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CHIST-ERA Projects Seminar 2023

Towards Sustainable ICT (S-ICT)

April 04, 2023



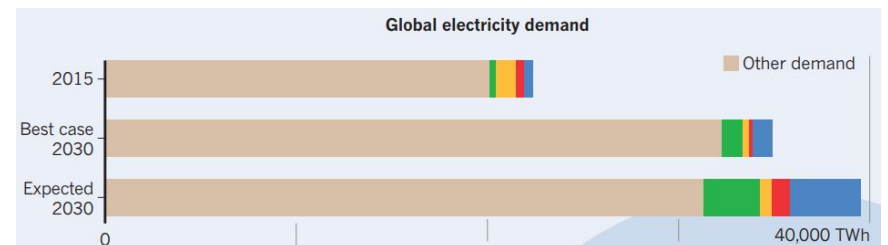
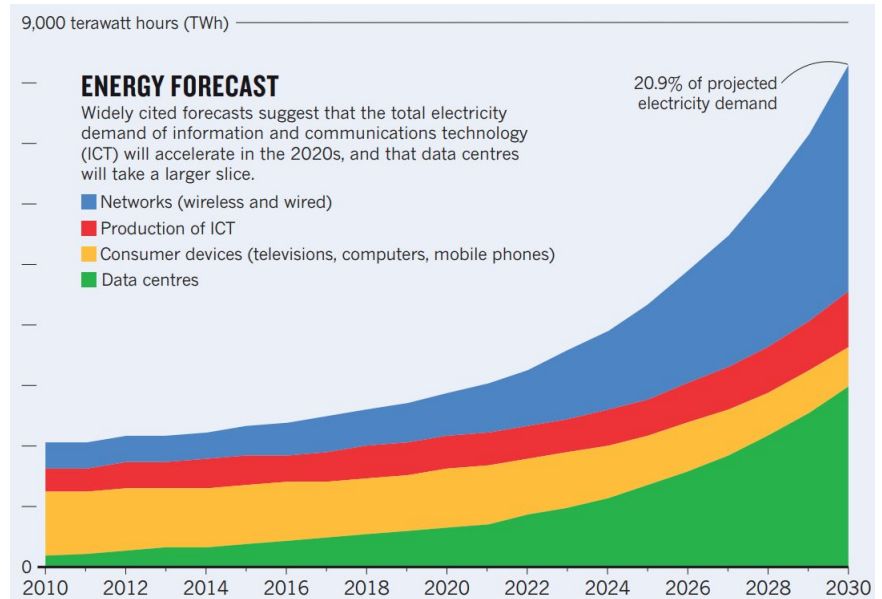
Programme co-funded by the
EUROPEAN UNION



Motivation for Sustainable ICT

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- ❖ By 2030, ICT will consume up to 20% of the world's electricity
- ❖ To make ICT more sustainable we need to:
 - Make ICT technology more energy efficient
 - Reduce reliance on non renewable energy sources
 - Harvest energy directly at the source
 - Reduce e-waste

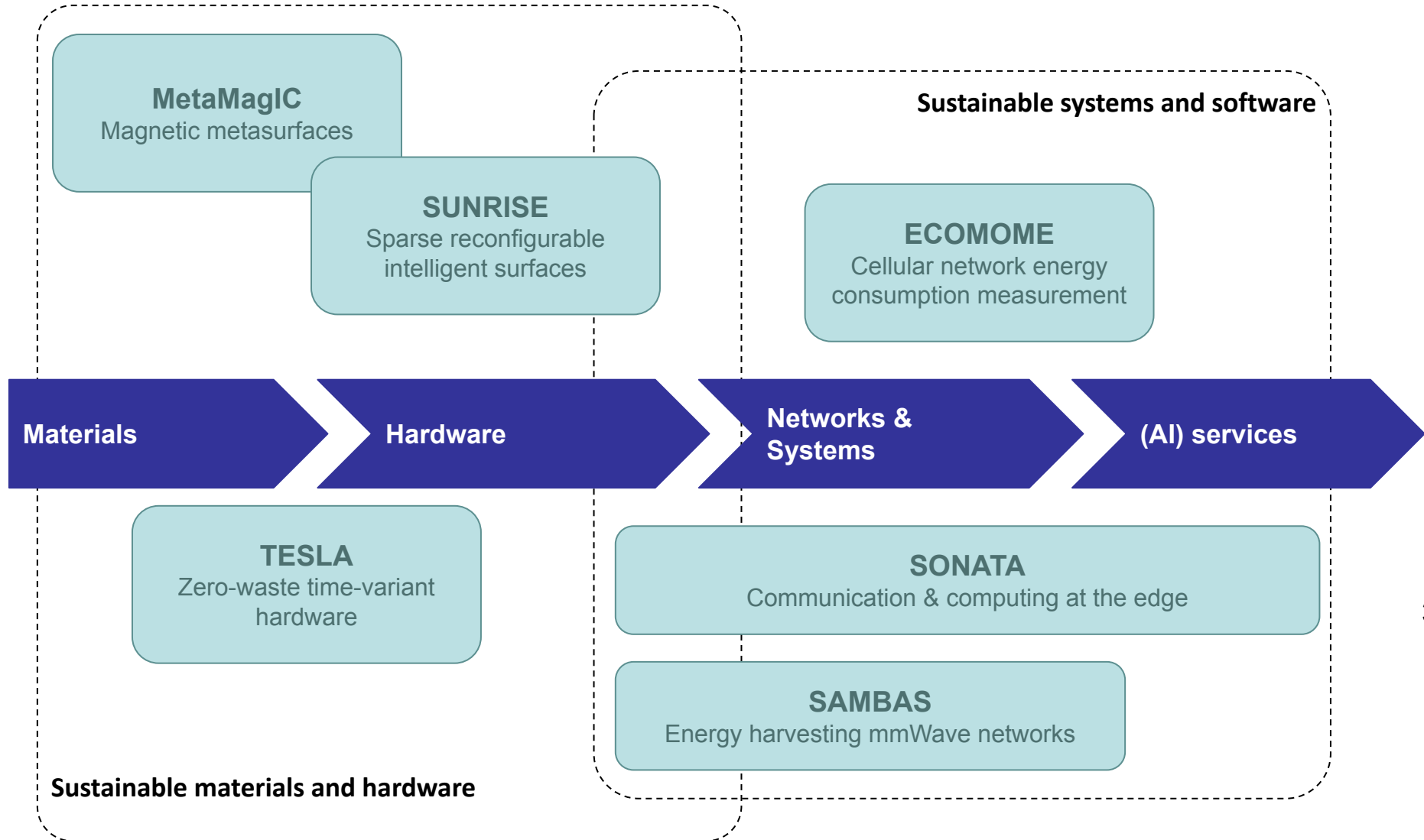


Source: <https://media.nature.com/original/magazine-assets/d41586-018-06610-y/d41586-018-06610-y.pdf>



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Funded Projects



Major Achievements and Outputs

Engineered Metasurfaces for efficient magnetic field sensors

(AI-based) energy optimisation solutions in network & service management, including renewables

Energy Measurements & Models for computing and communications

Materials

Hardware

Networks & Systems

(AI) services

Memristors for efficient analog-computing & storage

Biodegradable sensors, supercapacitor and solar cell fabricated and tested

Federated Learning for efficient learning at the edge

Over-the-air computing for efficient computing & communication

Expected Impact: Improving energy efficiency and sustainability of ICT solutions, from materials to services



Upcoming Challenges and Needs

- ❖ Datasets on energy consumption
 - ✓ Data collection (project specific)
 - ✓ Data reuse and sharing (between projects)
- ❖ Measuring the full sustainability life-cycle of ICT systems
 - ✓ Requires interdisciplinary view from materials to services
 - ✓ Availability and transparency of data from commercial parties
- ❖ Material availability
 - ✓ How to find the most sustainable materials?
 - ✓ Widespread use of critical rare metals in ICT
 - ✓ Supply chain issues
- ❖ ICT could inhibit the transition to 100% renewable energy networks
 - ✓ People want bigger AI models, faster networks, etc.
 - ✓ Sustainability is not a KPI
- ❖ Exploitation beyond scientific outputs
 - ✓ How to make industry care about sustainability? EU policy, citizens, global needs, ...



- ❖ **Availability:** Open Access papers, GitHub, Chist-Era website, technology transfer of some project results
- ❖ **Potential users:** governments, policy makers, general public, network operators, industry (integration of new materials), product (smartphones) manufacturers (product design)
- ❖ **Dissemination:** industry event participation (Mobile World Congress), involvement in standardisation, development of general public oriented tools (websites, apps)



- ❖ **Added value:** cooperation with new people - creates new contacts
- ❖ **Advantages:** Small consortium, easy project proposals, high success rate during application and implementation of the project, higher impact, low overhead in reporting, research focus (not include companies), topic was open but focused
- ❖ **Possible improvement:** Harmonising Chist-era and national agencies rules
- ❖ **HE is more prescribed in advance (focused on exploitation and industry partners), CH is more flexible**



- ❖ HE calls include sustainability, but are more focused than Chist-Era (e.g. on hardware)
- ❖ Possible topic to tackle:
 - ✓ Life - cycle of ICT is completely missing in HE
 - ✓ Environmental monitoring
 - ✓ Circularity



- ❖ Gender balance in ICT
 - ✓ Massive skill shortage in ICT - sustainability attracts people - it is a good vehicle to gender balance
- ❖ OS - not a problem, governments already as to have all project results OA
- ❖ Public engagement - covered in previous slide
- ❖ Ethics - not relevant



- ◆ **Challenge: make people follow the DMPs**
- ◆ **All (present) partners confirm that their institutions / governments already require publications to be published in open access**



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Technology Transfer

- ❖ TT - too early now
- ❖ Tension between TT and OS - only internal (not towards industry)
- ❖ **Collaboration with companies**
 - ✓ One project has industrial partner
 - ✓ Joint experiments with company
 - ✓ Joint publications



Questions ?