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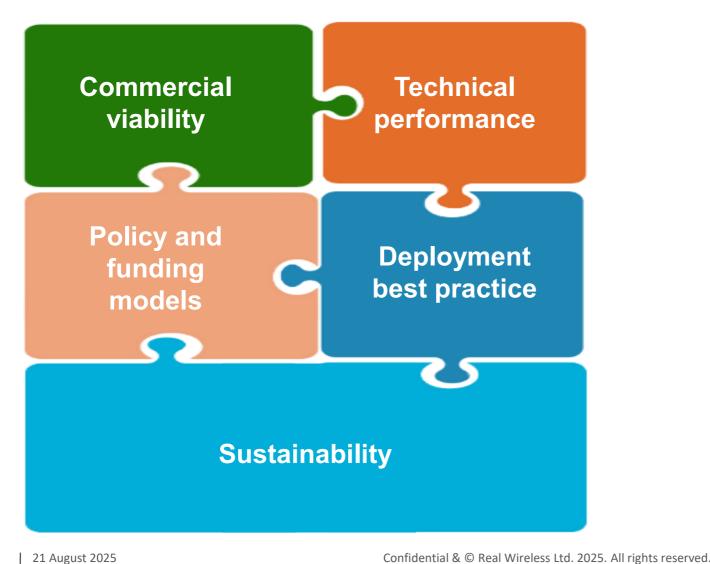


Approaches to sharing and caring for a sustainable future

Julie Bradford, Head of techno-economic analysis at Real Wireless CWTEC-6G Anarchy in the $UK-9^{th}$ July 2025



Figuring out the 6G puzzle



Technical performance – the traditional start point

"The **motivation** for the development of IMT-2030 is to continue to build an inclusive information society towards contributing to support the United Nations Sustainable Development Goals (SDGs)" – ITU-R M.2160-0

Goals for IMT-2030 from ITU-R:

- Inclusivity
- Ubiquitous connectivity
- Sustainability
- Innovation
- Enhanced security and resilience
- Standardization and interoperability
- Interworking

Peak data rate

Peak data rate

Peak data rate

Peak data rate

Coverage

capabilities

Applicable A

related capabilities

Sustainability

Interoperability

Security and

resilience

Reliability

Latency

Connection density

Challenge of setting detailed targets on capabilities whilst delivering against the vision of the original goals

Capabilities for IMT-2030 real wireless.

New for

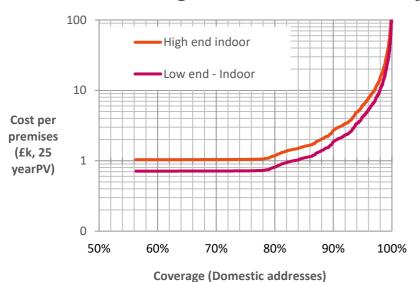
IMT-

2030



Commercial viability – the traditional stumbling block

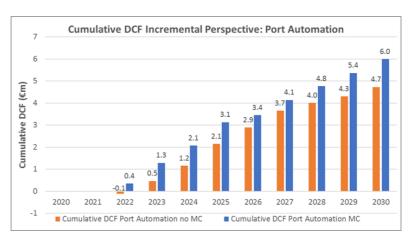
Illustration of high cost of rural connectivity

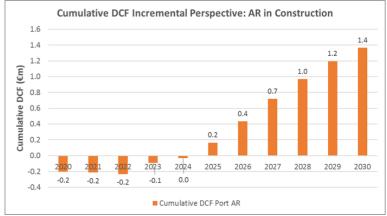


Cost per additional premise served, Wales study region, 2Mbps, 5MHz, normal power (64dBm/10MHz), indoor coverage target
From Real Wireless analysis supporting Ofcom considerations of cost of coverage obligation at 800MHz in January 2012

- Above is an old result (LTE in 2012) but with a very relevant message still as we think about inclusivity and ubiquitous coverage goals
- Where are cost and operational efficiencies in the IMT-2030 targets?

Illustration of different payback periods and risk profile for 5G industrial services





Discounted cashflow comparison for introducing two new industrial user targeted services in Hamburg port using 5G-slicing

From Real Wireless business case analysis during 5G-MoNArch in June 2019

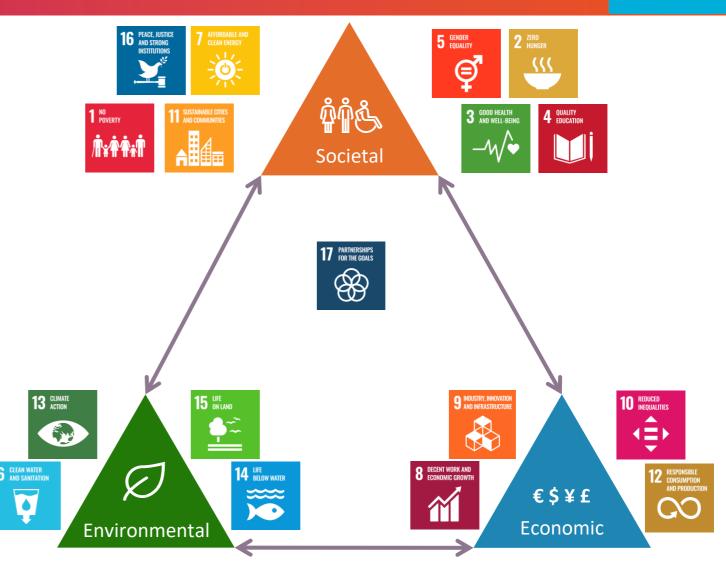
- 5G was designed to go beyond consumer services and unlock new industrial and business user revenue streams
- Benefits of new industry targeted 5G services were heavily promoted
- But business case and adoption challenges for many of these in practice





Sustainability – the "new" focus

- UN Sustainable Development Goals (SDGs)
 - High level human and planetary goals
 - Adopted in 2015 setting 2030 targets
- Environmental SDGs and Net Zero getting a lot of attention
 - **European Sustainability Reporting** Standards (ESRS) under European Green Deal
 - Example of ESRS for MNOs Telenor 2024 annual report
- But opportunity for 6G to affect other SDG areas too





Sustainability and 6G across all of its dimensions





Fconomic



Societal



Environmental

Long-term business viability & scalability Market competition & innovation Industry collaboration & partnerships Cost efficiency & resource optimisation Economic growth Regulatory framework & policy support

Bridging the digital divide (accessibility) Trustworthiness & Responsible Al Stakeholder engagement Ethical business practices Social well-being Cultural diversity Technology ethics

Net zero network design, deployment and operation Use of renewable energy sources Environmental data collection Storage and analysis Material usage and circularity **Environmental Total Cost of Ownership**

Sustainability in the context of 6G has 6 Dimensions

Digital transformation Innovative business models Workforce development Opportunities for SMEs Value network integration Global reach Social & economic inclusion

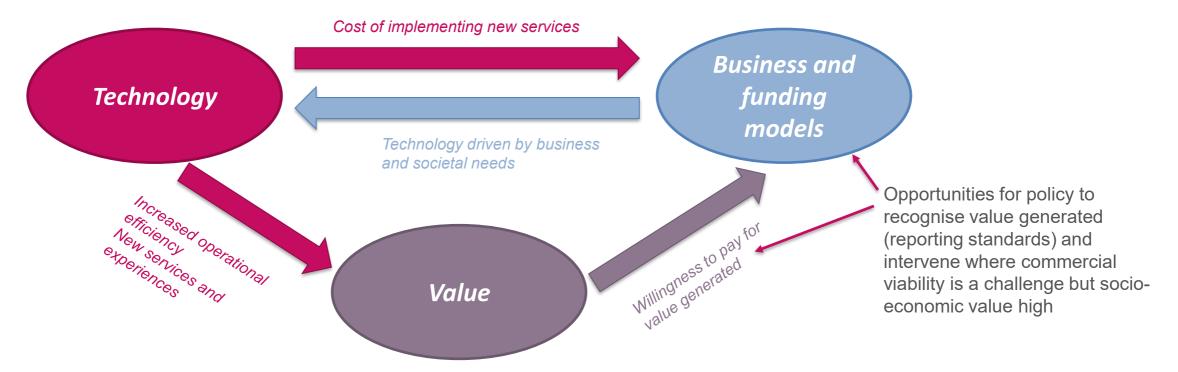
Digital equity Services with high societal value Personal privacy and data protection Ethical business practices Reliable, resilient and accurate information Support for democratic values

Vertical-specific environmental challenges Biodiversity & geodiversity impact Optimisation of natural resources Monitor & reduce emissions Supply chain improvements Smart energy management Sustainable mobility



Policy and funding models - bridging the "willingness to pay" gap





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- "Key Value" term being developed in European projects
- Has been discussed in 3GPP SA1 and transitioned to "Sustainability analysis"
- Some 3GPP SA1 use cases include a sustainability analysis but not mandatory





Deployment best practice – delivering services in the most sustainable way in real scenarios

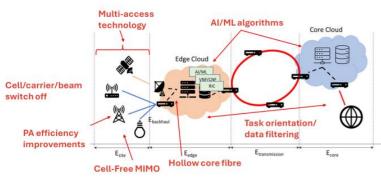


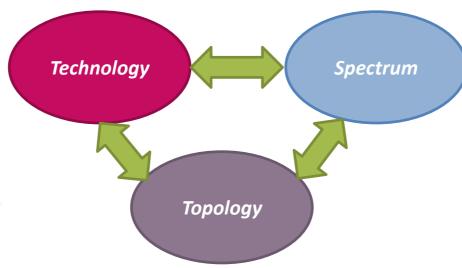
Improvements already possible

- 1&1 led deployment at Dortmund stadium
- Single rack for 1&1 (using O-RAN) vs 16 racks for other MNOs
- 2.5kW vs 35kW



Plenty of emerging technologies that need evaluating





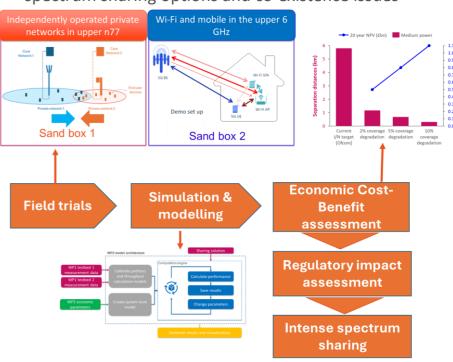
Shared infrastructure increasingly important

- Proved crucial to making progress on rural connectivity
- Increasingly important in high demand locations too
- UK strength in JOTS and neutral host industry
- Alignment and opportunities to share with other national infrastructure build programmes

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Ensuring spectrum options keep pace with deployment options

- "Network of networks" adding extra layers to spectrum decisions
- UK spectrum sandbox projects useful for field trialling spectrum sharing options and co-existence issues





Closing thoughts

Let's focus on fixing existing problems with 6G rather than creating new ones

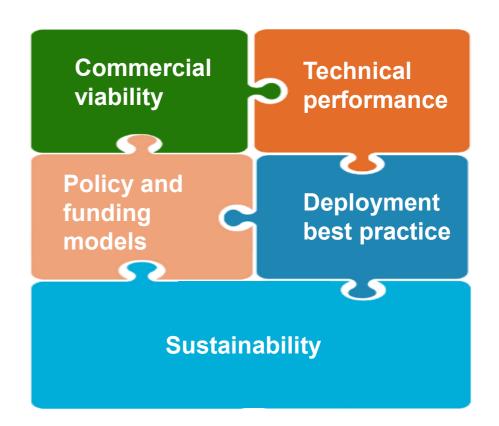
Innovations that simplify deployment and operations will help commercial viability

Sustainability across all dimensions must be part of our 6G thinking

But also need to recognise that some "greater good" services will need careful policy and funding considerations if ever to be realised

Industry fora, beyond standards bodies, for sharing and aligning on deployment and operations best practice are key

Holistic evaluations of 6G at "design phase" needed that complement "usage phase" reporting and monitoring. Required to understand the trade-offs and identify realistic deployment cases and a UK strategy where 6G can really have an impact.



Further details

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