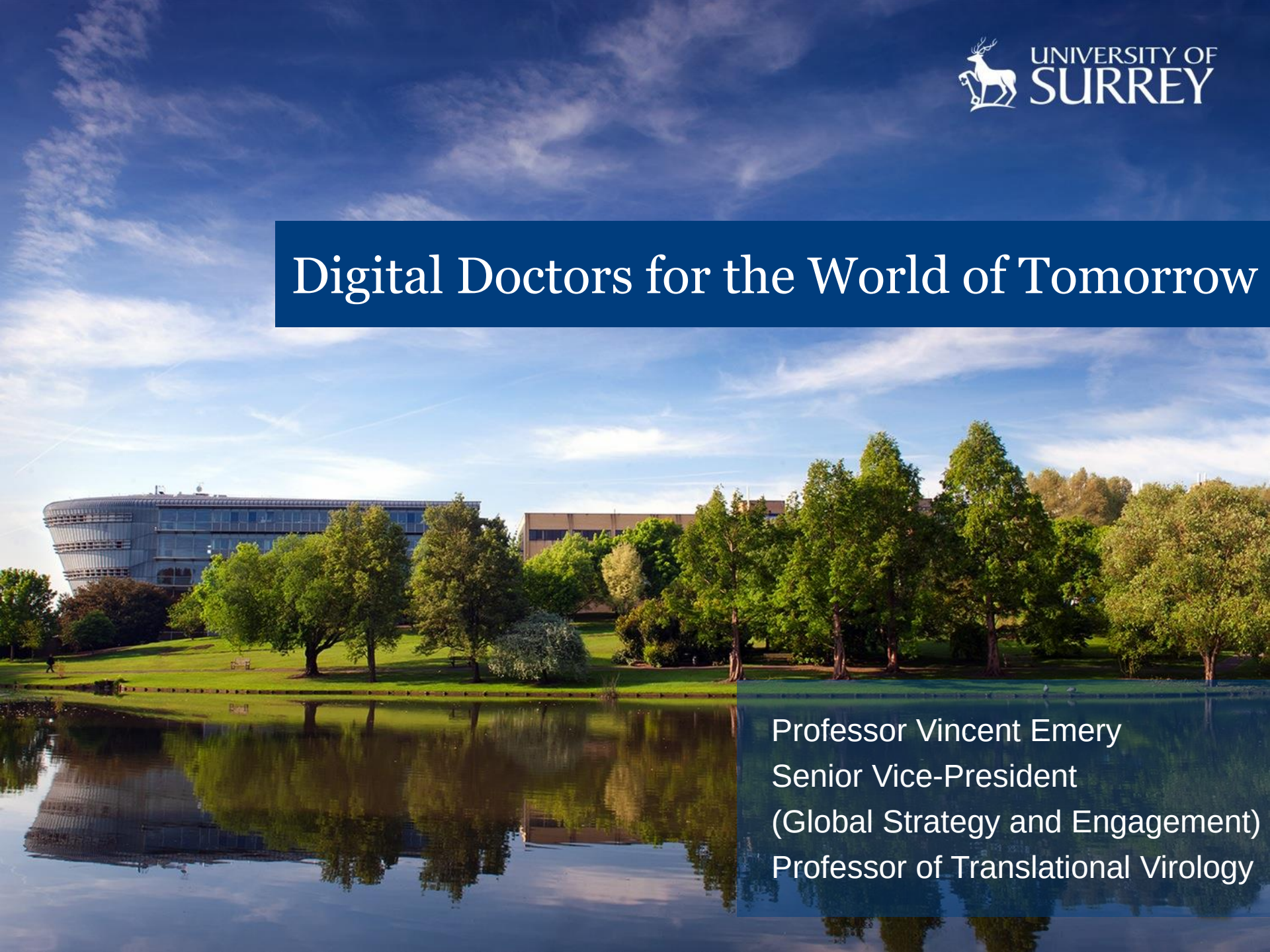
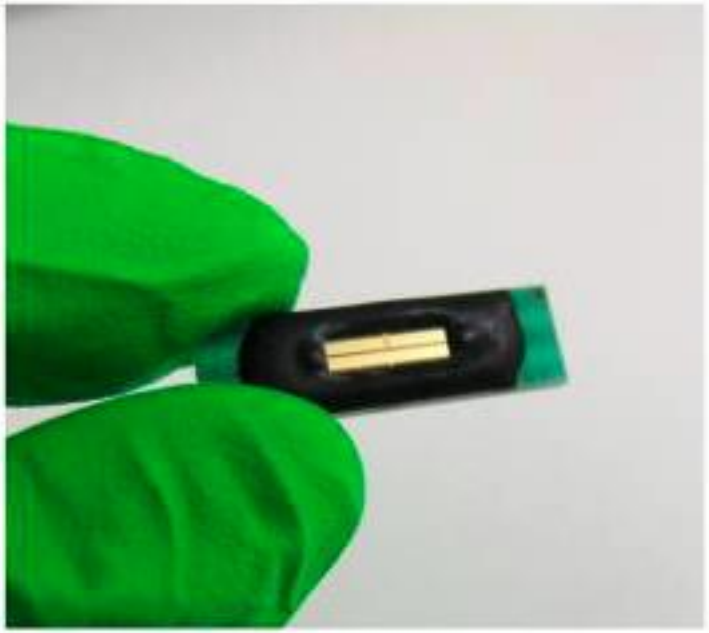


Digital Doctors for the World of Tomorrow

Professor Vincent Emery
Senior Vice-President
(Global Strategy and Engagement)
Professor of Translational Virology

Overview of the Presentation

- What are the skills required for the 21st century doctor
- Changes in healthcare management
- How should we educate doctors for these changes
    - Living in the digital age
- The Surrey approach to launching a new Medical School



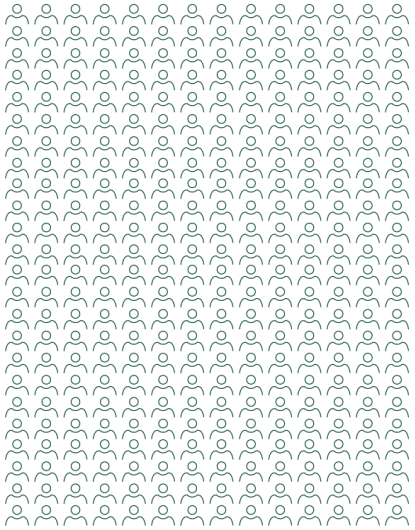
Budget and demand is forcing change in our healthcare system

£1.42b spent on emergency admissions
70% adult population inactive
21% smoke, 26% are obese

Fiscal challenge

Ageing population

Multiple conditions

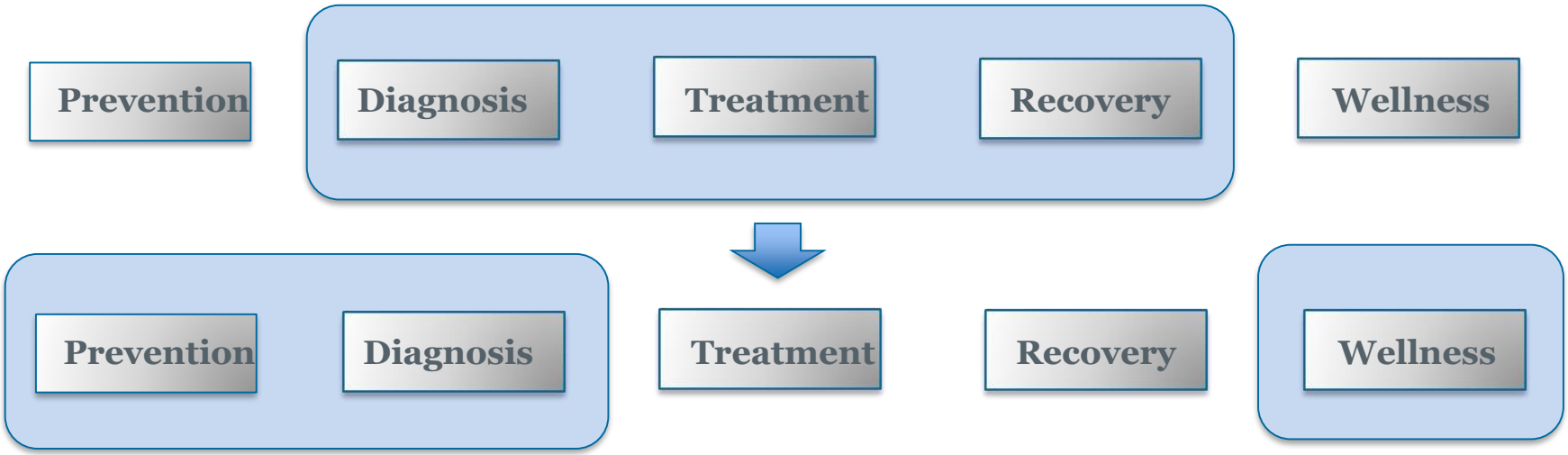


In next 20 years number of people aged 65-84 will grow by 1/3, those over 85 will more than double

Most people over 75 have two or more LTCs

>65 = 80% hospital stays over 2 weeks

The NHS Five Year Forward View



"...a radical upgrade in prevention and public health"

" Break down the barriers in how care is provided....between primary care, community services, hospitals, social care, mental health..."

"...integrated hospital and primary care systems"

"multispecialty community providers"

Technology is key to future healthcare delivery

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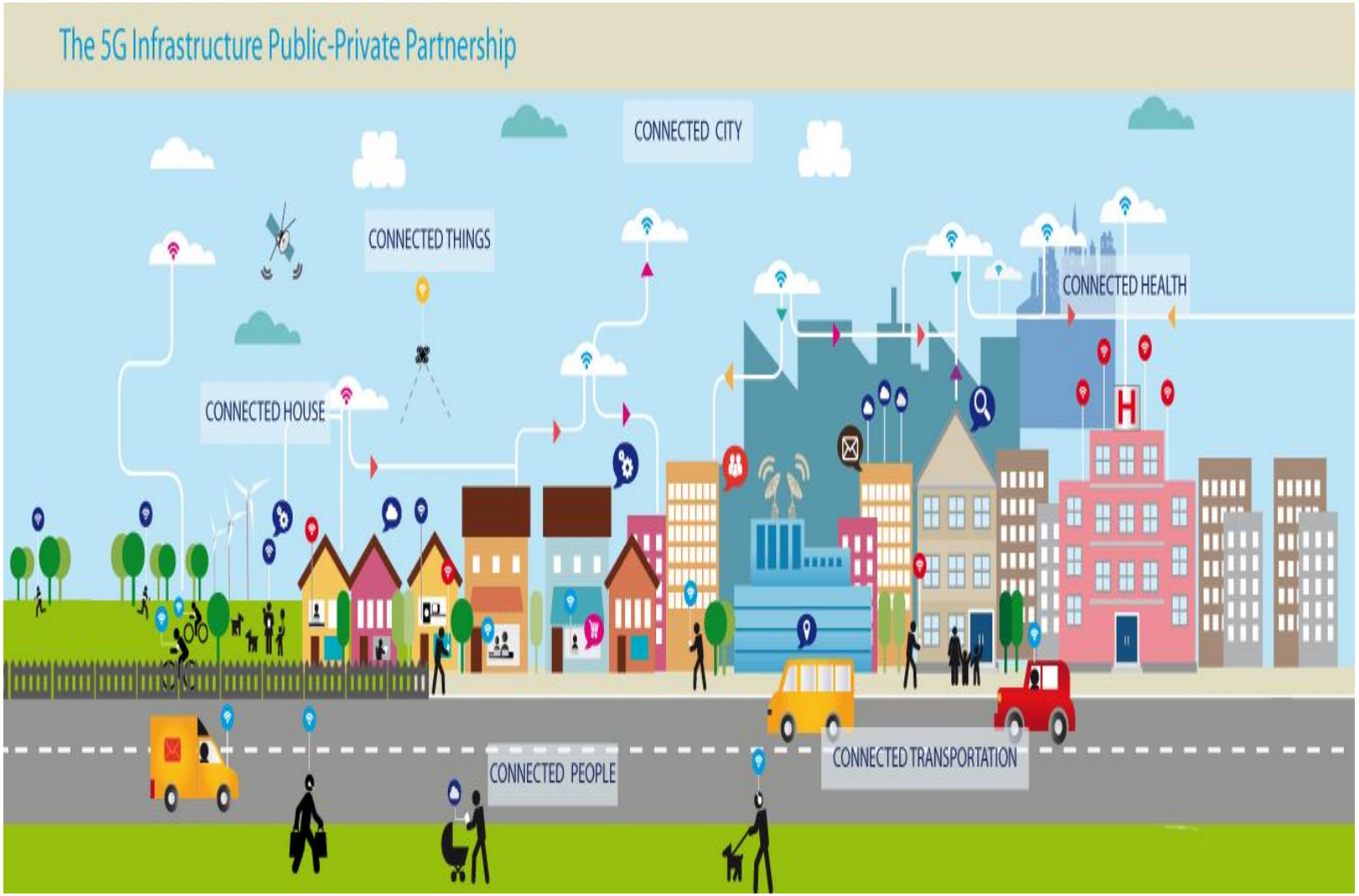
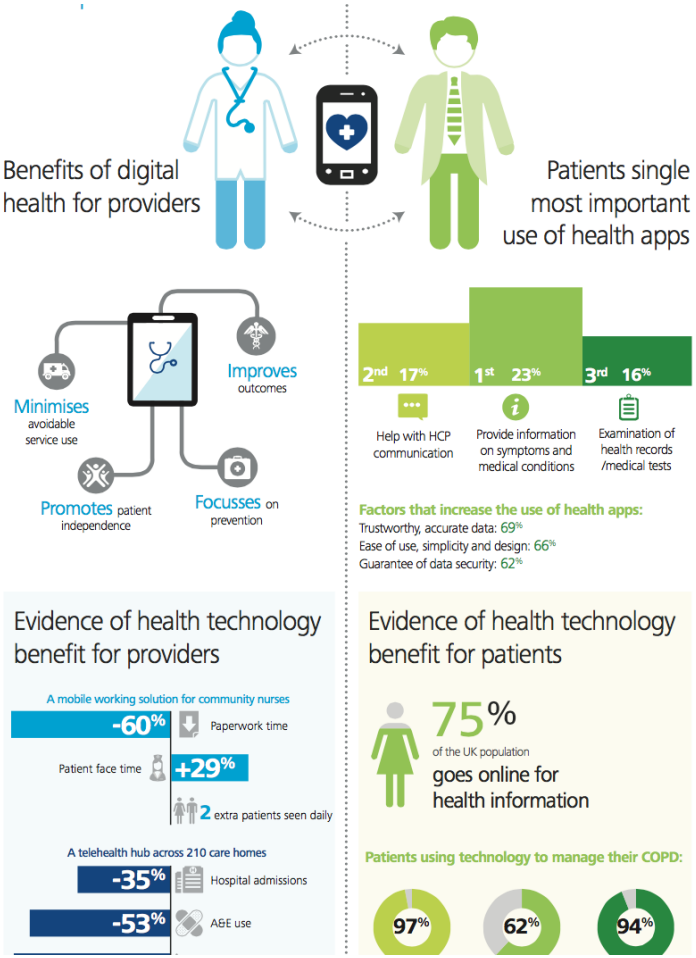
Why eHealth - CONNECTED SOCIETY…



How digital technology is transforming health and social care



Technology enhanced care is capable of providing cost-effective solutions at a time when the demands on health and social care services continue to increase.

Developing technologies of the future...

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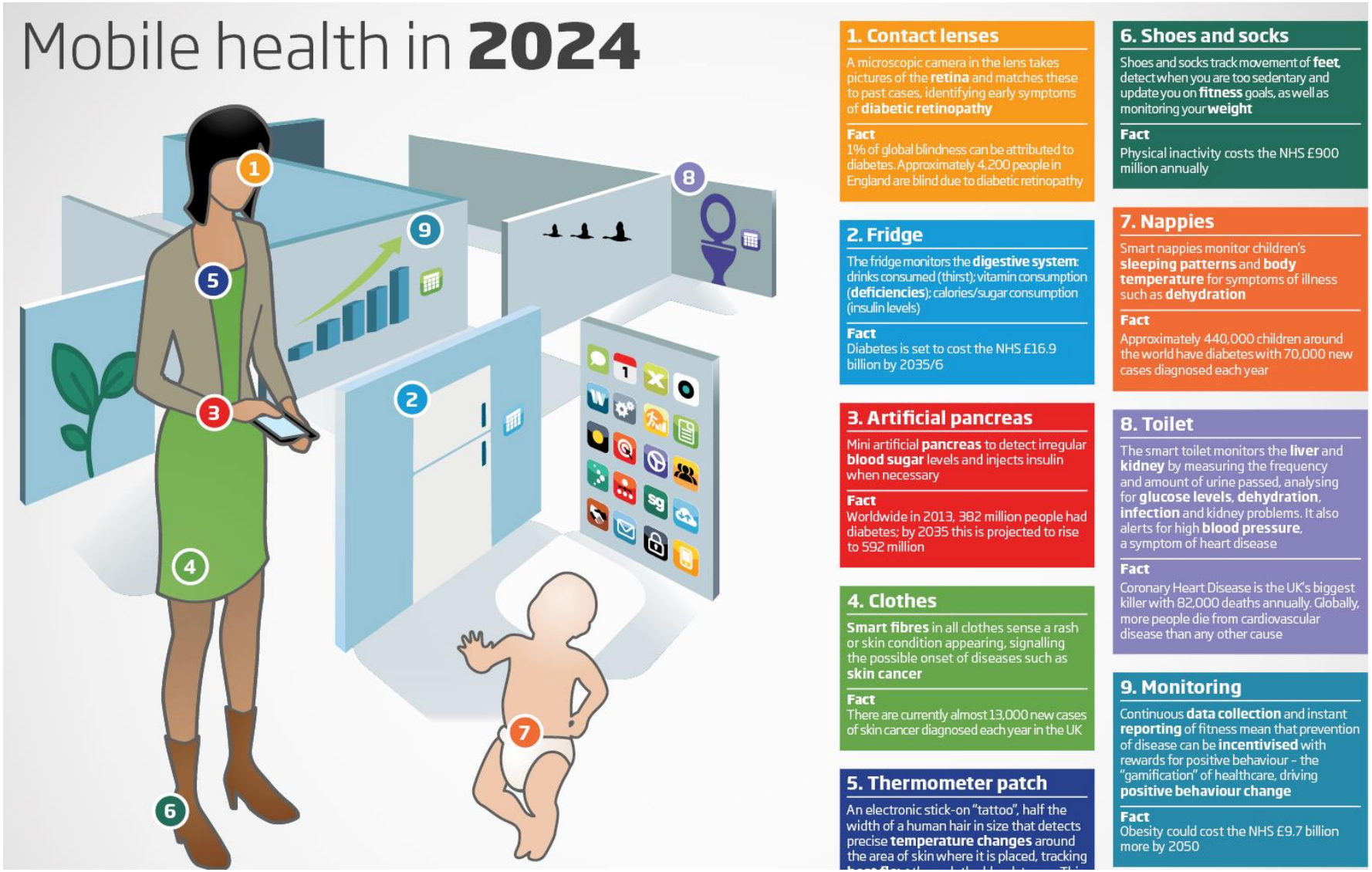
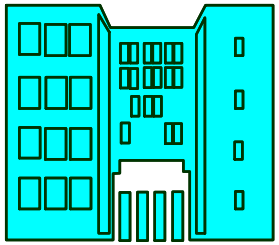


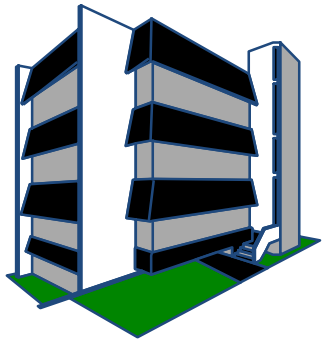
Direction of Travel

home

primary care centre



community care centre



local hospital

regional/specialist hospital

Evolution of healthcare up until the late twentieth century

Evolution of healthcare since the late twentieth century

Evolution of laboratory medicine up until the late twentieth century

Point-of-care testing for the future

Price et al 2010

Personalised and preventative health

- New solutions to engage citizens to take control of wellness and disease prevention
- Health care no longer in the specialist domain – ‘disruptive’
- Predictive, personalised and preventative
- Moving from episodic and reactive to continuous and proactive models of care

The Surrey Approach

Launching a new medical school

Aims of the Surrey curriculum

Medical graduates fit to deliver caring, integrated and technologically advanced healthcare

They will be great clinicians and communicators, but also:

- Leaders in embracing the potential of digital and communication technologies, keen to innovate and improve

- Able to work dynamically in multi disciplinary teams across community and hospital boundaries, to the benefit of their patients, they will be flexible and resilient, able to embrace and adapt to changing healthcare needs.

Our graduates will understand the interconnected factors of environment and economy that affect physical and mental health, and have a strong sense of social responsibility to the diverse communities they serve.

Characteristics of the Surrey Medical Graduate

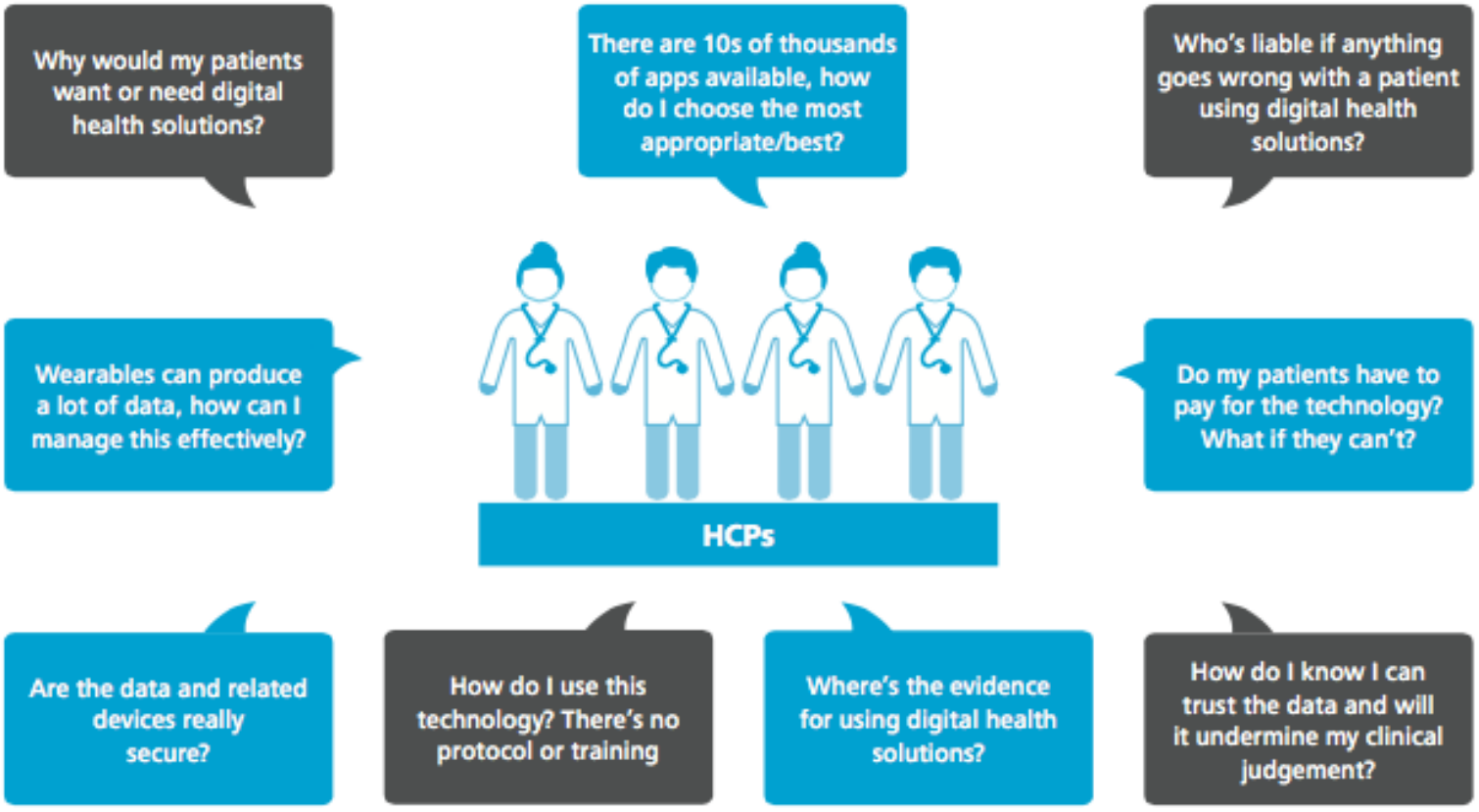
Surrey doctors will be…

- Confident intellectually-curious generalists
- Trained in a research-informed background but many/most looking forward to work in the UK, in hospitals and general practice
- Demanding and innovative leaders in practicing digital medicine wherever they go; *doctors able to lead change in a digital world*
- Understanding of the power of digital to transform health economics and patient experience
- Willing and able to reach beyond their speciality when treating patients with multiple morbidities
- Equipped with the skills to work with patients 1-1 and in the community setting through experiences from term one and the entire fifth year

The challenge

Barriers preventing technology enhanced communication adoption by healthcare providers

Staff, particularly doctors, are often reluctant to engage with technology, illustrating the importance of engaging staff during the design phase of deployment

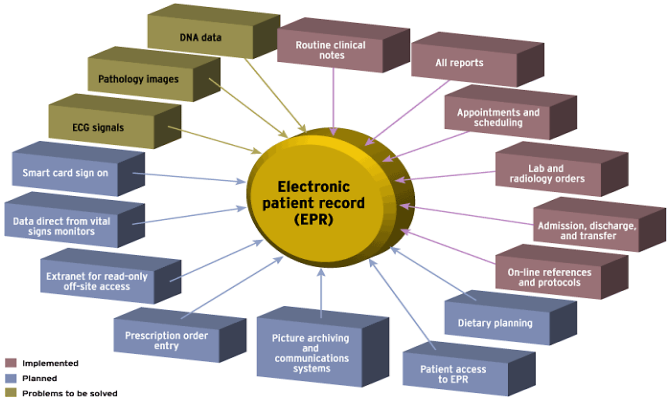


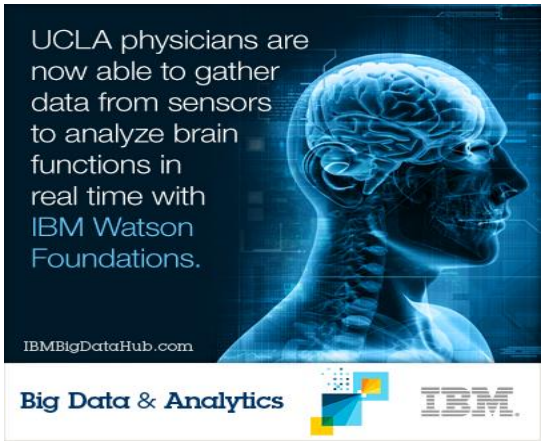
Source: Deloitte Centre for Health Solutions analysis, 2015

eHealth and medical education

- Gap between current medical curriculum and eHealth/clinical informatics in health care contexts clearly identified
- Traditional clinical training does not always equip medical practitioners with the knowledge and skills required to understand how eHealth can be used to improve outcomes for patients, clinicians or organisations or to work collaboratively as a MDT eHealth team
- Requirement for a fundamental change in the design and delivery of medical education to ameliorate the forecasted shortages in the medical workforce
- Need to better prepare medical students to practice in modern, technology-enabled environments
- Shift focus on illness to wellbeing

Doctors of the future…





Embedding eHealth into undergraduate medical education

‘To encourage the adoption by health and social care profession of telemedicine and other digital technologies that deliver much improved patient outcomes, more effectively and efficiently;

- to pioneer the teaching of digital health technologies to clinicians and medical students;
- to explore how digital health technologies, such as apps, can assist in delivering clinical education and health and social care delivery;
- to equip and educate healthcare managers, decision-makers and policy makers on the relevance of adopting digital health technologies;
- to promote healthcare and technological system innovations;
- to disseminate good practice and establish standards’

The Royal Society of Medicine (https://www.rsm.ac.uk/sections/sections-and-networks-list/telemedicine-ehealth-section.aspx)

Doctors of the Digital Age

How will our students learn digital and communication technology?

Digital technology principles integrated into case based learning:

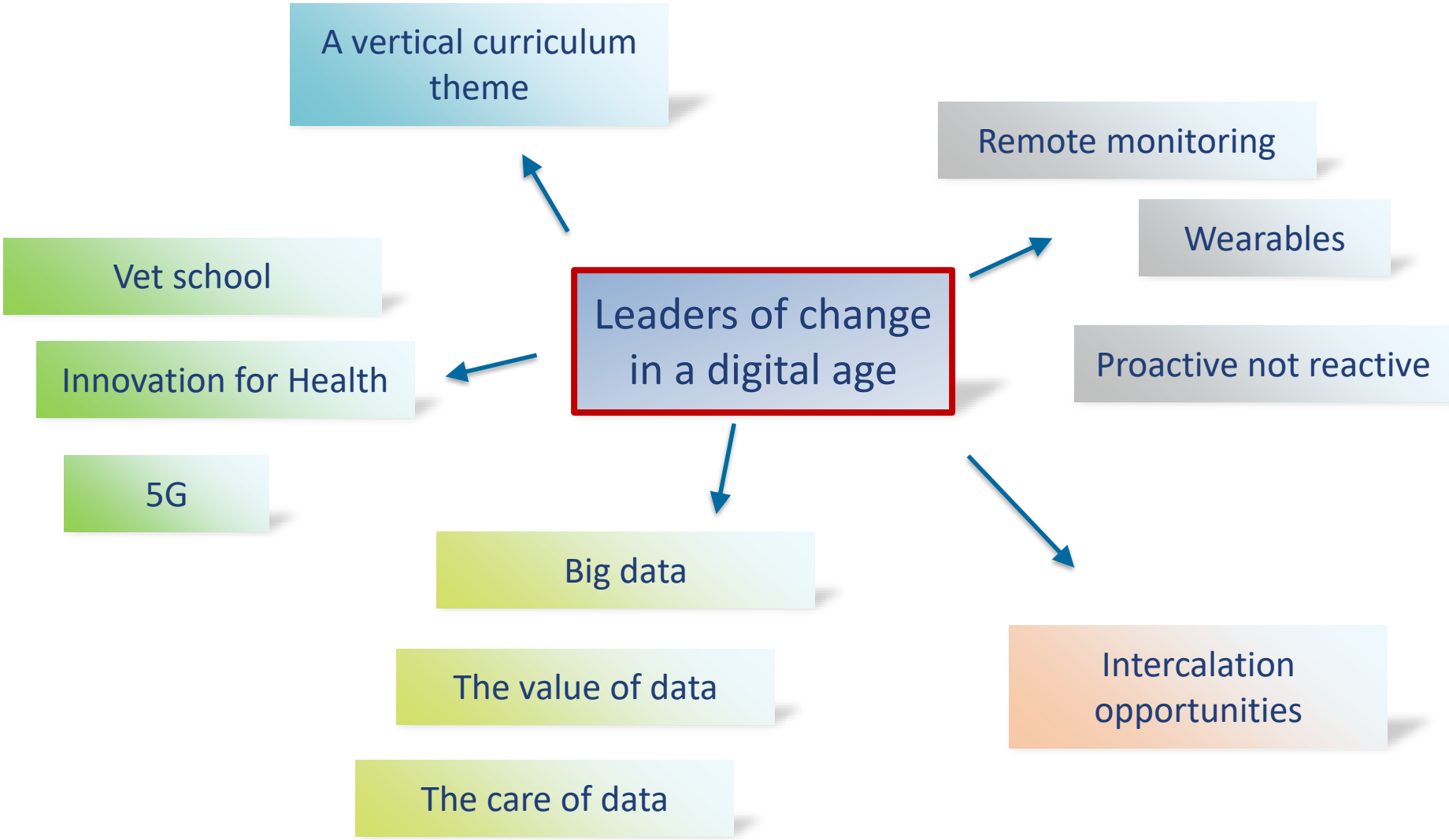
- **Year 1: Understanding the value of data** – ethics of consent, collection, coding and confidentiality.
- **Year 2: Applying data to healthcare situations**: 'big data' and practical examples of its uses

Intercalated BSc (optional but about 50-60% will want to do one) in eHealth, 5G Innovation Centre, Medical/ Vet Engineering, Medical Physics, Industry exposure, as well as the 'usual' subjects.

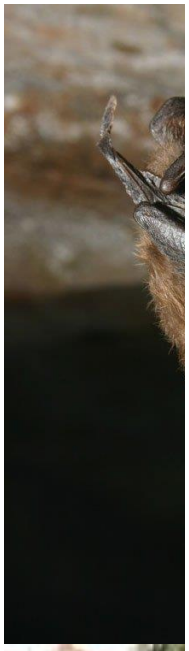
Years 3 & 4: Student Selected Components (short projects)

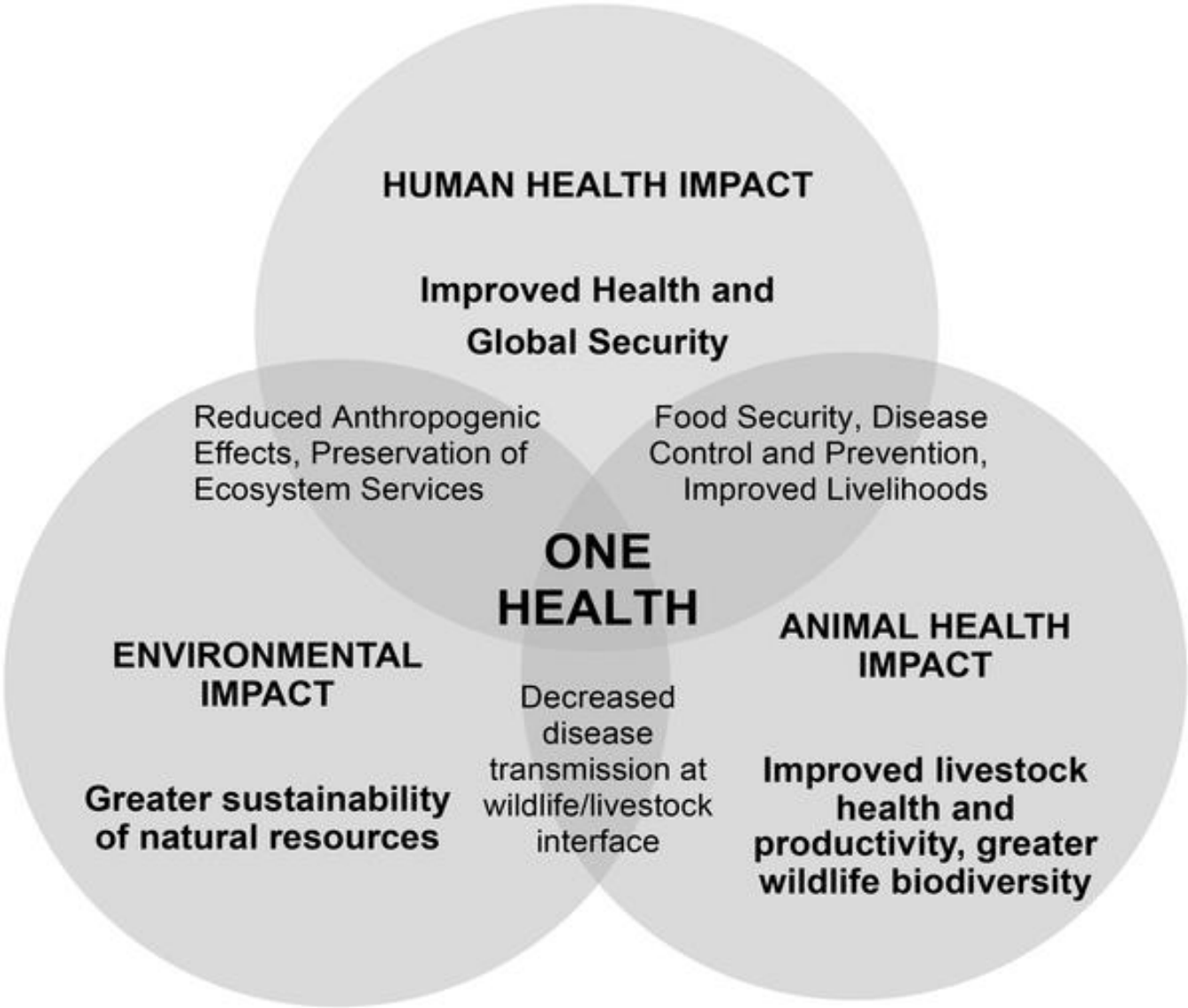
Year 5: Electives: Future applications of data, evaluating e technology and translating its use to a patient population: eHealth patient monitoring and pre-empting emergencies. Placements in industry related to medicine.

Digital ideas & concepts



New & Emerging Diseases





Digital Innovation for Animal and Human Health

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CODE

SURREY CENTRE FOR THE DIGITAL ECONOMY

zoetis

enterpriseM3

Driving prosperity in the M3 corridor

What is the 5GIC?

The 5G Innovation Centre 5GIC is based at the University of Surrey in the Institute of Communications Systems

- World's largest academic/industry research partnership & test facility for the development of future 5G Communications.
- £5m from Enterprise M3 (EM3) the Local Enterprise Partnership and £10M from UK government to support:
  - 5GIC test facilities development
  - Step-out 5GIC facilities to SMEs within the region
  - Create 5G Incubation Facilities at key locations within the region
  - Develop links to other regions of the UK
- £58m already invested by industry partners
- £12m investment from the Higher Education Funding Council.
- UK-based and with significant international connections to China, Korea & Japan
- EM3 Board link between 5GIC and China Britain Business Council.

5GIC main study areas

- Delivering faster, lower latency and more reliable mobile broadband. This means a new radio access technology, coverage extending to cell edges, a flatter network architecture making use of software defined networking and network function virtualisation.

- Sufficient rate so that the user has the impression of infinite capacity.

Internet of Things

- Connecting very many devices in a way that is spectrally efficient and allows 10 year device battery life. Exploring the power of big data and analytics.

- Applying IoT technology to application verticals like eHealth, m-Health, connected cars, smart cities, smart homes, video gaming:
  - Example is our roll out of dementia patient monitoring in the home environment - now embedded in 75 homes in local area
- Much higher energy efficiency and higher cyber security and data privacy performance

PoCs for tomorrow: mobile phone connected test for HIV

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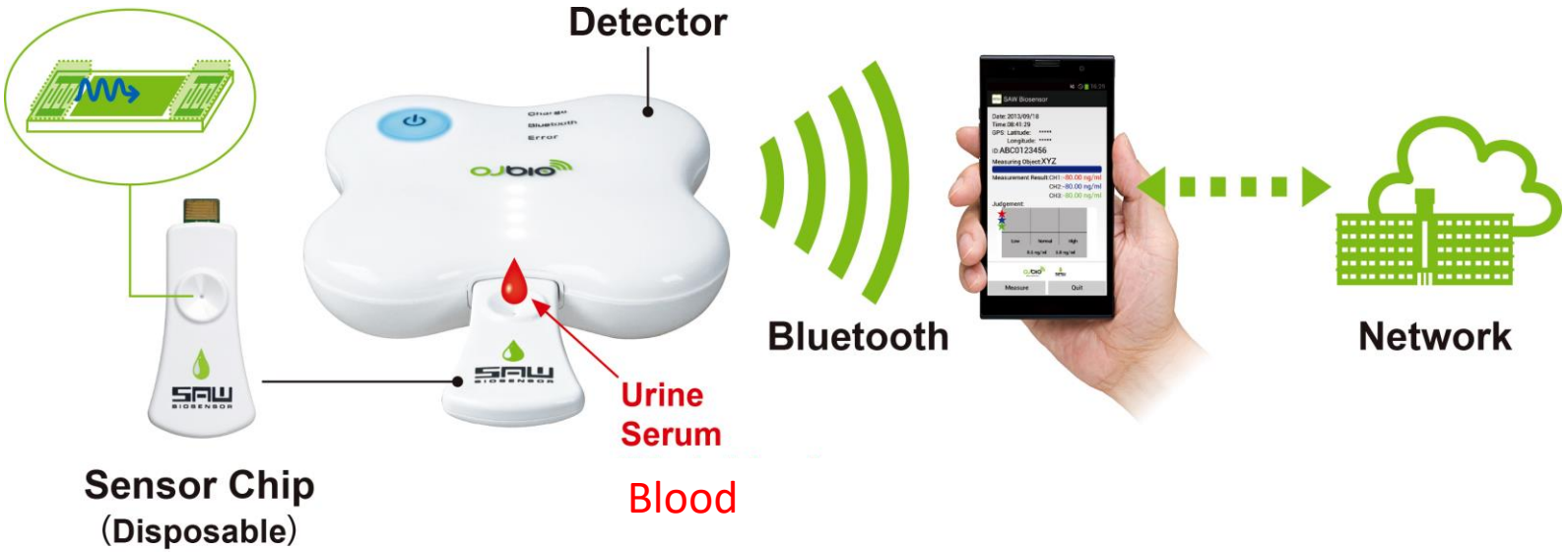


MOBILE DIAGNOSTICS

i-sense.org.uk

NHS National Institute for Health Research

Turbé V, Gray ER, Lawson VE, Nastouli E, Brookes JC, Weiss RA, Pillay D, Emery VC, Verrips CT, Yatsuda H, Athey D, McKendry RA. Towards an ultra-rapid smartphone- connected test for infectious diseases. Sci Rep. 2017 Sep 20;7(1):11971.

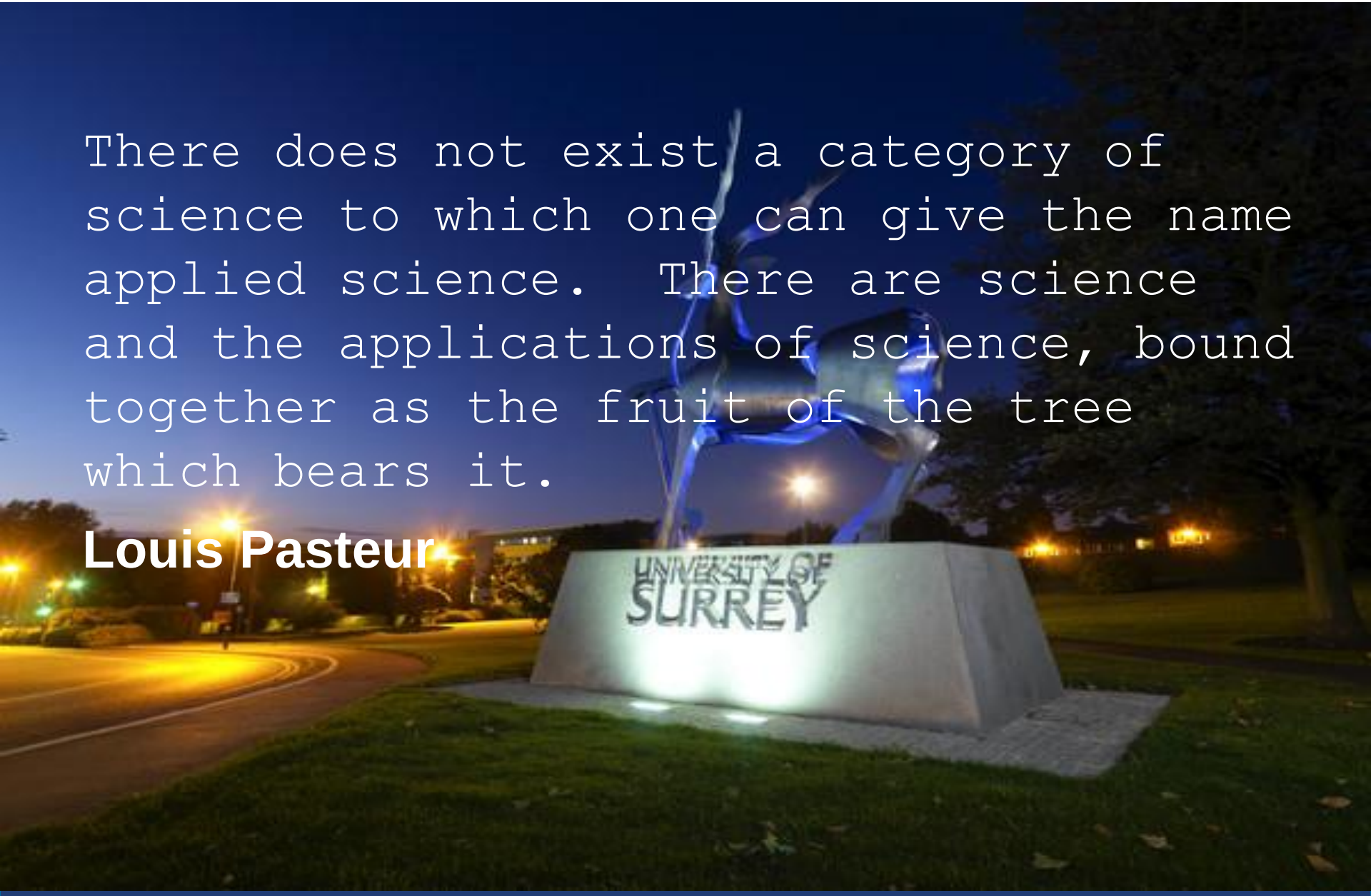
https://youtu.be/A7-GOZ1rFrU

EPSRC Pioneering research and skills

Conclusions

- Preventative medicine is key
- Integration of digital technology into all aspects of patient management key to deliver cost effective and efficient healthcare
- Need to educate the next generation of doctors that are able to:
  - Work across traditional disciplines
  - Be comfortable with technology and evolving technologies
  - Agile and adaptable
  - Aware of the global nature of healthcare and potential threats

Thank you


There does not exist a category of science to which one can give the name applied science. There are science and the applications of science, bound together as the fruit of the tree which bears it.
Louis Pasteur
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