Discussion Toolkit

CELEBRATING 25 YEARS

SCIENCE WEEK

8-15 Nov 2020

Supported by Science Foundation Ireland

CHOOSING OUR FUTURE

Science Foundation Ireland sfi For what's next

BACKGROUND

Science Week celebrates its 25th year in 2020, taking place from November 8th - 15th, against a societal backdrop of life changing experiences as we all live in the face of the COVID-19 pandemic. Now, more than ever, people have turned to the information science provides to guide our decisions.

The theme for Science Week 2020 is **Choosing Our Future**. Many of the choices we make today, in how we work, rest and play, will influence our cultural and societal norms tomorrow. With Climate Action still urgently required, and having lived together through the changes the pandemic has brought, this year Science Week will support conversations amongst the public about what they want future Ireland to look like, and how science will support the hope we have for our collective future.

Science Foundation Ireland, developed this toolkit in collaboration with Genuity Science, Pam O'Leary, Cork Educate Together Secondary School, SFI Centre for Research Training in Genomics Data Science, ADAPT the SFI Research Centre for Digital Media Technology, Huawei, The INTEGRITY Project at Trinity College Dublin (as funded by the European Union's Horizon 2020 research and innovation programme).

Some of us are excited to go back to exactly the way things were before the pandemic, others have found recent times to be a relief and want to keep the changes we've experienced, others want to hold on to some of the changes but not all of them. Our impact on the environment has improved in so many ways, such as air quality, and yet deteriorated in others, such as the use of single-use plastics. Remote working is the new norm for a significant number, this has directly impacted on quality of life in the positive and the negative for so many, for others it has resulted in a serious hit to livelihoods as footfall in office areas drop. Through all of this journey, the public has been largely united in turning to science for the data to inform decisions for today, and to bring hope for tomorrow.

This toolkit will introduce and provide information on four topic areas (Ethics and AI, Genomics, Future Cities and Vaccines) and ask groups to discuss, consider and debate the impact of these technologies on our future.

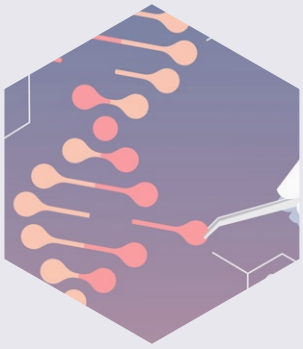
'We normalised a lot of rather bad habits before COVID-19 – long commutes, working too hard, rushing all the time, eating your food in front of the telly, now is the time to maybe correct an awful lot of that and have a better quality of life. I hope you think about it.'

Bibi Baskin – Twitter

HOW TO GET INVOLVED?

During Science Week host a discussion on what you hope to see science achieve in the future. This toolkit provides background and discussion stimulus for four topics.

Ethics and AI



Genomics

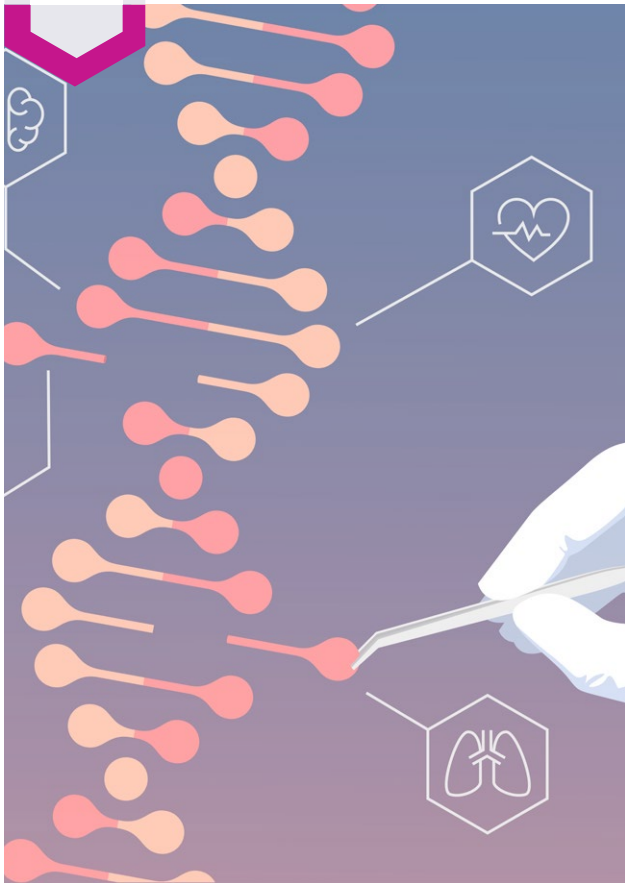
Future Cities

Vaccines

Share your thoughts on social media using #ScienceWeek or join the national online conversation on the Choosing our Future Public Forum, where a panel of experts will be asking the public to have their view across a range of issues. Find out more at ChoosingOurFuture.ie

TOPIC 2

GENOMICS
Introduction and Background



What is DNA?

Put simply, genomics is the study of an organism's genome – its DNA – and how the information encoded within DNA is used to build the organism. All living things, from single-celled bacteria, to multi-cellular plants, animals and humans, have DNA.

Genuity Science (2020)

Developed in collaboration with:

genuity science

SFI Centre for Research Training in GENOMICS DATA SCIENCE

What is a genome?

- All living things have a genome made up of DNA, which contains the instructions to build and repair our bodies. DNA has four building blocks, which we refer to by the letters A, T, C, and G and our genome has more than 3 billion pairs of these letters arranged in a very precise sequence
- Every person's genome is around 99.9% the same as everyone else's, but that 0.1% equates to around 3 million differences.
- Some differences in our DNA determine physical characteristics, such as eye colour. Others can influence our chance of developing a disease.
- We can now sequence DNA (determine what those DNA letters are and what order they appear in) and analyse genomic information to inform healthcare, helping to better diagnose, treat and even prevent disease

What are genes?

Genes are sections of DNA which are the basic units of inheritance. This means that genes determine what traits are passed down from a mother and father to their child.

Humans have around 20,000 'coding' genes, which contain the information to build and regulate proteins – essential for building and repairing our bodies. Some genes determine physical characteristics, such as eye colour. Others can influence the chance of developing a health condition, such as cystic fibrosis.

- Genes account for 2% of our genome. We are only starting to discover what the other 98% of the genome does.

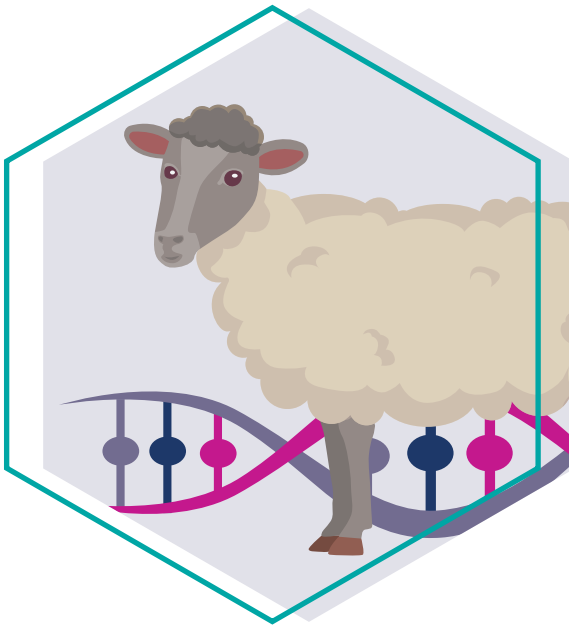
Other Applications of Genomics

- We can learn about our ancient ancestors through genomics. Read More.
- Metagenomics is the study of the genomes of our gut microbes (the microbiome), (ie the genomics of our gut microorganisms), we're starting to learn how our gut microbes affect our health. Read More.
- Potato genomics research at Teagasc helps us select for and breed crops with better qualities such as size or disease resistance. Read More.
- Researchers in Galway can monitor Irish marine biodiversity (ie the variety and levels of different aquatic species) by collecting and sequencing environmental DNA. Read More.

Discussion Stimulus

1. Mila's story - Mila was once like any happy, healthy child. But at age 3, she started to falter. At 6, she was diagnosed with Batten disease, a rare and fatal genetic disorder. She lost her sight, her language and her ability to walk independently. No one had an answer — until a plea on Facebook led her parents to Dr. Timothy Yu in Boston Children's Hospital's Division of Genetics and Genomics. Watch Mila's Story.
2. From incubation in a bra to an afterlife under glass, how a cloned sheep attained celebrity status. Read More.
3. Legal and Science arguments from Harvard on gene editing: Read More.

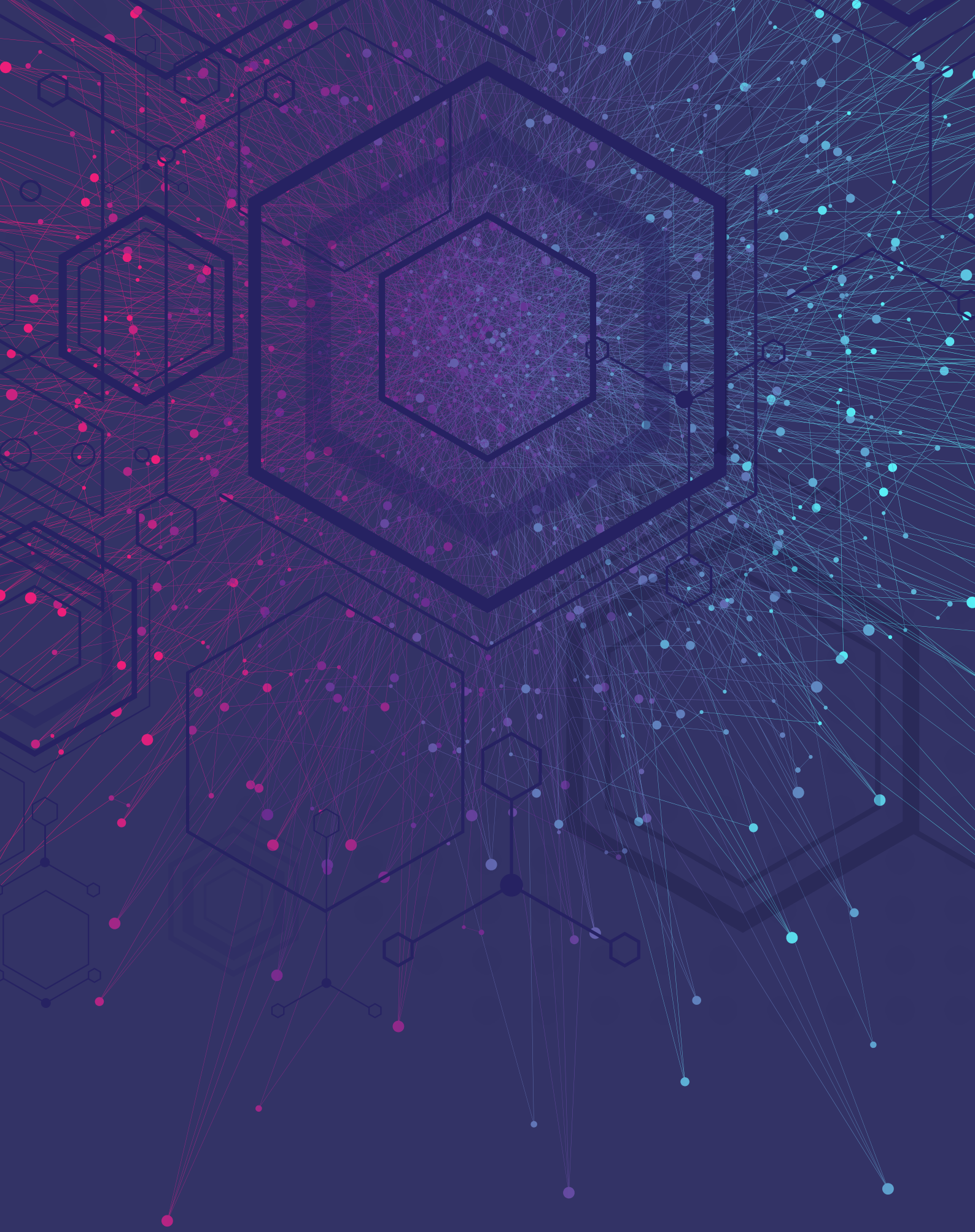
Guiding Scenarios for Discussions



There are many important personal, social and ethical questions surrounding genetics and genomics. Everyone's views are different and often there isn't a simple or definitive answer. This card-based activity helps you to discuss your views and explore what other people may think. Read More.

Additional Questions to Further Stimulate Discussions

1. Should human gene editing be allowed?
2. Is creating a designer baby ok if the baby could save a sibling's life e.g. a kidney or bone marrow?
3. What are the ethical issues involved in editing out disabilities such as blindness or chromosomal disorders?
4. What are the ethical issues involved in cloning humans?



Science Foundation Ireland
Three Park Place,
Hatch Street Upper, Dublin 2.
scienceweek@sfi.ie

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