"The challenges facing European agricultural and life science universities, and their development to 2030"

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Context – University College Dublin

- University Founded in 1854 (Albert College 1838)
- Largest University in Ireland (comprehensive)
- University Campus 5 km from Dublin city centre
- 34,000 students
  - 9,300 graduate students (27%)
  - 10,200 international students (30%)
  - 5,000 student in overseas campuses
- Funding – only 36% from government
- Poor Staff:Student ratio (1:21)

1. Our Challenges to 2030

2. Education as a core activity
3. Research as a core activity
4. University Challenges
5. Global challenges
6. Conclusions

ICA Forum 2016

Association for European Life Science Universities

Challenges for Life Science Universities in delivering future global leaders

"The multidisciplinary nature of agriculture and life sciences … … a broad knowledge of the natural, social and applied sciences is needed … …"

Both a strength and a weakness

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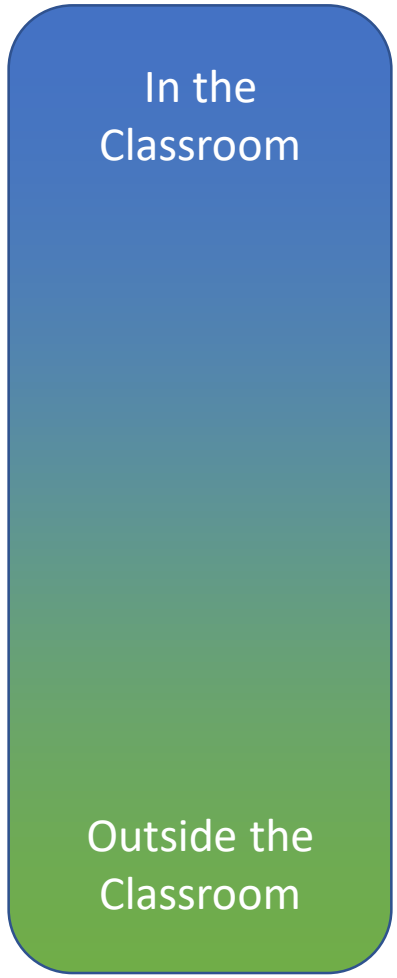
2. Education challenges

- Multidisciplinary challenge
  - Increasingly complex
  - more and more to learn
- Challenge of specialisation
  - General – know a little about a lot
  - Specialise – know a lot about a little
  - Opportunities for new degree options
- Changing face of learning
  - Reducing emphasis on information acquisition
  - Increasing emphasis on understanding and decision making.

Education – key components

- Deep knowledge of subject matter (relevant to their programme of study)

- Transversal skills
  - Ability to Analyse and Evaluate (data)
  - Critical thinking and innovation
  - Problem solving
  - Ethics
  - Organisational & collaboration skills
  - Tolerance & Respect
  - Independence
  - Adaptability & Resilience
  - Interpersonal skills.



Education – the environment

- In the class room
- Practical / Applied learning experiences
  - Laboratory and field work
  - Work Experience
  - Role of practitioners (alumni) in providing education
- Outside the Classroom – but in the University
  - How well do we promote learning outside the classroom?
  - How can we do better in this aspect of educating our students?
  - Is this a distinctive feature of University life?
- Globalisation
  - Study Abroad
  - Increased student mobility
  - Need for increased co-operation among universities.

Education – who we teach

- Traditionally our University students

- Moving to a much broader community of learners
  - Life Long learning
  - Only attending university for 4 to 5 years between the ages of 18 to 24 may be a lost opportunity
  - Continuous Professional Development
  - Executive Education

- Our own University Staff.

Education - disciplines to 2030

- Traditional Subjects will remain strong
  - Animal, plant, soil science; breeding & genetics, etc

- Animal and Plant Health
- Food security, integrity
- Business and Trade
- Environment and climate sustainability
- Energy (production and consumption)
- Health systems (nutrition, aging)
- Waste reduction and management
- Social and Behavioural Science

Education – the good news

- There is a “war for talent”
- “Leadership and talent are the biggest opportunity and the biggest constraint on progress”
- We have a vital role to play in nurturing and developing talent for society.

3. Research challenges to 2030

- Hire the best people to do the best research
- Have the best facilities and equipment
  - Bigger
  - More complicated
  - More expensive
  - Collaboration is a possible solution
- Funding models are changing
  - More collaboration needed
  - More industry involvement
  - More complexity
- Competing demands of
  - the need for basic and curiosity driven research
  - research having to have greater impact (payback to stakeholders).

Research – progress needs

- Natural Science challenges
  - Working with and understanding nature
  - Enhancing, maintaining, changing nature
  - New approaches and new efficiencies
  - Progress can be slow
- Engineering challenges
  - Solving well defined problems
  - Building novel solutions
  - Progress is often rapid (proportional to € spent)
- People Challenges
  - Behaviour
  - Business models
  - Progress is unpredictable
- Agriculture and Life Science is all of these things.

4. University challenges to 2030

- 4.1 Finances – funding models are changing
  - External income, industry, philanthropy, partnerships/collaborations, etc
  - Charity or business (with a profit & loss)?

- 4.2 Buildings – old v new buildings/facilities
  - Design, planning, construction, maintenance, flexibility, repurposing, sustainability

- 4.3 Impact
  - Contribution to global needs – obvious (more later)
  - Contribution to local and national needs – less obvious, always changing, regional and specific, difficult.

4.4 People – Our University Staff

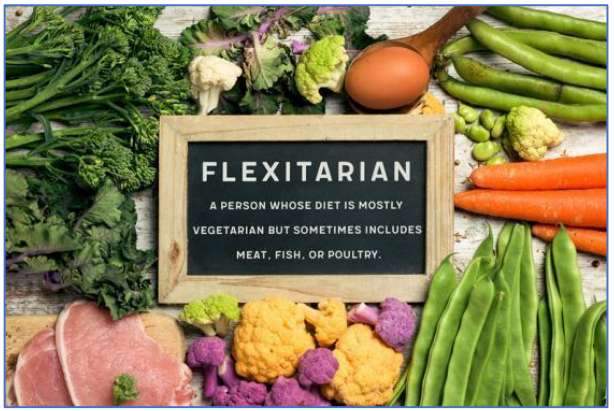
- Our greatest resource
- Should have the ambition to attract and retain the best people
- Should not view them as a static resource
- Require constant upskilling and education – career progression
- Equality Diversity & Inclusion issues – our staff reflect increasingly complex societies – how must we adapt.

4.5 The Reputation Challenge

- Reputation accounts for everything
  - Are we seen as reliable and trustworthy?
  - Do we maximise our reputations?

- With the ready availability of news (even fake news) universities need to continue to build their reputation as the source of high quality information – reputable information.

The information challenge



5. Addressing Global challenges

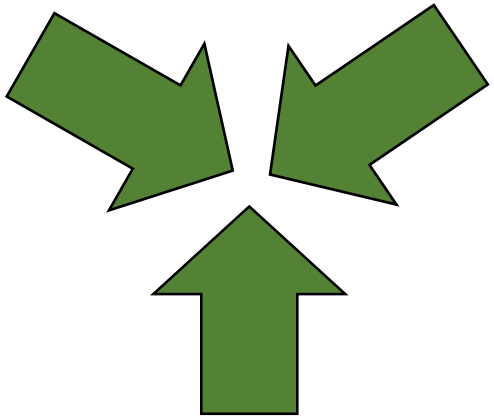
- SDGs
- Sustainable life on earth, Energy
- Climate Change, Biodiversity
- Inequality and social justice
  - Food, shelter, employment, economics, diversity, …
- Health and Wellbeing - pests and diseases
- Behavioural and political change
  - Redefining Europe, fake news, populism, migration, war

- Role for Agricultural and Life Science Universities?.

Global Issues

Climate Change
& Environment

Population
& People



Data
& Technology

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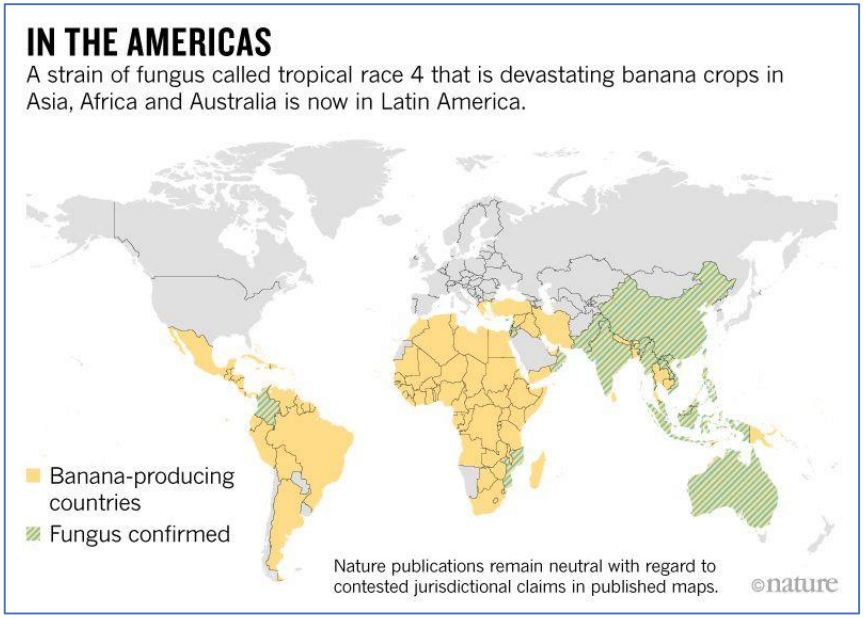
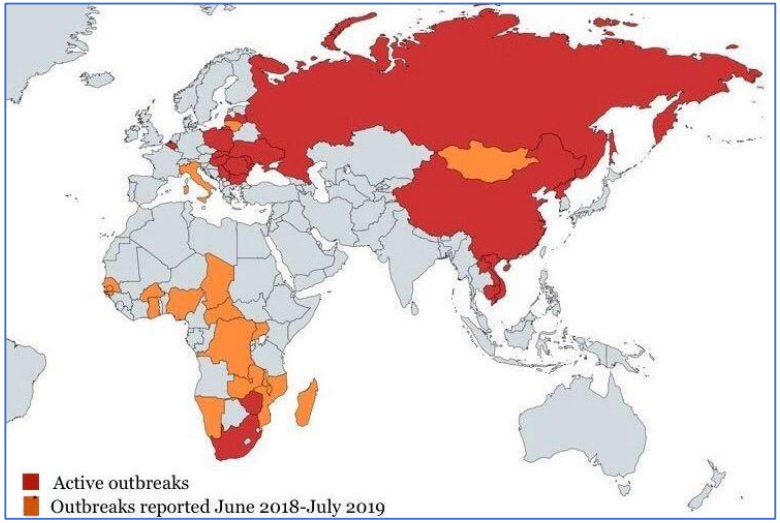
Climate Change –diseases

Fall Army Worm

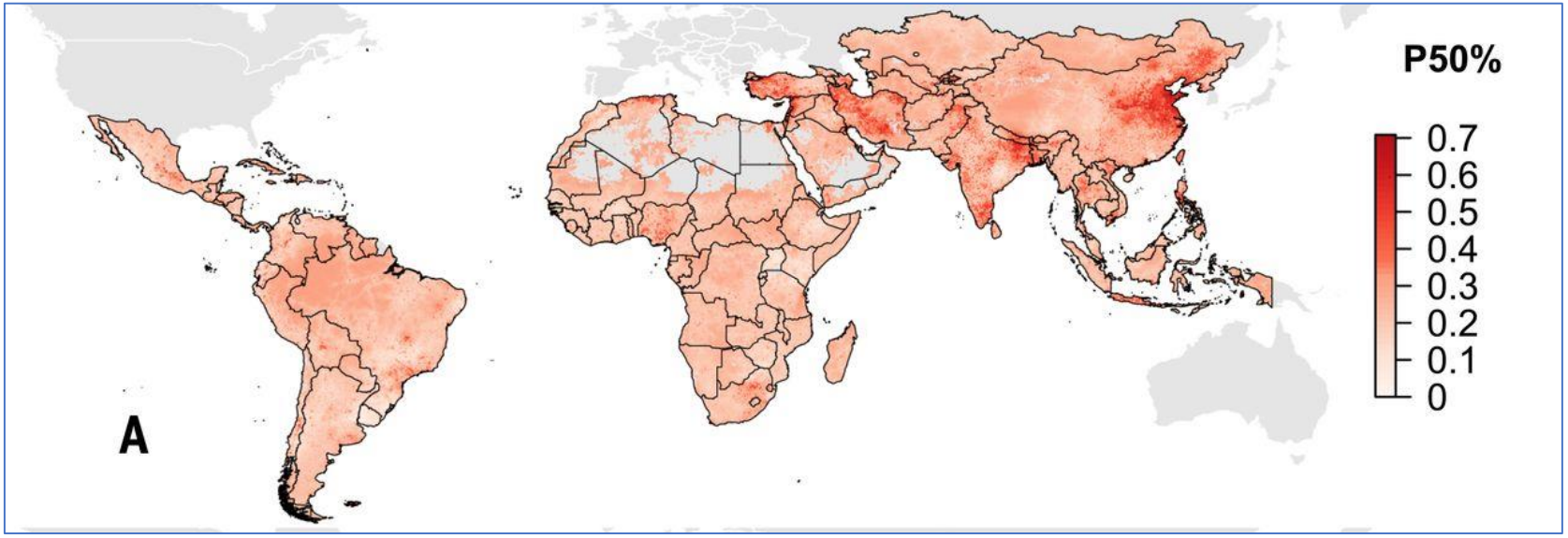


Banana pathogen: Tropical Race 4 (TR4)
Fusarium oxysporum

African Swine Fever



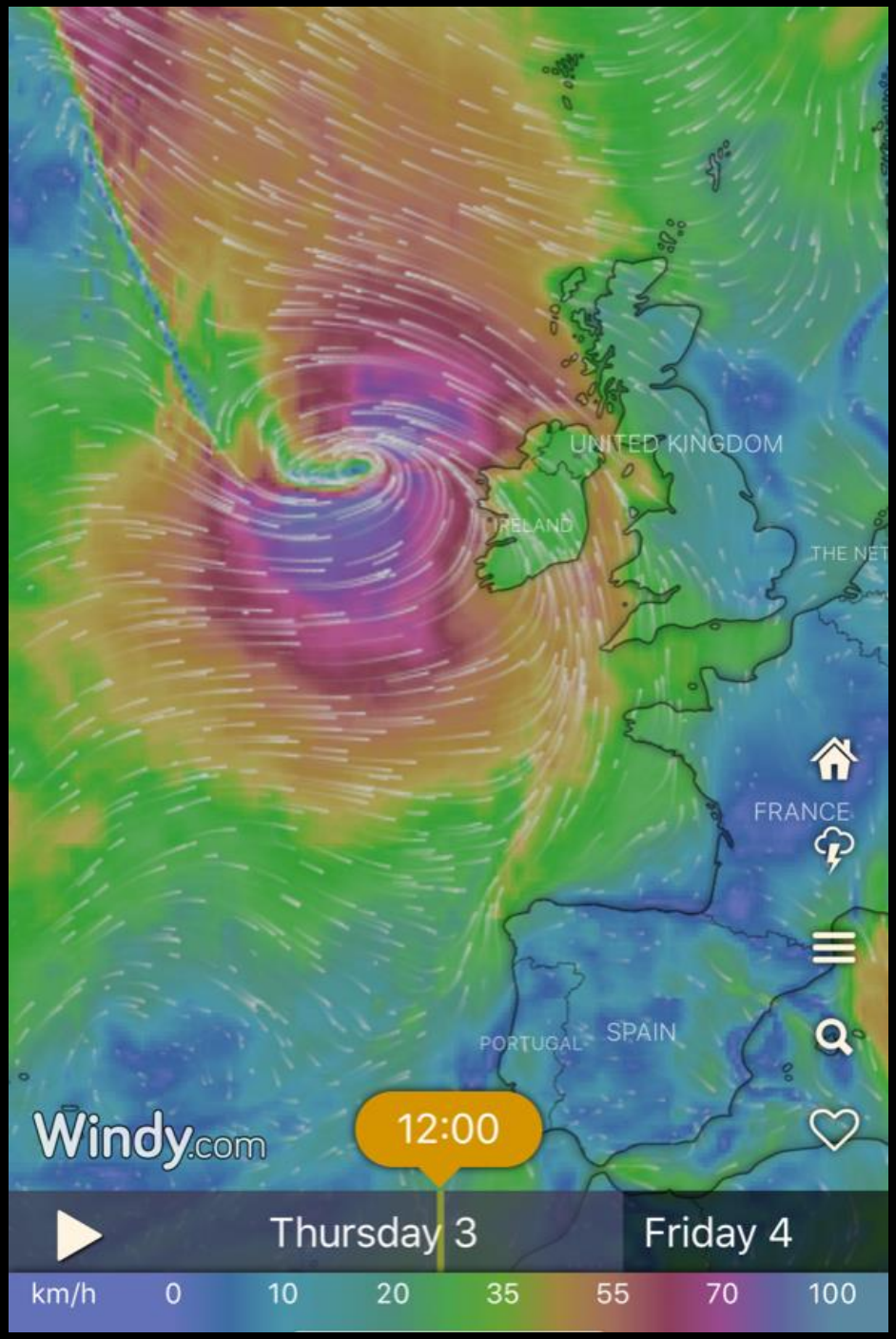
Anti-Microbial Resistance



Proportion of antimicrobial drugs to which more than 50% of bacteria are resistant. (Van Boeckel et al 2019)

(Tropical) Storm Lorenzo

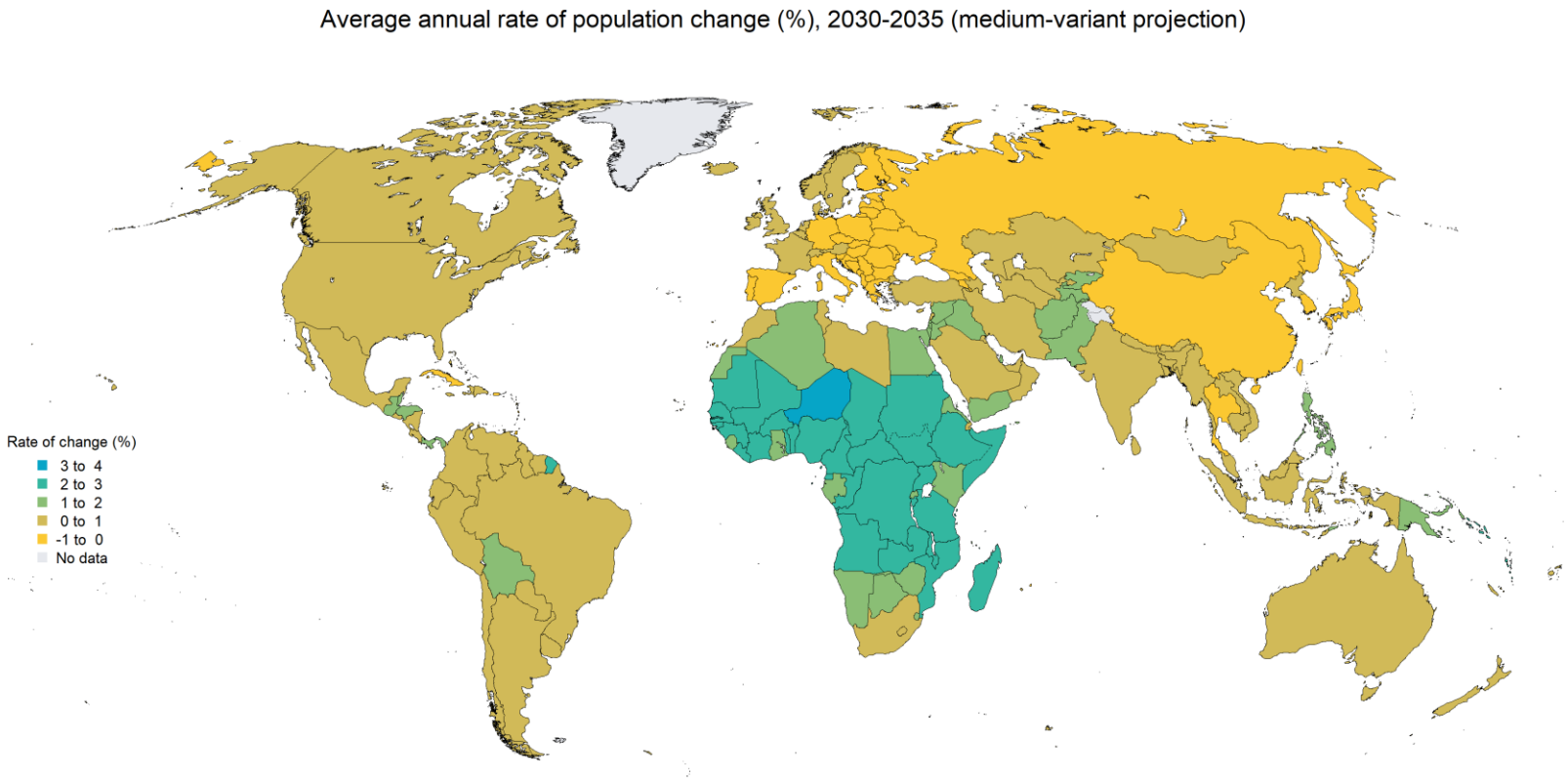
(3 October 2019)



Population challenge

- Expected world population in 2050, 9.8 billion
- Between 2017 and 2050
  - 26 African countries population will increase by (100%)
  - EU28 population will increase by 4%
- Both positive and negative population changes create challenges but also opportunities
- Growth of the working-age population is creating opportunities for economic growth – a *demographic dividend*
- Absolute need for education to create conditions conducive to sustained economic growth.

UN world population projections



Data source: United Nations, DESA, Population Division. *World Population Prospects 2019*. http://population.un.org/wpp/

The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

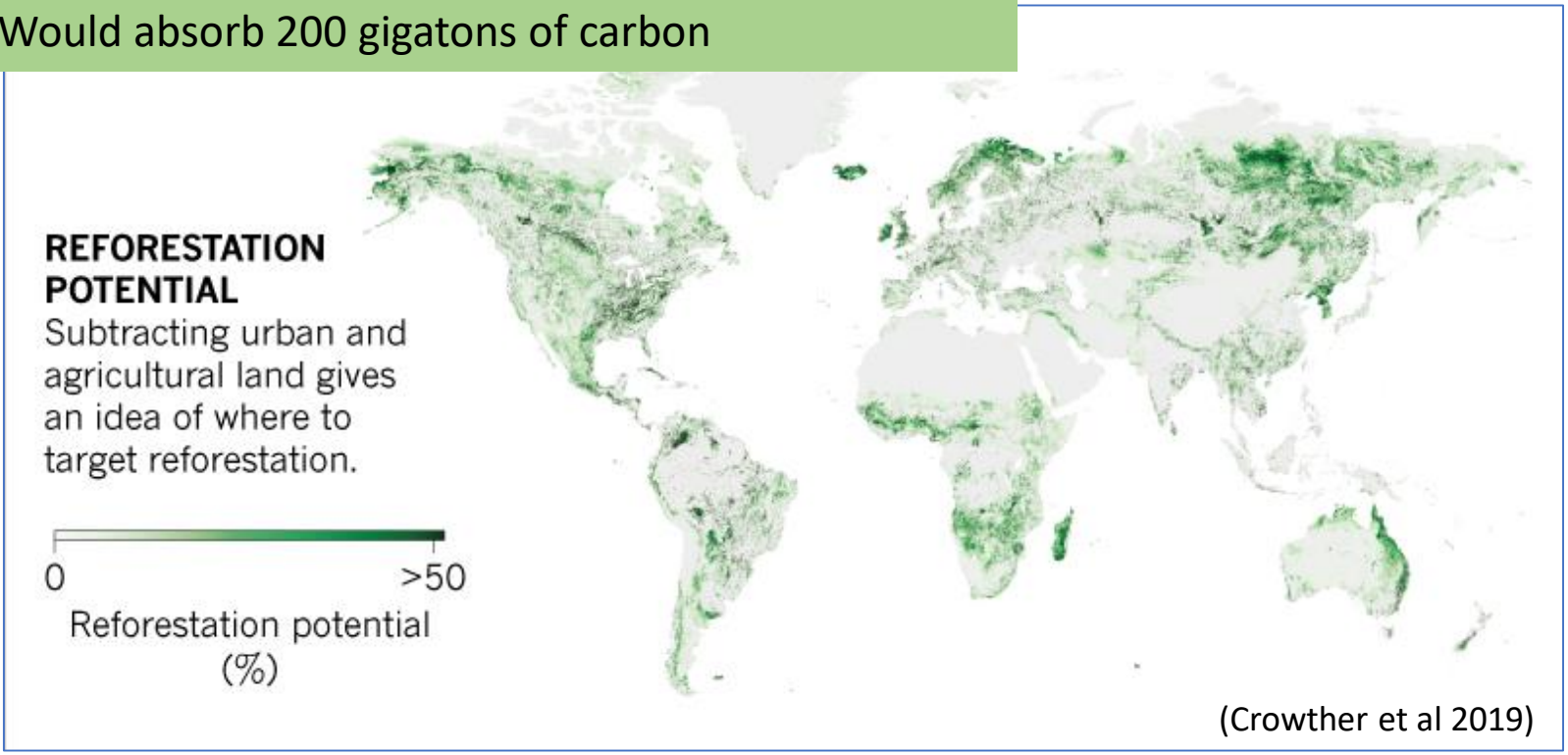
Data and technology

- Improving efficiency will only get us so far
- Technology solutions, digital revolution
- New business models (innovation), every business must be a technology business
- University Farms: increasing need for large scale demonstration of new technologies
- Smart agriculture, virtual reality, assisted reality, blockchain, artificial intelligence, machine learning.

Big data, machine learning

Forest cover

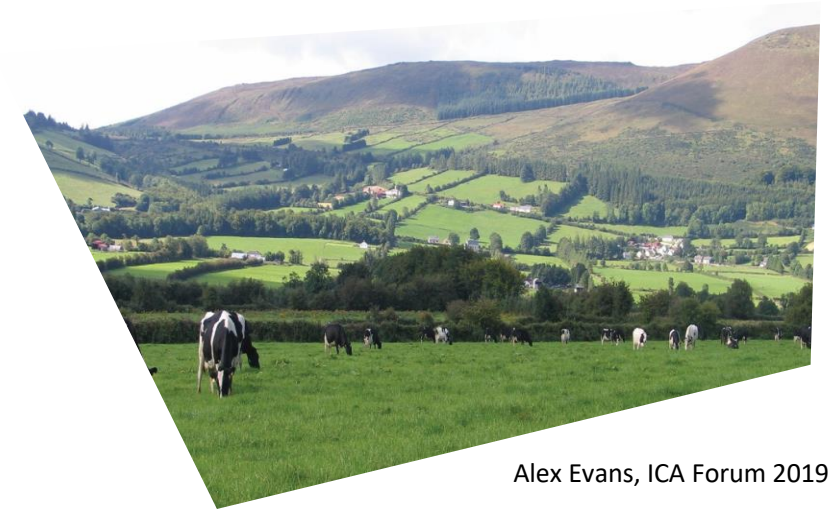
- Data from ground measurements – 430,000 Ha
- Data from satellites
- Machine learning – global model of tree density
- Estimate remaining capacity - 1.2 billion more trees
- Would absorb 200 gigatons of carbon



(Crowther et al 2019)

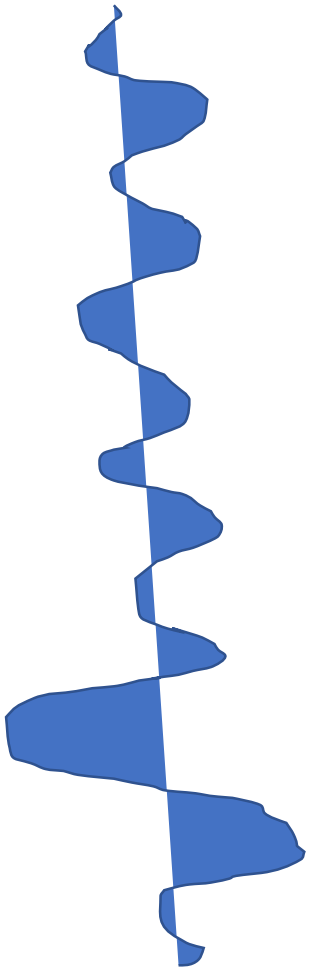
6. Concluding remarks

- Our developments to 2030
- University sustainability challenge
  - Education
  - Research
  - Impact
  - Staff (celebrate diversity, engender acceptance & tolerance)
  - Operating philosophy
  - Collaboration



Wicked challenges (to 2030)

- Be more international but travel less
- Be more collaborative but be more business-like
- Be more elitist (only the best) but be more inclusive
- Life as we know it but without the CO_2 burden
- Expand your university but consume less
- Feed 10b people but without ruining the planet.



Agriculture and Life Sciences are the best sectors to be in to be relevant to address the challenges and to take advantage of opportunities.

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