

[www.scotland5gcentre.org.uk](http://www.scotland5gcentre.org.uk)

# The Scotland 5G Centre

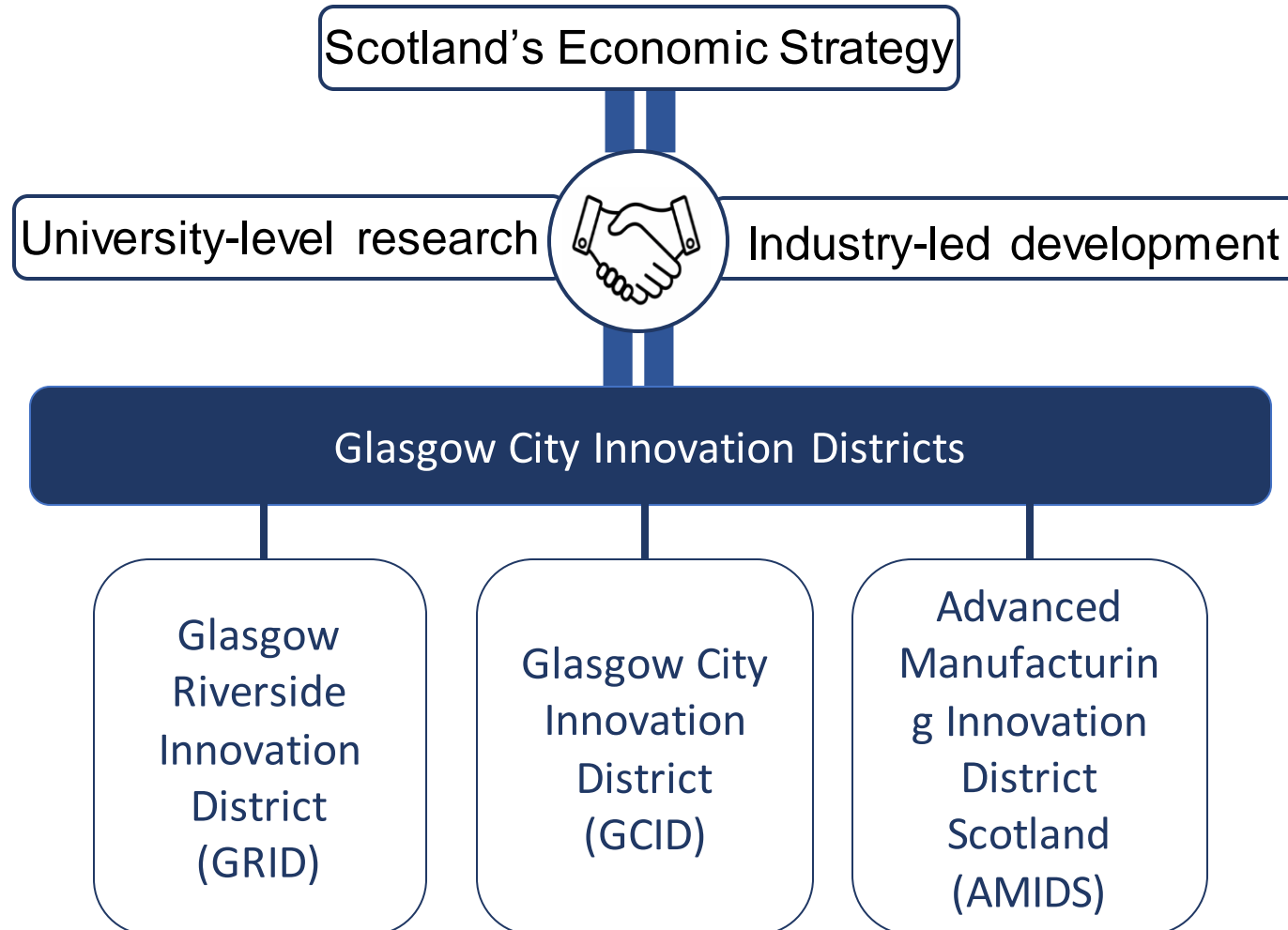
Wave 1 Project:  
Innovation Districts



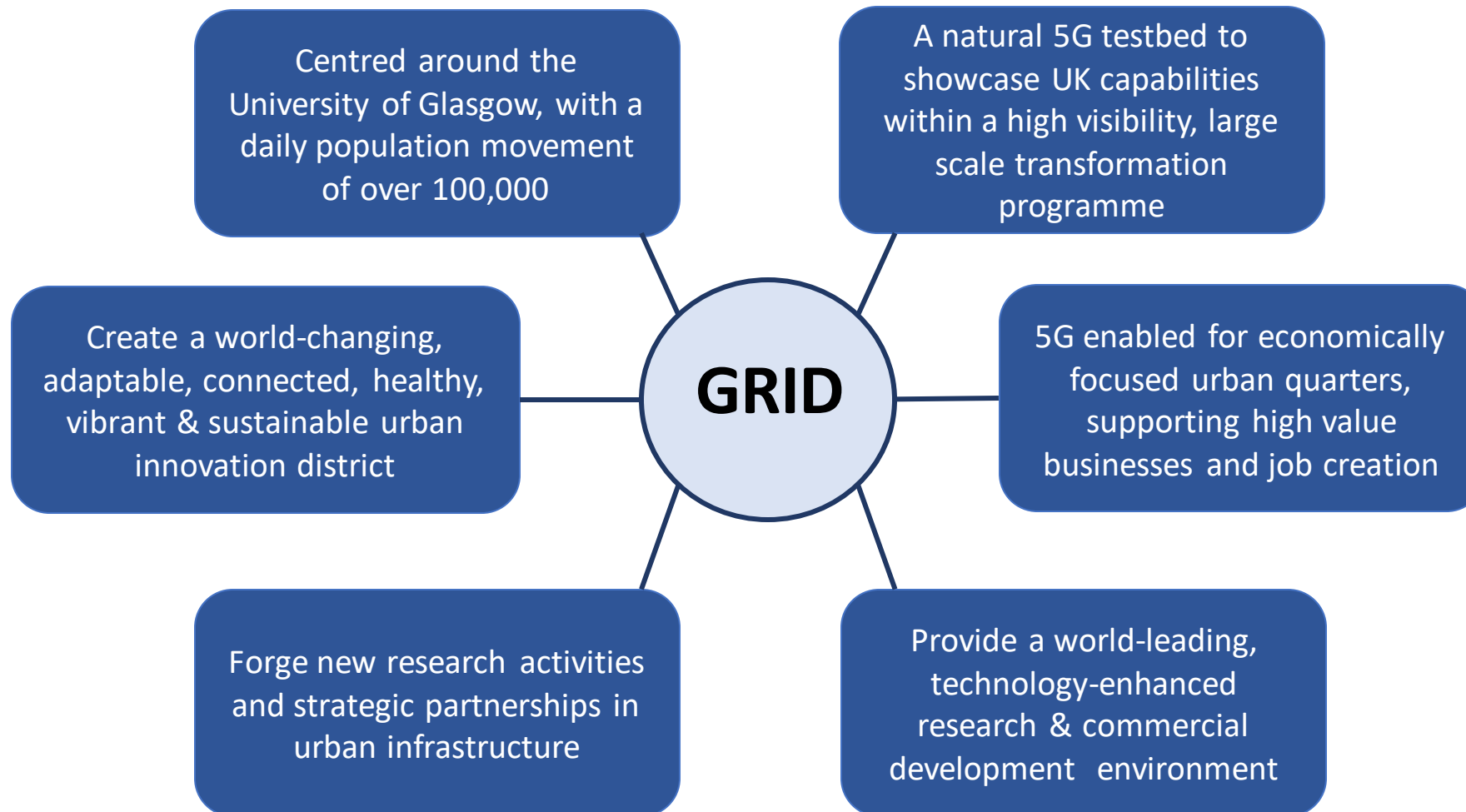
The  
Scotland  
**5G** Centre

Leading our nation's digital future

# Introduction



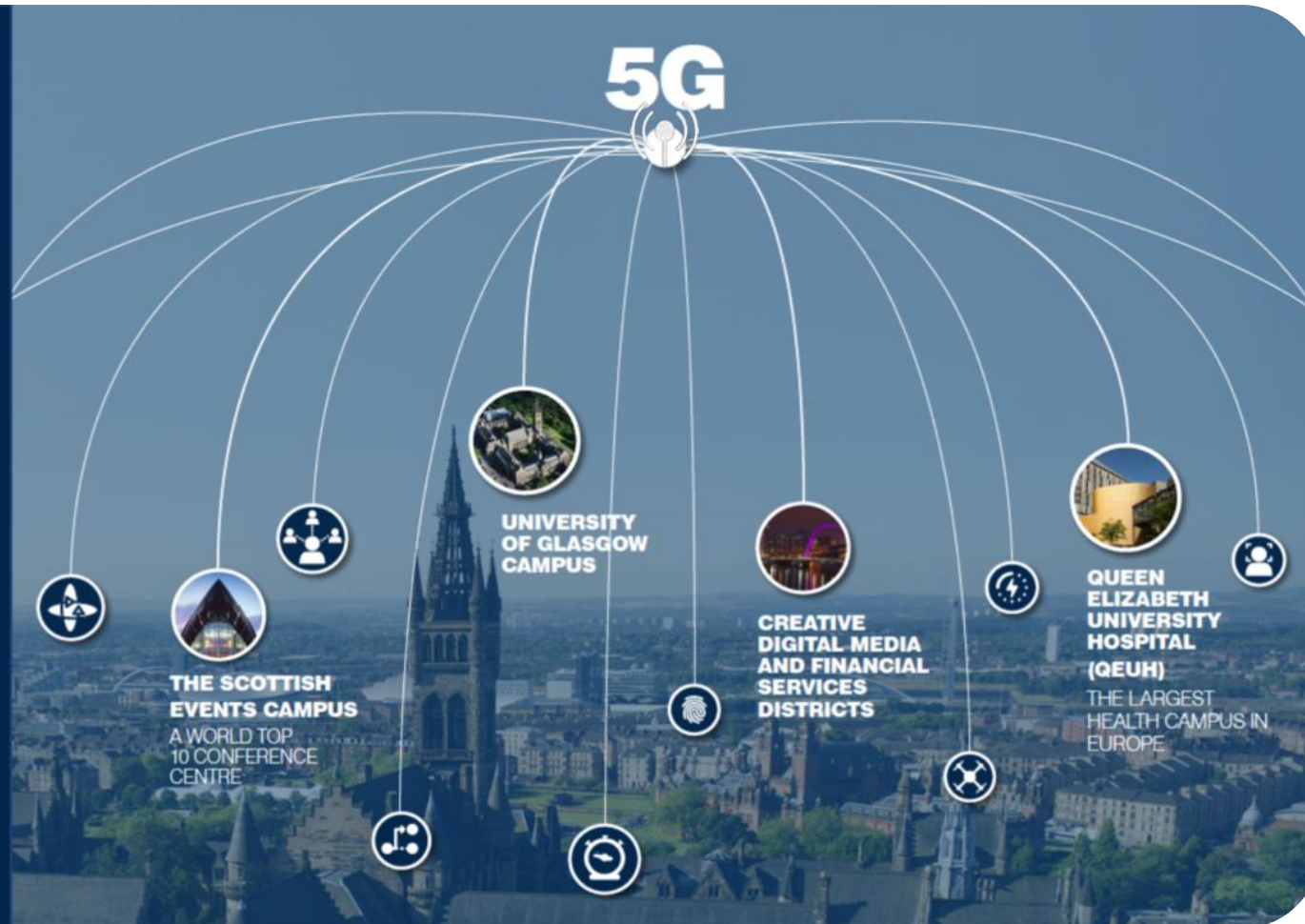
# Glasgow Riverside Innovation District (GRID)



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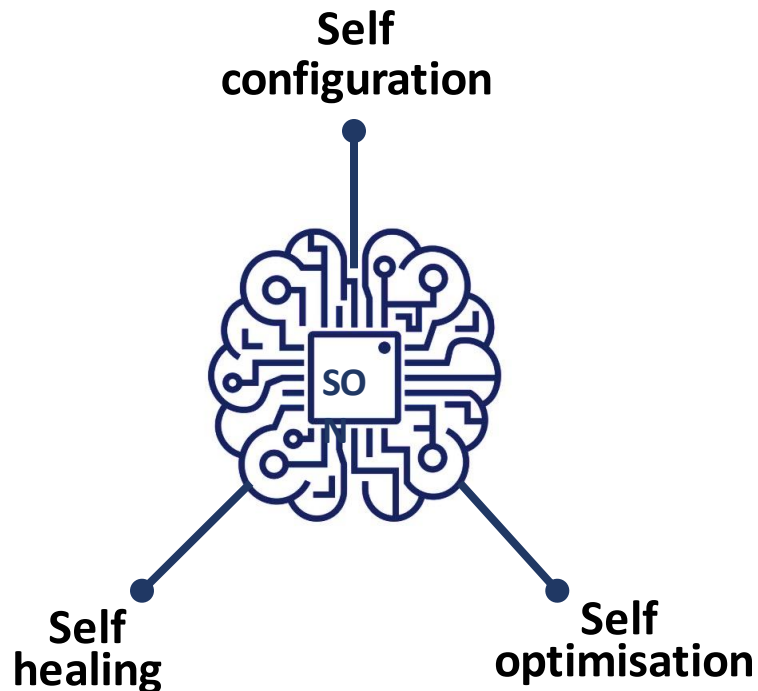
## 5G Digital District

The Glasgow Riverside Innovation District (GRID) under development by the University of Glasgow in partnership with the Glasgow City Council, Scottish Enterprise and the Scottish Government.



# Tangible Outcomes – A Self Organising Network

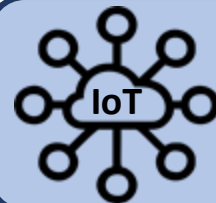
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A unique 5G SON for easier & quicker planning, configuration, management, optimization and healing of mobile networks

Speedup deployment, minimise human intervention, improve system performance, maximise RoI and deliver better services

Allow operators to maximise their key performance indicators, while reducing OPEX and improving user quality-of-experience

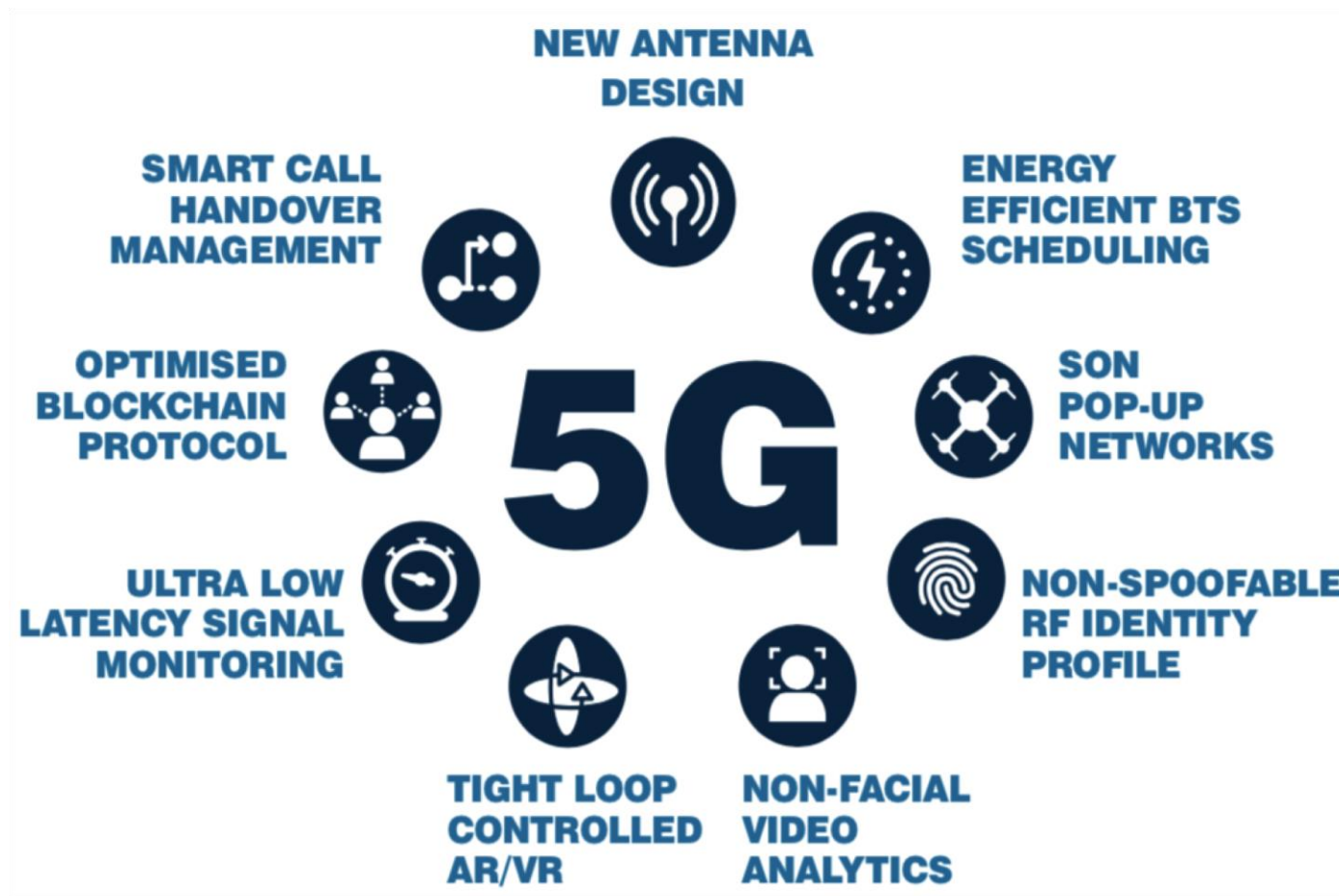


**Internet of Things (IoT) Platform:** Will support technologies on both licensed and unlicensed radio bands including LoRa and Sigfox








**A Local Network:** An alternative to wired technologies for significantly reducing capital and operational expenditure and delivering superior service

# Key Deliverables



# Scalable Use-Case Platform

	<b>Mobile CCTV monitoring</b>	UHD video from mobile or vehicle-mounted cameras without losing frames	<b>URLLC, MEC, Smart Mobility Management</b>
	<b>Live Augmented/Virtual Reality (AR/VR)</b>	Enhanced view for smart tourism with low jitter, low latency control over cellular network	<b>URLLC, MEC, Caching on the edge</b>
	<b>Connected health devices</b>	Large scale/number of devices using closed loop data analytics	<b>URLLC, NFV, SDN, massive MTC, NOMA</b>
	<b>Secure IoT platform</b>	'Trusted' IoT Networks Using Blockchain and RF Identity Profiles	<b>URLLC, Blockchain, massive MTC and sensors</b>
	<b>Pop-up network</b>	Agile (de)commissioning of ultra-dense network of APs without prior planning	<b>SON, <i>moveable</i> access points</b>





University  
of Glasgow

Professor Muhammad Imran  
Muhammad.Imran@glasgow.ac.uk



The Scotland  
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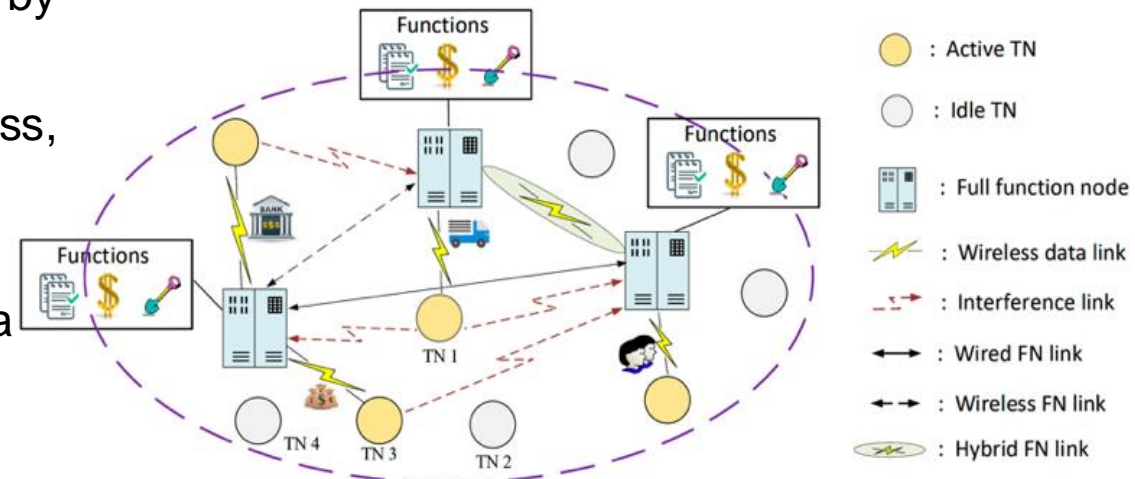
# Wireless Blockchain Networks for Healthcare Data Security and Privacy

Blockchain is an ideal solution for healthcare data management since it is:

- secure
- accountable
- immutable
- high privacy

We will build a 5G use case for healthcare database management by using blockchain

- Blockchain consensus for healthcare data management, access, control and sharing
- Zero-knowledge consensus for data privacy
- Wireless (5G) blockchain network for secure big healthcare data

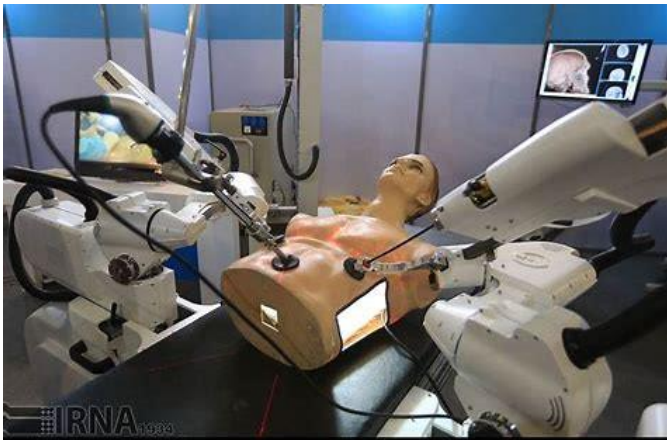


# Tight Loop Control (Low Latency/High Bandwidth) 5G Enabled VR/AR

Remote training

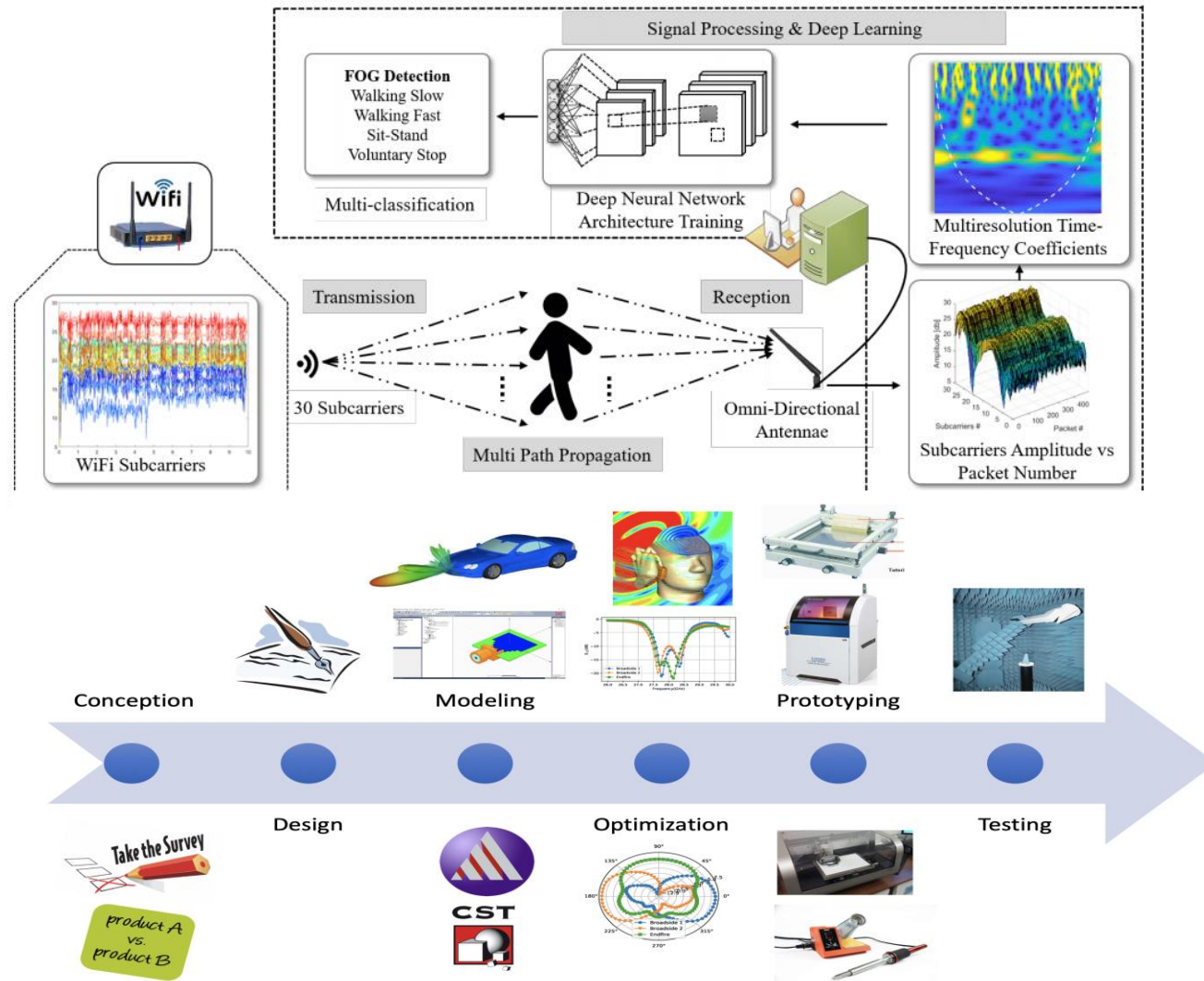


Remote diagnosis



Remote Surgery

Guodong.Zhao@glasgow.ac.uk



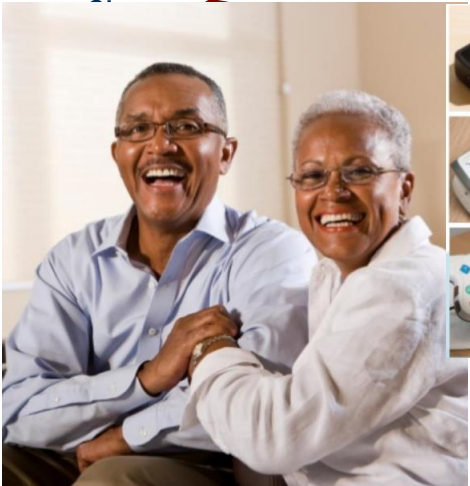
RF signals are available almost everywhere and can be used to monitor surrounding activities

Novel antenna design for enhancing signal coverage

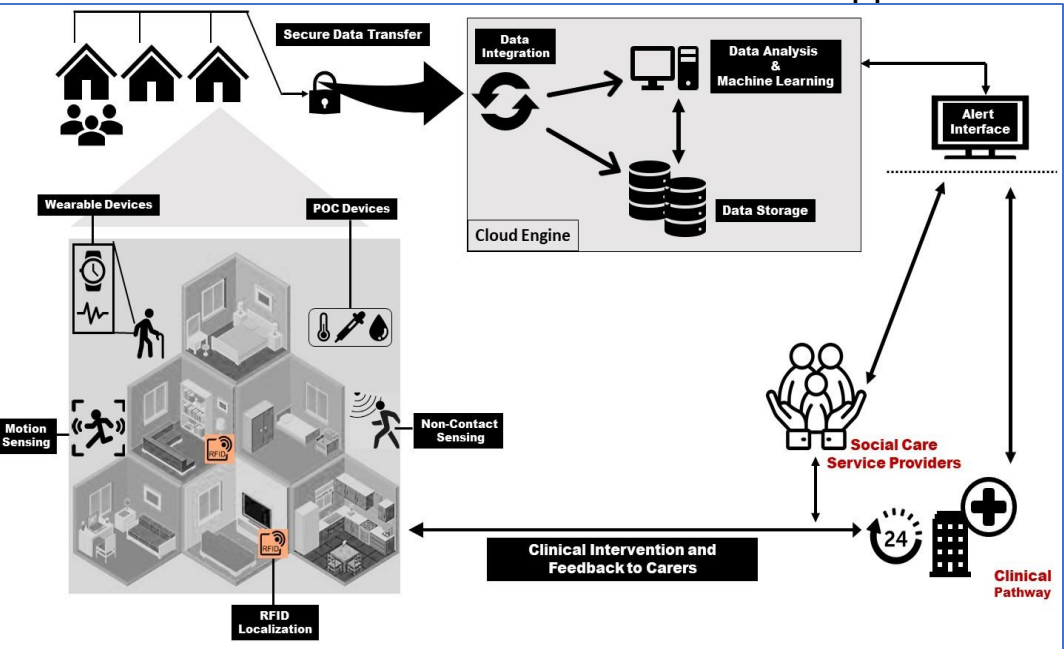




AI driven smarter, personalized, preventive and proactive healthcare monitoring



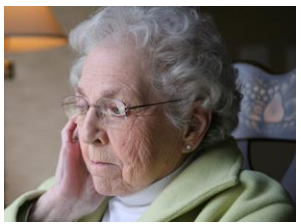
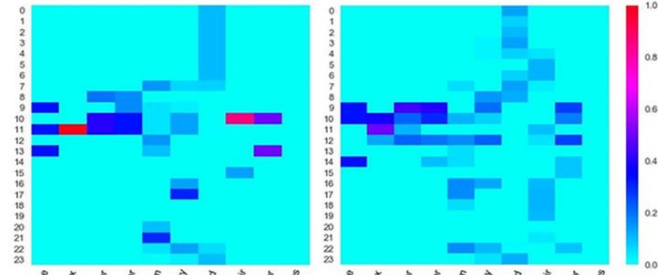
Remote Monitoring of Elderly Homes to provide Personal Healthcare Applications



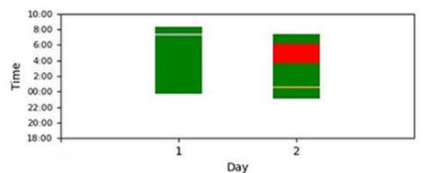
Urinary Tract Infection Detection



Non-invasive Aggression Detection



Hypoactivity Detection

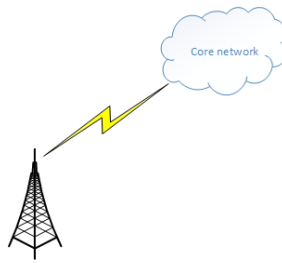


Daily Living Activity Analysis for identifying Behavioural Anomalies

## Challenges



Deployment Time



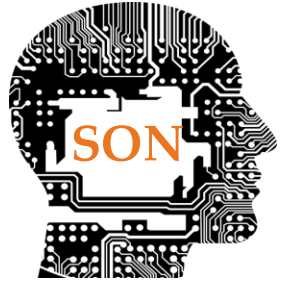
Backhaul



Power

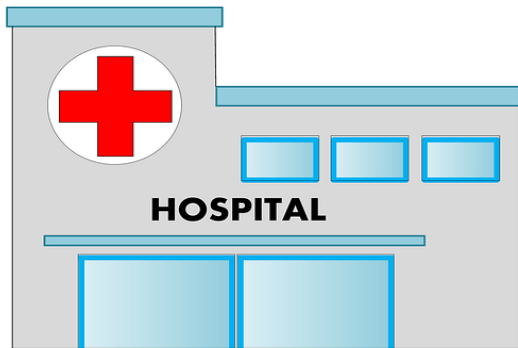


Spectrum

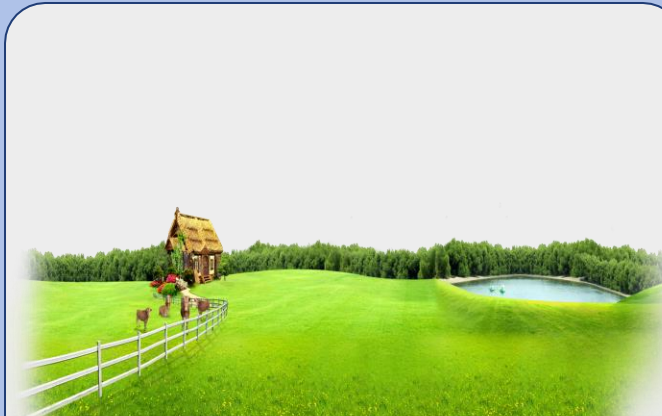


## SON-ENABLED POP-UP NETWORK

## Use cases



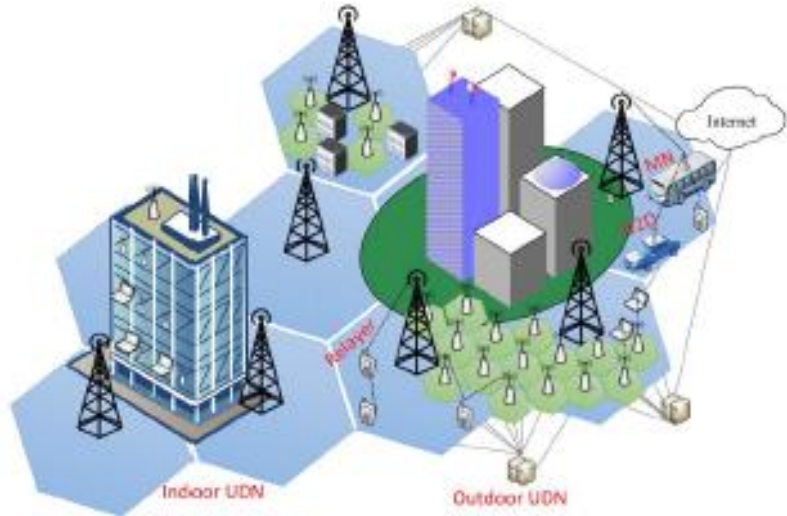
Healthcare



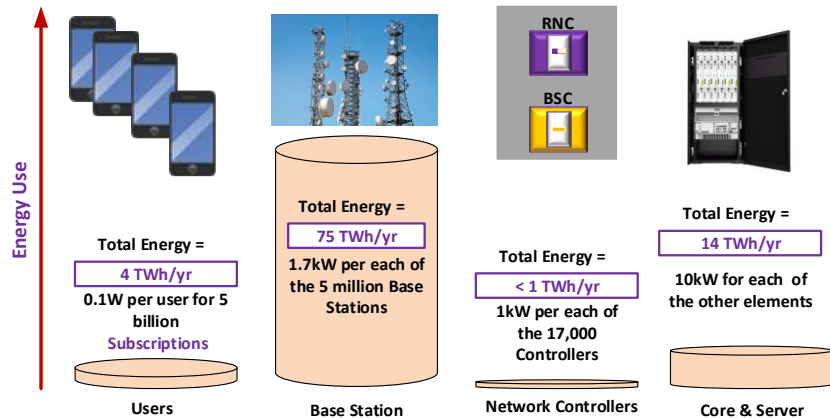
Rural connectivity



Disaster management



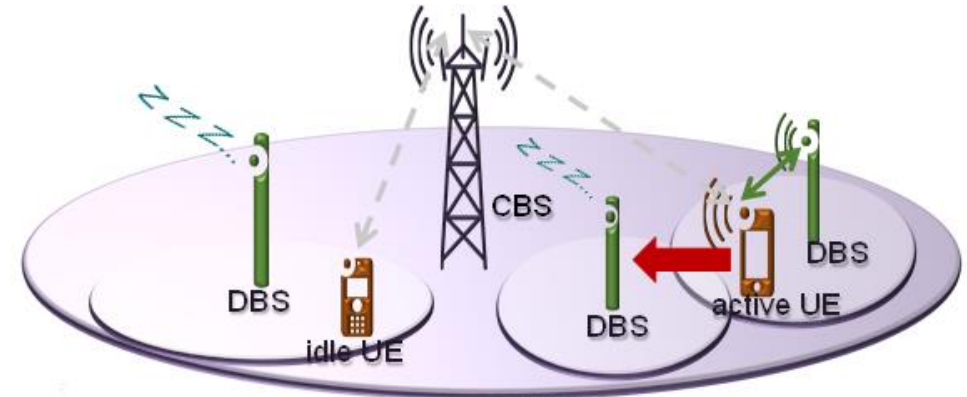
✓ Urban 5G networks will be ultra dense to support 5G KPIs



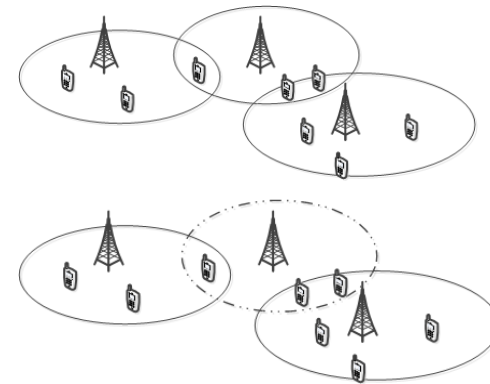
✓ Ultra densification leads to significant energy consumption

## Self-Organised Networks (SON)

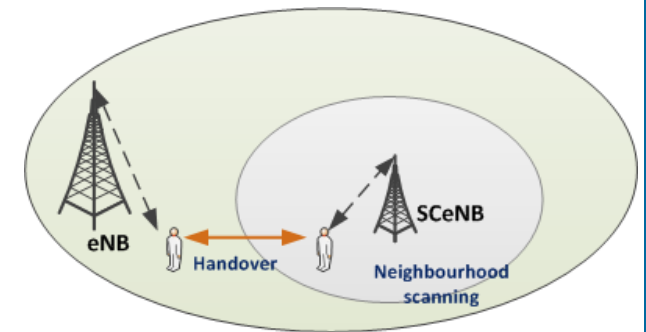
### Control-Data Separated Architecture



### Artificial Intelligence (AI) Enabled Solutions



On-demand activation and deactivation



Mobility management