

Smart Ecosystems: Enabler for Future Innovations in Health & Daily Life

Deutsch-Brasilianischer Dialog über Wissenschaft, Forschung und Innovation
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TU Kaiserslautern &
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Kaiserslautern, Germany

Agenda

- Fraunhofer Applied Research Organization
- Smart Ecosystems: Towards Digital Society 2.0
 - Fokus: Health & Daily Life
- Challenges for Software & Systems Engineering

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Joseph von Fraunhofer (1787 – 1826)



© Deutsches Museum

Researcher

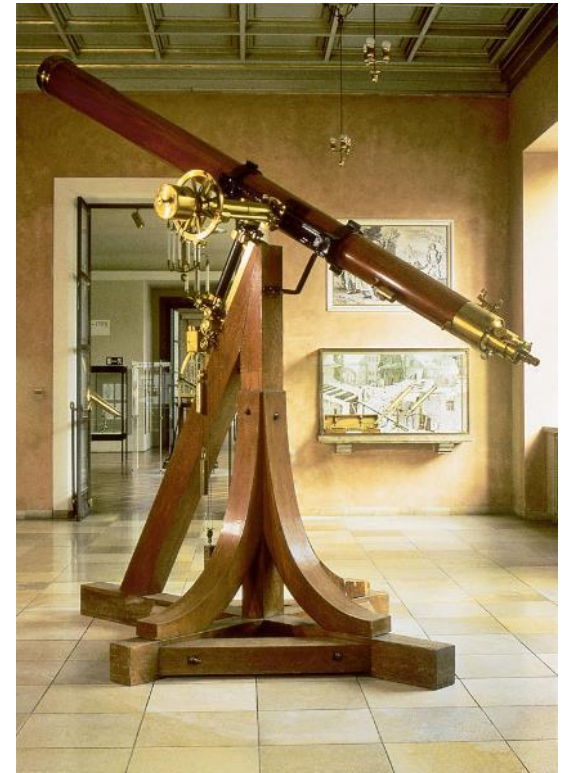
→ Discovery of the “Fraunhofer lines” in the solar spectrum

Inventor

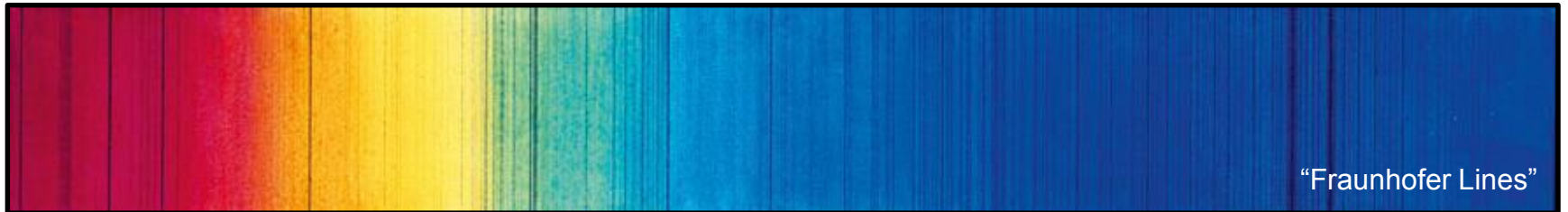
→ Development of new methods for lens processing

Entrepreneur

→ Director and partner in a glass manufactory



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“Fraunhofer Lines”

Fraunhofer-Gesellschaft, the largest organization for applied research & technology transfer in Europe

Applied Research for Economy and Society

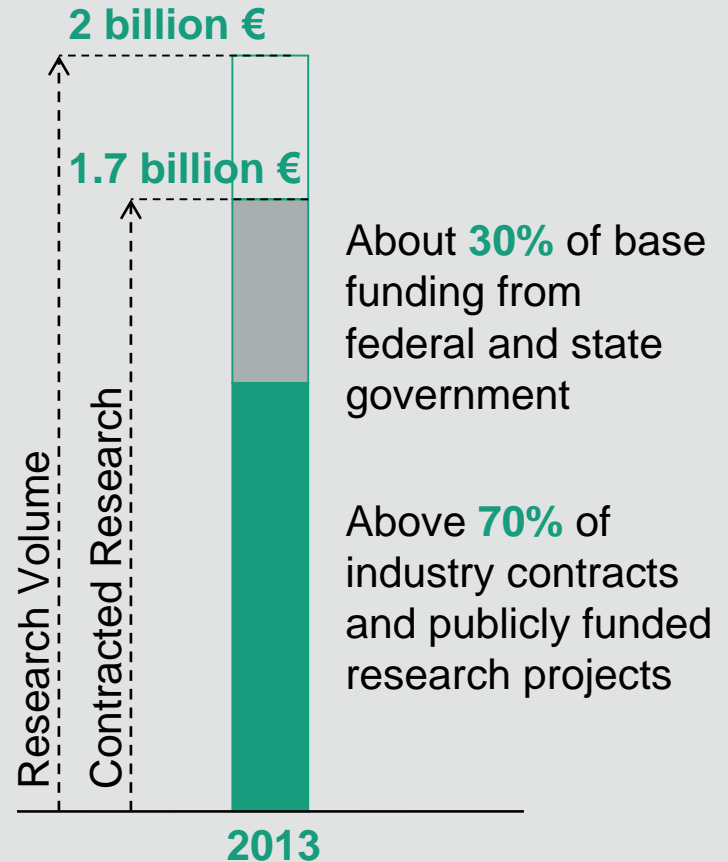


About **24,000** employees

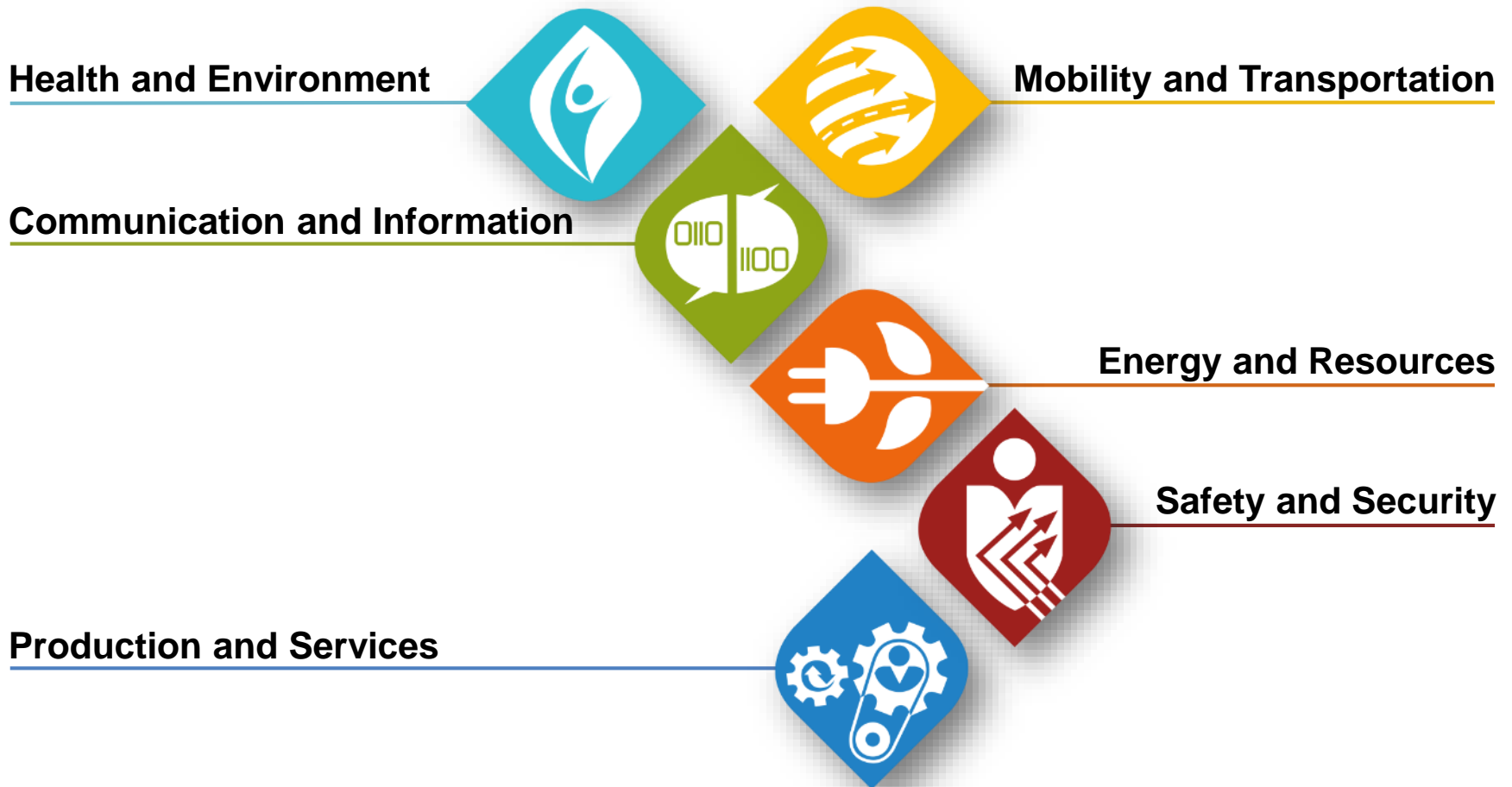


70 institutes and research institutions

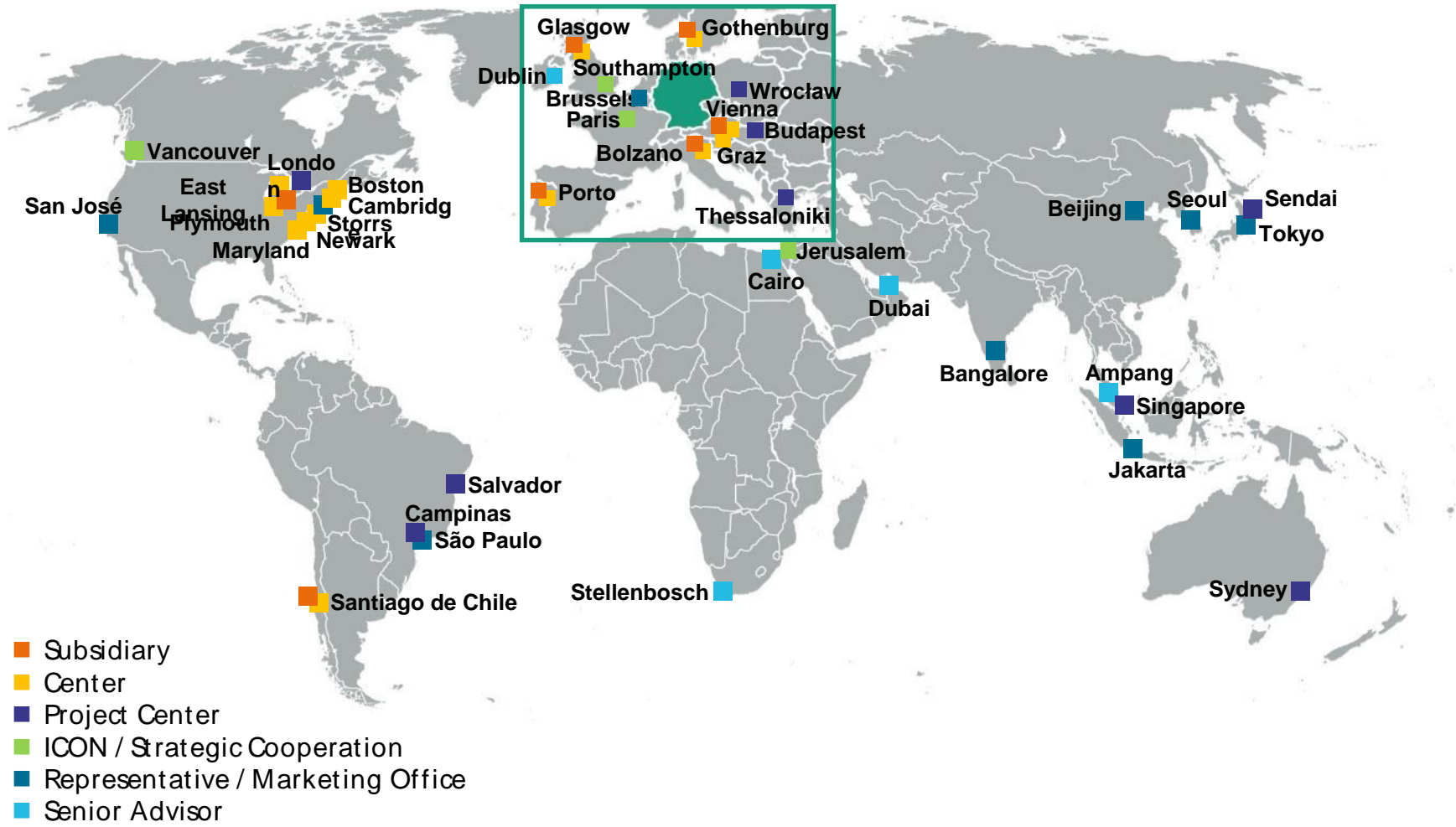
Hauptstandorte ●
Nebenstandorte ○



Fraunhofer Fields of Research



Fraunhofer Worldwide

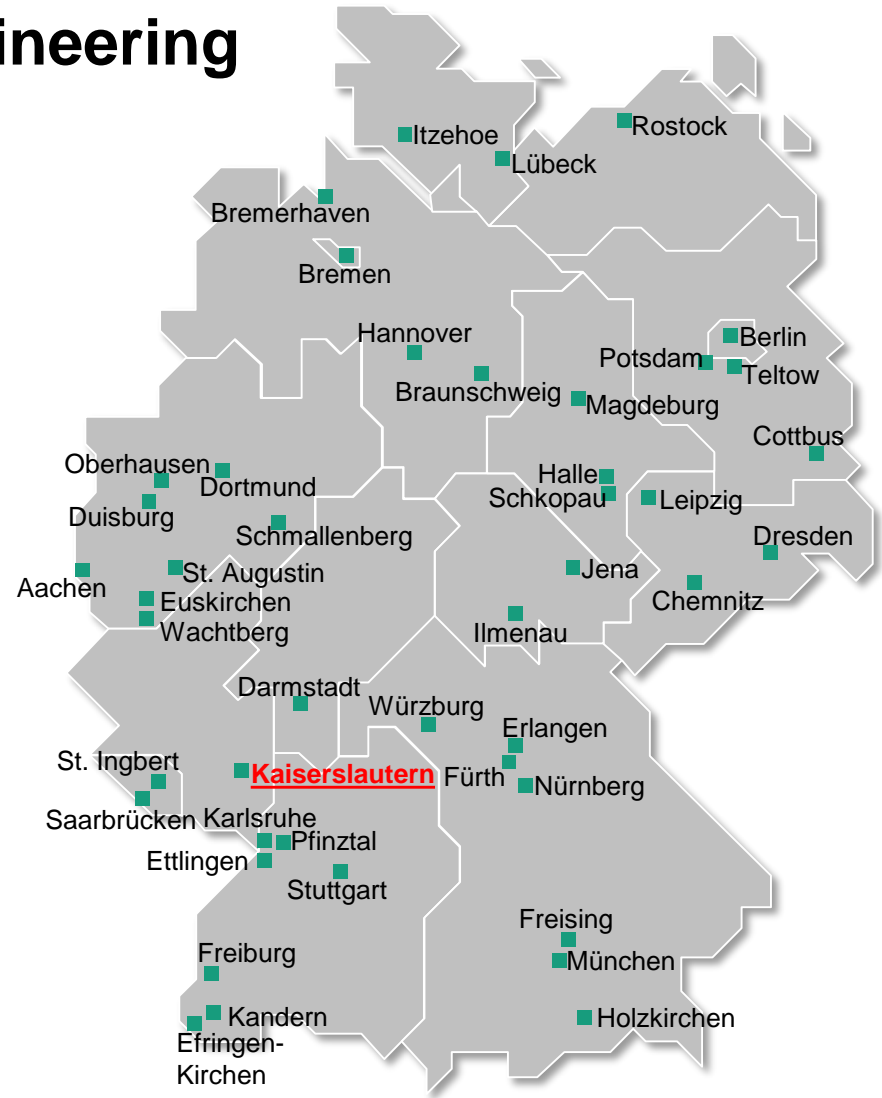


February 20, 2015

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Fraunhofer Institute for Experimental Software Engineering

- Founded in 1996
- One of the leading **software & systems engineering** institutes in Europe and worldwide
- Over 200 employees



Fraunhofer Project Center for Software & Systems Engineering at UFBA – Software & Systems Engineering for the Brazilian Market

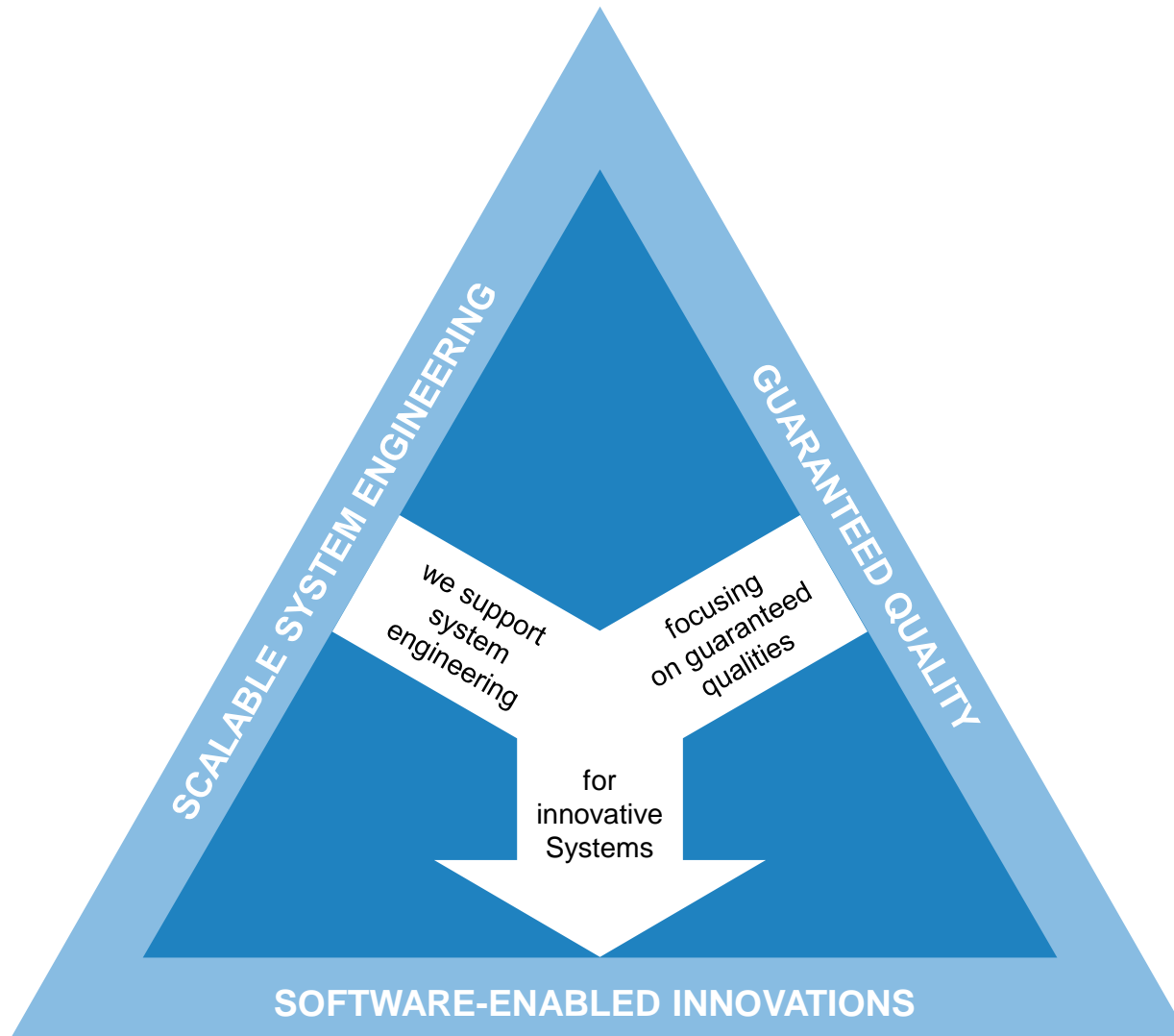


Premises in the Tech Park of Bahia

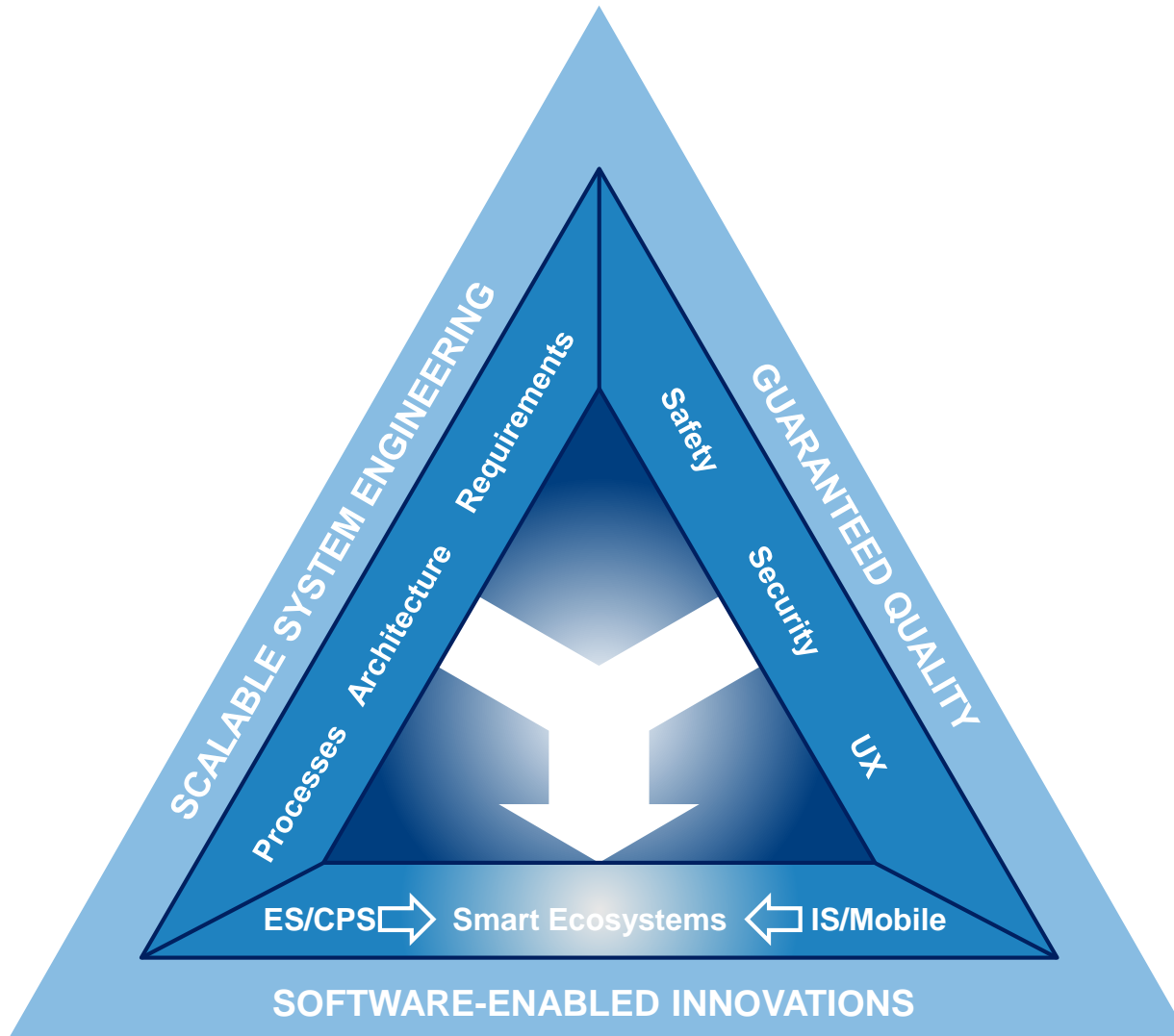
- Partnership between UFBA and Fraunhofer IESE
- Experts on Software Engineering
- App. 30 researchers (18 full time equivalent)
- Operates from the Tech Park of Bahia
- Made possible by the State Government



Core Competencies of Fraunhofer IESE



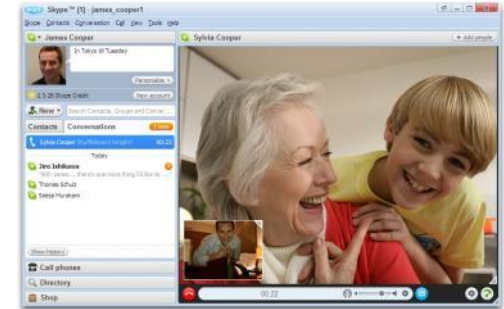
Core Competencies of Fraunhofer IESE



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Integration: A Driver in Private Life



Integration as Driver for Business Life: Integration Enables Innovation!



... in Information Systems as well as in Embedded Systems

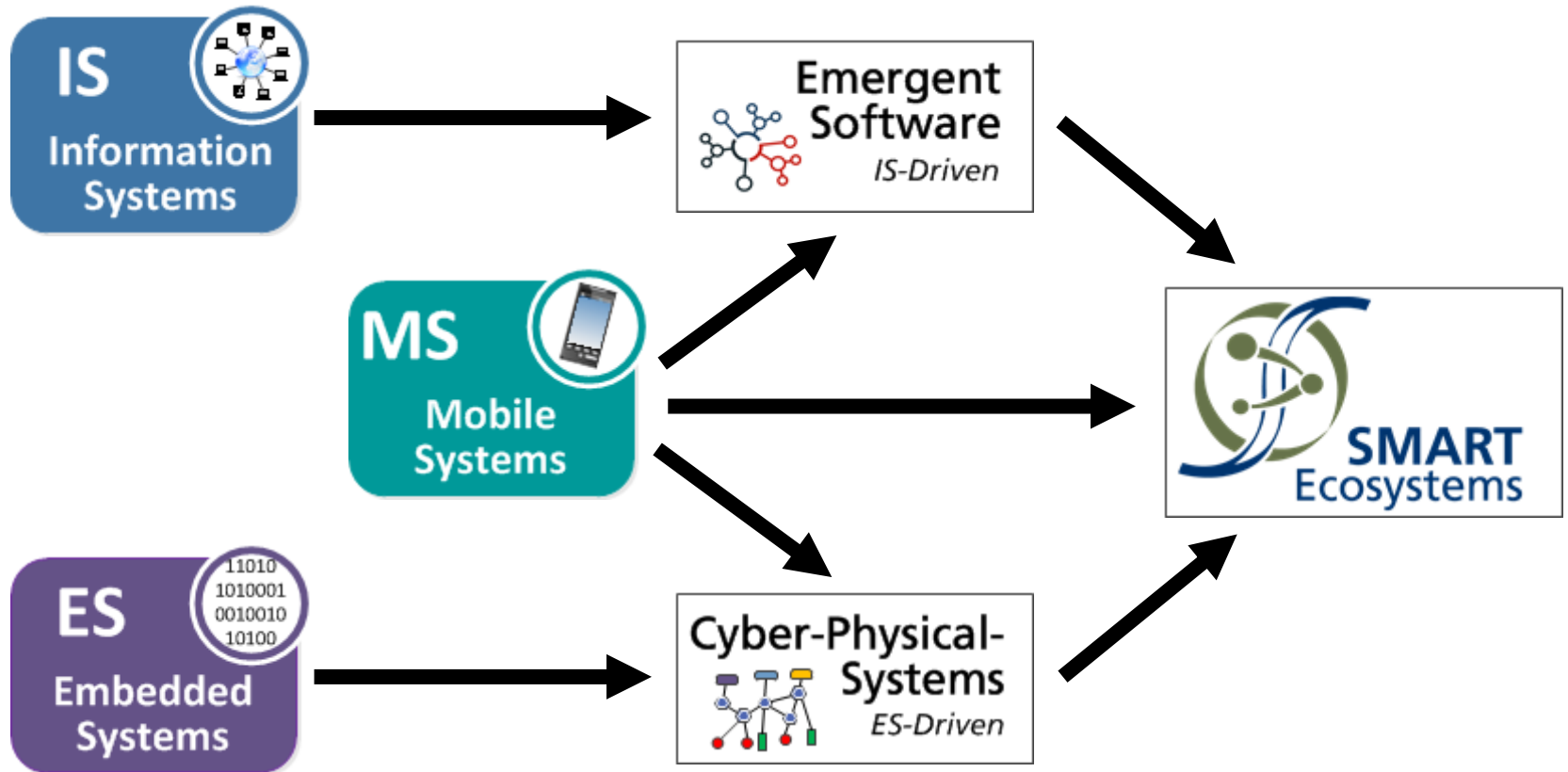
Physical Objects Get a Digital Life (are connected with the digital world)

- Physical objects (things, living objects, people)
 - produce data (through observation using sensors)
 - have a history (enabling prediction)
 - are influenced by data (using actuators)
 - context-dependent
 - E.g., location-aware
 - adapt in real time



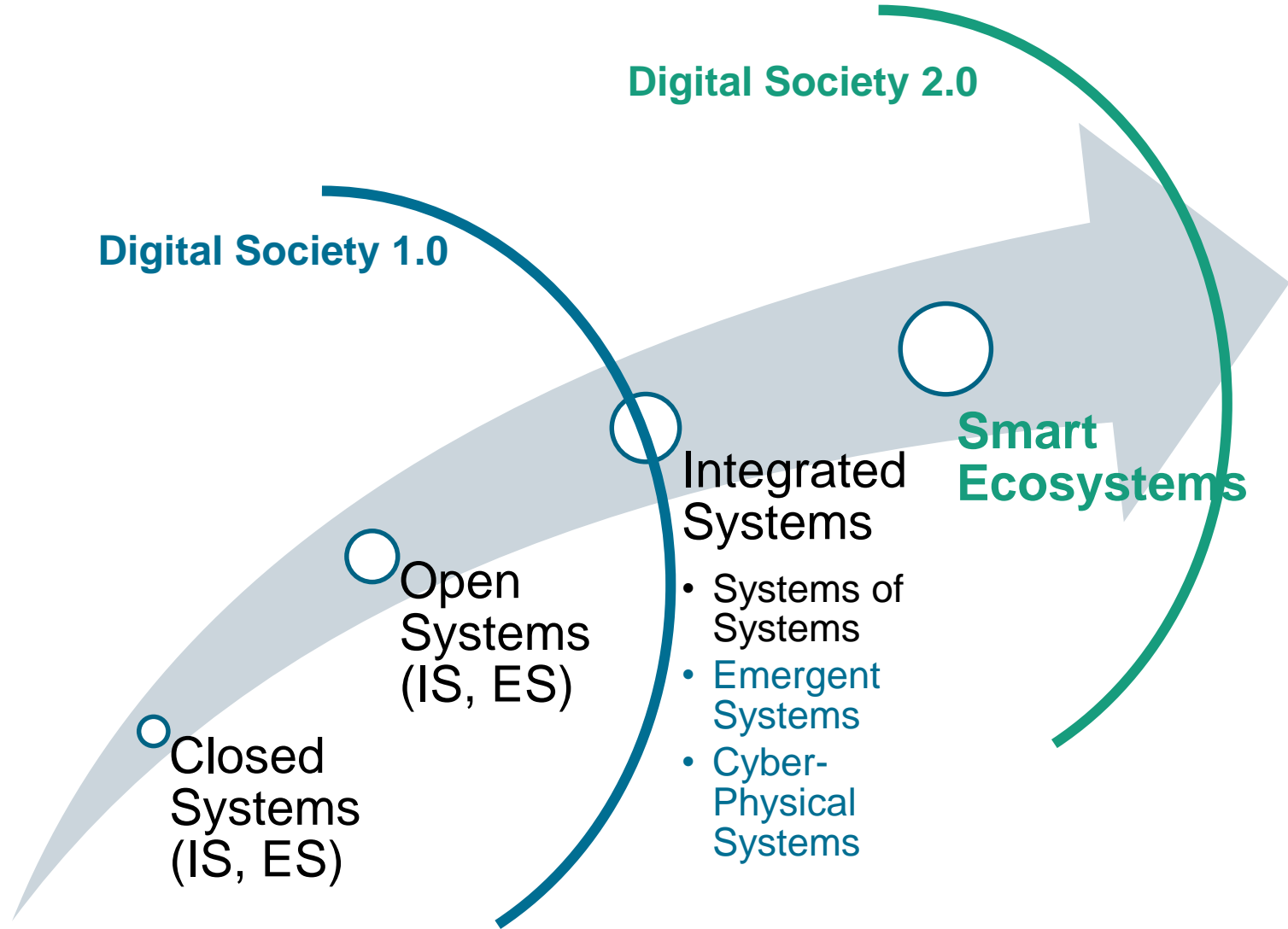
[Picture from <http://b-metro.com>, Cheri Ellis]

IT Mega-Trend: Integration



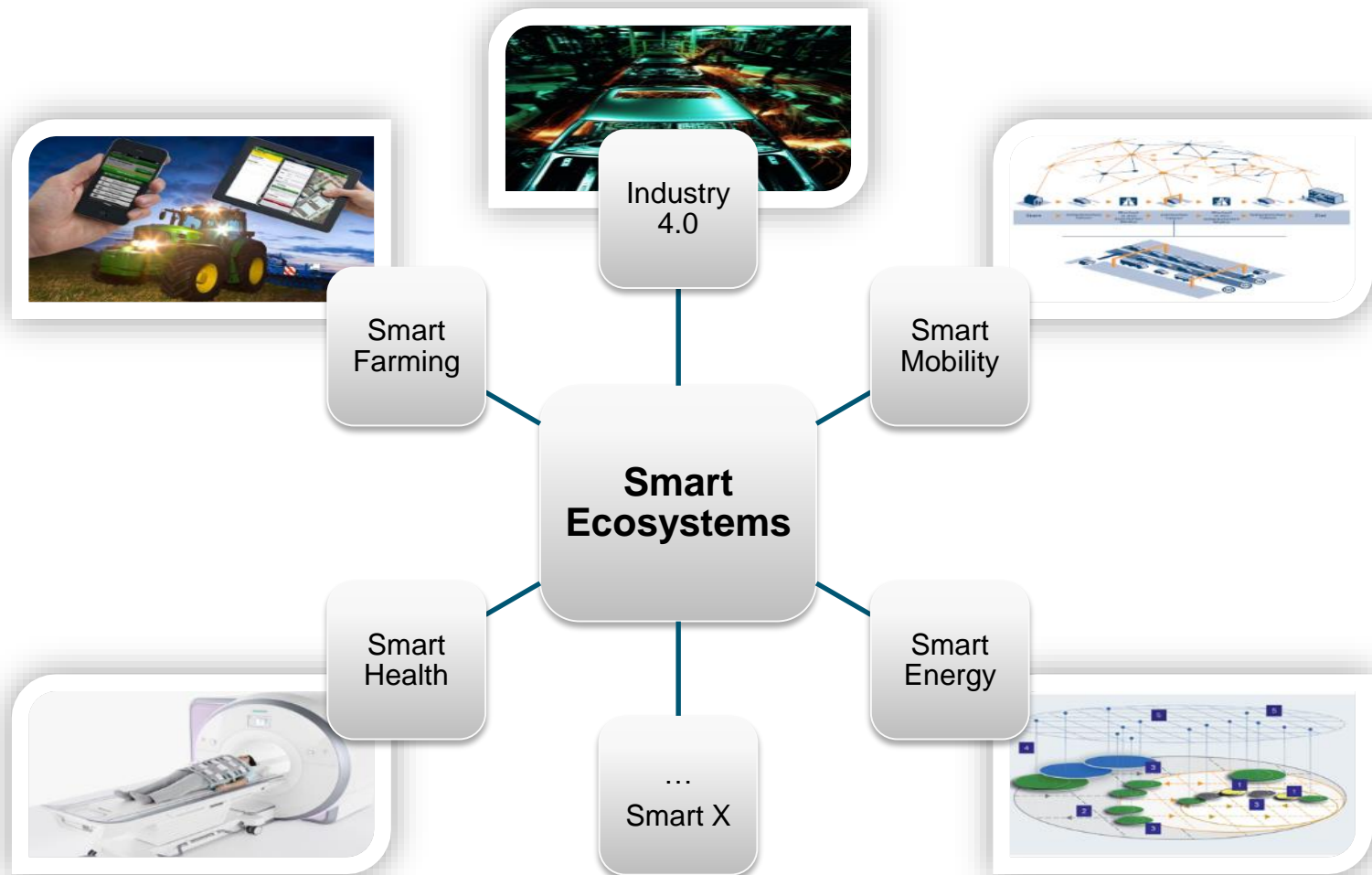
Big Data / Data Analytics

Societal Changes through Smart Ecosystems



Smart Ecosystems

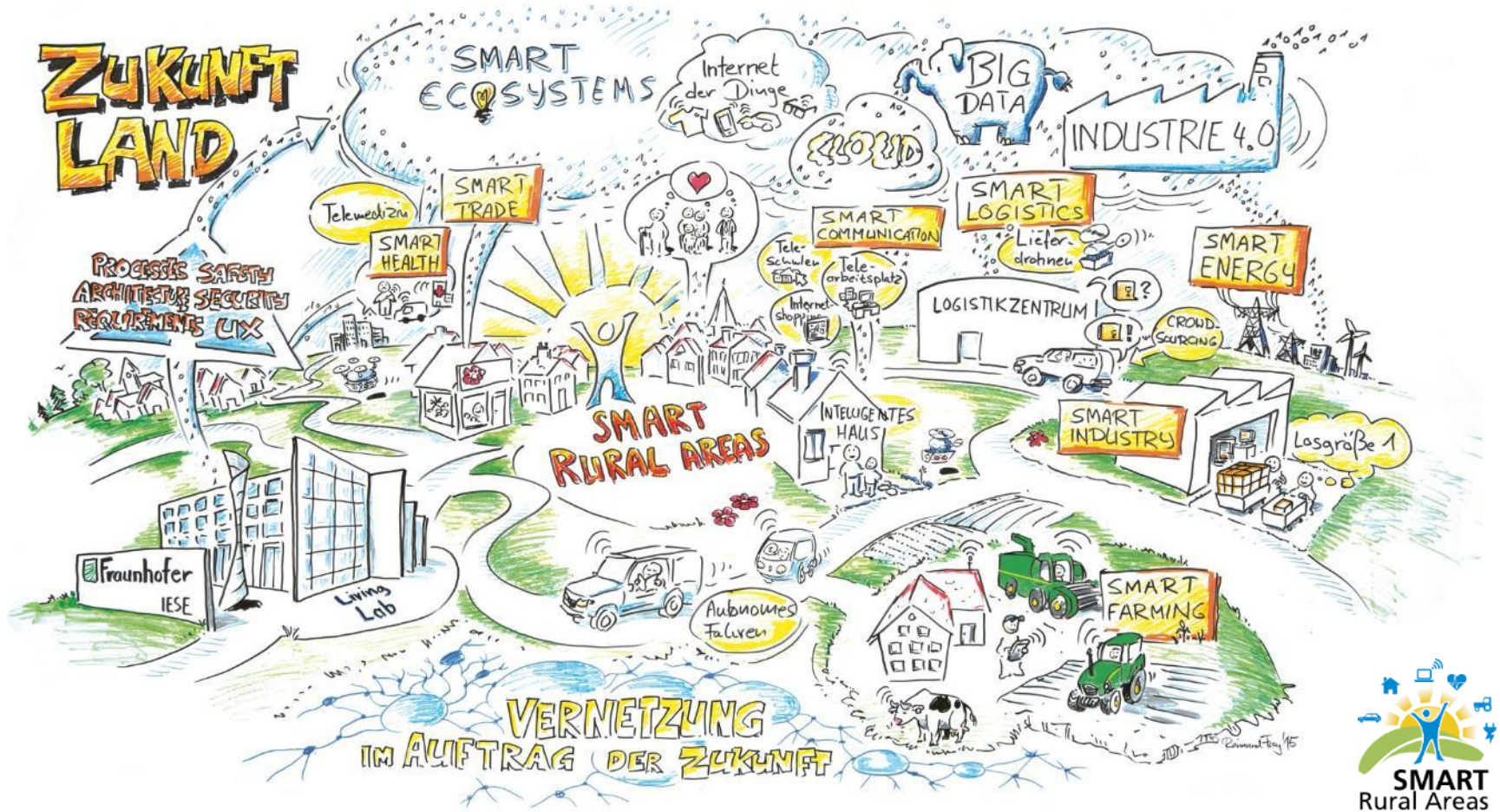
A Trend across Domains



Smart Health

- **Up-to-date and accessible individual medical record** (Comprehensive connectivity & data access) → **trustworthiness, especially data privacy?**
- **Comprehensive logistics** (Up-to-date systems in hospitals & health system) → **trustworthiness, especially data privacy?**
 - E.g., new emergency system in RLP
- **Process support & automation** (Business re-engineering towards process organization in Hospitals and entire health system to avoid redundant book keeping – e.g. medical diagnoses are automatically transferred to MRI → **safety & security?**)
 - E.g., projects in many hospitals
- **Safety at home** (Safety technology like in cars, so that elderly people can live longer at home → **trustworthiness, especially data privacy?**)
 - E.g., AAL technology in houses/apartments in RLP
- **Safety in Rural Areas** (Virtual access of (health) services, so that rural areas can be made attractive again → **broad-band connectivity?, data privacy**)
 - E.g., comprehensive „Smart Rural Area Initiative“ in RLP
- **Fast Independence after illness** (Telemonitoring, so that people can get back to work/life faster after surgery → **trustability, esp. Data privacy**)
 - Telemonitoring project SUSI-TD in RLP

Our Main Theme in 2015 – Smart Rural Areas – Zukunft Land



Smart networking between mobility, logistics, energy, health, communication, safety and security “only” for cities?

Industry 4.0

Key Challenges of Implementing Smart Ecosystems



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Smart Ecosystems

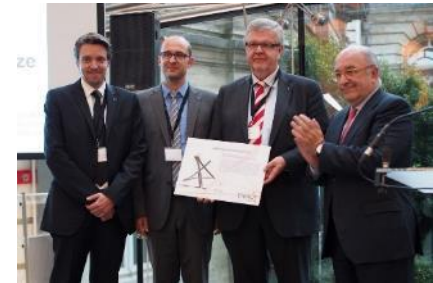
Key Challenges for Software & Systems Engineering



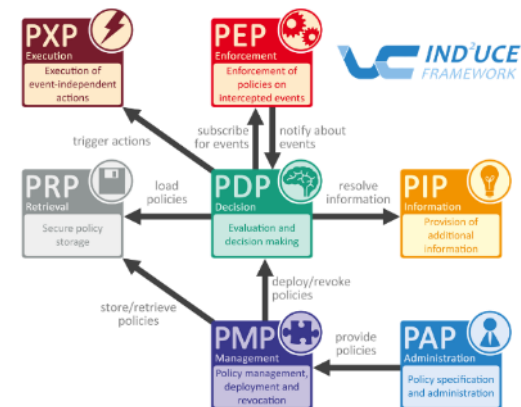
IND²UCE Framework



2014 Innovation Prize
Winner



- The IND²UCE Framework (INtegrated Distributed Data Usage Control Enforcement) provides all necessary components for implementing data usage control.
- Static access control & encryption are insufficient in smart ecosystems!
- Context-sensitive data usage policies support appropriate compromise between new business models and data privacy needs (e.g., data can only be used in a specific building, data must be deleted after 1 week, data can only be copied 3 times)
- Graphical selection of policies by end-user creates trust!
- The framework has been implemented in several environments and can be evaluated in the IESE Data Usage Control Lab



24

TAKEAWAYS

- Companies and societies can strongly benefit from Smart Ecosystems
 - No alternative, trend cannot be stopped
- Opportunities and risks need to be balanced
 - Opportunities include
 - new jobs based on new business models
 - Ecologic opportunities based on sharing economies
 - Health & general life applications help overcome demographic challenges
 - Risks include
 - Untrustworthiness (safety, security, data privacy)
 - Wrong compromises between business models & Trustworthiness
- Complex software is the key enabler of new business models
 - Software & System Engineering capabilities are key to success
 - Guaranteed qualities (e.g., safety, security, data privacy)
- Fraunhofer provides strong competencies for these challenges (in EU and Brasil)

Thank You!

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