Late Sheet - Society, Environment, and Council Development Executive Advisory Board on Thursday, 20 October 2016

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Tim Pope – Biography

Tim Pope is a senior manager in PwC with a blend of policy, practice and consulting experience in relation to local government and urban issues, developing mainly working across London and the South East. He is an urban planner by background, with transport and design specialisms. He started his career advising on inclusion in the build environment, including assistive technology, and worked for government on housing, regeneration, environment and local government policy and programmes.

In his consulting career he has focussed transformation programmes to help public sector organisations reshape the operating model, deliver efficiencies and adapt to new ways of working. He is currently advising various local councils on their strategy in response to reorganisation, decentralisation and devolution opportunities. Prior to PwC he also worked at Nesta supporting social ventures and maintains a passion for public value innovation in terms of new structures, services and organisational forms that deliver impact and outcomes. He is a fellow of the RSA.

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Smart cities

Mega trends and leadership

Guildford Borough
Council
20 October 2016

pwc

Introduction

The megatrends – shift in global economic power, demographic and social change, rapid urbanisation, technological breakthroughs, and climate change and resource scarcity – are the big changes that are disrupting the economy, business and society as a whole.

How are the megatrends affecting the world today and what do they mean for future local leadership?

Five global mega trends shaping the future

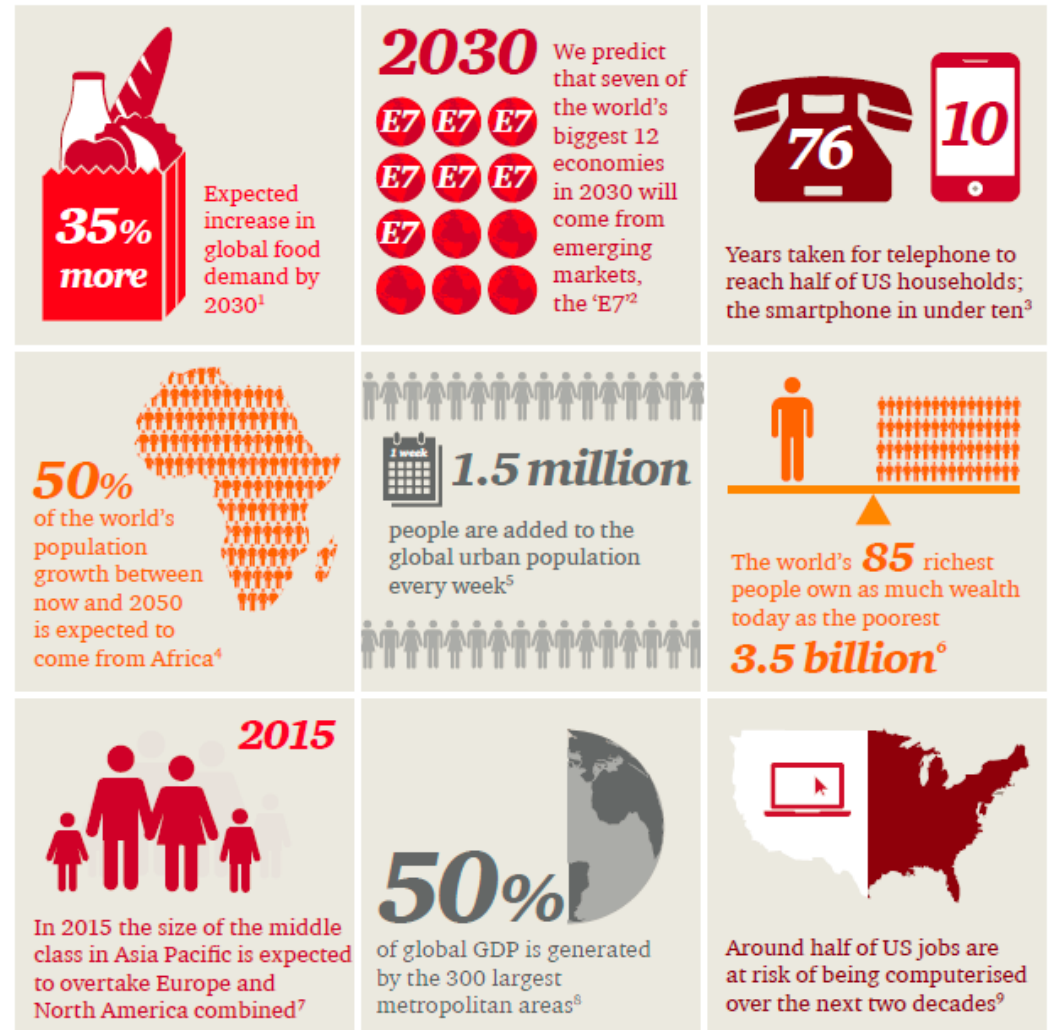**Rapid urbanisation**

Demographic and social change

Climate change and resource scarcity

Shift in global economic power

Technological breakthroughs

35% more Expected increase in global food demand by 2030[1]

2030 We predict that seven of the world's biggest 12 economies in 2030 will come from emerging markets, the 'E7'[2]

Years taken for telephone to reach half of US households; the smartphone in under ten[3]

50% of the world's population growth between now and 2050 is expected to come from Africa[4]

1.5 million people are added to the global urban population every week[5]

The world's **85** richest people own as much wealth today as the poorest **3.5 billion**[6]

2015 In 2015 the size of the middle class in Asia Pacific is expected to overtake Europe and North America combined[7]

50% of global GDP is generated by the 300 largest metropolitan areas[8]

Around half of US jobs are at risk of being computerised over the next two decades[9]
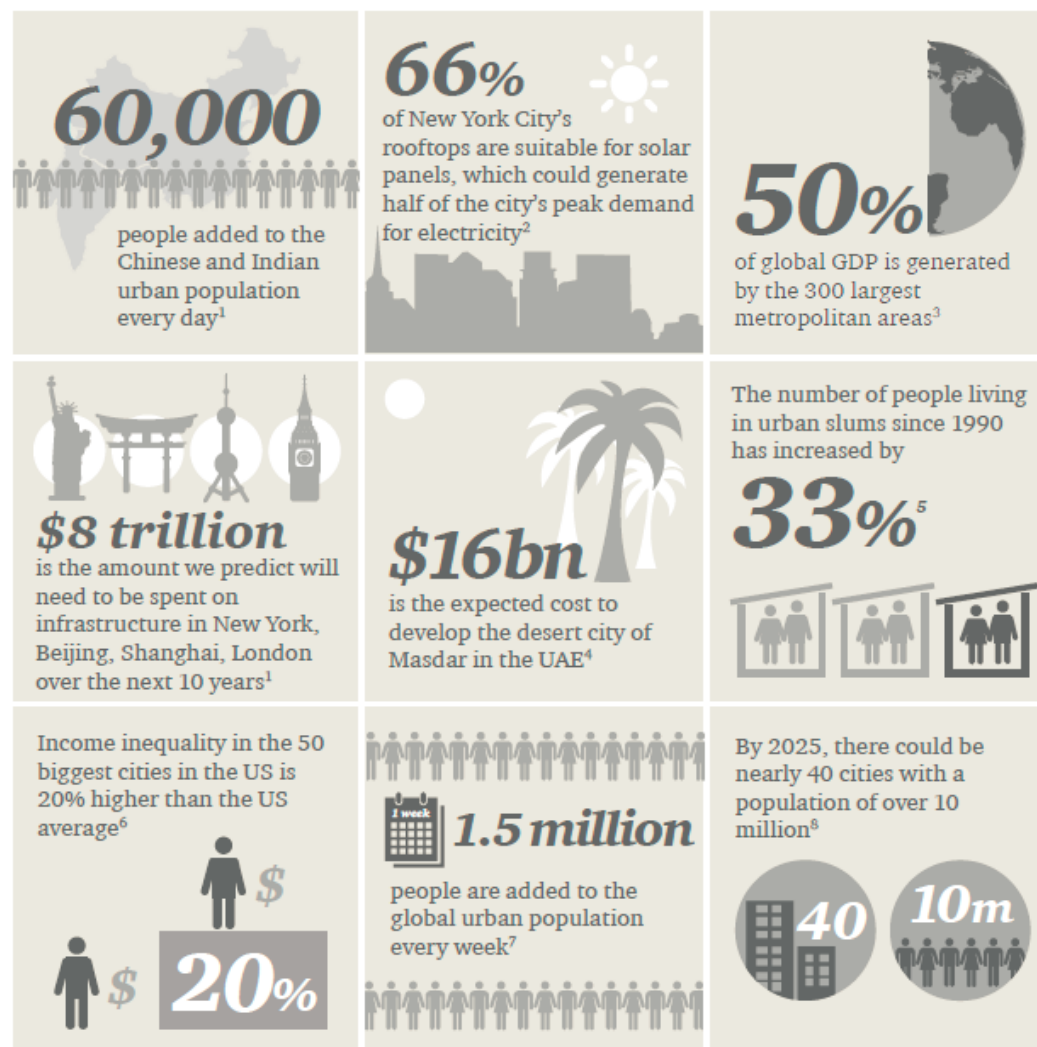
Rapid urbanisation
The rise of cities

- The rise in prominence of cities globally is unprecedented – and is where most people now live.

- Strong population growth is putting pressure on infrastructure, the environment and social fabric of cities.

- These challenges are driving some countries to develop 'Smart Cities', with spending of around $1 trillion globally.

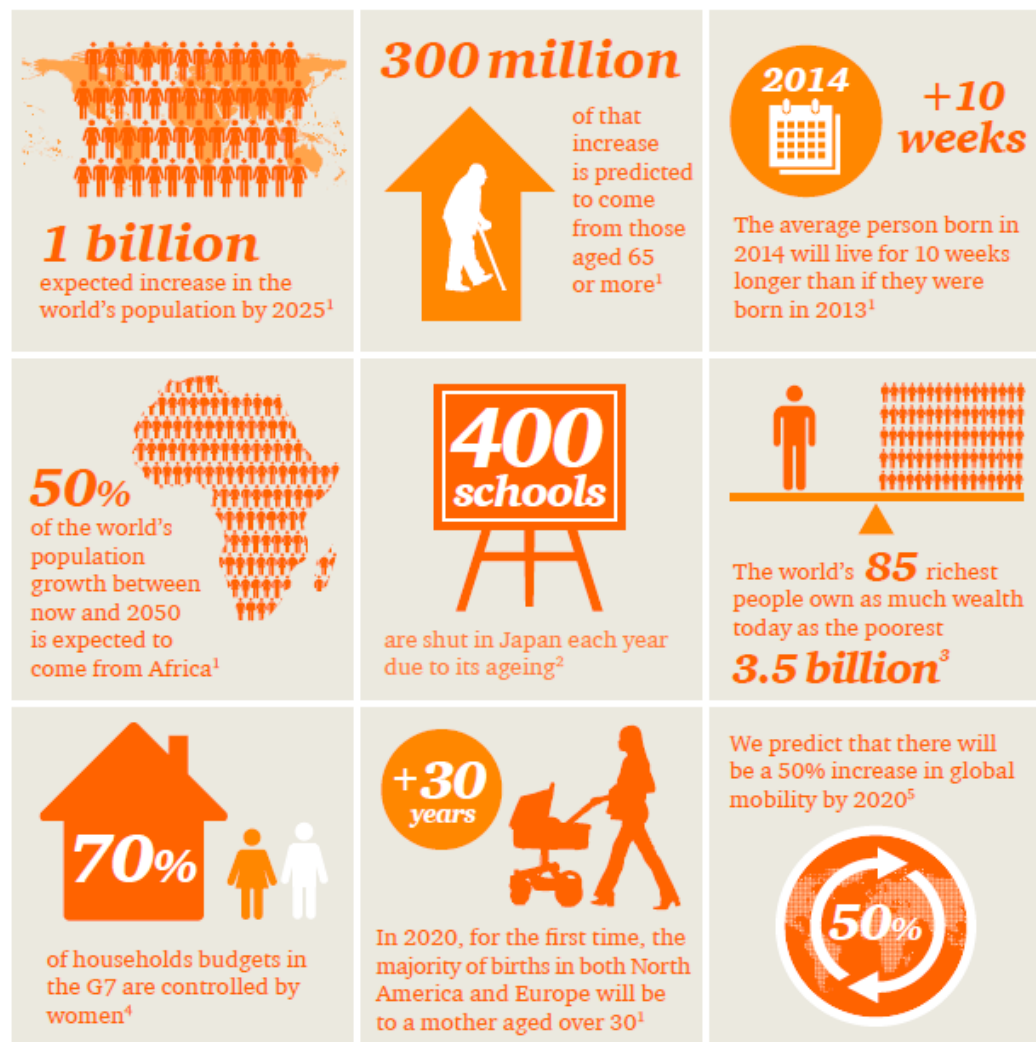- Perhaps more relevant will be the application of technology to enable growing cities to remain liveable.

60,000 people added to the Chinese and Indian urban population every day[1]

66% of New York City's rooftops are suitable for solar panels, which could generate half of the city's peak demand for electricity[2]

50% of global GDP is generated by the 300 largest metropolitan areas[3]

$8 trillion is the amount we predict will need to be spent on infrastructure in New York, Beijing, Shanghai, London over the next 10 years[1]

$16bn is the expected cost to develop the desert city of Masdar in the UAE[4]

The number of people living in urban slums since 1990 has increased by **33%**[5]

Income inequality in the 50 biggest cities in the US is 20% higher than the US average[6] **20%**

1.5 million people are added to the global urban population every week[7]

By 2025, there could be nearly 40 cities with a population of over 10 million[8] **40** **10m**

Demographic and social change
A billion different voices

- There will be 8bn people by 2025, with the over 65s the fastest growing segment of the population.

- Different regions have different changes. The average age in Japan in 2050 is expected to be 54 – and just 21 in Nigeria.

- Women are closing the wage gap with men. Ageing populations have more consumer power. Nigeria will be larger than America by 2045. The world is becoming more diverse.

- And evidence suggests that diverse workforces are improving business and economic performance.

1 billion expected increase in the world's population by 2025[1]

300 million of that increase is predicted to come from those aged 65 or more[1]

2014 +10 weeks The average person born in 2014 will live for 10 weeks longer than if they were born in 2013[1]

50% of the world's population growth between now and 2050 is expected to come from Africa[1]

400 schools are shut in Japan each year due to its ageing[2]

The world's **85** richest people own as much wealth today as the poorest **3.5 billion**[3]

70% of households budgets in the G7 are controlled by women[4]

+30 years In 2020, for the first time, the majority of births in both North America and Europe will be to a mother aged over 30[1]

We predict that there will be a 50% increase in global mobility by 2020[5]

Climate change and resource scarcity
Finite supply

- Demand – for energy, food, water - will rise. But there is a finite supply.

- At current trends there could be just 50 years of oil and gas supply available.

- Policy and natural reactions are unpredictable and inconsistent, but are likely to be reactive to short term events.

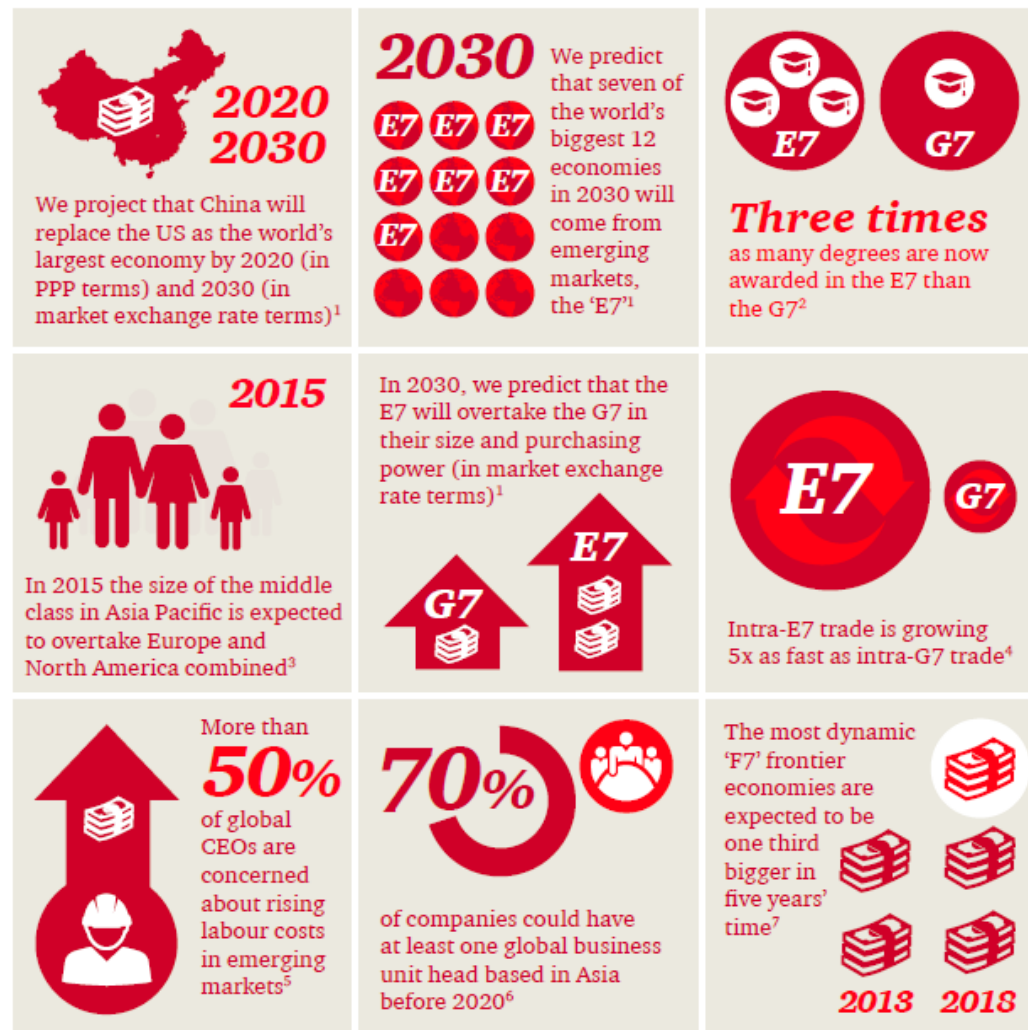- Sustainability will be a core competency, not a luxury.

35% more Expected increase in global food demand by 2030[1]

3% of all water in the world is fresh water, and three quarters of this is locked in glaciers[2]

50 years of supply left in proven oil reserves assuming that current levels of demand continue[3]

Average temperatures are predicted to increase by over **2°C** in the 21st century[4]

6% annual reduction in carbon intensity is required to meet the 2°C target (well above historic norms)[5]

20% of worldwide energy consumption could be saved through energy efficiency measures[6]

There is almost **3 times** as much carbon in the known coal, oil and gas reserves than in the carbon budget to limit temperature rises to 2°C by 2100[7]

The global population is predicted to demand 50% more energy by 2030[8] **50%**

It takes 7 units of fossil fuel energy to produce one unit of food energy[9]

Shift in global economic power
Emerging markets

- The Asia Pacific has a large middle class than Europe and America combined.

- By 2030, the E7's purchasing power will overtake the G7 and contribute an increasing share of global demand.

- Some emerging markets will become increasingly core to global business.

- As high skilled talent becomes global it will change business cultures.

- Developed countries will see a closing of the wage gap.

2020 2030 We project that China will replace the US as the world's largest economy by 2020 (in PPP terms) and 2030 (in market exchange rate terms)[1]

2030 We predict that seven of the world's biggest 12 economies in 2030 will come from emerging markets, the 'E7'[1]

Three times as many degrees are now awarded in the E7 than the G7[2]

2015 In 2015 the size of the middle class in Asia Pacific is expected to overtake Europe and North America combined[3]

In 2030, we predict that the E7 will overtake the G7 in their size and purchasing power (in market exchange rate terms)[1]

Intra-E7 trade is growing 5x as fast as intra-G7 trade[4]

More than **50%** of global CEOs are concerned about rising labour costs in emerging markets[5]

70% of companies could have at least one global business unit head based in Asia before 2020[6]

The most dynamic 'F7' frontier economies are expected to be one third bigger in five years' time[7] **2013 2018**

Technological breakthroughs
Disrupting everyone

- Technology is one of the biggest disruptive forces. The time from breakthrough to mass market application is collapsing.

- The first digital wave of e-commerce is already familiar.

- A second wave will see connected devices help consumers achieve tasks and outcomes.

- A third wave may see consumers aggregating demand to create value.

58 mins The average time a US consumer spends using their smart phone a day[1]

Seven times more connected devices than people by 2020[2]

2012 2014 90% of the data that exists today was created in the last 2 years[3]

Around half of US jobs are at risk of being computerised over the next two decades[4]

7000 houses could almost be powered every day with just the energy burned by active users of the Nike + app[5]

By 2020, we predict that digital natives will be the majority population segment in the UK[6]

0.5% of data is only currently analysed[7]

76 10 Years taken for telephone to reach half of US households; the smartphone in under ten[8]

#1 #2 If Facebook was a country, it would be second most populous in the world (after China)[9]

Collisions

The disruptive states of the world that arise when Megatrends interact – or collide.

For example - the sharing economy is a result of a collision between four of the megatrends. It enables consumers to gain access to, rather than own, goods and services. Typical sharing economy companies offer music streaming services, person-to-person finance and accommodation and car sharing sites.

New business models, new competition, new customers and new activities to regulate and manage.

Full speed forward
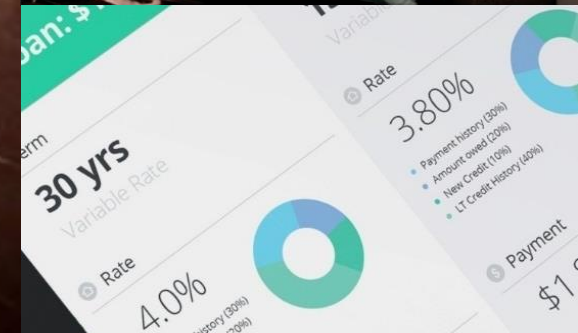
Sustainable competition

Distributed leadership means going beyond control to participation

- Leadership lies at the heart of enabling and delivering sustainable urban competitiveness.

- But cities depend intertwined relationships among multiple stakeholders.

- Individual urban leaders are not less powerful or important than before but the distribution of leadership requires more skills.

- It also needs to be situationally aware – what works in London may not be as successful in Singapore.

- To rise to the challenge leaders need to ensure the vision for a place is owned by all stakeholders – politicians, officials, businesses and residents.

Stability and change

Stakeholders

Catalysts

Distributed Urban Leadership

Power sources

Features

Processes and tactics
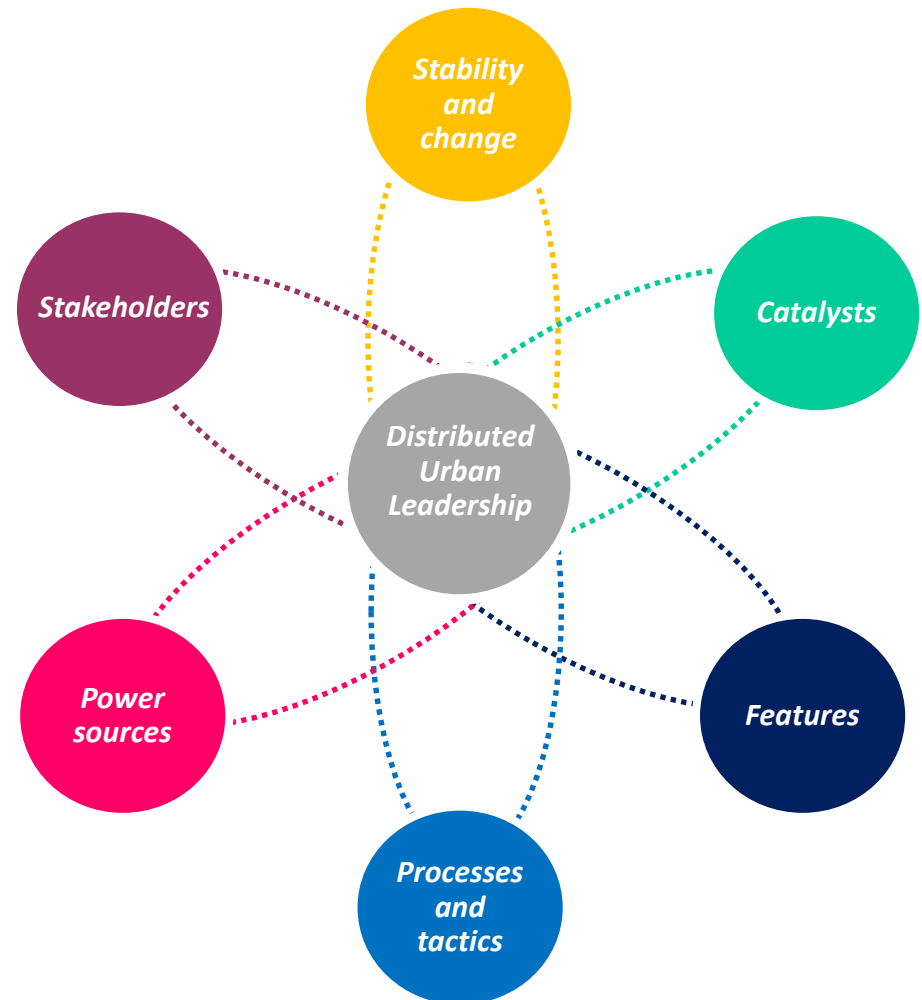
Key question examples

Catalysts

Features

Processes and tactics

Power sources

Stakeholders

Stability and change

How and why is my city changing?

Who are the place based leaders of our place?

Are others visions and strategies linked with the public objectives?

What tactics can we use to nudge behaviours?

What competencies do others have that could help?

Do we have a history of entrepreneurship?

Who are the emerging leaders and how are we as engaging them?

How can we change ways of working to engage others?

How do we frame problems in new clear and inspiring ways?

How can we use different leaders in different situations?

How do we involve the unusual suspects?

How can we involve others in shared outcomes?

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Cities of the future
- opportunities & challenges -

Professor Jeremy Watson CBE FREng – IET President

Nigel Ward CEng MIET – Past IET Trustee & Honorary Treasurer

About the IET

§ Europe's largest professional body of engineers

§ 167,000 members worldwide in 150 countries

§ 6,400+ learned papers published

§ 900,000 digital library users

§ 800,000 IET video views on YouTube

§ 122,000 event attendees at 1,500 events worldwide

§ IET Wiring Regulations (BS 7671)
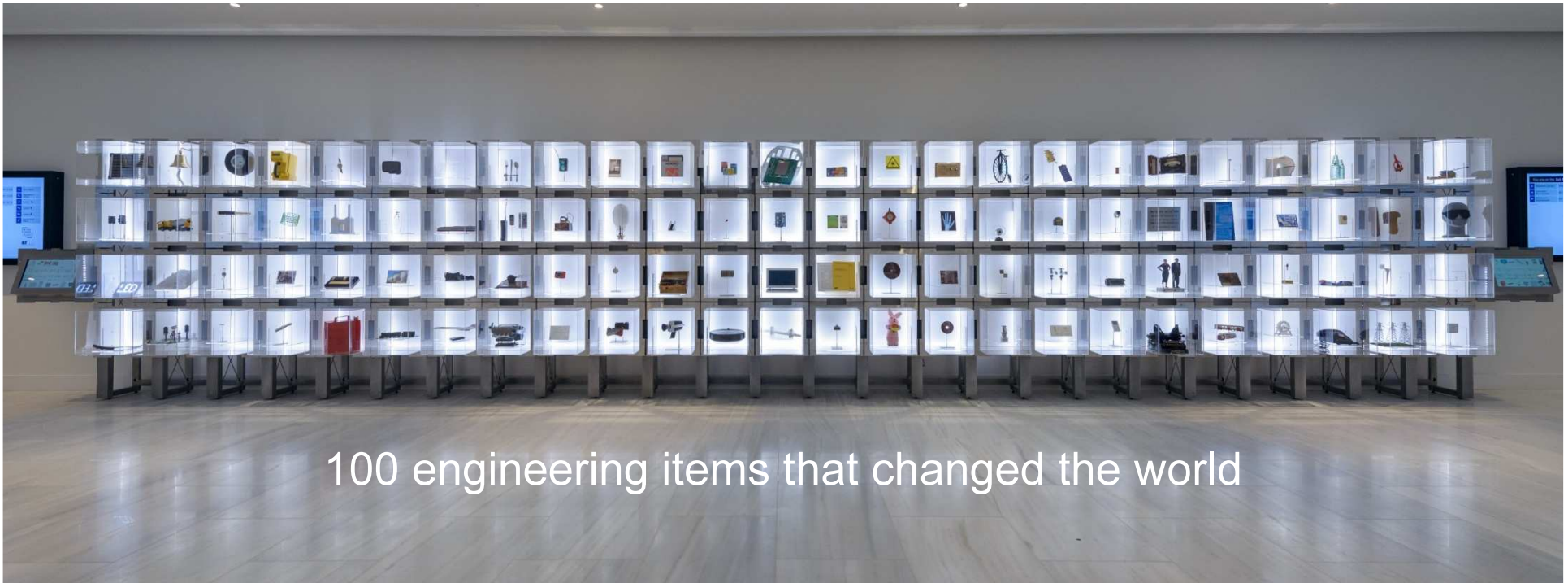
100 engineering items that changed the world

Smart City opportunities

Cities: Many inter-dependent systems
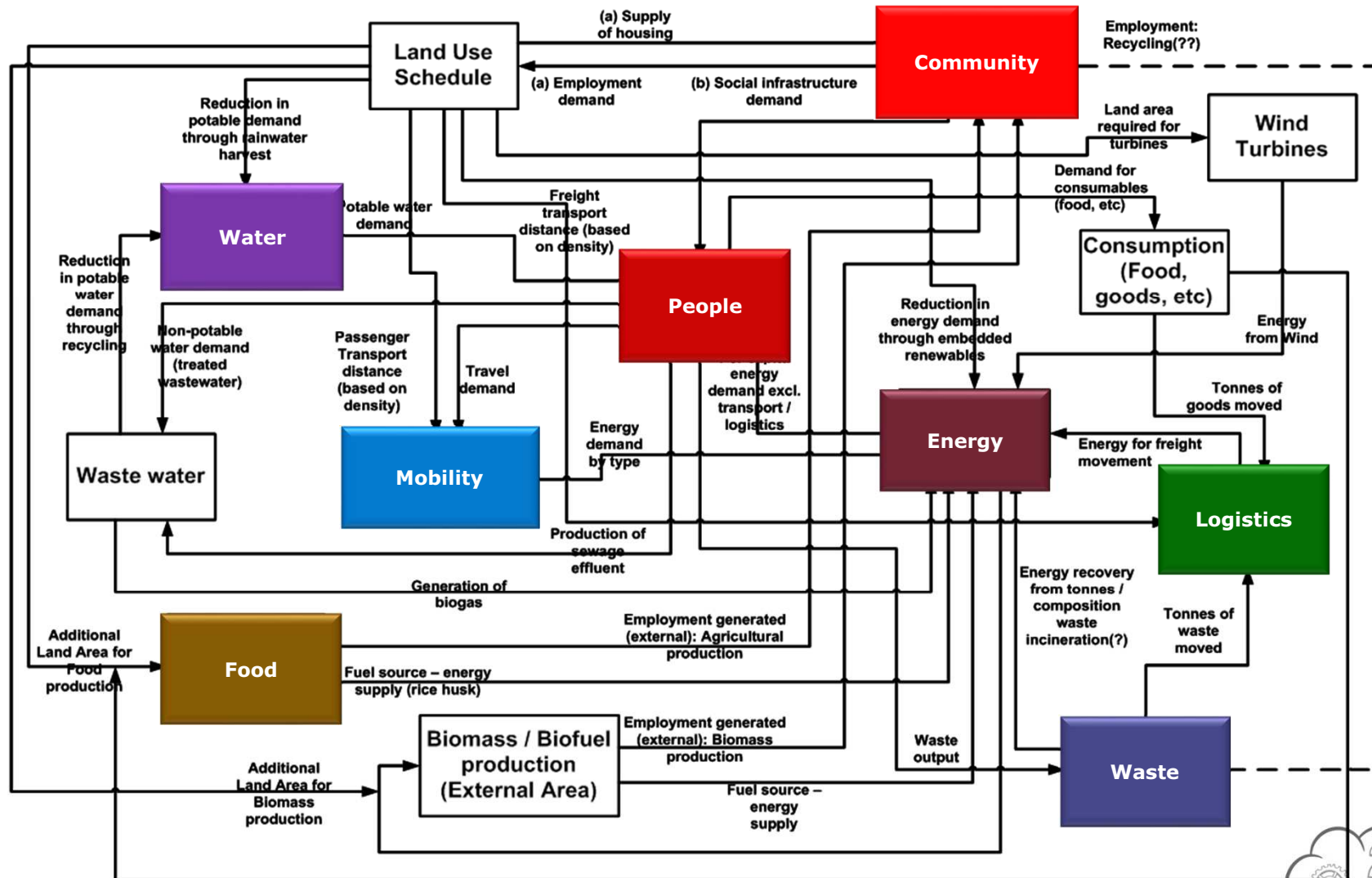
What do people understand about smart cities?
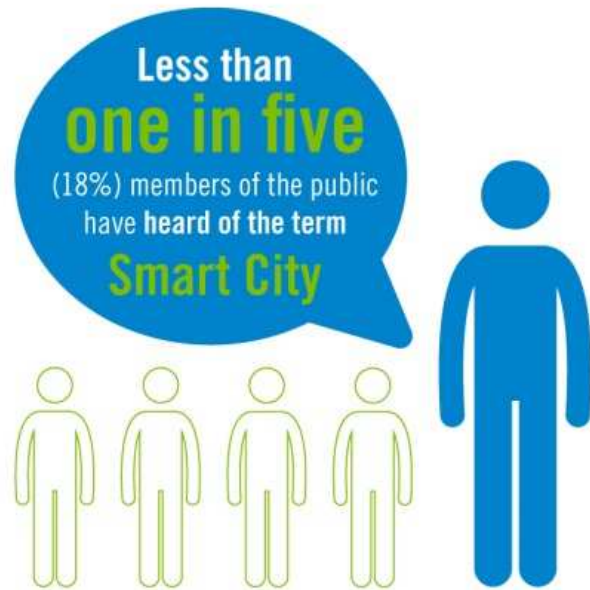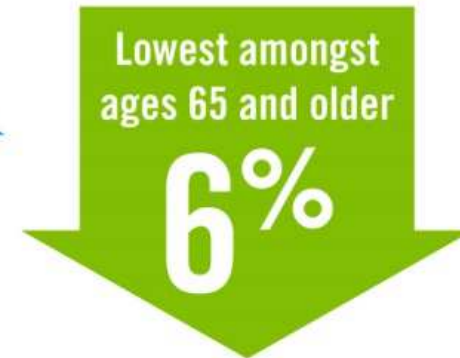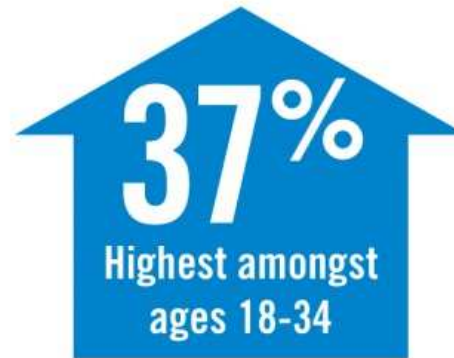
29%

Intelligent
Street Lighting

Rated
most useful

8%

Autonomous or
Electric Vehicles
hired or ordered
from smartphones

Rated
least useful

23%

Sensors embedded
in roads and buildings
which measure
traffic flow and
predict congestion

25%

Green buildings:
Energy generation/
distribution,
collect and recycle
water and waste

15%

Up-to-the-minute
travel info delivered
to smart phone
to enable journey
payment and
planning

UCL

IET The Institution of
Engineering and Technology

Engineer
a better WORLD
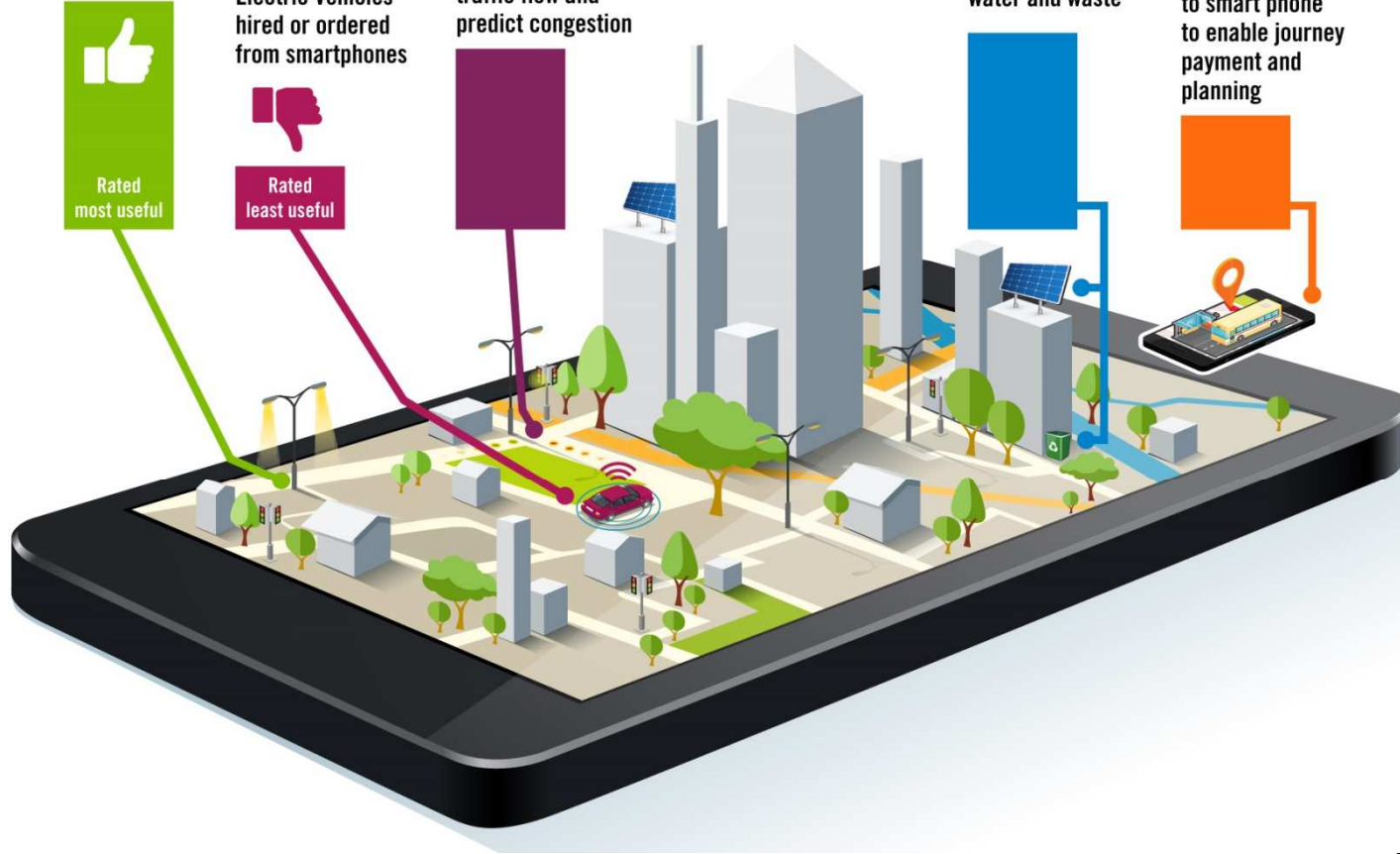
Opportunity Discovery

How we manage our world
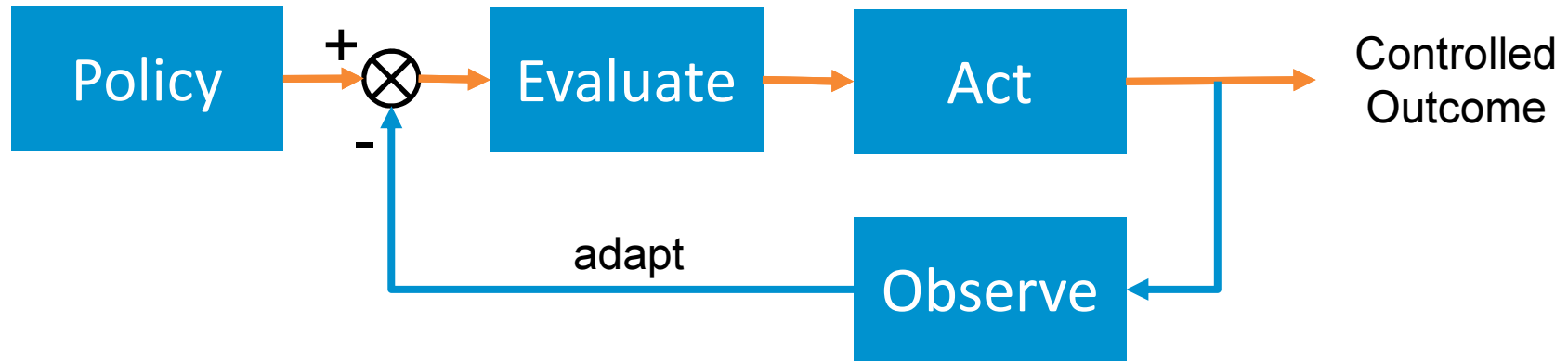
Policy – decide what outcome we want
Observe – measure current situation
Evaluate – decide the best course of action
Act – implement change
Adapt – measure the effect of actions and adjust

How to maximise efficiency
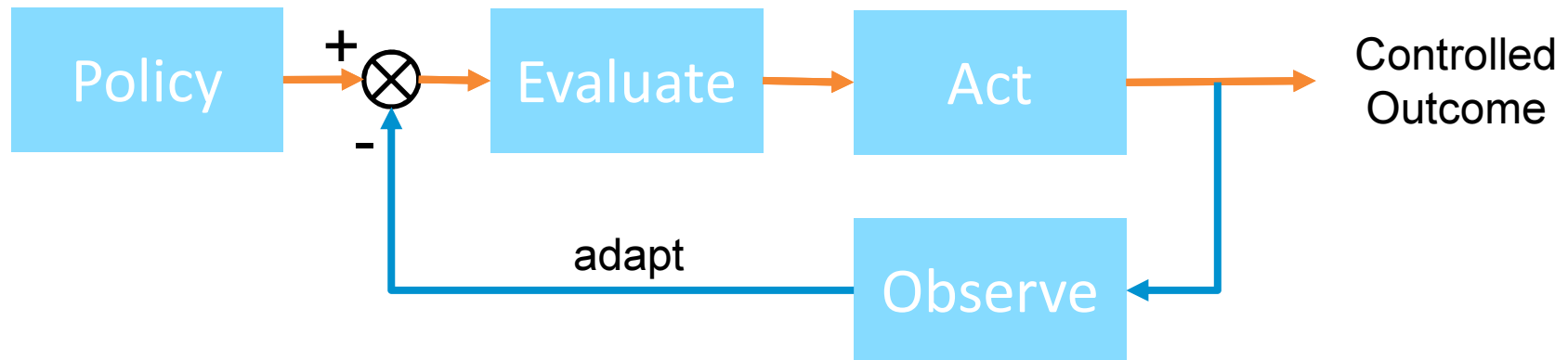
Observe – better measurement
Evaluate – better informed decisions
Act – finer control
Adapt – faster adaptation

Opportunities from new technology

Policy → (+/−) ⊗ → Evaluate → Act → Controlled Outcome

Observe — adapt (feedback loop)
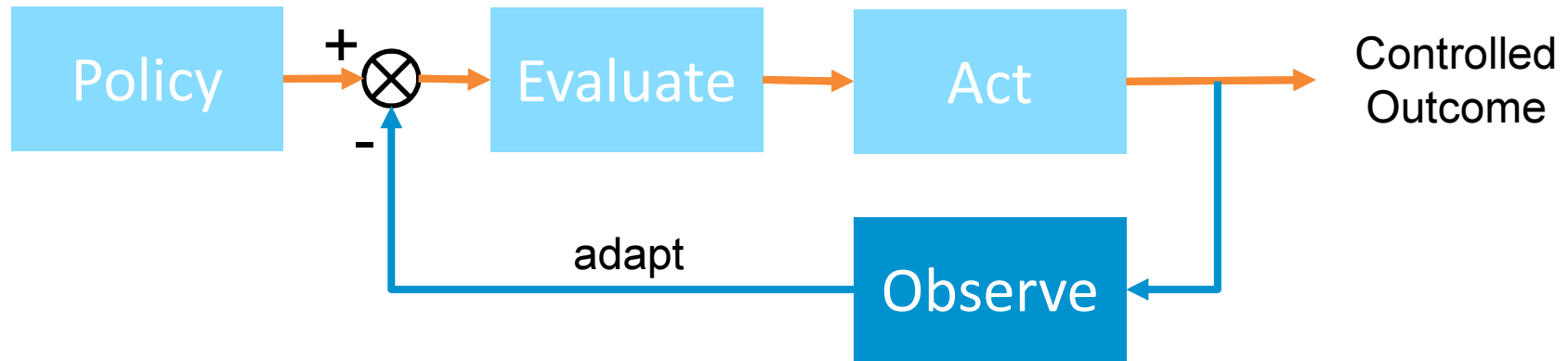
Observe – better measurement
- Internet of Things sensors
- Wireless connectivity
- Social input
- Aerial/satellite observation

Opportunities from new technology

Policy → + ⊗ − → Evaluate → Act → Controlled Outcome

Observe ← (from Act)

adapt (from Observe back to ⊗)
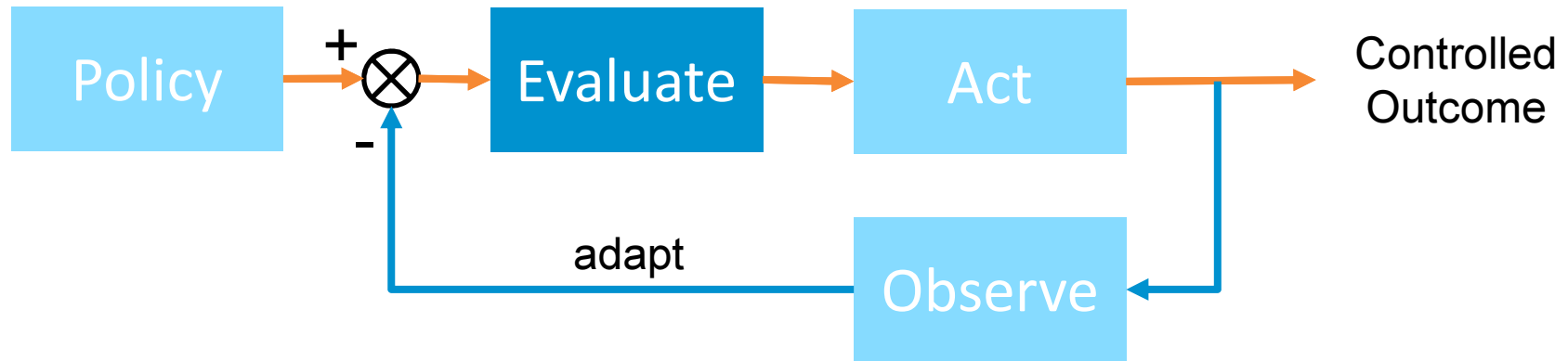
Evaluate – better informed decisions
- Cloud computing
- Big data analysis
- Citizen built apps

Opportunities from new technology
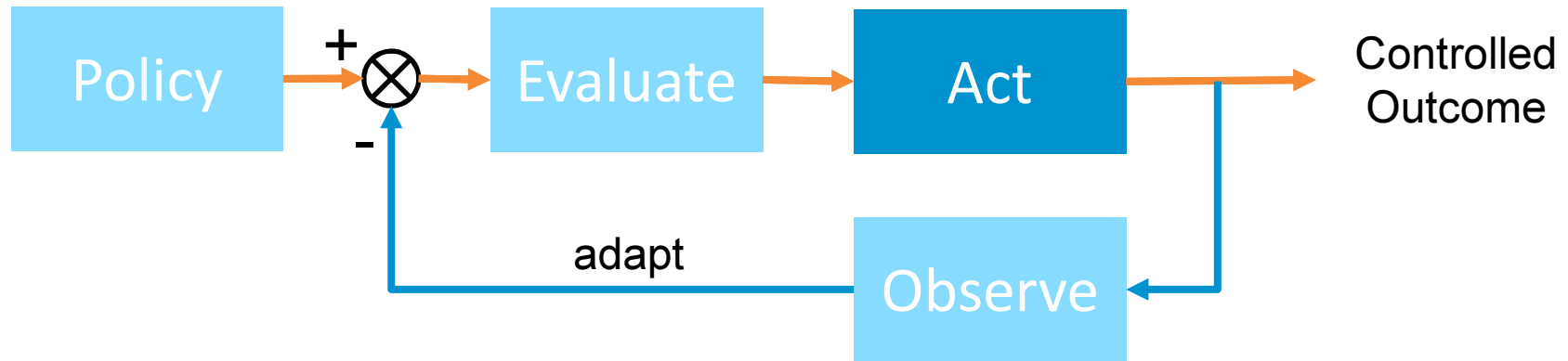
Act – fine control
- Controllable/connected devices
- Mobile devices
- Batteries/energy storage

A network of Interdependent Systems
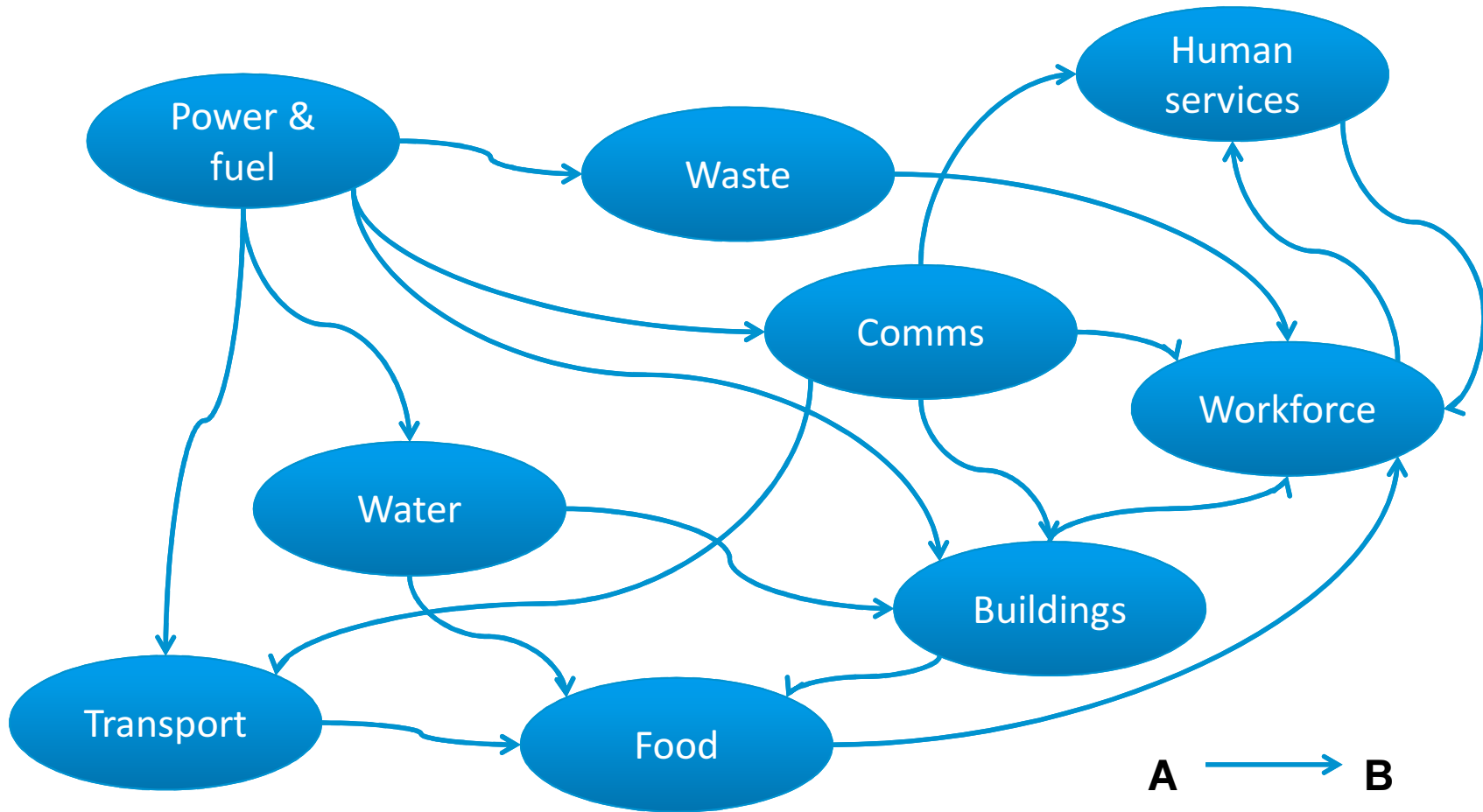
A ⟶ B

'B is dependent on A'

Example: Assisted Living

Our Aging Demography

- The UK has a growing and ageing population

- 15.4m people have at least one long term condition in England

- Numbers will grow (250+% increase in 50 years) also growth in multiple conditions

- The ageing population consumes 70% of health and social care budget

- People want to be supported to live independently (minimise hospital admissions

§*But*

- People aged 50+ spent £276bn in 2008 – about 44% of total UK family spending

Projection of Economic Impact from Ageing

Percentage of
GDP (EU27)

Legend:
- 2007
- 2060

~100% increase

Chart y-axis: 0, 2, 4, 6, 8, 10, 12, 14

Categories: Pensions, Healthcare, Long-Term Care, Unemployment benefit, Education
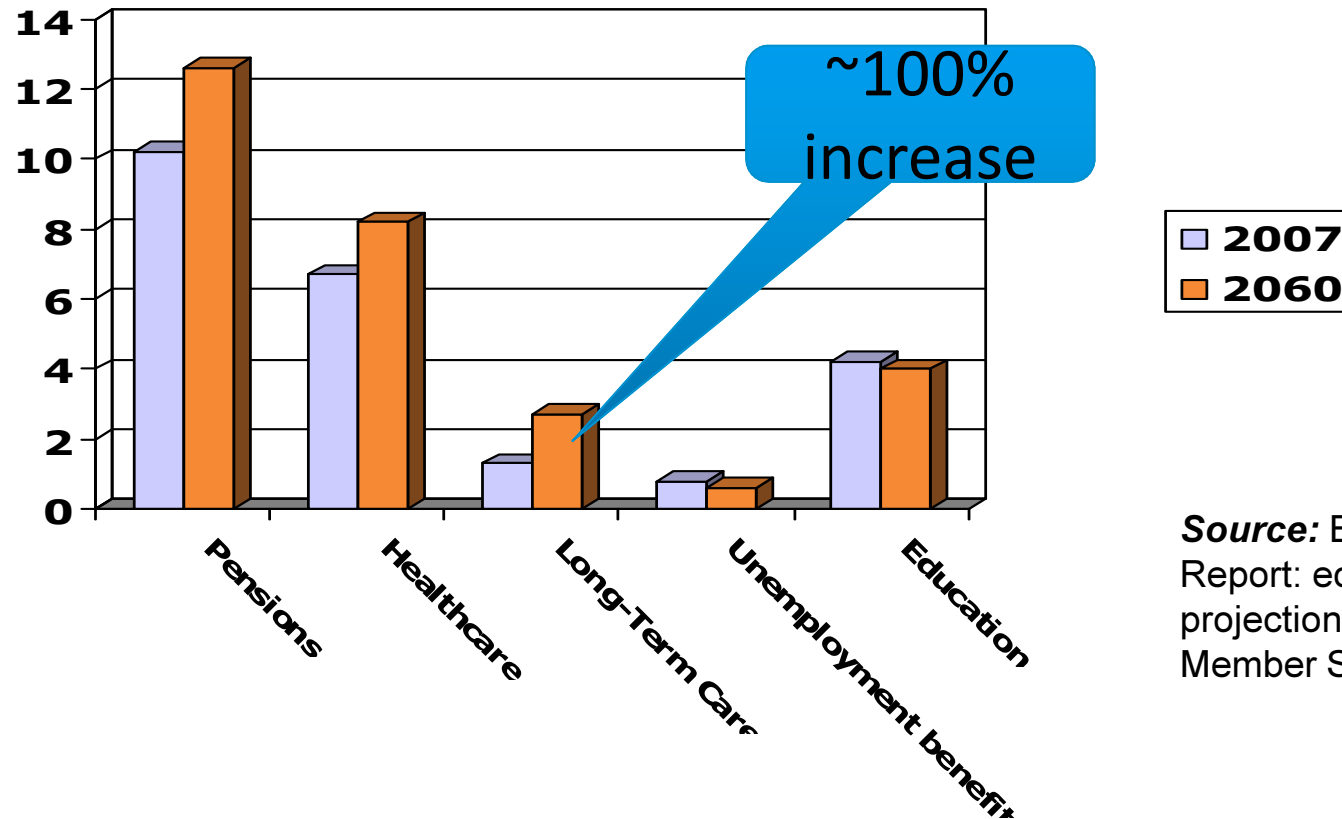
Source: EC '2009 Ageing Report: economic and budgetary projections for the EU-27 Member States (2008-2060)'

Social Care

"Unless we do something, by 2030 all of the authority's revenue will have to be spent on care of the elderly and disabled" – Outer London local authority

- Assisted Living can keep people in their own homes safely and for longer, at reduced cost
- A combination of sensors (including GPS), IT systems and service packages
- Trials by DH (the Whole Systems tele-health demonstrator) showed:
  - Mortality reduced by 45%
  - Emergency admissions reduced by 20%
  - A&E visits reduced by 15%
  - Bed days reduced by 14%
  - Elective admissions reduced by 14%
- Research needed in systems-scale deployment and business models

Relevant Research Council initiatives: MRC – Life-long Health and Well-being, TSB – ALIP, DALLAS (Delivering Assisted Living Lifestyles at Scale)
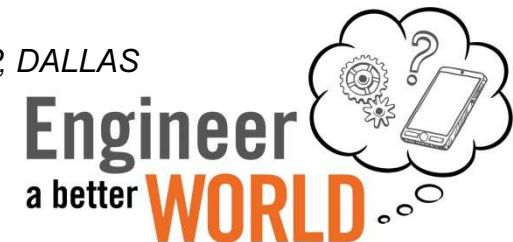
Assisted Living – a systems approach

- Sensors
- Local intelligence
- Communications
- Real-time services
- Tracking individuals (management of Dementia)
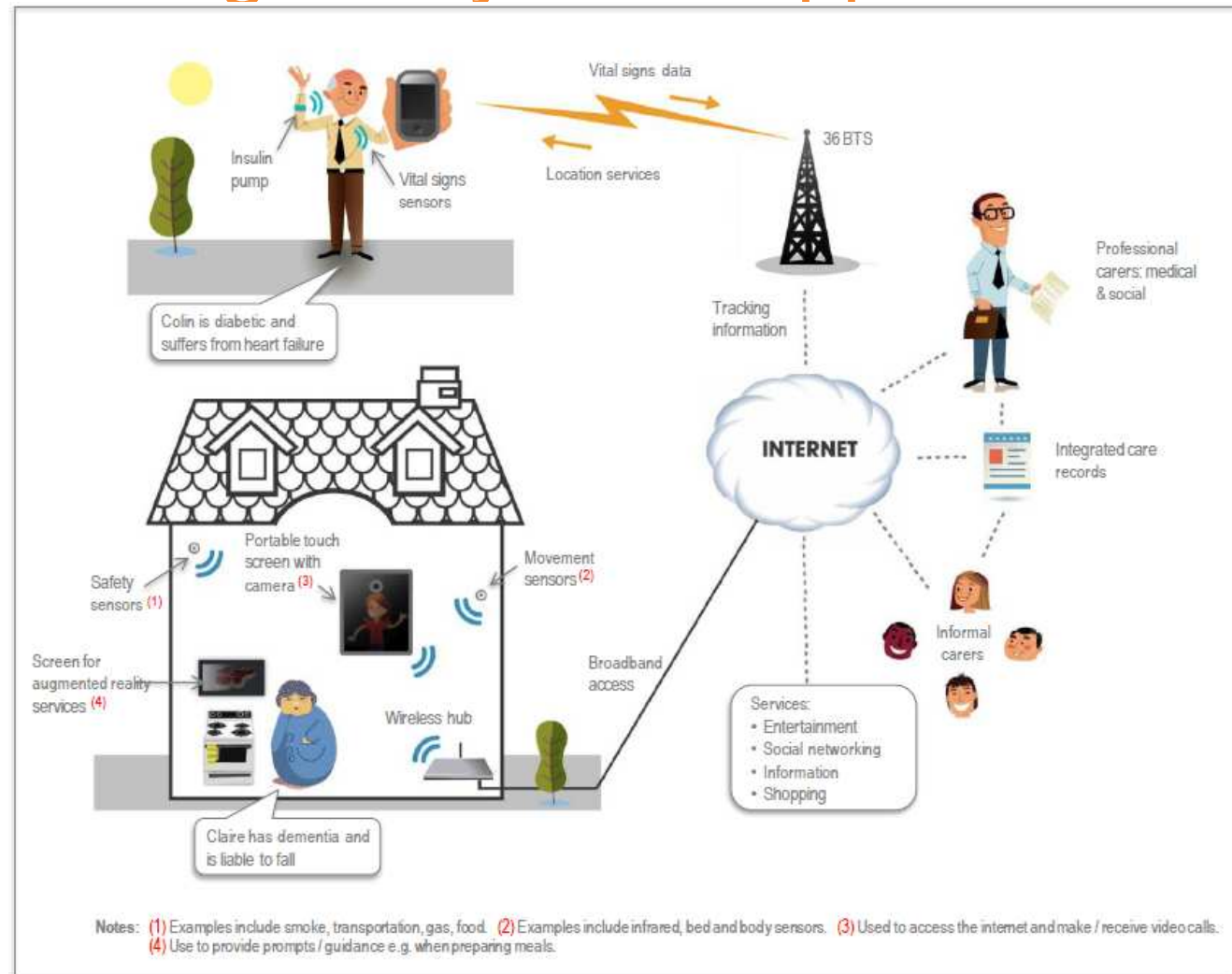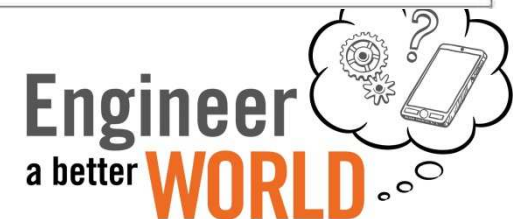
Example: Influences on Buildings and Infrastructure

Risks identified by CCRA

- Non-residential and residential properties at significant risk of flooding

- Expected Annual Damage (EAD) to residential and non-residential property due to flooding

- Hospitals and schools at significant risk of flooding

- Ability to obtain flood insurance for residential properties

- Urban Heat Island

- Overheating of buildings

- Energy demand for cooling

- Reduction in water available for public supply

- Public water supply-demand deficits

- Vulnerable people at risk

Systems/Risks Are Interdependent
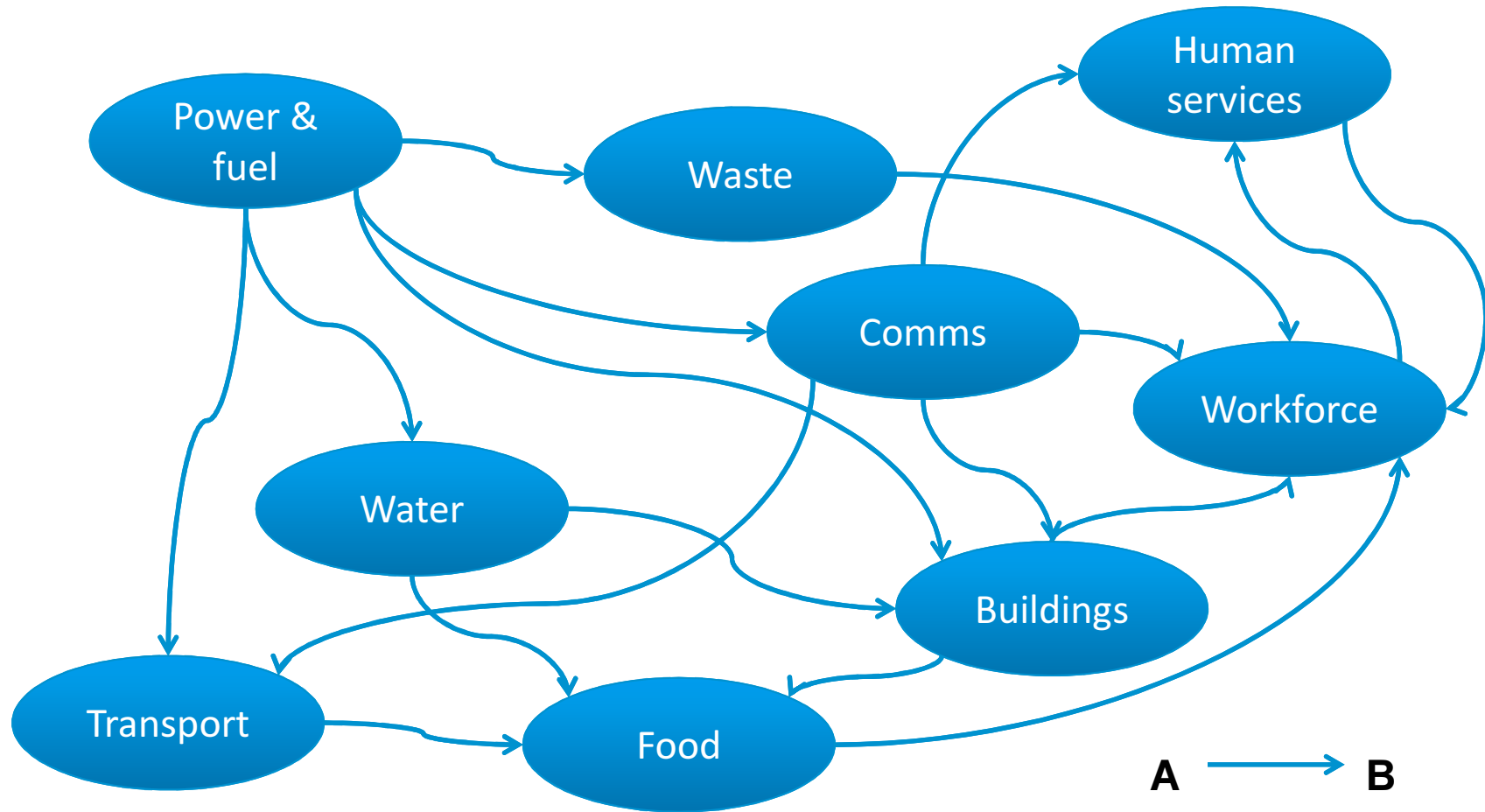
'B is dependent on A'

Estimating resilience

Resilience concerns the maintenance of operational capabilities of systems and sub-systems, with acceptable levels of degradation

1. Subsystems may be interdependent such that 'cascade failure' is possible
2. Subsystems may be redundant, such that the failure of one is supported by the continuing operation of another

- An estimate of resilience can be derived from a network analysis of these properties in real systems.
- *Probability calculations apply*
- Redundancy costs money
- Synergistic interdependency can save money, but has (manageable) risk

Modelling inter-dependencies

CLIMATE CHANGE POTENTIALLY IMPACTING TRANSPORT INFRASTRUCTURE																											
ENERGY INFRA-STRUCTURE AFFECTED	High temp		Low temp		Water table rise		Sea level rise		Storm surge		Prolonged Rainfall		Flood		Drought		Snow		Extreme Wind		Electric storm		Frost		Fog		Soil shrinkage	
	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P
Roads	M	H	M	L	M	M	M	L	H	H	H	H	H	M	H	M	H	H	H	M	L	L	H	M	H	M	H	H
Pedestrian routes	L	L	M	L	L	L	L	L	L	L	L	L	H	L	L	M	H	H	L	L	L	L	M	M	L	M	L	M
Cycling paths	L	L	M	L	L	L	L	L	L	L	L	L	H	M	L	M	M	H	L	L	L	L	M	M	L	M	L	M
Surface rail	L	H	L	L	M	M	M	M	H	M	H	H	H	M	L	M	H	H	H	M	L	L	M	M	M	M	M	M
U/G rail	L	M	L	L	L	M	L	L	M	M	H	M	M	M	L	M	H	L	L	L	L	L	L	L	L	L	M	M
Airport	M	H	M	M	L	M	L	L	M	M	M	M	H	M	H	M	H	M	H	M	H	M	M	M	H	M	M	M
Air ways	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	L	M	M	L	L
Terminals	L	L	L	L	M	M	L	L	M	M	M	M	M	M	H	M	M	M	L	L	L	L	L	L	M	L	L	L
Coastal infrastructure	L	L	L	L	M	H	H	H	H	H	M	L	H	H	L	L	L	L	M	M	L	L	L	L	H	M	L	L
Seaports	L	L	L	L	L	M	H	H	H	H	M	M	H	M	H	M	L	L	L	L	L	L	L	L	H	H	L	L
Inland waterways	L	L	M	L	L	M	M	M	H	M	H	H	H	M	H	M	L	L	L	L	L	L	H	M	L	L	H	M
Embankments	L	L	L	L	H	M	L	L	H	M	H	H	H	M	M	M	M	M	L	L	L	L	M	M	L	L	H	H
Tunnels	L	L	L	L	M	M	L	L	M	M	M	M	H	M	L	L	L	L	L	L	L	L	L	L	L	L	M	L
Bridges	M	H	M	L	L	M	L	L	H	M	H	M	H	M	M	M	M	L	M	H	L	L	L	L	L	L	M	L
Pipelines	L	L	L	L	M	L	L	L	H	L	H	M	H	M	L	M	L	L	L	L	L	L	L	L	L	L	M	M
Control systems	M	M	L	L	L	M	M	M	H	M	H	M	M	M	L	M	L	L	L	M	M	M	L	L	L	L	L	L
SatNav	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	L	L	L	L	L	L
Oil Distribution	L	L	L	L	M	L	H	M	H	M	M	M	H	M	L	L	M	M	L	L	L	L	L	L	L	L	L	L
Gas Distribution	L	L	L	L	M	L	H	M	H	M	M	M	H	M	L	L	M	M	L	L	L	L	L	L	L	L	L	L
Electric car recharge network	L	L	L	L	L	L	L	L	M	M	H	M	H	H	M	M	M	L	L	L	H	M	L	L	L	L	L	L
CO2 transport	M	M	L	L	M	M	L	L	M	M	M	M	H	M	L	L	L	L	L	L	L	L	L	L	L	L	L	L

Enablers and threats

§ **Enablers**

- Digitally-enabled integration
- Systems thinking
- Innovation in business processes

§ **Threats**

- Lack of holistic thinking in private and public sector
- Unaddressed resilience issues
- Weak, short-term and politically-modulated government support

Key themes

§ **Challenges**
- Sustainability – resource use, social, future-proofing
- Climate change – adaptation and mitigation
- Resilience – infrastructure, utilities, food, financial systems
- Demography and health

§ **Opportunities**
- Value aggregation
- Innovation
- Economic opportunity and transparency
- Security and safety
- Wellbeing

Example: Big Data & Smart Cities

Data integration in Cities

Mapping Energy Efficiency of Buildings

Mapping social data (e.g. Crimes)

Flood simulation
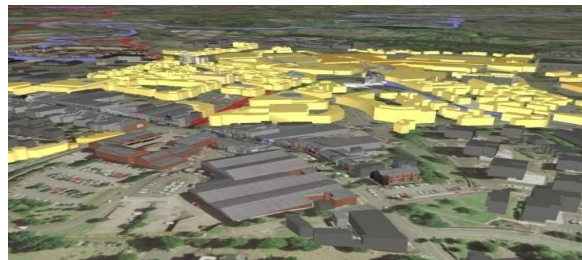
Multiple agendas in city development (transport, housing, employment etc.)

Public Consultations

Service synergies in Smart Cities

Real-time Telemedicine and Assisted Living

Personalised transport optimisation

Energy assurance services for PAYS

Security Monitoring and alerts

One view of our future world in 2050
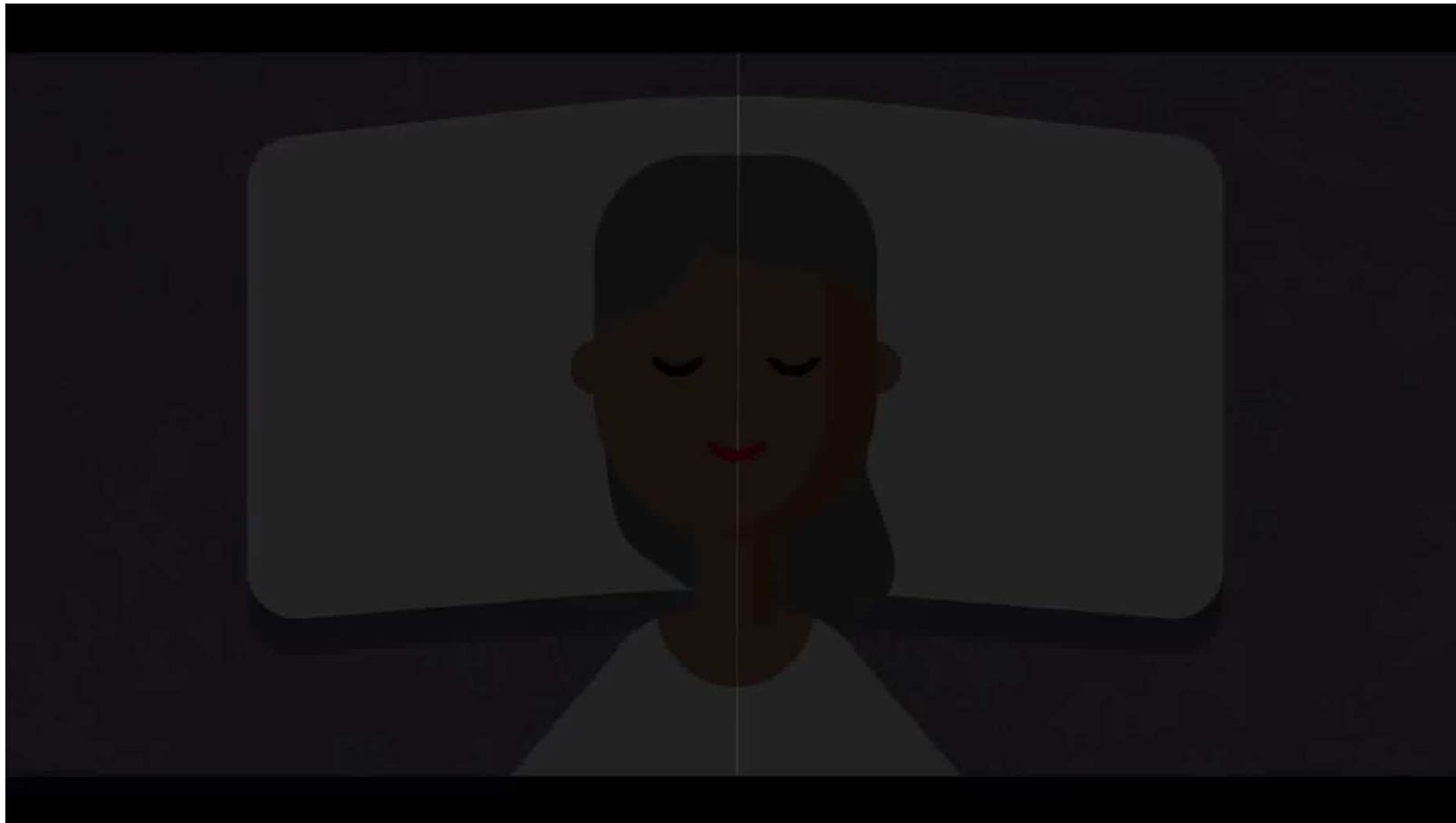
Thank you

Professor Jeremy Watson CBE FREng – IET President

Nigel Ward CEng MIET – Past IET Trustee & Honorary Treasurer

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IET
The Institution of
Engineering and Technology

How 'Tech Savvy' are we?

July 2016

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ACKNOWLEDGEMENTS

FOREWORD

The Institution of Engineering and Technology (IET) aspires to support its members and the engineering community in successfully bringing innovative technologies to market – and to demonstrate the increasingly vital role of engineering and technology in improving quality of life.

To support this ambition, the IET commissioned a nationwide research study to measure UK consumers' current understanding and acceptance of the latest technologies – and assess barriers to future engagement. The research combined a quantitative survey with qualitative focus groups, together with in-depth telephone interviews with members of the public and independent academic experts.

This report, *'How Tech Savvy Are We?'*, presents the key findings of our research. Within the report we explore the relationship of UK consumers, from teenagers to pensioners, with the latest technologies – and sheds important light on the current 'on the ground' issues and challenges which may be inhibiting greater public adoption of these technologies. Drawing on consumer and expert opinion, we also look at how companies and individuals involved in designing future interventions might adjust their practices to better meet the needs of the public.

We investigate how individuals see technology in their lives – their experiences, their expectations and their appetite for change. We examine some of the potential technology of the future – what does this look like, what specific technologies are emerging to support us as we get older, and what are the implications? We also consider the role of the engineering and technology professions. Specifically, the role companies and individuals can play in ensuring innovation is delivered in a relevant way that benefits people, and listens and responds to their needs.

Our findings suggest that there is a need for industry to provide greater assistance to older people to drive wider acceptance of technology by communication around the need or benefit. Industry also needs to ensure that effective support mechanisms are in place to help consumers of all ages fully understand how new technologies work. This throws up a discussion point around the extent to which suppliers and manufacturers support consumers, particularly older generations, in getting to grips with new technologies.

There also appears to be a disconnect between what industry is developing and what the public actually wants, and questions have been raised around the extent to which the two are currently joining up. Going forward these, and the other issues highlighted, will need to be overcome to support wider adoption of new technologies.

The issues in this report link to related research undertaken by the IET, *'Smart Cities - Time to involve the People'*, which found that, despite considerable investment by the UK government, local authorities and businesses, there is a basic lack of awareness among the British public about what a smart city is, does, and the potential it offers to improve residents' quality of life.

The common factor here is that both smart cities and new technologies in general are currently being developed without enough insight into the 'human factors' of what people want them to deliver.

Nigel Fine, Chief Executive, Institution of Engineering and Technology (IET)
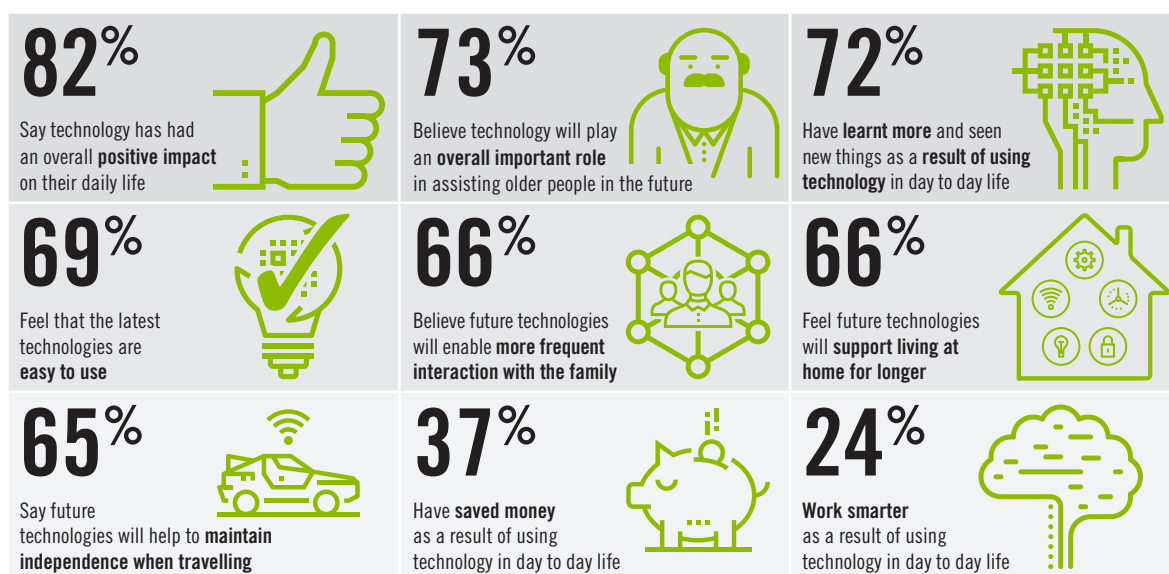
EXECUTIVE SUMMARY

The IET has commissioned quantitative and qualitative research to measure UK consumers' current awareness and understanding of the latest technologies – and to assess barriers to the acceptance of some potential future technologies. During late 2015, research undertaken by *Research by Design* on behalf of the IET surveyed 531 people drawn from a broadly nationally representative sample of the UK population – interviewees ranged from those aged 18 to 65 or older. Additionally, between March and May 2016 we undertook in-depth telephone interviews with members of the general public and independent academic experts to provide context for this report.
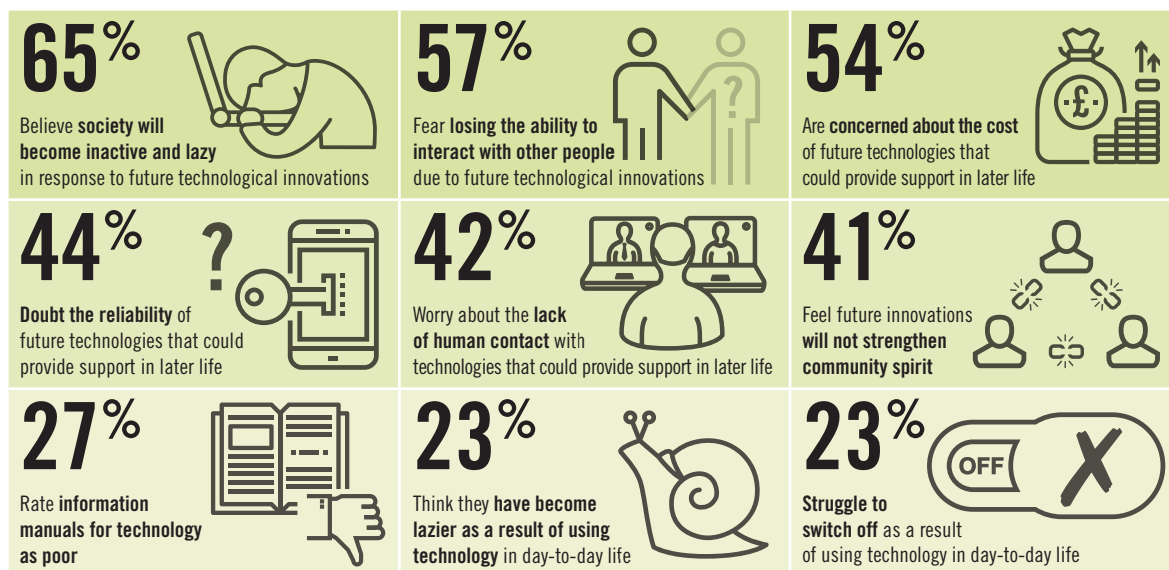
The main findings are:

1. Future technologies are expected to play an important role in supporting independence in later life. 73% of people expect new technologies to play an important role in assisting older people in the future, while 65% anticipate that future technologies enable them to maintain independence while travelling.

2. An overwhelming majority of UK consumers (82%) say technology has had a positive impact on their day-to-day lives, especially in terms of learning more, seeing new things and saving money.

3. There are concerns, though, that society could become more inactive, and too reliant on technology – with some of the respondents expressing concerns about becoming lazier, more unfit, leaving the house less, and struggling to switch off from the technology around them.

4. People aged 65 and over who have not grown up with technology around them, perhaps unsurprisingly, find it more difficult to master the latest technologies initially than younger groups do. Academic experts have highlighted a need to provide greater assistance to older people (especially) to ensure the adoption of technology

is driven by communication around the need/benefit – and that effective support mechanisms are in place to help consumers of all ages fully understand how new technologies work.

5. For two thirds of consumers printed support such as manuals, quick-start guides and FAQs are highly desired to help understand new products.

6. Just over one in five UK consumers (22%) say they find the latest technologies difficult to use when they first get them – 45% of these report that 'technology is not that straightforward so takes time to get used to it'.

7. There is no consensus among UK consumers on which of the six new technologies highlighted in this report would be most useful in later life – Smart healthcare devices are rated most useful by 27%, whilst driverless cars and robot help are deemed the most useful by only 10%. Is there a possible disconnect between what industry is developing and what the public actually wants.

8. Going forward – cost, reliability and lack of human contact are the biggest concerns among UK consumers about the take-up of future technologies that could provide support in later life.

What are the British public saying about the impact, or potential impact, of technology on their lives?

The good…

82% Say technology has had an overall **positive impact** on their daily life

73% Believe technology will play an **overall important role** in assisting older people in the future

72% Have **learnt more** and seen new things as a **result of using technology** in day to day life

69% Feel that the latest technologies are **easy to use**

66% Believe future technologies will enable **more frequent interaction with the family**

66% Feel future technologies will **support living at home for longer**

65% Say future technologies will help to **maintain independence when travelling**

37% Have **saved money** as a result of using technology in day to day life

24% **Work smarter** as a result of using technology in day to day life

The bad…

65% Believe **society will become inactive and lazy** in response to future technological innovations

57% Fear **losing the ability to interact with other people** due to future technological innovations

54% Are **concerned about the cost** of future technologies that could provide support in later life

44% **Doubt the reliability** of future technologies that could provide support in later life

42% Worry about the **lack of human contact** with technologies that could provide support in later life

41% Feel future innovations **will not strengthen community spirit**

27% Rate **information manuals for technology as poor**

23% Think they **have become lazier as a result of using technology** in day-to-day life

23% **Struggle to switch off** as a result of using technology in day-to-day life

HOW EASY DO WE FIND THE LATEST TECHNOLOGIES TO USE?

Over one in five UK consumers (22%) say they find the latest technologies difficult to use when they first get them, according to new research undertaken by the IET.

Only 45% of those aged 65 or older feel that the latest technologies are easy to use compared to 69% of consumers overall. The biggest barrier appears to be the mind-set that 'technology is not that straightforward so takes time to get used to it' (45%); a further 17% of those who say that technology is difficult to use feel that 'new technology is overwhelming'; and 9% report that 'not enough information is provided with the technology initially'.

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"The biggest challenge facing the average person in the adoption of new technologies is simply that they don't know how to use them."

Professor John Clarkson, Director of the Engineering Design Centre at the University of Cambridge.

"New technologies bring a new 'paradigm of interaction', and some adapt to these quickly whilst others don't. Learning is a slower process as you get older, but it's more about having embedded ideas and a mental model about how the world works, and that is applicable to everyone." said, Professor John Clarkson.

Professor Sarah Sharples, Pro-Vice-Chancellor for Research and Knowledge Exchange in the University of Nottingham's Faculty of Engineering, agrees. "Our natural tendency is to transfer habits and behaviours without necessarily taking into account how new technologies work," she says. "For example, if we think about TV recording technologies, with video recorders we became accustomed to the notion of physically storing material. This may not apply in the days of online services, but we haven't necessarily updated our expectations. This may mean we don't trust new technologies. In addition, technologies change so rapidly we are no longer able to fully understand how they work."

Respondents to the IET survey cite some common issues around the ease of the latest technologies. "I am 76, and my brain isn't tuned in to modern technology – I find it difficult to remember how to work them", said one. Another reports that "they never work as one would think and the instructions are always written for techie people to understand". However, those who say they find the latest technologies more straightforward to use, particularly the younger audience, profess their experience in using these technologies. Twenty-seven per cent of consumers who agree that the latest technologies are easy to use put this down to common sense – 21% say they are experienced/used to it, and a further 20% report that they are intuitive to use. As one respondent neatly summarises: "Growing up with this technology evolving alongside me means that I automatically find it easy to use".

These findings suggest, perhaps unsurprisingly, a gap in helping consumers of all ages to access the latest technologies. Greater assistance for older people, who have not grown up with technology all around them, is undoubtedly needed. "Working people generally get some type of support and hand-holding at work or through their colleagues, whereas for older people this type of support doesn't exist," explains Marjan Sarshar, Professor of Sustainable Built Environment at Nottingham Trent University. "Technology adoption must be needs and benefits driven. Someone needs to identify these needs and make older people aware that there is technology to support them."

Respondents to the IET survey also suggest that there is huge room for improvement in guidance for consumers. Typically less than a quarter of consumers rate the information provided by technology manufacturers as 'very good' and around 20-30% are disgruntled, to some degree, with such information.

Telephone call centres are deemed particularly bad, with 34% of respondents rating these as poor, followed by help through social media (31%), manuals (27%), FAQs (27%), user online forums (25%) and web chats (24%). One in five people rate quick-start guides as poor.

But it's questionable whether people's dissatisfaction merits increasing the level of information that comes with new products, according to Professor Clarkson. "There is undoubtedly a lack of information with products nowadays," he says. "I took a delivery recently which had a very small product guide with instructions to go to the website to walk through how to set it up. These are often not easy to follow – and not everybody has the ability to adopt these. The issue is whether you show people what to do all the time, or teach them to learn. This is part of the challenge facing industry."

MY PERSPECTIVE:
THE TEENAGER

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"As a millennium baby I constantly get asked to help others with problems and faults with their technology, with the same rationale – 'you've grown up with computers'. Personally I would say I haven't even scratched the surface of technology, but I suppose that having computer science lessons and typing lessons at the age of six says a lot about how prominent it has been in my life."

"I find it easy to understand the screens and technology that so many people find daunting. I assume I find it easier than older generations because I've had the gift (or curse) of growing up watching my parents struggle with the advances in technology – and have learnt from my mistakes with working it out, just as older generations did with sewing and vinyls. I don't think I've ever used a user-manual. There just seems to be an easier way to sift through the electronic walkthrough or work it out for yourself (especially with a trusty YouTube video). Even with my phone I just threw away the manual because I felt no need to use it, despite my parents insisting that it would be beneficial.

"As I've already started growing up with technology I cannot imagine life without it. It has become an obsession to almost all of my peers as it supports communication, cooking, building and wellbeing. As someone who religiously uses technology, I would ask manufacturers to consider all generations when designing new products to make them accessible to all.

"For young people, products should not be patronising. In fact, products need to be tailored to an older market than many manufacturers/designers think they are aiming at. There is a high degree of sophistication and desire to appear more mature among young people."

Lara Bragg

HAS TECHNOLOGY IMPROVED OUR QUALITY OF LIFE?

Overall, a majority 82% of UK consumers surveyed by the IET say that technology has had a positive impact on their daily lives – and 72% report that they have learnt more and seen new things as a result of using technology in day-to-day life.

Thirty-five per cent of people who say technology has had a positive impact claim this is due to assistance with day-to-day tasks, whilst others highlight the immediacy of information and ability to keep in contact with others.

"I've seen many grandparents in their 70s and 80s who have an iPad and have learnt to use Skype to speak to their grandchildren who live in a different part of the world," says Professor Sarshar. "Their fear of technology has been eliminated by their family purchasing the hardware for them, setting it up and showing them how to use it. So distance communications has become easier and substantially cheaper, but it is important for older generations especially to have somebody physically nearby to assist them if something does not seem to work."

Professor Sharples concurs: "It's easy to forget that individuals can very easily become socially excluded through the absence of technology. Access to services, communities and information of course is something we now take for granted but has changed our lives dramatically. Again, though, we need to support technology with local and accessible experts in places such as libraries and support centres."

Other specific personal benefits of new technologies highlighted prominently by members of the public responding to the IET survey are saving money (37%) and smarter working (24%). Rami Qahwaji, Professor of Visual Computing at the University of Bradford, adds: "New technologies have undoubtedly contributed to improving efficiency and connecting people. From a commercial perspective it has also created new business models and new data-based industry. However, from a negative perspective, there are new social trends emerging which we also need to be conscious of, and work to address over time."

Seven in ten people identify at least one negative impact of modern technologies on their daily lives. Most notably this is affecting the younger generation. Almost a third of 18-34 year olds (29%) surveyed say they struggle to switch off as a result of using technology in day-to-day life and 27% say they have become lazier. A further 17% claim they have become more unfit as a result of new technologies. Across all age groups, one in five say they have become too reliant on technology and 18% say they leave the house less.

The blurring of the work-life balance is a major drawback, Professor Sharples admits, as well as "the ethical implications of the digital footprint".

Professor Sarshar adds: "The negative impacts of technology on our lives are lack of family time, difficulty in holding another person's attention and people shouting on the phones in public spaces, for example on trains. Some people try to hide personal difficulties through immersion in a virtual world. In business, there are problems of over communication and multi-tasking to beyond human levels. It has become easier for people to shrug responsibility and pass tasks over email. Management and discipline in organisations has become increasingly important to resolve these types of issues."

At societal levels, consumers are also extremely cautious about the potential impact of future technologies. Nearly two thirds (65%) of people believe that society will become inactive and lazy, 57% say we will lose the ability to interact with other people and 53% feel we will stop making decisions and rely on computers. A further 41% disagree with the statement that future technological innovations will strengthen community spirit.

MY PERSPECTIVE:
THE 20SOMETHING

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"In my job I work long hours on film or TV sets and my work/home life becomes blurred during these periods. I need my mobile phone both for my job and to complete everyday tasks. For example, at work I use my mobile phone to source and purchase materials and I use Google maps or the City Mapper app to navigate my way around whichever city I'm staying in for a shoot."

"While away on location I need my mobile phone to pay bank bills, keep an eye on energy use and for shopping. I also use my phone to keep in touch with family and friends through email and Facebook. On set, during breaks and in the evening wherever I am staying, I know I can access TV/music/radio on my phone through Apple TV, Airdrop or Spotify. The advantages are huge both in terms of being able to do my job but most importantly stay in touch with loved ones.

"I tend to shy away from technology unless it's my iPhone as I find it frustrating to use. I never read user instructions. I guess I'm lazy in that I won't buy technology unless it comes with step-by-step, on-screen user instructions, as the iPhone does – but if I can't pick up a device and use it straight away, I'm not interested in using it.

"I can see disadvantages of technology among my generation. There are times when we are all out to dinner and it can feel anti-social when everyone is on their phones at the same time. I do worry that my generation is a new breed of person that won't talk to each other in public but will share a huge amount of information about their personal lives on social media."

Mia Gibbs

MY PERSPECTIVE:
THE 30SOMETHING

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"Technology is only going one way and people are going to become more reliant on it whether they like it or not. Those who don't embrace the changes/improvements will become antiquated in their approach and be left behind in this ever evolving world. Digital technology has been at the forefront of my life for far too long to remember — so much so that I cannot now imagine living without it."

"My job as a communications professional has certainly played its part in this whether it's through my iPhone, iPad, laptop, PC or Kindle enabling me to be professionally and socially connected 24/7. It depends on who you talk to in terms of whether it has improved quality of life.

"Yes, making decisions, contacting people, seeking quick answers or directions is now a lot easier, but it can also become addictive. I am regularly on my phone, laptop or iPad when in the company of others and this can be seen as pretty anti-social – but doesn't everyone do it these days? This ever growing technological world is a fast-paced one and there is a genuine fear of being left behind, particularly amongst the 'Gen Zs'!

"Digital transformation will allow me to progress up the career ladder whilst accessing information, adventures and experiences that used to happen 'over the hills and far away' in my very own house. I also think that new technologies will allow us to keep a close eye on our children as they grow up – you don't want to mollycoddle them, but in this increasingly volatile society, the easier it is to keep an eye on your children the better. Also, anything health-related in terms of online consultations or robotic support is something that I would personally endorse, especially to help take the pressure off the NHS."

Jon Dale

WHAT IS THE ROLE FOR FUTURE TECHNOLOGIES?

Nearly three quarters (73%) of UK consumers responding to the IET survey say that technology will play an important role in assisting older people in the future – with one in 10 people going so far as agreeing that it is 'critically important'.

Amongst those identifying an important future role for technology in providing help for older people, the majority focus on the ability and further potential to make life easier (29%), easier communication with family and healthcare professionals (22%) and provide personal support to aid independence (14%).

Assistance with healthcare is considered to be one of the biggest opportunities for genuine impact by future technologies, according to academic experts interviewed for this report. Dr Gillian Ward, a researcher in Coventry University's Centre for Technology Enabled Health Research, has just completed a three-year study funded by Innovate UK which found that consumers aged 50-70 are generally not aware of health technology products and services which can help them.

"As well as awareness, the biggest challenge facing consumers is they don't know where to get information or know how to choose what to buy. A key stage in the consumer journey in terms of purchasing new technologies for health is recognising and accepting a health need."

Dr Gillian Ward, researcher at Coventry University's Centre for Technology Enabled Health Research
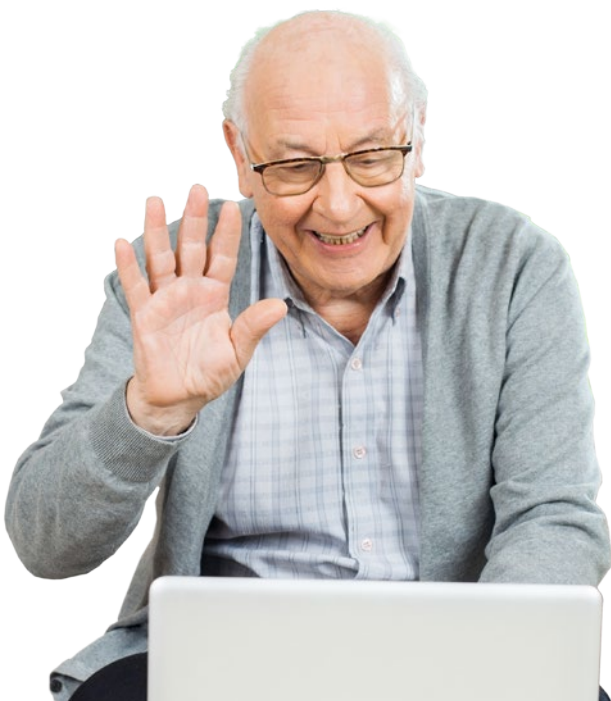
"However, we found that consumers in their 50-70s don't think they need these products – believing them to be for disabled people and not for them. Often health technology solutions are sought at a time of crisis after a life-changing health event has occurred. We need to adopt a wider public health approach to prevention and self-management of our own health and wellbeing."

Similarly, Professor Qahwaji highlights a major opportunity to support assisted living among older people. "Loneliness and social isolation are some of biggest killers of older people today," he explains. "Technology can play an important part in connecting people. Assisted living technologies integrated within future smart homes could also directly improve the quality of care for older or more vulnerable people."

Across the board, 45% of people believe that older people need most help with domestic chores, maintaining health and wellbeing (43%) and travelling outside the home (40%).

Those aged 65 and over believe that older people need more help with maintaining their health and wellbeing (58%) when compared with the views of the younger age group (18-34 year olds – 35%). Domestic chores (47%), travelling outside of the home (44%), shopping (37%) and looking after themselves (35%) are the other main future 'needs' cited by the oldest group surveyed.

The general principles of inclusive design can be used to support technology in the home, says Professor Clarkson: "There is a lot of innovation out there which can be introduced in the home. In Japan there are adjustable toilets which can be fitted on to the wall at different levels to suit the user's age or condition. Here we have to have our toilets stuck to a pedestal. It is eminently possible for others to have access to devices which are based elsewhere; there's just not enough of it going on. For example, there are some mobile technology products aimed at the older generation

which allow other people access to the device remotely and this may be helpful for close relatives in assisting with finding contacts on the phone. There are weighing scales which sit under the bed and can record people's pulse, how often they go to the toilet during the night and the impact on their pulse."

Overall, UK consumers are positive towards future technologies helping at a personal level. Around two thirds of people agree that they will enable more frequent interaction with family (66%), living at home for longer (66%) and maintaining independence when travelling (65%).

Forty-one per cent think they would need in-home demonstrations of future technologies, such as robots and driverless cars, when thinking about growing older. However, there are mixed perspectives about the introduction of robots and their ability to potentially help older people around the home. Sixty-one per cent of consumers report that robots would prolong independence in the home and 58% agree that robots will be effective in undertaking household chores like cleaning and cooking. Yet when prompted 39% of all respondents foresee that they are unlikely to use robots when they are older if they could provide help around the home and provide a degree of companionship. Additionally, assuming robots become common place to help older people in their homes, 55% of all respondents feel that older people will find them too intrusive.

MY PERSPECTIVE:
THE 40SOMETHING

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"I know that a lot of these innovations are available now, but honestly I think most of it is fairly useless unless there is a genuine need for it, such as disability. For example, it would be really depressing if we handed over care of the needy to robots. It is hardly a replacement for real people. If I was sick then smart healthcare devices would be useful but it's a bit obsessive for anyone else."

"Though I can see that if you are really sick but live somewhere remote, or need to talk to specialists abroad, then a virtual doctor could be useful. I do think that more medical care will eventually be done over Skype or online. Going forward, my advice is that future technology and innovation needs to fulfil a genuine need. Yet we should also get out of the mindset of getting rid of technology every couple of years – we need to be able to reuse and recycle a bit more cleverly.

"Technology, on the whole, has definitely improved my life. The main advantages are obvious – instant information, instant communication, instant entertainment, banking in seconds, bespoke DIY holidays booked, working from home, travel information at your fingertips, a camera that's with you all the time. I worry more for people who are sucked in and share and compare everything about their lives.

"On the whole I'm not afraid to fiddle with devices until I work them out – and I usually get there. User instructions are on the whole rubbish though – too many languages – and often not written from a user perspective. As a professional copywriter I'd like to rewrite them!"

Alice Fewtrell

MY PERSPECTIVE:
THE 50SOMETHING

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"I currently use a mobile phone, laptop, iPad and, to a lesser extent, a smart TV. I am fairly competent using all of these in terms of the basics. I use my phone every day, for text and email, but if you are asking whether I am getting the true use of all the features I would say not. With my smart TV, I just don't use the extras. In my case it's down to my age and lack of experience. My kids, and especially my teenage son, would dive in."

"If I understand it I will use it. I got an email through saying that iPhone 7 is now available – well, what has this got that an iPhone 4 hasn't? The assumption among manufacturers and service providers, I think, is that everyone is familiar with the technology. That's not the case. When I got my phone it came in a box with no instructions. My old Nokia phone came with a huge instruction booklet.

"There needs to be recognition about what people, particularly the older generations, are capable of when it comes to supporting their own needs. Technology will help with many areas in later life. The main one is speaking to people – and keeping in touch with family and friends – because with less money coming in you will probably travel a lot less.

"Technology will ensure that accessibility of information and people is maintained. You would assume that the development of new technology will bring more opportunities to use the equipment. Finding out how to use it first, and guidance on how to do so, is key. I would be keen to embrace that. The benefits need to be tangible and explained. But the key is understanding it, appreciating what it does for us and the expected impact of that."

Douglas Main

WHICH INNOVATIONS DO THE PUBLIC WANT?

The IET asked UK consumers for their views on six future technologies and how useful they would be to them in in later life. We report on the percentage of respondents rating each of these technologies as most useful. There is no consensus on demand for any of the innovations.

Smart healthcare devices are rated most useful by 27% of consumers. These are devices which keep an eye on people's vital signs such as heart rate, cholesterol and blood/sugar levels – and are electronically connected to medical records at doctors' surgeries. This does, however, build on the views of academic experts that in terms of future technologies those most likely to deliver genuine impact are in the field of healthcare, not least because this is something that consumers of all ages will need.

Only 10% of consumers rate driverless cars as most useful. Driverless cars are programmable or voice-activated cars capable of fulfilling the main transportation capabilities of a traditional car, which sense the environment and navigate to a destination without human input. These have been well-publicised in 2016, with the development of Google's self-driving cars. When asked to rate their usefulness in later life, robot support was also only seen to be most useful by 10% of the public.

Smart homes, with features such as automated or voice-activated opening doors and drawing curtains, all-in-one screens enabling residents to watch TV, play games, monitor CCTV and see and talk to loved ones remotely, are rated as the most useful innovation by 22% of consumers.

Sixteen per cent were most interested in online doctors giving consumers the ability to consult with a virtual doctor 24 hours of the day via an electronic device, such as a smart TV or tablet, without the need to go to a surgery.

Finally, remote control of heating and lighting within the home and 24/7 information on energy use and billing is seen as most useful by 15%.

> **"**"Ultimately the public needs to be more vocal on what technologies they find straightforward and not. Currently designers are not being asked to do the right things. It is the responsibility for those commissioning design to ask for things that support the needs of the wider population."

Professor John Clarkson, Director of the Engineering Design Centre at the University of Cambridge.

Professor Clarkson continues "For example, we have more and more buttons on the steering wheel column in our cars. Many people struggle to understand and don't actually use these. Similarly we have washing machines where we are paying an additional £50 per button. There is a sense that manufacturers need to keep adding features, but should we actually pay less to have fewer buttons if we don't want these?"

Professor Clarkson adds that academic institutions have an important role to play in supporting the development of inclusive design and, crucially, guiding developers on what the public wants. "We run consortia with companies across Europe, the likes of Nestlé and Reckitt Benckiser Group plc, to help them see what is possible and ultimately help them develop products that the population will find easy to use," he says.

The issue of overcoming this apparent gap between industry and public perceptions, of what is needed and therefore in planning future innovations, is also highlighted in Dr Ward's research. "We found a disconnect between industry perceptions of what older consumers are looking for in the health technology market and what consumers say they want," she says. "Industry needs to pay greater attention to ease of use, reliability, reassurance regarding standards and safety to overcome any fear of technology and place greater emphasis on value and lifestyle benefits rather than disability. Desirability is a good word to think of when approaching new health technology design."

Academics interviewed for this report say that developments around the "internet of things" and "connected home environments" are most likely to support independent living in later life leading to "more lifetime homes being designed and built". Others point to potential innovations around "wearable technology that is fashionable and fun" to support the monitoring of health and the continuing rapid progression of areas such as "gaming technologies for stroke rehabilitation and mind improvement". Most concur that future innovations around assisted living – tackling issues around rehabilitation, self-help and loneliness – is most likely to strike a chord with the majority of the British public.

MY PERSPECTIVE:
THE 60SOMETHING

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"I'm not sure that these technologies will be in place in my lifetime but looking to the longer term I can see that robots in the home could be commonplace for social care. Smart healthcare devices sound hugely useful and would reduce time and cost to the NHS. However, I wouldn't want the world to become devoid of human contact – it all sounds a bit like a futuristic film. Online or virtual doctors has to be an improvement, as there would be no need for a physical journey to the surgery and reduced costs to the NHS."

"As long as the doctor is a real person (i.e. not a hologram) and that this would involve a two-way conversation, it surely has to be progress. I wonder, though, if this may be subject to abuse if a doctor is virtually available 24/7?

"Smart homes are an upgrade of what we have now with applications such as WhatsApp, so I see this as a continuation of some of the applications and devices that we currently use on a daily basis. An element of this already exists for me – Bluetooth hub for heating and water, smart watch. I'd be totally in support of anything that comes on the market that would make my life easier. Depending on cost, I'd most definitely purchase devices such as these.

"I would very much want to use a driverless vehicle. I think they would be much safer as there would be fewer accidents and speed restrictions would be adhered to. They'd also enable older people to remain mobile for longer. I like the idea of booking a driverless vehicle online – for it to then arrive at my house for my personal use. Generally I find new technology quite easy to use, but I struggle to rectify problems when they occur. I can ask any of my grandchildren and they will instantly fix something for me as it is second nature to them. However, more needs to be done to assist my age range to access relevant information."

Irene Beahan

HOW CAN WE SUPPORT TECHNOLOGY ADOPTION?

Cost (54%), reliability (44%) and lack of face-to-face human contact (42%) are the main concerns facing UK consumers about the take-up of future technologies that could provide support in later life, with the older group of 65+ expressing the greatest fears around; cost 73%, lack of face-to-face contact with humans 58% and reliability 55%.

Professor Sharples admits that cost is a major issue around adoption of new technologies:

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"Understanding the value of investing in a new technology can be difficult and in many cases the basic cost of technologies such as smart phones is simply too high. So we end up with a big variation in technical tools being used by people."

It is also important to consider user needs and capabilities throughout the design process, says Professor Sharples, in order to reduce that sense of 'complication' – particularly for the older generation. "Keep interfaces simple and maintain familiar mental models in new technologies," Professor Sharples continues. "Also remember the physical and cognitive capabilities of older adults. In addition to reduced manual dexterity that may make small keyboards or touchscreens difficult to use, reduced eyesight may affect visibility of text size, screen brightness can be hard to control, and circulation problems may reduce the effectiveness of touchscreens which can ultimately be difficult to use when wearing gloves."

The Consumer Models for Assisted Living project (www.comodal.co.uk) run by Coventry University identified the top three factors that would encourage 50-70 year olds to buy assisted living products: believing that a product will really make a difference, a feeling that costs are affordable and worth it, and a belief that the product will make life safer at home. "These simple marketing messages are often missed by suppliers and manufacturers," summarises Dr Ward. "I also believe that the co-design of new health technology products and services with the people that they are intended for, together with product designers, health and care service commissioners and SMEs, will ensure that these technologies are successfully adopted."

There is undeniably an appetite to retain or, in some cases, return to traditional forms of information provided by technology manufacturers. Two thirds of respondents (66%) say they ideally want printed support such as manuals, quick-start guides and FAQs from technology manufacturers and service providers to help them to better understand their products.

Online manuals/video are highlighted by 53% of all respondents and online interaction by 37%. Those aged 18-34 are most positive about online methods, with 55% looking for online manuals/video and 46% for online interaction. The 35-54 age group prefer printed support (65%) but are generally open to all other communications. However, unsurprisingly, it is the oldest group who most prefer to receive support through traditional means – 79% of those aged 65 or older want printed support, while 43% would like telephone assistance.

Another consideration is that people need to see the usefulness of new technologies and be convinced they will be easy to use. "You will always get the older generation of people who aren't prepared to learn, or are resistant to learning yet another new technology," says Professor Sarshar. "However, in my experience, even older people learn new technologies when they're sure it benefits them. Many people may feel technologies are imposed upon them and that they don't necessarily address their needs. The current young generation may also not want to learn the next generation of technologies in 20 years' time if they feel it is imposed upon them."

Professor Sarshar identifies three key pillars of assistance for the British public around the adoption of future technologies: "Better support and hand-holding by relevant public authorities; stronger community support; and more targeted and user-friendly technology design."

"Giving people power over which technologies they want to see being used and developed" is paramount, concludes Professor Qahwaji.
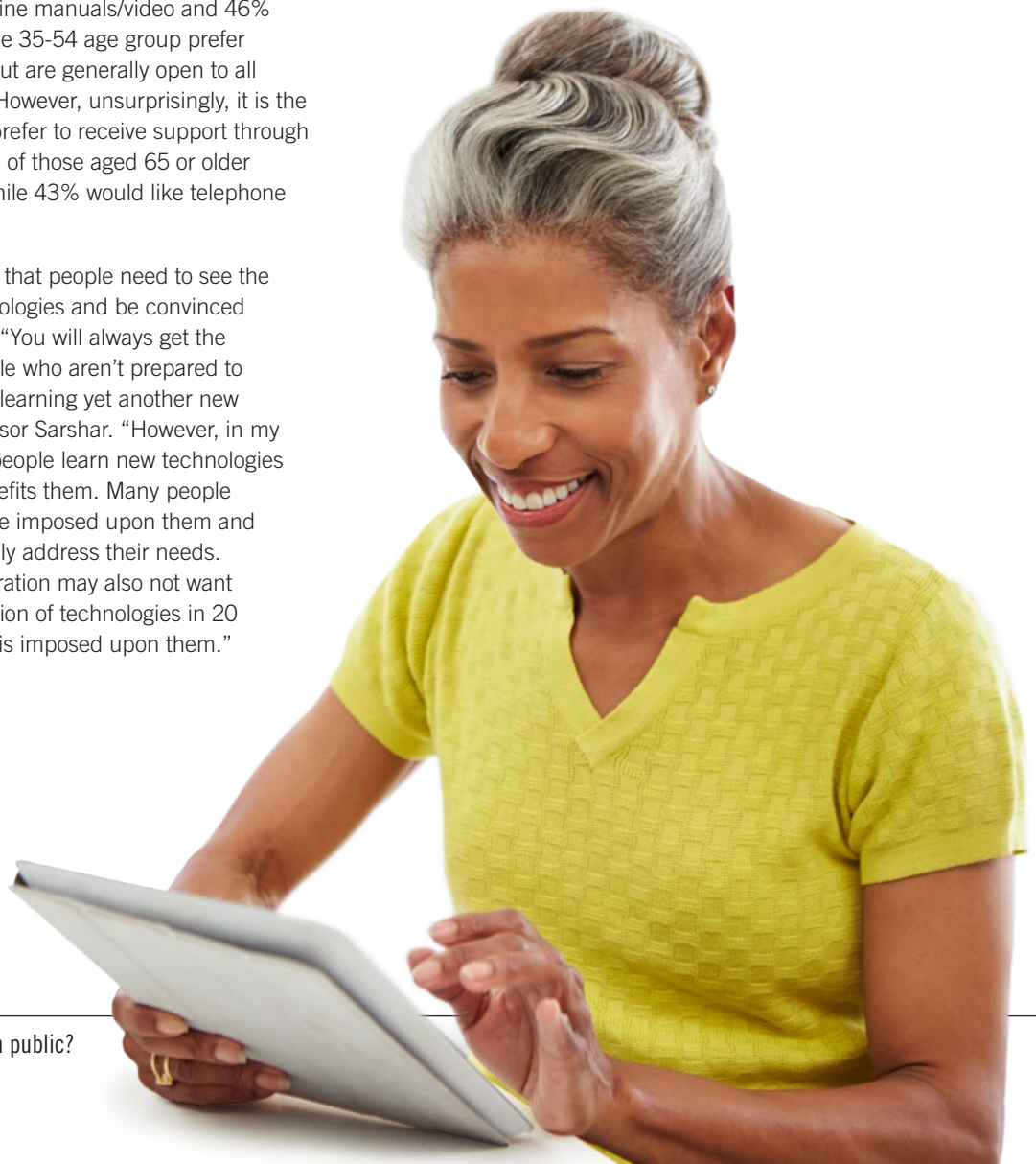
MY PERSPECTIVE:
THE 70SOMETHING

"

"All the technologies introduced in recent years are amazing and make life so much easier. Using computers to book airline tickets, holidays, online shopping and mobile banking is so convenient, if a little risky though. Generally all new technologies have had a positive impact on my life. Keeping in touch with people by text and email, finding people I have lost touch with and, if I'm housebound, online grocery shopping and clothes shopping is great."

One disadvantage is spam mail – they keep thinking of new ways to annoy me! Instructions from manufacturers are almost nil – sometimes we just have to fumble through or ask a friend. It is possible to 'Google' instructions for a product but these seem to assume we know the language involved. So, clearer, simple, more comprehensive instructions would be helpful – and also to indicate where to find instructions.

"Thinking about my own experiences I do find it difficult to operate my iPad sometimes, especially storing things. Again, clear and easy instructions would help.

"As I get older it's important to think about how to make the most of new technology. Being housebound and able to view callers via cameras, unlocking doors for callers, burglar alarms and alarms in case of falls, would be particularly beneficial to me. Smart healthcare sounds good in theory if elderly people can operate these, whilst an online or virtual doctor could be very helpful.

"Remote control of heating or lighting via a smart phone or tablet, again could be good. Robot support could be good and, in my view, driverless cars are the best idea so far providing they can be safely programmed."

Cynthia Wood

CONCLUSION

This report highlights a number of important issues and trends which are relevant to individuals and companies involved in developing future technologies, as well as policy-makers and funders overseeing related developments.

1 – A majority of UK consumers believe that technology has had a positive impact on their day-to-day lives and there is strong recognition that future technologies will play an important role in later life – particularly in terms of enabling greater independence in the home and while travelling in old age. However, cost, reliability and lack of human contact remain the biggest concerns about the take-up of future technologies that could provide support in later life. These issues will need to be overcome to support wider adoption.

2 – Academic experts have highlighted a need to focus communication of new technologies around the need/benefit – as well as to provide effective support to help consumers of all ages (but especially older age groups) fully understand how new technologies work. Two thirds of consumers value printed support such as manuals and quick-start guides in addition to online or electronic support. This is felt most strongly amongst the older age group but also to some extent by younger audiences – which highlights the need for suppliers and manufacturers to understand customer capabilities and adequately support consumers, particularly older generations, in getting to grips with new technologies.

3 – There is no clear consensus among UK consumers on which future innovations will be most useful in later life. Of the six new technologies highlighted in this report, the highest percentage (27%) of respondents highlighted smart healthcare devices as the most useful, while only 10% see driverless cars and robot help as the most useful. Given the recent media focus on driverless cars, it is perhaps surprising that they do not feature more positively. There appears to be greater appetite for innovations focusing on healthcare and supporting independence in the home. This might suggest a disconnect between what industry is developing and what the public actually wants.

'How Tech Savvy Are We'?

There is not a simple answer to this question. But what is clear from this research is that one size does not fit all. The sentiments expressed in this report by the public, and especially older generations (those with the disposable income to ultimately buy new innovations), must not be ignored.

IET RECOMMENDATIONS

1   The UK would benefit from a **public engagement programme, led by Government and industry, to highlight the potential of new technologies to address some of society's biggest challenges**, such as the ageing population and an overstretched public health system. The programme should also aim to address perceived 'downsides' with technology such as greater inactivity – as well as encourage more entrepreneurship and innovation by inspiring businesses to develop solutions to meet proven customer needs.

2   **Engineers and technology providers need to work collaboratively with other sectors**, such as healthcare and local authorities, to ensure that their R&D programmes, design techniques and market delivery plans meet consumer and societal challenges. Such collaboration will drive a more multidisciplinary approach to developing new technologies, together with greater sharing of technological innovation between different sectors ('horizontal innovation').

3   **Businesses supplying high-tech products and services need to find more effective ways to promote the benefits of their products and services**, rather than the product and service features. People are more likely to welcome the 'greater independence' a robot could provide than the robot itself. These businesses should also put **more thought into supporting the different levels of technical ability of their customers.** This includes the language and information channels they use to help people access technology.

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