Center for Artificial Intelligence

Faculty of Electrical Engineering and Computing
University of Zagreb
## https://cai.fer.hr

Prof. Sven Lončarić

Director

Why does industry need universities?

- Universities play an important role in a **knowledge society** for the **production, transfer and application of knowledge**
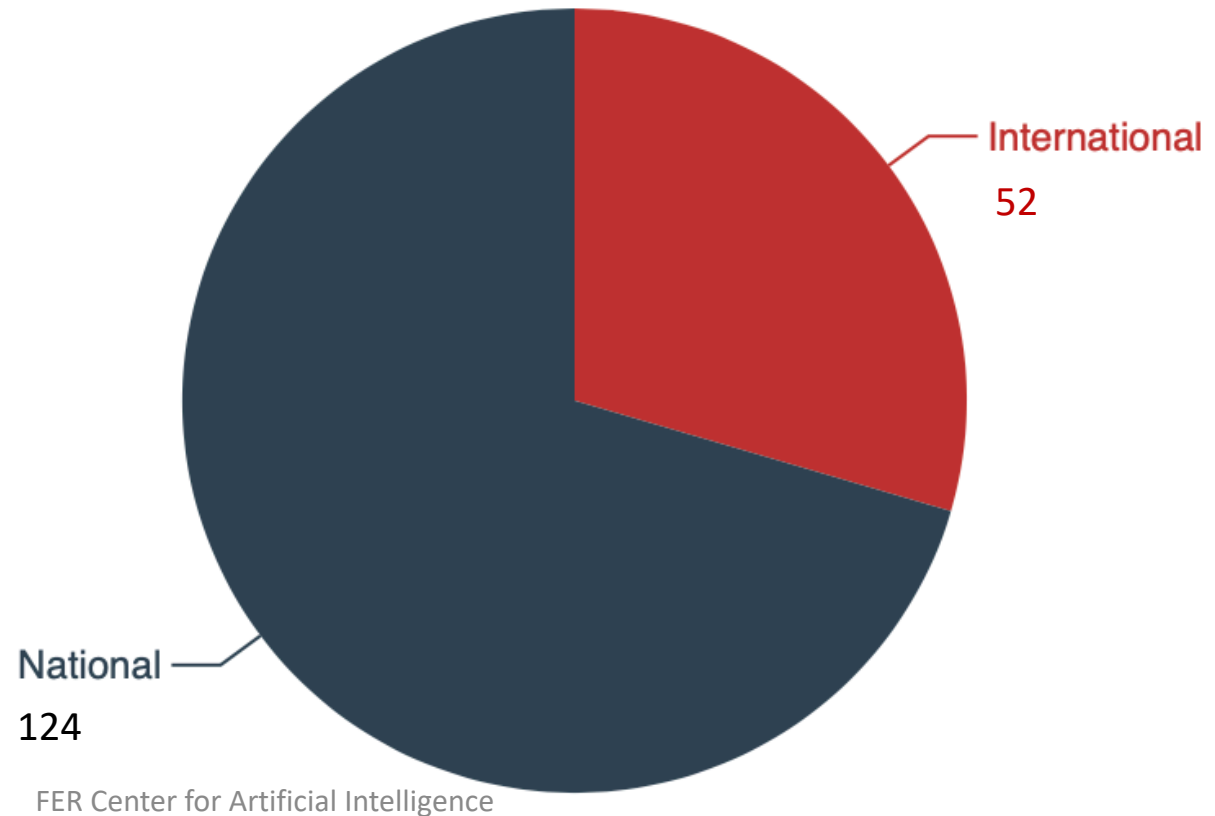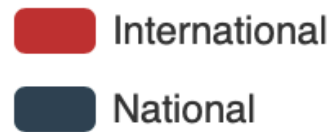
Research and development at FER

- According to the European Commission report, FER is among leading institutions in Croatia in terms of successful R&D project applications for EU funds
- FER currently has 176 ongoing R&D projects

THE TRIPLE-HELIX MODEL

GOVERNMENT

INDUSTRY

ACADEME
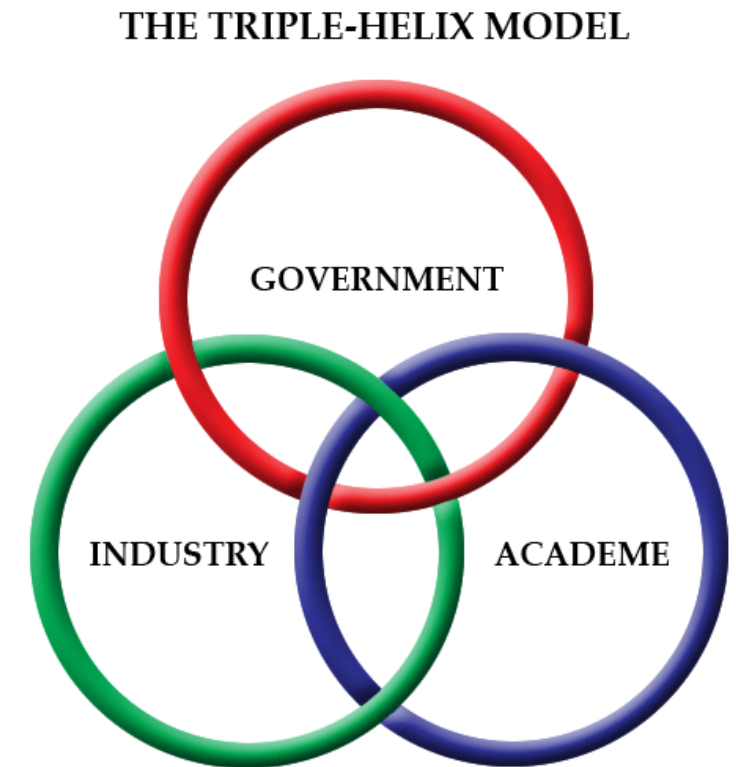
Source: Henry Etzkowitz and Loet Leydesdorff, 2000
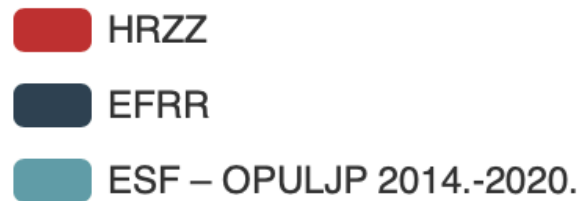*Diagram: www.techpinoytrend.blogspot.com (03 March 2011)*

Research and development at FER

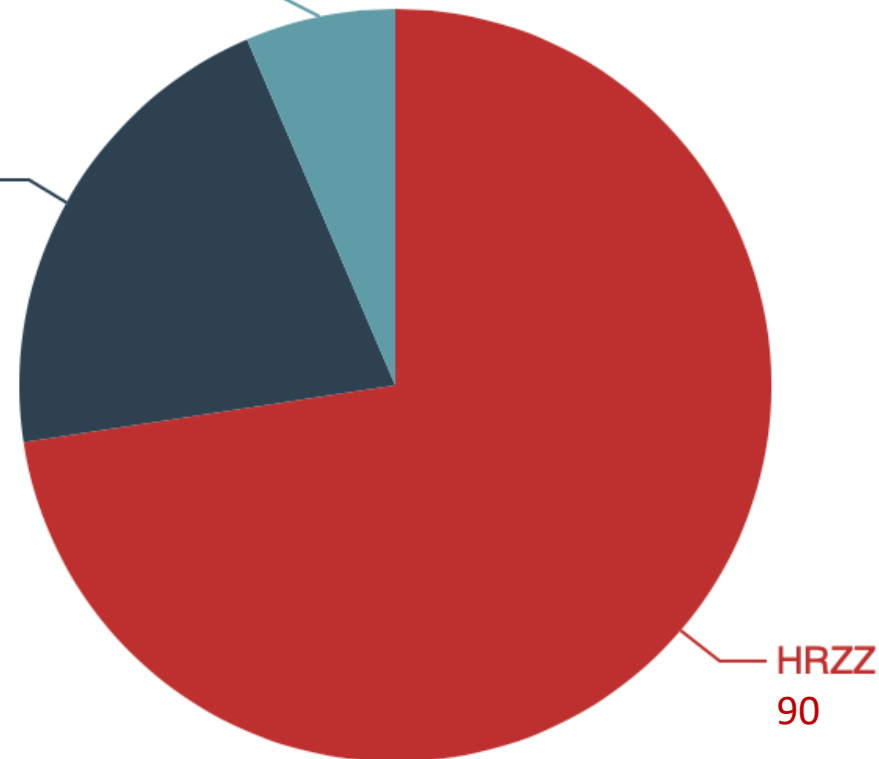Number of projects in progress: 176

International
National

International
52

National
124

R&D at FER – National projects

National projects by categories

Legend:
- HRZZ
- EFRR
- ESF – OPULJP 2014.-2020.

ESF – OPULJP 2014.-2020. 8

EFRR 26

HRZZ 90

R&D at FER – International projects

International projects by categories

Legend:
- H2020
- ERASMUS+
- COST
- Ostali
- BILAT
- INTERREG

INTERREG 3
BILAT 6
OTHER 6
H2020 18
ERASMUS+ 4
COST 15
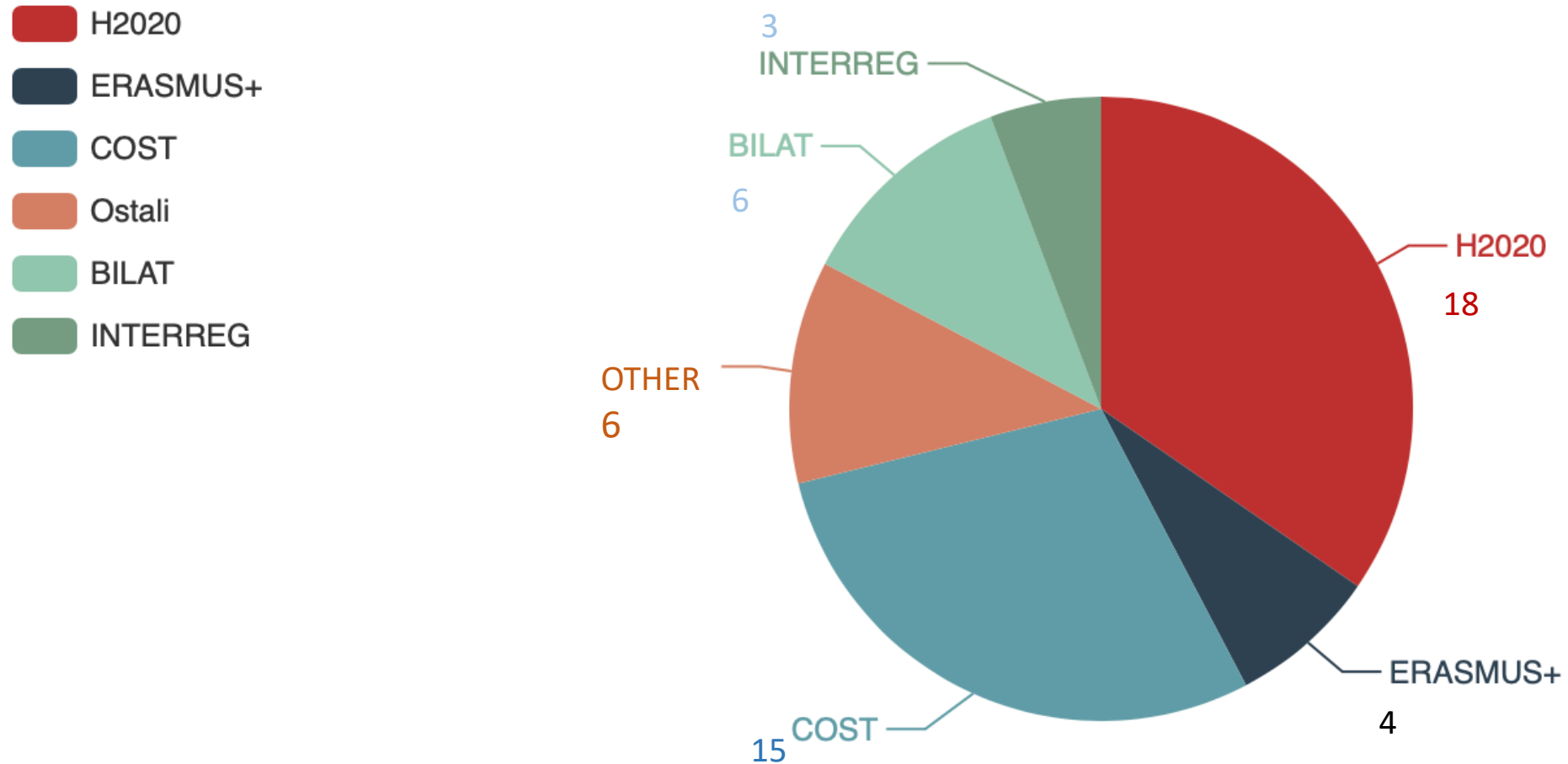
Research and development at FER

- Why are R&D activities important?

- FER currently has more than 150 researchers employed on projects with public and private funding

- Many projects are in collaboration with domestic and foreign companies

- This results in:
  - Advances in theory and applications
  - Education of young professionals needed by industry

Center for Artificial Intelligence at FER

- Formally established in October 2019
- **The largest research center in the area of artificial intelligence in Croatia**
- 18 research laboratories at the Faculty of Electrical Engineering and Computing, University of Zagreb
- More than 100 researchers (professors and doctoral students)

Center for Artificial Intelligence: Areas

- AI research areas include, but are not limited to:
  - Machine learning, deep learning
  - Natural language processing
  - Computer vision
  - Financial analytics
  - Robotics
  - Internet of things
  - Bioinformatics
  - Cybersecurity
  - Recommender systems

Center for Artificial Intelligence: Goals

1. To advance theoretical foundations of artificial intelligence (AI) and to drive progress in AI theory and applications

2. To collaborate with industry through the transfer of AI technology with the purpose of developing new knowledge-based innovative products and services

3. To provide top-class AI education at undergraduate, graduate, and doctoral levels, as well as continuing education for the industry

R&D services for industry in cooperation with Innovation Center Nikola Tesla - ICENT

- R&D services of the Centre for companies include:
  - collaborating with companies in the Centre research laboratories
  - transferring AI technology and distributing AI knowledge and know-how to companies
  - developing and delivering AI technologies and tools
  - creating innovative AI-based product prototypes and applications

Education services for industry

- The continuing education services of the Centre aimed at the industry include:
  - training courses for industry aimed at specific problem-solving AI tools and applications
  - dedicated courses for company employees
  - seasonal schools on various AI topics
  - industry-oriented workshops for dissemination of information about AI technologies

Center for Artificial Intelligence @FER

- Vision
  - The vision of the Centre is to be a world-class research centre in the area of artificial intelligence (AI)
- Mission
  - to lead and conduct synergistic AI research with academic and industrial partners and with the government;
  - to advance the industry by development and transfer of AI technologies;
 - to provide educational opportunities for the next generation of AI researchers and practitioners.

Center for AI:
An overview of research activities

- Center for AI is organized into 18 research laboratories
- Research laboratories of the Center are oriented towards various theoretical aspects and applications of AI

Laboratory for Financial and Risk Analysis

- Prof. Zvonko Kostanjčar

- Selected projects:
  - Estimation of common risk factors in financial markets
  - Deep learning models for consumer credit risk assessment
  - Machine learning models for agricultural decision support systems
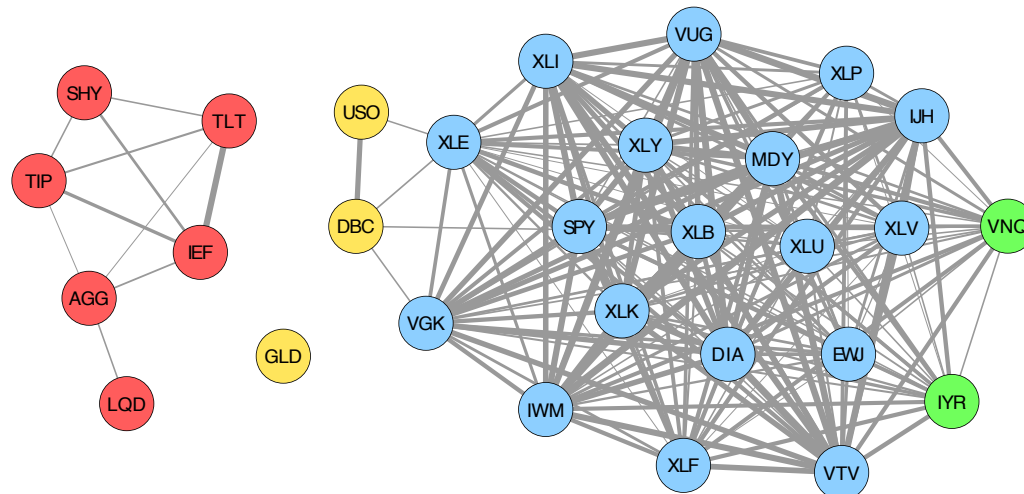
Text Analysis and Knowledge Engineering Lab

- Prof. Bojana Dalbelo Bašić, prof. Jan Šnajder
  - Selected project: Textual analysis of Facebook comments in the telecom domain, aiming to provide actionable insights for managing and improving customer experience
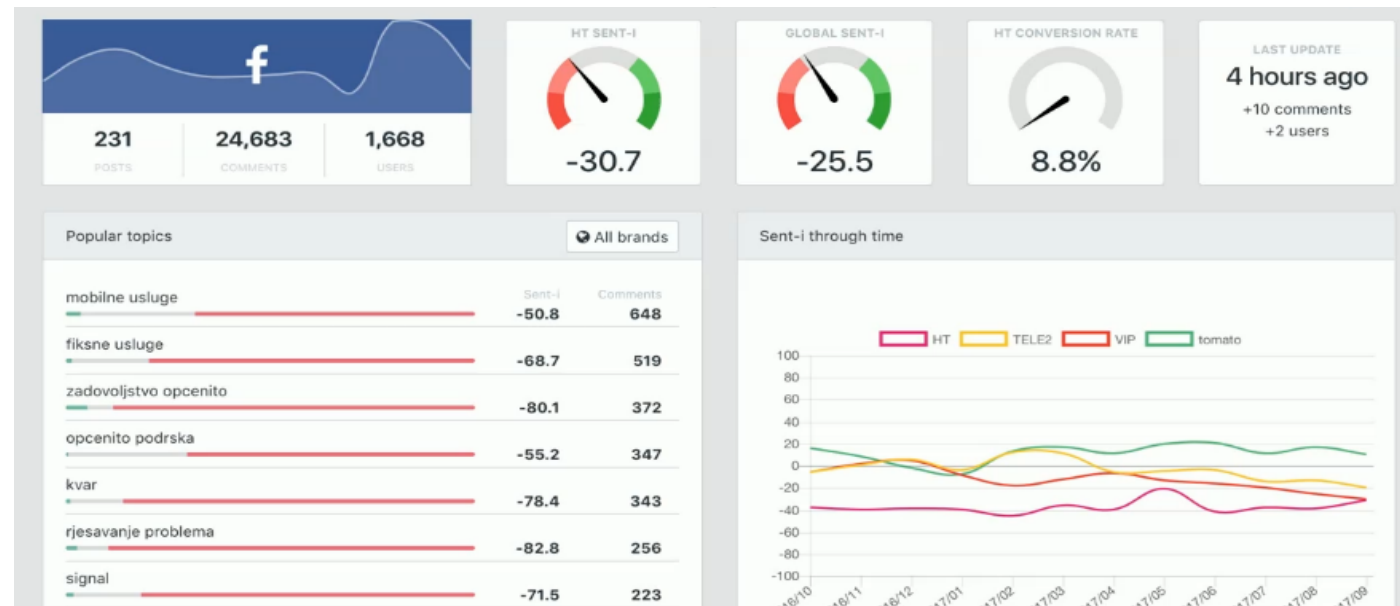
Laboratory for Autonomous Systems and Mobile Robotics

- Prof. Ivan Petrović

- Selected project:
  - SafeLog - Safe human-robot interaction in logistic applications for highly flexible warehouses

Laboratory for Bioinformatics and Computational Biology

- Prof. Mile Šikić

- Selected projects:
  - AGESA - Algorithms for genome sequence analysis
  - SIGMA - Single genome and metagenome assembly
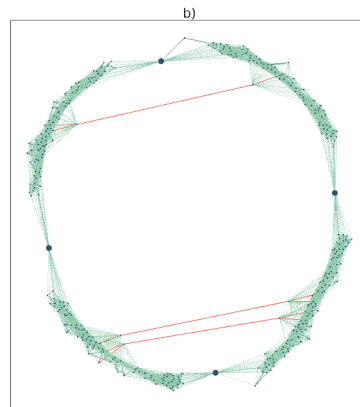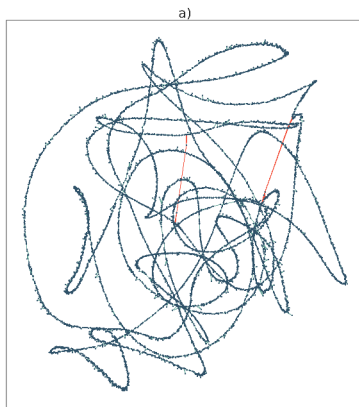
Social Networking and Computing Laboratory

- Prof. Vedran Podobnik

- Selected project:
  - Managing Trust and Coordinating Interactions in Smart Networks of People, Machines and Organizations
  - SmartSocial - A Platform for Context-Aware Social Networking of Mobile Users
  - ICT Competence Network for Innovative Services for Persons with Complex Communication Needs

# Laboratory for Special Purpose Information Systems

- Prof. Krešimir Fertalj
- Laboratory is focused on innovative processes of building intelligent, predictive and proactive systems to support human activities, which by architecture, logic and functionality overcome the so-called business information system

Information Security and Privacy Lab

- Prof. Stjepan Groš

- Selected projects:
    - Cyber Conflict Simulator
    - Cyber-fraud Protection System

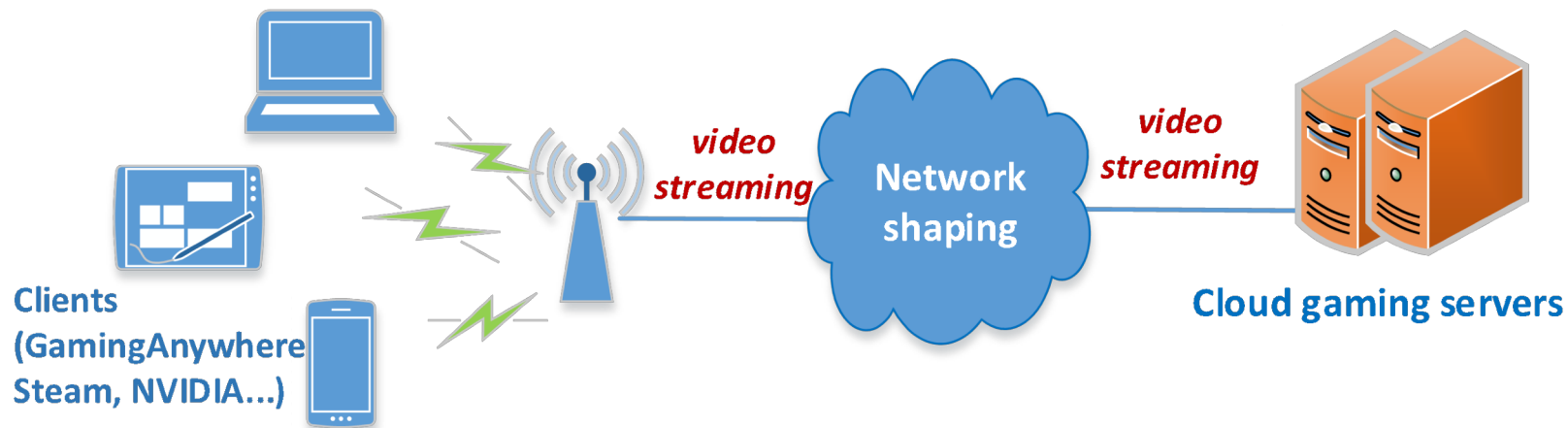- Applications of AI in information security and privacy area

Internet of Things Laboratory

- Prof. Ivana Podnar Žarko
- Selected project:
  - symbIoTe - Symbiosis of smart objects across IoT environments
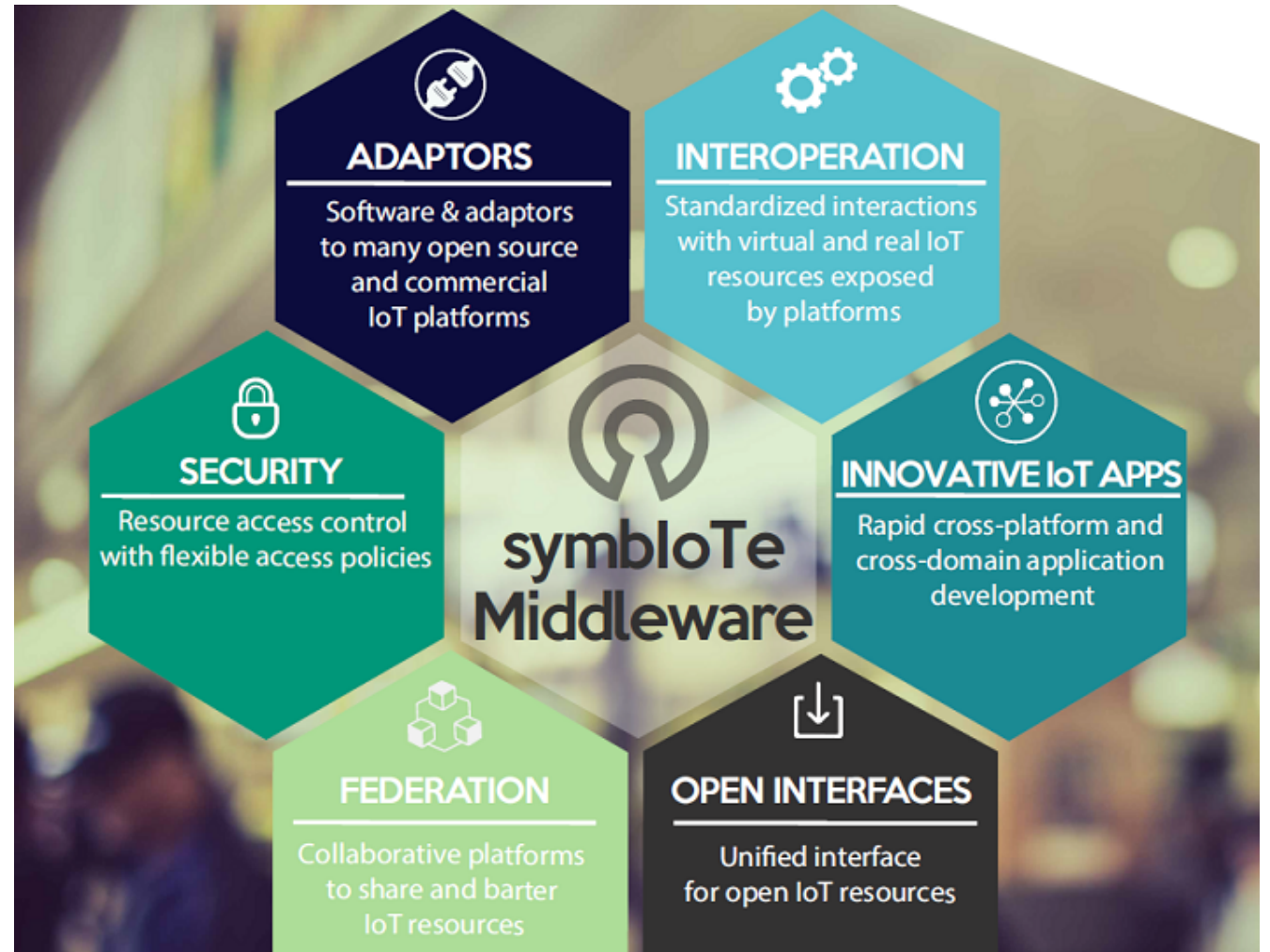
Multimedia Quality of Experience Research Laboratory

- Assoc. Prof. Lea Skorin-Kapov

- Selected projects:
  - Cooperative Quality of Experience Management for Interactive Cloud-Based Multimedia Applications in Mobile Networks

Clients
(GamingAnywhere
Steam, NVIDIA...)

video streaming

Network shaping

video streaming

Cloud gaming servers

Advanced Shape Reconstruction and Registration Laboratory

- Prof. Tomislav Pribanić

- Selected projects:
  - Smartphone and Tablet Extraction of Anthropometric Measurements
- 3D shape reconstruction and analysis using AI methods

Image Processing Laboratory

- Prof. Sven Lončarić

- Selected projects:
  - Methods and algorithms for real-time color image enhancement
  - Smart Modular System for Ultrasonic Inspection in Extreme Conditions
 - Immersive Visual Technologies for Safety-critical Applications
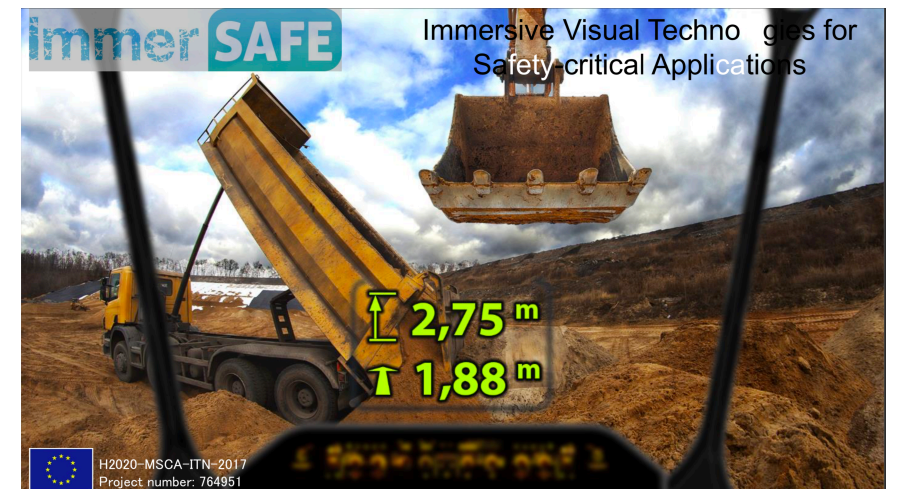
Laboratory for Underwater Systems and Technologies

- Prof. Nikola Mišković

- Selected projects:
  - Advancing Diver-Robot Interaction Capabilities - ADRIATIC

Excelling in research, innovation and education

Laboratory for Pattern Recognition and Biometric Security Systems

- Prof. Slobodan Ribarić

- Selected project:
  - Knowledge-based Approach to Crowd Analysis in Video Surveillance
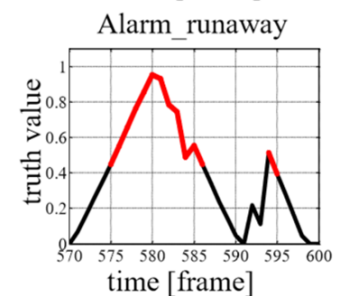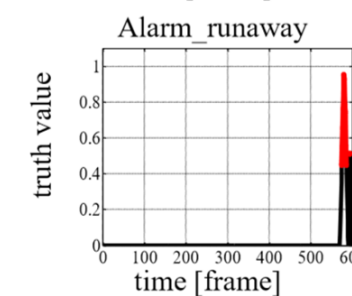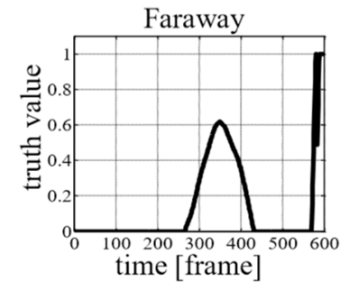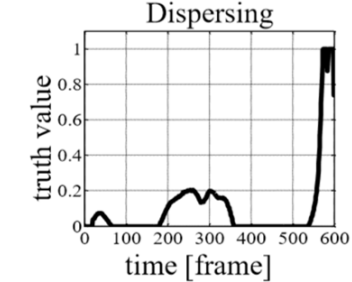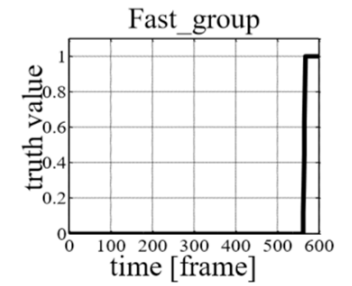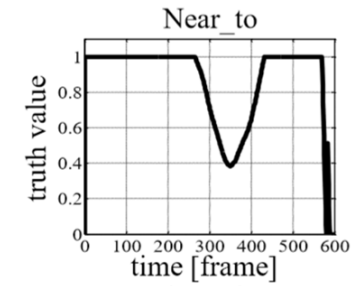
Laboratory for Robotics and Intelligent Control Systems

- Prof. Zdenko Kovačić, Prof. Stjepan Bogdan
- Selected project:
  - Estimation and Control for Safe Wireless High Mobility Cooperative Industrial Systems
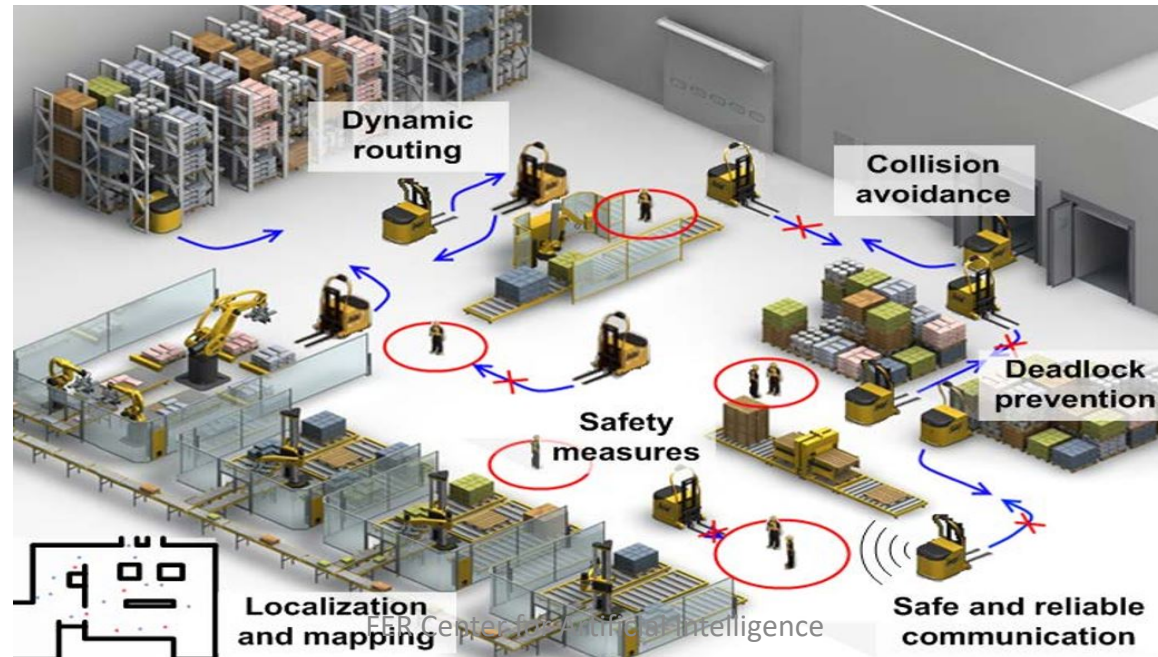
Human-Oriented Technologies Laboratory

- Prof. Igor S. Pandžić

- Selected projects:
  - Character animation and Facial Features Tracking



Image courtesy: Visage Technologies

Laboratory for application of information technologies in education

- Prof. Ivica Botički

- Selected projects:
  - Opening up education through seamless and collaborative mobile learning on tablet computers

Laboratory for Renewable Energy Systems

- Prof. Mario Vašak

- Selected projects:
  - 3Smart: Smart Building – Smart Grid – Smart City
  - Development of a System for Predictive Control and Autonomous Trading of Energy in Buildings
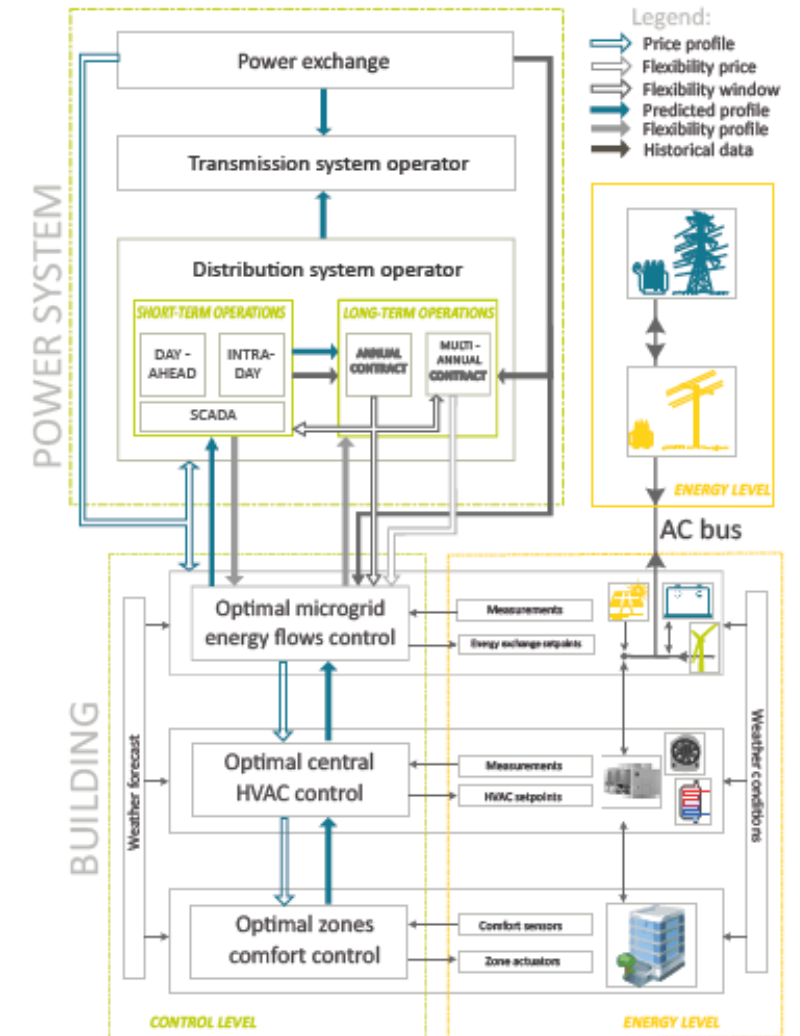
Data Streams Laboratory

- Prof. Krešimir Pripužić

- Selected project:
  - Efficient real-time processing of fast geospatial data
  - Integrated system for protection of cyberfraud (e.g credit card fraud)

Laboratory for Assistive Technologies and Alternative and Augmentative Communication

- Prof. Željka Car

- Selected projects:
  - Strengthening national capacity for application of assistive communication

Thank you

- Contact:
  - Center for Artificial Intelligence
  - Faculty of Electrical Engineering and Computing
  - University of Zagreb
  - https://cai.fer.hr

  - Prof. Sven Lončarić, Director
  - Sven.Loncaric@fer.hr