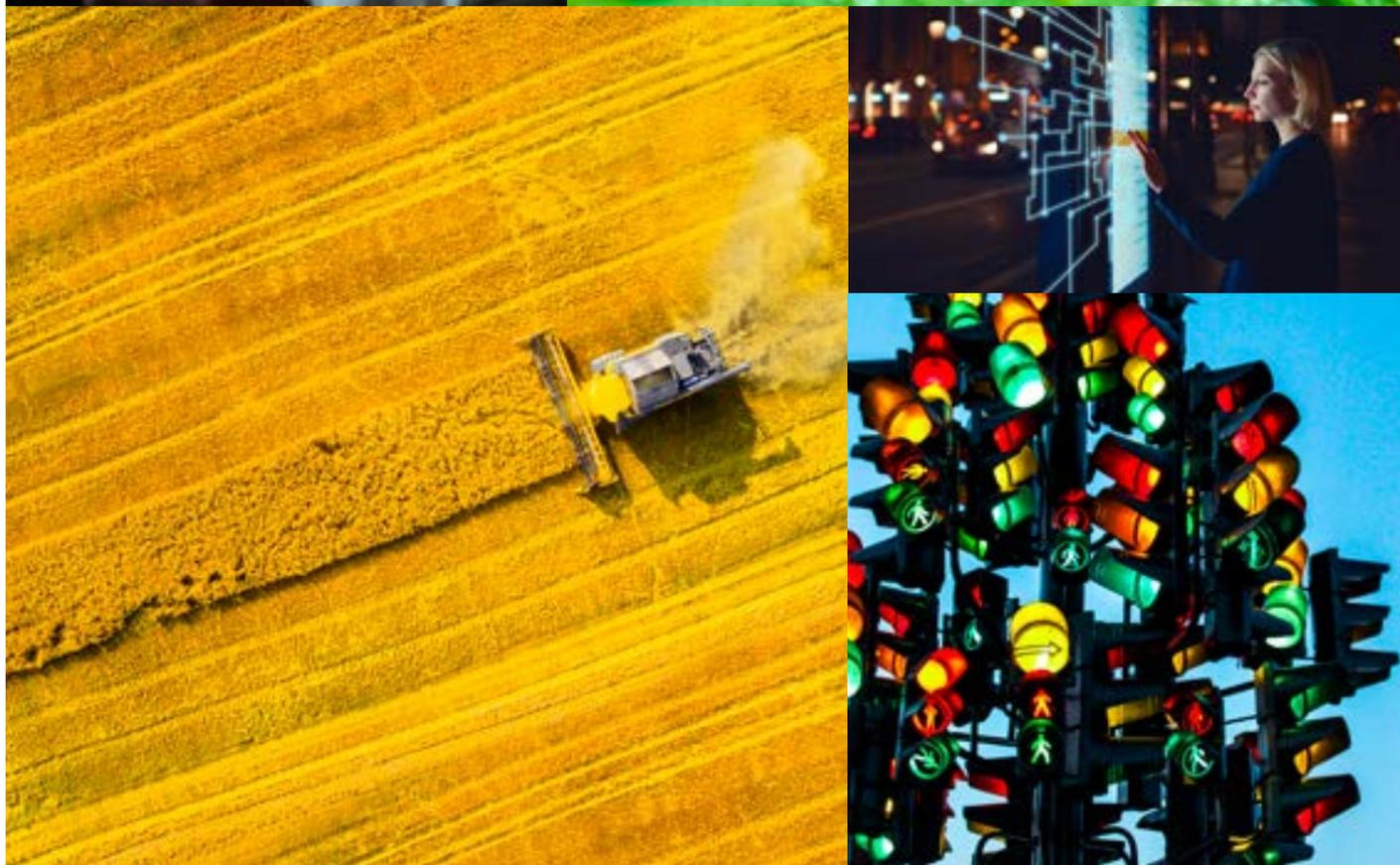




# UNDERSTAND, EXPLAIN, IMPROVE

THEMATIC COLLABORATION INITIATIVES 2017-2022





## Understand, explain, improve

Significant societal challenges within our health, our environment and our society have made it increasingly important for universities, together with surrounding stakeholders, to explore new solutions. Lund University has a unique opportunity to contribute with its research and education.

For a long time, the University has had many collaborations enabling utilisation of its knowledge and its own development through tight interaction in dialogue with societal stakeholders. Extensive subject knowledge serves as a foundation – and it is this breadth, specifically, that is the University's greatest strength. Through this, we can participate in multifaceted collaboration around the distinct challenges of today, which demand significant subject expertise to find solutions.

To create incentives to collaborate, stimulate and facilitate forms of collaboration and new interdisciplinary collaborations within and outside the University, we have launched special thematic collaboration initiatives through competitive calls for funding. These bring researchers together from at least three faculties and at least one external partner in new initiatives focused on future challenges. The investment of close to SEK 60 million is significant. The initiatives facilitate conditions, not just for collaborations, but also for the University to have a joint focus.

On the following pages, there are descriptions of the eleven initiatives already launched. We have great hopes that these collaboration initiatives will collectively work with the University's aim to understand, explain and improve our world and the human condition.

**Bo Ahrén**  
**Pro Vice-Chancellor with special responsibility for external engagement at Lund University**

**EDITOR AND GRAPHIC FORM**  
 Bodil Malmström  
 Cooperation office  
 Research, Collaboration and Innovation  
 Lund University

**TEXT**  
 Catrin Jakobsson, Noomi Egan, Bodil Malmström and Pia Romare

**PHOTO**  
 Kennet Ruona, Johan Bävman, Gunnar Menander, Erik Andersson, Salar Haghigatafshar. Catrin Jakobsson, Bodil Malmström and Shutterstock

**PRODUCTION**  
 Print: Mediatryck, Lund University march 2019  
 Paper: Cover: CVG silk 150 g. Interior: CVG silk 115 g.

## Innehåll

Big Science and Society .....	4
Heritage of Migration and Mobility in a Democratic and Inclusive Society .....	8
A Social Rights and Social Policy Perspective on Housing for the Ageing Population .....	12
Circular Biobased Economy .....	16
Together Stepping into Tomorrow's Classroom .....	20
LUWater .....	24
Narrating Climate Futures .....	27
Intelligent Intelligence .....	30
LU Food Faculty .....	34
e-Health@lu.se: Joining Forces for Sustainable e-Health .....	37
The Future of Drones .....	40
Register of the initiatives .....	44





Arrivals and Departures board

Destination	Platform	Time
Stockholm	1	10:15
Uppsala	2	10:30
Åkersberg	3	10:45
Åkersberg	4	11:00
Åkersberg	5	11:15
Åkersberg	6	11:30

↑ Spår 2-6    ♿    ♿    ♿  
← Väntsal    ♿    ♿  
Spår 1    ♿ →  
Ersättningstrafik    ♿ →

Creating a smoother start for Max IV and ESS

►The MAX IV Laboratory and the European Spallation Source, ESS – two world-class research facilities are being set up in Lund. Research at MAX IV has been underway since 2016 and ESS is opening its user programme for researchers in 2023. Is it now just a matter of waiting for a breakthrough and completely new research findings within medicine, biology, geology and nanotechnology? Is it that simple?

“No. Often there is too much confidence placed in large research facilities being enough in and of themselves. That they attract expertise and create a strong research environment. However, it is not quite as simple as that”, says Olof Hallonsten, researcher at the Department of Business Administration at Lund University and coordinator of the collaboration initiative BISS - Big Science and Society.

#### SWEDISH CONTEXT

BISS is researching the conditions required by MAX IV and ESS to fit into the Swedish context. What is necessary for these facilities to be used in the best way possible; and how are the best conditions achieved for the operations to run efficiently and provide positive social impact, in the broad sense?

“To position ESS in Lund was essentially a political decision. The whole process has taken approximately 10 years, however, unfortunately during this time little thought has been given to the fact that investments in other areas such as infrastructure, development of expertise, and changes to regulations are also needed.”

#### INDIVIDUAL NEEDS AND SOLUTIONS

He says what we must do now is make the best of the situation. And, with BISS, pave the way for practical solutions based on the requirements of academia and businesses.

Because, according to Olof Hallonsten, it is neither desirable nor feasible to simply look at how other research facilities, such as those in Grenoble in France and Hamburg in Germany, have proceeded. This is because the solutions have to suit both the Lund and national contexts, and that in the aforementioned cases there were already structures in place that could take on the facilities.

#### SIGNIFICANT CHALLENGES

“The challenges of establishing such large research facilities are many”, says Olof Hal-

lonsten. “They consist of everything from data management and interfaces to industrial research environments, to tax regulations and labour migration in order to recruit staff.”

#### IMPROVED INCLUSION

As an academic collaboration initiative run by researchers at Lund University, BISS is completely independent of all stakeholders. The goal is to contribute constructively, starting from a deeper and broader understanding of the relationships between advanced research facilities and wider society, to an improved inclusion of ESS and MAX IV in society.

The main mission of BISS is to contribute long-term sustainable solutions and perspectives on challenges and issues outside topical considerations in politics, the exercise of public authority and industry.

The initiative also benefits from relevant international and historical comparisons, not least the long history of the MAX Laboratory in Lund.

#### SPECIFIC MEASURES

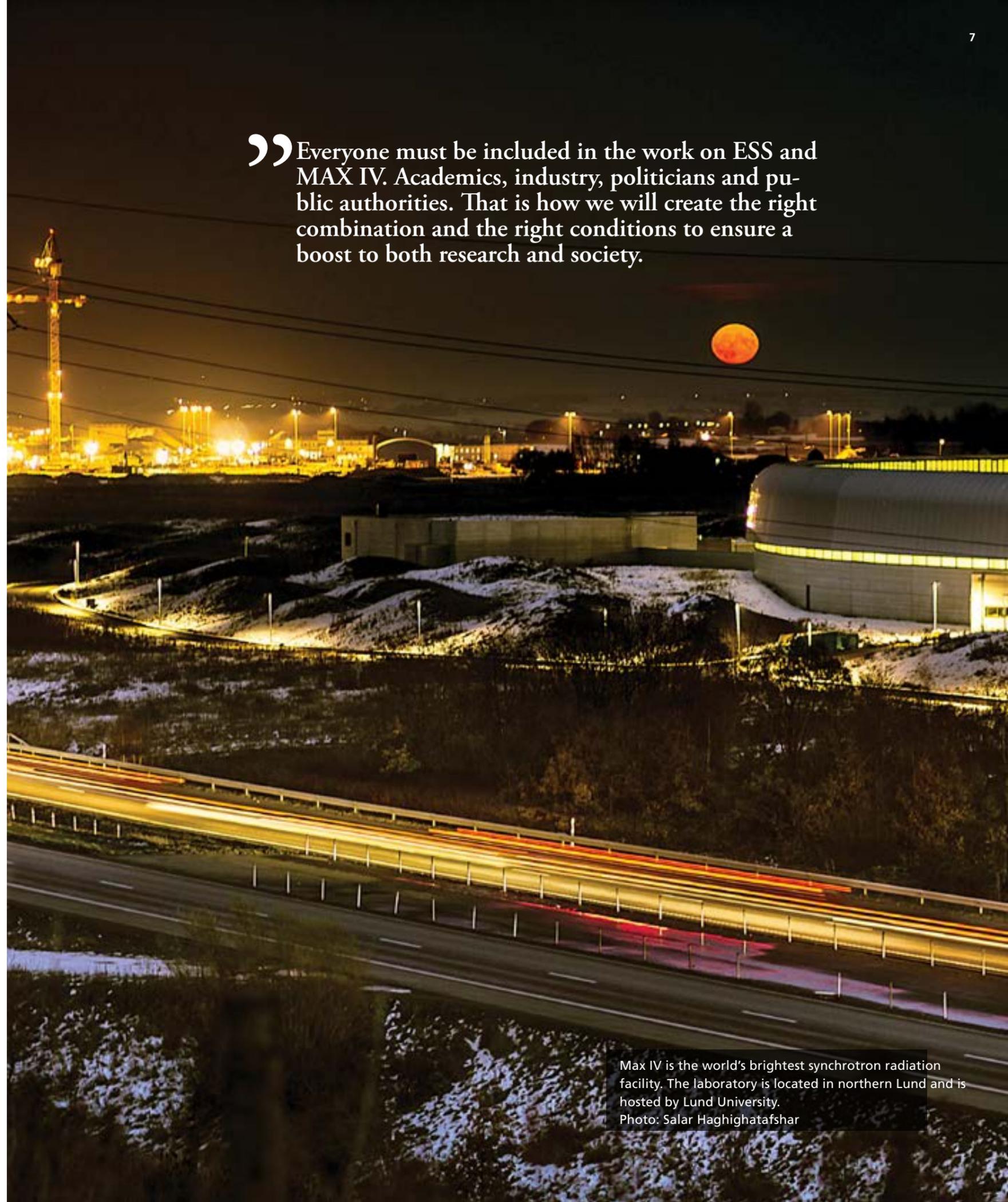
BISS works with different relevant sub-themes. Within one of these, which focuses on Swedish life science and how it can benefit from ESS and MAX IV, in collaboration with MultiHelix Think Tank, they have carried out round table discussions with different stakeholders to identify the needs and challenges that must be managed. The work shall be detailed in a report including a list of specific measures that are produced in collaboration with stakeholders. In other sub-themes, BISS is planning more conferences, seminars and workshops, and publications in the form of popular science-oriented articles that analyse issues such as taxation rules and skills provision.

#### A BOOST TO SOCIETY

“Everyone must be included in the work on ESS and MAX IV. Academics, industry, politicians and public authorities. That is how we will create the right combination and the right conditions to ensure a boost to both research and society, concludes Olof Hallonsten.

**Text: Noomi Egan**  
**Bild: Kennet Ruona**

”Everyone must be included in the work on ESS and MAX IV. Academics, industry, politicians and public authorities. That is how we will create the right combination and the right conditions to ensure a boost to both research and society.



Max IV is the world's brightest synchrotron radiation facility. The laboratory is located in northern Lund and is hosted by Lund University.  
Photo: Salar Haghigatafshar



# Cultural heritage as a meeting place or border guard

---

► Can we understand cultural heritage in new ways if we view migration and mobility as part of our joint heritage? Can cultural heritage issues create new meeting places and in what way do they act as border guards? A new collaboration initiative at Lund University is investigating the role of cultural heritage in society.

---

“Paradoxically, today there is probably an idea of cultural heritage as being something that is fixed and permanent, despite the fact that mobility and migration, are increasingly being seen as part of the cultural heritage of today”, says Lizette Gradén, researcher in ethnology at Lund University and coordinator of the collaboration initiative Heritages of Migration and Mobility in a Democratic and Inclusive Society.

Cultural heritage is often associated with phenomena of cultural and historical value; material things such as objects, buildings and monuments, or intangible expressions such as music, traditions or food from a particular place.

#### NEW OPPORTUNITIES

Within the collaboration initiative, cultural heritage is seen as an opportunity to identify how different actors attach different cultural meaning related to migration and mobility to the term. What is seen as cultural heritage can therefore be renegotiated and change over time.

The initiative is based on the government bill from 2017 “Cultural heritage policy for a Sweden that stands together” – a text that describes the growth of the area of cultural heritage in Sweden and identifies a series of societal changes that have led to cultural heritage issues becoming more pressing than previously. One of the social challenges is migration.

“Migration changes the role of cultural heritage in society. And it places demands on the universities and other actors to research cultural heritage based on mobility and relocation”, says Lizette Gradén.

#### MULTIFACETED IMAGE

The collaboration initiative brings together researchers from Lund University and staff working at the Regional Museum in Kristianstad, Kulturen in Lund and the Museum of Movements in Malmö. In addition to these, the collaboration initiative also works with cultural institutions in the US – where the view of cultural heritage is more dynamic than in Sweden, and cultural policy is constantly being negotiated. In the US, the cultural heritage of different groups is given room and it is normal, for example, for ethnic groups to establish their own museums and meeting places. At the same time, ethnic cultural heritage is strongly associated with a sense of American citizenship and becomes, in a way, part of the joint heritage. It becomes a multifaceted image.

“We all know migration is not a new phenomenon, however, in recent years the idea of freedom of movement within Europe has come to a head. In Sweden, many people have reported that it can be hard to be both Swedish and an immigrant, to be able to identify yourself with different groups at the same time. A person’s expe-

riences and cultural heritage do not become a building block in a joint new sense of community in the same way as it does in the US”, says Lizette Gradén.

#### SOFT POWER

She says that a discussion on what cultural heritage is and what it could be is especially important since cultural heritage can be likened to soft power. The actors privileged to define cultural heritage, and decide what is worth preserving, also affect how we will live in the future. This is why discussions are needed on the role cultural heritage can play as a force for understanding and meetings.

#### SIGNIFICANT SOCIAL RELEVANCE

The discussions have significant social relevance, says Lizette Gradén, given that today’s society is defined by extensive migration across national borders and mobility within borders. At the same time, there is increased support for nationalistic tendencies in Sweden and Europe; political parties that often protect what they identify as the country’s cultural heritage and are scared of traditions and customs being lost.

“However, the creation of cultural heritage has always been about selecting and discarding. Take folk costumes for instance, when the museums started collecting them in the 1800s the most commonly selected were those that were the most beautiful and grand and those are the collections we associate with textile cultural heritage today”, says Lizette Gradén.

#### INTANGIBLE CULTURAL HERITAGE

The collaboration initiative will, among other things, work with intangible cultural heritage that sometimes connects people in other ways than the material one. The museums in the collaboration initiative report that many newly arrived immigrants do not have many cultural belongings with them, particularly if they have fled from situations of conflict. Researchers in Lund will work together with the museums in the region to support them in their work.

“Cultural heritage can become a meeting place to highlight both similarities and differences. People are brought together by difficult experiences of loss but also by positive aspects such as a common passion for e.g. music, theatre, tastes, cooking, art or other traditions. And in this way initiate a larger discussion around a multifaceted and shared cultural heritage – as well as how it is preserved and made relevant for future generations”, concludes Lizette Gradén.

**Text: Noomi Egan**

**Image: Bodil Malmström, Shutterstock**

” The creation of cultural heritage has always been about selecting and discarding.

# Making room for later life



► We are growing older in Sweden and longer lifespans are often positive as more active years are added. However, not everyone's latter years are filled with grandchildren, golf and long holidays in Portugal. Older adults need good housing to grow old in, no matter their health status. The thematic collaboration initiative A Social Rights and Social Policy Perspective on Housing for the Ageing Population wants to make an impact on future housing policies and housing.

"When we stop working, our homes become an important arena upon which our entire lives are based", says Susanne Iwarsson, professor in gerontology and care for older people and coordinator of the initiative. "And there is a lot of research showing that how we live has an impact on our health. Depression is more common among those who cannot get out and about and if you cannot do enough physical exercise there can be medical consequences."

The municipality has an overall responsibility for planning the housing supply. Everyone should be able to live in good quality housing. When it comes to the older adults, the principle of continuing to live at home has had direct consequences on housing policies. On the one hand, the municipality would like to enable aging residents to continue to live at home, within the ordinary housing stock while; on the other hand, there are not enough suitable housing options on the housing market. Currently, there are only 13% of people over 80 years of age in special housing for older adults and people with physical or mental disabilities. The question is the kind and number of assisted living options or other housing options that will be required in the future?

"It is an outrage that we still do not have a housing stock that matches our population", states Susanne Iwarsson emphatically. "It is simply not on the cards for the municipality to build enough special housing for the entire older population."

#### WEAK COLLABORATION

Susanne Iwarsson and her research colleagues want to reduce the 'silo mentality' that separates the social planning of health and welfare and the best way for the construction sector and housing market to create suitable housing for the aging population. In practice, the collaboration between the sectors is weak.

Through the thematic collaboration initiative the researchers want to get decision makers to understand that investment is not only required in staff who deliver traditional care. Investment is also required in staff who have expertise to be able to contribute to the transfer of research-based knowledge within medicine, health, technology, law and architecture to practical activities, primarily within the municipalities. All in order for older

adults to be able to age actively and positively and live in ordinary housing stock more so than is possible today.

"There are not many politicians who speak with an understanding of knowledge transfer", says Susanne Iwarsson. "It is common for them to act reactively to fix the issues within the care sector – there is a lack of understanding of the bigger picture. Preventative actions are unusual, maybe due to the fact that the benefits are only seen in the longer term."

"Sweden is one of the countries with the highest standards of housing in the world; however, we have distinct problems relating to social rights. Loneliness, alienation, insecurity and poverty are a few examples."

#### NO LONGEVITY

Susanne Iwarsson is critical of the fact that for many years and without any follow-up of the effects, the government has invested millions on incentive funding to municipalities and counties.

"There are good examples of projects with interesting angles of approach, however, when the project funds run out the conditions are such that it is not possible to benefit from the knowledge that was being created. There is no longevity in short-sighted investments."

#### SEVERAL PARTNERS ARE REQUIRED

Within the new collaboration initiative there are many partners. A couple are public housing companies - Karlshamnshem AB and Österlenhem AB. In Karlshamn there is a joint research project already underway. As part of the project an app is being tested that is used to reliably assess how accessible all homes actually are. How the stairs are built, is there a lift and where in the apartment are there narrow passages? Maintenance staff are trained by the researchers to be able to carry out this mapping so that the housing company receives a detailed overview. In this way, they receive informed decision support when they are going to renovate or offer different kinds of apartments to people seeking housing.

Another partner is Helsingborg Municipality that wants to contribute the knowledge it has from contact with senior citizens living in ordinary and special housing. Marina Asplund, process developer at Omsorg Helsingborg care services, wants to ensure that the options for



”  
When we stop working, our homes become an important arena upon which our entire lives are based, says Susanne Iwarsson professor in gerontology and care for older people and coordinator of the initiative.

how we can live in the final season of life are not so limited. Many feel forced to move to different kinds of special housing despite wanting to remain at home.

"I have a wish to see aging take place in society and to not be so discriminated against. If you are 45 and have some kind of disability you are compared with others of the same age who are healthy and active. However, if you are 75 and frail you are compared with other older adults who are ill. Older adults are not a homogenous group despite often being treated as such."

Marina Asplund believes an increased digitalisation in home environments makes things easier for those in need of care as well as for staff. Night cameras, security cameras or reminders if staff have forgotten anything. Greater access to digital aids would create a more individualised home environment where it is possible to remain at home and feel secure longer.

#### GOAL – TO LIVE A POSITIVE LIFE

For 25 years Susanne Iwarsson has developed a deep understanding of the health of older adults and sees housing for ageing population as a great challenge for society. Her grandmother inspired her to become an occupational therapist and then to conduct research:

"I grew up with a grandmother who was severely disabled by MS but it did not stop her from being very independent. I want to contribute to people being able to live positive lives, despite diseases and disabilities."

**Text: Bodil Malmström**

**Foto: Kennet Ruona, Johan Bävman**

# Getting it right this time: circular biobased economy

► It has never been clearer that we must make drastic and global changes in how we treat the planet to stop our consumption from having catastrophic consequences in the future. Among other things, we need to stop depending on fossil raw materials and instead move toward a circular biobased economy.



“Today’s society is, for the most part, built on fossil raw materials”, says Josefin Ahlqvist as coordinator for the thematic collaboration initiative Circular Biobased Economy and goes on to say, “The fossil raw materials we use are admittedly also biological but they are precisely fossil, that is to say, it has taken millions of years for them to form. When we burn carbon and oil we release lots of carbon dioxide into the atmosphere and this accelerates global warming. We are also using them much too quickly and it is only a question of time before they run out. It is simply not sustainable.”

#### **EXPLOIT BIOLOGICAL AND RENEWABLE STARTING MATERIALS**

Josefin Ahlqvist says we are facing two main questions in this issue; fossil raw materials are going to run out and we have to stop burning them so as not to destroy the climate.

“What we mean by a circular biobased economy is that instead of using fossil raw materials we should exploit biological and renewable starting materials”, she says and explains it is not just vehicle fuels but also materials such as plastic.

“The idea behind a bio-economy is that we should consistently use renewable biobased raw materials for everything”, says Josefin Ahlqvist who adds that we should also strive for the use of renewable energy in the form of solar cells, wind and hydro energy, as well as other environmentally-friendly energy sources.

Biological material can come from many different sources: agricultural products, forest material, abattoir waste, compost heaps, seaweed from the ocean and so forth – any biological material you can regenerate in a reasonable period of time.

#### **CONSIDER THE ENTIRE LIFE CYCLE**

The circular way of thinking should permeate all of society. It also means we should use the resources we already have as efficiently as possible and place emphasis on recycling. Not least of metals. Josefin Ahlqvist raises the shipping industry as a good example in that it is common to repair and restore ships to a great extent before the decision is made to produce new ones. She says it must become an established practice to consider the entire life cycle before creating new products and materials.

“We must think circularly from the beginning – getting it right this time!”

In order to create new chemicals, materials and biofuels a lot of scientific detective work and research is required to find the right starting materials to arrive at the processes which make it possible to extract the structures and molecules which we need to replace the fossil raw materials.

“The hope is to be able to create so-called bio-refineries where, just like in an oil refinery, several different products can be extracted in several different steps”, says Josefin Ahlqvist.

#### **BACTERIA LEND A HAND**

In Lund researchers are working on discovering new methods to convert biomass into usable components. Among other things, they use bacteria which can help break down large molecules as well as being able to produce other valuable molecules and biofuels.

The researchers also use enzymes, which are proteins acting as biological catalysts. Biocatalysis and other methods are used, for example, in a current project where researchers are working on finding new uses of the lignin – one of the main components of forest biomass. Lignin is a by-product from the pulp and paper industries, and is today mainly used as an on-site fuel. However, lignin could potentially be used for production of many valuable products, such as bioplastics, through new routes of depolymerization and conversion using microbes. This would be good not just for the environment but it also as a way to strengthen the forest industry.

“This is an important aspect”, emphasises Josefin Ahlqvist, who explains that if we are going to be able to carrying out the necessary and society-wide changes required for a sustainable development, industry needs to be included as a driving force.

#### **MANY EXPERTS REQUIRED**

The switch to a circular biobased economy comprises every aspect of society. In other words, experts from many different fields are required to cover all the different angles of approach which the changes and adjustments carry with them. The area is very interdisciplinary. Many experts are required, everyone from chemists, engineers, biologists and ecologists to toxicologists who in the early stages can see the advantages and possibilities, conduct risk analyses and predict problems with the new materials produced. And the new technologies mean there is also great demand for experts in economical, political and social sciences.

“Lund is unique in that we have great access to so many different researchers with different backgrounds and expertise right from basic research right through to product development”, concludes Josefin Ahlqvist.

**Text: Catrin Jakobsson**

**Image: Shutterstock**



” Biological materials can come from many different sources: agricultural products are one of the rich sources

” We are destroying young brains.  
There is all the evidence in the world  
showing that it is not possible to multitask.

## In the world of apps

---

► How does a school support its pupils in an optimal way to ensure the most number of pupils reach their full potential? Collaboration initiative Together Stepping into Tomorrow's Classroom want to strengthen the message that quality is needed in the use of digital learning resources. Learning apps can both be a help and a hindrance.

---

Agneta Gulz, professor of Cognitive Science at Lund University and coordinator for the thematic collaboration initiative Together Stepping into Tomorrow's Classroom.

The explosion of digital learning resources in schools combined with the unfortunate idea that there is value in learning on your tablet or computer signals a red flag according to Agneta Gulz, Professor of Cognitive Science at Lund University:

“There are huge quality differences in our digital aids and unfortunately many of them are of poor quality. The challenge lies in providing teachers with strengthened knowledge so they can understand why they are using a particular app and what it should lead to for the students.”

Agneta Gulz, together with several other researchers, runs the new thematic collaboration initiative Together stepping into tomorrow’s classroom at Lund University How does a school support its pupils in an optimal way to ensure the most number of pupils reach their full potential? With the collaboration initiative the researchers would like to disseminate their research results to teachers, principals, parent associations and students in teacher training with the message that the quality of digital learning resources chosen for classroom use needs to be assessed.

“These days we have new research opportunities to study the learning process more closely in classrooms and to follow what happens with students in real time. This means we can also see how future digital aids should work.”

#### ADVANTAGES WITH DIGITAL LEARNING RESOURCES

Good digital learning resources which are subject-specific and educationally well-developed provide many advantages in comparison with traditional textbooks. To learn the capital cities of Europe or multiplication through a well-designed app can be the best way to learn. Pupils can compete with themselves and the teacher can adapt their teaching and provide support and feedback at various levels. Different components which support learning in a powerful way.

#### CAN FOOL THE SYSTEM

However, many of these digital aids do not stand the test and are not at all good for learning. There are many more than one thousand apps on the market directed at primary schools, but if a pupil makes a mistake they need to know why and receive constructive feedback. Only a small per cent of these apps do this, according to Agneta Gulz. She is also very critical toward pupils often being able to systematically test their way forward and, in that way, fool the system.

#### DEVELOPMENT BASED ON INDIVIDUAL ABILITIES

But Agneta Gulz is simultaneously optimistic and pessimistic when it comes to the use of digital learning resources to encourage pupils to develop their skills based on their own abilities and needs.

“There are many good digital learning resources which focus on well-defined bottleneck areas acknowledged to be difficult within mathematics, for example, where pupils are known to get stuck”, says Agneta Gulz who continues, “However, unfortunately there are many apps which look attractive on the surface and, as they are sold on the app store, teachers and parents are fooled into thinking the educational design has been well-thought-out. The graphics look nice, the music is good and you can choose your own typeface, but it is just the packaging and not at all adaptable.”

#### POWERFUL MARKET FORCES

But how does tried and tested science compete with the powerful market forces at play?

By preparing future teachers early on during their training replies Agneta Gulz, whose research group Educational Technology Group is at the forefront. The group is itself developing a digital play-and-learn game which she hopes will reach users right across Sweden. The content will also be available in Arabic in order to study the importance of pupils receiving information in their first language.

Together with pupils, teachers and researchers, they are also building virtual teaching environments in so-called Virtual Reality which is combined with more traditional tested teaching methods.

“Meeting with the children is an incredible source of energy for my work, they make sure that I will never give up”, says Agneta Gulz. Her drive for young people to receive the best support possible in their learning is steadfast. And above all, she emphasises, for those who may not otherwise have a good start to life. Children who come from environments where adults do not talk or play with them very much and who therefore do not receive the necessary foundations.

#### IT IS NOT POSSIBLE TO MULTITASK

Agneta Gulz is also very critical of children doing many things at once.

“We are destroying young brains. There is all the evidence in the world showing that it is not possible to multitask. What the brain does is jump very quickly between different things which is disastrous and weakens the ability to focus.”

This is where a school with a well-developed plan with a combination of technical support for teachers and more classical education can make a difference to a child’s opportunities to learn.

“I think the future is bright and believe that many more teachers will be better prepared and able to use digital learning resources in a smart way. That is what has to happen.”

” Meeting with the children is an incredible source of energy for my work, they make sure that I will never give up

# What is the value of the water?

► It was a dry summer and in many places we had to save water. Now, if not before, we realise how much we need water – that all life around us is dependent on clean water. Water issues play a part in several of society's biggest challenges. The initiative LUWater and Lund University brings together hundreds of researchers tackling these challenges.

We are used to thinking we have a limitless supply of clean water in Sweden and that we can waste water at home and use it for complementary irrigation of crops. However, if it doesn't rain for a long time, like the summer of 2018, the groundwater supply is reduced and we have problems both in the city and in agriculture. It is not good if it rains too much in a short period of time either – it can cause flooding and overflow, that is to say, discharge from wastewater and rainwater pipes.

"The dry and warm spring and summer we have just seen in 2018 gives us an indication of our future climate", says Kenneth M Persson, director for the initiative LUWater. And even if we can count on increased precipitation in the long-term it will be distributed much more unevenly than before. A much more unpredictable climate is something we already have to learn to manage and plan for.

## WATER IS USED A LOT

Having to plan so we have sufficient water supply to keep ourselves and our crops and animals alive, is **one** perspective on our dependence on water. Yet we humans use water for so much more. We wash, shower, clean and flush our toilets with water. Water makes the production of paper and the pulp industry and several other important industries possible. We even use water to transport all waste and pollutants through our wastewater systems. So, aside from the right to clean water, we need to plan for sustainable

cities, fight the spread of diseases and achieve good health.

## POLLUTANTS END UP IN THE OCEAN

"Sooner or later all substances we use end up in water – it is not possible to avoid that", says Kenneth M Persson. "Water is the best solvent we know of."

"Some pollutants are caught up in treatment plants, but a lot continues out to lakes and waterways, for example, drug residues and microplastics. Rainwater also carries with it substances from the ground and air and transports them via surface water drains to the groundwater or to lakes and rivers. Water is everywhere and moves around our earth in a perpetual cycle", explains Kenneth M Persson.

"For example, we can find pollutants from Europe in the meat and blood of polar bears up in the Arctic, pollutants which have been carried there via water and food chains. It is currently permitted to release substances which do not disappear, that is, that do not break down – since there are no natural ways to break them down. However, people should know that, for example, perfluorinated compounds such as PFOS or PFOA are present in fire fighting foam which basically never breaks down. And that microplastics remain in nature for 500-700 years!"

"If you have that knowledge then you understand we need to use materials which do not remain and

” Sooner or later all substances we use end up in water – it is not possible to avoid that



Kenneth M Persson, Professor of Water Resources Engineering and director for the initiative LUWater.



Some pollutants are caught up in treatment plants, but a lot continues out to lakes and waterways, for example, drug residues and microplastic.

accumulate in the food chain, rather we need materials which break down or are transformed when they end up out in nature.”

#### USE WASTEWATER SYSTEMS IN THE BEST POSSIBLE WAY

How then do we best prevent the spread of undesirable substances and contagious bacteria in wastewater? To phase out the use of undesirable substances and treat the discharge directly at the source would obviously be the best way but this is only possible in some cases. Therefore, we need to ensure that the wastewater systems we have function in the best possible way, says Kenneth M Persson. Through different improved measurement systems it is possible to achieve a comprehensive idea of how the system is coping, if it is old or is about to break. Later on we could perhaps complement the systems with specific sensors to receive even more information.

“Subsequently, when we have information on the state of the system we can widen our focus and study the water use – how much waste-water is formed, and where – in a city such as Lund. If we then also look at how much water is available I think we could get quite a comprehensive idea of what society’s water balance looks like.”

#### SUSTAINABLE WATER USE

How much water an area has access to can be ascertained by calculating, among other things, precipitation and evaporation. These factors vary year to year and therefore calculations are made from an average number taken from several years’ worth of measurements. To achieve sustainable water use we need to plan our society so that there are good margins for coming dry years.

“In Cape Town in South Africa water use has been dimensioned to use significantly more water than the average calculated supply”, says Kenneth M Persson. “When it gets as dry as it did this year they therefore have serious problems. They now have to work on both supply and demand; can they increase supply and find more water, can they reduce demand or build more recirculating systems?”

#### CREATE GOOD MARGINS

In Sweden, on the other hand, we normally have plenty of fresh water; we have rain and snow which tops up streams, rivers, lakes and form groundwater. Consequently, we often only need to use a small part of the resource.

“If we can build a society where we only need to use around 20 per cent of the average water supply we would have good margins even during dry years”, says Kenneth M Persson.

He thinks we should all be able to help out to use water in smarter ways, in the same way we have been trying to reduce our energy use both at home, in municipalities and in industry. Because, do we really need to use so much water?

**Text:** Pia Romare

**Photo:** Kennet Ruona, Shutterstock

Johannes Stripple, coordinator for the thematic collaboration initiative Narrating Climate Futures and political scientist at Lund University.



## Stories with inherent power

► A well-thumbed science fiction novel. Computer models of Sweden’s vegetation in the year 2100. How to best plan for an educational exhibition. These are three examples of climate stories which the thematic collaboration initiative Narrating Climate Futures is investigating in a project which brings together visions of the future and climate policy.



The project wants to explore whether stories, and different ways of imagining the future, can have an impact on climate measures and policy instruments. A broad approach provides the researchers with the opportunity to look at examples of climate narratives which are maybe not considered stories in the general sense. Future energy systems, scientific models of rising temperatures and urban living labs are studied as well as climate representations in art, literature and film.

#### **VISUALISING THE FUTURE**

“Stories have significant inherent power. They help us visualise the future and highlight what it means to be human. If we can identify and expose different kinds of narratives, from various areas and sectors, together we can investigate how these may impact on policies and provide us with a new way to manage and respond to climate change”, says Johannes Stripple, project manager and political scientist at Lund University.

Like the research methods, the project’s work methods are also broad and interdisciplinary. In many ways they can be described as innovative given that they consider

creativity and participation. It includes guided tours of art exhibitions, workshops which allow participants to try out and reflect on different narrative techniques, input on a forthcoming exhibition on the global goals, a book club, and climate walks with researchers and artists in Kristianstad’s Vattenrike Biosphere Reserve and the Gropahålet Nature Reserve.

“To be in a museum or out in nature with others to investigate something gives rise to other insights and discussions. It creates greater scope for research than more traditional models do”, says Johannes Stripple.

#### **A COLLABORATIVE PROJECT**

According to him, the choice of work methods has a lot to do with the project being a collaborative one where researchers and external stakeholders are involved. Nearly all of the faculties at the University are taking part with researchers from different levels, from Master’s students to post retirement professors. External parties include artists and curators, production companies, several municipalities across Skåne, consultants, businesses and authorities in the climate and energy sectors,

as well as museums and visitor centres such as Malmö Museums, Skissernas Museum (Museum of Artistic Process and Public Art) and the Naturum Vattenriket visitor centre.

“We are not a closed network, rather researchers and other interested parties can jump onboard whenever they like. We are constantly developing new ideas and we would like to continue taking advantage of existing ideas both within and outside the University. It is that sort of input which drives the work forward. Our website will be a live and natural meeting place for our ideas, information and collaborations”, says Johannes Stripple.

“Narrating Climate Futures is sowing seeds which need time to grow.”

#### **LEAVE A MARK ON SOCIETY**

Enduring collaboration is an intended outcome of the project. Collaborations which can go on for many years – and leave a mark on society as a whole in regards to solutions and ideas on how to manage the effects of

climate change and how they in turn can play a role in climate policy measures and agreements. And Narrating Climate Futures has already made some progress: they have received funding for two new projects, one on stories about a fossil-free society, together with an interdisciplinary group of researchers in Utrecht, Warwick and Durham, and another about forests. They are also working on two significant applications together with external stakeholders.

“We want to continue with what we are doing! Because we cannot afford to wait if we are serious about wanting to save the climate and create a better future”, concludes Johannes Stripple.

**Text: Noomi Egan**  
**Image: Shutterstock**  
**Photo:: Catrin Jakobsson**

# Intelligent intelligence

► We are facing significant societal challenges. Our security policy situation in Sweden has changed and the fight against organised crime is so extensive, and has such momentum, that it needs to be tackled with coordinated participation from society as a whole.





Tobbe Petterson, researcher in intelligence analysis at Lund University who leads the initiative Intelligent Intelligence.

Research at Lund University is required to contribute to improved and more efficient intelligence activities, something that both the prevention and fight against crime require to make any progress.

Specifically, the intelligence activities are about equipping decision makers with relevant data. For example, the task of the intelligence services at a strategic national level is to map the situations and opportunities for negotiation of foreign powers and to judge the development of events. Intelligence activities in all its forms have even started to play a more prominent role in international relations, crisis management, business activities and the fight against crime.

#### NEW IMPORTANT KNOWLEDGE

In order to improve and make intelligence activities more efficient mainly in defence and fight against crime, researchers at Lund University are now collaborating with practical intelligence activities within several authorities such as the Swedish Armed Forces, the Swedish Migration Agency and the Swedish Police. Such a collaboration, according to Tobbe Petterson, researcher in intelligence analysis at Lund University, will lead to the operative organisation receiving new important knowledge.

#### FRUITFUL COLLABORATION

“The intelligence process and the methods used show an extraordinary similarity to the processes and methods used within research, and collaboration between practical intelligence work and academia is therefore obviously fruitful”, says Tobbe Petterson who is also the coordinator

of the thematic collaboration initiative “Intelligent Intelligence”.

#### TEXT AND WRITING ANALYSIS

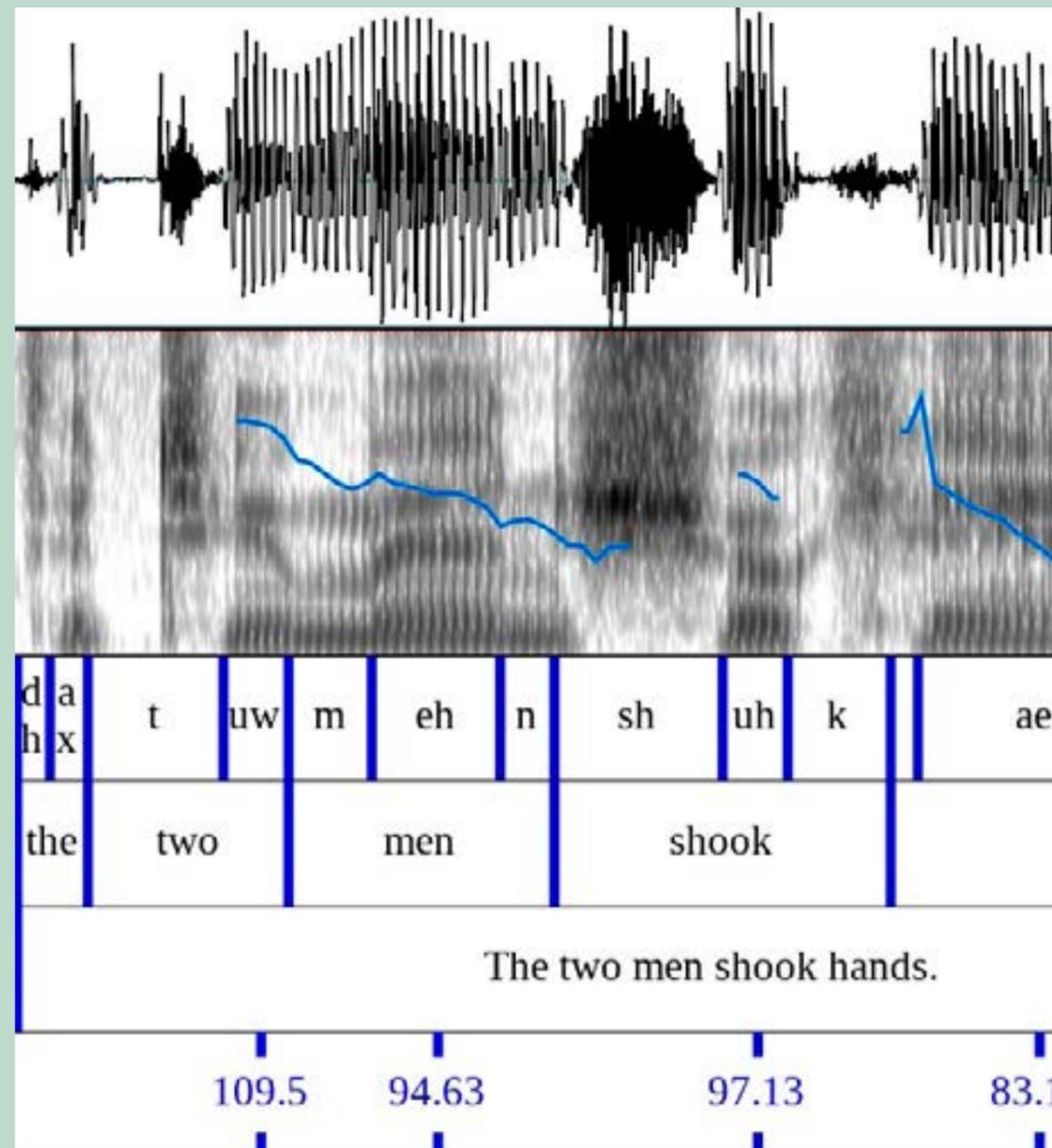
Useful new knowledge for intelligence activities can be found in many research areas such as sociology, psychology, communications, and technology. A specific example is language research where the methods in text and writing analysis can be developed to suit the operative intelligence activities.

#### PROFESSIONAL DEVELOPMENT

Professional development is also something which is in demand from authorities both to strengthen the operative sections of the activities, and as a staff welfare measure with the aim of stimulating and retaining qualified staff.

“Researchers today have a great opportunity to support professional development in intelligence authorities, for example through further education in methods and critical thinking – areas where universities are traditionally strong and which are of key importance for successful intelligence activities”, says Tobbe Petterson.

**Text:** Pia Romare  
**Photo:** Shutterstock, private  
**Spektogram:** Johan Frid



## AUTHENTIC OR NOT?

In this diagram of the spoken English phrase 'The two men shook hands', there is an acoustic analysis of frequency, time and sound intensity. The upper section shows the waveform, the middle section the spectrogram, and the lower section different aspects such as phonemes, words, text as well as characteristics in speech melody. Speech melody itself is seen on the blue curve.

The analysis can be used by intelligence services to assess statements from individuals who may be witnesses or suspects in criminal investigation contexts. The analysis can also be used when interviewing prisoners of war.

Which dialect does the person speak, which words are used frequently? And how does the person organise their speech, is it authentic or not?

Psycholinguistic methods to determine how people talk, write, read and listen can assist operative intelligence services to better understand human language capabilities.

► We should reduce our meat intake and eat a mainly vegetarian or completely vegan diet. That is the advice. However, do we all want that, and do we understand the consequences for our health, Swedish food production or for the climate and a sustainable environment? The so-called protein shift, from animal to plant-based protein, and its effects is one of the complex questions on food which researchers at LU Food Faculty, Lund University, are tackling.




---

### Which food we produce, and how we do it, has recently become the focus of debate about our future.

---

“Of the 17 global goals for sustainable development which the UN adopted in 2015 there are eight which concern food, placing our research on the agenda”, says Yvonne Granfeldt, researcher at the Department of Food Technology, Engineering and Nutrition.

The global goals state that there should be enough food for all and that the food we eat should contribute to health and well-being. At the same time, the food should be produced and distributed in a sustainable way with regard to climate and environment as well as socially and economically.

#### REDUCED MEAT CONSUMPTION

With regard to the effects of a protein shift, Yvonne Granfeldt, food chemist, and Charlotta Turner, analytical chemist, explain that from a climate and environmental perspective there is a lot of research supporting a reduction in red meat consumption, at least if it is based on sustainable production taking account of biodiversity, among other things.

“However, when it comes to the nutritional aspect of a protein shift, the evidence is not as clear”, says Yvonne Granfeldt. “In Sweden as we increasingly switch to a diet with less animal protein – where seaweed, planktonic algae, insects, and cultivation waste products may play a part – we will be eating a considerable number of innovative products and processed raw materials. This includes different fats and different carbohydrates, dietary fibres, vitamins and minerals. We do not have sufficient evidence on how nutritional uptake and health may be impacted by this.

#### NEW RAW MATERIALS

Charlotta Turner raises the example of seaweed to demonstrate the complexities –health aspects aside – of introducing new raw materials in the food chain.

“I am very interested in seaweed at the moment, both micro and macro algae. Our chemical analyses show that seaweed contains substances which could prove potentially interesting for foods.



Yvonne Granfeldt and Charlotta Turner are in perfect agreement: the food we eat is to give health and well-being. At the same time, the food is to be produced and distributed sustainably with regard to the climate and environment, as well as socially and economically..

However, as Yvonne says, there are also other substances which do not taste good. So how can we process the seaweed to maybe hide or remove those tastes?"

Then how can we imagine food containing seaweed? Should it be something we have in a sports drink or can we put seaweed in patties, convenience food, or is it something we could use as a spice? Should we cultivate the seaweed, choosing the species which do not absorb poisonous metals as much, or should we harvest seaweed from the ocean? What do consumer groups think about this, wonders Charlotta Turner.

"So it is important to also study consumer behaviour", says Charlotta Turner. "We as chemists think it is exciting to look at what seaweed contains from a purely chemical point of view, but the consumer is not going to eat more seaweed just because we are studying seaweed molecules!"

#### USE AGRICULTURAL WASTE

To produce new food from raw plant materials is a challenge if we are to reduce our meat consumption. The raw material can, as Charlotta Turner highlights, be seaweed for example, but it can also be the agricultural waste products of today. Currently, growers often only extract one thing from each cultivated raw material, oil from rapeseed, starch from potatoes or juice from fruit or berries. The rest is discarded or sold cheaply as animal feed or for soil improvement. There is potential here which growers and the industry should exploit, say Charlotta Turner and Yvonne Granfeldt.

One example where researchers and growers are collaborating to transform agricultural waste into new foods is rapeseed. A research group at the Department of Food

Technology, Engineering and Nutrition, together with colleagues, has developed a process to refine proteins from oil cakes and they are now testing to see if it is possible to use the protein to make a mince product.

#### PROCESSING IS EXPENSIVE

However, Charlotta Turner points out that even if it is possible to create a product which the consumer wants from different kinds of waste products, sometimes it proves to be very expensive when you consider the entire process around it. It is also important to include researchers who can provide both an economical cost analysis and a life cycle analysis to see what the total costs are in the end – not just for consumers but also for the environment and climate.

The global challenges contain many complex questions affecting our own future and that of the planet. In the work to adopt the goals concerning food, Charlotta Turner, together with Yvonne Granfeldt, recently started the collaboration initiative LU Food Faculty where traditional food research on raw materials, production, processes, food properties and preservation, as well as on consumption, innovation and economy, is linked to sustainability, environment, nutrition and health.

"In our new network we link everything together. It is really difficult but also lots of fun", says Yvonne Granfeldt.

**Text:** Pia Romare

**Photo:** Shutterstock, Bodil Malmström



## When healthcare moves into the digital space

**Text:** Catrin Jakobsson  
**Photo:** Shutterstock, Erik Andersson

► Paper prescriptions for medication have been replaced by e-prescriptions, electronic medical records have become common practice, doctors' appointments are booked online and virtual doctors' visits via video link are increasingly common. Digitisation is a process happening throughout society – not least in healthcare.

eHealth is a new and increasingly important area which capitalises on the possibilities of digitisation and comprises all use of digital technology in healthcare. People are increasingly turning to electronic services to take care of their wellbeing.

"By eHealth we mean not only health apps on your mobile but all electronic services used within health and healthcare", says Guðbjörg Erlingsdóttir, associate professor lecturer in ergonomics at the Department of Design Sciences and coordinator of the thematic collaboration initiative eHealth@Lu that is working towards sustainable e-health development.

#### DIGITAL HEALTHCARE EASES THE LOAD ON HEALTH SERVICES

Digital healthcare is becoming increasingly common and the hope is that the new system can, for example, enable and facilitate the follow-up of patients after treatment, all without the patient having to visit a clinic. A model like this can help to streamline and ease the load on health services where there is a frequent lack of both staff and resources. The Government's vision is for Sweden to be a leading country in eHealth by 2025. Increased digitisation could lead to healthcare on equal terms and also increases the independence of the healthcare user.

#### NEW TECHNOLOGIES IMPLEMENTED

Guðbjörg Erlingsdóttir is conducting research on the impact of eHealth on society from several different perspectives – one is on how digitisation of healthcare impacts the work environment for healthcare providers and how interaction with healthcare users works when the new technologies are implemented.

"The idea is that digital technologies should help and support both healthcare professionals and patients", says Guðbjörg Erlingsdóttir, emphasising the importance of educational and user-friendly products.

#### HOMES ARE INCREASINGLY COMMON WORKPLACES

For example, one of the projects has had the aim of producing concepts for systems to facilitate the work of healthcare professionals who conduct home visits.

"It is becoming increasingly common for nurses and medical professionals to work in patients' homes since many elderly and sick patients continue to live at home for much longer than before", says Guðbjörg Erlingsdóttir.

This can be stressful for staff when they are alone in their workplace and do not have anybody else at hand to consult with when they have to make important decisions. Digital systems could, for example, allow nurses to have closer contact with doctors when needing a second opinion and facilitate the organising of healthcare measures and medication, etc.

However, as new electronic solutions for healthcare problems are developed and implemented, the need for research on their potential consequences increases – both for healthcare and for society as a whole. The effects can be unexpected and are not necessarily only positive.

#### BETTER ACCESS TO PERSONAL MEDICAL RECORDS GENERATES ANXIETY

In 2012, electronic medical records were introduced, providing patients with open access to their own medical records online. At first, psychiatric medical records were excluded from this system since they were considered potentially sensitive. However, in 2015 these too were included in the system.

In two studies, Guðbjörg Erlingsdóttir and doctoral student Lena Petersson conducted research on how this impacted the work situation for healthcare professionals who provided the care and wrote up the medical records.

"Among other things, it showed that many psychologists were negative about the medical record system", she says, continuing, "The knowledge that the patient would receive some of their notes made them more wary about what and how to write and they believed it impacted negatively on their work."

The studies showed that the open medical record system also created concern among medical secretaries who have close contact with patients. Many reported they felt worried to meet patients who potentially did not agree with what was stated in the records and who might be disappointed or upset.

The eHealth@lu platform brings together researchers from seven different faculties and external actors from both public and private sector – who share their knowledge and help each other to see possibilities and solve problems which arise when healthcare moves into the digital space.

**Text: Catrin Jakobsson**

**Photo: Shutterstock, Erik Andersson**

” We are working towards sustainable e-health development.



Guðbjörg Erlingsdóttir, associate professor lecturer in ergonomics at the Department of Design Sciences and coordinator of the thematic collaboration initiative eHealth@Lu.



” Drones are a tool to expand the imagination

## On high altitude

---

► Drone technology is already transforming our world in a myriad ways. In Rwanda, they are used to deliver blood to hospitals in the countryside, thereby saving hundreds of lives a year. And in the field of agriculture, drones measure the height of crops and detect the temperature of water. But more research into how drones could, and should, be used is needed as the new technology is developing fast.

---



“Drones are a tool to expand the imagination. Their uses stretch the boundaries of research as we know it. But at the moment we do not have the framework to fit the development”, says Nicolás Dell’Unto, archeologist at Lund University and coordinator for The Future of Drones: technologies, applications, risks and ethics.

He explains that there are currently two frontiers in drone technology. One is centred on what you can do with drones; and in this area the field is almost uncharted as more and more sectors and researchers are starting to look into ways of using the technology. The other one is focusing on rules and regulations.

“These two things go hand in hand. Rules and regulations will set limits on how we can use drones and remote sensing technology.

#### THE AIRSPACE

One such framework, and an area that the research collaboration group, will investigate, is the U-space. The U-space occupies the air-space beneath the fly zones in the European Union. Today, this space is uncolonised, and is not formally owned by neither nation states nor private property owners.

“Who can fly over this space? Will it be up to residents to decide over the air above their house, or the nation state? Depending on how you decide to regulate, it will impact on where drones can fly and deliver goods and services.”

#### NEW TECHNOLOGY - NEW CONSIDERATIONS

There are also current regulations and ethical considerations to take into account as the new technology is developing. As a general rule, photography from a drone in Sweden is not allowed if it could be seen as violating for the person that has been photographed or filmed – which means that it can be difficult to film on people’s property. Many people would also feel unease at being surveilled by driverless drones.

Another issue is that of accountability, who is responsible if a drone accidentally hurt or injures a person or someone’s house?

The technological limits of drone technology are almost endless, on the other hand. Examples of things you can already do include

using drones to assess water quality, track and map wild fires, assess the health of plants and take air quality readings. In the field of archeology, laser scanners mounted on drones can be used to digitally remove forests and vegetation to identify new archeological sites without digging. And the list of usages is growing fast.

#### MULTITUDE OF WAYS

Nicoló Dell’Unto explains that reason why drones can be used in such a multitude of ways is that they can fly very low and carry a range of different equipment such as high resolution cameras, instruments for remote sensing, heat sensors and multispectral instruments. This makes it easy for drones to collect different data at a very high resolution.

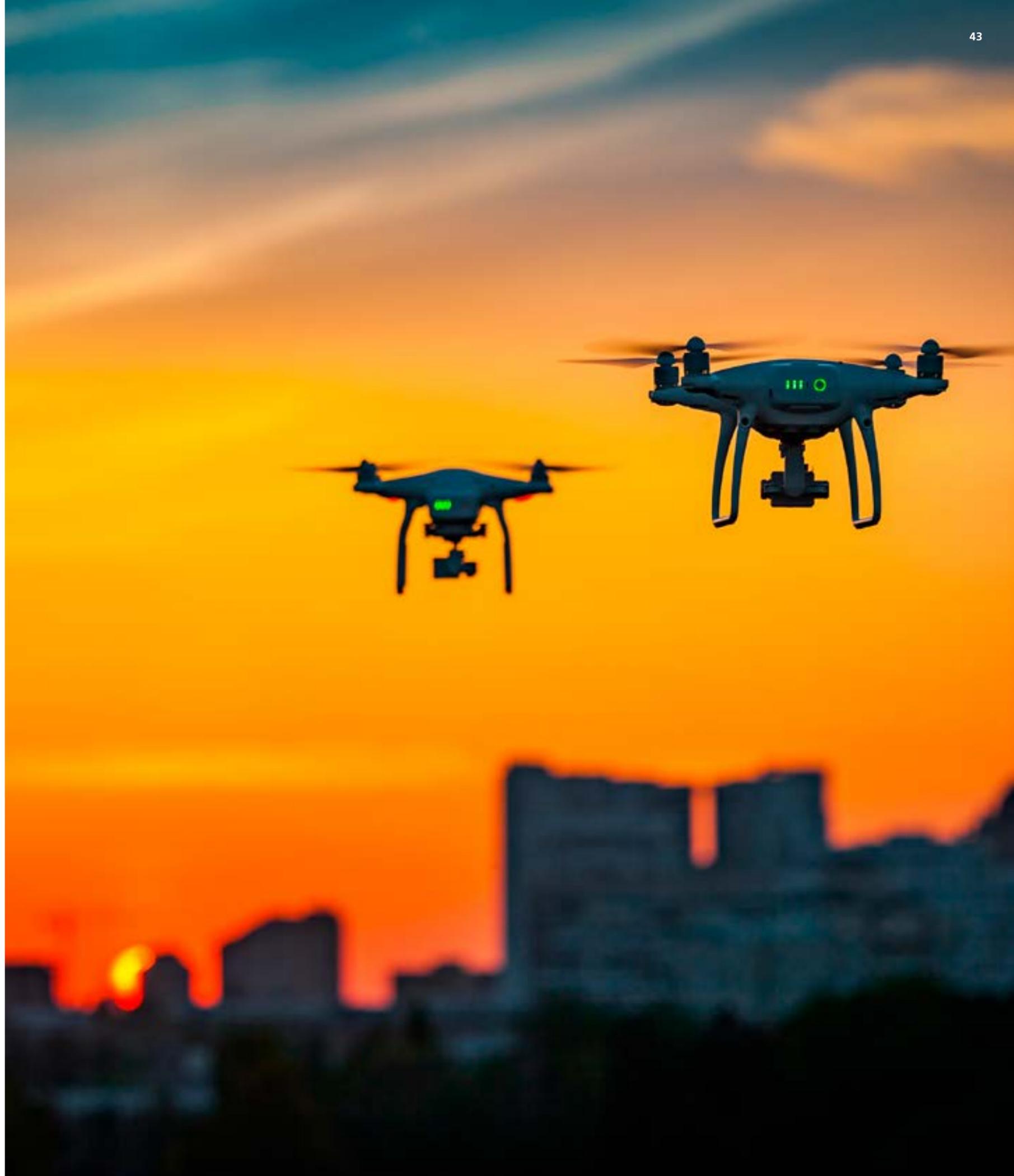
#### ORGANISING TARGETED ACTIVITIES

The research project’s aim is to explore both how drones can be used to address societal challenges and related frameworks and regulations. They will do so by organising targeted activities together with industry, authorities and interested researchers. As part of the work, researchers from different fields will try out new technology developed by participating companies. The companies are at the forefront of using drones in Skåne.

“The private sectors is vital to push the field forward. They can tell us what society wants, and that is an immediate advantage. By working collaboratively, we can be part of a creative endeavor and together explore the many issues surrounding how drones could and should be used”, he concludes.

**Text: Noomi Egan**

**Photo:: Kennet Ruona, Shutterstock**



## Big Science and Society

The establishment of the ESS and MAX IV research facilities in Lund brings about a number of societal challenges. To collectively tackle these challenges, the Joint Faculties of Humanities and Theology, the Faculty of Social Sciences, the Faculty of Law and the School of Economics and Management come together in this initiative.

### Collaboration partners:

Bryne AB	Forschungszentrum Jülich	Science & Technology Facilities Council UK
CR Competence AB	KPMG	Swedish Migration Agency
DTU Technical University of Denmark	MAX IV	The Swedish National Archives
Ernst & Young Law	MultiHelix Think Tank	The Swedish Tax Agency
European Spallation Source (ESS)	SARomics Biostructures AB	

## Heritages of Migration and Mobility in a Democratic and Inclusive Society

The initiative is focused on issues of cultural heritage and migration faced by the Öresund Region's many cultural heritage institutions. The research node consists of researchers from the following departments and specialised centres: the Centre for European Studies, the Centre for Öresund Region Studies, the Department of Law, the Department of Gender Studies, the Department of Arts and Cultural Sciences, the Department of Service Management and Service Studies and the Malmö Theatre Academy.

### Collaboration partners:

Borderland Foundation	Kulturen in Lund (via ABM Skåne)	SAXO Inst. Kph, & Centre Advanced Migration Studies, AMIS
Center for the Study of Upper Midwestern Cultures, University of Wisconsin at Madison	Malmö city	Smithsonian Institution
German, Nordic, and Slavic (GNS) Department, University of Wisconsin	Michigan State University Museum	The Swedish National Archives/Landsarkivet i Lund & rep.för ABM Skåne
	Regionmuseet Kristianstad (via ABM Skåne)	

## A Social Rights and Social Policy Perspective on Housing for the Ageing Population

The goal is to generate knowledge, through concrete collaboration, that has an impact on future housing policy and housing that involves researchers from the Faculty of Medicine, the Faculty of Law, the Faculty of Social Sciences and the Faculty of Engineering.

### Collaboration partners:

Helsingborgs kommun	Kristianstad University	SPF Seniorerna
Hälsostaden Ängelholm (Region Skåne)	miThings	Tech4Care
Karlshamnsbostäder AB	Pensionärernas Riksorganisation (PRO)	Vetenskap & Allmänhet Österlenhem AB

## Circular Biobased Economy

The goal is to convert sustainably produced biomass into products that are used and recycled, involving researchers from the Faculty of Science, the Faculty of Social Sciences and the Faculty of Engineering.

### Collaboration partners:

IKEM - Innovation and Chemical Industries in Sweden	Lund City Region Skåne
---	---------------------------

## Together Stepping into Tomorrow's Classroom

What advantages and disadvantages are related to technology-supported learning methods – and how can they be combined with non-technology-supported methods? Next generation learning technology is the focus for researchers in cognitive science, design sciences, linguistics, neuroscience, subject didactics, technology, psychology and educational sciences.

### Collaboration partners:

AAA-lab, Graduate School of Education, Stanford University	Fälads skolan, Vårfruskolan och Svaneskolan, Lund	Massive Entertainment i Malmö
Doktorander i Lärande (DIL)	Macleanskolan och Rutgerskolan, Skurup	Science Center, Malmö Museer
		School departments in Lund and Helsingborg

## LU Water

Today's challenges, of both increased scarcity and increased abundance of water, are the subject of research by researchers at the Faculty of Medicine, the Faculty of Law, the Faculty of Social Sciences, the Faculty of Science, the Joint Faculties of Humanities and Theology, the Faculty of Engineering, the School of Economics and Management and the International Institute for Industrial Environmental Economics.

### Collaboration partners:

Eureau	Lund city	Swedish Agency for Marine and Water Management
Havs- och vattenmyndigheten	Länsförsäkringar Skåne	The Swedish Water & Wastewater Association
Helsingborgs city	Malmö city	WIN Water
Isle Utilities	Region Skåne	WssTP
LRF-The federation of Swedish farmers	Simrishamns municipality	
	Sweden Water Research AB	

## Narrating Climate Futures

Narratives and ideas on climate and how we can shape the future with our actions for necessary climate changes, bring together researchers from the Faculty of Social Sciences, the Faculty of Science, the Faculty of Fine and Performing Arts, the Faculty of Engineering, Lund University Centre for Sustainability Studies and the International Institute for Industrial Environmental Economics.

### Collaboration partners:

Anagram	The Swedish Board of Agriculture	Universities in Netherlands, Australia and Great Britain
Malmö museer	Trivector Traffic AB	WWF

## Intelligent Intelligence

Improved and more effective intelligence activities, something that both the national defence and the fight against crime is dependent on, involves researchers from the Faculty of Social Sciences, the Joint Faculties of Humanities and Theology, the Faculty of Engineering and the School of Economics and Management.

### Collaboration partners:

Malmö University	Stockholm University	The Swedish Police
National Defence Radio Establishment	The Swedish Armed Forces	Swedish Security Service
Norwegian Defence Intelligence School	Swedish Coast Guard	The Swedish Prison and Probation Service
Norwegian Institute for Defence Studies	Swedish Customs	The Swedish Tax Agency
	Swedish Defence University	Umeå University
	The Swedish Enforcement Authority	
	Swedish Migration Agency	

## LU Food Faculty

The food system is facing enormous societal challenges where terms such as sustainability, security and health are key. Researchers from the Faculty of Social Sciences, the Faculty of Science, the Faculty of Law, the Faculty of Fine and Performing Arts, the Joint Faculties of Humanities and Theology, the School of Economics and Management and the Faculty of Engineering form part of the initiative.

<b>Collaboration partners:</b>	Food Nexus	Skåne Food Innovation Network
Arla Foods AMBA	National Food Agency, Sweden	Swedish University of Agricultural Sciences
Asthma and Allergy Association	Probi AB	Tetra Pak Packaging Solutions AB
Aventure AB	Region Skåne	

## e-Health@LU: Joining forces for Sustainable e-Health Development

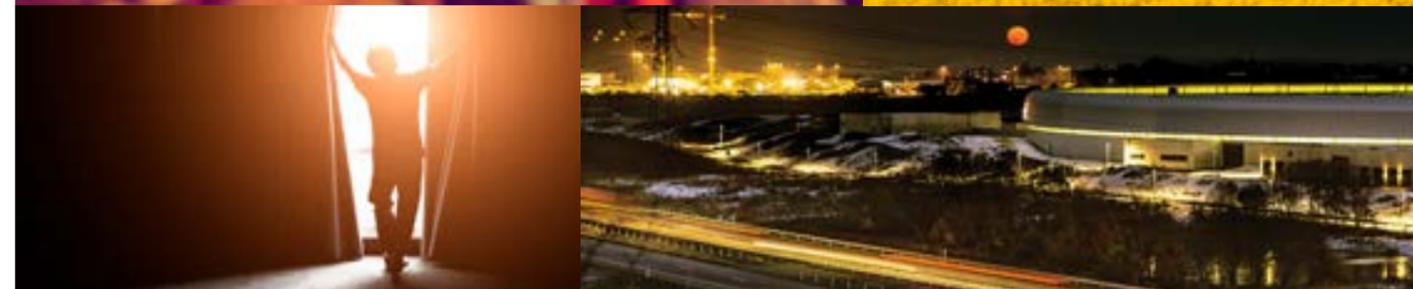
This collaboration initiative wants to contribute to sustainable development of digital services and products in health and healthcare. Researchers from the Faculty of Engineering, the School of Economics and Management, the Joint Faculties of Humanities and Theology, the Faculty of Law, the Faculty of Medicine and the Faculty of Social Sciences are taking part.

<b>Collaboration partners:</b>	IBM	Mobile Heights
Collaboration partners:	itACiH AB	Region Skåne
Axis	Jonas Enebrand AB / eFrid	RISE
Connexion Insights	Kara Connect	Sensitive AB
Cross Technology Solutions AB	Kävlinge municipality	Sigma Connectivity
Doctrin AB	Landskrona municipality	Skåne University Hospital
Engaging Care Sweden AB	Lund city	Sony Mobile Communications AB
Helsingborg city	Malmö University	Swedish Association of Health Professionals
Herlev Hospital, Denmark	Medicon Village	Topp
Hörby municipality	Min Doktor	Zenit Design

## The Future of Drones: technologies, applications, risks and ethics

Drone technology is used to tackle a multitude of societal challenges. Researchers are taking part from the Faculty of Science, the Faculty of Social Sciences, the Joint Faculties of Humanities and Theology and the Faculty of Engineering.

<b>Samverkanspartners:</b>	Lantmäteriet	Università di Siena
Aviation Capacity Resources AB	Ljungbyhed Air	Vultus
Cybaero	Luffartsverket	Wrans Gunnarstorp Gods AB
University of Copenhagen	Lund city	





**LUNDS**  
UNIVERSITET

[www.lunduniversity.lu.se](http://www.lunduniversity.lu.se)

LUND UNIVERSITY

Box 117  
221 00 Lund  
SWEDEN