

Model Guided Medicine (MGM)

Patient Specific Modelling and Management for Medical Diagnosis and Therapy

FET “Understanding Life through future ICT”

Brussels, June 10th, 2010

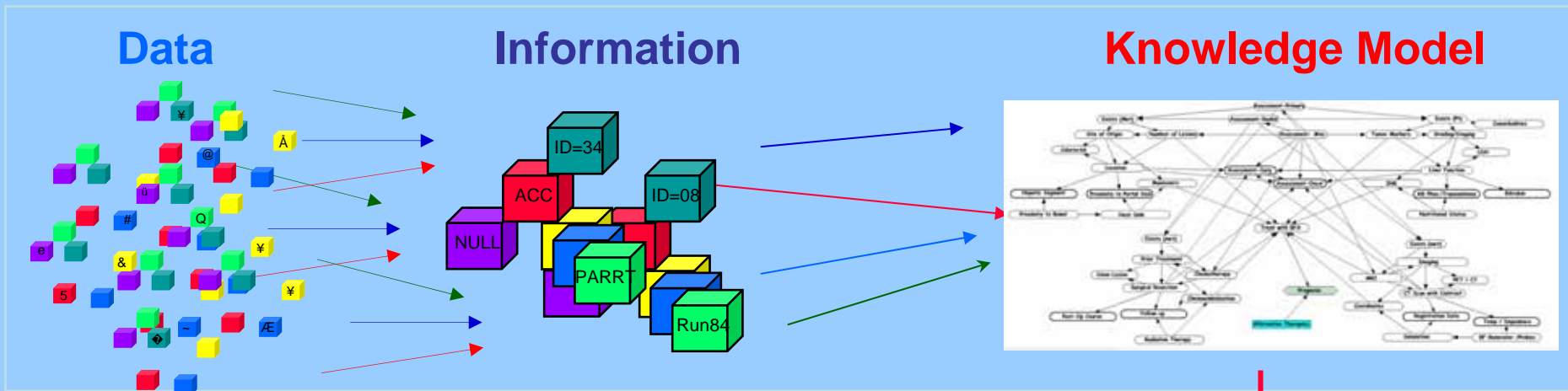
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Idea

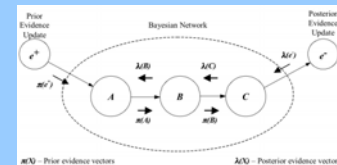
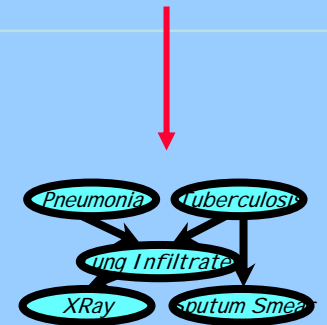
From data- and information-centric to **model-centric medicine** for intelligent decision making in medical diagnosis and therapy



Examples of models:

Probabilistic Relational Models (PRMs)

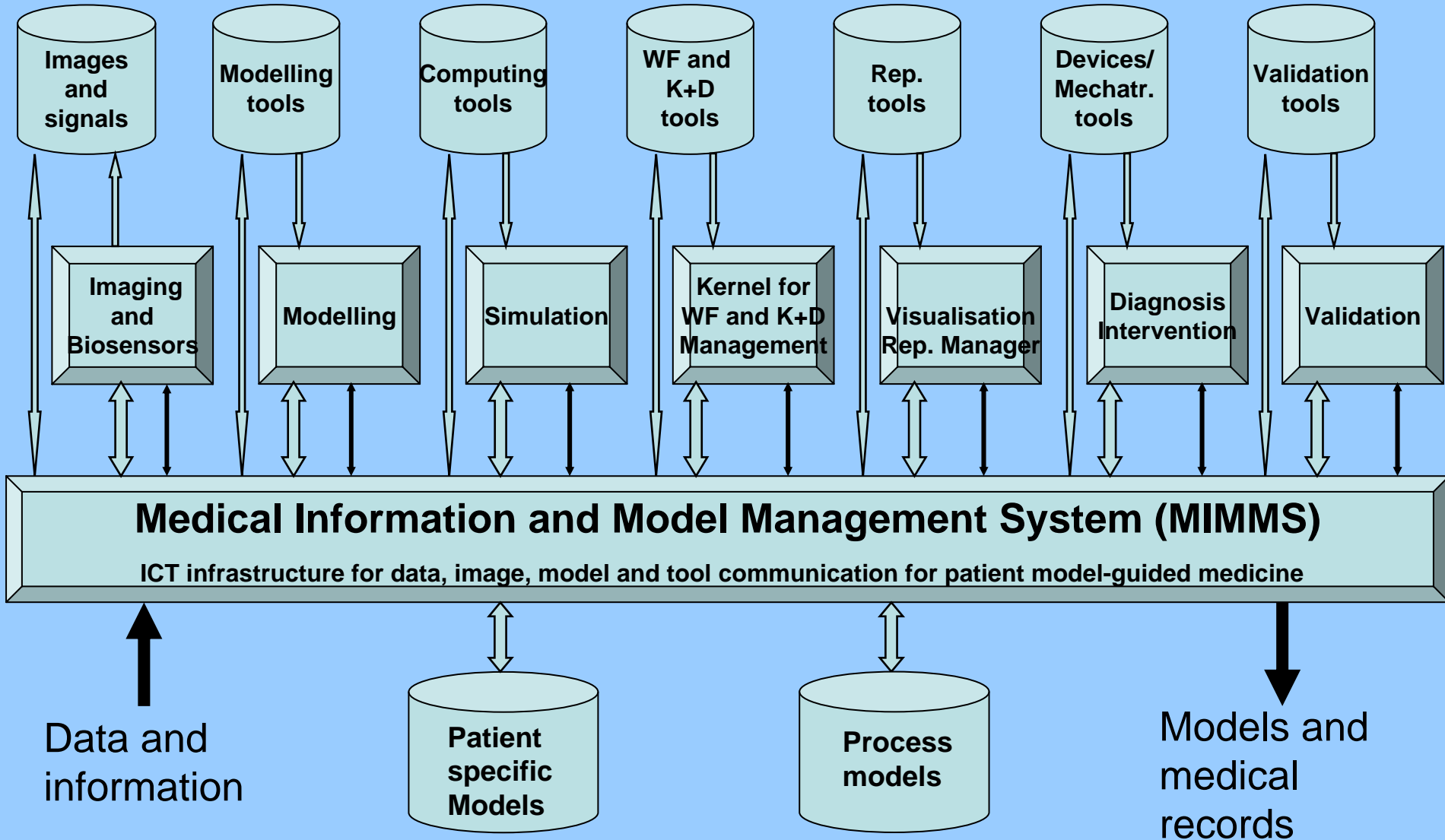
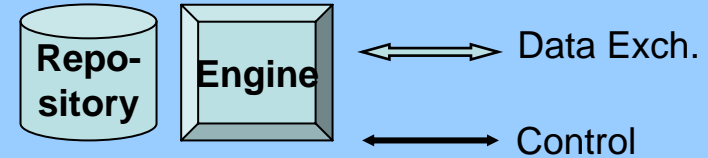
Multi-Entity Bayesian Networks (MEBN)



Ambition

ICT architecture and functionalities for Model Guided Medicine (MGM)

(to be realized by 2020)

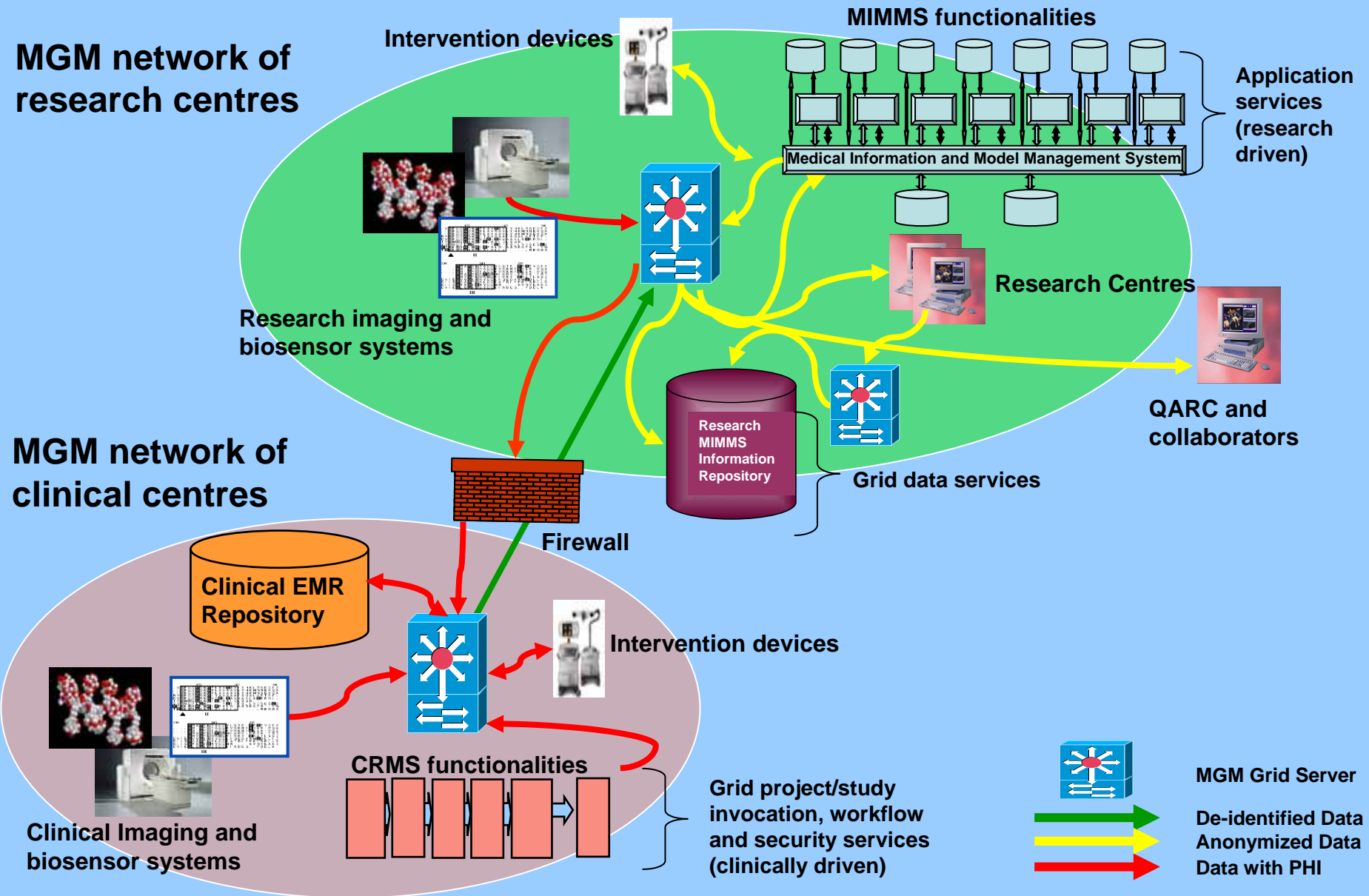


Impact

- Model Guided Medicine (MGM)
 - Patient-specific modelling (PSM), Process modelling (PM) and Medical Information and Model Management Systems (MIMMS) will enable a **Model Based Medical Evidence (MBME)**.
 - If designed and employed successfully, this MBME will help to establish scientifically valid standards for medical activities of physicians, patients and the health care community at large.
 - MGM requires the challenging task of developing appropriate diagnostic and therapeutic ICT-based tools such as a MIMMS and other computing and communication intensive systems.
- Advantages for Physician and Patient:
 - **PSM**: Descriptive, interactive, updatable, probabilistic representation of the patient.
 - **PM**: Capable of medical procedure analysis, understanding, learning, prediction and decision-making.
 - **MIMMS**: Medical ICT-based system which integrates the PSM with the PMs and a spectrum of computer assisted medical functionalities to provide a model based patient care.

Integration

ICT platform/infrastructure for MGM services and management



Plausibility

1. Mathematical modelling and information technological structuring of generic and patient-specific models as well as medical processes for a selected number of clinical settings (2011-2015).
2. Prototype development of MGM subsystems for a comprehensive MIMMS including demonstrations of MGM application (2013-2017).
3. Development of methods for human-computer interactions with PSMs and process models (2013-2017).
4. Development of algorithms and systems for process as well as knowledge and decision management (2011-2017).
5. Clinical applications and evaluation of a selected number of MGM examples (2015-2020).
6. Realization of repositories with PSMs and processes for different medical disciplines including protocols for cross health care enterprise sharing of models and definition of appropriate standards (2015-2020).
7. Validation of the impact of MGT on patient, physician, health care settings, industrial technology development and society in general (2017-2025).

Support

- The International Foundation for Computer Assisted Radiology and Surgery (IFCARS) is built on a more than 25 years of experience in assessing and coordinating R&D activities in computer assisted medicine on a world wide basis.
IFCARS is active in the promotion of R&D results in congresses and peer reviewed publications as well as in the realisation of new medical projects.
The combined achievements of IFCARS/CARS and its partners have had a major impact on how health care is carried out today.
- MGM network of research centres
IFCARS research partners for a FET: Final selection TBD
- MGM network of clinical centres
IFCARS clinical partners for a FET: Final selection TBD