



# BIOPATTERN – Network of Excellence



*BIOPATTERN - Computational Intelligence for  
Biopattern Analysis in Support of  
eHealthcare*

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# Outline of talk



- The BIOPATTERN Project
  - Project information
  - Main drivers
  - Grand vision and challenges
- Concepts of biopattern analysis and bioprofilling
- ICT requirements and implications for e-Health
- The future and concluding remarks
- How to contact us



# BIOPATTERN – Project information



- EU FP6, 4-year, Network of Excellence (NoE), project within the ICT for Health
- The NoE integrates the activities of 31 partners from healthcare, academia and industry to reduce fragmentation
- It brings together researchers in relevant areas – e.g. medical informatics, bioinformatics, biosignal analysis and e-delivery technology
- Partners are from 11 countries
- More details are available at: [www.biopattern.org](http://www.biopattern.org)



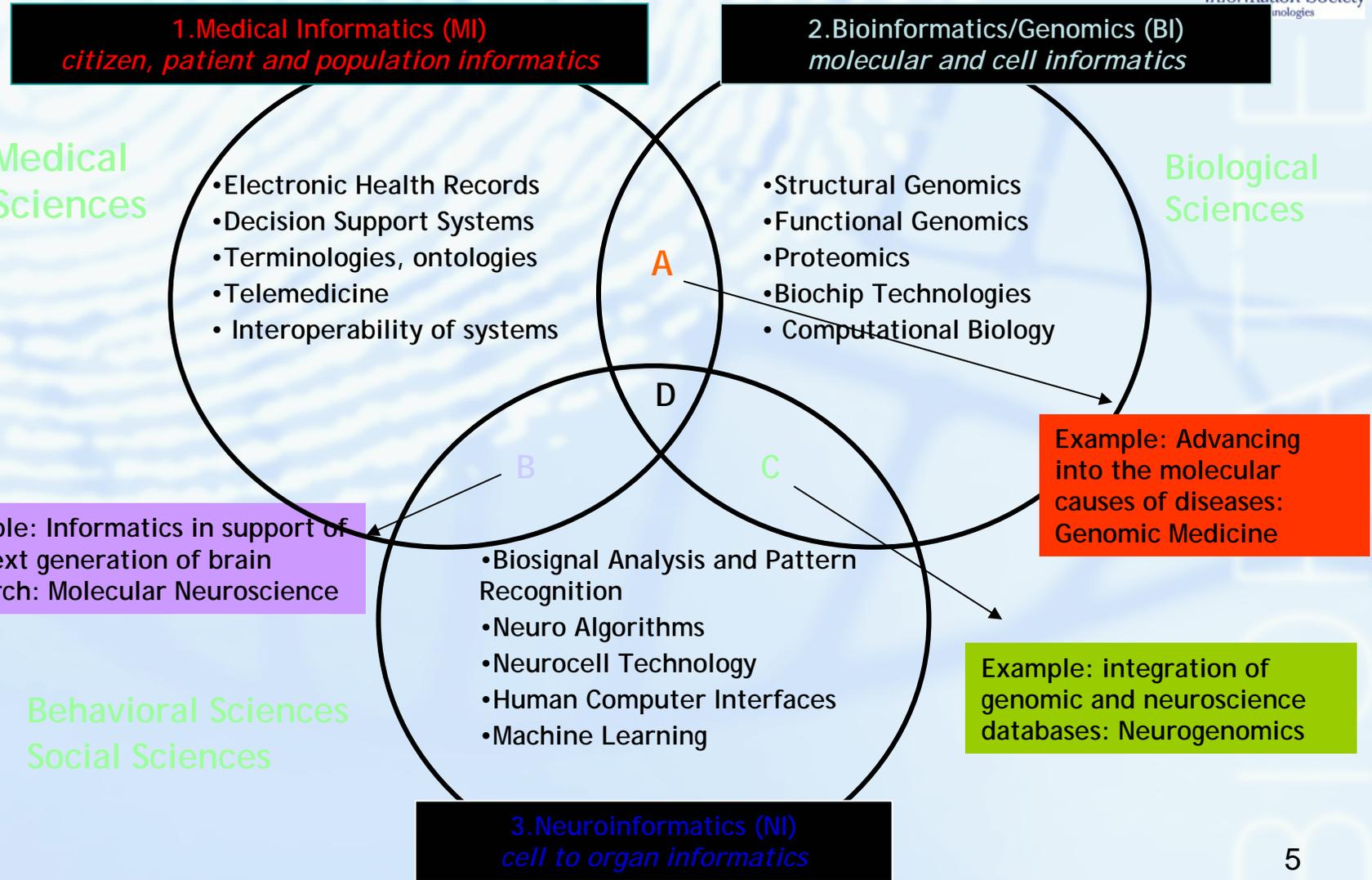
# BIOPATTERN – Main drivers



- The Data Problem – data deluge
  - Modern technology enables us to generate large volumes of biodata, e.g. from:
    - modern clinical practice
    - novel biosensors
    - genomics and proteomic
    - emerging area of ‘systems biology’
  - Limited ability to analyse and interpret the vast and complex data being generated in biomedicine.
  - New ways will be needed to represent, process and analyse such data.
- EU eHealth and Biomedical Informatics Research Agenda.



# Biomedical Informatics - Knowledge Empowering Individual Health Care & Well-Being





# BIOPATTERN – Grand vision and challenges



“To integrate co-operative research aimed at a pan-European approach to coherent and intelligent analysis of a citizen’s *bioprofile*; to make the analysis of this *bioprofile* remotely accessible to patients and clinicians; and to exploit the *bioprofile* information to combat major disease classes”.

- Vision is long term, but will inspire new objectives.



# Meaning of biopattern & bioprofile



- *Biopattern* – basic information which provides clues about underlying clinical evidence for diagnosis and treatment.
  - A snapshot which includes features derived from data (e.g. genomics, EEG, ECG, imaging etc );
  - Often used for diagnosis and short-term patient monitoring.
- *Bioprofile* – personal “fingerprint” that combines a person’s current and past bio-history and future prognosis.
  - Combines data, biopatterns, analysis and predictions of future or likely susceptibility to diseases.
- Focus – to see how far we can realise the vision of a citizen’s bioprofile; to identify barriers to the vision, to examine ways in which bioprofile could be exploited for healthcare.



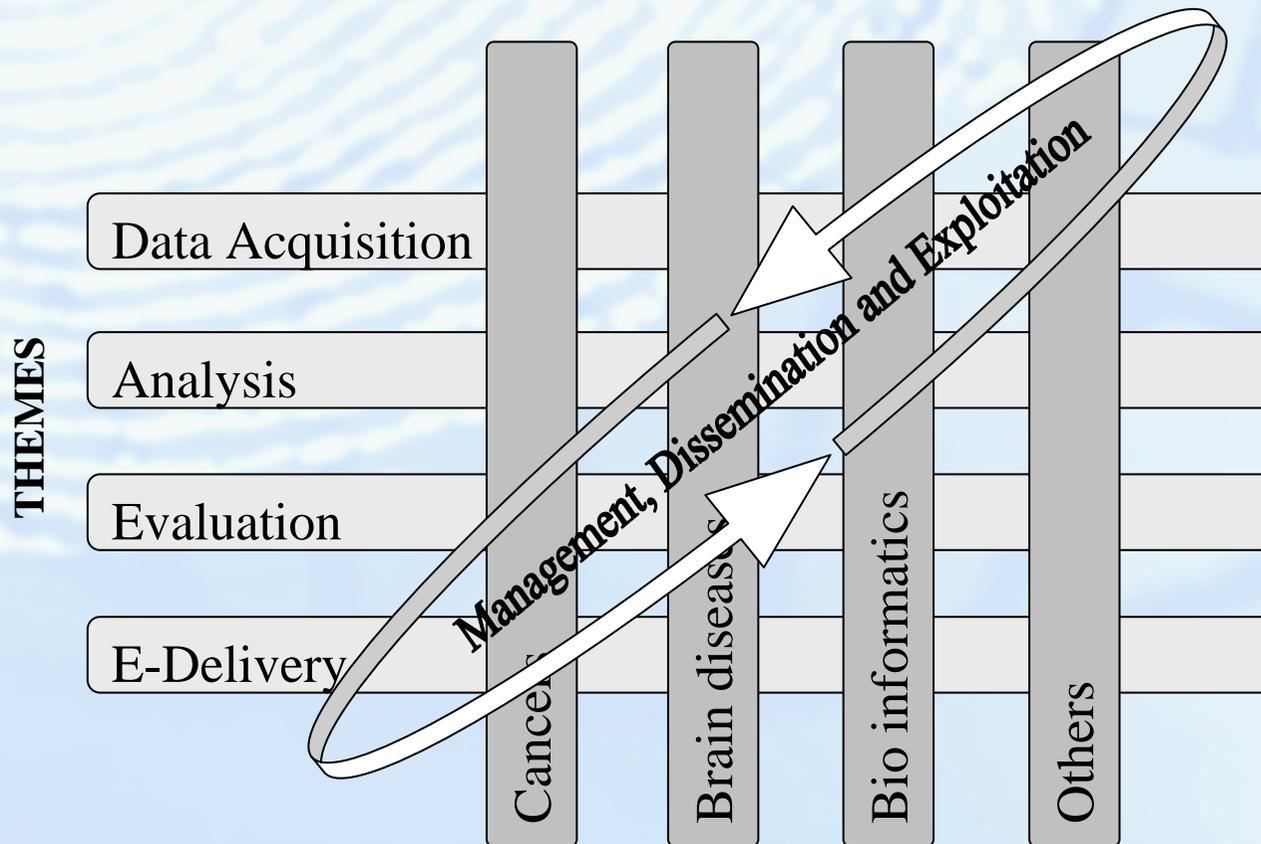
# Objectives of the NoE



- Integration – to tackle and reduce fragmentation in existing research capacities (31 partners in the NoE);
- ‘Virtual Research Institute’ – to create a new research community;
- Roadmap – to identify gaps in knowledge, key challenges and to initiate joint activities to address them;
- New opportunity – to identify how bioprofiles could be exploited for healthcare, such as disease prevention, diagnosis and treatment;
- Accessibility and spreading excellence – to make the results and their applications widely accessible; to spread excellence within and beyond the network partners.

# Thematic organisation of project

## Special Interest Groups





# Subprojects - creating the basis for integration



- Partners activities have been organised into subprojects as a key step towards integration
- Each partner contributes to specific subprojects based on partner's:
  - interests
  - expertise and
  - capacity to undertake agreed research activities.This way, we strengthen complementarities and mutual specialisation.
- Subprojects create focal points around which groups of experts can gather to undertake clearly defined joint activities and to exchange ideas. This should facilitate the exchange of knowledge and integration.
- It should create the basis for, small, co-ordinated 'virtual research groups', with clearly defined objectives which are directly linked to the goals of the NoE.



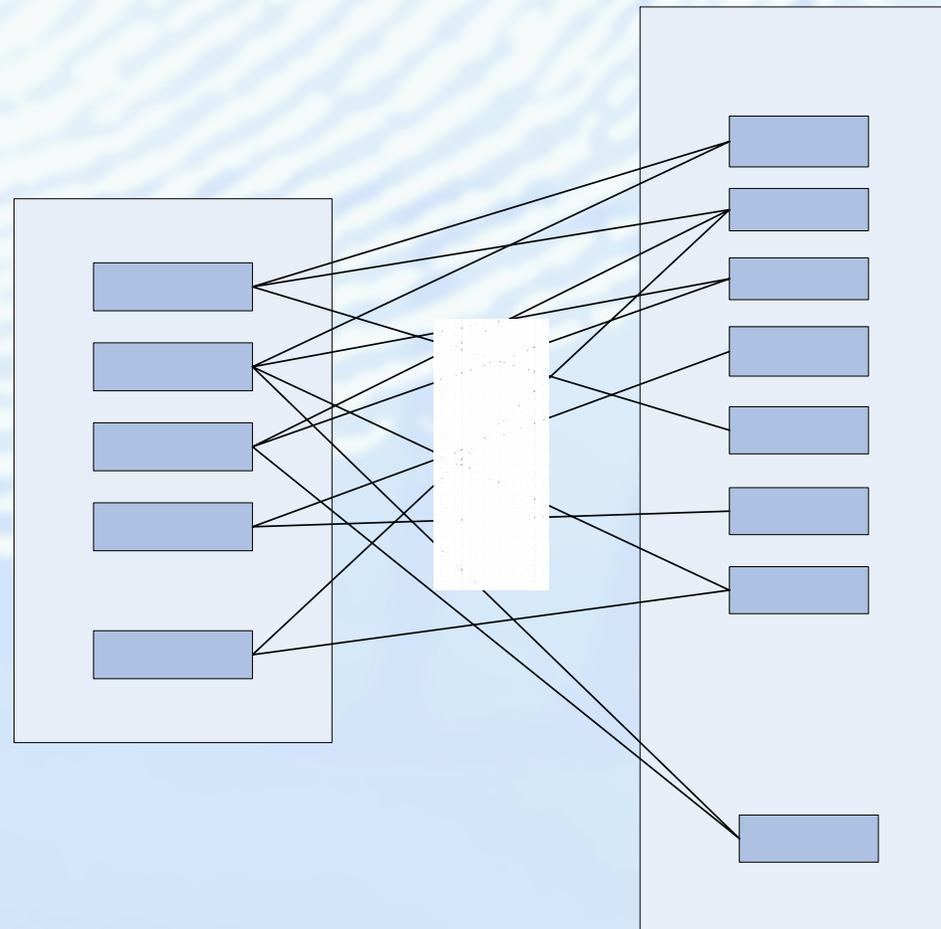
# Some of the subprojects



Subprojects (some linked to other major EU projects) include:

- A framework for bioprofiling in brain diseases
- Perinatal brain damage, identification of risk situations and prevention
- Early detection and progression of dementia
- Epilepsy assessment
- Brain tumour diagnosis
- Breast cancer bioinformatics
- Ocular melanoma
- Ovarian cancer assessment
- Oncological diseases of the blood
- A framework for bioprofiling in cancer diseases
- New and emerging e-delivery technologies
- Evaluation and benchmarking
- Standardisation and protocols for data acquisition.

# Relationship between DoW deliverables and subprojects



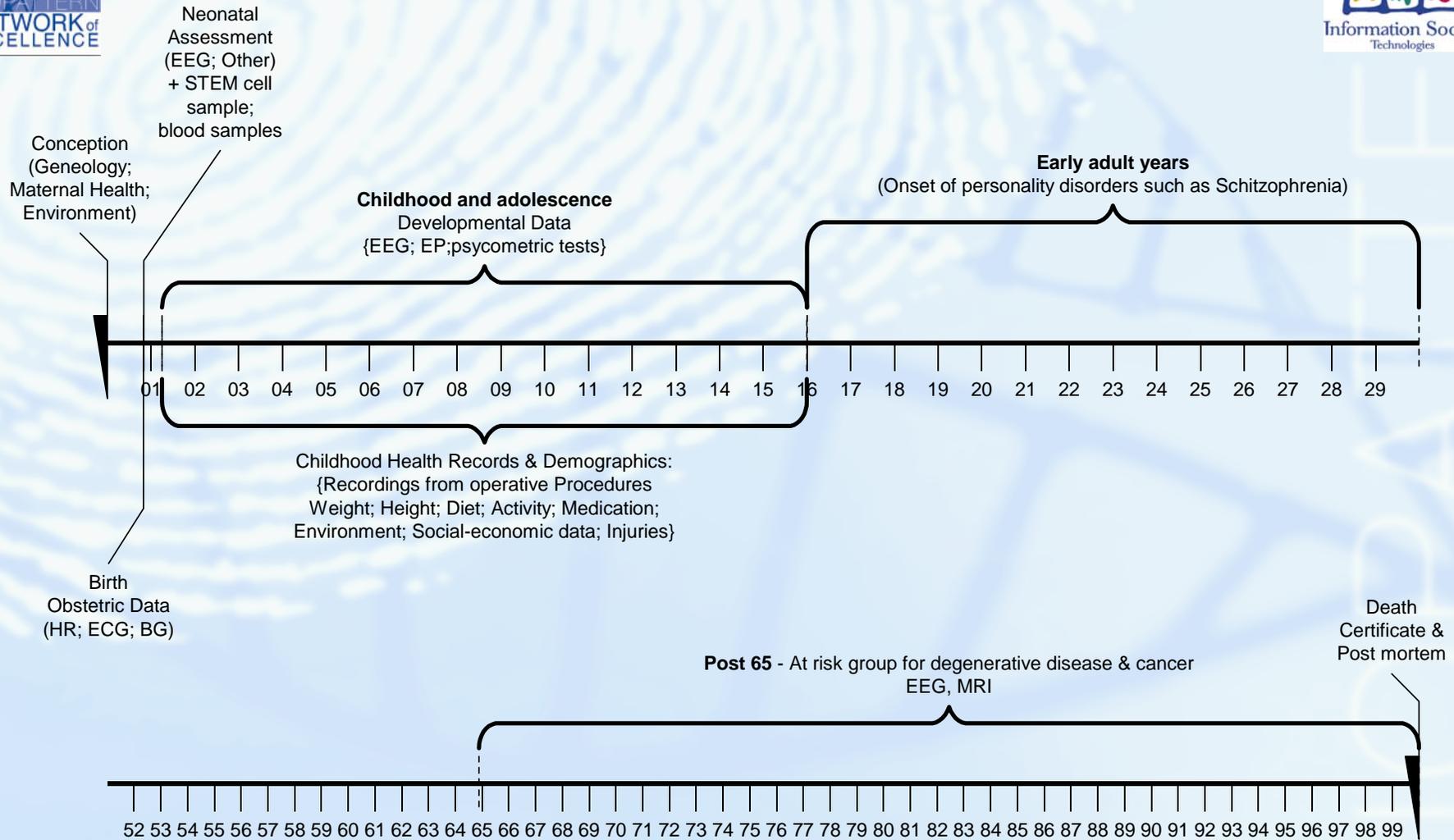
## Remarks

- Some subprojects are designed to integrate and co-ordinate activities. Others to look into key emerging areas (e.g. grid computing) or to tackle specific technical or clinical problems.
- The benefits of subprojects include that they:
  - enable partners to contribute to the Grand Vision, based on their interests, expertise and capacity to contribute;
  - serve as an important mechanism for partners to work together and to develop new ideas;
  - provide lead partners the opportunity to make the best use of available resources to advance knowledge in an integrated way;
  - enable the Exec Team to restructure and re-orientate partners' research activities to facilitate integration.



# Concepts of biopattern analysis and bioprofiling

## – time line for brain diseases



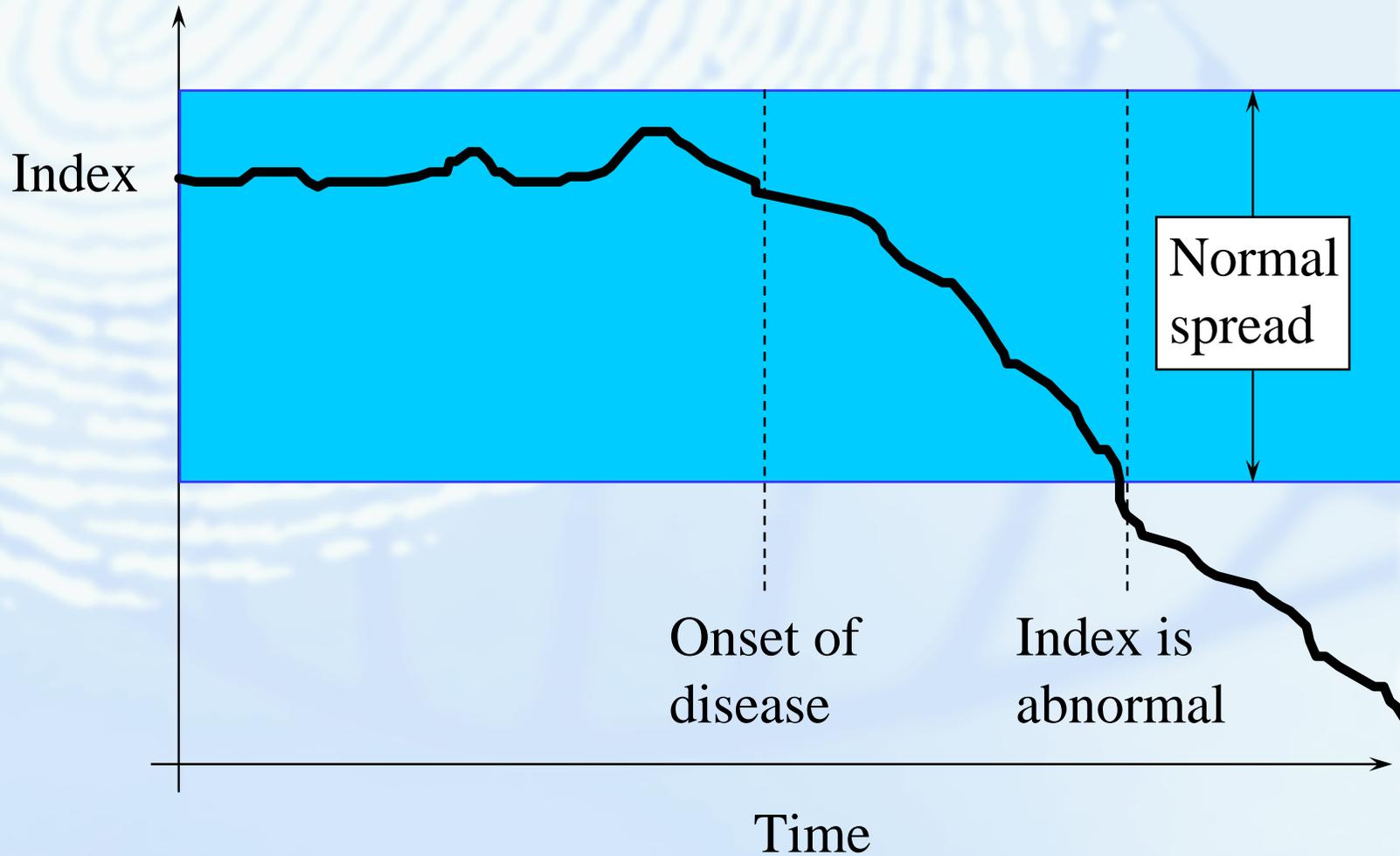


# Main research challenges and goals



- Biopattern and bioprofile analysis – an aspect of this will involve, observing changes in biomarkers derived from analysis of biodata (MI/BI).
- For long term (e.g. months or years) assessments
  - the markers may be used, e.g. for early detection of the onset of diseases (e.g. dementia);
  - the data and computing resources may be located at multiple centres.
- For short term (e.g. minutes, hours or days) assessments
  - the markers may be used for early detection of onset of events (e.g. adverse events during labour, epileptic seizure, key changes in the depth of anaesthesia during surgery);
  - real-time, nonlinear processing may be necessary to derive the markers so that timely action would be taken.

# Subject-specific bioprofile analysis – hypothetical trends in biomarker/index



# ICT requirements and key features

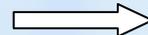
- Conceptually, we wish to ‘bioprofile from birth to death’
- Bioprofiles will be dynamic, large and in databases geographically distributed:
  - Mobility of the citizen
  - Bioprofile databases are located in different centres/countries.
- Online access, analysis, remote diagnosis, prognosis and decision support capability will be needed.



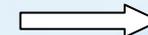
France  
(0-20)



U.K.  
(20-40)

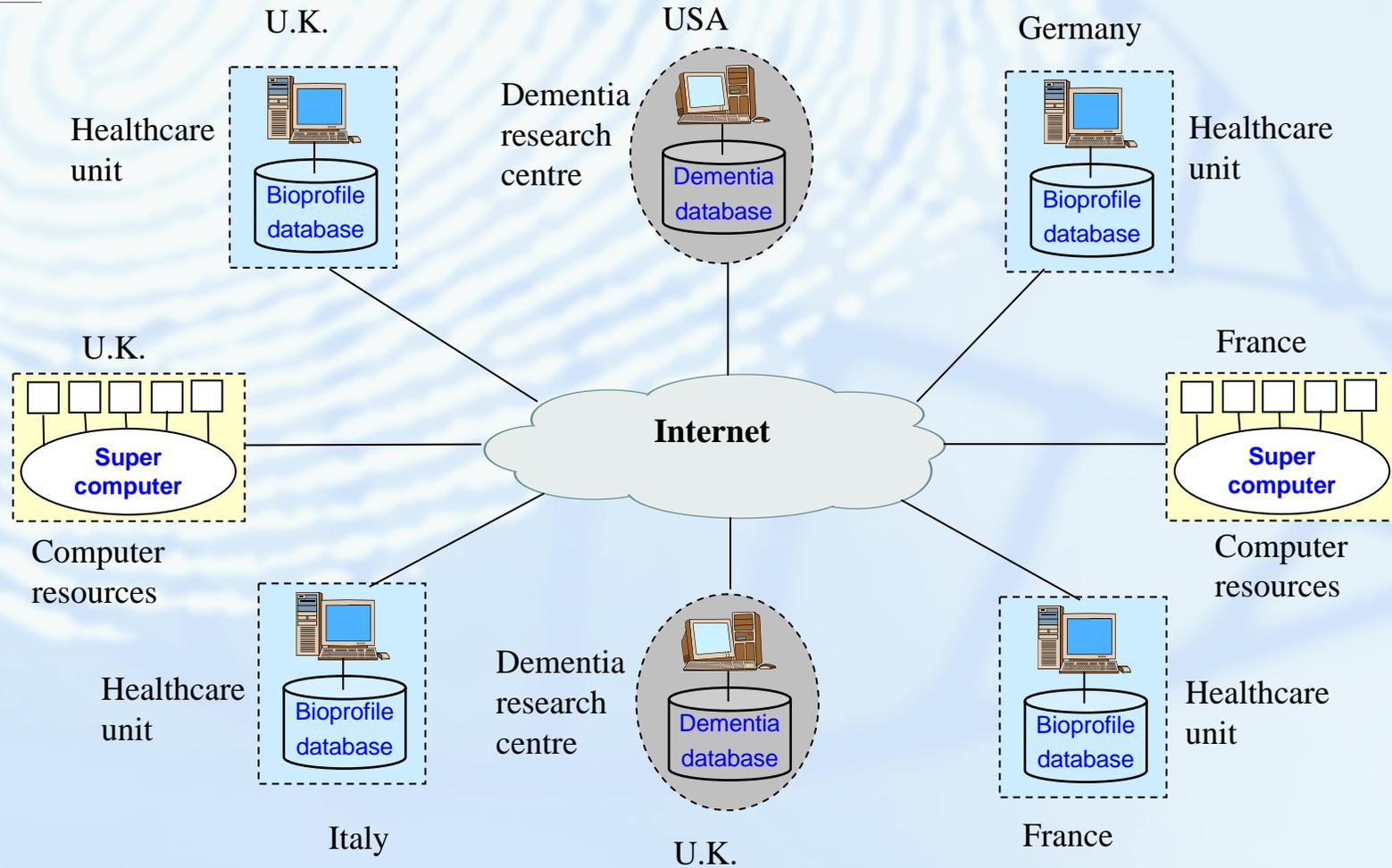


Italy  
(40-60)

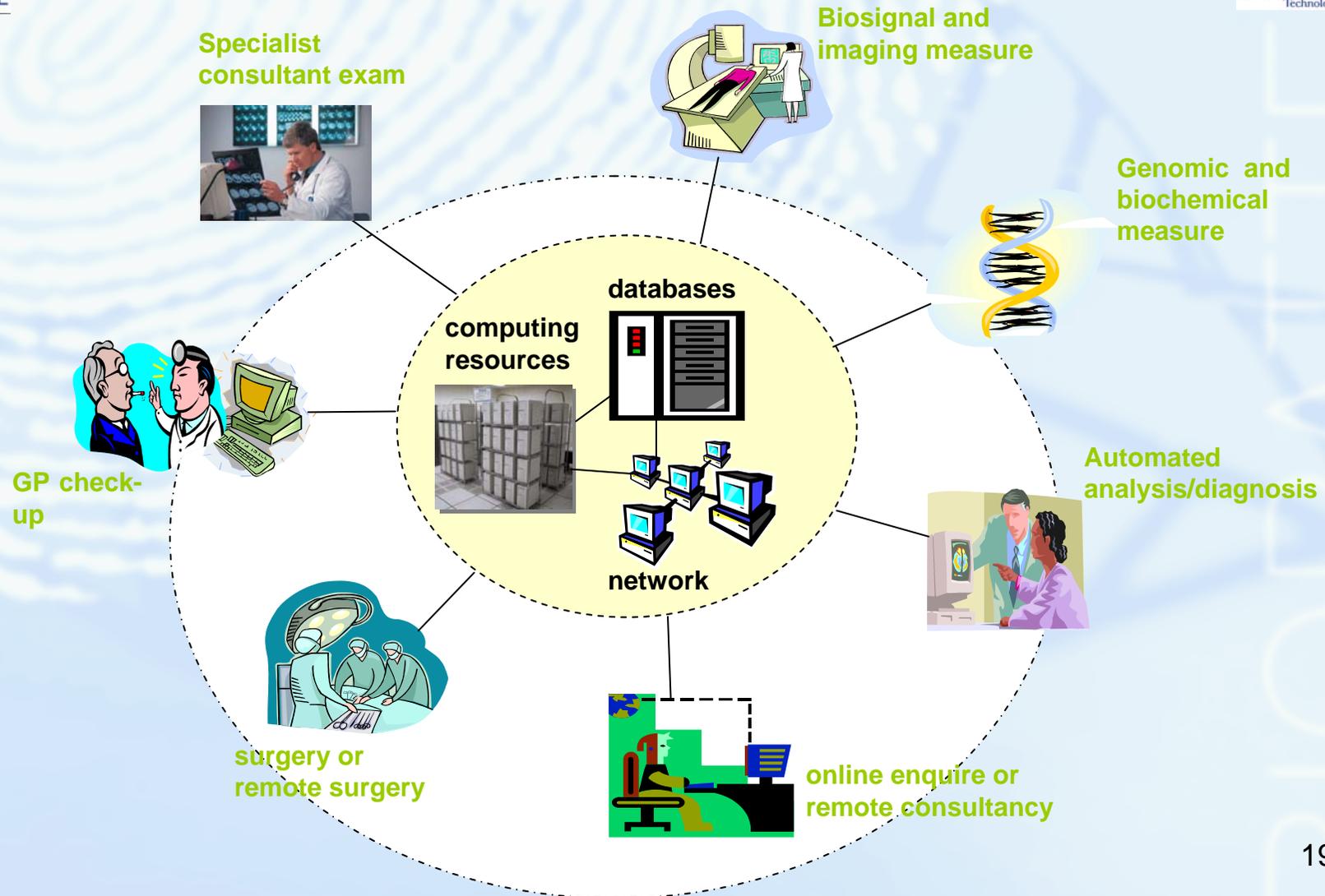


Germany  
(60 -- )

# A possible grid-based solution



# Implications of ICT and e-Healthcare

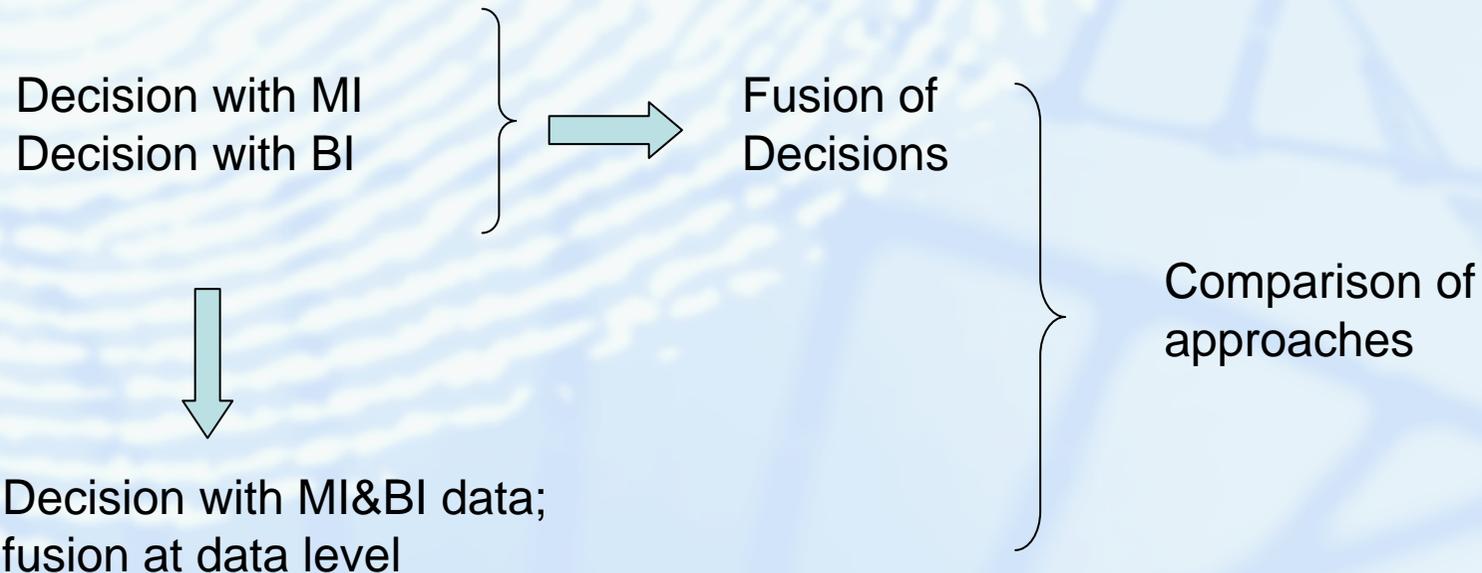


## First 18 months - some performance indicators

- A large number of people integrated into the project (27% female).
- Strong commitment from partners (about 30% own contributions).
- Successfully completed first year deliverables (19 in total).
- Organised or contributed to many events (workshops, training events and conferences).
- Developed co-operative links with other projects (e.g. eTumour, GIMEMA), and major bodies (e.g. the IEE, IPEM).
- Established a Scientific Advisory Board (positive feedback so far).
- A large number of publications (43 journal, 57 int. conference, 8 edited books/proposals). Several joint publications involving 2 or more partners.

## Next steps - proof of MI/BI concept

- How do we exploit and what do we gain from BI?



- Substantiate relevance and evaluate potential



# CIMED'2005

## The BIOPATTERN Conference



- Venue:
  - Lisbon, Costa da Caparica, 29 June – 1st July 2005
- Papers submitted:
  - 69 papers received so far
- Several BIOPATTERN workshops and meetings

[www.uninova.pt/cimed2005](http://www.uninova.pt/cimed2005)

CIMED 2005 - Microsoft Internet Explorer

Address <http://www.uninova.pt/cimed2005/>

Second International Conference on  
Computational Intelligence in Medicine and Healthcare  
*The BIOPATTERN Conference*  
29th June - 1st July 2005, Costa da Caparica, Lisbon, Portugal

Home Themes Committees Programme Fees Important dates Papers submission Registration Venue Contacts

## CIMED 2005

### Computational Intelligence in Medicine and Healthcare

THE BIOPATTERN NETWORK OF EXCELLENCE CONFERENCE

This is the second International Conference on Computational Intelligence in Medicine and Healthcare (CIMED). CIMED evolved from the successful series of International Conferences on Neural Networks and Expert Systems in Medicine and Healthcare (NNESMED) held in Plymouth, England in 1994 and 1996, in Pisa, Italy in 1998, and on Milos Island, Greece in 2001. CIMED conference series started in 2003 in Sheffield, England, and reflect the full range of artificial and computational intelligence techniques being applied to medicine and healthcare, of which neural networks and expert systems are now but just two.

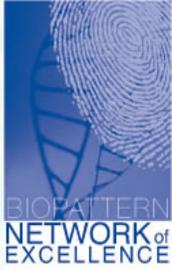
CIMED is focused on the application of intelligent computational methods and systems to support all areas of biomedical, clinical and healthcare practice, making it a strongly interdisciplinary conference, bringing together healthcare specialists, clinicians, biomedical engineers, bioinformaticians, computer scientists, communications and computer network engineers and medical/biostatisticians.

CIMED'2005 is expected to have an unprecedented number of participants due to the support of the BioPattern Network of Excellence - Computational Intelligence for Biopattern analysis in Support of eHealthcare - that will co-sponsor the event and organise workshops and meetings in parallel with the main conference. The official language of the conference is English.

SPONSORS:

## Concluding remarks

- We have made significant progress towards achieving the project objectives in the first Period.
- Partners find the project very interesting and challenging and are strongly committed.
- BIOPATTERN provides an important framework for partners with similar interests and complementary expertise to work together to develop new ideas. The Commission should be commended for this.



## How to contact us

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