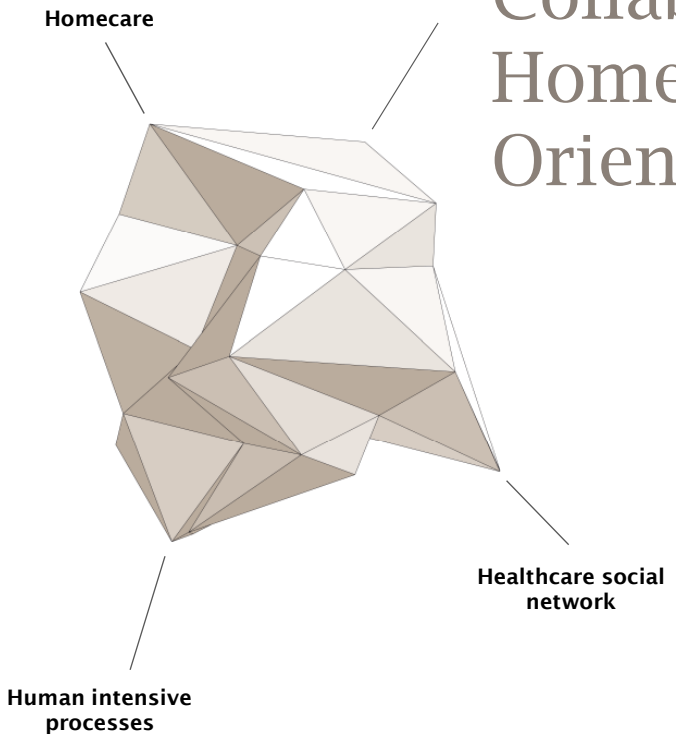
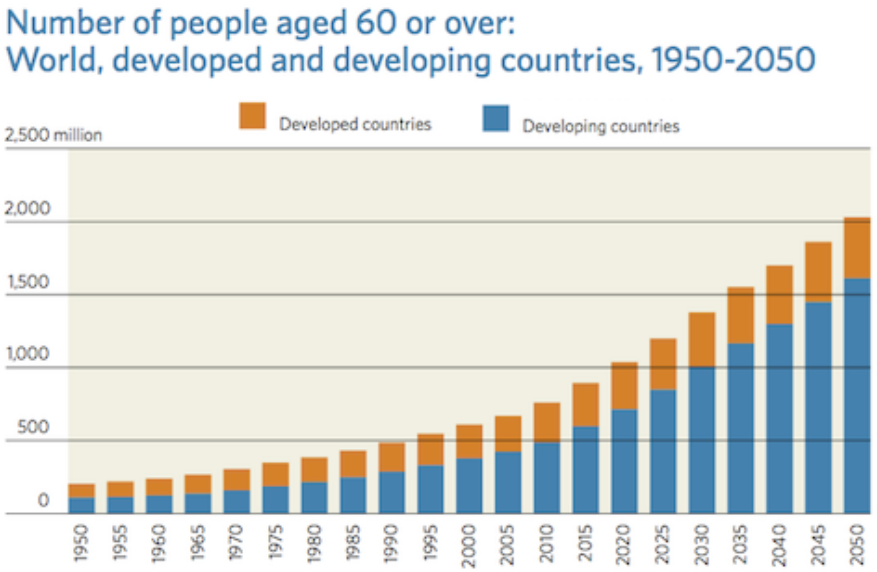
The Seventh International Conference on eHealth, Telemedicine, and Social Medicine

CyMED: a Platform for Supporting Collaboration and Coordination of Home Care Teams using a Process Oriented Approach

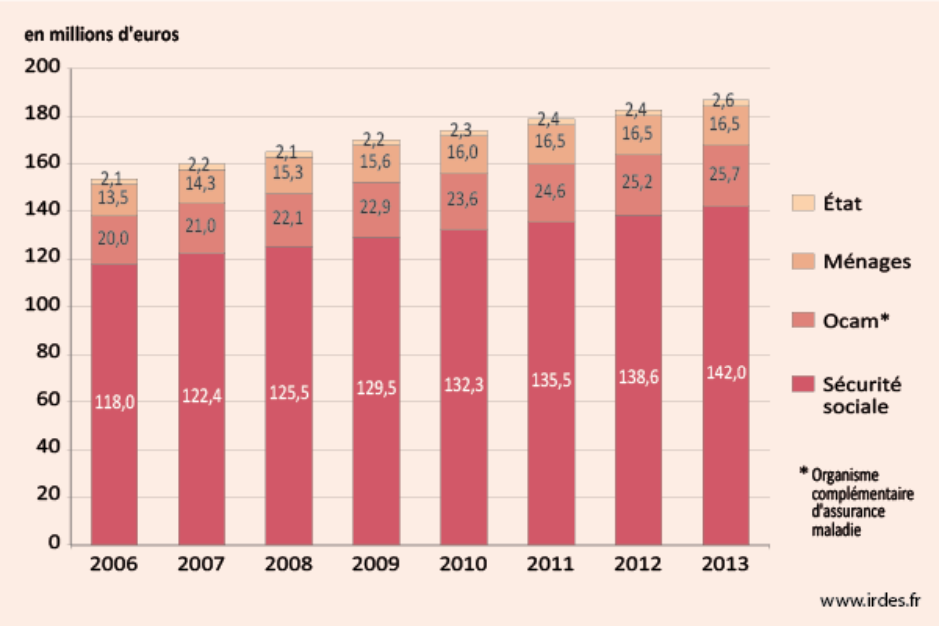


Awatef Hicheur Cairns,
Nathalie Dos Reis,
Andrew Cairns,
Christophe Lefrère,
Gilles Leloup,
Jean-Luc Strauss

Context

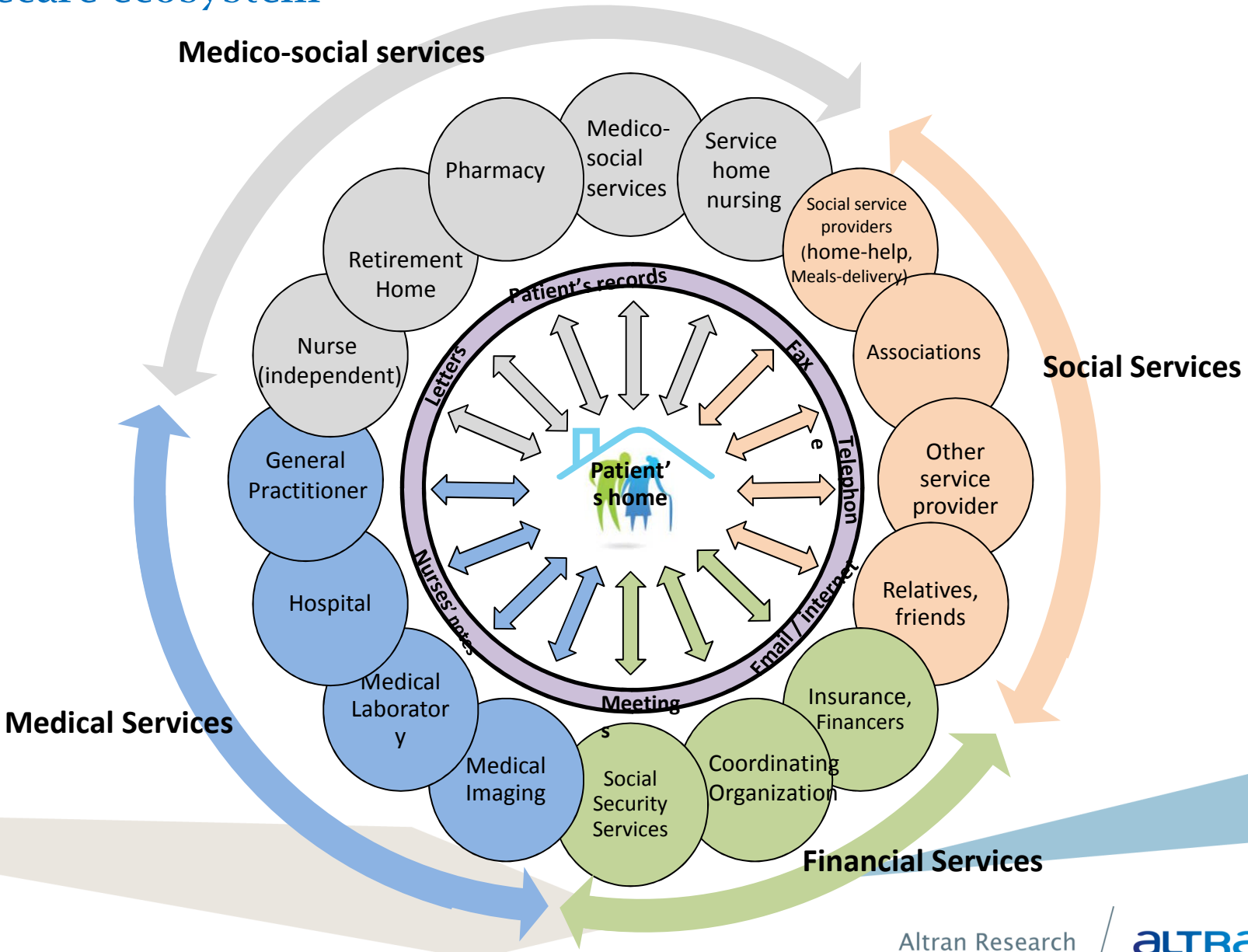


Evolution of Health Care Financing (in Billions of €)



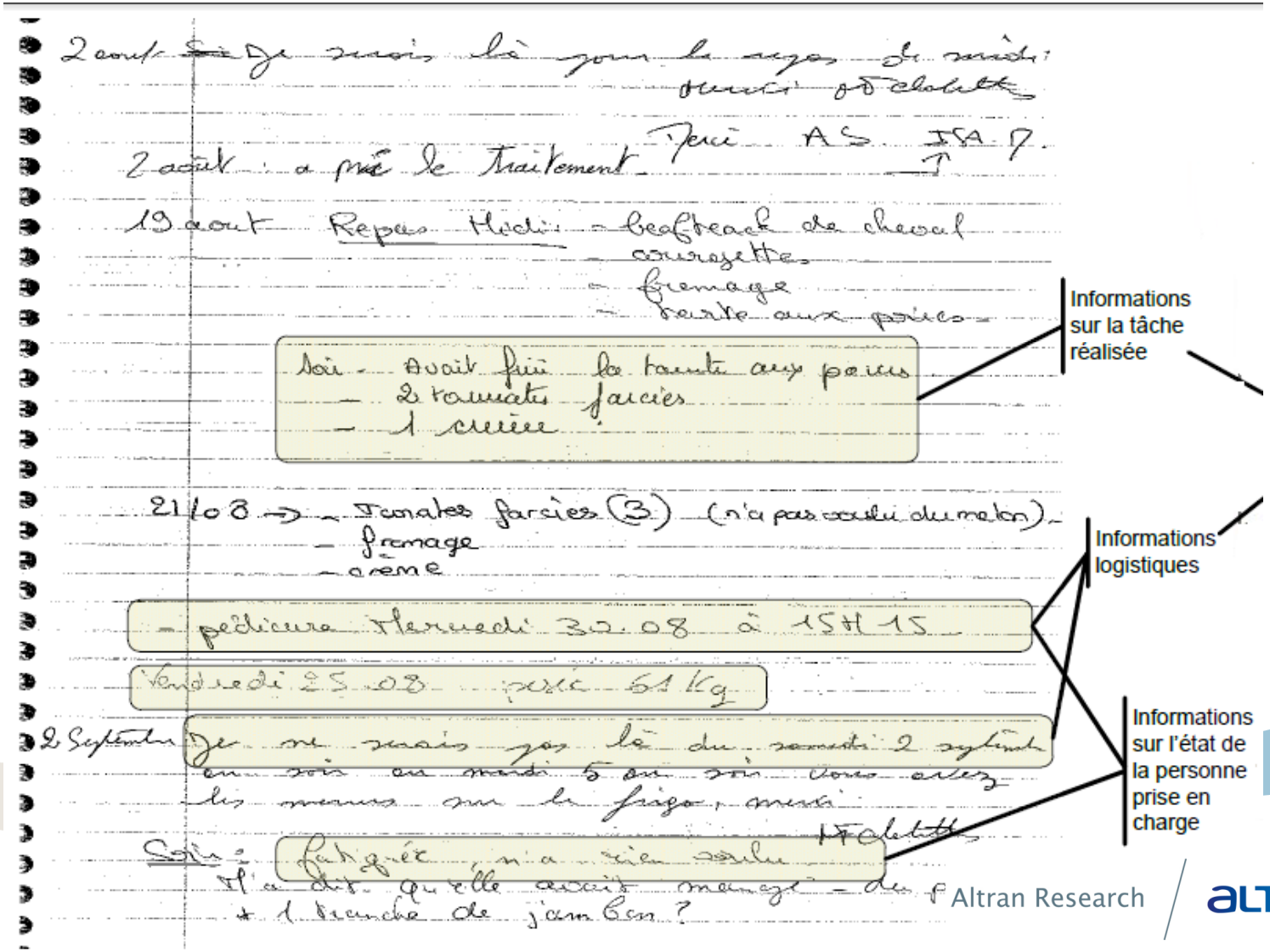
- Optimize the way health services are provided →
  - Collective services at home
  - Home Health-Care + e-Health

Homecare ecosystem

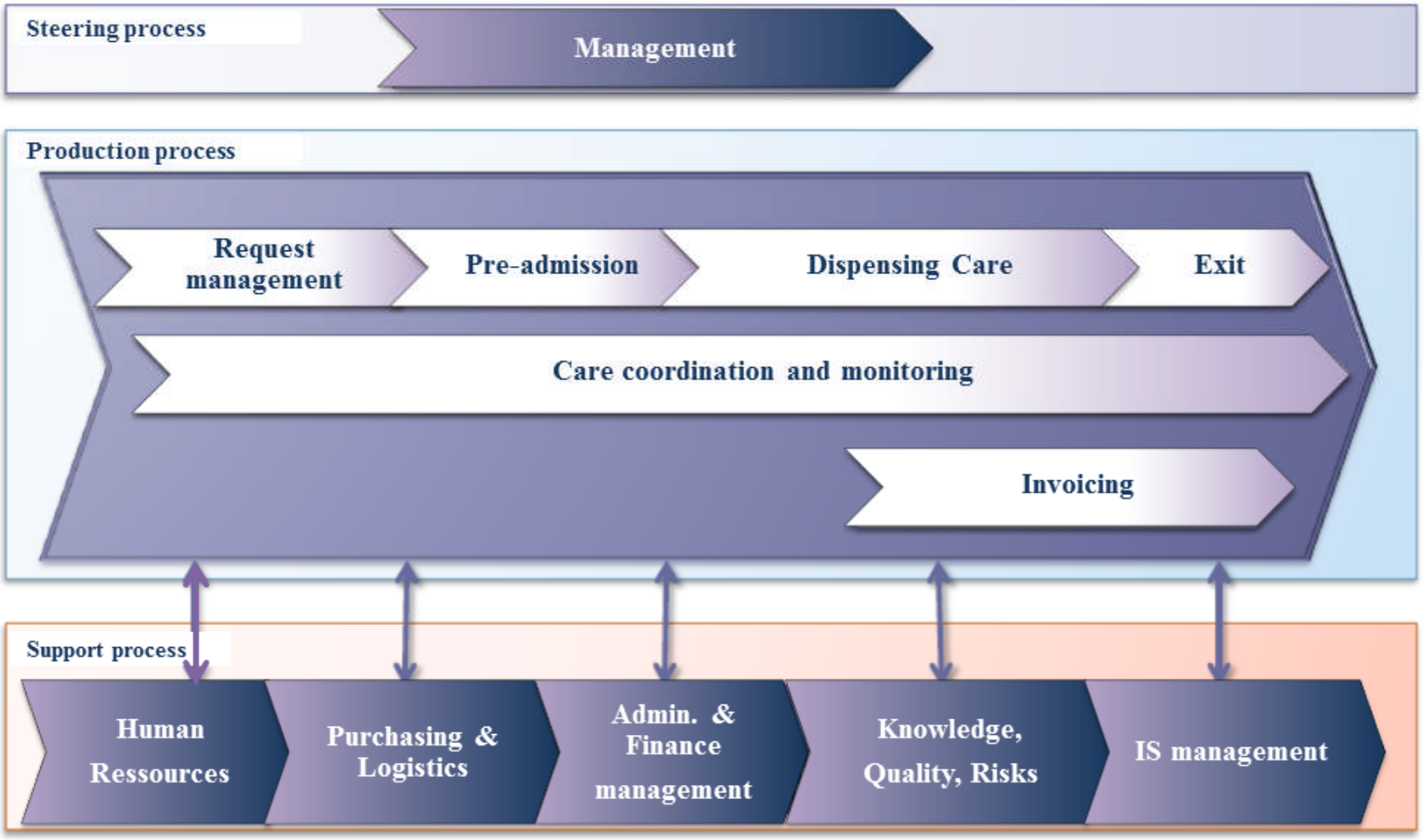


Homecare ecosystem

- Coordination media: nurses' / service providers' logbook



Homecare **processes** map



Characteristics of Homecare processes

✓ Personalized

- Each patient has specific conditions and hence personalized process

✓ Collaborative under a loosely-coupled governance

- Responsibilities are distributed between different organizations delivering services of diversified nature

✓ Dynamic

- Adaptation of the processes to take into account exceptions.

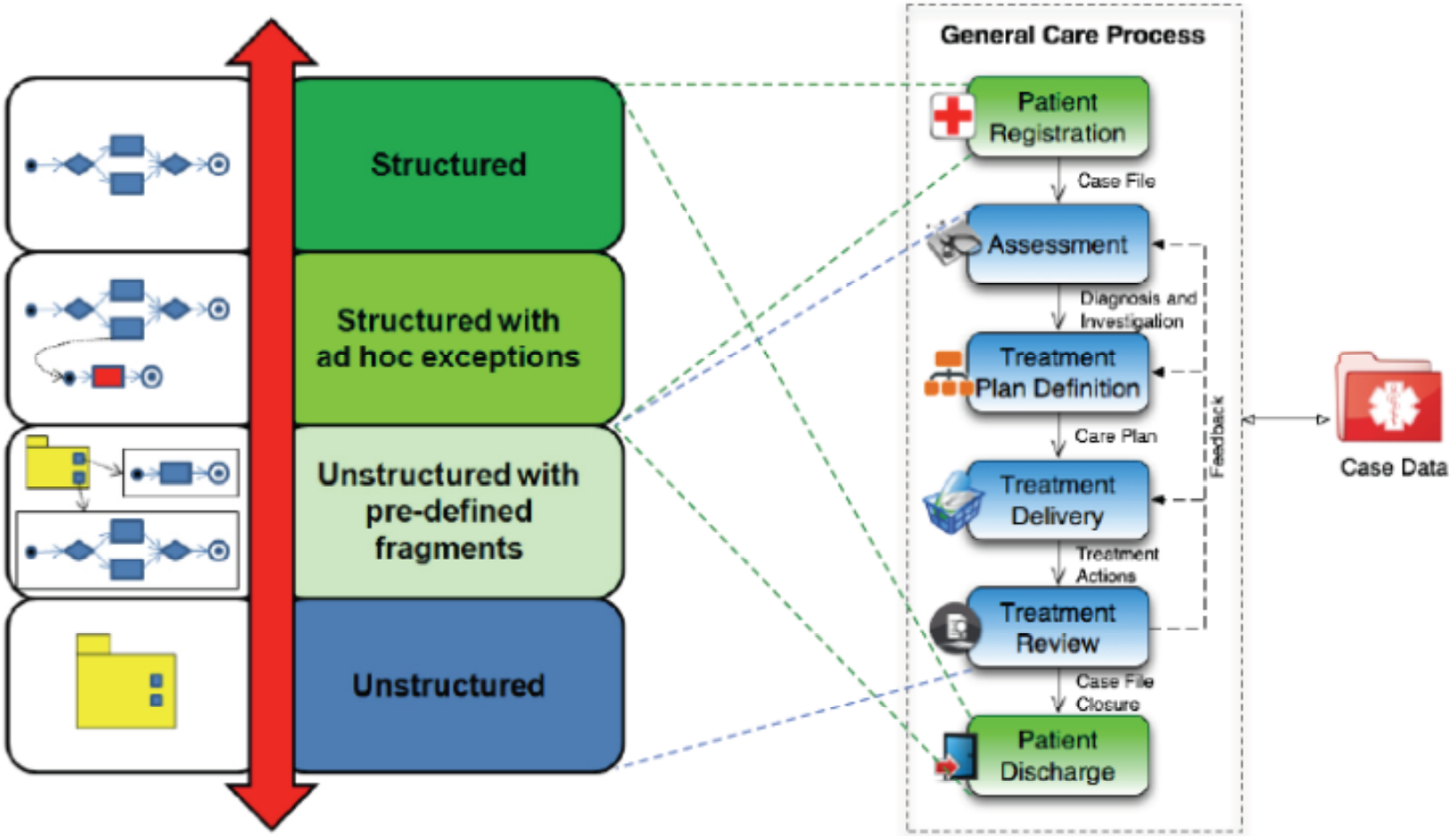
✓ Time constrained

- the defined personalized patient agenda is constrained by a protocol listing the various tasks with different temporal characteristics (scheduled, non-scheduled, changes in frequency over time, etc...), but subject to random changes

✓ Regulated

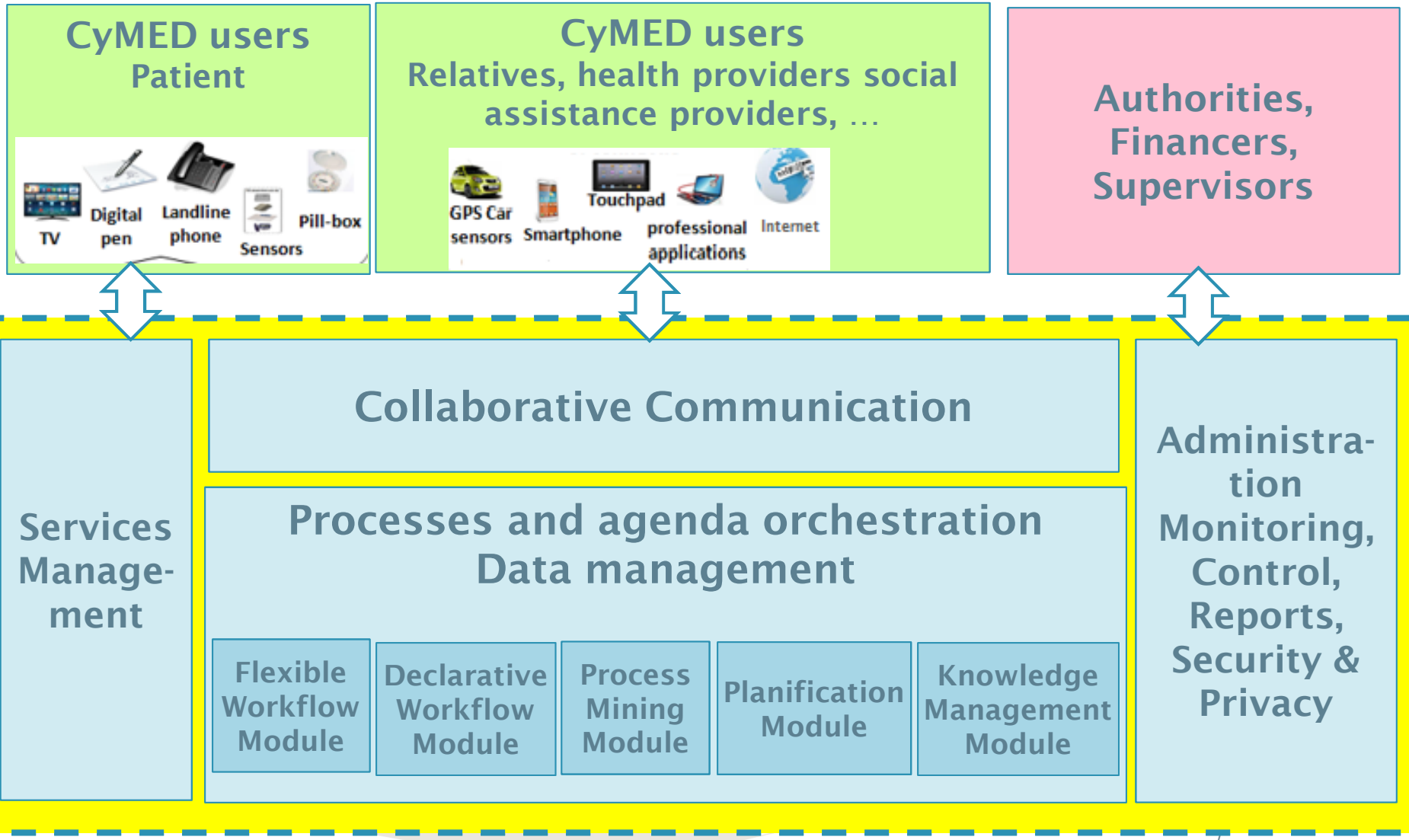
- Healthcare protocols, data privacy and actions' traceability.

Types of home care processes



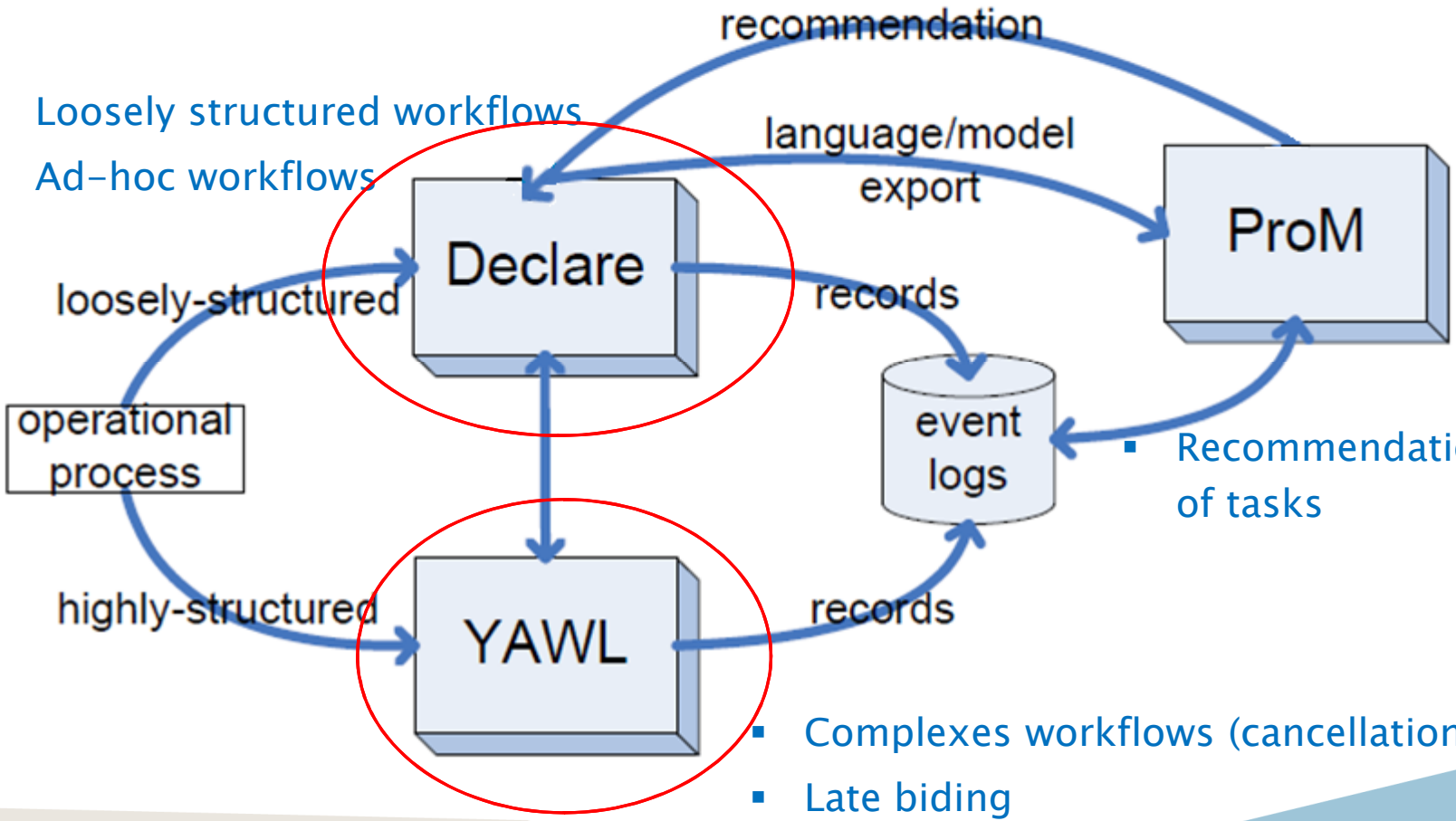
Source : Claudio Di Ciccio and al. "Knowledge-intensive Processes: An Overview of Contemporary Approaches", CEUR Workshop Proceedings, Vol. 861, pp. 33, 2012

CyMED: a platform to help manage Home Care processes smoothly with efficiency and patient comfort oriented



A Flexible workflow engine to manage homecare processes and a Process mining engine to generate recommendations

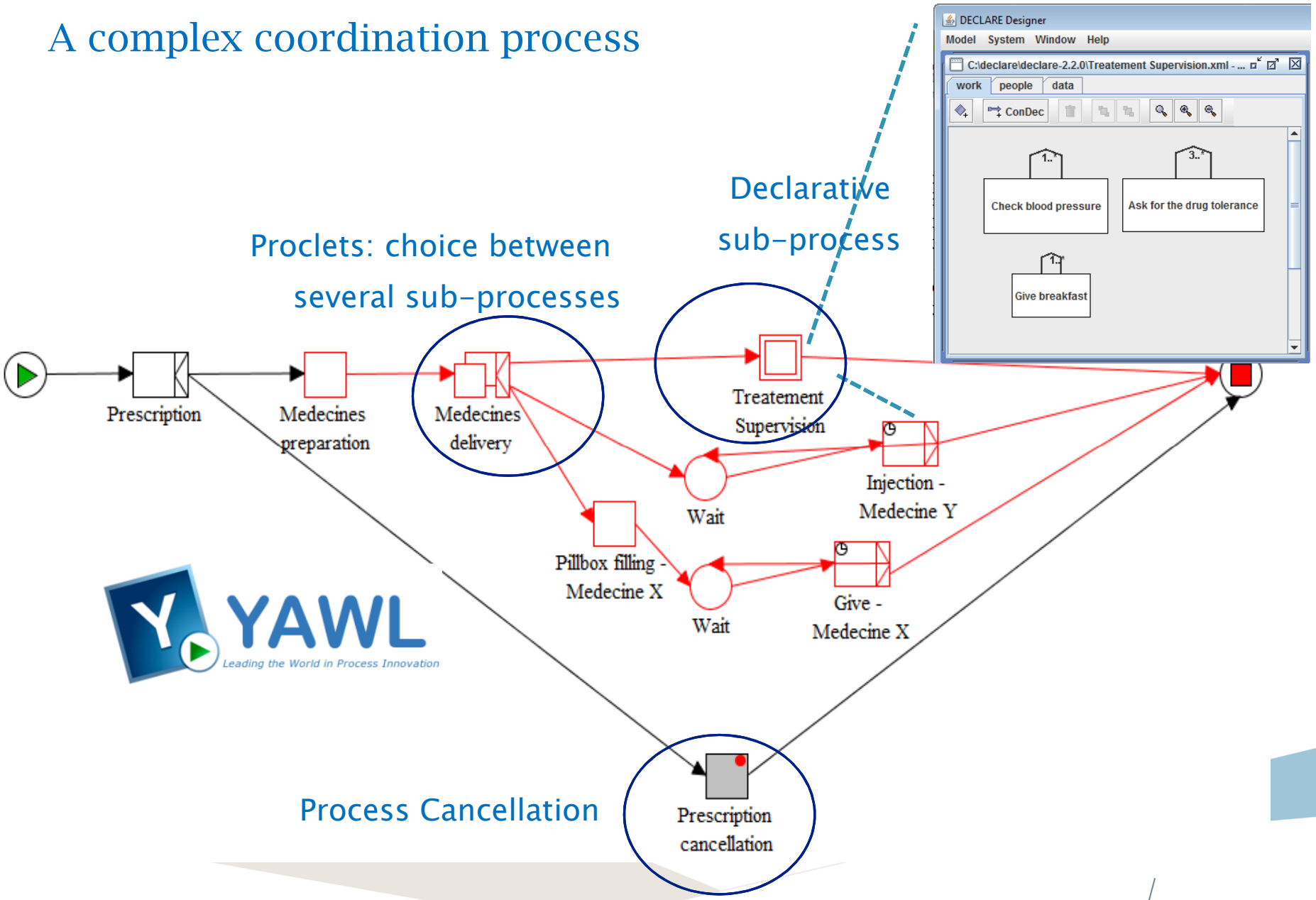
- Loosely structured workflows
- Ad-hoc workflows



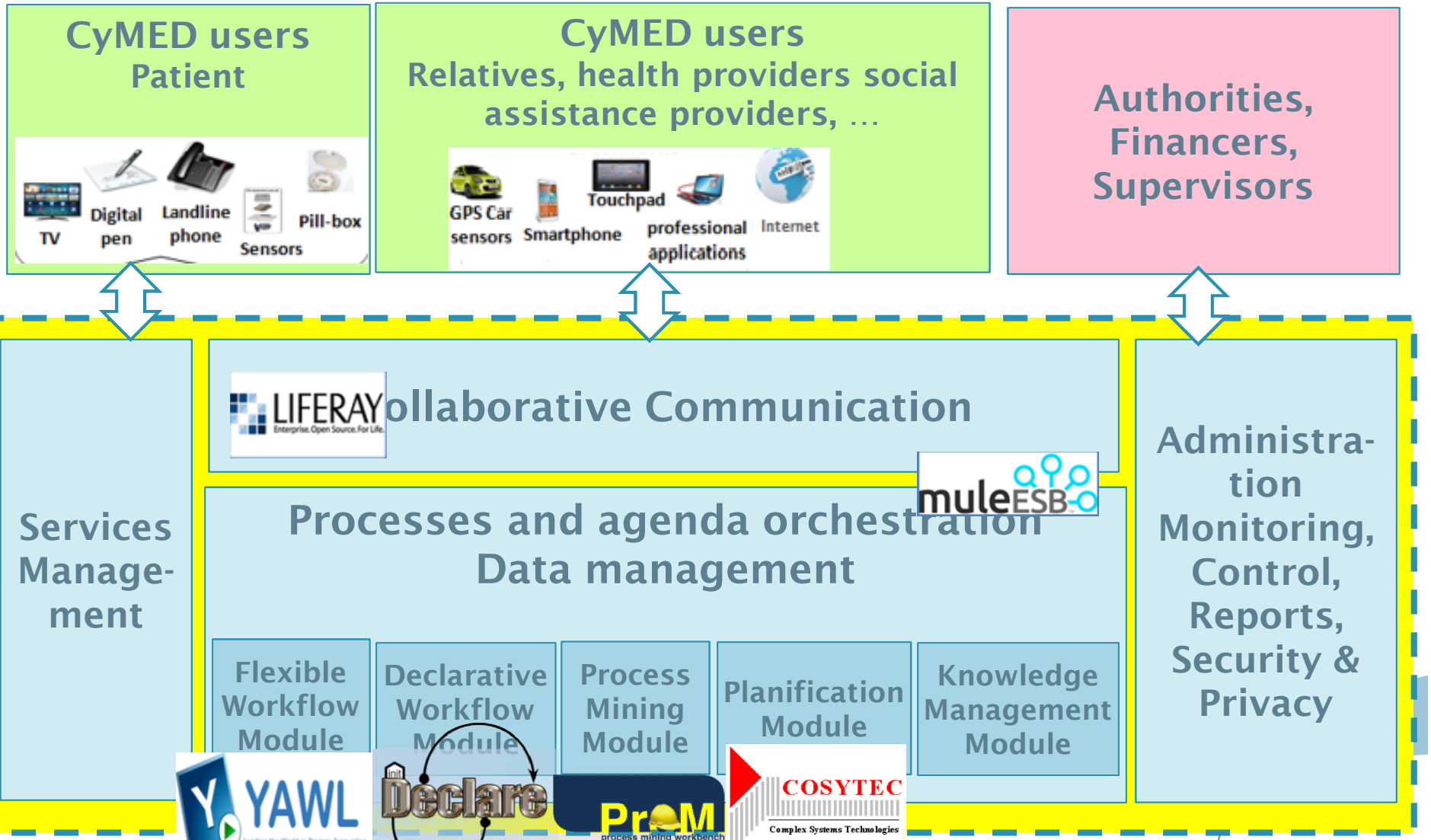
- Recommendations of tasks

- Complexes workflows (cancellation,..)
- Late biding

A complex coordination process



CyMED: Technology Stack



CyMED main services : The homecare social network

Community group

- **Private group**
  - Dependant person group, including: referent, GP, specialized doctor, paramedical, home-helper

Community Objectives

Inform
News wall

Communicate
Private messenging

Plan
Appointments management

Follow up
Treatment and other tasks tracking

Alert
Emergency notification

Geolocate
Community member positioning

CyMED main services : The homecare social network's KPI

Social network capital	■ Number of contacts with a direct relationship with the patient and thus part of its private community ➢ It is measured by yearly total volume of contacts, vol. and % of contacts /category
Number of social network gaps	■ Number of contacts categories (e.g. generalist practitioner) within a patient private community with no contact. It may lead to automated caregivers recommendations. ➢ It is measured by total volume of contacts categories with 0 contact per private community.
Patient medical data exceptions	■ Number of patient health abnormal data requiring to take action, e.g.: number of medications administrated but not taken. ➢ It is measured by daily total volume of exceptions notified
Level of engagement the community	■ Number of new events (direct messages, posts, meetings, tasks or alerts) submitted by private community members ➢ It is measured by monthly total volume of events generated by the private community, or by a category of the community or by a member of the private community
Quality of service provided by the community	■ Share of alerts and/tasks managed and completed by the private community ➢ It is measured by monthly total volume of managed alerts and total volume of completed tasks by the community, or by a category of the community or by a member of the community

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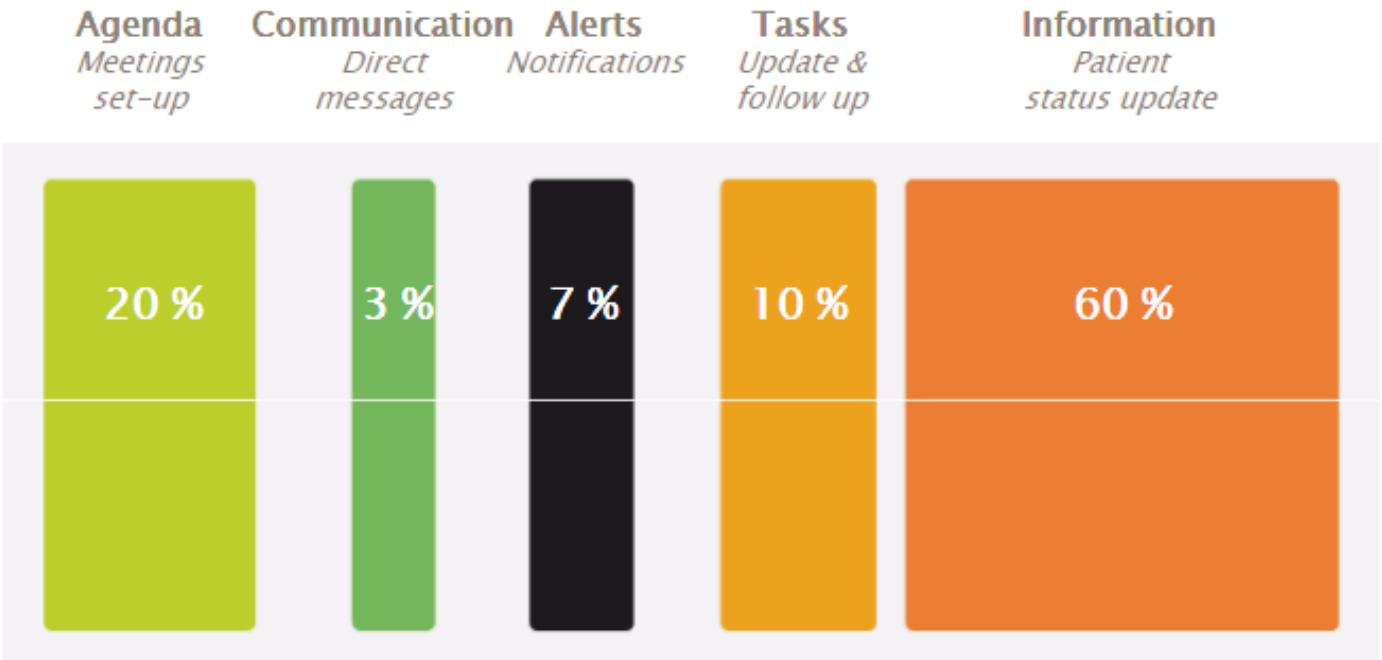
CyMED main services : The homecare social network's KPI

- Patient network engagement level

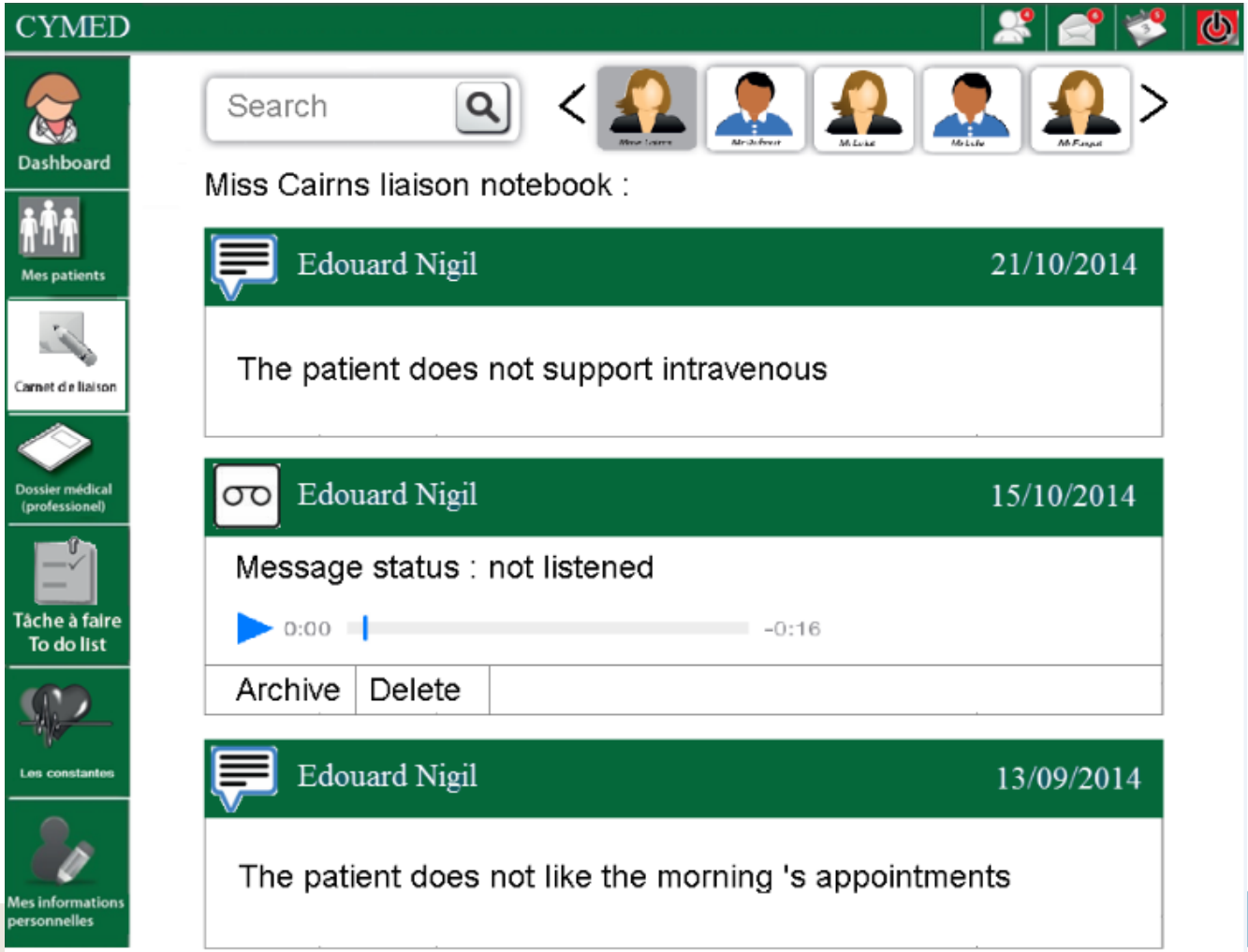


Level of engagement may be measured at the scale of:

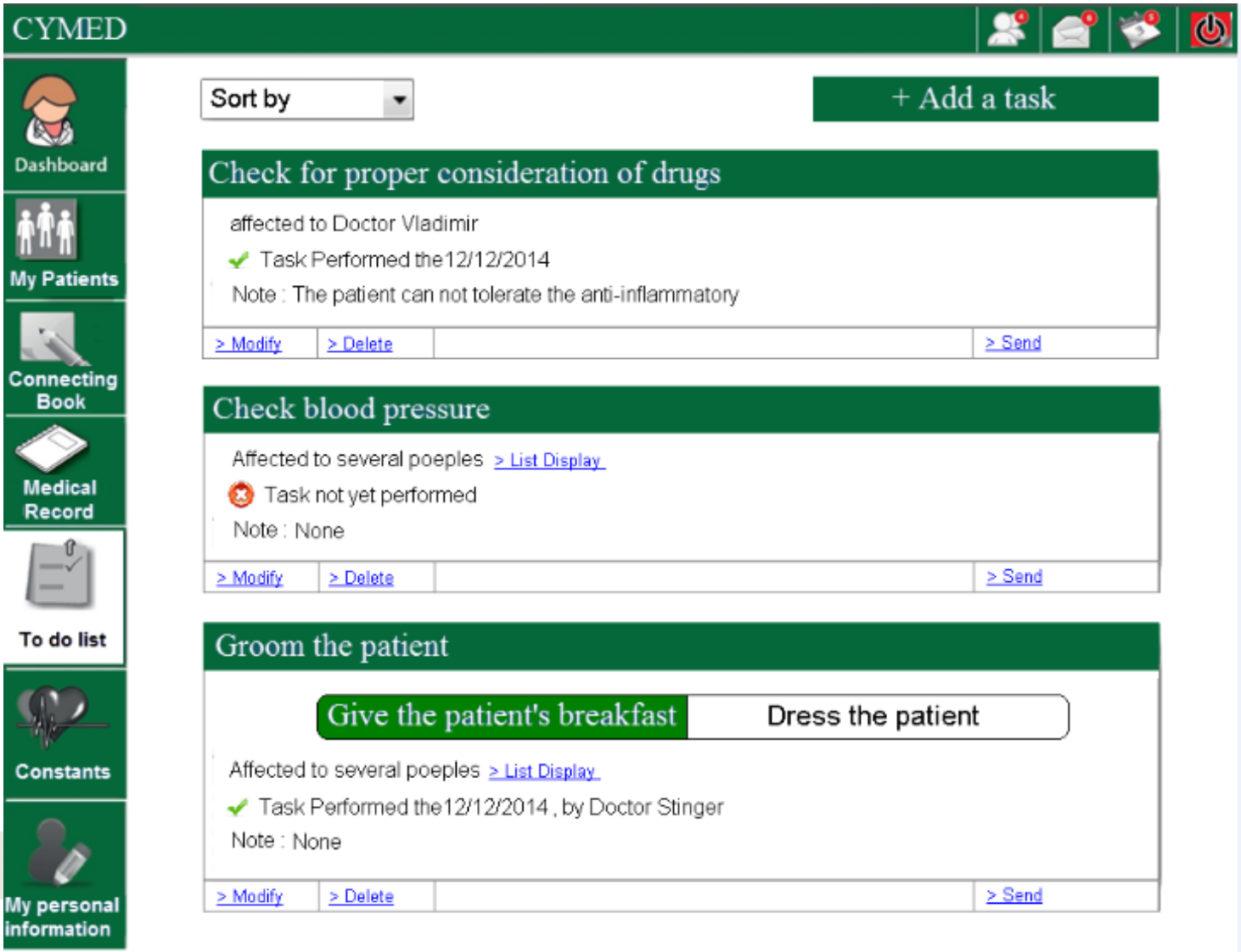
- the whole private community
- a category of the community (e.g. doctors)
- a member of the community (e.g. the patient's son)

1. **High level of community engagement and interaction**: *120 interactions/year*
2. **Predominant use of information and meetings set-up**: *80%*

CyMED main services : liaison notebook



CyMED main services : The to-do-list



CyMED main services : The optimal planning service

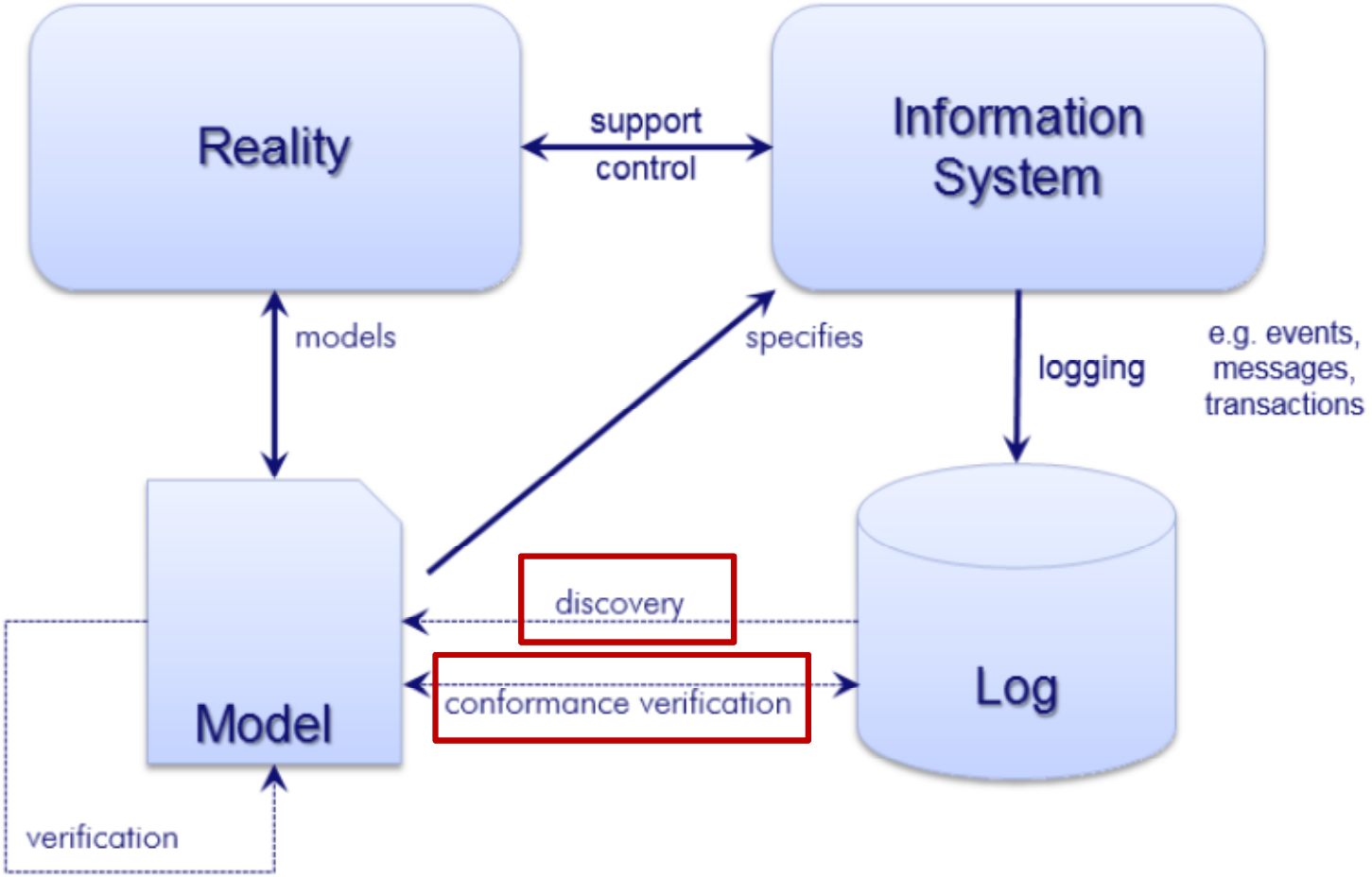
➢ General constraints

- ✓ Matching between availability of patients and various actors
- ✓ Automatic reschulding when an actor fails to fulfill its tasks with minimal perturbation regarding the protocol constraints
- ✓ Delivery of material resources before their use by qualified personnel
- ✓ Usability delays of perishable material resources
- ✓ Qualifications required for person carrying out action / providing care
- ✓ Synchronization of stakeholders involved in the case of shared visits
- ✓ Minimum waiting time between successive visits
- ✓ Precedence of tasks (coordination workflows)

CyMED main services : Health monitoring and detection of loss of autonomy

- Prevent degradation of the patient's status
- Based on information reported by:
  - ✓ sensors used at home
  - ✓ comments from the patients and their homecare providers
- Detected risks trigger
  - ✓ A reorganization of the care process
  - ✓ Alert the members of the patient's community
    - Alert thresholds customized per patient
    - Diffusion process depend on the patients' context

Process Mining

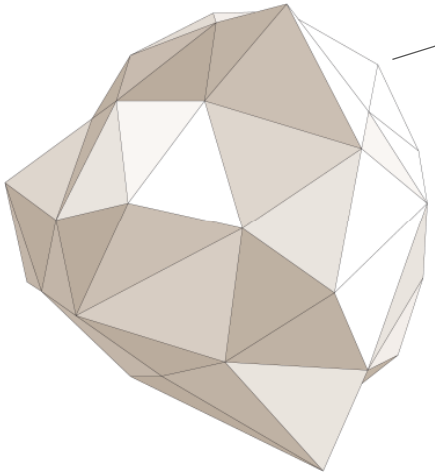


Conclusion and future works

- An efficient coordination approach using **advanced process oriented technologies** for data sharing, communication, process orchestration and resource planning.

- Future works
  - Deploy CyMED in real-life environments;
  - Implement and synchronize the optimal planning service with YAWL system;
  - Customize DECLARE constraints for homecare;
  - Introduce ontologies to represent domain knowledge;
  - Use process mining to improve homecare processes;
  - Adapt the recommendation mechanism of DECLARE to homecare.

INNOVATION MAKERS



Thank you for your attention !

Questions ?

Jean Luc Strauss (jeanluc.strauss@altran.com)

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AUTHORS: **Awatef Hicheur Cairns**, Nathalie Dos Reis, Andrew Cairns, Christophe Lefrère, Gilles Leloup, Jean-Luc Strauss

PRESENTER: Jean-Luc STRAUSS

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- Specialist in Workflow Modelling
- Thesis in 2009 with CNAM (France) on Workflow Modelling
- Currently: Research Leader on 2 Research Projects With Altran Research

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Panel Discussion Topic

Patient Self-Management Tools:

Categories of Tools and how they support Self-Management and Empowerment

Åsa Smedberg

The Department of Computer and Systems Sciences, Stockholm University

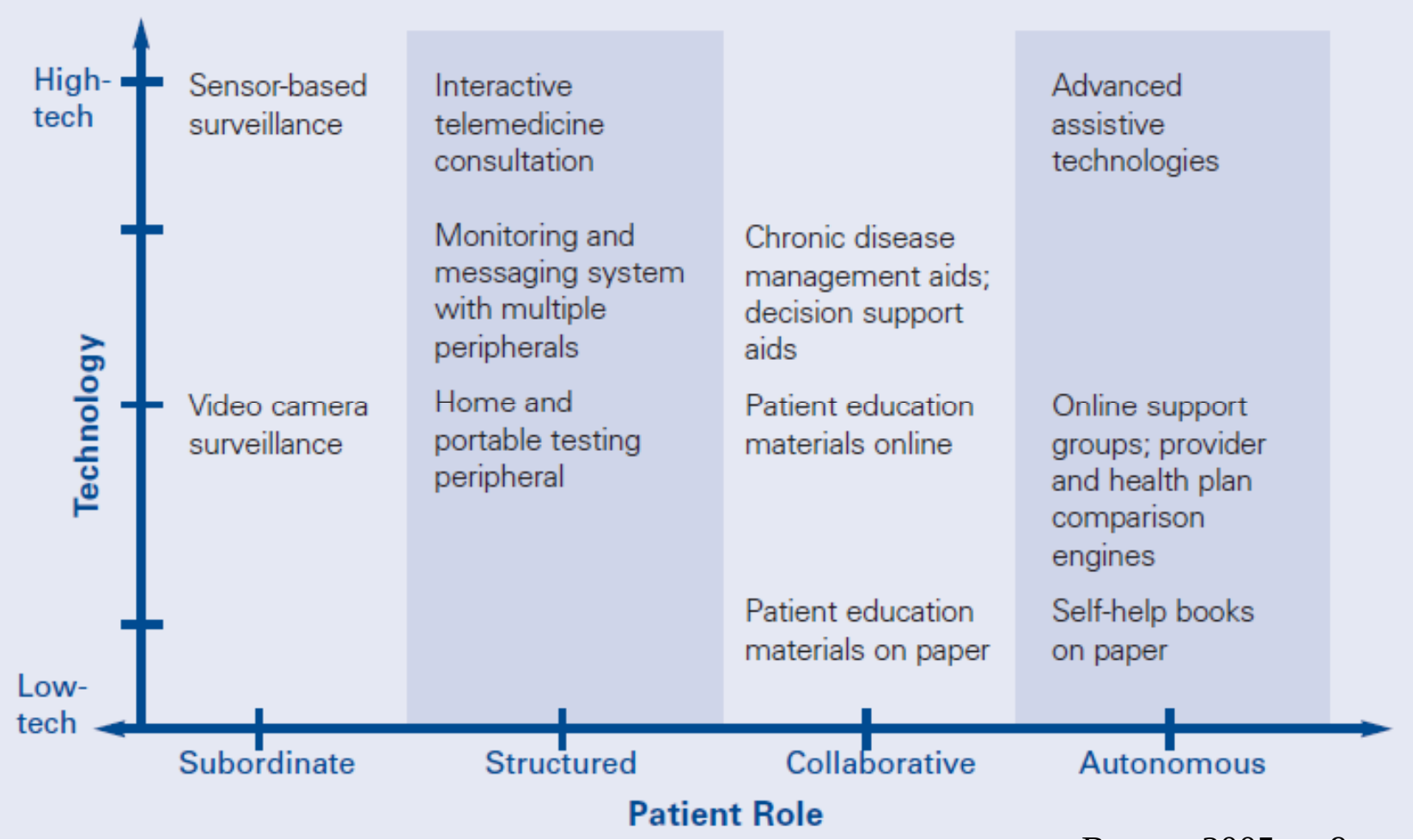
Stockholm University

Patient Self-Management

"the tasks that an individual must undertake to live well with one or more chronic conditions. These tasks include gaining confidence to deal with medical management, role management, and emotional management." McGowan, 2005, p. 3

"the individual's ability to manage the symptoms, treatment, physical and psychosocial consequences and life style changes inherent in living with a chronic condition." Barlow, et al., 2002, p. 178

Patient Self-Management Tools



Barrett, 2005, p. 9

Patient Empowerment

- Empowerment refers to
  - experiencing personal growth through developing skills and abilities along with a more positive self-image
  - ability to make personal decisions, to exercise critical thinking and to access relevant resources
  - ”power to..” and ”power over..”
- Brings new patient role and relations to healthcare

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Empowerment in Online Patient Self-Help Groups

- "Reliance on self and peers rather than on authoritative professionals contributes to gaining a sense of personal competence"

  (Barak et al., 2008, p. 1869)

- Voluntary participation and free choice contribute to feelings of self-determination
- Social engagement through helping others and socially identifying with others

Online Peer Conversations for Learning

- **Statements**
- **Requests on neutral issues - fact queries**
- **Requests on personal issues:**
  - ✓ **Setbacks**
    - –Personal experiences of recurrent breakdowns
  - ✓ **Obstacles**
    - –Foreseen difficulties to overcome
  - ✓ **Incentives**
    - –Motivational factors, induce action or motivate effort

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Suggested Discussion for the Future…

- What is needed to successfully address self-management and the use of tools for patients and their close ones?
- Are there obstacles? How to overcome?
- New criteria for measuring effectiveness of patient care….

HealthCare Platforms: Lessons Learned and Future Challenges

Piotr Bała
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Healthcare platforms – lesson learned

- Web access, mobile devices are popular and attractive both to the users and developers
- The use of telemedicine solutions increases
- New technical solutions such as robots (daVinci)
- There is significant progress in the HCI, especially to enter and display data on the mobile devices
  - still formal problems while used for diagnosis and medical treatment
- The data has to be store and process somewhere (cloud, grid, …)
  - Security is a concern
  - Formal problems including different national regulations
- There are some application areas where data cannot be processed using smartphone, tablet or PC.

Healthcare platforms – challenges

- There are some application areas where data cannot be processed using smartphone, tablet or PC.
  - Genetics based treatment (NGS,…)
  - Image processing
  - Personalized medicine
  - Surgery planning
- Example approaches:
  - Virtual Physiological Human
  - Human Brain Project
- Requirements:
  - Store and process large data sets in the short time (minutes note days)
  - Strong security
  - Easy of use

Four (modest) lessons learned

eTELEMED 2015
Panel discussion on Health Care Platforms:
Lessons Learned and Future Challenges

Ruud Janssen
Research Group IT-innovation in Health Care
Windesheim University of Applied Sciences
Zwolle, The Netherlands

Windesheim

SenseMedic & DiMove: real-time medication monitoring

Evidence is just one way to convince stakeholders (and often it's not enough)

Panel discussion, eTELEMED 2015, Lisbon, Portugal, 22-27 February 2015

Windesheim

HighTech@Home: open source home care technology

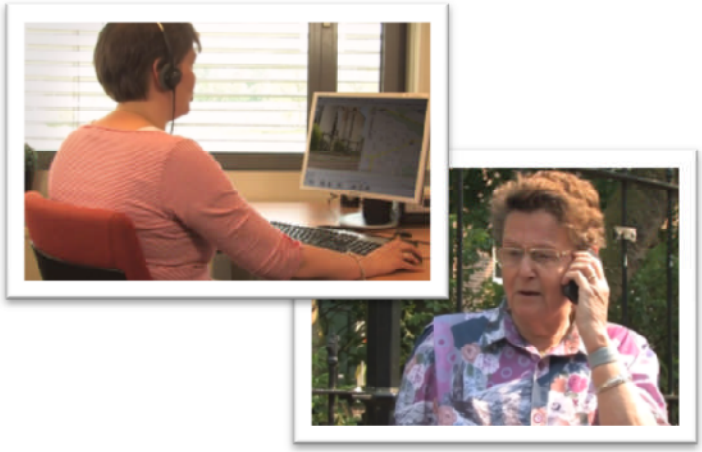
Open Source is not about cost savings,
it is about investment

Panel discussion, eTELEMED 2015, Lisbon, Portugal, 22-27 February 2015

Windesheim

TalkMeHome: guiding a lost person home safely

A seemingly straightforward task can in fact be very complicated



Panel discussion, eTELEMED 2015, Lisbon, Portugal, 22-27 February 2015

The Smart Floor: fall detection

Even an obvious solution needs someone willing to own the problem

Panel discussion, eTELEMED 2015, Lisbon, Portugal, 22-27 February 2015