ICON Research

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ICON
Intelligent Connectivity

- ICON Research
- Semcom
- Chistera

CHISTERA Experience & Lessons (3 Projects)

- LEADINGEDGE + CONNECT + ANDROMEDA + MUSECOM^2
- Very low overhead (totally different than EU-SNS projects – "bad")
- 1 in-person meeting per year (depending on travel budget)
- No deliverable required but need to fill in yearly-reporting for CHISTERA office (easy!)
- In Finland no deliverable needed, KPIs: scientific publications + Msc/PhD
- Cross-exchange researchers towards year 2or3 (from experience + budget allowing)
- Over time find a common collaborative work

6GENESIS (World 1st 6G Program)

6G Enabled Wireless Smart Society & Ecosystem

- National Flagship for 2018–2026
- Led by **University of Oulu**

5 Oulu ICT facts

1. **2.6B** users for wireless technologies developed in Oulu.
2. **3-4B€** exports per year from wireless industry in Oulu.
3. **200** new startups from ICT since 2014.
4. **150** researchers makes CWC one of the leading radio group.
5. **Core technology** contributions from 3G to 5G

1. **Wireless Connectivity**
Ultra-reliable low-latency communications and Tbps
Enabling Unmanned Processes

2. **Devices & Circuits**
THz communications materials & circuits
Enabling Unlimited Connectivity

3. **Distributed Computing**
Mobile edge intelligence
Enabling Time Critical & Trusted Apps

4. **Services & Applications**
Multidisciplinary research accross verticals
Enabling Disruptive Value Networks

Intelligent Connectivity & Networks/Systems (ICON)

Mehdi Bennis

22 ppl, 12 projects
(5 SNS, 2 CHISTERA)

CWC-RT

Radio Access Techniques (RAT)

Matti Latva-aho

Communications Signal Processing (CSP)

Markku Juntti

RF Engineering (RFE)

Aarno Pärssinen

CWC-NS

Wireless Systems (WS)

Ari Pouttu

Wireless Medical Communications (WiMeC)

Jari Iinatti

Networking (NET)

Mika Ylianttila

EDGE ML for/over Wireless

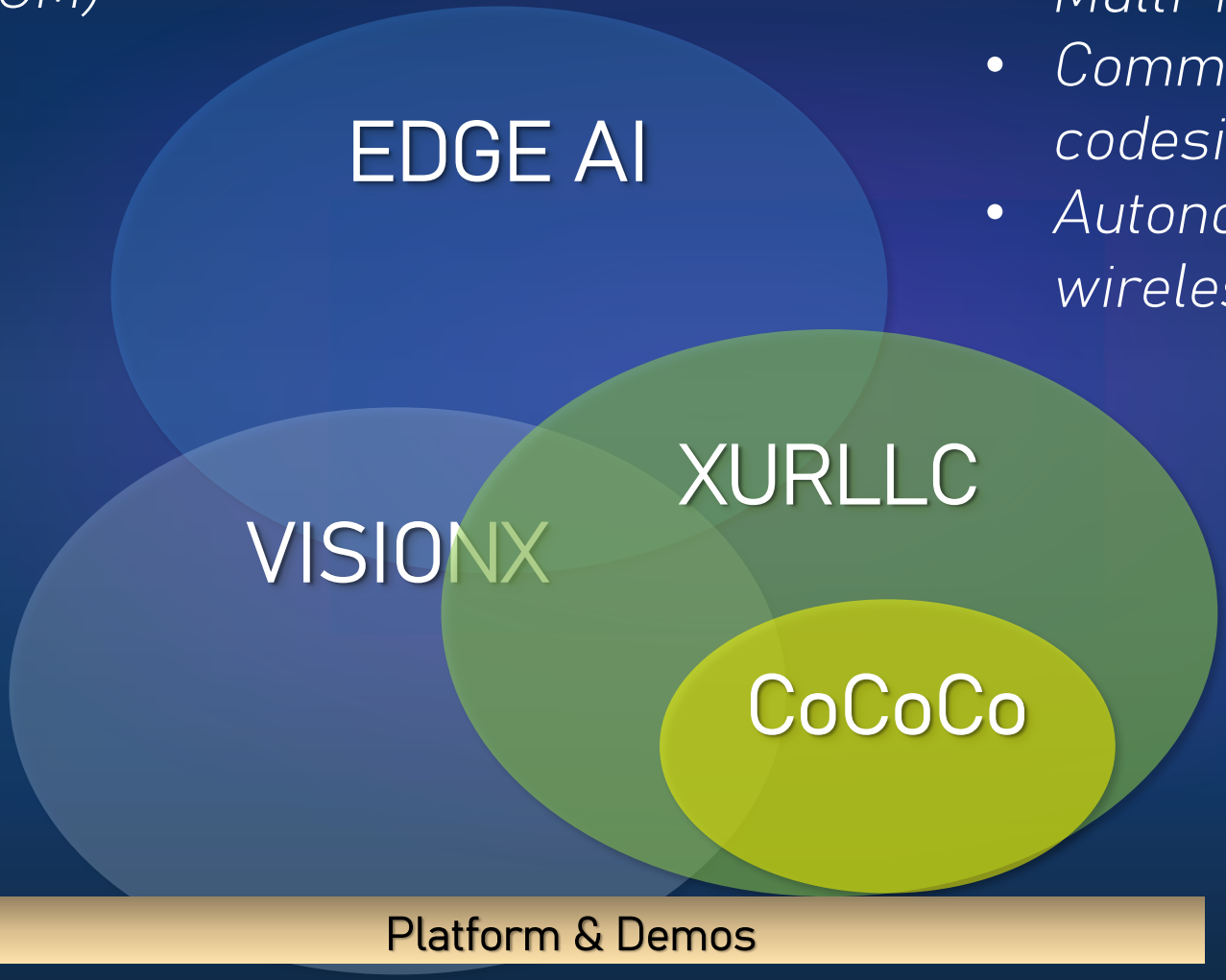
- *Theory (Neurips, JMLR, ICML, IEEE TWC/TCOM)*
- *Applications*

Extreme URLLC

- *Multi-Modal URLLC*
- *Communication+control codesign*
- *Autonomous control over wireless*

Semantic Communication

- *Theory*
- *Applications*

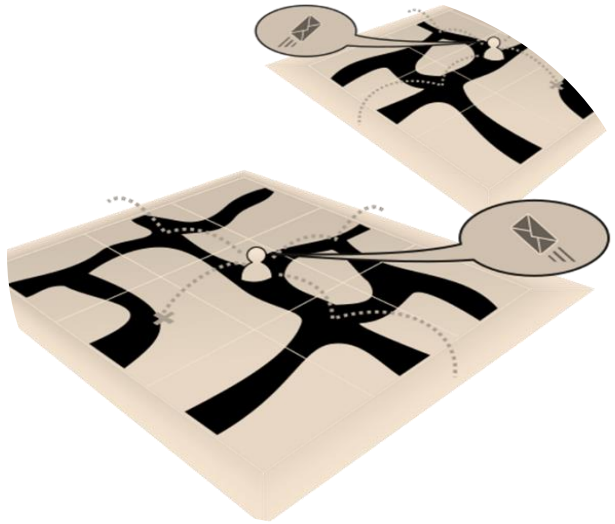


Platform & Demos

Edge AI + Robotics

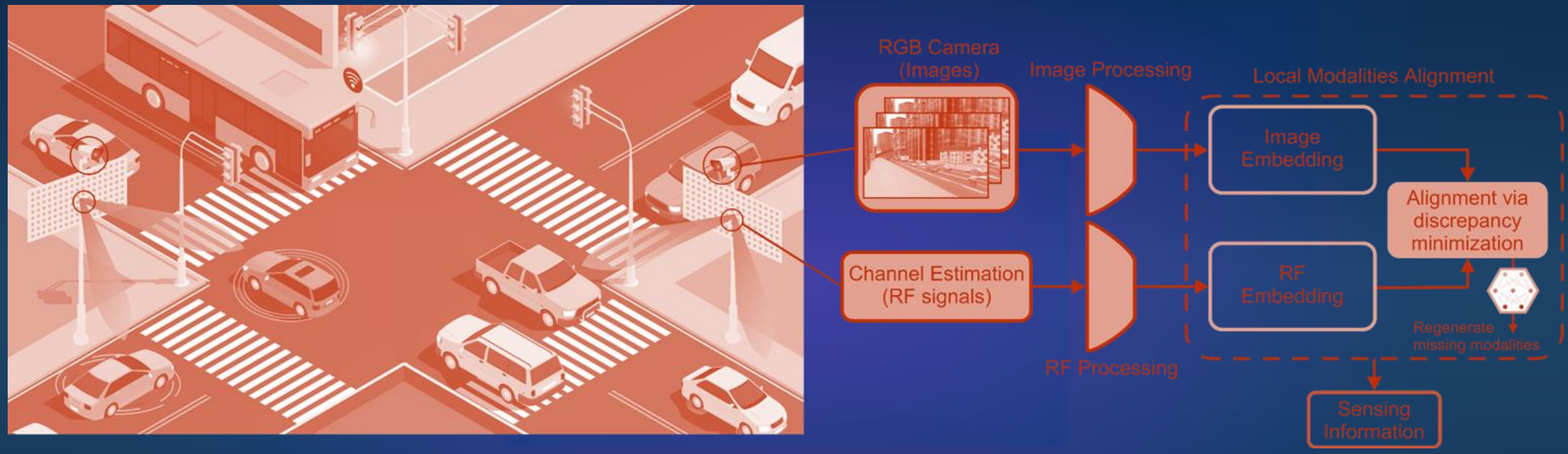
MUSECOM^2

Cooperative Map discovery



RF-Image alignment for Sensing

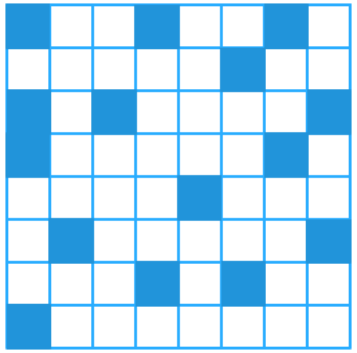
RF-vision alignment for sensing + single/multi-agent downstream task



- V2I scenario with RSUs equipped with cameras and active channel estimators
- Sensing parameters extracted and aligned in multiple modalities (locally per RSU)
- Multi-agent case: multiple RSUs collaborate to solve a PHY layer task using their extracted sensing information

Use Case: Collaborative Map Discovery

T: Global Theory



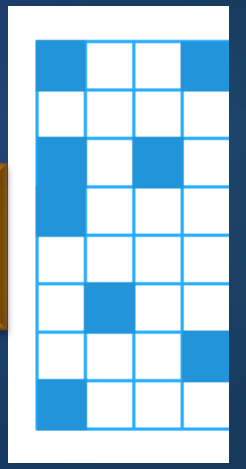
$\{T_i\}$: Set of local theories

Local Generative Model

Agent i's beliefs about the theory of the world

Agent j's beliefs about the theory of the world

Local Generative Model



$\{T_j\}$: Set of local theories