INFOrum Scientium

Study visits to the Gothenburg area 2016

Forum Scientium

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The research school Forum Scientium at Linköping University, Sweden, has as one part of its responsibilities to stimulate the PhD students career planning as early as possible. One way that this is done is through study visits to research-intensive companies and to research departments at various universities. During the visits, we try to meet senior persons within research and development, as well as persons who recently made the transition from being a PhD student to becoming a professional. The network of earlier Forum members, the so-called Former Scientium, and the PhD student's supervisors are valuable when arranging the study visits and contributes to the high quality of the visits. 23-24 May 2016, Forum Scientium had an intensive study visit programme in the Gothenburg area, Sweden.

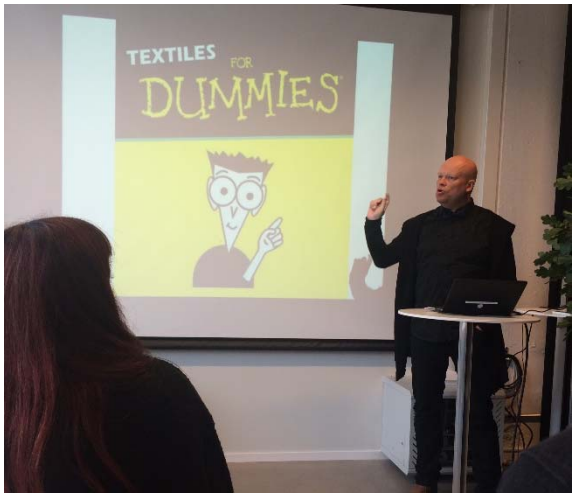
"The Forum Scientium pyramid symbolizes the need for a good foundation, the need to receive inputs and have collaborations from more than one side, and the creation of a peak of excellence."

Forum Scientium

LINKÖPING UNIVERSITY

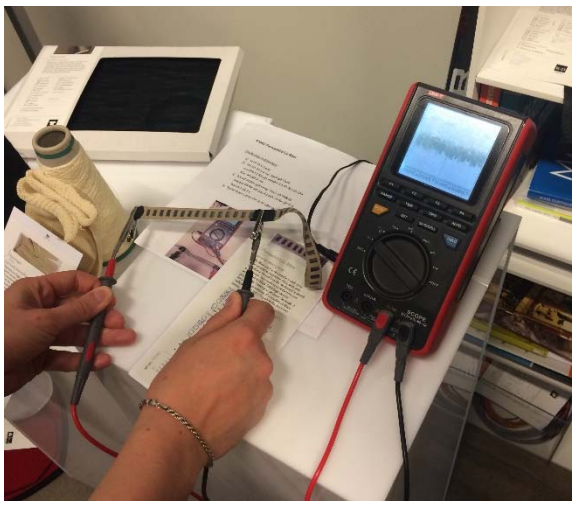
Smart textiles, Swedish school of Textiles, Borås

The Swedish School of Textiles is situated in the old textile factories by the stream Viskan in downtown Borås, a mirror image of the facilities in Norrköping. We were greeted by Nils-Krister Persson,



who made his dissertation in Biomolecular and Organic Electronics, Linköping University in 2005. He has since worked within the framework of the smart textile initiative. He introduced us to the concept of smart textiles and gave a critical review of the current trends in the field. After learning about the possibilities to construct smart items through clever fine-tuning of material properties in the different hierarchical levels of textile we were offered a tour of the production and laboratory facilities.

We got the opportunity to stroke and stretch materials made by weaving and knitting and see automated as well as manual production techniques. As an extra bonus we also saw some of the design work carried out by the fashion students.



/Josefin Nissa and Anders Elfwing

SP Food and Biosciences, Gothenburg

SP Technical Research Institute of Sweden is a leading international research institute. It has many subsidiaries around Sweden and one of them is the Food and Bioscience unit in Gothenburg.

We were welcomed by former Forum Scientium member Sophia Wassén, who introduced us to the research institute and its work. SP focuses on applied research, thus they take place between industry and academia. They are the bridge that connects the demands of the industrial partner with the research capacity of the academia.

We got an insight into the different research areas, as well as into her research within Soft Material Science. She gave some examples of their projects: protein coat for bananas to extend their shelf life, characterization of food structure and rheological measurements (science of the deformation and flow of matter, describing material properties of fluid and semi-solid materials), and the “Gothenburg throat” which models the swallowing tract in order to develop food for people with swallowing

disorders. She also mentioned us their most interesting projects: ProVeg (new vegetable food with higher protein content) and Shark (sausage made from mussels).

Charlotte Eklund-Jonsson continued with a presentation of "The Food Accelerator", which offers support to researchers and companies working within the food area in Västra Götaland and have an idea that they want to implement.

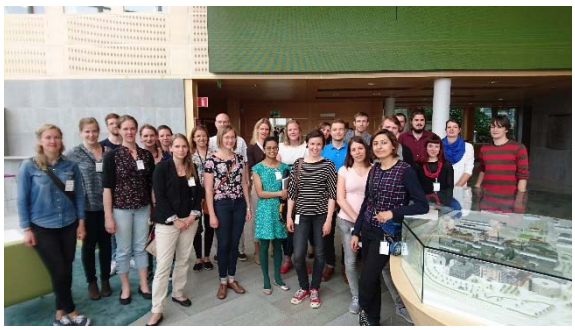
Magnus Röding gave us an insight into his life from university studies at Chalmers to a post doc in Australia, and how he ended up at SP with his expertise in Mathematical statistics. After a nice lunch, where some of us got the opportunity to discuss diets of today with Charlotte, we met up with Jennifer Davies. She gave us a short presentation about the environmental effect of food processing, how it can be quantified and its importance.

Finally, we got a few lab tours at SP. We started at the Process and Technology development, where companies can get help with streamlining of food processing, simulation and optimization of microwaves and heating processes. We got the chance to see the sensory evaluation laboratory where the different properties of the new products are tested, as well as the microscopy area where we saw a short video of how cheese is deformed depending on its fat content. As the last station of our visit we got a short introduction from the Microbiology and Hygiene unit that are specialized in food safety, product quality and process hygiene.

/Camilla Halvarsson & Judit Randek

AstraZeneca AB, Mölndal

A highlight of this year's study visit was the visit to AstraZeneca in Gothenburg, one of their three global research facilities. We were greeted by former Forum Scientium members Pernilla Eliasson, Stina Axelsson, Christina Jungar, Elin Nyman and Kenny Hansson.



They introduced the broad pharmaceutical spectrum that AstraZeneca covers, ranging from cardiovascular and metabolic diseases, respiratory, inflammation, autoimmunity and oncology to infection and neuroscience. Mainly taking diabetes

treatment as an example we were introduced to the complete development of a pharmaceutical drug, including pre-clinical, clinical phase I-III with an emphasize on late stage of clinical trials.

The former members of Forum Scientium could give us a special insight into what to expect if we would work at AstraZeneca or rather what they expected before they started working there and how their careers were shaped within the company and of course, what brought them to AstraZeneca in the first place. Even though, AstraZeneca is a big pharmaceutical manufacturer the job profiles are surprisingly research intense. Furthermore, there are two kind of career paths to pursue – one science focused involving just minor management tasks and the other one oriented towards project and executive management.

Moreover, we got a little tour and saw an-entire-room-occupying robotic microscope used to study cell imaging. After a most compelling introduction to the technique and image analysis by Alan Sabirsh, he finished the session with a guessing quiz of different cell types ranging from neurons, heart cells up to fat cells that were surprisingly difficult to guess.

/Johannes Gladisch, Patricia Roch and Meenu Rajan

Carl Zeiss AB and Centre for Cellular Imaging (CCI) at Sahlgrenska

The second day of our visit to Gothenburg one group visited the Centre of Cellular Imaging (CCI), which is one of the Core Facilities at Sahlgrenska Academy. CCI offers services in microscopy, including training, planning and preparing of samples. We were welcomed by Former Scientium member Jens Wigenius who introduced us to his colleagues Carolina Tängemo and Laurent Guerard before we got a general tour of the facility. During this tour they showed us their multiphoton microscope, two standard confocals (upright and inverted) and also their superresolution confocal microscope, capable of photoactivated localization microscopy (PALM).

After that we had a demonstration of laser micro dissection (LMD), which is a method for isolating cells/regions of tissue on a microscopic scale. We also learned about their scanning electron microscope (SEM) and a microscope capable of high content screening. Then we had a well-deserved fika with buns and coffee, and during that time everyone present gave a short introduction about themselves. Jens, Carolina and Laurent shared with us what they had been up to before starting at CCI and also mentioned that CCI holds a useful imaging course each year in April.

Jens Wigenius work nowadays at Carl Zeiss AB as a Sales Manager specialized in Microscopy.

/Magnus Bernhardsson

Insplorion AB, Gothenburg

After lunch some of us had the opportunity to visit Olof Andersson, former Forum member. Olof holds a PhD in Sensor Science from Linköping University. After his PhD he continued with a PostDoc also at LiU and then worked for different companies such as Lingvitae AB as an external consultant, and Layerlab AB as a Senior Scientist and then as Director of Instrumentation and Technology. He is currently Product Manager at Insplorion AB and is responsible for the development of Insplorion's scientific instruments.

Insplorion is a rapidly growing company founded in 2010. Their systems are based on an optical technique called Nanoplasmonic Sensing, enabling a very high sensitivity and robustness.

Olof told us about his career and how exciting and challenging it can be to work in a start-up company.

/Lia Fernandez

SP Medical Devices, Gothenburg

For a majority part of the group our last visit during this study visit was at SP Medical Devices. Here we were meet by Research manager Jukka Lausmaa that gave us a short introduction to the SP Technical Research Institute of Sweden and the unit Medical Devices part of this organization. The overall role of SP is to work in the area between academia and industry doing applied research.

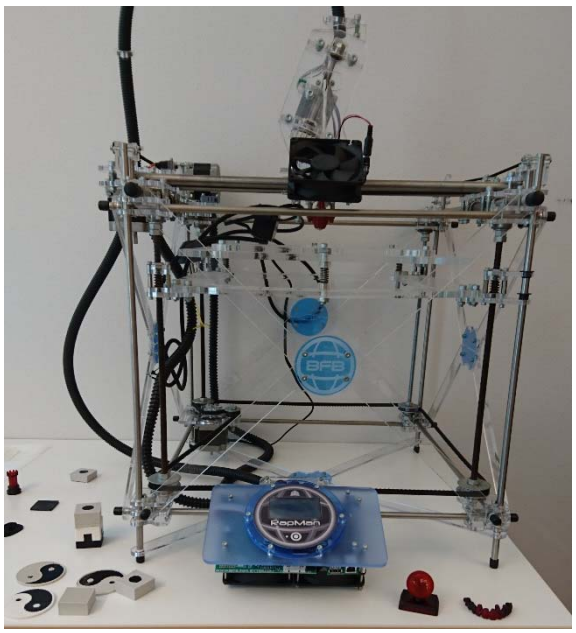
SP Medical Devices is a small workplace with about 30 employees (22 PhDs), which is situated in Gothenburg but with a close collaboration with the Chemistry, Materials and Surface department of SP that is situated in Borås. They also have access to a GLP approved facility that is located in Borås.

After the introduction we were given a tour of the facilities and LiU alumni Patrik Stenlund presented some examples of the work that they do and what possibilities they have for research.

The area of research is all connected to medical devices and they perform cytotoxic analyses on the materials used in medical devices. For toxicological and drug screenings they also have a 3D cell printer for better modelling of tissues.

There are also possibilities for evaluation of microbial and biofilm growth on for example implants or catheters.

The facilities were also equipped with 3D printers for fast prototyping of for example implants and devices for testing the mechanical strength and rheology of the prototypes as well as biological samples.



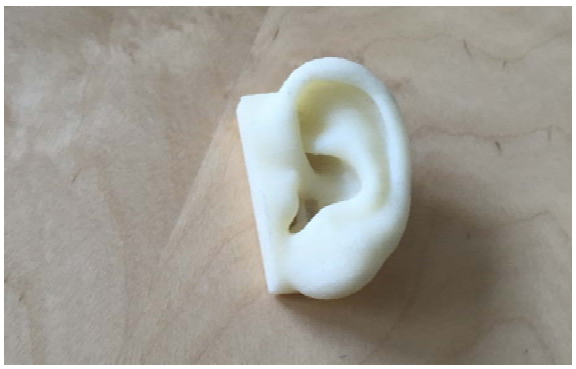
/Kjersti Claesson and Kalle Bunnfors

3D Bioprinting, Chalmers University of Technology, Gothenburg

Tuesday morning a group from Forum Scientium had the opportunity to visit the 3D Bioprinting Center at Chalmers University. The basic research interests of the 3D Bioprinting Center at Chalmers University of Technology are the tissue engineering and the 3D cell culture. Two 3D bioprinters are available to print living cells, the center can also make biocompatible biomaterials or bioinks for 3D bioprinting with living cells.

Paul Gatenholm, professor in Chemistry and Chemical Engineering at Chalmers University of Technology, gave Forum Scientium an in-depth tour of their 3D Bioprinting facility in Gothenburg. The work started 2008 with the aim of making blood vessels with help of bacteria and nanocellulosa scaffolds. Today, Paul Gatenholms research group use 3D printers with Bioink, a ”smoothie” containing cells and a hydrogel, to print scaffold microstructures for tissue to reproduce within, with a resolution of 10 micrometres! By using induced pluripotent stem cells, iPSC, together with scaffolds, organ-like structures within which tissue can be produced and differentiate to any cell type. Research on chondrocytes, cartilage cells, is being conducted to create a model for repairing damaged cartilage in the future.

The current obstacle is oxygenation and transport of waste product of the tissue as it grows in size where eventually diffusion is not sufficient. For this Paul Gatenholm’s research group is experimenting with sacrificial polymer evenly spread in the tissue that later can be removed and in the cavities created inject endothelial cells. Additionally, carbon nanotubes can be incorporated into the scaffold. This conducting material is facilitating an attractive habitat for neurons to grow on, making it possible for ganglion like-organs to be produced. This can be applied on damaged nerve ends in the spinal cord for patients that lost motor-functions during injuries. This research is still in the experimental phase on rats.

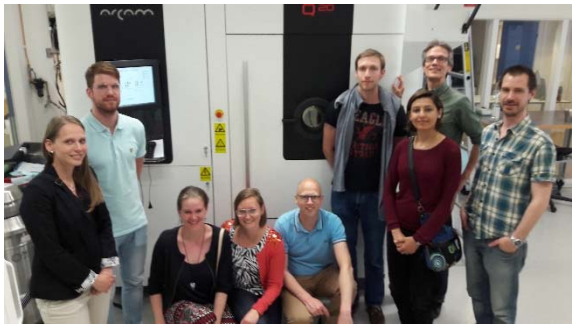


The ultimate goal is to be able to print organs that can replace aging ones. With mitosis the telomeres region decreases and eventually no more mitosis can occur. The most viable solution today would be to generate a fresh organ.

/Maria Seitanidou & Andrey Höglund

Arcam AB, Mölndal

One of the Forum Scientium groups visited during Tuesday afternoon the company Arcam AB, located in Mölndal. Arcam AB produces 3D-printers, based on electron beam melting (EBM) for production of metal components. These machines are mainly sold to companies, which products benefit from an additive manufacturing solution.



Their main focus is currently within aerospace and orthopaedic implant industries. At arrival we were welcomed by Ulf Ackelid, a former PhD from Linköping University. He showed us to a conference room were Stefan Thundal, a salesperson from Arcam, had an interesting introduction to the company.

After that, Ulf and Maria Pettersson held a more detailed presentation about the technique and showed us different metal components that could be produced by their machines. We finished up with a tour around the company and we got the opportunity to look inside the machine and also see the process. We thank Ulf, Maria and Stefan for a very pleasant study visit.

/Katarina Bengtsson and Malin Hammerman