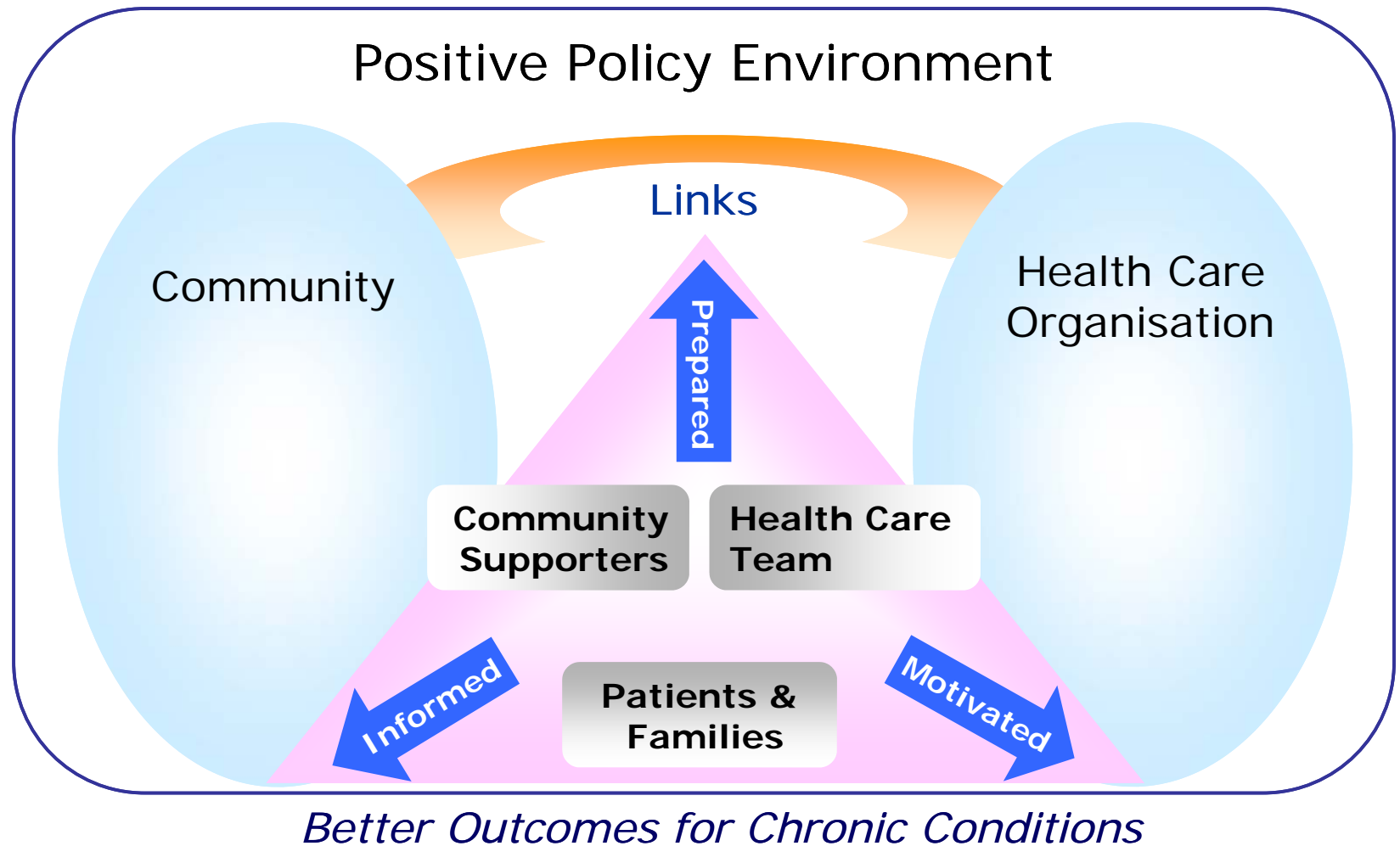


# A knowledge-acquisition framework to facilitate the development and reengineering of care plans in electronic format

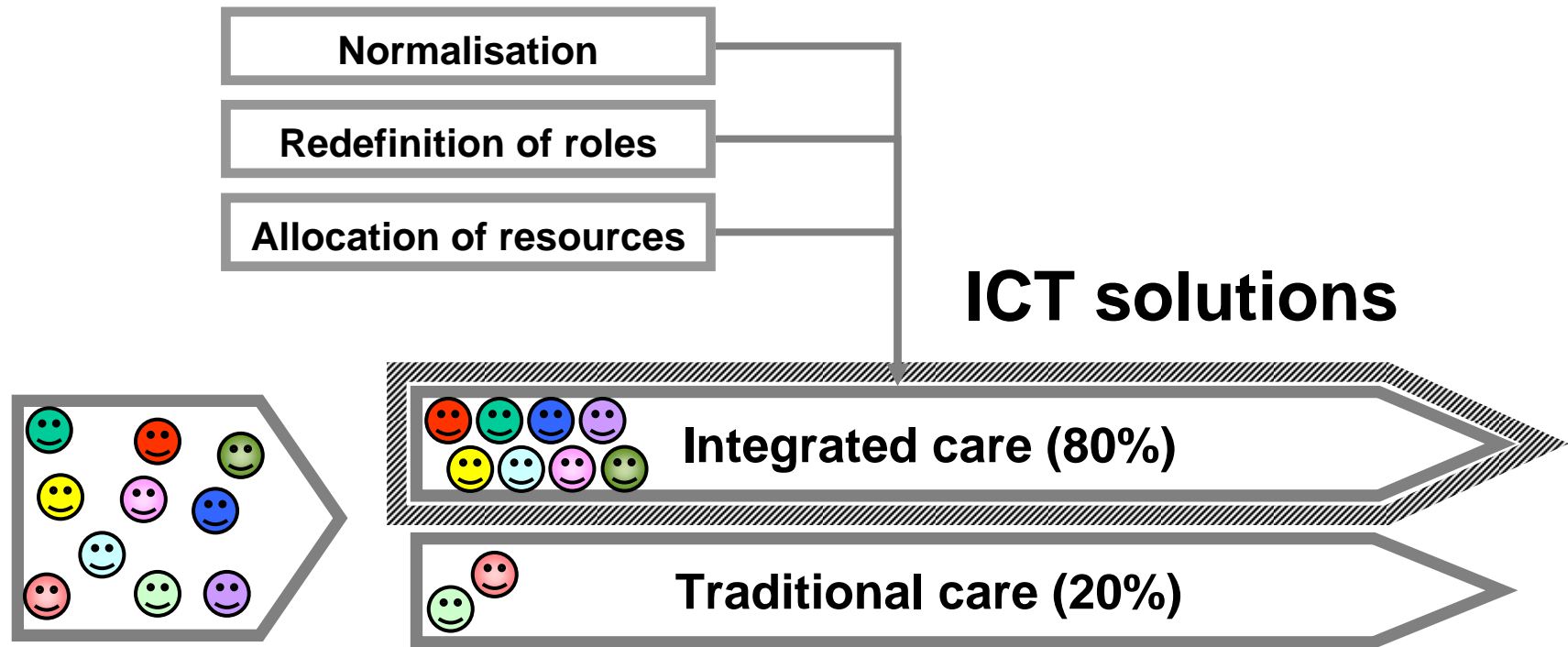
A. Alonso, M. Marcos, J.R. Alonso, G. Gelabert,  
B. Martínez-Salvador, D. Riaño, M. Taboada.

# A framework addressing chronic conditions



*Innovative care for chronic conditions: building blocks for actions: global report. Epping-Jordan J, editor. 2002. Geneva, Switzerland : Non-communicable Diseases and Mental Health, World Health Organization.*

# Service model



*Adapted from Berg M et al. Health Information Management. Integrating information technology in health care work. Routledge 2004.*

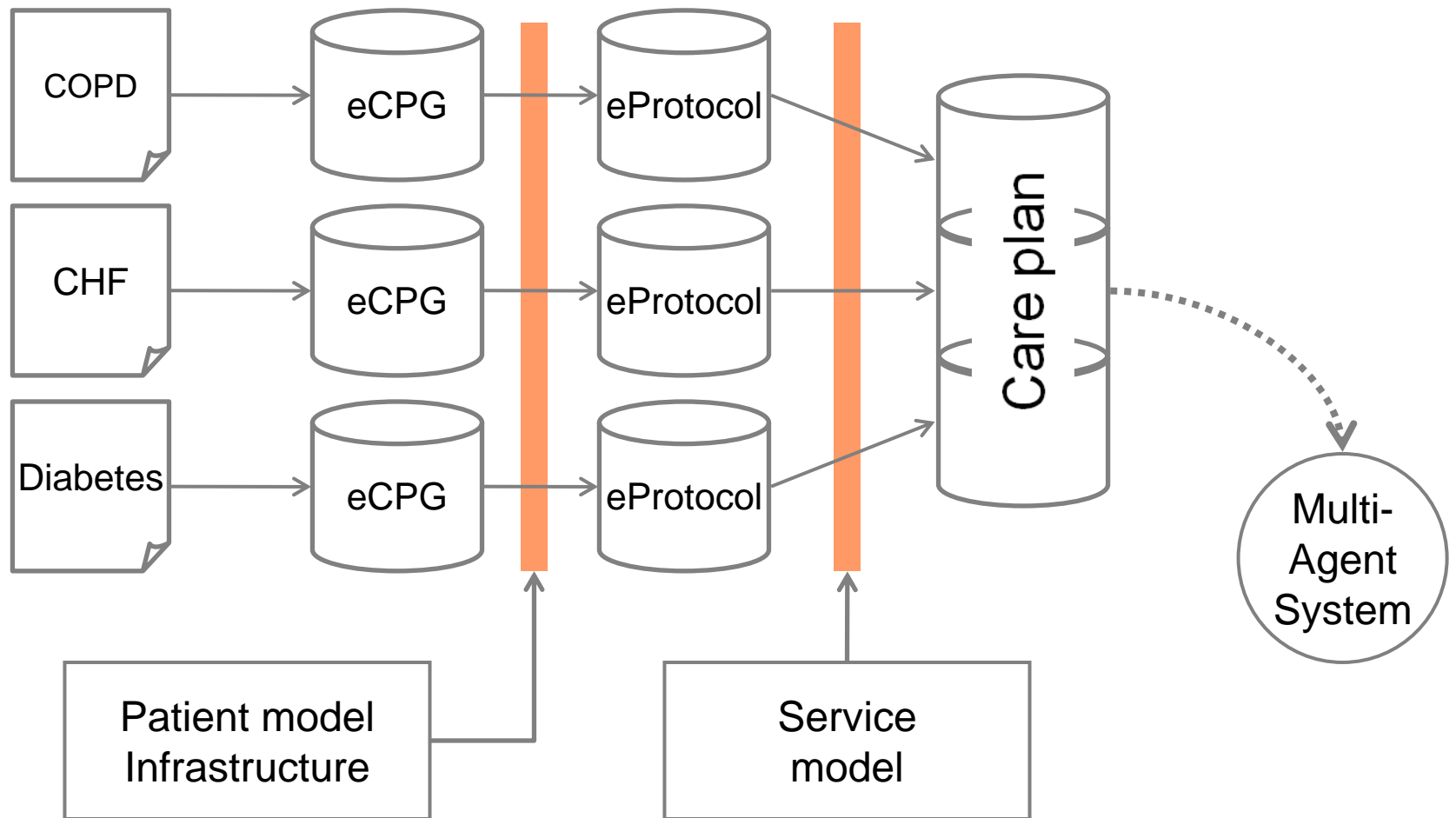
# Questions

- Would it be possible to facilitate the development of care plans, their implementation and outcome analysis and reengineering?
- Can Artificial Intelligence (AI) tools serve these purposes in a way that could be acceptable by end users (health professionals)?

# Objective

- The HYGIA project aims at the development of care plans in electronic format using specific-purpose AI languages for the representation of medical guidelines and protocols.
- Apart from serving as a basis for further development of dedicated decision support systems, the representation of care plans in these languages is important in terms of healthcare knowledge capitalization.

# Project overview



# Specific objectives

- Design and implement a set of tools to automate, as far as possible, the acquisition of knowledge from textual CPGs.
- Propose a methodological framework to develop electronic protocols from electronic CPGs.
- Propose a methodological framework to elaborate care plans from electronic protocols and other resources (hospital databases containing information about patient treatments)
- Construct and use new inductive learning algorithms to generate health care knowledge from hospital databases with the use of ontologies that provide the semantic component of the medical domain of the guidelines.
- Application of these knowledge structures (CPs) to support decision making and quality control by means of a multi-agent system that interprets the knowledge in the context it is used.
- Identify and assess the adherence of health care professionals to CPs in a program of chronic patients.

# Project components

Textual analysis  
Ontology management

Knowledge acquisition  
Knowledge engineering

Knowledge induction  
from databases  
Tools for knowledge  
exploitation

Knowledge validation  
Knowledge exploitation

# Textual analysis / Ontology management

- (Semi)-automatic Acquisition of Knowledge from textual CPGs
  - Natural language processing to recognize words, to make syntactic analyses and to divide phrases into words (tokens)
  - Information extraction to extract pre-specified types of information from the text of the CPG
  - All the processes supported by medical thesauri as the Medical Unified Language System (UMLS)
- Main phases
  - extract a domain ontology from textual documents
  - (semi)-automatically acquire the knowledge of CPGs
  - represent it in a language oriented to describe electronic CPGs

# Knowledge acquisition / engineering

- Method for transforming eCPGs in protocols and the combination of protocols in CPs
  - Software Engineering: “eCPGs and protocols are similar to programs”
  - Formal verification of eCPG directives in the electronic protocols
- Main phases
  - determine sort of eCPG directives to verify in the e-protocols.
  - propose an experience-based methodology to obtain e-protocols
  - formalization of patient and institution models to construct CPs.
  - propose a methodology to combine and adapt e-protocols

# Knowledge induction / exploitation

- Develop algorithms to obtain health care procedural knowledge from hospital databases
- Design and implement a software tool to apply health care procedural knowledge
- Main phases:
  - Propose a data and a knowledge model to represent health care procedures
  - Develop inductive learning algorithms to obtain procedural knowledge from procedural data
  - Design and implement a Multi-agent system to make this knowledge actionable
  - Adapt the Multi-agent System to incorporate the screening of adherence indicators

# Knowledge validation

- Provision of models on COPD, CHF and diabetes to create the intermediate and final products
- Description of adherence indicators
- Provide data of the historical database of the hospital
- Test intermediate and final software in a program of chronic patients

# Thank you

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