

Nondimensional Shape Optimization of Nonprismatic Beams with Sinusoidal Lateral Profile

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SUSTAINABLE HEALTHCARE AS A FUTURE DRIVING FORCE FOR SWEDISH ECONOMY

# SUSTAINABLE HEALTHCARE

– A NATIONAL SWEDISH INNOVATION AGENDA –



2015

# Sustainable Healthcare: our definition

## INTRODUCTION

Medical care in the Western world accounts for between 8% and 17% of GDP (according to the WHO), depending on the country. In Western Europe, the average is about 10% of GDP. A sector of this size inevitably has **a significant impact on the environment.**

Healthcare activities, due to their specific nature, affect the environment in different ways (waste production, use of chemicals, increasing use of disposable materials etc.). These impacts often are almost exclusively due to healthcare (pharmaceuticals in the environment, infectious waste, different sources of radiation, antibacterial materials etc.).

Over the past 10 years, interest in Sustainable Healthcare has grown globally. **Sweden is considered one of the world leaders in terms of Sustainable Healthcare.** One of the reasons is that since the 60s, Sweden has been a forerunner in the introduction and implementation of environmental legislation as well as the concern in sustainability issues, that has also been reflected in the healthcare sector.

Sustainable Healthcare has an untapped export potential. Sweden has made great efforts in the sustainability area and is in most cases among the top players in the world, but this has not been exploited to its full potential as a lever for increased export. In this Innovation Agenda we elaborate the issue of the unrealized potential of Sustainable Healthcare.

## DEFINITION OF SUSTAINABLE HEALTHCARE

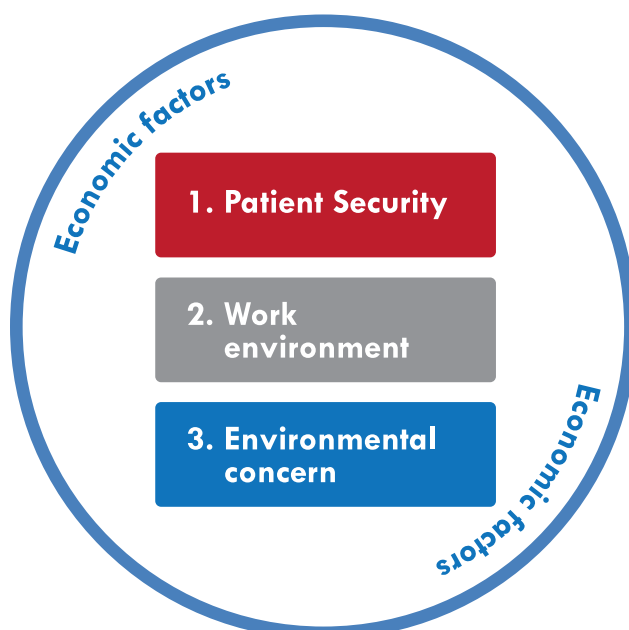
The concept of Sustainable Healthcare includes several aspects and spans over various disciplines and areas.

Sustainable Health	Sustainable Healthcare	Environmental Health
<ul style="list-style-type: none"> <li>• Disease prevention</li> <li>• Promotion of healthy lifestyles</li> <li>• Public health issues</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable hospitals</li> <li>• Sustainable behaviour</li> <li>• Sustainable technologies</li> </ul>	<ul style="list-style-type: none"> <li>• Disease causation</li> <li>• Effects of environment on health</li> <li>• Diseases as results of environmental impact</li> </ul>

The focus of the Innovation Agenda is on the environmental impacts of healthcare buildings and on the activities that take place in them. In this Agenda, we distinguish Sustainable Healthcare from Sustainable Health which relates to prevention and public health. Disease prevention activities help reduce healthcare impacts, however they are not considered in the Agenda. A further distinction should be made between Sustainable Healthcare and Environmental Health which focuses on the effects of environmental impacts on human health.

*“ Sustainable healthcare concerns the care of a patient with as little negative impact on the environment. ”*

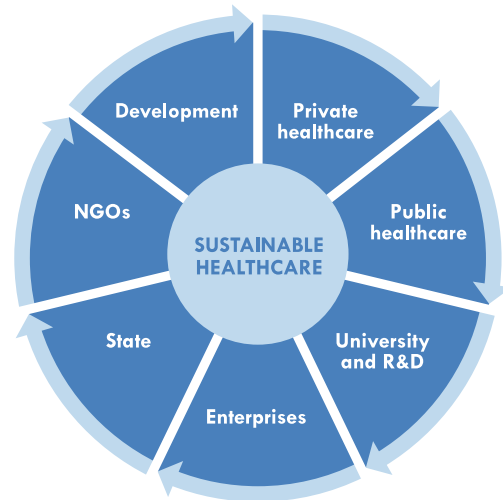
The model below illustrates the concept of Sustainable Healthcare and the correlations of its aspects. This model was developed within the Swedish-Danish EU project *Green Healthcare Öresund* (2008). It outlines the order of priorities for tackling environmental issues in healthcare. Patient safety always comes first followed by working environment, and last but not least environmental concern. This means that environmental work should not interfere with work environment and patient safety.



# Swedish stakeholders in Sustainable Healthcare

## HEALTHCARE INNOVATION

Healthcare innovation involves a wide range of stakeholders from different sectors and scientific fields. Even though they develop innovation in different ways, relatively few address sustainable development, which highlights the importance of a more comprehensive understanding of sustainability in healthcare innovation. Outside the well-established technological innovation systems, almost every Swedish hospital, county and region has been involved in national/EU projects and other activities related the environmental that aim at improving sustainability in healthcare.



## SUSTAINABLE HEALTHCARE INNOVATION

Sustainable Healthcare is an interdisciplinary cross-sectoral area. Many different stakeholders, both from public and private sectors, are interested in or affected by Sustainable Healthcare.

- **Public stakeholders:** research centers, municipalities, regions, counties, healthcare administrations, universities, national boards etc.
- **Industrial stakeholders:** companies working in the healthcare sector or other sectors with potential applications in healthcare. Industrial stakeholders include private healthcare, Life Science companies, Med Tech and other companies with sustainable solutions applicable to hospitals (e.g. Cleantech companies).

- **Networks, professional organizations and Science Parks:** organizations in the healthcare sector which contribute directly or indirectly to Sustainable Healthcare innovation.
- **International organizations:** organizations that bring together different stakeholders of Sustainable Healthcare at an international level. NGOs frequently drive forward sustainability issues in healthcare.

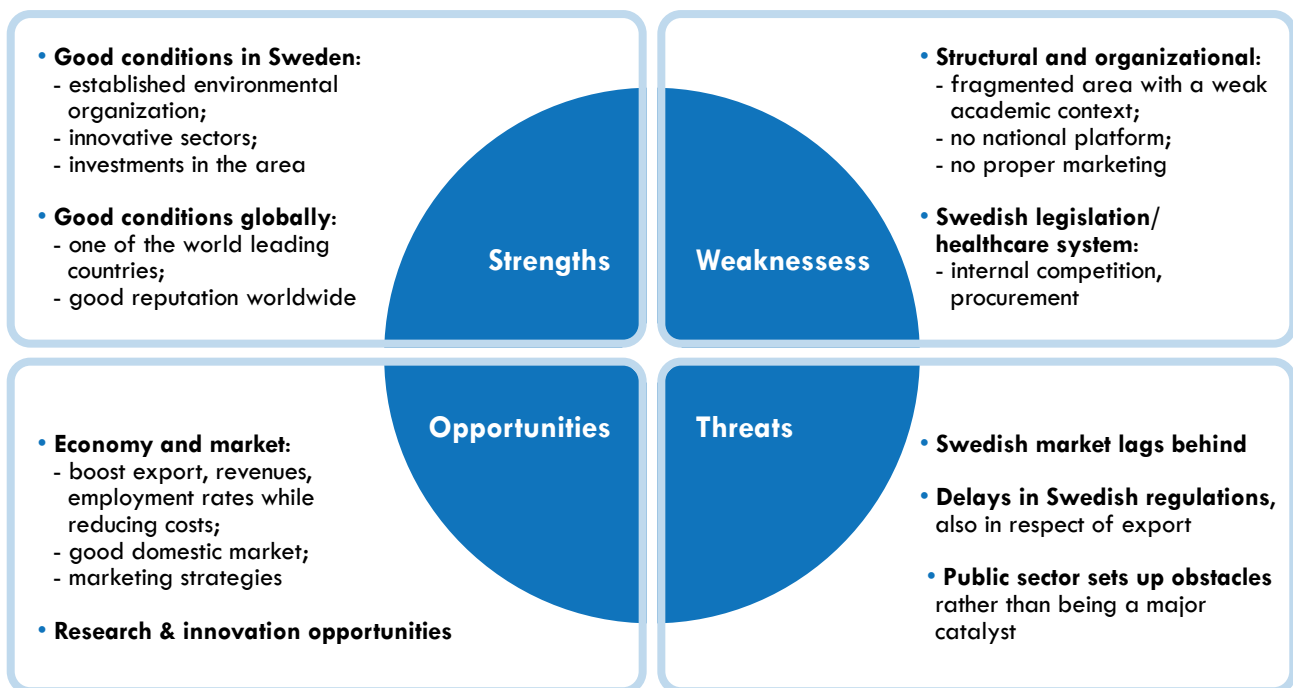
As the model below illustrates, Sustainable Healthcare is a horizontal framework as compared to the sector-specific approach used in industry classification. There is no Sustainable Healthcare industrial sector: different solutions, products and innovations span over a wide range of sectors.

Sustainable hospitals	Good environmental performance	Good environmental performance	Applications for healthcare	Good sustainability performance and applications for healthcare	Smart locally produced organic food	Support/boost sustainability performance	Management system, reporting, training
Construction industry	Life Science	Med Tech	Clean Tech	"Regular" Companies	Food Industry	ICT	Management

# Export potential: a SWOT analysis of Swedish Sustainable Healthcare

Each of the many organizations involved in the work on the Innovation Agenda provided its own view of the challenges and opportunities that Sweden has in the field of Sustainable Healthcare. The SWOT analysis presented below is partly based

on the experience from Sustainable Healthcare of the project management and the report authors, partly on the interviews and meetings with various stakeholders conducted within the work on the Innovation Agenda.



## SWEDISH BEST PRACTICES IN SUSTAINABLE HEALTHCARE

There are many ongoing long-standing projects in the area of Sustainable Healthcare that bring together universities, businesses, counties and span across borders for better efficiency. Sustainability aspects that these projects focus upon differ: energy efficiency, resource optimization, biomaterials, sustainable transportation etc.

The following three examples show the depth and width of Swedish research:

- **MistraPharma:** the project aimed at identifying pharmaceuticals that can affect aquatic ecosystems and managing the risk for growing antibiotic resistance in the environment ([www.mistrapharma.se](http://www.mistrapharma.se))
- **PVCfreeBloodBags:** the purpose of this cooperation of public healthcare institutions and plastic manufacturers is to produce a PVC-free blood bag that follows the required specification and contains no hazardous substances ([www.pvcfreebloodbag.eu](http://www.pvcfreebloodbag.eu))
- **CLIRE - Climate Friendly Health and Care:** the project includes six sub-projects that aim to demonstrate how healthcare can work with climate change in different ways, from energy efficiency in hospital buildings, to greenhouse gas reduction in supply chain. ([www.clire.se](http://www.clire.se))

# Conclusions and future objectives



## STRUCTURAL CONCLUSIONS

- The **sector-specific approach** which is a most widely used approach is **not suitable for a cross-sectoral area** such as Sustainable Healthcare. In most cases, the focus on a specific sector is an obstacle to interdisciplinary collaborations and projects.
- There is a high demand for **an independent platform for Sustainable Healthcare** with the capacity to bring together all stakeholders, to facilitate meetings, events or other activities where companies, researchers and healthcare institutions can meet to discuss challenges and opportunities for cooperation.
- **Stakeholders lack coordination and often are unaware of their role in Sustainable Healthcare.** Companies lack knowledge about the work and needs of the healthcare sector. The academia lacks understanding of the challenges within the area of Sustainable Healthcare. It is necessary to give all stakeholders a broader view of Sustainable Healthcare and help them identify their own roles in the area.
- Cleantech companies do not have the same opportunities to test, validate and commercialize their products/services for healthcare, as the Life Science industry. However, **Cleantech industry has a significant potential for further development.**
- Purchasing organizations lack information on **sustainability requirements that are applicable to procurement processes**, as well as innovations that are available on the market.

## EXPORT-RELATED CONCLUSIONS

- Sweden is well-known abroad as an expert in Sustainable Healthcare. However **the export potential of the Swedish expert knowledge is not fully realized.** This concerns not only Swedish environmental technology, but above all the systematic approach, management, know-how etc.
- **Swedish companies with innovative solutions for Sustainable Healthcare target foreign customers** rather than the domestic market. The Swedish market is considered to be much more complex and difficult to access, and therefore less profitable.
- Sweden has been at the forefront of promoting sustainability in healthcare for many years, but today Norway and Denmark are investing heavily in environmental technologies and green innovations in the healthcare sector. Consequently, **Sweden could eventually lose its leading position.**

## COMMUNICATION-RELATED CONCLUSIONS

- Many companies do not consider healthcare as a potential customer due to lack of knowledge about how the sector operates. Therefore, **better communication and simple activities (e.g. study visits and meetings with healthcare procurement) can make a significant difference.**
- Many domestic stakeholders are unaware of Sweden's leading position in Sustainable Healthcare. As a result, **national export policies often neglect the area that could provide high export revenues due to lack of knowledge.**
- According to a number of companies involved in the work with the Agenda, the healthcare sector is often sceptical about new solutions that business offers. **Business needs more opportunities to communicate and test its solutions** while hospitals need risk-minimizing warrants for testing an innovation.
- Healthcare, industry, academia and other sectors seek **meeting places at local, regional, national and international level** where all Sustainable Healthcare stakeholders can meet, discuss current and future challenges and share knowledge.

# Results: the Nordic Center for Sustainable Healthcare

The work with the Agenda highlighted the high need for an independent platform that would bring together all stakeholders in the field of Sustainable Healthcare. Following this conclusion, Vinnova extended the project and provided additional funding to start an interdisciplinary center focused on Sustainable Healthcare.



## PURPOSE AND TASKS

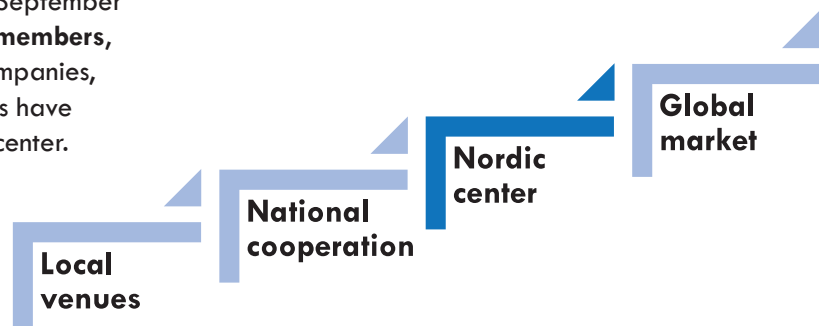
The Nordic Center for Sustainable Healthcare (NCSH) is an intersectoral arena for stakeholders, organizations, projects and expert knowledge in the sector of Sustainable Healthcare. **NCSH is an umbrella organization for existing companies, projects and competence.** Our ambition is that the NCSH shall generate collaboration and ideas, and gather actors from the healthcare sector.

The NCSH shall help the healthcare sector and its suppliers of products and services to **reduce their environmental impacts**, while **increasing export and employment in healthcare** in Scandinavia. Moreover, the reputation of Scandinavia as the world's leading region in terms of Sustainable Healthcare will be further strengthened.

## A GROWING NETWORK

The **kick-off meeting for the NCSH was held on May 28th, 2015** at Medeon in Malmö, combined with the final conference for the Innovation Agenda. Over 60 participants from business, public sector, universities and municipalities arriving from Italy, Belgium, Sweden, Norway and Denmark attended the meeting.

The interest in the NCSH is vast, and the number of members is rapidly increasing: in early September 2015, **the NCSH already had over 20 members**, and many national and international companies, as well as counties, regions and hospitals have expressed a strong intention to join the center.



# Contributors to the Innovation Agenda

*“ More than 200 organizations have contributed to the Innovation Agenda. ”*

The working group for the Innovation Agenda was led by TEM Foundation in collaboration with Swecare, Lund University and a number of other partners. The work that included many activities (interviews, workshops, meetings, conferences etc) was carried out in synergy with other initiatives and projects related to Sustainable Healthcare.

## FOCUS AREAS

The work on the Innovation Agenda included three principal focus areas:

### Focus Area 1: UNDERSTANDING THE MARKET

- What innovations does healthcare need?
- What areas are overlooked?

### Focus Area 2: MARKET COMMUNICATION

- How do hospitals/regions, companies, and universities communicate their needs and offers?
- How can expertise of the healthcare sector (the customer) be coupled with expertise of companies (the supplier) in terms of Sustainable Healthcare?
- What is needed to improve collaboration between healthcare institutions with universities and companies?

### Focus Area 3: ACCESS TO HEALTHCARE MARKET

- How can companies get access to hospital environments for product testing and development?
- What kind of support do SMEs need to scale up and reach out to foreign markets?
- What needs to be done to boost export of Swedish Sustainable Healthcare solutions?

## PARTICIPANTS

The contents of this report is a result of the work with the Innovation Agenda that involved more than **200 organizations from business, hospitals, municipalities, counties, regions, cluster organizations, NGOs and academia.**

In order to make a balanced and comprehensive analysis of the state of the art in Sustainable Healthcare, these organizations participated in a series of activities where they gave answers and suggestions within the 3 focus areas of Sustainable Healthcare. The feedback from the participants provided the basis for the analytical part of the Innovation Agenda.

## DIFFERENT ENQUIRY CHANNELS

- **8 national meetings** with more than 100 organizations involved;
- **4 international meetings** held in Norway, the United Kingdom, Germany and Sweden (with participation of foreign ambassadors);
- **2 workshops** with more than 50 participants;
- **16 interviews** with key stakeholders in the area of Sustainable Healthcare;
- **600 contacts** in the NCSH mailing list;
- **more than 3000 contacts** through TEM and Swecare mailing lists.





## A NATIONAL INNOVATION AGENDA FOR SUSTAINABLE HEALTHCARE



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