

Area Progettuale “Internet del Futuro”

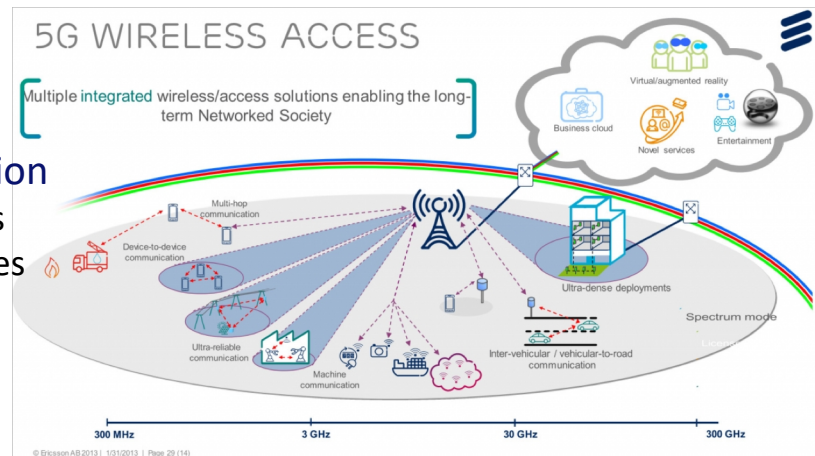
Andrea Clematis
IMATI-CNR
clematis@ge.imati.cnr.it

Andrea Passarella
IIT-CNR
a.passarella@iit.cnr.it

Pisa, 30 Novembre 2018
Conferenza DIITET – Area Strategica Informatica

Research Themes and Topics

- **NGI:** Next Generation Internet
 - NGI communication technologies in (and beyond) 5G
 - Novel NGI network paradigms
 - IoT and WSN in NGI and NGI industrial networks
- **Cloud/HPC:** Distributed Parallel and High Performance Computing
 - Cloud Computing
 - Edge Computing
 - High Performance Computing



Rationale: NGI + Cloud integration

- Cloud/edge-controlled networks
- Decentralisation of cloud services
- Integration of service & network functions (primarily at the edge)

Rationale: pervasive SW tech

- SW design methods at the basis of any network and cloud/fog service

- **SW:** Software Engineering
 - Formal Engineering of Cyber-Physical Systems
 - End user development of internet of things applications
 - Agents and self-adaptive systems
 - Testing of software systems and services
 - Monitoring and analysis of software architecture and Smart Environment
 - Software Verification via Constraint Solving
 - Modelling and Verification of Business Processes

Mapping in Funding Agendas

FP9 “Horizon Europe”

PILLAR II

GLOBAL CHALLENGES AND INDUSTRIAL COMPETITIVENESS

3. DIGITAL AND INDUSTRY

3.2.5 Next Generation Internet

The Internet has become a key enabler of the digital transformation of all sectors of our economy and society. The EU needs to take the lead in driving the next generation Internet towards a human-centric ecosystem in line with our social and ethical values. Investing in the Next Generation Internet will improve EU industrial competitiveness in the global economy. Optimising EU wide take up will require large scale cooperation across stakeholders.

Broad Lines of Activities

- Technologies and systems for trusted and energy-efficient Next Generation Internet network and service infrastructures (beyond 5G connectivity, software defined infrastructures, Internet of smart things, cognitive clouds), leveraging real-time needs, virtualisation and decentralised management (edge computing, blockchains, shared contexts and knowledge);
- Next Generation Internet applications and services for consumers, industry and society building on better user control of data, transparent language access, new multi modal interaction concepts, highly personalised access to objects, information and content, including immersive and trustworthy media, social media and social networking;
- Software technologies embedding Artificial Intelligence, data analytics and security in Internet applications and services predicated on the free flow of data and knowledge.

3.2.6 High Performance Computing and Big Data

High Performance Computing and Big Data have become indispensable in the new global data economy, where to out-compute is to out-compete. High Performance Computing and Big Data analytics are critical to support policy making, scientific leadership, innovation and industrial competitiveness, and to maintain national sovereignty.

Broad Lines of Activities

- High Performance Computing (HPC): next generation of key exascale and post-exascale technologies and systems (e.g. low-power microprocessors, software, system integration); algorithms, codes and applications, and analytic tools and test-beds; industrial pilot test-beds and services; supporting research and innovation for a world-class HPC infrastructure, including the first hybrid HPC / Quantum computing infrastructure in the EU;
- Big Data: Extreme-performance data analytics; "Privacy by design" in the analysis of personal and confidential Big Data; full-scale data platforms for re-use of industrial, personal and open data; data management, interoperability and linked applications;
- Reduced carbon footprint of ICT processes, covering hardware, software, sensors, networks, storage and data centres, and including standardised assessments.

The AP in numbers

- **12** Institutes involved
- **77** active researchers
- **~56** FTEs
- **Project portfolio**
 - **11** H2020
 - **4** National
 - Incl. MISE **5G tests** with TIM (Bari-Matera)
 - **8** Regional
 - Tuscany, Lombardy, Liguria
 - **5** industrial
 - Incl. Nokia, FINCANTIERI



imati



Next Generation Internet

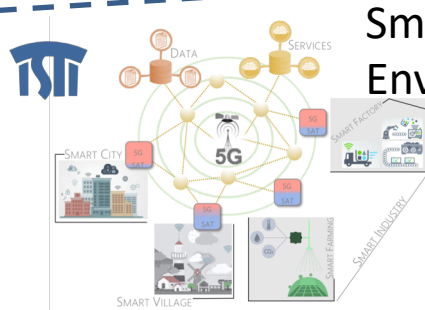
5G

IT

MIMO

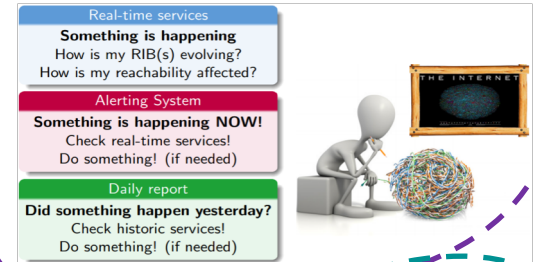


Smart Environments



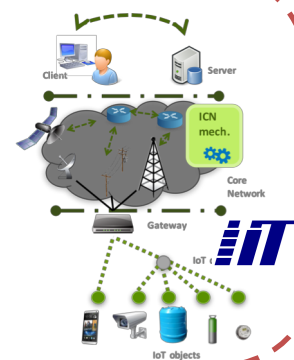
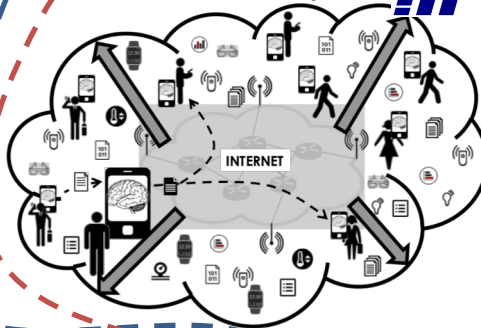
Network measurement

IT

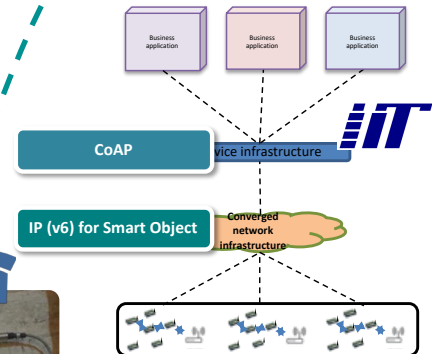


Human- & data-centric networks
Internet of People

IT

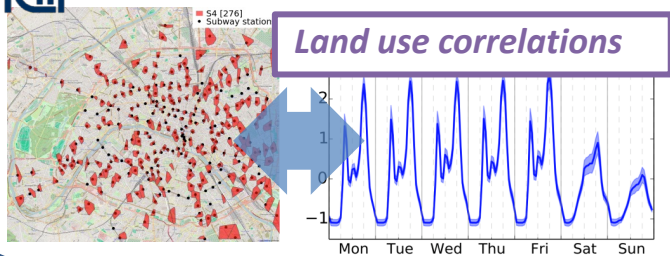


(Industrial) IoT

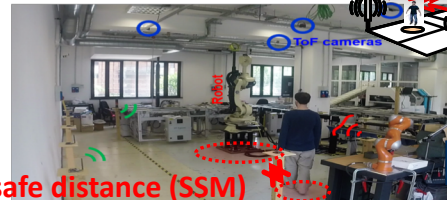


BigData for Network Intelligence

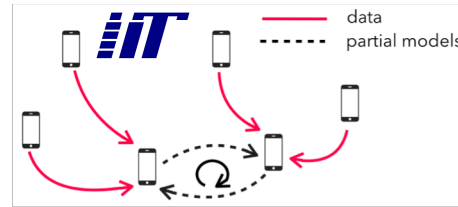
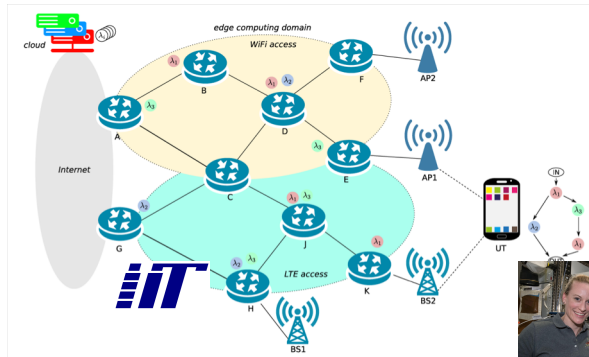
IT



safe distance (SSM)



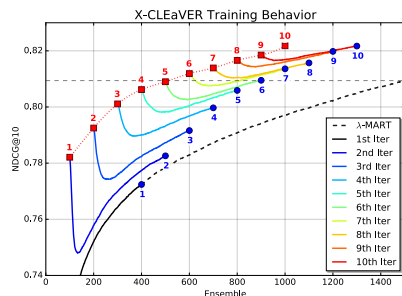
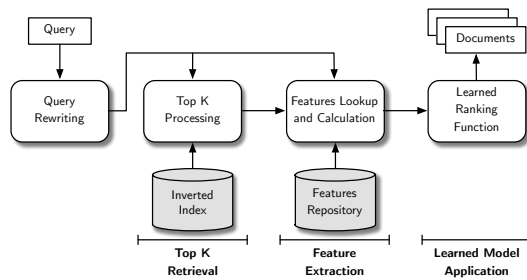
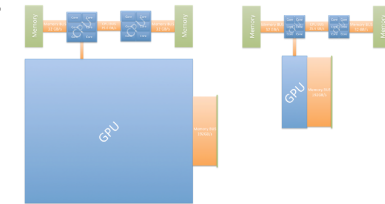
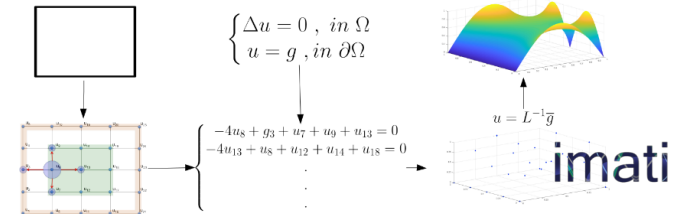
HPC: Distributed Parallel and High Performance Computing



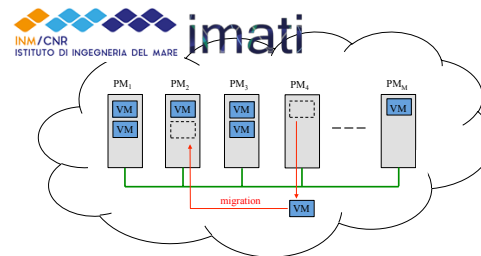
Edge computing

imati

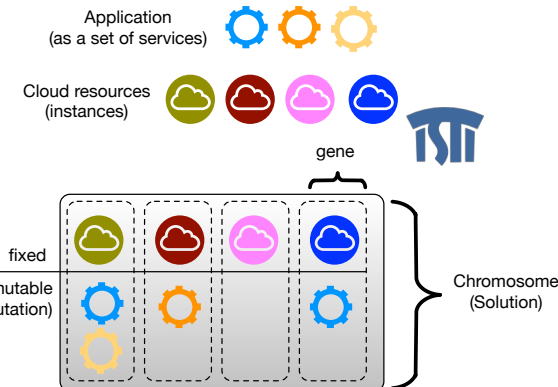
Complex HPC methods



Large-scale information systems

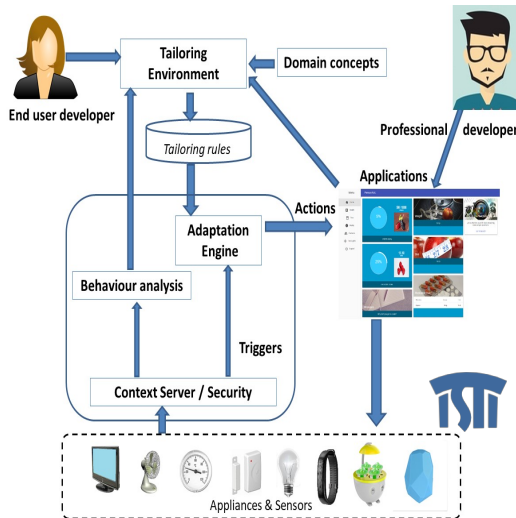


Cloud and virtualisation

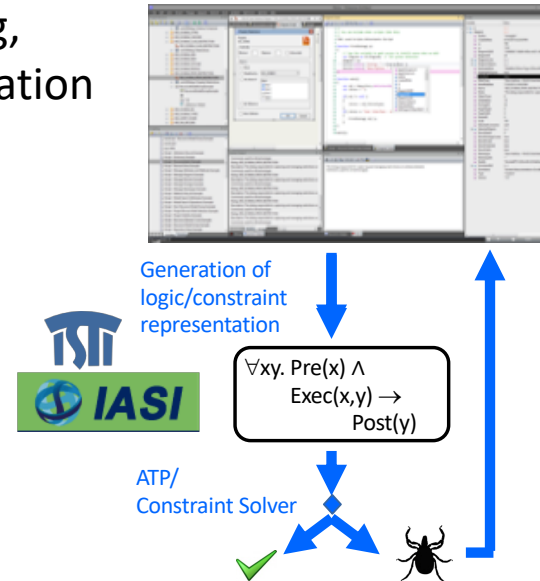


Software Engineering

End-user development



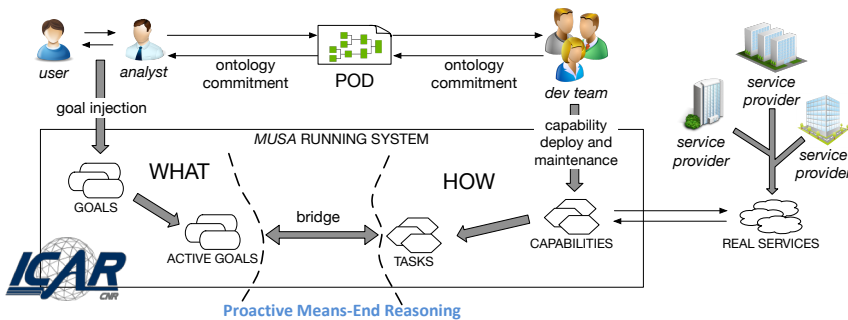
Modelling, testing, verification



Formal analysis



Agents-based systems



SW methods for big data analytics

