Conasense: a world-wide foundation

Leo P. Ligthart
Chairman Conasense
Presentation BoG IEEE-AESS
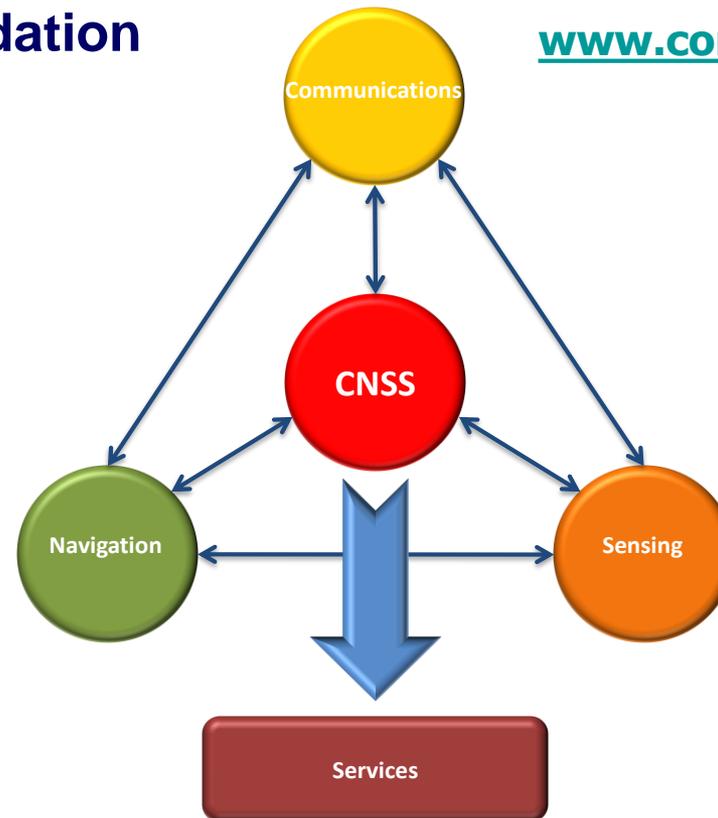
Support

IEEE-AESS, ...
EuMA, ...
EU, ESA, ...
Multi-national programs
Academy of science per country
Engineering societies per country
Prioritized programs per country

Conasense initiators:

Prof. dr. Leo Ligthart
Prof. dr. Ramjee Prasad
Prof. dr. Marina Ruggieri
Dr. Homayoun Nikookar

River Publishers Series in Communications

CONASENSE
Communications, Navigation, Sensing and Services

Editors
Em. Prof. dr. ir. L. P. Ligthart
Prof. dr. R. Prasad

River Publishers

Preface

1: **CONASENSE: A New Initiative on COmmunication, NAvigation, SENsing and Services, L P. Ligthart**
2: **"Integration of Communications, Navigation, Sensing and Services for Quality of Life: Challenges, Design and Perspectives", M Ruggieri, R Prasad, M De Sanctis, T Rossi, S Morosi**
3: **"Flexible Intelligent Heterogeneous Systems for Enhancing Quality of Life", E Del Re**
4: **"CONASENSE as cross-cutting challenge – a Dutch perspective based on IIP Intelligent Communication", E R Fledderus, H Eertink, P Essers**
5: **"Mimo systems and application to brain computer interface by using EEG", S Pupolin**
6: **"Multimedia and network quality of service", O Asenov, V Poulkov**
7: **"Potential applications and research opportunities in the Conasense inititiative", M Şafak**
8: **"Green wireless sensor networks with distributed beamforming and optimal number of sensor nodes", H Nikookar**
9: **"Battle on frequency spectrum use for radio navigation and radio communications: It cannot go forever – We have to find the solution!", D v Willigen**

CONASENSE CHARTER: "Hollistic exploitation of the electromagnetic spectrum", O Lauridsen

CONASENSE Essentials

- R&D Think tank which sets the vision and roadmap on future Communication, Navigation, Sensing and Services
- Working programs on integrated COmmunications, NAvigation, SENsing, SErvices with potential impact at a global scale
- Harmonization of initiatives with global support from Academia, Research Institutes, Companies, Policy Makers, Regulators and User Groups
- To organize Futuristic Annual and Topical Conasense workshops

CONASENSE Field of Interest

To integrate academia, industries, research centers, institutes and organizations in an effort to build up the long-term vision for the convergence of communication, navigation, sensing and services

CONASENSE Strategy

To merge the research innovations from three different worlds towards ubiquitous and consistent access by users to the world of services and in support to generalized user mobility

Why CONASENSE?

- **Answer to the rapidly evolving and radically changing of the way traditional communication and services are being used, wanted and performed**

- **Personal mobile devices gain a new dimension, meaning not merely mobile phones but capable of :**
  - **Sense and communicate over radio**
  - **Locate and communicate over radio**
  - **Act and communicate over radio**

Which future for CONASENSE?

The future of CONASENSE lies in how fast people adapt to changes offered by the convergence of "communications, navigation, location, manufacturing" and how we develop "super" applications that advance the society and human needs

Role of CONASENSE for Business Creation
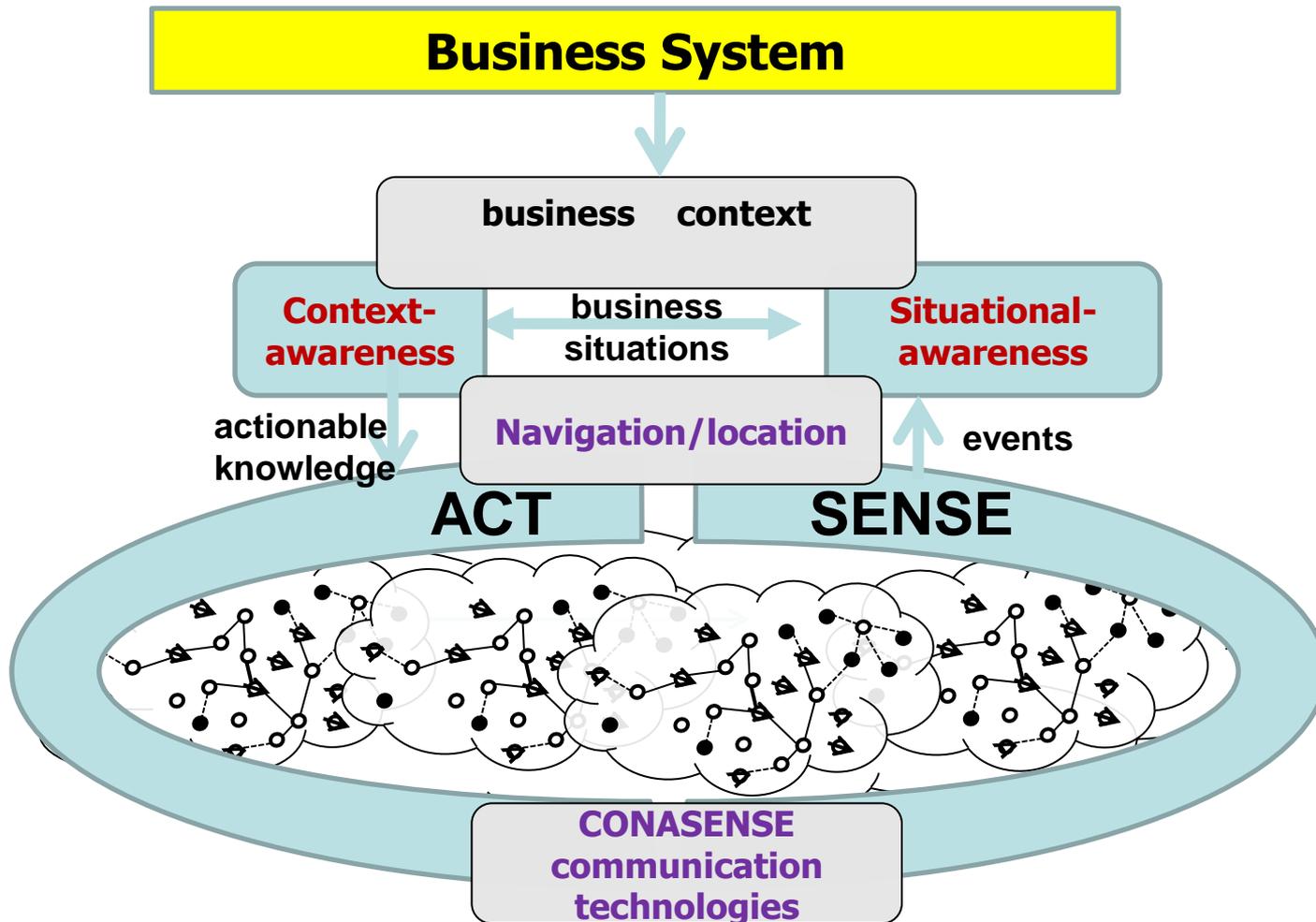
CONASENSE Conceptual Pillars

- **A wide range of novel converged services, applications, technologies and business models**

Technology innovation

Education with new technologies

Research

Standardization

Access to Global markets
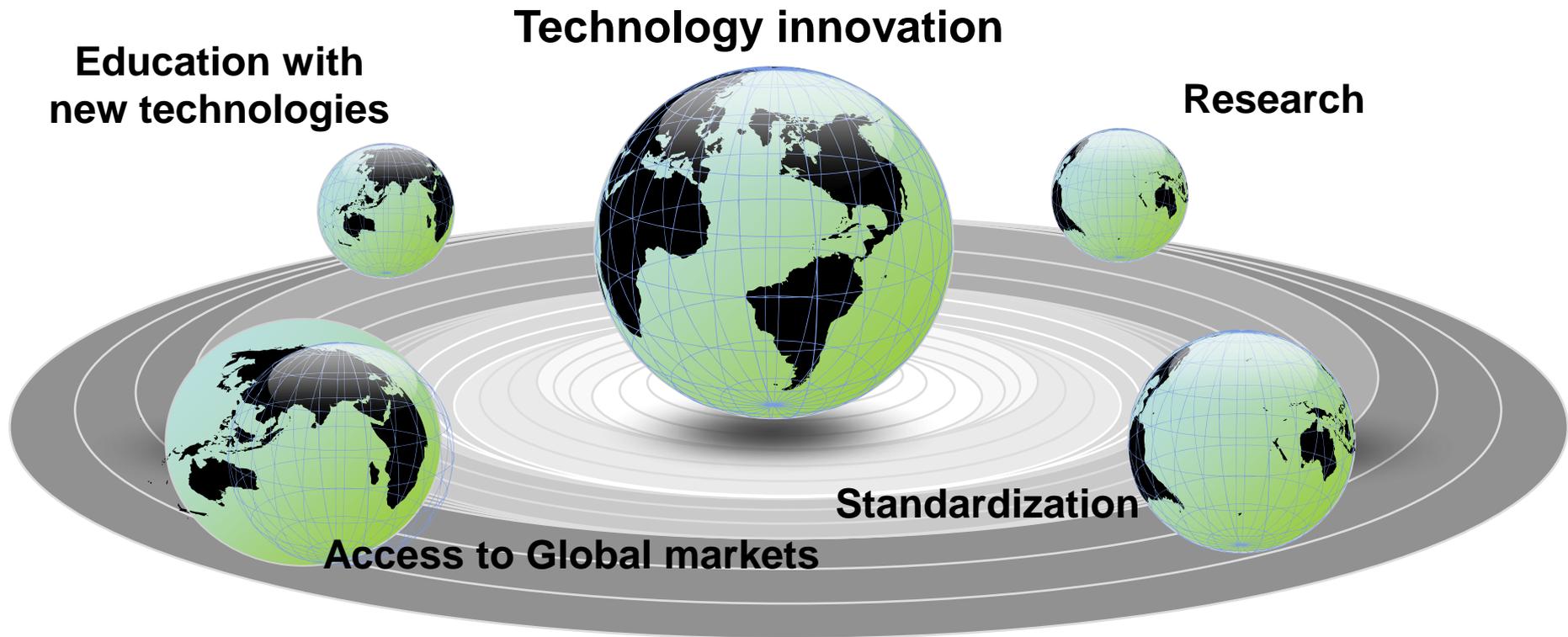
Conasense topical areas

Strategy for and design of integrated systems
Knowledge on user requirements at system level and the various types of user interfaces
    (terminals, equipment, person to machine, M2M)
Services needed at short / medium / long-term
  Disaster monitoring and real-time management
  Network supporting services in emergency applications
    including terrestrial / satellite-assisted localization and communication functions
    Emergency and crisis management
    Searching a missing person
  Tele-health services (including telemedicine self-care and assisted services)
    Sensing (electronic nose, eye and tongue)
  Road traffic and vessel traffic optimization
  Environmental monitoring and protection, oil spill
  Precision agriculture / farming
  Security

Scenarios

Scenario 'Health and well-being in 2025'
    people confronted with a sudden emergency situation
    people experiencing daily living difficulties at home
    cost control of cure (hospitals, care centers, tele-care providers, care chain)
    healthier lifestyle, prevention and well-being
Scenario 'Smart energy in 2020'
    support for electric cars, smart metering, tariff differentiation
Scenario 'Smart mobility in 2020' for people and goods with improved user mobility as
    reducing traffic jams, increasing throughput and safety support

Two themes as focus for 2014 + 2015:
"Health" and "Quality of Life (QoL)"

**Cross fertilization with other disciplines is most appreciated by societal and/or
granting organization**
First choice for QoL, in which also health and well-being issues are included
For defining the subjects different disciplines are involved (in next slides 2 examples are given)

Other potential services in the theme "Health" may include
> **track the health conditions of pregnant women + unborn baby**
> **health problems of elderly people**
> **supportive means for patients suffering Alzheimer**
> **support in medical care**

Stroke rehabilitation:
Real time EEG signal analysis and robot assisted movement learning

UNIVERSITÀ
DEGLI STUDI
DI PADOVA

EEG acquisition unit   **PHANTOM Robot**

Competences needed

1. Neurophysiological
2. Physiotherapic
3. MIMO
4. Radar
5. Robot interfacing
6. Signal processing
7. Statistical analysis

Robot control unit

Signal processing unit

Domain challenge in healthcare and well-being	Description
Waiting lists	Societal most pronounced and commonly known challenge: the need to wait before treatment can occur in hospitals, health centers or at medical professionals
Lack of personnel	Especially in care: nursing professions and informal care. We have an ageing society, which leads to a higher demand for care in combination with a reduction of the work-force
Lack of resources, e.g. expensive MRI scanners	Cost of procurement, duplication of equipment, non-optimal scheduling, waiting lists
Dealing with increased availability of new treatments	Due to scientific developments, the number of possible treatments increases
Fragmentation of care organization	• Market is difficult to penetrate for newcomers • High entry costs – economies of scale difficult to achieve due to fragmentation • No clear problem owner, inhibiting the uptake of innovations • Hard to keep track of overall 'patient' process
Financing structure	No clear problem owner, inhibiting the uptake of innovations

Cross-cutting challenges

•How to deal with reliability and prioritized *communication* over heterogeneous networks? (COnasense)

•What are requirements and technologies for open application platforms in order to effectively support third party applications and services (e.g. basic platform services and software-development-kits)? (conasenSE)

•How to access, exchange, provide and control *data coming from various sources*, complying with standards while ensuring privacy and scalability? (conaSENse)

•Significantly increase the availability of solutions in domains with strong availability requirements. Implementation and up scaling of new *(communication) networking* and service technologies in domains may require new concepts. (COnasense)