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Tech in the Town

4IR and local government: opportunities, risks and next steps for policymakers

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Overview

- What are the opportunities for local government from 4IR technologies?
- What are the barriers to realising these benefits?
- What next for policymakers?

What do we mean by 4IR?

Our research focused on:

- Autonomous vehicles
- Robotics
- Artificial intelligence
- Internet of things
- Big data/data analytics

The 4IR opportunity

Research suggests a number of benefits from rolling out 4IR in local government

- Using new technologies to improve the environment:
  - Reducing light, noise, water and air pollution
  - Improving monitoring of the environment
  - Driving up recycling rates

- Improving local transport infrastructure:
  - Reduced congestion
  - Improved road quality
  - Better public transport

- Improving community safety through data analytics

- New opportunities for rethinking urban spaces – including freeing up land for housing

Smart street lighting is already delivering tangible benefits

- Smart street lights can turn on and off (or dim) according to need – reducing light pollution and generating substantial financial savings.

- In Oslo, smart street lighting paid for itself in three years.

- Internet connectivity allows local authorities to more rapidly respond to broken lighting, and prioritise maintenance activity where it is most needed.

- Other opportunities from smart lighting:
  - Increased revenue-raising opportunities. E.g. from advertising and wi-fi hotspots
  - Using street lights to monitor the environment.
  - More timely and efficient gritting of roads, through the use of temperature sensors.

Improving road conditions and traffic flows through 4IR

- Drones that can detect and repair roads are already being developed (e.g. by academics at the University of Leeds) – raising the prospect or “self-repairing cities”.

- Predictive traffic signs can help divert vehicles to improve overall traffic flow. Can “smart motorway” technologies be used in towns/cities?

- Dynamic parking charges and road pricing increasingly likely in a world of 4IR and electric vehicles.

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Using AI and car cameras to predict and fix potholes – “car as a sensor”

Using AI to fix potholes

UW researchers develop artificial intelligence software to detect road problems

NEWS Aug 01, 2018 by Johanna Weidner Waterloo Region Record

Researchers at the University of Waterloo have developed artificial intelligence software to improve road maintenance. - Mathew McCarthy , Waterloo Region Record file photo

New Ford Focus to introduce advanced pothole detection tech

Cars equipped with continuously adaptive damping can respond to holes in the road

Improving the local public transport offer

- Fleets of autonomous taxis, buses and trains increasingly likely. In Singapore, there are plans to introduce driverless buses on its public roads by 2022.
- Using big data to provide more accurate guidance on journey times and optimal routes.
- In Barcelona smart city technologies (such as smart traffic lights) are being used to ensure buses encounter as many green lights as possible when travelling.

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Driverless shuttle bus at Nanyang Technological University in Singapore

Opportunities from smart bins

- Bins with fill-sensors, which automatically compress rubbish, are being rolled out.
- Potential to use smart bins to change the charging structure for household waste collection – creating stronger incentives to recycle. E.g. charging households “per kilogram”/”per bag” of waste collected.
- Bins which automatically separate recyclables are being developed.

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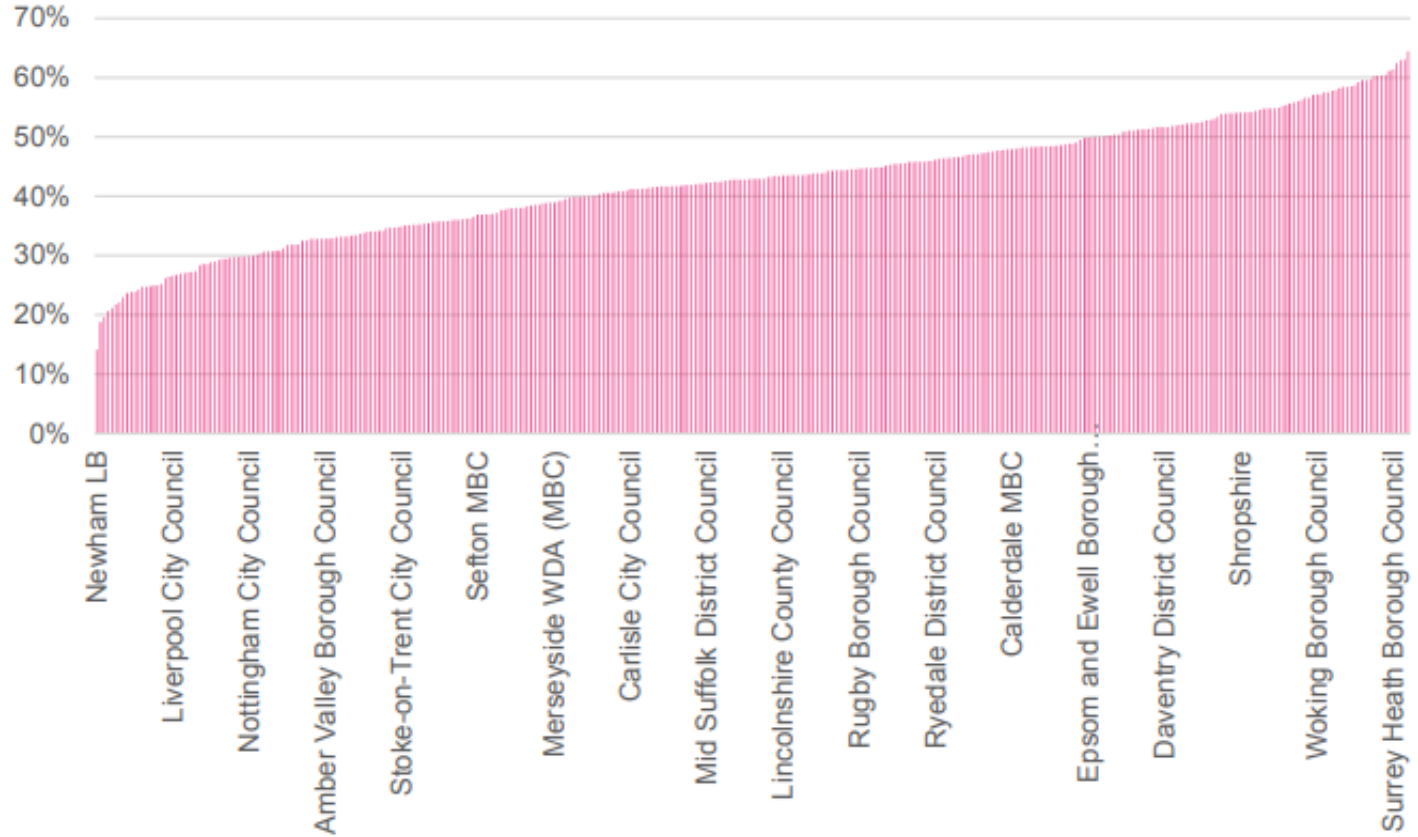
Smart bins could help improve recycling rates – which vary greatly across the country

% of household waste that is recycled, reused or composted, by local authority in England



Source: SMF analysis of Defra waste data

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Smart bins could help improve recycling rates – which vary greatly across the country

Top 10 and bottom 10 local authorities in England, by recycling rate

Top 10 local authorities, by household recycling rate		Bottom 10 local authorities, by household recycling rate	
Local authority	Recycling rate	Local authority	Recycling rate
East Riding of Yorkshire Council	64.5%	Newham	14.1%
Rochford District Council	63.0%	Westminster City Council	18.8%
South Oxfordshire District Council	63.0%	Barrow-in-Furness Borough Council	19.6%
Three Rivers District Council	62.4%	Birmingham City Council	20.7%
Surrey Heath Borough Council	61.4%	Council of the Isles of Scilly	21.2%
Stroud District Council	61.2%	Lewisham	21.8%
South Northamptonshire District Council	60.5%	Wandsworth	22.1%
Vale of White Horse District Council	60.4%	Gosport Borough Council	23.0%
Derbyshire Dales District Council	60.3%	Hammersmith and Fulham	23.7%
Stratford-on-Avon District Council	60.3%	Slough Borough Council	23.9%

Source: SMF analysis of Defra waste data

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More broadly, 4IR offers opportunities to improve environmental monitoring in local communities

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Safer communities through predictive technologies

- Predictive policing, which uses data trends to foresee criminal activity, has enabled local police forces to prevent crime taking place.
- Results from trials indicate that such models can help cut crimes where perpetrators exhibit predictable patterns of behaviour.
- After using predictive policing across Greater Manchester, the borough of Trafford experienced a 26% drop in burglaries between May 2010 and May 2011 when the software was in use.

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Evidence from another Manchester on the power of predictive policing

Challenges and what next for policymakers

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Key challenges for policymakers

- How can likely public opposition be overcome? For example, potential opposition to road pricing, dynamic parking charges and smart bins.

- 4IR has the potential to offer significant improvements and cash savings for local government, but there are large upfront costs and infrastructure requirements. How will this be financed?

- Could 4IR make some things harder for local government? For example, increased homeworking and the decline of the high street could erode business rates revenues. Increased use of car sharing technologies could reduce parking revenues. Electric vehicles will require investment in charging points.

- Does local government have the workforce skills needed to take advantage of 4IR? What are the skills gaps which will need to be filled for a world of data analytics, robotics and automation?

- Ethical concerns about predictive policing – “guilty until proven innocent?”

- Do local authority planners need to be thinking more about 4IR when approving housing/commercial developments? Are the housing estates of today “4IR friendly“ in terms of road design, drop-off points for online deliveries, electric vehicle charging points etc.?

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Public and media opposition could be a significant barrier to rolling out 4IR in the community

The Telegraph

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HOME » NEWS » UK NEWS

Microchips in dustbins spy on three million

Image 1 of 2

The microchips could be used to charge households for the amount of non-recyclable waste produced

News › UK News › Department for Transport

All new cars must have 'black box' spying device fitted from next year

EU regulations say all new cars must have built in spy box from October next year which will track speed and driving h

SHARE 8 SHARES By Adrian Shaw 17:32, 18 MAY 2014

Black box: New invention from next year

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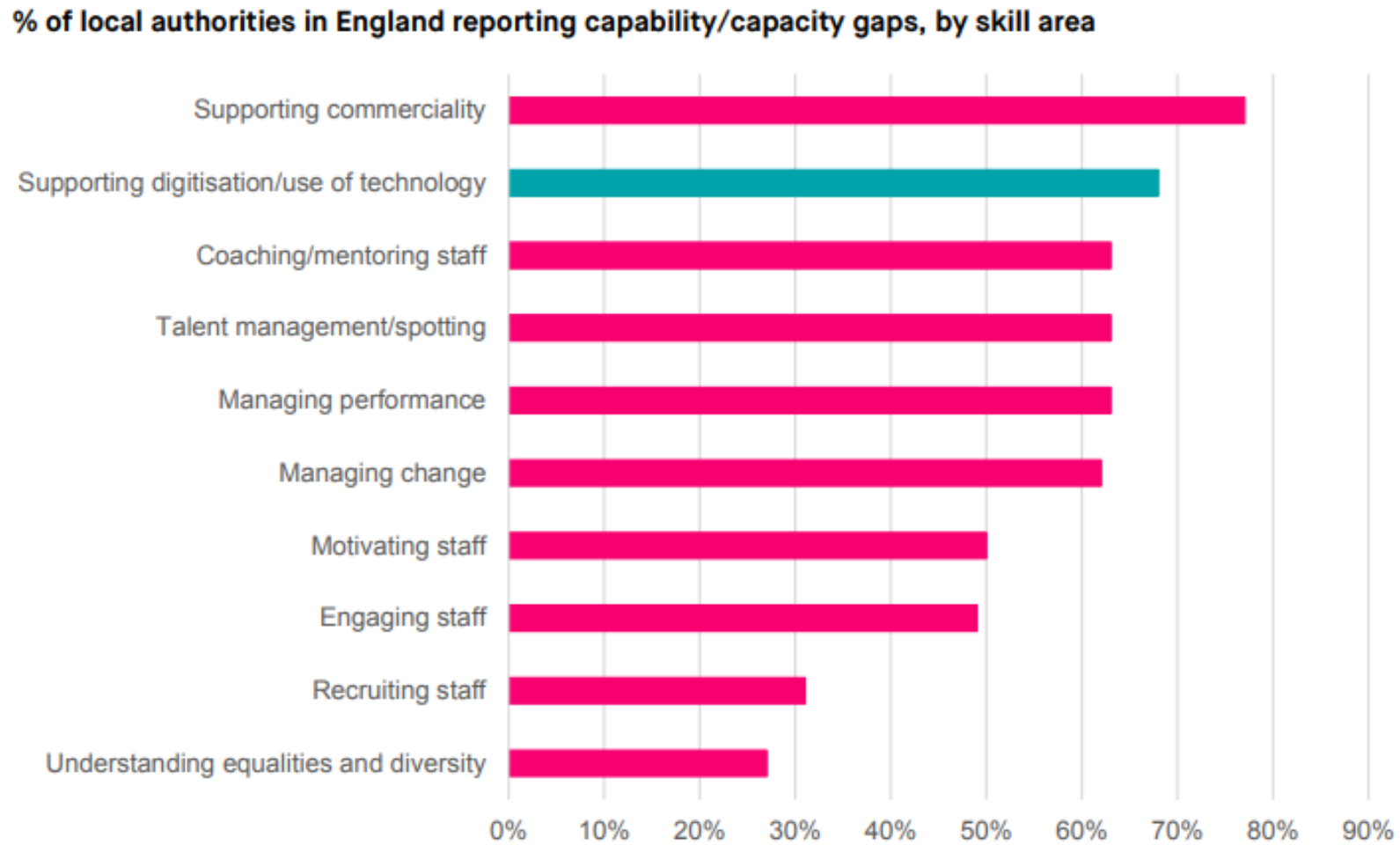
Survey evidence suggests a digital skills gap in local government



Source: Local Government Association workforce survey 2014/15

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What could policymakers do to address these challenges? Three recommendations from the SMF

- **Create a local government "4IR innovation fund" to incentivise the rollout of 4IR technologies and allow an evidence base to be created.** A bigger evidence base on the benefits of 4IR can reduce risk aversion in local government, particularly with respect to investments which might take a number of years to yield a net return.

- **Explore the role that outcome-based contracts could play in encouraging private sector providers of outsourced services to roll out new technologies.** Under outcome-based contracts, service providers are paid according to the outcomes they deliver, rather than the means with which they reach such outcomes => potentially more scope for innovation.

- **Dynamic road and parking charges, and new smart bin collection charges, should either operate on a largely revenue-neutral basis, or in a way that generates clear, tangible benefits to households and businesses.** A carrot rather than a stick-based approach to dynamic pricing might be most acceptable to the public. For example, households that produce less waste or recycle more could be awarded some form of Council Tax rebate.

Any questions/observations?

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Thank you for your time. To discuss further please contact…

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