



DOCTORAL DERBY FINALS 2022



RESEARCH
SUMMARIES

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Muntpunt

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Department/Research group: Law, Science, Technology and Society (LSTS)

Now you don't 'see' it, now you do: Making accessibility the rule in personal data protection law

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Can you read the first sentence of my research summary? In the European Union, more than 30 million people with conditions affecting their vision, would have trouble reading it. If you also have trouble, you already find yourself in an excluded position. This is an example of inaccessible format and there are several more, which can affect your access to crucial information about your use of apps, services and devices.

Making accessible design the rule and not the exception could mean using proper color and fonts on an electronic form; or turning highly complex language into easy-to-understand infographics; or enabling the use of assistive technologies, such as screen readers. Accessible data protection language and procedures improve transparency, by enabling citizens to make well-informed decisions and exercise their rights at an equal and inclusive manner. In other words, mainstreaming accessibility is about removing barriers for all.

In my research, I explore how the concept of accessibility is considered in the law and policies of personal data protection, and I map shortcomings and best practice. Specifically, I investigate which accessible tools and procedures national regulators and companies use to allow information exchange and facilitate the exercise of our fundamental rights, as data subjects.

Olaya Lara

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Faculty: Medicine and Pharmacy

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Putting xCT offside to tackle pancreatic cancer from different angles

Pancreatic cancer is one of the most aggressive malignancies and is projected to become the second leading cause of cancer-related deaths. The statistics for pancreatic cancer are very cumbersome with 95% of patients not surviving five years after diagnosis. Unfortunately, there is a lack of adequate treatment, which might be related to the fact that conventional therapies only focus on attacking the tumor and do not consider the whole picture. Namely, cancer is an inflammatory disease that can promote other diseases such as cancer anorexia and mood disturbances, which on their turn also contribute to poor patient survival. Our research focuses on xCT, a protein that is highly present in tumor, immune and brain cells. Deletion of this protein reduces tumor growth in different cancer types and attenuates inflammation. Therefore, blocking our target could stimulate different players to work as a team in the fight against pancreatic cancer.

To summarize, in contrast to other tumor types, only minor improvements for pancreatic cancer have been made over the past decades whereas the incidence is rising. We therefore believe that in order to tackle pancreatic cancer we need to put xCT offside.

Shabnam Zaman

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Faculty: Sciences and Bio-Engineering Sciences

Department/Research Group: DBIO AMFI-ECOL

The wonderful world of frog glue: a sticky topic

We've all heard the story of The Frog Prince. Some of us have even come across memes where the princess falls to her doom after the fabled caress, abruptly ending the fairytale. But what if her lips were sealed by the kiss instead?

From indigenous poison-tipped arrows to trendy new hallucinogens, toxic frog secretions are deeply rooted within popular culture. A more obscure defense mechanism, but one that is no less fascinating, involves "bioadhesion." Here, substances produced by the skin become extremely sticky within mere seconds, making it nearly impossible for a predator to eat the animal. In other words: these frogs have the (super)power to create (super)glue.

Although bioadhesion is a rare feature in frogs, it has evolved several times in species that are spread across different continents. My research explores the origins of this remarkable survival strategy, and why it is present in some frogs but not in others. To answer this, I use technologies as low-tech as Lego® bricks (literally) to microscopes that can magnify on a nanoscale (i.e., a billionth of a meter!). Surprisingly, what I've discovered is that the ingredients needed to make this glue exist in almost all animals - yes, including you and me - but only a few special little frogs have evolved to take things to the next level. Or, at risk of sounding like a motivational quote: the power of stickiness was within them all along.

Michiel De Proost

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Faculty: Languages and Humanities

Department/Research group: Philosophy & Ethics (RHEA/ETHU)

Social egg freezing: the next step towards women's emancipation?

The number of women who freeze their eggs for so-called social reasons, such as pursuing education or achieving career goals before having children, increases year-over-year. This phenomenon, trying to stop women's biological clock, is being declared as a reproductive revolution and compared to the introduction of the birth control pill in the early 1960s. However, it is still an open question whether social egg freezing enhances women's emancipation as it could be an important step towards more gender equality. While this debate is not yet settled, existing research has yet to address the actual motivations of women and assess the moral reasoning they give on their decisions.

I talked with 21 women who were interested in this procedure in Belgium and came across several findings that highlight tensions regarding the emancipatory potential of SEF. For example, my findings challenge the stereotype of self-choosing and career-oriented women, as participants' choices were mainly driven by concerns about having more time to find the right partner. To conclude, I argue that social egg freezing is not inherently emancipatory as its introduction without relevant cultural change cannot be a remedy for women's inequality.

Lianne van Os

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Department/Research group: Liver cell biology research group

Curing liver disease with the help of mini-livers

Two million people die every year due to liver disease caused by Hepatitis A/B/C, alcohol abuse, the use of certain medication or an unhealthy diet. Remarkably, around 25% of the world population suffers from a fatty liver. This liver damage results in scar tissue formation and if this process is not stopped, too much healthy tissue will be replaced by scar tissue resulting in liver malfunction. Sadly, there is no medication that can prevent scar tissue formation in the liver.

To investigate how we can stop this process we developed mini-livers in the lab. From 1 mouse liver we can make around 600 mini-livers. With these mini-livers we can imitate chronic liver disease by giving them an overdose of paracetamol or an unhealthy fatty diet resulting in scar tissue formation in the mini-livers. Interestingly, we are also able to prevent injury and scarring of the mini-livers by giving medication that is now being tested in humans. Our findings thus allow us to reduce the number of lab animals used for medication testing and it could lead to the development of new drugs to cure liver disease.

Joren Vanlaere

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Faculty: Engineering

Department/Research group: MECH/FLOW

A safer energy transition through efficient hydrogen detection

An energy transition is essential to protect our climate. The European Commission, the organization that carries out EU's policies, wants to use hydrogen to achieve this goal. Hydrogen can be used in many ways. For example, as a renewable alternative for Russian gas or to power cars, ships, and aircraft. The main advantage of hydrogen compared to fossil fuels, is the lack of carbon atoms to form CO₂. This is an important emission that contributes to global warming.

Our research will use software to improve the location of hydrogen detectors. These detectors measure the amount of hydrogen in the air. Their goal is to find leaks before a dangerous situation presents. Hydrogen detection is important as it is highly flammable. Further, our senses cannot detect it because it is colorless, odorless, and tasteless.

Guidelines could help place hydrogen detectors. However, these have not been developed up to now. Our results can help develop these guidelines. This way we could ensure they are both safe and practical.

Lina Jasmontaite

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Department/Research group: Research Group on Law, Science, Technology & Society (LSTS)

Empowering individuals by making personal data breaches transparent

Countless headlines about companies that had suffered personal data breaches did little to improve security of our digital identities. A body of law has been developed to prevent and tackle harmful effects of personal data mishandling on individuals. I am studying a part of this body of law, known as the General Data Protection Regulation in order to determine whether it empowers individuals. I examine whether notifications of personal data breaches to individuals should be regarded as one of many empowering actions, alongside data subjects' rights and information obligations. Research has shown that personal data breach notifications carry potential to enhance transparency of data processing operations and in this way empower individuals. Only knowledgeable individuals that are provided with transparent and extensive information concerning their data mishandling can take actions that could empower them and increase their security online. For example, they can change a password in the aftermath of a personal data breach, or they can choose a provider of services that takes security personal data seriously and does not experience regular incidents. Therefore, I call for a new way of thinking: entities processing personal data must be transparent to us as we are transparent to them by our online behaviour.

Eva Roose

Doctoral School of Life Sciences and Medicine

Faculty: Physical Education & Physiotherapy (LK)

Department/Research Group: PAIN VUB & Rehabilitation Research (RERE)

The fight against pain after breast cancer: it feels so unfair!

Everybody knows someone with a history of breast cancer, but did you know that fighting breast cancer doesn't stop with beating the cancer alone? After survival, 1 out of 3 must deal with pain complaints. On top of that, most of them lost their femininity, are chronically fatigued and not able to rebuild their lives as before. These women struggle to accept their pain, feel anxious towards their future and are sometimes angry about their situation. Doesn't this feel unfair to you? Well, it seems that these negative emotions and thoughts of injustice affect pain and quality of life. Therefore, we need to explain the origin of pain and the importance of these thoughts and emotions in the maintenance of pain complaints. As Martin Luther King said, 'injustice anywhere is a threat to justice everywhere'. This means that tackling injustice first is the key to success. Therefore, we propose a specific kind of education that will particularly target the feelings of injustice in breast cancer survivors with pain. With this treatment, we hope to decrease the pain and improve the quality of life, so it's finally no longer fighting, but living after breast cancer.

Maximillian Weil

Doctoral School of Natural Sciences and (Bioscience) Engineering

Faculty: Engineering

Department/Research Group: AVRG

Guaranteeing our way of life and improving renewable energy through Smart Infrastructure

Imagine a world with unreliable bridges, electricity pylons and wind turbines; where transportation of people and goods is no longer straightforward and electricity is no longer available at the turn of a switch. My research aims at guaranteeing the reliability of societies' most vital infrastructure by increasing their inherent intelligence. Smart Infrastructure seeks to instrument infrastructure with sensors, gathering data on vibrations and deformations. Using this gathered information, my research aims at detecting damage in the structure, ensuring safety, reliability and potentially increasing the lifetime. Machine Learning, that can be trained to automatically differentiate a cat from a dog in a picture, can also be used to differentiate between the data of a safe and a damaged structure.

Aside from safekeeping our vital infrastructure, Smart Infrastructure can also be used to extend the lifetime of offshore wind turbines. By determining the amount of damage caused in certain situations, like storms at sea, it is possible to guide decisions such as stopping a turbine temporarily to keep generating electricity over a longer period of time. This guarantees that the turbine reaches the required 20 years of lifetime, making offshore wind a more attractive renewable energy source and ultimately reducing our dependence on imported and polluting fossil fuels.

