Digitally twinning the environment

Jonny Riggall

Navigating the next **industrial revolution**

Revolution 01

1784

Steam, water, mechanical production equipment

Revolution 02

1870

Division of labour, electricity, mass production

Revolution 03

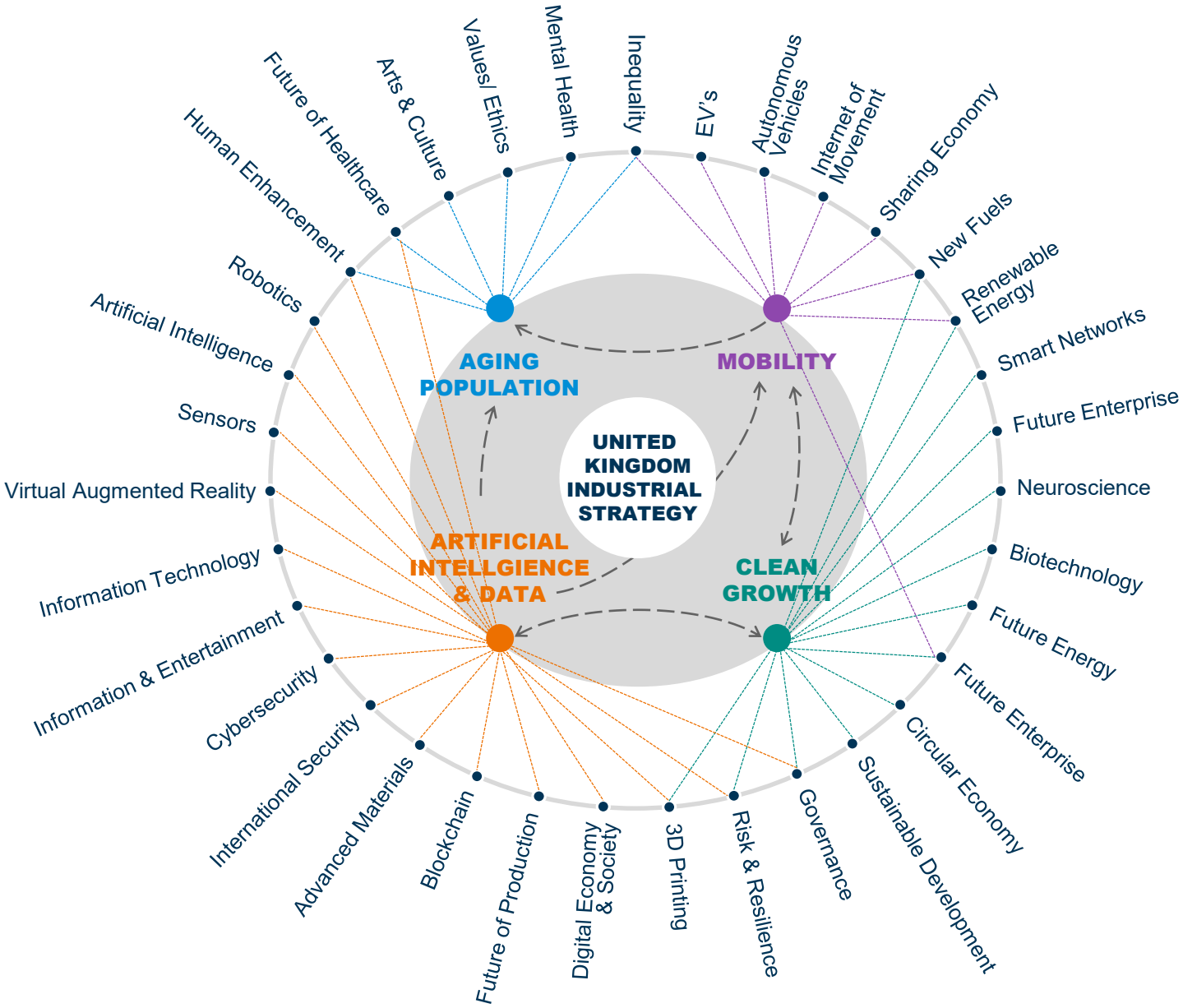
1969

Electronics, IT, automated production

Revolution 04

?

Cyber-physical systems


UNITED KINGDOM INDUSTRIAL STRATEGY
AGING POPULATION
MOBILITY
ARTIFICIAL INTELLGIENCE & DATA
CLEAN GROWTH
Human Enhancement
Future of Healthcare
Arts & Culture
Values/ Ethics
Mental Health
Inequality
EV's
Autonomous Vehicles
Internet of Movement
Sharing Economy
New Fuels
Renewable Energy
Smart Networks
Future Enterprise
Neuroscience
Biotechnology
Future Energy
Future Enterprise
Circular Economy
Sustainable Development
Governance
Risk & Resilience
3D Printing
Digital Economy & Society
Future of Production
Blockchain
Advanced Materials
International Security
Cybersecurity
Information & Entertainment
Information Technology
Virtual Augmented Reality
Sensors
Artificial Intelligence
Robotics

The 4th industrial revolution **top 5 drivers of change**

01 Changing working environments/arrangements

02 Rise of the middle class in emerging markets

03 Climate change/natural resource constraints

04 Rising geographical volatility

05 Consumer concerns about ethical and privacy issues

> Disruptive changes to business models will have a profound impact on the employment landscape over the coming years.
>
> World Economic Forum 2016

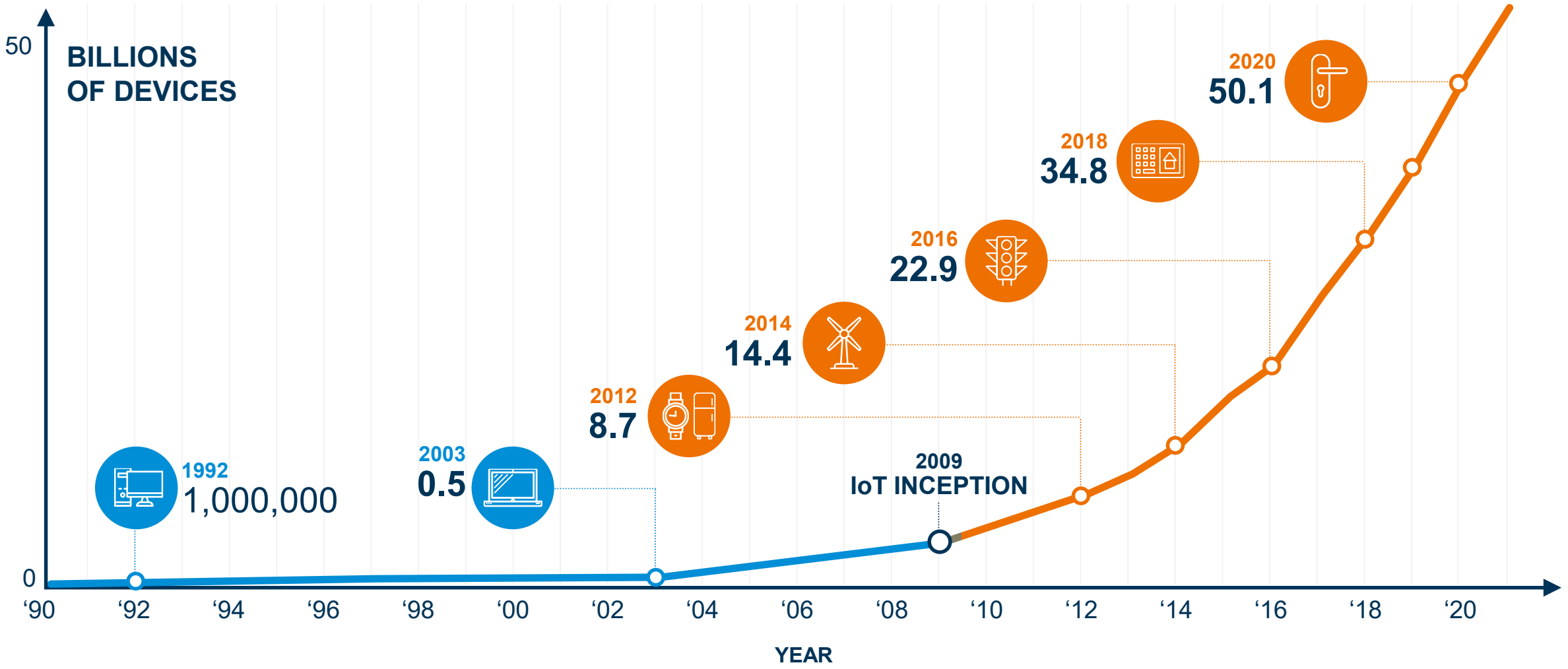
When will the **future** arrive?

Expected to occur by 2025

- 10% of people wearing **clothes connected to the internet**
- The first **robotic pharmacist** in the US
- The first **3D-printed car** in production
- 5% of **consumer products** printed in 3D
- 90% of the population with **regular access to the internet**
- **Driverless cars** equalling 10% of all cars on US roads
- The first transplant of a **3D-printed liver**
- Over 50% of **internet traffic** to homes for appliances and devices
- The first **city** with more than 50,000 people and **no traffic lights**
- The first **AI** machine on a corporate **board of directors**

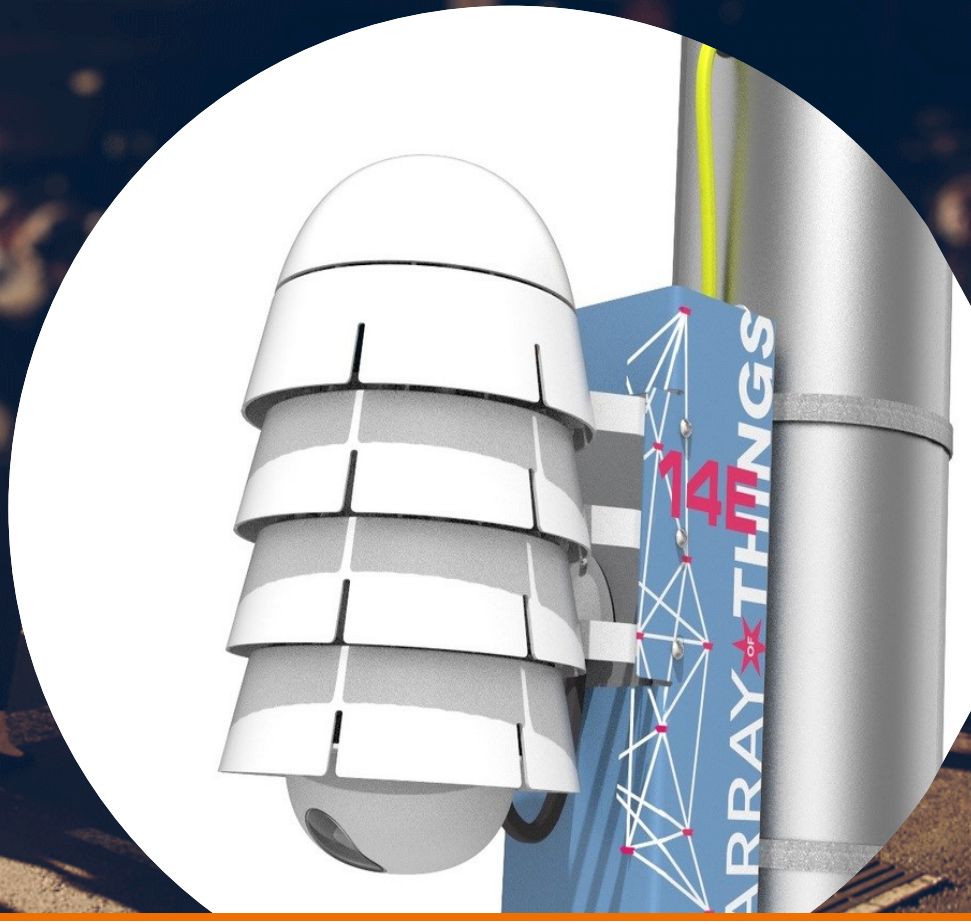
Source: World Economic Forum, Technology Tipping Points and Societal Impact Report 2015.
800 technology executives and experts form the information and communications technology sector were surveyed as part of our Technology Tipping Points and Societal Impact Report

The Internet of Things



Matching the environment

Urban **Sensing**



An **array** of **things**

pba peterbrett Stantec

Extracting the value of data

Adopt a tree through **your social network**

Mega Trends

The World of Sharing: **Unleashing knowledge**

The 4th industrial revolution
5 recommendations for riding the digital wave

1 Learn the process and language

“”

Environmental professionals, institutions and academia need to understand, learn and embrace the process and language of the digital sector, to be on an equal playing field and maximise the potential.

2 Create a national ledger for the environment

> A national ledger of environmental data needs to be created. It should be mandatory for all environmental data submitted with planning applications to be submitted to this ledger. Currently, the sum of the millions of environmental data collated is stored two-dimensionally in pdfs, and hence a significantly under-utilised resource.

3 Embrace connected devices and edge computing

> Local planning authorities should be required to establish a web of connected devices that automate environmental monitoring beyond just air quality. This data would form a comprehensive baseline for the national environmental ledger.

4 Learn from past lessons in environmental data analysis

> The use of rigid Excel spreadsheets for creating tools to represent environmental conditions needs to stop. Badly informed complex decisions are being made because of these tools.

5 Create the economic conditions for the Internet of Environment

> The Government needs to provide the economic conditions for the Internet of Environment to exist. The value of the environment, the ability to replicate it digitally and then to return the investment on its service through better understanding, is a considerable economic opportunity.

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