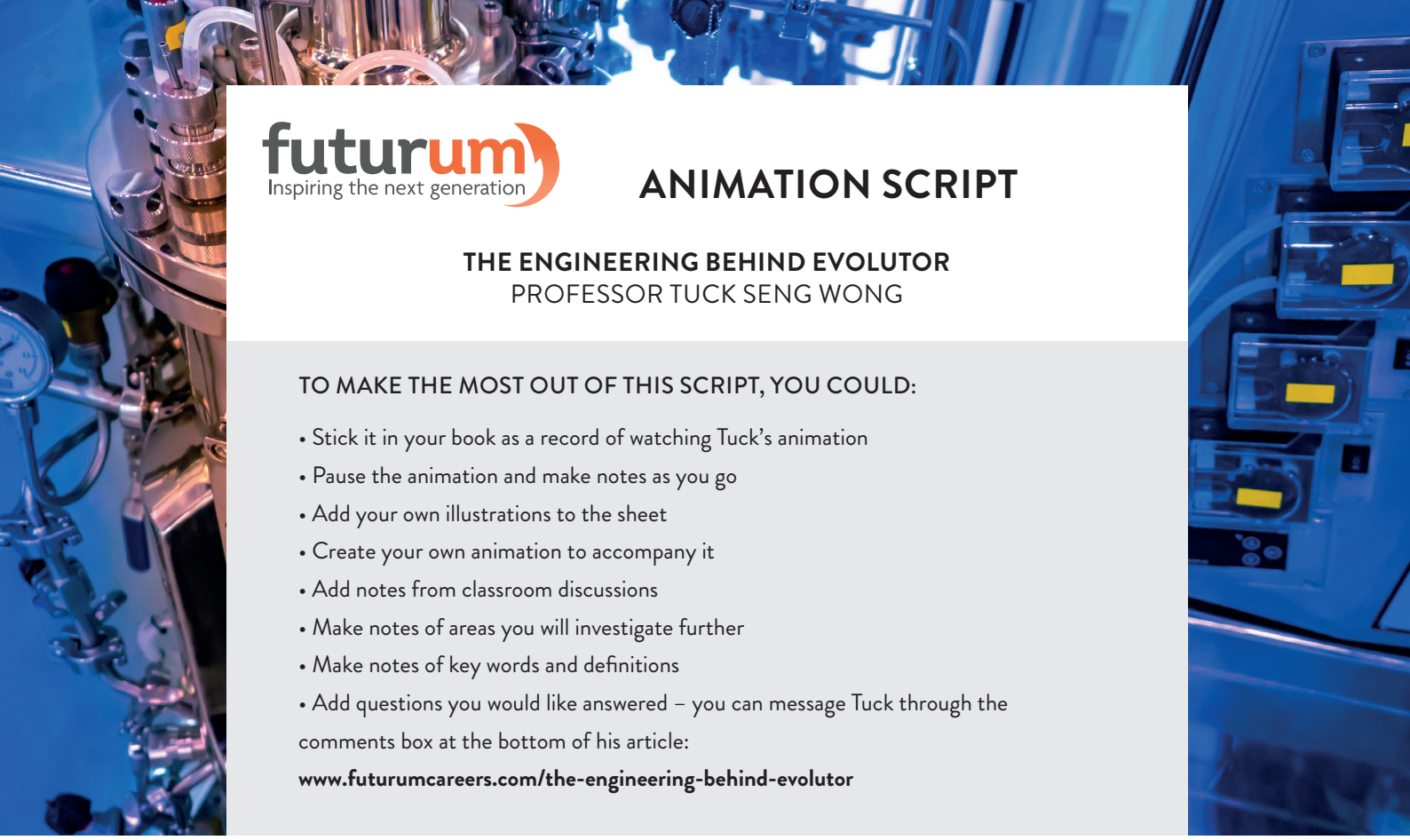

futurum
Inspiring the next generation

ANIMATION SCRIPT

THE ENGINEERING BEHIND EVOLUTOR
PROFESSOR TUCK SENG WONG

TO MAKE THE MOST OUT OF THIS SCRIPT, YOU COULD:

- Stick it in your book as a record of watching Tuck's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Tuck through the comments box at the bottom of his article:
www.futurumcareers.com/the-engineering-behind-evolutor

SCRIPT:

Charles Darwin introduced the concept of natural selection in his ground-breaking book On the Origin of Species in 1859. Natural selection is the process by which living organisms change and adapt and is a key mechanism of evolution. Organisms that are better adapted to their environment are more likely to survive, which means the genes that enabled their survival are more likely to be passed on.

Professor Tuck Seng Wong, a chemical engineer and biomanufacturer based at the University of Sheffield in the UK, is applying the concept of 'survival of the fittest' to engineering biological systems for industrial applications.

Tuck and his team believe that applying this Darwinian concept to biomanufacturing will help provide the solutions we need for a sustainable future.

They deliberately introduce mutations into a biological system and apply artificial selection to perpetuate a desirable trait. By evolving microbes, the team can optimise and maximise the use of natural resources. For example, bacteria and yeast can be adapted to turn waste products into food ingredients, biodegradable plastics, biofuels and other valuable resources.

To evolve microbes with specific properties – and with accuracy and predictability – Tuck and his team have developed Evolutor.

Genome sequencing allows the team to 'read' the genetic alphabets in a genome. By comparing a DNA sequence against a reference, the team can quickly identify the genetic variations that are responsible for a trait. For example, if the team isolates a yeast variant that produces more biofuel it will be able to understand the genetic basis of this by sequencing the genome of this yeast variant.

Evolutor is a clever device, which allows the team to manipulate and control the conditions of microbial growth. Depending on how Tuck and the team design an experiment or operate the Evolutor, they can evolve a wide range of microbial properties such as carbon utilisation, pH tolerance, inhibitor tolerance, product tolerance and productivity.

The microbe development capabilities of the Evolutor technology have a wide range of applications, including for bio-manufacturers in food and drink, pharmaceuticals and biologics, chemicals, agri-tech, biofuels, nutritional ingredients and microbiome health, materials, and flavours and fragrances.

ANIMATION SCRIPT

Tuck and his team now want to capitalise on the power of Evolutor to understand how Nature designed a microbial cell factory, its genetic makeup and gene function, and how these genes are regulated.

Evolutor is helping to build a sustainable future!
How would you use Evolutor technology to solve your biomanufacturing challenge?