

# Strategic Research Agenda

-Overview of SRAv5-

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# SRA v.5 ToC

## Executive Summary

### **Ch.1 Vision of the Future Mobile and Wireless Communication**

#### **Ch.2 Seamless User Experience**

- **2.1** **User Experience and Acceptance**
- **2.2** **Smart User Interfaces and Interactions**
- **2.3** **Future Mobile Device Form Factors**

#### **Ch.3 Business Infrastructures**

- **3.1** **Vision & Rational**
- **3.2** **Rationale and Objectives**
- **3.3** **Research Priorities**
- **3.4** **Applicability to the eMobility Technology Areas**
- **3.5** **Innovation / Exploitation**

#### **Ch.4 Trust and Dependability**

- **4.1** **Vision & Rational**
- **4.2** **Rationale and Objectives**
- **4.3** **Research Priorities**

#### **Ch.5 Ubiquitous Services**

- **5.1** **Vision & Rational**
- **5.2** **User Services**
- **5.3** **Service Creation Environment**
- **5.4** **Content and Media**
- **5.5** **Service Execution Environment**

#### **Ch.6 Ubiquitous Connectivity**

- **6.1** **Vision and rationale**
- **6.2** **Ubiquitous Networks**
- **6.3** **Radio Access**
- **6.4** **Opportunistic Communications**
- **6.5** **Platforms and Implementation**

#### **Ch.7 Frontier and Multidisciplinary Research**

- **7.1** **The perspective**
- **7.2** **Frontier Research**
- **7.3** **Multidisciplinary Research**

#### **Ch.8 Accompanying Measures**

- **8.1** **Non-Technical Barriers**
- **8.2** **Rationale and Objectives**
- **8.3** **Objectives of the SRA: Non-Technical Barriers**

# Future Mobile Communications

- ❑ Power/bandwidth limited
- ❑ Dynamic in nature
  - ❑ user traffic, user mobility, Service mobility, Radio operational environments, range of services (not only telephony),
  - ❑ New network topologies (mesh, adhoc, multihop, hybrids)
- ❑ Variety of service delivery modes:
  - ❑ Uni, multi and broadcast
- ❑ Group communications
- ❑ No more one person one device,
  - ❑ more likely one person many devices and *device to device* communications
- ❑ Cross (layer, spectrum, network) operation
- ❑ Variety of systems, short-range to long-range
- ❑ Self-organisation & network management & QoS management
- ❑ Shifts from *networking of networks* towards *services networking*
- ❑ Multi-modal services
- ❑ Security, privacy, trust and dependability important
- ❑ Flexible billings

# Mobile Convergence

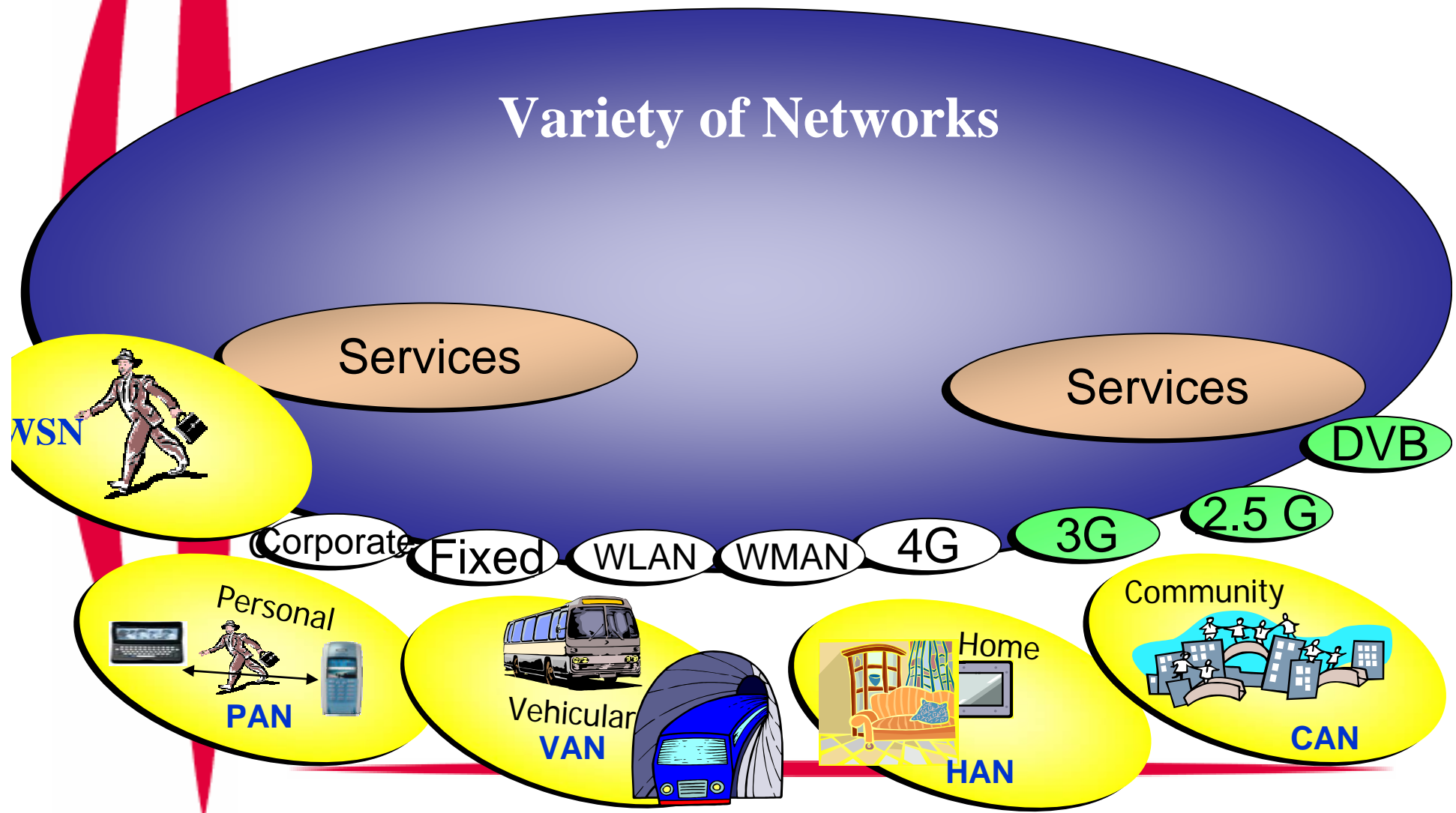
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# Different Co-Existing Business Models, Different Connectivity Modes, Cross-Industry Interfaces



# Networks Connectivity for Service Networking



# Requirements & Technologies

- **Requirements:**
  - **Bit rates Range: 10kbps  $\leftrightarrow$  Gbps**
  - **High User experience & satisfaction**
  - **Intuitive user interfaces**
  - **Ubiquitous connectivity, Always available & on**
  - **Service ubiquity**
  - **Security, confidentiality & trust**
  - **Dependable, robust and open to future advancements**
- **Intelligent Services:**
  - **Converged Services**
  - **Unicast, Multicast and Broadcast**
  - **Push & Pull**
  - **User Ambient intelligence-based applications**
  - **Platforms for faster application development & short-innovation cycle**
- **Involved Networks:**
  - **Wide Area Networks**
  - **Local Area Networks**
  - **Home Networks**
  - **Moving Networks (Car, Train, ..)**
  - **Personal Area Networks, incl. BAN**
  - **Wireless Sensor Networks**

# New Research Approach

- **Current practice:**
  - **New standards (New air-interface & new Spectrum, with a promise of peak rate!!!!)**
  - **Air-interface and system-level protocols not designed together**
  - **System planning and protocols are designed based fixed average statistics (particularly freq. allocation) whereas mobile networks are dynamic in nature**
- **Implications:**
  - **Promises not met**
  - **Too complex to use and operate**
  - **Inflexible for future yet unforeseen services**
  - **Inter-operability problems**
  - **Inflexible to operate at optimum point**
  - **Slow standardisation process**



# Future Approach

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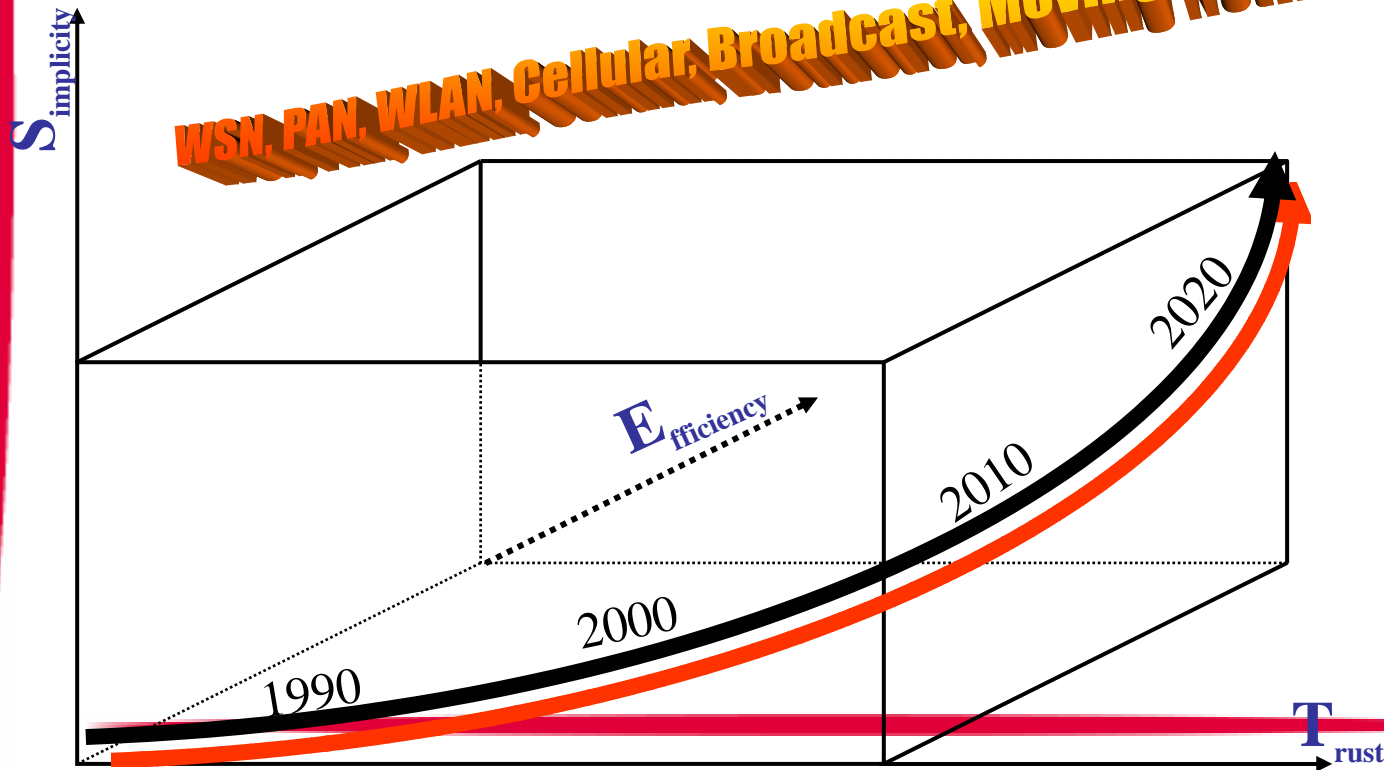
- End-to-end solutions**
  - Joint research and optimisation of link & system, network**
  - New system topologies**
  - Adaptation to local environments**
  - Auto-planning (self-organisation, self-configuration, self-healing)**
  - Opportunistic Communications**
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# S.E.T Concept

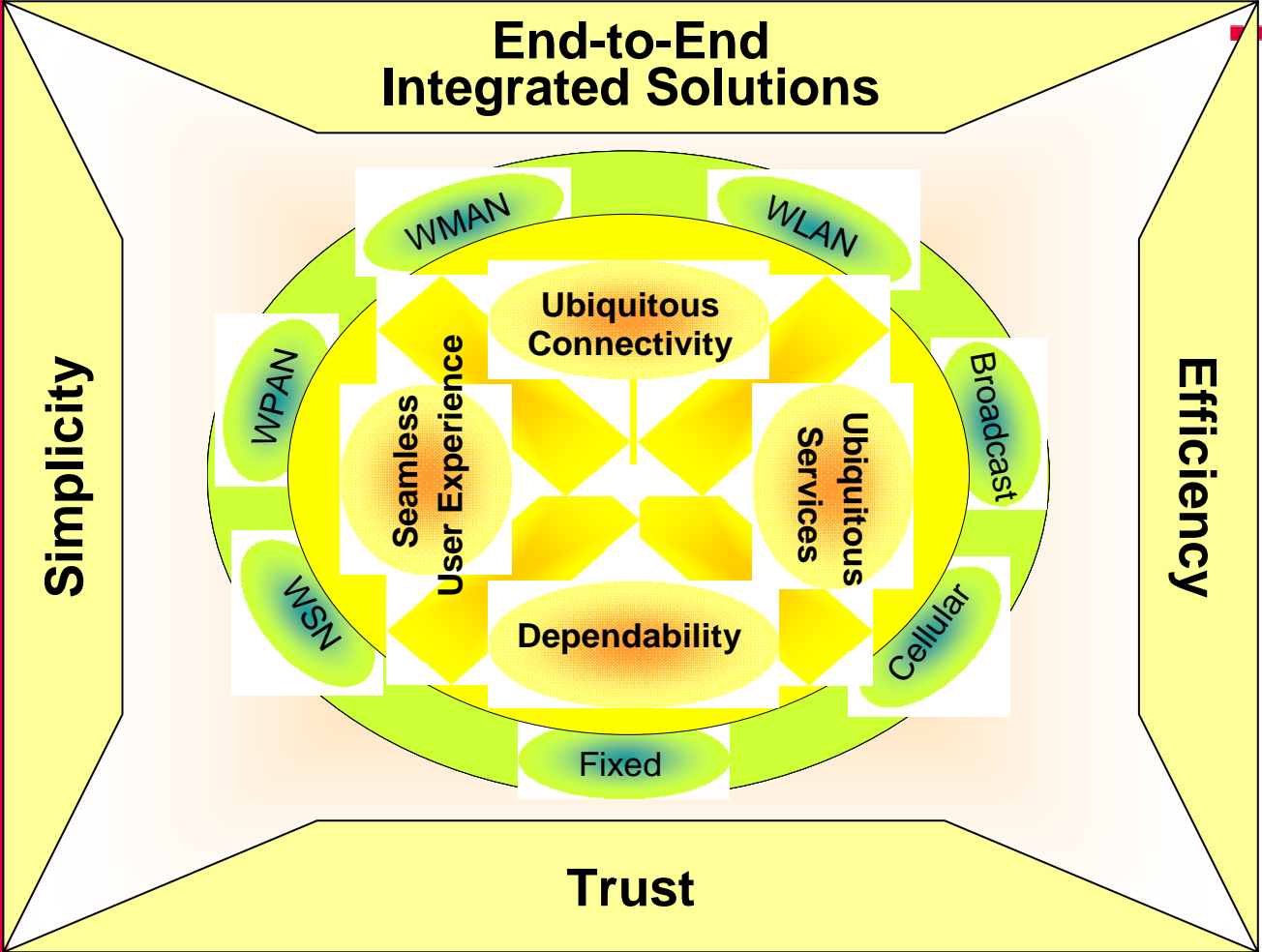
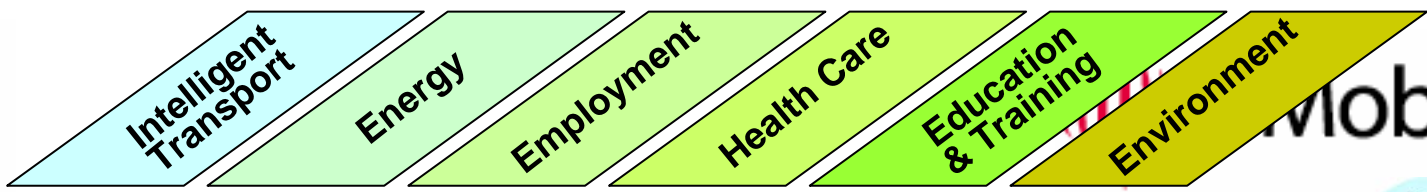
## Future Research Approach

# Simplicity Efficiency Trust

WSN, PAN, WLAN, Cellular, Broadcast, Moving Networks



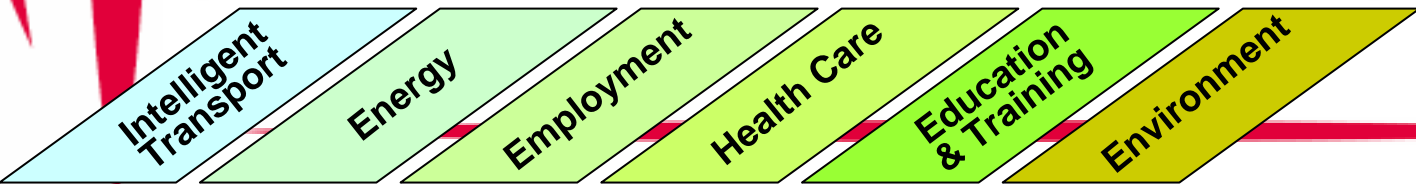
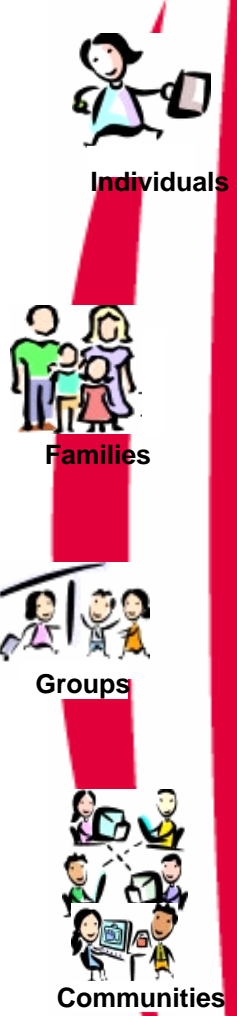
# Mobility



**Simplicity**

**Efficiency**

**Trust**






# Research Priorities

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## □ **Seamless User Experience**

- **Smart user interfaces with learning capabilities**
  - **New mobile form factors**
  - **Efficient search engines**
  - **Automatic-zero configuration and complexity management**
  - **Intelligent and real-time customer care**
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# Research Priorities

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- **Security & Dependability**
    - **Secure and dependable end-to-end network protocols and applications**
    - **Safe and secure software download mechanisms**
    - **Advanced authentication techniques**
    - **Robust and Secure end-to-end Self-  
(configuration, organisation , healing)**

# Research Priorities

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- **Ubiquitous Services**

- **Network and device agnostic service execution platform**
- **Ambient intelligence capture**
- **Innovative context-based services**
- **User created contents platforms**
- **Peer-to-peer communication support**
- **Unified Digital Rights Management**

# Research Priorities

- **Ubiquitous Connectivity**

- **Auto-Connectivity between legacy and new types of networks**
- **Joint Optimisation of coverage, capacity and quality**
- **New deployment and self-organised system architectures**
- **Intelligent resource discovery and Management**
- **Multi-layered mobility management**
- **New network architectures and protocols for **post-IP****
- **Innovative transceiver architectures**
- **New coding design and signal processing for cooperative networks**
- **New frequency bands and Spectrum sharing schemes**
- **Efficient wireless backhaul links**

# Summary

- **Not stand alone research but a **Holistic** one**
- **To achieve **High Efficiency**, managing complexity, simplicity, Trust**
- **Multidisciplinary Research**
  - **Telecommunication Engineering, Computer Science, IT Services, Nano-technologies**
  - **Human Sciences**
- **Multi-Industry**
  - **Telecom, Transport, Consumer electronics, Clothes manufacturing, Health services, Media, Tourism, Government, Etc..**