementation of an environmental plan that emphasizes environmental goals in pushing sustainability in curriculum development, as it tends to inhibit teachers from actually acting to incorporate sustainability into their courses (this also says a lot about how the environmental goals regarding curricula are set, an issue that is addressed further on in the thesis) Rather than an overall university focus on achieving a certain number of courses related to the environment, Olsson argues, it is better to have the freedom to encourage curriculum development where and when it takes place. Both Olsson's and Sharp's conclusions are related to what Meadows states as *the system's ability to adapt*; the rules that state how a system can self-organize and what it is allowed to add on. The formalized and chronological natures of most environmental plans tend to inhibit initiatives that are un-thought of, outside of the plan.

In the case of LU, the ideas that are put forth should be seen as a resource bank for:

- The Environmental group at LU;

[23] Sharp mentions characteristics, such as lack of a clear central point and a need to appear rational at all times.

- The University management;
- Centre for Environmental Studies (MICLU). Responsible for implementing sustainability in curricula;

Where do we intervene

The figure below shows what types of interventions the recommendations put forth in this thesis are and where they intervene in the system, as defined by Meadows.

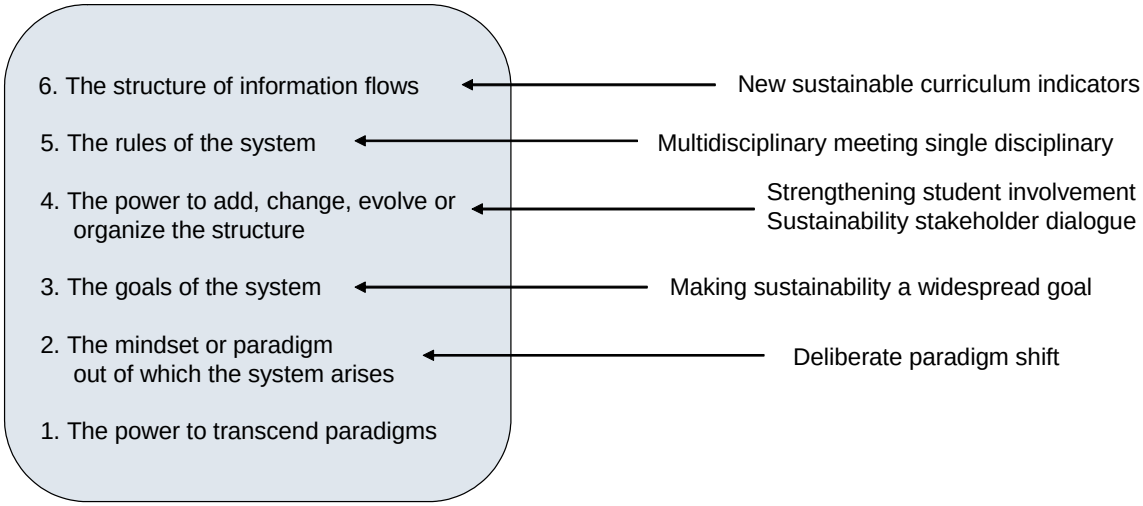

Figure 4.1. Places where the recommendations intervene in the system. Source: Author

6 – New sustainable curriculum indicators. The idea for indicators presented in this thesis, aims to provide a new type of feedback loop at LU, thus changing the structure of information flows.

5 – Multi disciplinary meeting single disciplinary. This idea extends the degree of freedom in the system. It aims at promoting mutual learning between single disciplinary teachers and multi disciplinary students and teachers.

4 – Stakeholder dialogue. Performed with an honest intention to take into account the outcome of the dialogue, stakeholder dialogue at LU, means a shift in the power to add, change, evolve or organize the structure of the system. A shift in the sense that some of this power is handed over to interests outside the organisation; to the stakeholders of LU.

3 – Strengthening student involvement. Similar to stakeholder dialogue, this is an idea of how to promote students and teachers at LU to engage in sustainability related activities, activities that are believed to strengthen the systems ability to adapt.

2 – Incorporating sustainability in the overall goal. This related directly to the goals of the system.

1 – Deliberate paradigm shift. An ambitious attempt to assess and revaluate the current university paradigms.

6. New Sustainable Curriculum Indicators

Current status at LU

The environmental plan contains 42 goals. The status on achieving these can be seen as indicators of success in moving towards the environmental side of sustainability. An internal evaluation of the fulfilment of the environmental goals is carried out once a year by the LU environmental group. Accounting firm Ernst & Young perform an external evaluation of the environmental work once every second year. Fulfilment of the goals is, as is often the case, not always possible to measure in an exact way. The evaluation is often done by estimates from the staff, sometimes complemented with qualitative information.

Regarding greening of curriculum, the policy is that: "All education at Lund University shall implement those environmental issues that are relevant for that subject or educational program"[24] This has been broken down into the following goal, freely translated: *All full time students should from 1999 be offered a short practical environmental education*. In the environmental report of 2003 this goal is seen as fully achieved, with the motivation that a. The university has a substantial number of courses related to environmental issues and b. The student association Sustainable University together with the Centre for Environmental Studies at LU have hosted a series of open lectures with topics related to sustainable development. This conclusion is criticized by the student association Sustainable University in their evaluation of the environmental work[25]. They do not feel that this series of seminars is equal to offering the students a short practical environmental education.

In the evaluation of LU environmental work carried out by Ernst & Young (2004) a facilitated round table discussion was carried out, including faculty and administrative staff at different levels. A reflection that surfaced during these discussions was that many students enter the university fairly conscious of the environment but leave it less conscious. When asked to make an estimate of how much, the average group estimate was that students are 40% less environmentally conscious when they leave the university than they were when they started studying. If this reflection is a correct one, it of course means that things are going in all but the right direction.

Motivation for implementing the idea

"What gets measured gets done". By itself measuring is not always enough but more importantly; measuring incorrectly as in not what we believe we are measuring is enough to be counter-acting what we are trying to achieve. Therefore, developing and using correct indicators of where we are heading is crucial to achieving success. The idea put forth in this thesis is high on Meadows list of leverage points as it introduces a new set of indicators that are presented to the system in a new way.

Another motivation for implementing this idea lies simply in the fact that it makes sense to monitor the effectiveness of any implementation program. In this case it is sustainability in curriculum. If, over time, it is not assessed we do not know if the policy we have is pure window-dressing. We also do not know if the resources we are probably spending to make the policy a reality are well spent.

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[24] LU-Policy for integrating environmental issues in education and research (1998)

[25] Sustainable University 2003

Final motivation can be learned from Middlesex University Business School in London, which have made an ambitious attempt to measure sustainability knowledge among their students. Proper measurement of sustainability inclusion in curriculum answers one of the most controversial questions in the teaching of sustainability. *"Does what we teach actually make a difference in moving our students towards sustainability or environmental responsibility?"(Holt 2003)*

Description of the idea

Indicators

As described by Sustainable Seattle, an association devoted to enhancing the long term quality of life in the Seattle area, "A system's health is dependent on the health of the whole pattern, which can sometimes be reflected (and thus measured) in the status of a key part of the system" (Page 72. Sustainable Seattle indicator report 1998). This is what indicators do, they try to reflect the state of the system; it's health. In this case we want to determine if sustainability in curriculum is well on the way to recovery or to the hospital. In order to find a role model for indicator development, I looked to various university related initiatives in this field.

ESD indicators

The Sustainability Assessment Questionnaire (SAQ) was developed by University Leaders for a Sustainable Development. It is a qualitative survey that is supposed to assess the extent to which a college or university is sustainable. Taking the questionnaires is a 3-4 hour exercise, which can be undertaken by a representative sample of people at the university. The Sustainability Indicators in the SAQ are

- Courses with sustainability content in all departments
- Sustainability as part of traditional disciplinary education
- Institution's relationship to surrounding environment part of formal and informal education

Gothenburg University has the ambitious goal of by 2005 having the entire university certified according to ISO 14001. Their overall goal regarding curriculum is that "all students at the university should be offered basic environmental courses or elements thereof". Also, a more detailed goal is to host a special sustainability day for the students. To measure the way this is going, they count the number of courses that contain environmental/sustainability issues in some way. For instance, out of 14000 courses, 120 (9%) clearly touch upon environmental/sustainability issues. This rendered a ☺ for the greening of curriculum related goal. Regarding the sustainability day, this wasn't carried out so the indicator came out as a ☹.

The authors of the University of Florida indicator report state that they are the first university in the world to publish a report that is compliant with the Global Reporting Initiative. This move, according to the webpage, places this university among the world leaders in sustainability reporting, along with four other universities: UCLA, and Princeton Penn State, the University of Victoria and Lund (which is interesting, since Lund's report is basically addressing the environmental side of sustainability).

The indicator used by Florida to measure sustainability content in curricula is to count the number of courses with environmental, social and economic sustainability content. They are thus, separating the three pillars of sustainability and measuring them one by one.

The Global Reporting Initiative (hereon GRI) was launched in 1997 by the U.S. Coalition for Environmentally Responsible Economies (CERES) and United Nations Environment Programme. The initiative has the goal of "enhancing the quality, rigour, and utility of sustainability reporting". The guidelines have fairly quickly received worldwide acceptance among reporting companies. They are primarily a support for businesses; however some of the recommendations can still be of use for a university. The current edition, the 2002 guidelines, is the third edition.

The association University Leaders for a Sustainable Future proposed a resource document for universities, based on GRI. As stated by Rodrigo (2003 p.66) this document lists the following indicators with regards to sustainability inclusion in university curricula:

1.1 Available courses

1.1.1 Number and percent relative to total of courses taught each year related to sustainability concepts

1.1.2 Number of students enrolled in sustainability-related courses

1.2 Administrative support

1.2.1 Number and percent of departments and colleges including sustainability in curriculum

1.2.2 Sustainability courses included in general education requirement

1.2.3 Existence of available sustainability-related majors and minors

After having looked at several attempts to measure if sustainability and/or environmental issues are entering the curriculum, the examples above seem to be a fairly representative approach. Both goals and indicators of achievements are typically measured in "*number of courses or programs offered with some sort of environment/sustainability content*". However, as brought to my intention in interviews with staff at LU, this might not be what we want to measure. This indicator measure, at best actually, the level that the university *attempts* to include sustainability in curriculum. So, what more can be done?

In September 1998, a group of faculty, staff and students released the first Penn State Indicators Report. The report tried to do something at the time quite pioneer: Examine Penn State through the sustainability lens and evaluate whether the university was moving toward or away from sustainable practices. The report attracted nation-wide attention, and led to the forming of Penn State's Green Destiny Council, a faculty-staff-student association, committed to promoting ecological responsibility at Penn State. In 2000, the report was repeated; producing the Indicators 2000, stating some improvements since the last evaluation but also makes it clear that a considerable "sustainability deficit" still existed. The report contains one indicator, out of 33, that is related to curriculum. "Ecological Literacy of Graduating Seniors" (*Penn State Indicators Report 2000* p.89). At Penn State, this is measured by control questions posed to a sample of 150 graduating seniors (chosen randomly). Some results of the results were that…

…40% didn't know the world's population to the nearest billion.

…63% were unable to name one law that protects the environment.

…43% were not aware that acid rain is a common phenomenon in their state.

…40% were unable to name two tree types on campus.

Out of 4, this rendered the indicator value 2 (second lowest). It can certainly be debated if these are the right questions to use to assess ecological literacy but the indicator approach used by Penn State is different from most others in that it *evaluates the students*, instead of the course content. This case opened my eyes to this approach. The advantages of using it will be described later in this chapter.

Sustainable Seattle

The association "Sustainable Seattle" has around 200 members. Starting in 1993, they have produced three reports containing some 40 indicators that are supposed to give a snap-shot of Seattle's current sustainability performance. The association utilises a number of criteria for indicator development that are valid regardless of the system they are to monitor. The indicator framework suggested in this thesis is meant to fulfil these criteria.

• Relevant. They fit the purpose for measuring, telling you something about the system you need to know. In the case of Sustainable Seattle, they illustrate something basic and fundamental to the long-term cultural, economic, environmental, or social health of a community over generations.

• Reflect community values. The crucial role of indicators is communication. Perhaps more important than providing data, indicators illustrate community values and elicit reactions. Good indicators are expressed in imaginable, not eye-glazing numbers, and resonate with the intended audience.

• Attractive to local media. The press publicizes them and uses them to monitor and analyze community trends.

• Statistically measurable. Data exist that are relevant to this geographic area, and preferably comparable to other cities, counties or communities. If data are not readily available, a practical method of data collection or measurement exists or can be created.

• Logically or scientifically defensible. Understandable rationales exist for using the specific indicator and for drawing general conclusions from it.

• Reliable. You must be able to trust what the indicator shows. For example, a gas gauge that shows it is half full when it is really empty may cause you to run out of gas in an inconvenient place. In addition, indicators should be measured consistently over time, so that you have comparable data.

• Leading. Indicators must give you information while there is still time to act. "Carbon emissions" is an example of an indicator that provides information in advance. Global temperature change, "global warming," is the concern, but because of lags in the response of the physical system and short-term fluctuations that mask long-term trends, temperature may respond only after decades of atmospheric change.

• Policy-relevant. Does the indicator have relevance for policy decisions for all stakeholders in the system, including the least powerful ones? Can anything be done to affect the indicator? Should it be included anyway to suggest improved policy responsiveness?

McKerlie, in her master thesis at IIIEE 2003, mentions another criterion for indicator selection that I find recommendable:

- In order not to overload the user/audience with information (the list of potential sustainability indicators is endless) it is practical to select indicators that may be representative of several factors. As an example she mentions that "average percentage of income required to pay for housing", may also reflect "cost of living", Availability of affordable housing and even have implications towards "the state of the economy, employment and homelessness". (McKerlie 2003, p.15)

Pressure State Response

McKerlie also lists the following topics as typically communicated in an indicators report

What is happening? (state)

Why is it happening? (pressures)

How does it compare? (to previous years, to other jurisdictions)

What is being done/what can you do? (response)

She has derived these topics from the Pressure State Response framework developed by Anthony Frend in the 70's. This framework has been applied for sustainability reporting by organisations such as UN, OESCD and State of the Environment Group.

Developing Indicators for inclusion of sustainability in Curricula

With these general recommendations, specific selection criteria and list of topics to include, the exercise can begin, of developing a recommendation for LU on how to improve their indications on how sustainability inclusion in curriculum is going. In measuring something, a natural first question is: What do we want to measure? In this case it is the level of sustainability inclusion in curriculum. This leads to another question; Why do we want sustainability in our curriculum? *Because we want students coming out of the university to make sustainability contributions.* This implies that we really want measure is how likely it is that this will happen. An indicator of would thus measure if the students have what it takes to act according to that phrase. Perhaps not the easiest of exercises but on the bright side: If we can do this, we are also likely to provide indications on a lot of other tings; how well is sustainability being taught to the students; how much sustainability content is available in the curriculum, to mention some. We would thus be fulfilling McKerlie's recommendation to develop indicators that cover a lot of ground. It must also be noted that this indicator will tend to be influenced by many things that not related to sustainability content in curricula, such as students general ability to learn, skills developed during the education etc.

To measure if students are likely to make sustainability contributions is closely related to what makes people act in a certain interest. Emmanuel and Govindajanan (1996), authors within the field of management control, mention three reasons why people may fail to act in an organisation's best interest:

- *Lack of direction*. People do not always understand what is expected of them.
- *Lack of motivation*. People's incentives aren't motivating them to perform.

- *Lack of abilities*. People lack knowledge (experience and information) to perform adequately.

If students coming out of the university are expected to make sustainability contributions it would help if they did not lack these three things in relation to sustainability. And if that is what we want out of the education then these three are a good basis for developing indicators. In order to make them more suitable in relation to sustainability in curriculum I have taken the liberty to change their emphasis slightly.

1. Awareness. Lack of direction is closely related to awareness: If people are not aware of a problem they are not likely to respond to it. Hence, if they do not know that the environmental support systems of this earth are being destroyed at a rate faster than they are being re-plenished or that a large part of the population of the world can not meet their basic needs they are not likely to do anything about it. As can be understood from the above, this awareness is closely related to student awareness of the state of the world and a vision of what sustainability means i.e. what a sustainable society looks like.

2. Willingness to act. To be motivated and be willing to act, the students need to have a feeling both of international and intra-generational solidarity (care for future generation). Both are value related. For this motivation to be there, a willingness to move towards a sustainable future is essential, which makes it closely related to student values and students being able to perform the mental exercise that described by Cortese *"Painting a picture of a future that is so desirable that people will want to move from where they are now to that new future - a sustainable future"* (www.secondnature.org/cortese 2004-09-14)

3. Ability to act – The students must possess the necessary skills to make sustainability contributions. They must understand the environmental, social and economic impact of designing a city centre in a way that eliminates the possibility to ride a bike to get there. They also need to know alternative, more sustainable ways of doing it. This is closely related to an understanding of their place in the universe. I.e. how they can contribute, most clearly in relation to their future employment.

It is recommended that these three areas: Students *Awareness, Willingness and Ability* in relation to sustainability serve as the basis for indicators sustainability inclusion in curricula.

It is also recommended that a student questionnaire should be developed that enables measurement of this indicator. A set of indicator questions relating to areas of or threats against sustainability should be developed (for instance water pollution, global warming, air pollution, biodiversity, water resources and distribution of wealth). Which areas to cover will depend on the length of the questionnaire, which in turn will depend upon the context in which it is given, therefore it is difficult to make a general recommendation. However, s suggestion for this questionnaire has been developed by the author of this thesis. It should be noted that this questionnaire needs to be further tested and most likely improved before it is used. The questionnaire should start with a general description of why the study is done, what the information will be used for and some description of sustainable development. Also, it might be interesting to note age and gender, and name but on a voluntary basis. The boxes below show questions measuring the three areas *awareness, willingness and ability* to make actions that contribute to a sustainable development. A fourth box shows questions meant to measure causality; what caused the results. The source of input for awareness related questions was

United Nations (2002)[26]. Regarding the ability related questions, some general suggestions are given here by the thesis author but this area would greatly benefit from being developed by teachers in a subject specific context. Correct answers in red.

Measuring *awareness*

World population is expected to grow to about … billion in 2025

a. 4 b. 6 c. 9.3

The total number of people living in poverty (based on an income threshold of $1 per day) declined slightly in the 1990's, from approximately …in 1990 to approximately…in 2002

a. 1.3 billion to 1.2 billion b. 200 million to 180 million c. 10 million to 9 million

The number of people that are chronically undernourished has also declined, from approximately in … 1990 to approximately….in 2002

a. 100 million to 80 million b. 840 million to 800 c. 2 billion to 1.8 billion

State if you find the following problematic statements to be

a. completely true b. not as serious as depicted c. complete exaggerations

Water use has increased six-fold over the last century, and many freshwater systems are being degraded because of excessive water withdrawals, which has lead to the loss of more than 20% of the worlds 10 000 freshwater species and half of all wetlands.

a. b. c.

Global production and consumption of energy increased throughout the 1990's, with most of the increase in fossil fuels such as coal and oil. The consumption of fossil fuels and CO2 emissions (the major green house gas) are 10 times higher in North America than in the developing regions.

a. b. c.

Forests provide a variety of "natural services"; water and soil conservation, climate change mitigation and protection of biodiversity. The world's forested area declined by about 2.4% in the 1990's, the main reason being expansion of agriculture. Forest area decreased in all countries over the entire world.

a. b. c.

(In Europe natural forests have actually expanded since less need for agricultural land due to low population growth and increases in agricultural productivity)

The source of input for the willingness related questions was Middlesex University, UK (Holt 2003), if no special reference is given (in special reference case this thesis author was the source).

[26] Global Challenge, Global Opportunity: Trends in Sustainable development, published for the world summit on sustainable development in Johannesburg 2002

Measuring *Willingness*

State the extent to which you agree to the following statements

a. completely agree b. more or less c. completely disagree

We owe a duty to our children and grandchildren to preserve the environment.

When we can, we have a duty to help needing people in other countries as well as our closest family and friends.[27]

We owe a duty to animals and nature; they don't exist just for our enjoyment.

Politicians can be trusted to take care of the environment.

Scientists will always be able to find a solution to these problems

The source of input for the ability related questions is the thesis author.

Measuring *Ability*

State the extent to which you agree to the following statements

a. completely agree b. more or less c. completely disagree

Would you say that you have been given a sound knowledge base from which to understand concepts and definitions related to sustainable development?

In future work life, would you say that you will be able to assess the economic, environmental and social consequences of your actions and choices?

Have you learned of any tools or specific knowledge that will help you make contributing actions towards a sustainable development in your future work-life? Examples: Knowledge on how to use eco-labelling to achieve market differentiation for marketing students or green chemistry knowledge for chemistry students.

If you can think of any specific tool (s) or knowledge that you have learned, please state them below.

Measuring causality/How they retrieved the information

[27] Source: Thesis author

Do you think you have become more aware and knowledgeable of sustainability issues during your time at the university?

Yes No

Has the university played a role in this?

Yes No To some extent

What other sources of information did you have for this knowledge and awareness (such as friends, family, media)?

Did you undertake a dedicated environmental course during your study period at LU?

If yes, which one?

Did you study at a program, if yes which one?

One initial test was carried out among 15 students about to graduate from the program "Environmental management and policy" at IIIEE in Lund. Since these students have voluntarily embarked upon and are weeks away from finalising a 60 credit program with content strongly linked to sustainability, they can serve as a control group in the sense that they should perform fairly well on the test otherwise it is probably inadequately formulated.

Regarding the *Awareness*-related questions, the control group performed very well. The average result was five correct answers out of six. However, the question that caused the most problems was a tricky one, namely if forests area *all around the world* have decreased. This question was added to see if the students were likely to go for the "worst" alternative in case they were uncertain, which they seem to have done, as forest area is actually *increasing* for instance in Sweden and Canada, contrary to what the students believed.

Regarding the *Willingness*-related questions, the control group also performed well. Half of the students who answered showed the highest possible willingness to act towards a sustainable development. The other half to a varying degree responded *more or less* to some of the questions, indicating that they are also, but not to the same extent, willing to act towards sustainable development.

Regarding the *Ability*-related questions, around half of the control group achieved full points, i.e. thought they had the ability to act towards sustainable development in their future work-life, interestingly however half of the group stated that they more or less have this ability. This can be seen as these students having understood the complexity of the issues and maybe feel that the ability is likely to always be *more or less*.

Feedback from Diane Holt of Middlesex University Business School was also obtained. This can be found in appendix 7. This school has made a questionnaire that in parts is related to the one in this thesis.

What needs to be done in order to turn this recommendation into an indicator report based on the Pressure State Response Framework is the following:

- How does it compare? (to previous years, to other jurisdictions). Develop control questions in order to assess student status on the three indicator areas when entering the university (optional but desired).

- What is happening? (state). Develop questions that assess the same status when leaving, or after a certain number of years. The next and very ambitious step here would be to follow up on a small sample of students and assess how they contribute to sustainability in their future actions after having left the university.

- Why is it happening? (pressures). Questions should be developed that ask of the students how they obtained/didn't obtain the knowledge related to the sustainability areas.

- What is being done/what can you do? (response). Questions asked relating to what the students think are the best ways to obtain the sustainability knowledge in relation to the three areas. Also, qualitative information delivered by teachers at various institutions would be suitable to feed in here. I.e. what are they doing/intend to do to improve the situation.

Recommendation 5. Multidisciplinary students meeting single disciplinary teachers

Current status at LU

Multidisciplinary efforts in research and education are taking place at LU. Both the centre for environmental studies (MICLU) and IIIEE are examples of this. The Environmental Masters programs at these institutes are multidisciplinary and both institutes engage in spreading this approach across the university (to exemplify, IIIEE by teaching environmental skills to technical students, MICLU by pursuing research initiatives involving multiple faculties). Complete environmentally related programs and courses also exist, as well as related to the social side of sustainability (for instance, an undergraduate program for knowledge of less developed countries).

However, little efforts seem to be made in *bringing this diverse knowledge together*, in order to learn from it across university institutions. This recommendation is a suggestion of how to tap into that knowledge. It should be clearly stated that the exact implementation of this recommendation, will need to be carried out by people with larger pedagogical and teaching skills than this thesis author.

Motivation for implementing the idea

Introducing multidisciplinary programs that deal with issues of sustainability in some way is commendable and it can be seen by looking at employees in non-governmental organizations, national environmental programs and in municipality environmental departments throughout the world that these students often end up trying to make a positive contribution for environment and humanity[28]. In opening the university paradigm to multi and trans-disciplinary thinking, however, it is not enough by itself. The intervention described here would primarily be an aid for teachers in developing sustainability-related content in their teaching. It would also be a way to make disciplines meet and use their respective knowledge

[28] See, for instance the IIIEE alumni book

to solve a common problem; which is likely to, in it self, open up new alleys of knowledge and, equally important, introduce new allies in finding possible solutions.

Description of the idea

A field exercise at IIIEE last year was related to regional sustainable development. The purpose was to study and provide solutions in a real world assignment. One group went to the north of Sweden to help the municipality of Åre developing more sustainable tourism and product policies. The exercise involved a group of design and architecture students from Delft University in Holland that came to the institute in Lund for the duration of this course module. The purpose of having them in the group was experimental and, from the students' point of view, vague. However, as will be presented below, this encounter turned into a mutual learning experience. This is what happened during the month the two groups spent together.

The two groups quickly got on speaking terms. The students of Delft explained the state of sustainability issues in their education, very little in the basic industrial design and architecture programs, but there were some courses available. They started inquiring the students at IIIEE for guidance on how design and architecture could work towards sustainability. The students of IIIEE, eager to understand more about these subjects in order to understand their implication for the environment, in turn questioned the Delft students regarding specific design and architectural knowledge. The result was mutual learning and exchange of ideas. The students from Delft all read the book "From cradle to cradle" on ecological design and architecture, borrowed to them by a student at IIIEE. Three of them have continued to learn about sustainability in their education (one through choosing to take one of the extra courses mentioned earlier, one through making the graduation project take that direction, one through applying for an internship at an organic farm).

As for IIIEE students, who didn't get a design lecture this year as that teacher got a stomach disease, some of them achieved a better understanding of the basics of design, how the design process works etc.

McKeown, in a toolkit named "Education for Sustainable Development" (2002), describe "the strengths model" as an approach to introduce sustainability content into various disciplines. McKeown claims that every discipline and every teacher can contribute to sustainability education. Topics that contribute to Sustainable Development are often already inherent in the existing education curriculum but not identified and highlighted in the context of contributing to sustainability. Thus, identifying and recognizing them is one of the keys to move forward.

She recommends starting with ensuring that educators and administrators understand the concept of sustainability and are familiar with its principles. Once this is done, they can start to examine curriculum and school activities for existing contributions to ESD. Next, they can identify potential areas in existing curriculum where sustainability can be inserted. She mentions inserting knowledge, issues, skills, perceptions, and values associated with ESD.

Specifically for LU, the university has two masters programs that are related to sustainability issues, in somewhat different ways: IIIEE and LUMES. A natural suggestion would be that LU, together with these institutes, work to dedicate one of their course modules into finding and develop existing curricula at LU. IIIEE will be used in this example. Teachers throughout LU, from various disciplines, would be invited to take part in this course module. Together, the students at IIIEE, aided by supervisors, could share their knowledge regarding

sustainability in the various subjects. It should be noted that students enter these educations with a bachelor degree, meaning that together they already have a basic understanding of many of the subjects at LU.

In line with the Strengths model, the first step would be to develop a shared understanding of sustainability and its principles. Next step would be the teachers trying, together with students from IIIEE, and facilitated by supervisors, to learn from each other. The method to do this, which would best facilitate mutual learning, is probably better developed by someone with more pedagogical and group dynamic skills than me. The main idea, however, would be that together with the students of for instance IIIEE and facilitated by supervisors, the teachers at various institutions would develop understanding of sustainability related concepts and tools that can be applied in the courses they teach.

It is the experience of this thesis author, that when trying to solve specific problems, the tools that are most efficient to it will naturally be sought in many cases. It is therefore recommended that at least part of this knowledge sharing is done by solving problems together.

Possible outcomes of the exercise could very well be cases, with potential solutions, that are applicable both to students at a multidisciplinary environmental program and to students at a certain institution. To use an example, the problem of marketing a more expensive, ecologically grown potato, is a challenge that is equally interesting for students of IIIEE as for students of the market communications course at the institution of business administration.

The value for the teachers taking part in the module could be the:

- The current status regarding sustainability issues in relation to their fields.

- How to use their particular field to achieve a more sustainable development

The value for the students at IIIEE students could be

- Knowledge regarding the single disciplinary subject.

- Single disciplinary thinking, knowledge and tools in the context of achieving sustainable development. This could be applied in future course modules as well as work life.

Recommendation 4 - Stakeholder dialogue

Current Status at LU

The extent to which LU engages in stakeholder dialogue was assessed in interviews and by looking at the history of planning processes. The answer depends on how we define stakeholders. It is common to divide them into internal and external. The internal stakeholders are within the organization; in the case of a university this means professors, researchers, administrative staff and students. These seem to be fairly well consulted in many cases at LU, for instance in developing the current Strategic Plan, where a group worked to incorporate the views of internal stakeholders into this document during a period of dialogue.

The external stakeholder can be defined as one outside the organization "who can affect or is affected by the achievement of an organization's purpose" (Andriof et al 2003, p. 15). In the case of LU, they seem to enter the picture more by chance. Evaluating LU's overall

performance is, according to the president, mainly done by looking at how others evaluate the university (media, student associations, research communities). This means that some stakeholders are included, such as Högskoleverket, since it performs reviews of universities and gives recommendations for improvements. Also, on a more irregular basis, future employers will rate various educations at universities across Sweden. It also means that some stakeholders are completely left out because they don't make their voices heard that particular year, or ever. To conclude, a conscious and systematic dialogue with external stakeholders is not carried out today. It is notable that the same is the case with Gothenburg University, which is considered to be very forward thinking when it comes to environmental issues.

Motivation for implementing the idea

Several authors talk about the need for universities to become learning, as well as teaching organizations. Leith Sharp of Harvard University has been mentioned before. He provides one explanation why this is particularly crucial to address the global environmental problems. His reasoning is: An effective solution to the problem of non-sustainability is a moving target; new information will continuously become available that will reveal new environmental requirements and opportunities. Therefore, the challenge is to become skill-full at the process of change itself. I see stakeholder dialogue as one move towards becoming a learning organization. Sharp also mentions forums for broad community involvement, discussion and consideration as an approach to maximize the survival and expansion of greening initiatives. Stakeholder dialogue is such an approach.

For LU, the fact that external stakeholders do not always make their voices heard, will mean the risk of them reacting negatively to LU, in which case this reaction is likely to come as a surprise. This is one of the advantages typically brought up in literature on how to sell the stakeholder dialogue activity to companies. See the figure below that displays the early warning response one can get from engaging in stakeholder dialogue.

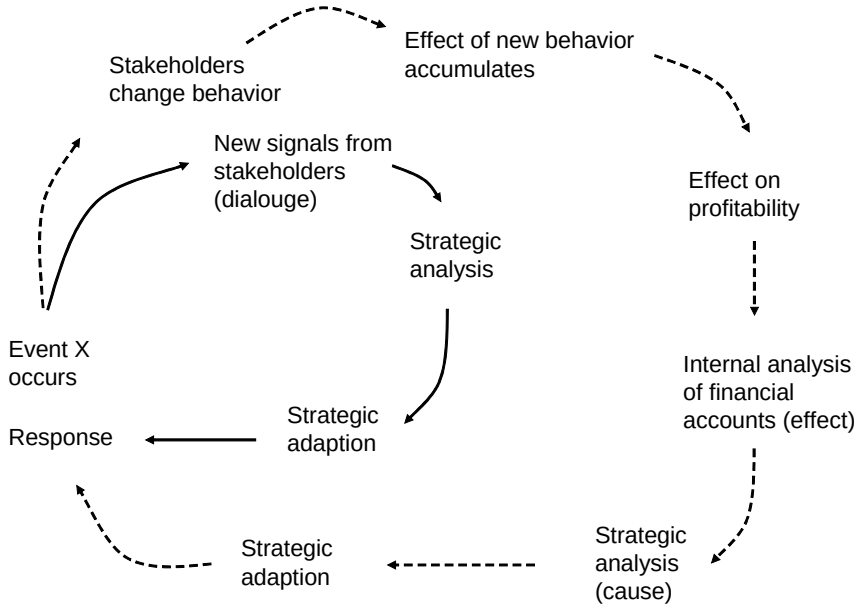

Figure 4.2: Stakeholder dialogue resulting in faster response time Source: House of Mandag Morgen 1999

Description of the idea

For stakeholder dialogue to produce appropriate responses it needs to "actively communicate with stakeholders and actively manage their relationships" (Andriof et al 2003 p.11). Active communication and management to me means timely, well prepared and carried out by motivated people. The model applied here is an attempt to achieve this at LU. It is important to note that the dialogue could and probably should revolve not only around curriculum but rather LU's overall performance on sustainability issues. This is to optimize the use of the event once having stakeholders in place.

As no university was found that could serve as our role model, I looked to the corporate world. Body Shop conducted its first social audit in 1993. One of the objectives of these social audits is to ensure continuous improvements with its stakeholders. The company has defined three types of social performance that can be used as a checklist when engaging in stakeholder dialogue (Zhang et al 2003). These can be used by LU to engage in stakeholder dialogue. A fourth step has been added by me. This step specifically concerns suggestions from stakeholders on how to improve LU's sustainability performance.

1. *Performance against standards (performance indicators).* The Body Shop has set up benchmarks, both internally and externally and both qualitative and quantitative, and reflect them against national and international best practices for the activities or policies that the indicators refer to. In the case of LU, the indicator framework suggested in this thesis could serve as the base for this part of the dialogue. Another basis for this part could be the environmental report that contains performance in relation to the 42 goals set out by the university. My recommendation is that the number of goals should be reduced and that the report is made more easily readable before presented to invited stakeholders. If we follow the lead of the Body Shop, performance on the chosen indicators should be communicated to the invited stakeholders in advance, together with a reflection in relation to other universities. The three universities mentioned below are examples that could be used. They all have progressive indicator initiatives and an open attitude towards sharing information regarding their performance. However, it should be noted that the quality and frequency at which university indicator reports seem to vary significantly from year to year. It is therefore of essence to make sure that the universities chosen are adequate for that particular year.

    - Pennsylvania State University, Pennsylvania, USA. (http://www.psu.edu) Penn State is one of the pioneers of sustainability indicator reports. Has made an attempt to measure sustainability inclusion in curriculum through questionnaires. It is a large size university, almost twice the size of LU in terms of students.

    - Middlesex Business School, London, UK. (http://mubs.mdx.ac.uk) The university has been specifically active in sustainability in assessing sustainability literacy among its students. It is young (some 30 years) and attracts students from a large variety of countries.

    - Gothenburg University, Sweden (http://www.gu.se). This university is by Swedish comparison probably the one most similar to LU (Similar size, types of education, type of stated environmental goals).

As a stakeholder event should be a learning experience, this part of the dialogue should also include suggestions for updating/improving the indicators.

2. *Stakeholder perception of performance against core values.* In Body Shops case they use their mission statement and something called the Trading Charter but, as stated in another article on the subject, "a variety of formal and non-formal policies which prescribe the organisation's intentions with respect to its stakeholders" (Wheeler and Sillanpää 1998) could enter here. In the case of LU, this step could include performance against the core values of the university. The core values of today, as described in the Strategic Plan, could be used. However, these might be too general in order for this to be implemented. Instead, a suggestion would be to engage the stakeholders in what core values they perceive that the university has and relate this to the core values they believe it should have. This might prove especially interesting in relation to potential students, future employers and university staff. To exemplify, the CEO of the nearby Ideon Research Park might feel that a core value should be risk-taking or daring and might feel that LU stand for the opposite, risk-averse and careful.

3. *Stakeholder perception of performance against specific needs of stakeholders.* Body Shop use focus groups to, with stakeholders, identify their needs and then use anonymous surveys to measure their opinion.

In the case of LU, the role of higher education in general and LU in particular in meeting that particular stakeholder's needs could be carried out. This part would include a dialogue regarding what these needs are and what LU sees as their role in meeting those needs. To exemplify, the stakeholder Sustainable University (association of students) might feel that they need more help from the university to attract volunteer students to their organization. LU might see this as beyond their function. This part is probably crucial for LU in determining the role of education, which as stated by Sterling (2001) is one of the keys in unlocking the values of any educational system.

4. *Improving performance*

"Ask not what the university can do for you but what you can do for the university". How do the stakeholders see that LU could improve its sustainability performance? Do they have any ideas that they think could work? Are there any pressing environmental or social issues that could be addressed in a course at LU?

This could be an excellent opportunity to make the stakeholders feel that their participation is of use. Stories of good ideas that have been implemented could hopefully become a re-curing point on every event.

Who to include?

As stakeholder dialogue usually takes time from a company trying to provide maximum value to its shareholders, and with limited time and resources to spend on the event the question of who to include as a stakeholder has gained a lot of attention. The selection criteria are typically based on those *having claims on the organization* and on those *with influence to act on that claim* (see for example "the Copenhagen Charter – A guide to stakeholder reporting"[29]). This makes sense in terms of maximizing shareholder value but I fail to see that it is the optimal choice of stakeholders to make a company more sustainable in its practices. The influence to act by

29 Ernst & Young, KPMG, PricewaterhouseCoopers, House of Mandag Morgen (1999). Defines interest and influence as key selection criteria

future generations and those without any food on their plate may for example be considered extremely low.

Wheeler and Sillanpää (1998) define a stakeholder as "any individual or entity who can be affected by an organisation or who may, in turn, bring influence to bear." They continue by defining social and non-social stakeholders.

Social stakeholders being those that are most obvious for a company - customers, employees investors, local communities, suppliers and other business partners. These groups are labelled primary social stakeholders as their relationship with the company is direct and involve human entities. They also label secondary social stakeholders such as civil society, business at large and various interest groups were the involvement is less direct but not necessarily less influential.

Non-social stakeholders are defined as those, which do not involve human relationships, such as the natural environment, non-human species, future generations and their defenders in pressure groups. These may also be divided into primary (direct) and secondary (indirect) categories but this is not an exercise the authors have carried out.

I find this classification particularly useful as it means that those affected but not able to make their voice heard are represented. This seems particularly important for a university where the organisation is likely to affect people and eco-systems all over the world through the students they educate. It is therefore a recommendation that this classification is used for LU. Of course, the problem that now arises is how to represent some of these stakeholders. The exercise of identifying the relevant stakeholders for LU is outside the scope of this thesis and will depend heavily on the budget for such an event. However, below are some crucial groups that could easily be forgotten and some ideas on how to solve their representation.

- A typical group that can't speak for themselves would be *the natural environment*. Might of course be represented by an NGO such as Swedish Natural Protection Association or similar. Depending on the ambition, it could also be represented more specific by sub-topics (such as oceans, biodiversity and air). To act as a representative could be an exercise that is a part of an educational experience for students at some course at LU. There is also plenty of staff at several institutions that would fit well as a representative.

- *The social side of sustainability* also needs to be represented somehow. This is particularly challenging but also particularly relevant when we consider the international social impact of future students. Similar to the natural environment, NGO's such as Amnesty, Human Rights Watch, and *'Children's Right in Society,'* could act on the behalf of social well-being in the world. Also, sub-groups such as future generations, democracy for all, food security in the Third world countries, equal rights for women and children etc. could be formed. As in the above, LU has internal capacity to act as a representative of some of these sub-groups. One program at LU is, for example, related to under-developed countries and their needs.

- *Future generations* are a key group, as intra-generational solidarity is at the heart of sustainability. This thesis can present no single right way on how they should be represented. One way would be to ask the various stakeholders that they also speak for the future generations needs of the aspect they represent. Another would be to elect a representative in advance that specifically tries to prepare the needs and views of future generations.

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Successful stakeholder dialogue

Buckens and Hinton, at a college centre for environmental technology, undertook a study of 1000 companies that had engaged in stakeholder dialogue. In this case the researched group were specifically involved in environmental stakeholder initiatives (ESI), meaning that the dialogue was meant to evaluate and contribute to the improvement of the environmental work undertaken by the company. The sample of companies was mainly European and leaning heavily towards the chemical sector, something that the authors point out as being linked to more pro-active companies being active in this sector and area. The paper presents what the researched companies experienced as crucial for successful environmental stakeholder dialogue[30]:

- A company needs to consider if it can "bare all" about its practices, processes and products. The initiative will only be successful if the company is open and honest. This includes being prepared to act upon, or explain why not acting upon, suggestions that come up in the dialogue. For LU, doing this for the first time, it will be crucial for the person (s) running the event to have a pre-understanding of the mandate to act upon the results of the dialogue and communicate this clearly to the participants.
- The choice of staff. The people involved must have some decision making power but also be open for a dialogue.
- Management of the actual event(s) should be carefully considered. External sources provide credibility and may increase stakeholder confidence. Also conflict handling skills that may be of importance.
- External stakeholders should be included in the process early, i.e. already in setting objectives. This will increase "ownership" of the process.
- Feedback of the dialogue. Evaluating the value, or outcome, somehow is important not only to motivate its existence but also to show weaknesses in the current approach. Did we succeed in getting the right people there? Did they engage in dialogue? This needs to be prepared beforehand so that somebody looks and makes notes during the event.
- In the first attempts it might not be wise to include all stakeholders but try to put together a representative mix.

I will add one point to the list, after having read Wheeler and Sillanpää's paper on stakeholder inclusion (1998). This point is probably easier seen by someone outside the company, which would explain why it didn't turn up in the previous study.

- Optimally, the firm's leadership, management and core principles should be united in a stakeholder-inclusive ethos.

  Wheeler and Sillanpää mention Levis Strauss as an example. They state that the company has both a vision statement that includes serving the community and society at large, and a CEO with a clear vision of the company ethos. This implies that a pre-requisite for this idea to be successful at LU is an organizational belief that these stakeholders should affect the organization. This, together with a commitment to seriously test the idea and its outcome should *minimally come from top management*.

[30] I have shortened the list somewhat as I thought some were unnecessarily similar and less relevant for a university.

Recommendation 3. Facilitating Student Involvement

Current status at LU

Student participation has an impressive tradition at LU. The first multi-disciplinary course related to environmental problems ever at LU was designed by two students in 1968. One of them is the current director of IIIEE, Thomas. B. Johansson. Johansson was later involved in developing a 40 credit environmental course, aimed at students with varying backgrounds. This eventually evolved into what is now the Institution for environment and energy systems at LU. Over the last ten years, student involvement in environmental and later sustainability issues has fluctuated. Around the time that the current environmental plan at LU was developed (1997), environmental issues were higher than presently on the student agenda. The student environmental association at the technical faculty, for example, had around 35% student participation in 1999[31]. Today, involvement regarding sustainability in curriculum at LU comes for instance from the student association Sustainable University. It has some 20-30 members. The association receives support from the Centre for Environmental Studies (MICLU). For instance, the two conjointly host sustainability seminars to mention one activity. Co-operation with the entire environmental group has functioned very well, according to Sustainable University, an organization that, naturally, is not happy with the low participation. A possible reason identified by them is that the environmental subject is too serious and therefore doesn't apply to students, who mainly want to have fun in their spare time.

It should be mentioned here that the conditions for student participation, in general, at LU seem to be rather favourable. Management is obliged, sometimes by LU statues, to consult with the student community in producing strategic plans and other key documents deciding where the university is heading. This fact is to some extent related to the current management, the president is known for a participatory management style. The recommendations below should be seen in the light of this: In an already favourable climate for student participation, such as that of LU, what can be done to further facilitate student involvement, particularly regarding sustainability issues?

Motivation for implementing the idea

Out of the 20-30 members of Sustainable University only around 10 are currently active. Nevertheless, this is the organization that produced the report that pointed to low awareness of environmental issues at LU. The report achieved attention in the local newspaper and has clearly made an impact on the management of sustainability related issues at LU, thus living up to a famous quote by Margaret Mead… *"never doubt that a small group of thoughtful, committed people can change the world. Indeed, it is the only thing that ever has."* In this thesis it is believed that student participation can be a two-bladed sword in; it can aid in achieving sustainability inclusion in curriculum (trough evaluating the work that LU does in the field, initiating events related to the field etc.) and it can educate students regarding sustainability issues through internal learning in groups such as Sustainable University.

Another motivation is provided by Sharp, claiming that any greening effort that aims at achieving broad participation needs to be responsive to the three predominant subcultures that exist within universities – faculty, administration and students.

[31] As stated by Håkan Rodhe, professor at IIIEE, actively involved at this time.

Description of the idea

To promote student participation can be done in various ways, Sharp (2002) describes an approach related to laying the ground for the students. He sees a number of problems that negatively influence the success of student participation in the greening of universities:

- Lack of access to timely information about the way the organization works;
- Little guidance on how students can most effectively influence organizational decisions
- No effective means of ensuring a continuum of organizational learning between multiple student generations.

Possible solutions to these would be

- Put someone from the university as a resource person regarding student involvement in sustainability issues.
- Provide an up-date of information that is good to know if you want to change LU to any student association. What are the contacts to make certain things happen, the decision-makers, the official and unofficial pathways of information?
- Offering students the possibility of internship at the environmental department of LU. This might also be a bridge between students and the LU environmental group, particularly if the intern (s) were involved in strengthening student involvement.

An example of this, at the University of British Columbia, Canada (UBC), is provided below (http://www.sustain.ubc.ca 20041003).

At UBC it is stated that active participation of the student population is a vital part of educating the entire university regarding sustainability issues, as some of the student's energy, vision and commitment regarding these issues is of great value. Consequently, at this university, several actions have been undertaken to promote this participation. A Student Training and Employment Program offers UBC students paid work at the Campus Sustainability Office. The intern program is to some extent sponsored by companies, mainly local ones.

Students hired through the program, called TrekSTEP1, undertake a variety of activities under the guidance of staff from the sustainability office. The job description ranges from conducting public tours of the university's green buildings to designing and leading outreach campaigns that raise awareness about sustainability within the campus community.

As stated by UBC, the program has provided students with:

- An opportunity to develop leadership and communication skills while helping UBC achieve its sustainability goals.

- Jobs developing educational tools for varied work environments.

- The chance to work on critical environmental issues with staff, faculty and fellow students.

Sharp also states that the greatest leverage to achieve change at a university occurs when all three organizational sub-groups of a university have a shared vision and a sense of alignment in their actions. This goes in line with Meadows top two leverage points - changing paradigm and goal – as both imply a shared vision and sense of alignment.

- In order to achieve this shared vision and alignment regarding LU's approach to sustainability, the strengthening of student participation could include promoting participation by faculty and staff as well as students, in a combined council or association.

An example of this, at Harvard University, is provided below (http://www.greencampus.harvard.edu 2004-09-03)

The Harvard Green Campus Initiative is a university-wide collaborative effort between faculty, administrators, staff and students with the goals of reducing the environmental impacts of campus operations and promoting environmental sustainability.

The organization includes an

Inter-faculty advisory committee, consisting of four faculty, two administrative and four student representatives. This group meets yearly, advices on strategic planning and faculty participation

Steering Group consisting of four members to advise Initiative staff on programs, operations and planning.

Core staff is employed by the university and consists mainly of program co-ordinators such as sustainable buildings, energy reduction and of administration such as IT and economy.

Interns, meaning students that use part of their study-time to engage in these issues. For instance, a summer intern-ship program included 11 interns that worked on seven projects across the university from June through August 2001. Their goal was to confront concrete problems and come up with workable solutions. The internships were coordinated by the Harvard Green Campus Initiative, in collaboration with different institutions at Harvard that hosted the interns. Examples of projects were: A greenhouse gas inventory was performed, Alternative fuel vehicle project for campus transport, Computer energy reduction program.

The above mentioned examples are related to the processes of the university, but could also be extended to include curricula of various institutions as a project, where the workable solution could be examples of how to include sustainability issues into that specific course curriculum.

Recommendation 2. Making Sustainability a widespread university goal

Motivation for implementing the idea

Sharp (2002) argues that the three sub-cultures that exist within universities; faculty, administration and student organisational culture are the products of different group histories. These group histories have different decision making practices, time constraints, priorities, threats and opportunities that each group has experienced within the university system. Inherent tension comes from the delegation of and struggle for power between these three groups. Sharp suggests that the greatest leverage in achieving institutional change occurs when all three groups share the same vision and sense of organisational alignment in the actions they perform.

It was mentioned in the system chapter that the transformative function[32] does not seem to be incorporated in the overall of LU. Maybe this function will enter anyway, through other mechanisms? This seems unlikely, at least on a wider scale. The most common pathways into curriculum comes from within the subject (through research results) and from future employers. Future employees do not value the attribute high enough and the essence of the subject is not likely to naturally evolve into changing the world to a better place. In the context of LU a descriptive anecdote exists that tells the story. The first effort made by the MICLU director to fulfill his assignment from the University Management included a meeting with teaching staff from the Economics institution at LU, where he talked about the need to include sustainability examples in their courses. On this meeting, he was dismissed because, not only did they feel that sustainability issues lack relevance in their education, but that it was against the Higher Education Act, as it would mean that they didn't teach the students what they should, namely the essence of the subject of economics.

Another motivation is related to the current status regarding the goal at LU, which was described in the systems part of this thesis: The current environmental policy and goals have not made their way into the overall goal of the university. According to Emmanuel and Govindajanan (1996) the extent of personal control depends on two basic forces:

- Individual self control; most people want to do a good job and

- Social control; a pressure exerted by workgroups on those who deviate from group norms and values.

Both will have little effect if sustainability issues do not enter as a part of what constitutes wanted behaviour i.e. that which moves the organisation towards the goal.

Current status at LU

The overall goal, or function, of the LU system was described in the system part of this thesis. However, LU naturally exists as a part of other systems, both smaller and larger. In relation to the goal of LU, a number of these related educational systems have policies, or goals, that clearly influence the goal of LU. For instance, the Swedish government influences the goal of LU through the higher education act and through statements and recommendations. In the same way, the centrally stated goal of LU influences the subsystems of LU. In order to make the goal of LU work towards inclusion of sustainability in curriculum, an effort to consider the goals of the systems that are outside the decision-making power of LU was made in order to see how they are likely to influence the goal of LU. Many other goals, such as those of future employees, parents and students will not show. However, these actors should, if our democratic election system works properly, at least to some extent, be incorporated in the Swedish national goal. Three actors that were considered as having obvious impact were analysed: UN, EU and the Swedish government.

A brief description of each and their goal in relation to sustainability in higher education curriculum is presented below. It should be said that the exercise of determining the goals of these various actors outside of LU was done through information available at websites, a method that mainly finds the stated, formalised goal.

[32] The transformative function: To encourage change towards a fairer society and better world.

UN Via UNESCO[33], UN has decided to promote 2005-2014 as the Decade of Education for Sustainable Development. The goal with this decade is to "*promote education as a basis for a more sustainable human society and to integrate sustainable development into education systems at all levels. The Decade will also strengthen international cooperation towards the development and sharing of innovative education for sustainable development programmes, practices and policies".* (http://portal.unesco.org/education/admin 2004-08-22)

Specific objects and targets for a number of stakeholders will be developed in the implementation scheme, which is currently being developed.

EU

Heads of State and Government met in Lisbon in March 2000 and agreed on a strategy designed to make the European Union *"the most dynamic and competitive knowledge-based economy in the world by 2010"*. This has become known as 'The Lisbon Strategy' and it encompasses a number of different public policy areas. EU Ministers for Education are pursuing a process to achieve a number of common goals for the European education system by 2010; improved quality and effectiveness, easier access for all and openness to the wider world. The European Commission has recently adopted proposals for the next generation of EU programmes in the education sector. The aim is to have these new programmes approved by the Council of Ministers and the European Parliament before the end of 2005. They will run from 2007 to 2013. After reading these proposals it seems that EU does not intend to take a pro-active stance regarding sustainability in higher education. EU legislation has a binding effect on the membership countries and any initiatives on an EU level can affect the goal of LU. Presently however, with regards to sustainability in higher education, you might say that this institution rests. However, criticism has been raised about the *inability to incorporate environmental concerns across EU sectoral work* (which is already a stated EU policy) and as the presidency of the EU rotates different aspects tend to become highlighted during different periods.

National

The government in Sweden has appointed a committee to come up with proposals as to how sustainable development should be given a stronger role in our country's education system. Prime Minister Göran Persson stated the following on the opening seminar at the conference "Education for sustainable development" in Gothenburg May 2004.

"I would like to state here and now that the time is ripe to include sustainable development in the Swedish Higher Education Act. The policy document for universities and colleges must clarify this social commitment in the same way it already clarifies Swedish pre-school, compulsory school and upper secondary school.

In this way, our engineers, economists, social workers and mathematicians will be able to adopt the holistic approach that is so necessary if we are to succeed in the transition to a more sustainable society.

In this way, university managements will be stimulated into allocating resources and building up expertise around learning for sustainable development". (http://www.svenskaekodemiker.se 20040615)

This is an intention that might eventually turn into a goal, however as it was stated in public and since a working group is currently overseeing how this should be done, it is fair to say that the prime minister is likely to follow through this intention. In what sense and to which extent

[33] UNESCO is the group within UN responsible for the implementation of Chapter 36 (Education, Public Awareness and Training) of Agenda 21

sustainability in curriculum will eventually be a part of the higher education act is too early to say.

Conclusions and Recommendations

As can be understood from the above analysis of educational goals, a number of these policies and goals are likely to include sustainability in curricula within short, namely the UN goal in relation to the decade of education for sustainable development and the Swedish national goal to include sustainability in the higher education act. Both are likely to have a strong influence on LU. In the case of UN, UNESCO will call upon national initiatives regarding sustainability. This will eventually reach the universities of Sweden. In the national Swedish case, the influence might even become a legal nature, through the higher education act. On an EU level, sustainability in higher education has not entered as a clearly communicated goal, however it can be argued that incorporating environmental concerns in decisions across all EU sectors should mean that these issues ought to enter the educational policies and goals. If, and when, this actually happens is another issue.

Description of the idea

In this case the idea is rather a series of recommendations in relation to the conclusion regarding the goal of LU:

Sustainability issues, including sustainability inclusion in curriculum needs to enter as an overall agreed upon goal.

Recommendations

1. As described earlier in this thesis, LU has little tradition of being goal oriented; a conclusion that can be drawn from this is that the system will benefit from fewer goals that are clearer communicated, if the goals are to serve the purpose of guiding diverse efforts. This, to me implies the need to include environmental and sustainability related goals into the strategic plan, at a minimum. It also needs to be mentioned in the overall statements on where the university is heading. The goal of sustainability needs to enter daily work both in written and in mental form and this is a clear way to do it.

2. Regarding sustainability in curriculum, I recommend that the goal is related to the end-user; the student. This covers more ground. An idea would be to propose a goal of sustainability literacy for all LU students. I.e. No student should graduate from this university without a basic comprehension of sustainability. The indicator initiative suggested in this thesis could provide a way to measure the progress towards achieving this goal. Orr (1991) suggested that no student be allowed to leave any university without a basic understanding of the following concepts. The list was written in 1991 and the exact items on the list may matter less as a recommendation than the exercise of actually writing such a list.

- the laws of thermodynamics
- the basic principles of ecology
- carrying capacity
- energetics

- least-cost, end-use analysis
- how to live well in a place
- limits of technology
- appropriate scale
- sustainable agriculture and forestry
- steady-state economics
- environmental ethics

A possible way to increase ownership of a sustainability related goal would be to ask each faculty or institution to develop their own list of concepts related to sustainability that they believe is essential that the institution teaches its students. In relation to the development of this another source of inspiration could be the Key Action Themes presented by the UN Decade of Education for Sustainable Development. These are listed in appendix 3. They are also likely to be further developed as the decade proceeds.

3. In what is maybe the most influential network for LU, Universitas 21[34], sustainability is not communicated as a goal. The goal of this network is to *"facilitate collaboration and cooperation between the member universities and to create entrepreneurial opportunities for them on a scale that none of them would be able to achieve operating independently or through traditional bilateral alliances"* (http://www.universitas21.bham.ac.uk/about 20040824). In terms of networks, it might make sense for LU to enter a network where sustainability is an agreed upon goal. A number of university declarations regarding sustainability in curriculum exist. One example that was mentioned previously is the Talloires declaration (http://www.ulsf.org/programs_talloires.html). To varying extent, these declarations also mean that you enter a network of signatories, where information regarding for example sustainability inclusion in curriculum can be shared. The signing of a declaration also provides the signing university with a comprehensive description of what sustainability is, as it is included in the declaration. Finally, the signing of a declaration can be carried out at a ceremony, inviting the press, students, staff and the community thus sending a clear signal that sustainability is a goal of LU. Over time, it is also something that can be pointed at, as president s come and go.

4. A university nearby geographically and of similar size to LU have managed to incorporate these issues fairly well in the overall goal. Gothenburg University together with Chalmers Technical University, which is closely related to Gothenburg undertake almost 40 % of all environmentally related research in Sweden, according to Swedish EPA. The university is one example where the goal of environmental progress (sustainability in some ways but not completely) has penetrated the overall organisational goal to a relatively large extent. A number of measures are undertaken at Gothenburg to ensure this:

- Gothenburg has included environmental issues in the faculty working assignments. These assignments are a management tool that is developed each year for every individual faculty, as a guide in how they should focus their work.

- The overall vision for the university contains the following statements

[34] Universitas 21 was mentioned by LU management and is stated by the environmental group as one that clearly has influence on LU, on a central, top management level. It has 16 member universities in eight countries

"The answer to the question 'Who is the university for?' should be 'for humanity'".

"Academic education and research are not goals in themselves, but are a means to improve us all as humans and to make the world a better place to live." (http://www.gu.se/english/vision, 20040823)

- The strategic plan of Gothenburg University lists environment and sustainable development as a profile area for the university. Also in the strategic plan (freely translated): "*The ambition is that the research and education within environment and sustainable development should be number one in Europe. A step in achieving this is to certify the entire university according to ISO 14001 by 2005".*

ISO 14001 is mentioned above and, both from judging at the way it is communicated and as stated by the environmental co-ordinator at that university, it seems to have served a unifying purpose at Gothenburg University. It might seem intuitive to recommend that LU does the same. However, after interviewing Brorsson[35] and Sammulisto[36], one thing is clear: ISO 14001 certification of an Environmental Management System is no miracle cure. It is one tool to try and improve your environmental work. The actual outcome in terms of performance will depend largely on ambition level and organisational circumstances and a general recommendation to implement it is not justifiable. However, for the interested reader, a list of Gothenburg experiences in relation to this is supplied in appendix 5.

Meadows (1999) argue that the reason top management can have great power is their influence over the goal. One powerful person can change the behaviour of an entire organisation, or country for that matter, by articulating and standing up for new system goals. This seems to be what has happened at Gothenburg University. The former president strongly articulated a goal that the university should work pro-actively with environmental issues and sustainability, in processes as well as education and research. This was stated over and over again, in talking to the press and with staff. It was incorporated both in minds and in formal, written documents. Indeed, the new president has taken less active part in these issues, but as the goal has been institutionalised, the environmental group feel that their mandate is strong enough to be 'automatically extended', even without explicit top management involvement.

Knowledge exchange on a top management level with Gothenburg University Regarding sustainability issues might thus provide useful for LU.

5. In achieving the goals related to sustainability, it might not be enough to speak out the new goal and rely on personnel control to make people perform according to the goal. As stated before, by Emmanuel and Govindajanan (1996), the reasons people fail to act according to an organisation's interest can be

- Lack of direction. People do not always understand what is expected of them.
- Lack of motivation. People's incentives aren't motivating them to perform.
- Lack of abilities. People lack knowledge (experience and information) to perform adequately.

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[35] Brorsson is responsible for ISO 14001-certification at international firm Trelleborg AB and has written several books on the matter.

[36] Sammalisto is currently finalizing her PhD on Environmental Management Systems (such as ISO 14001) in universities.

This needs to be taken into consideration and actions to make people not lack them developed. To exemplify, incentives/rewards for acting in accordance with the goal might be necessary. The ways to do this are several and does not have to be money related. Gothenburg University nominates environmental profile of the month, at many LU institutions teacher of the year is selected; a combination of the two is one way to go. Education for teachers regarding sustainability might be needed to increase ability to meet the goal. This has, of course to some extent already been done at LU, for example environmental education has been given to a limited amount of teachers.

Recommendation 1. Paradigm change

Current status at LU

Some of the current paradigms in relation to education at LU were described in the chapter System analysis, the main findings were:

- *Miles deep, inch wide,* regarding the specialized and disciplinary structuring of curricula.
- *Knowledge evolves through criticism,* regarding the creation of knowledge through research results.
- *Knowledge should be delivered by experts,* regarding the way teaching is perceived.
- *A university is an institution of rationality,* regarding how a university wants to be perceived.

Motivation for implementing the idea

Similar to the definition of a paradigm, Senge (1990) define system archetypes as the stories that get told over and over again within an organization until they are a part of the mindset. He also states that failure to understand them will likely lead to fixing the problem but not the thinking that produced the problem in the first place. Senge further describes the System Archetypes as "system patterns that underscore many organizational responses and activities".

As was described in the system analysis chapter, some of the current university paradigms might be inhibiting forces that work against the inclusion of sustainability in curricula. Doe this mean that they should be shifted? Not altogether, but it makes sense to try to understand them and also try to make sure that measures to promote curricula changes towards sustainability are strong enough to penetrate the resistance caused by them. This might sound abstract so an example will be used: If you tell someone to travel around the world you have to give them a pretty strong incentive if the current paradigm is that the earth is flat and you will fall over the edge if you attempt it. In relation to higher education curricula this means:

If teachers believe that they risk receiving criticism for introducing sustainability issues into their curricula (paradigm: *knowledge evolves through criticism*) and if they believe that they do not have enough knowledge to do it (paradigm: *knowledge should be delivered by experts*, inch *wide, miles deep*) nor that a university should be teaching value related things such as how to make the world a better place for future generations (a university is an institution of rationality) then you will have to give them some pretty strong incentives to go ahead and do it anyway.

Description of the idea

This recommendation should not be seen as a step-by-step methodology to achieve a paradigm shift. It is well beyond the scope of this thesis to provide such a methodology (that would rather be in the category of Nobel-price winning research). It is however, an attempt to point at what, in the current paradigms, might be inhibiting the inclusion of sustainability

issues into curricula and what might be possible paths to open up some of these paradigms, to facilitate the inclusion of sustainability in curricula.

The before mentioned Senge is the author of one of the most influential works in organizational learning and systems thinking in recent years; The Fifth Discipline (1990). A popular quote from this publication is that *"The unhealthiness of the world today is in direct proportion to our inability to see it as a whole"*. Sharp (2002) states that this is precisely the case in the university sector; it has failed to perceive itself as part of the whole planetary life support system. To develop this" *understanding of place within the whole" requires a massive mental shift as it touches upon people's mental models. Sharp therefore suggests that individuals throughout every university need to*

See their place in the whole of the planet's life support systems:

See their place in the whole of the campus system; and

See the campus system's place within society

If these sounds like admirable insights to have and people at universities don't have them, how do you install them; how do you change a paradigm? Meadows (1991) quote Thomas Kuhn[37], who wrote about the great paradigm shifts of science. In essence, the method is the following: You keep pointing at the anomalies and failures in the old paradigm, you keep speaking louder and with assurance from the new one, you insert people with the new paradigm in places of public visibility and power. You don't waste time with reactionaries; you work with active change agents and with the vast ground of middle ground of people who are open- minded.

The above can be boiled down to three key actions:

- Point to the failures of the old and speak with assurance about the new one

- Insert "new paradigm people" in places of public visibility and power

- Find and promote change agents

Interestingly, Lozano-Ros, in his master thesis on Education for Sustainable Development (2003), also point to the need of recognizing and fostering change agents and opinion leaders as being vital in achieving the necessary institutional change towards sustainability.

So what should be the new paradigm? This thesis will, at best, ignite a dialogue regarding the current paradigms. However, Orr (1991) has made a suggestion that is worth considering.

In describing what education must be for, he suggested six new principles to replace the current foundation of modern education. These make up a foundation to consider in creating the three pillars that echo a paradigm as will be described by Sterling (2003) after the description below. They are directly quoted in the box below.

[37] Kuhn's most renowned work "*The Structure of Scientific Revolutions"* he wrote while a graduate student in theoretical physics at Harvard

First, *all education is environmental education*. By what is included or excluded we teach students that they are part of or apart from the natural world. To teach economics, for example, without reference to the laws of thermodynamics or those of ecology is to teach a fundamentally important ecological lesson: that physics and ecology have nothing to do with the economy. That just happens to be dead wrong. The same is true throughout all of the curriculum.

A second principle comes from the Greek concept of *paideia*. *The goal of education is not mastery of subject matter, but of one's person*. Subject matter is simply the tool. Much as one would use a hammer and chisel to carve a block of marble, one uses ideas and knowledge to forge one's own personhood. For the most part we labor under a confusion of ends and means, thinking that the goal of education is to stuff all kinds of facts, techniques, methods, and information into the student's mind, regardless of how and with what effect it will be used. The Greeks knew better.

Third, I would like to propose that *knowledge carries with it the responsibility to see that it is well used in the world*. The results of a great deal of contemporary research bear resemblance to those foreshadowed by Mary Shelley: monsters of technology and its byproducts for which no one takes responsibility or is even expected to take responsibility. Whose responsibility is Love Canal? Chernobyl? Ozone depletion? The Valdez oil spill? Each of these tragedies were possible because of knowledge created for which no one was ultimately responsible. This may finally come to be seen for what I think it is: a problem of scale. Knowledge of how to do vast and risky things has far outrun our ability to use it responsibly. Some of it cannot be used responsibly, which is to say safely and to consistently good purposes.

Fourth, *we cannot say that we know something until we understand the effects of this knowledge on real people and their communities*. I grew up near Youngstown, Ohio, which was largely destroyed by corporate decisions to "disinvest" in the economy of the region. In this case MBAs, educated in the tools of leveraged buyouts, tax breaks, and capital mobility have done what no invading army could do: they destroyed an American city with total impunity on behalf of something called the "bottom line." But the bottom line for society includes other costs, those of unemployment, crime, higher divorce rates, alcoholism, child abuse, lost savings, and wrecked lives. In this instance what was taught in the business schools and economics departments did not include the value of good communities or the human costs of a narrow destructive economic rationality that valued efficiency and economic abstractions above people and community.

My fifth principle follows and is drawn from William Blake. It has to do with the importance of "minute particulars" and *the power of examples over words*. Students hear about global responsibility while being educated in institutions that often invest their financial weight in the most irresponsible things. The lessons being taught are those of hypocrisy and ultimately despair. Students learn, without anyone ever saying it, that they are helpless to overcome the frightening gap between ideals and reality. What is desperately needed are faculty and administrators who provide role models of integrity, care, thoughtfulness, and institutions that are capable of embodying ideals wholly and completely in all of their operations.

Finally, I would like to propose that *the way learning occurs is as important as the content of particular courses*. Process is important for learning. Courses taught as lecture courses tend to induce passivity. Indoor classes create the illusion that learning only occurs inside four walls isolated from what students call without apparent irony the "real world." Dissecting frogs in biology classes teaches lessons about nature that no one would verbally profess. Campus architecture is crystallized pedagogy that often reinforces passivity, monologue, domination, and artificiality. My point is simply that students are being taught in various and subtle ways beyond the content of courses.

Figure 9. Six new principles for modern education. Source: Orr (1991)

Sterling claims that an urgent need exists to evaluate and re-think education. He points to the failures of the current paradigm: *"…for nearly thirty years education has been identified in international and national policies as the key to addressing environment and development issues, and lately to achieving a*

more sustainable society. Yet most education daily reinforces unsustainable values and practices in society. We are educated by and large to 'compete and consume' rather than to 'care and conserve'." (Sterling 2001 p.21). Sterling also gives some directions on how to achieve the change in education that he believes is required. He argues that it involves developing three related bases, which echo the three dimensions of paradigm outlined above:

- A vision, that is, a philosophy and direction;

- An image of the desired state in terms of core values and ideas as a basis for discussion; and

- A design that allows realization of that image.

Obviously, when working in alignment, these have the potential to achieve significant change. There is, as Sterling also points out, nothing mysterious about these, but if they can be elaborated from an ecological perspective, it would provide a basis from which the dominant and conventional education paradigms could be evaluated and re-thought.

Finally, this thesis author believes that it is crucial for LU to *realise the uncertainty inherent in teaching sustainability*. How to best teach the subject in a way that is relevant and adequate to various subjects is likely to be an issue of debate and uncertainty. To overcome the barriers against this uncertainty the notion of the university as a learning organisation needs to be realised. The motivation for this is simple: waiting for scientific consensus or clear demands from future employers on how and why to make curricula changes towards sustainability will mean waiting until it is too late. The state of the world requires attention now. Therefore, it must be recognised that the journey towards a more sustainable development through the use of university curricula should start now. It should also be realised that we must accept uncertainty regarding how to include sustainability in curricula. Teachers should be allowed to be learners in this field, the motivation here is the same as in the above, if we wait until teachers see themselves as experts regarding this issue, it will be too late. Another motivation for this lies in a current paradigm. Teachers should not expect criticism as the only likely response for their efforts to change curricula in this direction, rather the attempt to learn while teaching should be welcomed, and treated as an *embryo of something that could be* as opposed to a hypothesis of how it should be done; as a hypothesis should be falsified if possible.

6 Conclusions and recommendations

In this chapter the conclusions of this thesis are presented by addressing the research questions. The findings that are applicable to other universities are also presented. Finally, some concluding comments related to the experiences from this thesis work are made.

Research Question 1

What are the currently perceived barriers to achieving this objective?

Answers to this question were sought in interviews. A root cause diagram[38] describing potential barriers against including sustainability in curricula was developed by the thesis author[39], one causal loop that is meant to portray part-reason why sustainability issues don't enter into curricula and a Cause and Effect figure displaying another part-reason[40]. These could be said to answer the first research question. The thesis does not intend to give a full and representative picture of the barriers currently perceived by the faculty, administrative staff and students but rather intends to collect the perceived barriers that were identified during interviews and present them in a comprehensible format. However, it is the belief of the thesis author that during the gathering and structuring of data in relation to this thesis, some understanding of these barriers has been achieved by the thesis author. In an attempt to present a picture of this understanding, the figure presented below has been developed.

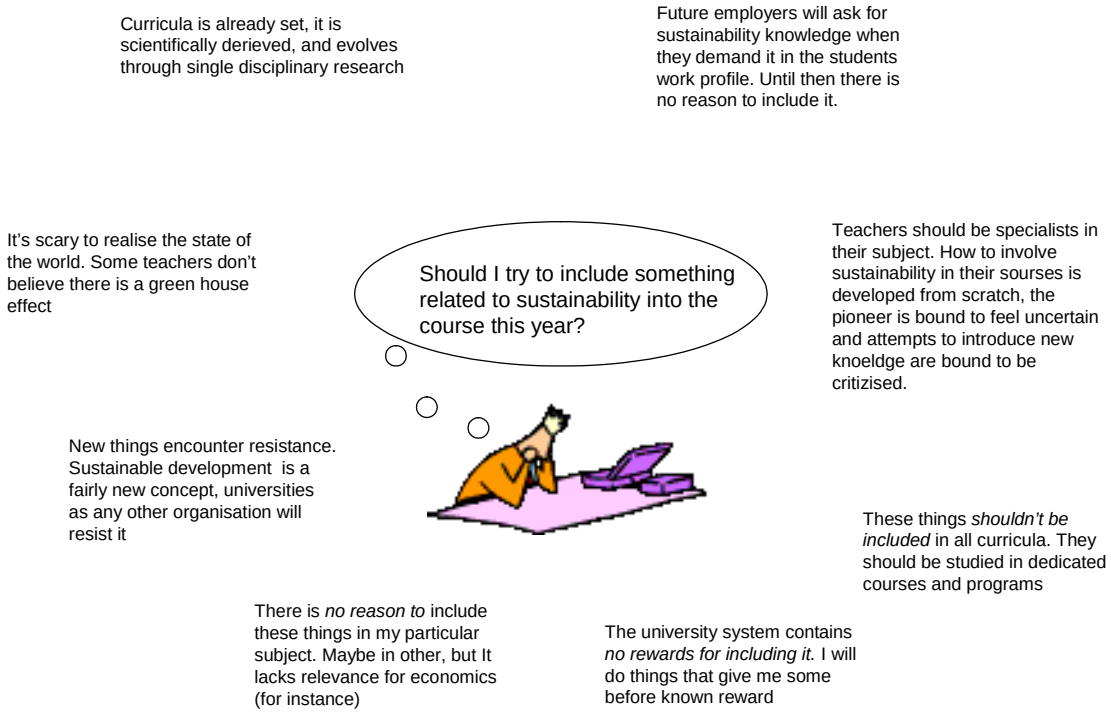

Figure 12 Barriers towards achieving inclusion of sustainability in curricula Source: Author

[38] Presented in figure 3.5

[39] First version based on interviews, second version after modifying it together with the environmental group.

[40] Presented in figure 4.1 and 4.2

Research Question 2

What are the leverage points in the Lund university system – where will it make most sense to intervene?

Meadows (1999) "Places to intervene in a system" provided a set of leverage points that were used as a base from which to understand the current status regarding these leverage points at LU. Chapter four; "Analysis of the University System", described this status at LU, regarding five potential leverage points. These five were ranked among the highest in order of effectiveness, according to Meadows. By providing this LU "system snapshot" of the leverage points below, the first Research Question was answered.

These leverage points were (in order of effectiveness):

The mindset or paradigm out of which the system arises.

The goals of the system

The power to add, change, evolve or organize the structure

The rules of the system

The structure of information flows

As the current status at LU regarding these was described, the implications of this status on achieving incorporation of sustainability issues into curricula were described. It was found that, *for every place in the system, the current status has elements that to some extent hinder this incorporation.*

Research Question 3

How could these leverage points be used in order to achieve the objective - how will it make most sense to intervene?

Chapter five; "Recommended interventions at LU", describes recommended interventions in the LU system. These are shown below, in relation to the above-mentioned leverage points. In developing these recommendations, consideration was taken with regards to the current status regarding these at LU. Consideration was also taken to develop ideas that correspond to the leverage points that rank highest in order of effectiveness. This answers Research Question 2.

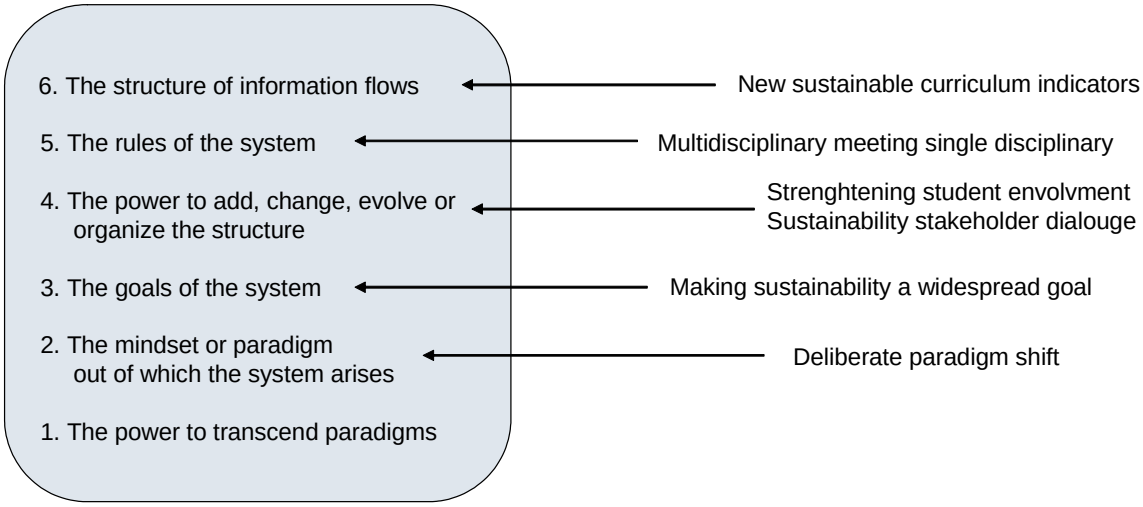

Figure 10. Places where the recommendations intervene in the system. Source: Author

Based on initial overview of the problem area at hand, four assumptions were brought into the research process. These are repeated below, together with concluding remarks as to their modification during the work. Apart from these assumptions, three new ideas evolved during the process. These new ideas are also described below, thus providing a full summary of the recommended interventions in this thesis.

- Stakeholder dialogue is one way to address the problem area (first assumption).

This assumption turned into a recommendation for LU on how to more actively engage in a structured dialogue regarding the university's sustainability progress, with the stakeholders of LU. This recommendation suggests a methodology for doing so and possible criteria of how to categorize the potential participants of this dialogue.

- Student involvement is another and conditions for this could be improved at LU (second assumption)

LU was found to have a fairly favourable climate for active student participation. Reasons for low involvement were found also outside the scope of LU (such as new, less favourable terms for student loans, making students eager to cut down extra curricular activities). However, this assumption turned into a number of recommended actions aimed to further facilitate student involvement regarding sustainability issues at LU.

- Indicators can be used to monitor the progress of inclusion of Sustainability into the diverse curricula throughout LU (third assumption)

In the cases analysed in this thesis, and several of them were pioneering universities with regards to sustainability reporting, the indicators regarding sustainability incorporation in curricula generally measured *sustainability content in curricula.* This motivated the recommendation to develop a questionnaire to assess the *Awareness, Willingness and Ability* of students to contribute to sustainability after leaving the university.

- *The certification of an Environmental Management System can have a unifying purpose and serve to institutionalise sustainability at LU.*

Whether it is purposeful to turn this assumption into a recommendation for a university depends on a number of case specific factors. To mention a few of these factors; a dedicated

group of people that will form the implementation group (a dedication that is likely to partly depend on the availability of funds), making sure that the certification process is seen as a top priority throughout the organisation (which is likely to be achieved through a clear top management commitment); EMS[41] and environmental knowledge support available (such as employees with ISO 14001 related knowledge or similar consultancy services). In the case of LU, this assumption turned out to be far from certain. Therefore, a general recommendation related to this assumption was not developed.

New ways to address the problem area, found during the process, were:

Multidisciplinary students meeting single disciplinary teachers

This recommendation involves using the "strengths model" (McKeown 2002) to assess current curricula content through a sustainability perspective and possibly add new items such as examples, cases and tools through engaging in inter curricula development together with students at a multi disciplinary masters program with clear sustainability links.

Making sustainability a widespread university goal

It was found that incorporating sustainability issues into curricula had *not entered as a recognized, prioritized goal* at LU. It was also found that the transformative function, as described by Sterling (2001) "To encourage change towards a fairer society and better world – the transformative function" was not recognized in the educational function of LU. This motivated recommended actions for how this could be achieved.

Deliberate paradigm shift

Some of the current higher educational paradigms are partially hindering the incorporation of sustainability in curricula. This recommendation is a suggestion that evaluation and re-thinking of the current paradigms might make the university system work swifter towards institutionalizing sustainability inclusion in curricula.

Conclusions applicable to other universities

For a university wanting to include sustainability in their curricula, it will make sense to assess the way the organization is currently functioning in relation to achieving this objective. Chapter 2; Analysis of the University System, is one way of performing this assessment. Advice on how to do it for each potential leverage point is provided below.

In assessing the current paradigm, three paradigms at LU and one as stated by Sharp (2002) can serve as assumed paradigms that could be tested and modified/falsified according to the reality of the University of study.

In assessing the current goal, Sterling's (2001) four main functions of a university can be used to assess which of these aspects the University of Study currently incorporates in its function.

Assessing the system's power to add, change, evolve or organize the structure, concerns asking how, where and what the system can add on to itself. In answering these questions in relation to sustainability incorporation in curricula, it is worth considering what finds the way into

[41] Environmental Management System

curricula, i.e. how is curricula changed, as well as who has the power to make curricula changes. At LU, it seemed that knowledge entered through employee demand and as a result of new subject-related knowledge with scientific value having been created. These can be used as possible pathways to test in the specific University of Study.

The rules of the system. At LU, the rules of the system in relation to the environmental work were set up in a command and control manner as stated in the environmental plan. If this is the case at the University of study, Emmanuel and Govindajanan's (1996) three steps of result control can be used as a base from which to structure the data. These steps are

1. Determine what result is desired.

2. Measure if it gets done compared with the pre-set standards.

3. Reward for achieving desired result or punish for not "so as to encourage the behaviours that lead to the desired result" (Emanuel and Govindajanan 1996 p. 112).

Assessing the structure of information flows to a large extent means assessing what gets measured and how. In relation to sustainability content in curricula, indicators can be used to measure the way this is going. Two things were looked for in this thesis, regarding the current structure of these, namely

- If they were leading or lagging i.e. did they provide an early or late warning signal?

- If they measured what we want them to measure?

These two questions can be used as a starting point from which to assess the current functionality of this structure in the University of Study. In measuring sustainability content in curricula, the three areas awareness, willingness and ability to contribute to sustainable development are suggested to provide base for developing these indicators. A questionnaire that can be used as a starting point for any university is also provided in the thesis. In measuring sustainability content in curricula, the three areas awareness, willingness and ability to contribute to sustainable development are suggested to provide base for developing these indicators. A questionnaire that can be used as a starting point is provided in appendix 7.

Finally, it should be said that the extent to which the system picture provided by this thesis author will actually lead to the recommendations suggested in this thesis having more chances of succeeding is something that is difficult if not impossible to determine today. However, it is the firm belief of this thesis author that a system conscious approach will tend to reveal some of the hindering and success forces at work in the system of study.

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Interviews – Short list

By phone

20040527 **Birgit Flening,** birgit.flening@se.ey.com, tfn 08-520 594 34, Accountant and Sustainability Director, Ernst & Young, Stockholm.(Wrote the evaluation of Lund University's environmental progress)

20040623 **Jens Mentzer,** jens.mentzer@miljo.gu.se, Environmental Coordinator, Gothenburg University

20040701 **Kaisu Sammalisto**, kso@hig.se, Dean of Environmental Management, University of Gävle

20040528 **David Lindegren,** Environmental consultant, Malmö municipality. Former employed to write environmental plan of LU.

20040602 **Anna Karlsson**, 070-6656540, ex. Chairman of Sustainable University, association of environmentally concerned students. Student at LU.

20040604 **Cecilia Billgren,** 046-2228332, Administrative Head of Chemistry department

2004-08-18 **Göran Broman**, goran.broman@bth.se, Professor at Blekinge Technical University

In person

20040602 **Göran Bexell**, goran.bexell@rektor.lu.se, President at Lund University

20040601 **Peter Honeth**, peter.honeth@rektor.lu.se, University Director at Lund University

20040601 **Johannes Persson**, johannes.persson@fil.lu.se, Head of division at the Philosophical institution. Former LU student.

Erik Persson, erik.persson@fil.lu.se, Environmental coordinator at the same institution

20040604 **Kerstin Gustafsson**, kerstin.gustafsson@bygg.lu.se, Environmental manager at LU

20040526 **Anna-Karin Dykes**, anna-karin.dykes@omv.lu.se, Dean at the institution for "Omvårdnad"

20040520 **Carola Jarnung**, carola.jarnung@bygg.lu.se, Environmental co-ordinator at LU, previous student at IIIEE.

200406 **Torbjörn Brorsson,** torbjorn.brorsson@iiiee.lu.se, Adjunct Professor, IIIEE and Senior Vice President of environmental affairs at Trelleborg AB. Former student at LU.

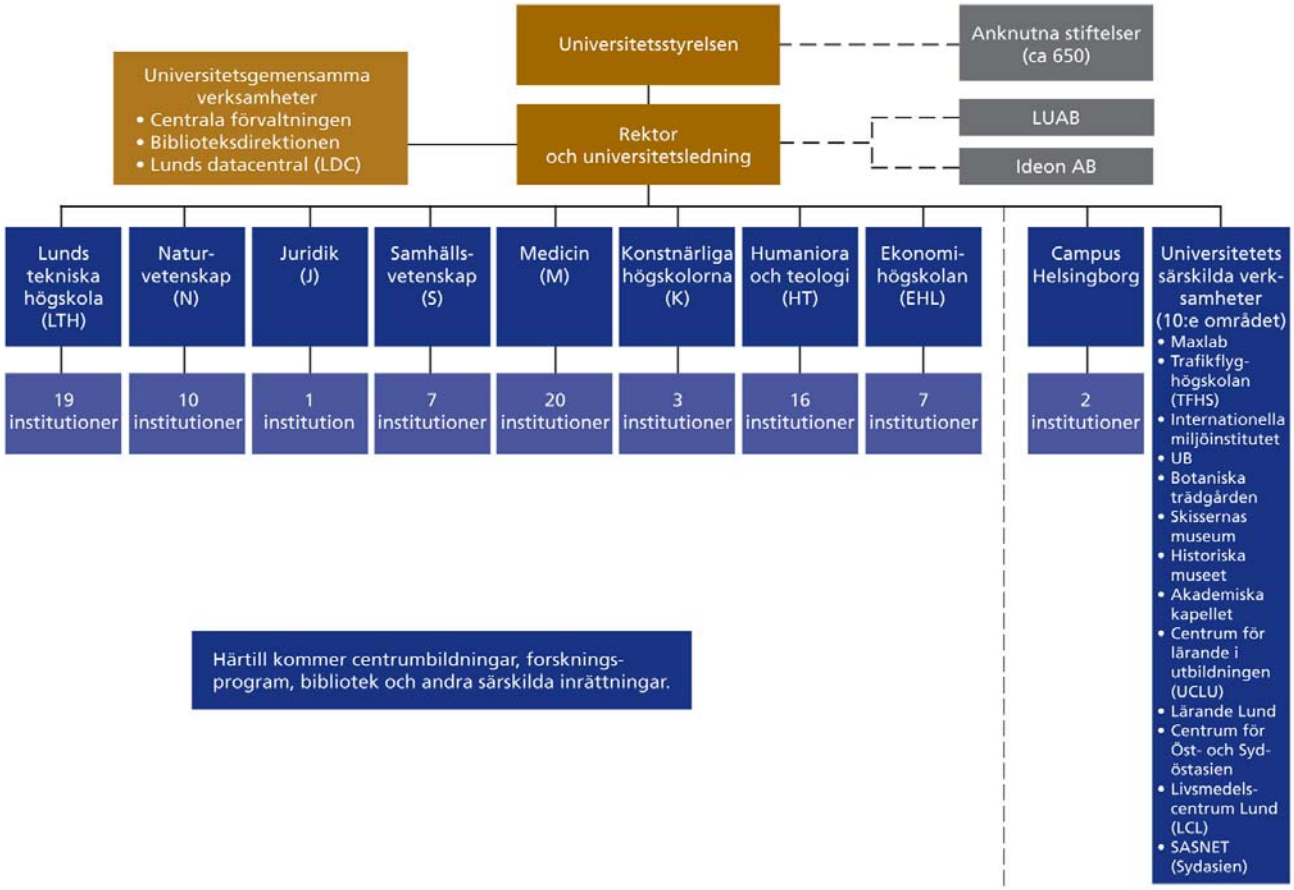
20040606 **Thomas B Johansson**, thomas.b.johansson@iiiee.lu.se, Director of IIIEE. Former LU student. Designed the first environmental course at LU in 1968.

20040714 **Lennart Olsson**, lennart.olsson@miclu.lu.se, Director of Centre for Environmental Studies at Lund University (MICLU) and researcher.

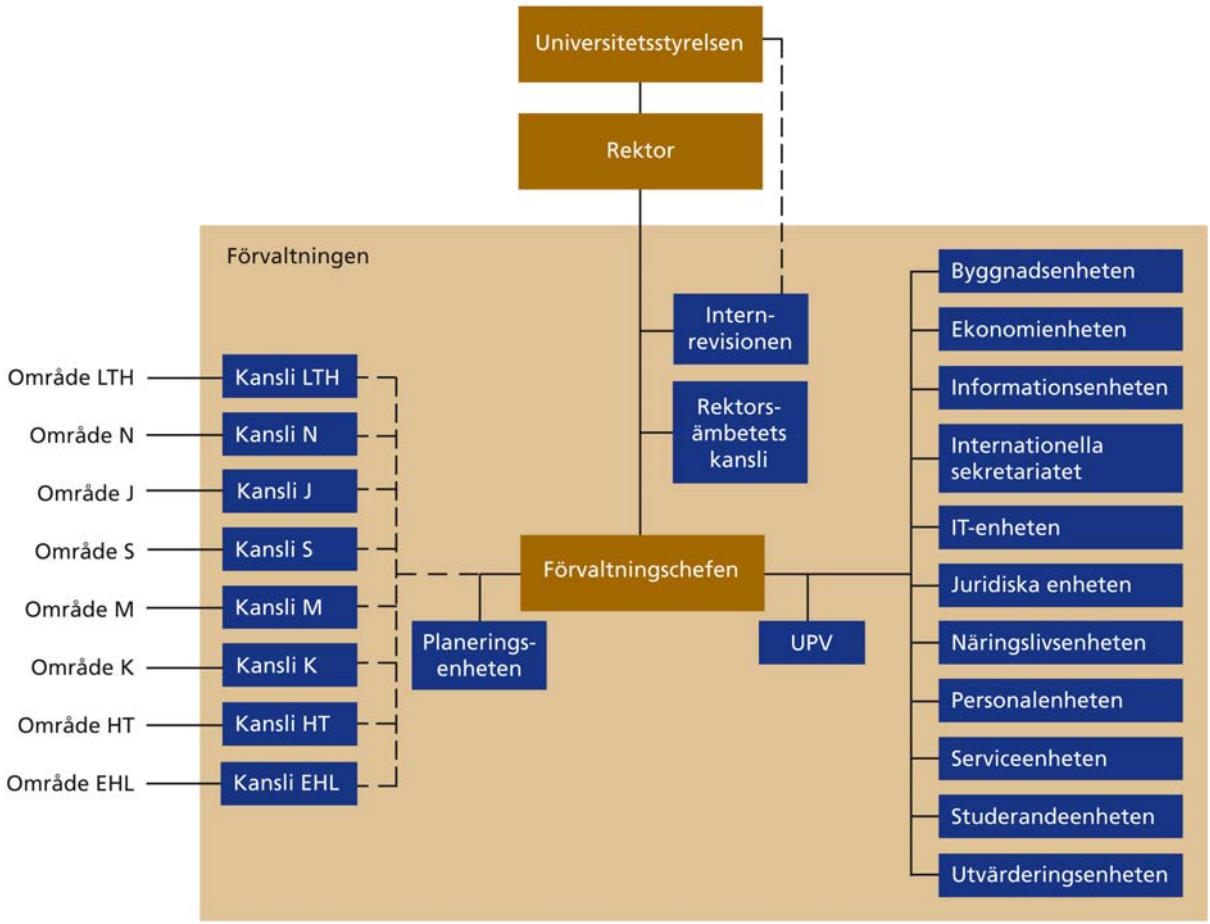
20040805 **Ingrid Järnefelt**, ingrid.jarnefelt@uclu.lu.se, Teacher and researcher at Lund Architect School.

Appendices

Appendix 1. Organizational diagram of Lund University



Appendix 2. Administrative Structure of LU



Appendix 3. Key Action Themes of the United Nations Decade of Education for Sustainable Development

(http://portal.unesco.org/education/admin 20040824)

- Overcoming Poverty
- Gender Equality
- Health Promotion
- HIV/AIDS
- Environment
- Water
- Rural Transformation
- Sustainable Consumption
- Sustainable Tourism
- Human Rights
- Intercultural Understanding
- Cultural Diversity
- Indigenous knowledge
- Media & ICTs

Appendix 4. A summary of The Environmental Diploma Concept at LU – 'The Frog'

'The Frog' is the diploma that is given to institutions that fulfil certain specified criteria[42]. These criteria were developed to be crucial for the environment in general and for meeting Lund University environmental goals in particular. The criteria are given a number of points and the institution has some freedom in choosing which requirements it wants to meet/not meet and still receive the diploma (a way of allowing them to grab "the low hanging fruit"). For a majority of the requirements this point flexibility is allowed but a few requirements are considered obligatory.

Overall, requirements can be divided as concerning

- Documentation and routines (routines should be gathered in a document available to all, deviations from the goals should be followed up etc.)
- organization (an environmental coordinator needs to be assigned, with knowledge about waste routines etc, acting as support for the others)
- Performance (light bulbs should be low energy).

Examples of obligatory requirements:

- An environmental policy should be in place.
- Responsibility for inner and outer environment should be assigned.
- An approved organizational plan for the environmental work should be in place.
- Institution should have environmental goals set for at least two environmental aspects (out of a total 6 that are identified for Lund University as a whole).
- The employees should have attended basic environmental education (is supplied by the environmental group).

Example of point-based (flexible) requirements:

- Transports related (a document on how staff gets to work should be in place, for trips longer than 150 km a car with good environmental performance should be used, bikes should be made available for staff..)
- Energy (all computer screens are shut off when people are not working, light bulbs are low energy)
- Waste (Printer cassettes are recycled, students are given the possibility to sort their waste)
- Raw material (employees do not use disposables such as plastic mugs, employees have the possibility to make double-sided print-outs from their computers, all employees are given ecological coffee)

[42] A full list of the criteria is available at http://www.lu.se/bygg/Miljo/kriteriedokument.pdf. (20040827)

- Procurement (Environmentally friendly paper for printing and copying are used, institution buys environmentally friendly dish powder, an inventory is made regarding procurement)
- Chemical, biological etc labs (A chemical inventory exists, routines for regular control of eye shower and emergency shower exist, routines ensuring that no substances are emitted to the sour).

Appendix 5. Gothenburg's view of ISO 14001

(Based mainly on interview with environmental Co-ordinator Jens Menzer of Gothenburg University)

- For them it has worked as a unifying goal.
- They have had a STRONG initial commitment from president and director, which has made it a lot easier.
- It has served the purpose of decentralizing environmental work but the environmental group has implemented the EMS with several modifications that makes it more decentralized.
- Money has been allocated centrally for the external environmental audits of institutions. Has probably made it easier.
- They are on their way to certifying the whole university by 2005, but it seems unlikely that they will succeed (many departments remain).
- Gothenburg pays 40.000/audit of a department of approx. 300 employees.

Appendix 6. The main topics of the interviews

The following topics were always addressed if not stated otherwise:

- Success and Hindering factors in implementing sustainability issues in higher education
- How to keep momentum of this work

By phone

Birgit Flening, Accountant at Ernst & Young (Wrote the evaluation of Lund University's environmental progress)

Main topics

- How did she approach the task?
- Conclusions
- Any impressions "off the written report"
- What is the problem area?

Jens Mentzer, Environmental Coordinator, Gothenburg University

Main topics

- Organizational structure, culture and differences/similarities with Lund
- Stakeholder dialogue
- ISO 14001
-

Kaisu Sammalisto, Dean of Environmental Management, University of Gävle

Main topics

- How is sustainability implementation in curriculum measured at Gävle and elsewhere?
- EMS in a university setting

Lund University related

By phone

David Lindgren, Environmental consultant at Malmö municipality. Wrote the underlying report that lead to Lund University's first environmental policy, goals and plan in 1998). Also studied at LU.

Main topics

- Why did he think the implementation had failed
- Potential thesis area of interest
- Student involvement

Anna Karlsson, ex chairman of Sustainable University, association of environmentally concerned students (Wrote the student report evaluating Lund University's environmental progress). Studying at LU.

Main topics

- Student involvement
- Their relationship with management

Cecilia Billgren, Administrative Head of Chemistry department (The chemistry department does no systematic environmental work today)

- Reasons for not being more active regarding environmental issues
- Controllable costs
- Key concerns for them in attracting students

In person

Göran Bexell, President at Lund University

Main topics

- His role, his means to govern
- Lund University structures, culture
- The role of education

Peter Honeth, University Director at Lund University (Has been director since the current environmental strategy was deployed in 1998)

Main topics

- The process of setting goals, policy, plan last time
- What could/should be done differently
- His role, the role of University management
- The role of education

Johannes Persson, Dean at the Philosophical institution (also studied and did his PhD at LU).

Erik Persson, Environmental coordinator at the same institution (The institution has recently entered the process of getting the Lund University environmental diploma)

Main topics

- Reasons for getting into environmental work
- Their view of Lund university structures, culture
- Controllable costs

Carola Jarnung, Environmental co-ordinator LU

Main topics

Same as interviewee below

Kerstin Gustafsson, Environmental manager LU

Main topics

- The progress since the start of her work
- The environmental departments place in the organization, culture, hierarchy
- Key Concerns for the future

Anna-Karin Dykes, Dean at the institution for "Omvårdnad"

(The institution recently got the Lund University environmental diploma)

Main topics

- What made them do it?
- How was the process of getting the diploma?
- Key Success Factors

Torbjörn Brorsson, Adjunct Professor, IIIEE and Senior Vice President of environmental affairs at Trelleborg AB. Studied and did his PhD at LU.

Main topics

- ISO 14001
- MICLU
- Lund University people and mentality

Thomas B Johansson, Director of IIIEE. Studied at LU and, as a student, designed the first environmental course ever at LU in 1968.

Main topics

- The history of environmental issues at LU.
- The power to change curricula
- Ways to implement sustainability in curricula

Lennart Olsson, Director of Centre for Environmental Studies at Lund University (MICLU), the centre that has the formal mission to incorporate sustainability issues in curriculum and research. Also a part time researcher at LU, focusing on climate change and developing countries.

Main topics

- The history of implementing environmental & sustainability into curriculum
- The LU system; rewards, root causes of problems etc.
- Ways to implement sustainability in curricula

Ingrid Järnefelt, Teacher and researcher at Lund Architect School.

Main topics

- Current status on sustainability in architect education
- Who controls curriculum
- What is needed to move ahead

Appendix 7. Feedback on student sustainability knowledge assessment

Feedback from Diane Holt

Principal Lecturer in Environmental Management at Middlesex University Business School, UK. This school has made a questionnaire that is in some parts related to the one in this thesis. These are some of her comments on the questionnaire that were not incorporated in the questionnaire but nevertheless make sense to take into consideration in developing a ready questionnaire, which, as pointed out by Holt, could be done in a focus group.

Regarding awareness it might be easier to use incidents that have caused environmental harm (such as Chernobyl) and perhaps also phenomena such as the greenhouse effect and acid rain and investigate student awareness regarding these events and phenomena.

To complement a definition of sustainable development that needs to be placed in the beginning of the questionnaire, it might be of interest to have some kind of sliding scale set of concepts to see what each individual respondent perceives sustainable development to be. This might also add to the understanding of students understanding of the concept. (Authors remark)