Queen Mary University of London

PAMBAYESIAN (Patient Managed decision-support using Bayes Networks)

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Norman Fenton

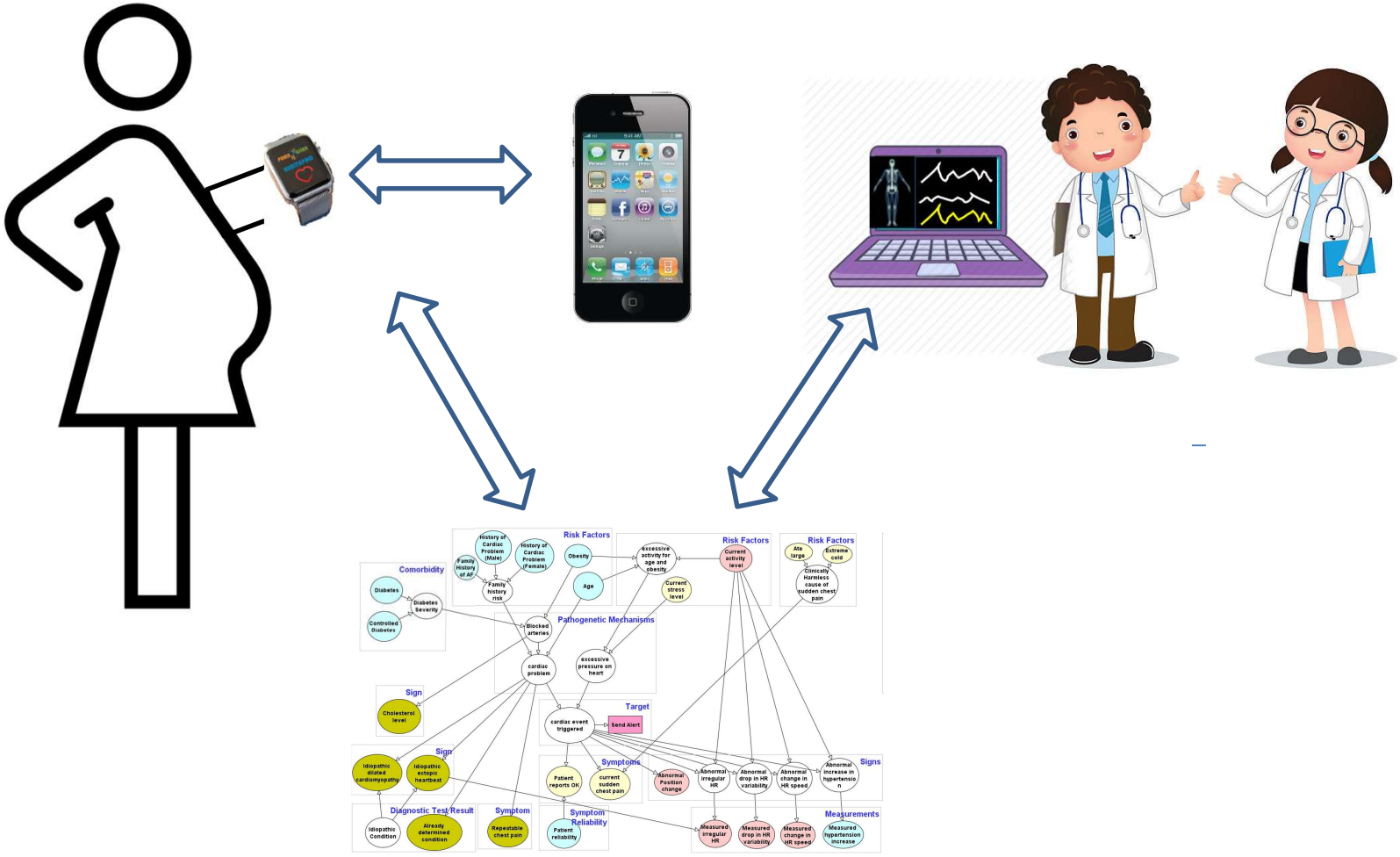
Risk and Information Research

Queen Mary University of London

pambayesian.org

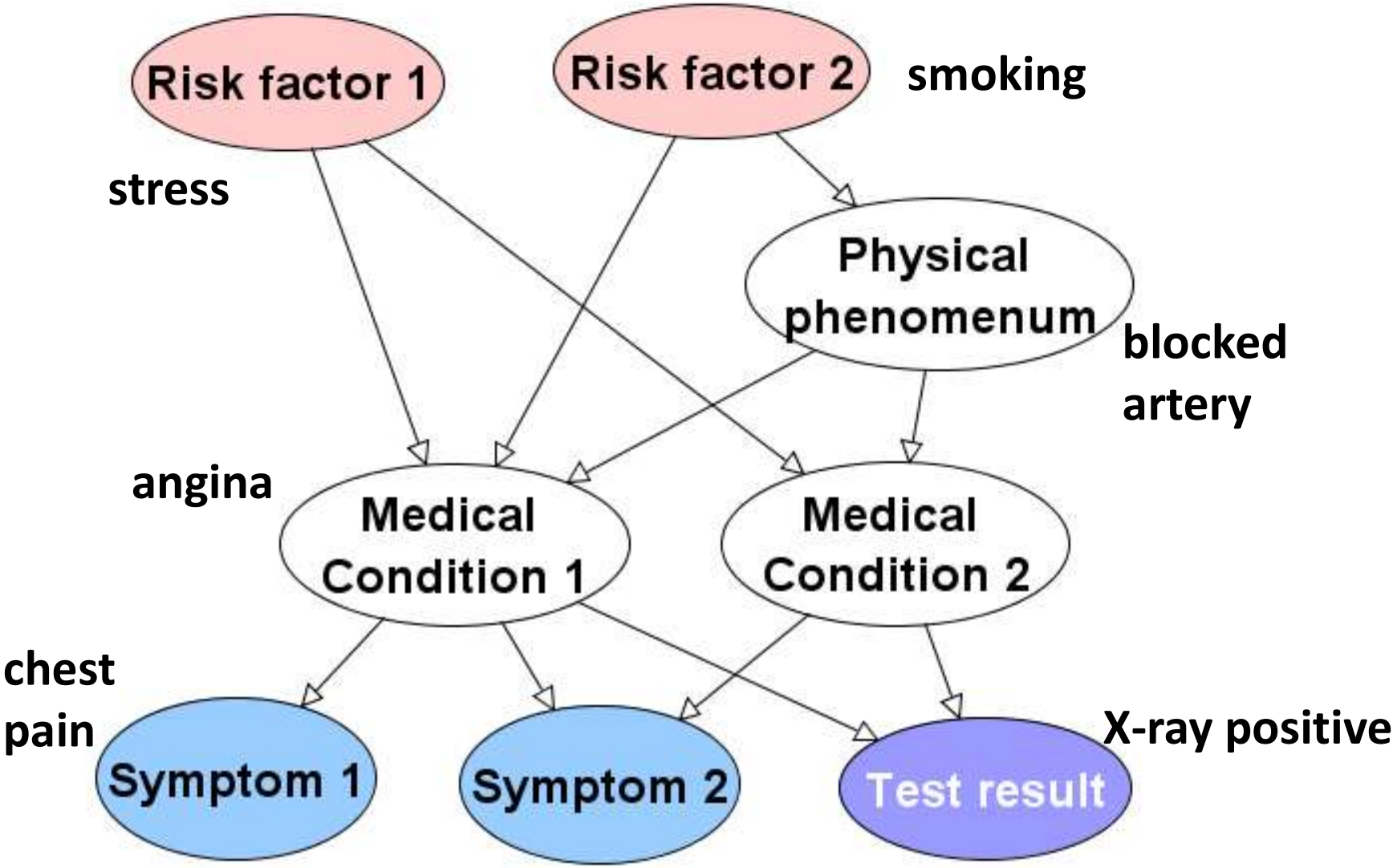
UKRI Engineering and Physical Sciences Research Council

A new generation of intelligent medical decision support systems



Engineering and Physical Sciences Research Council

A (causal) Bayesian network



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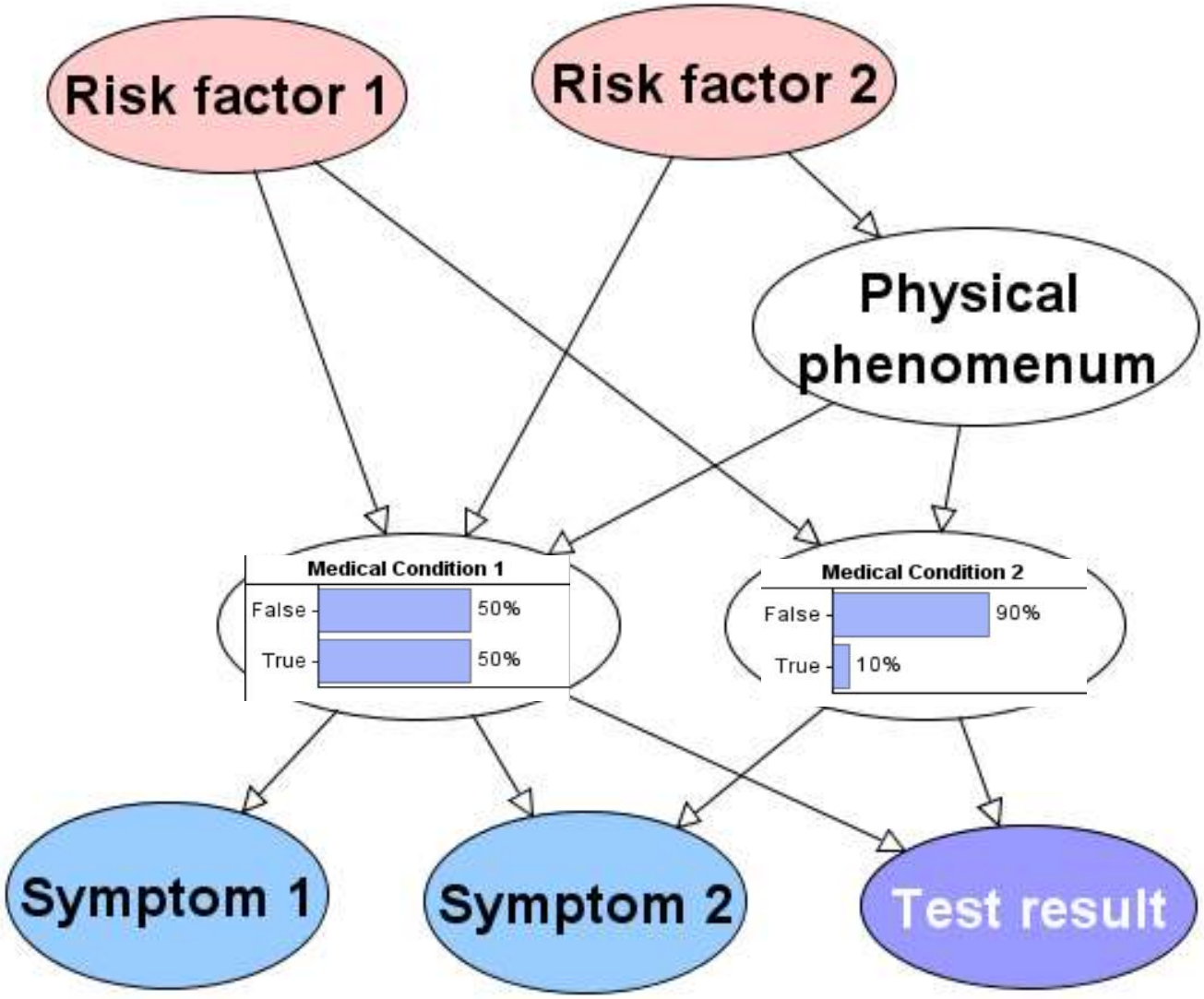
A Bayesian network



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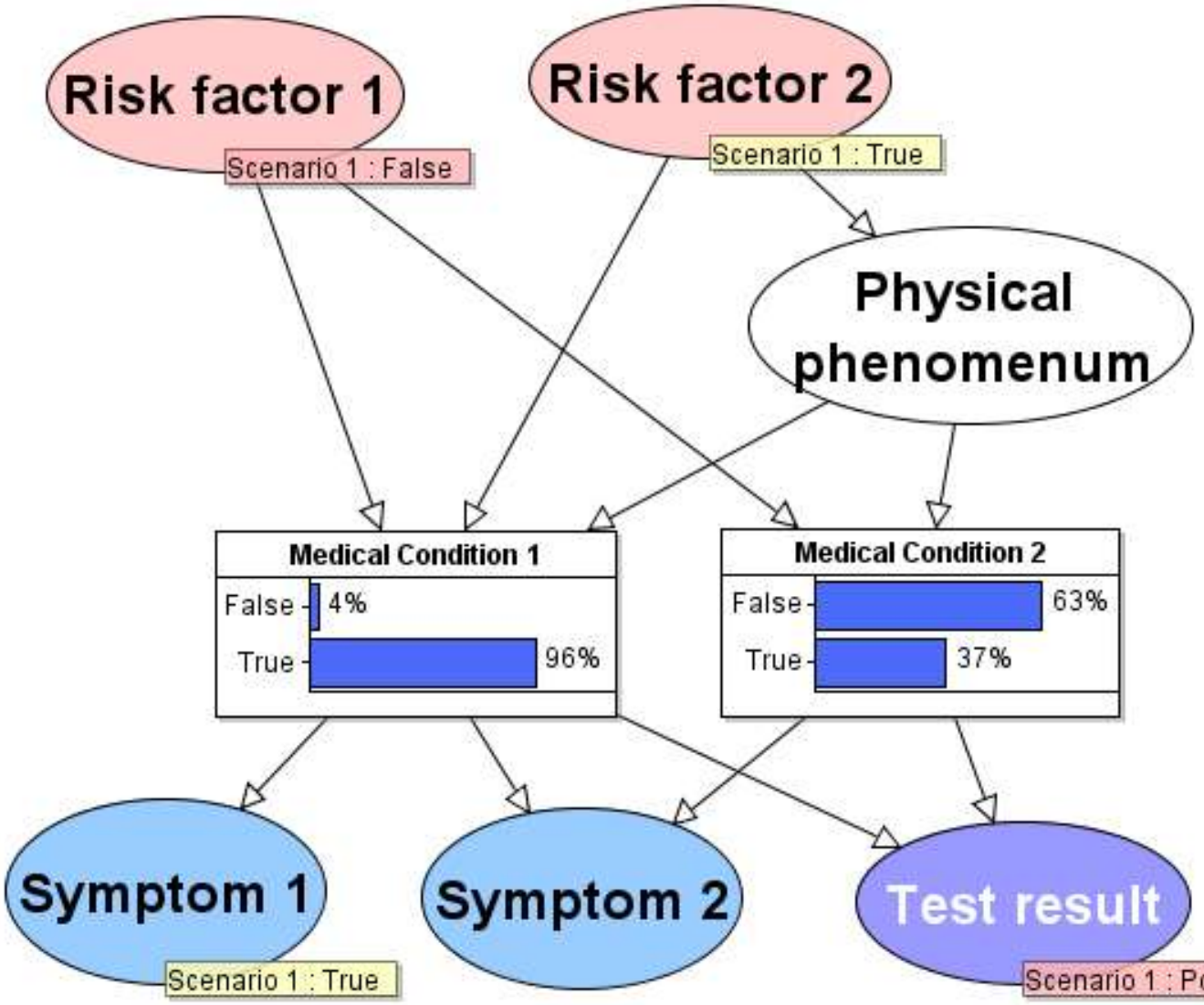
A (causal) Bayesian network

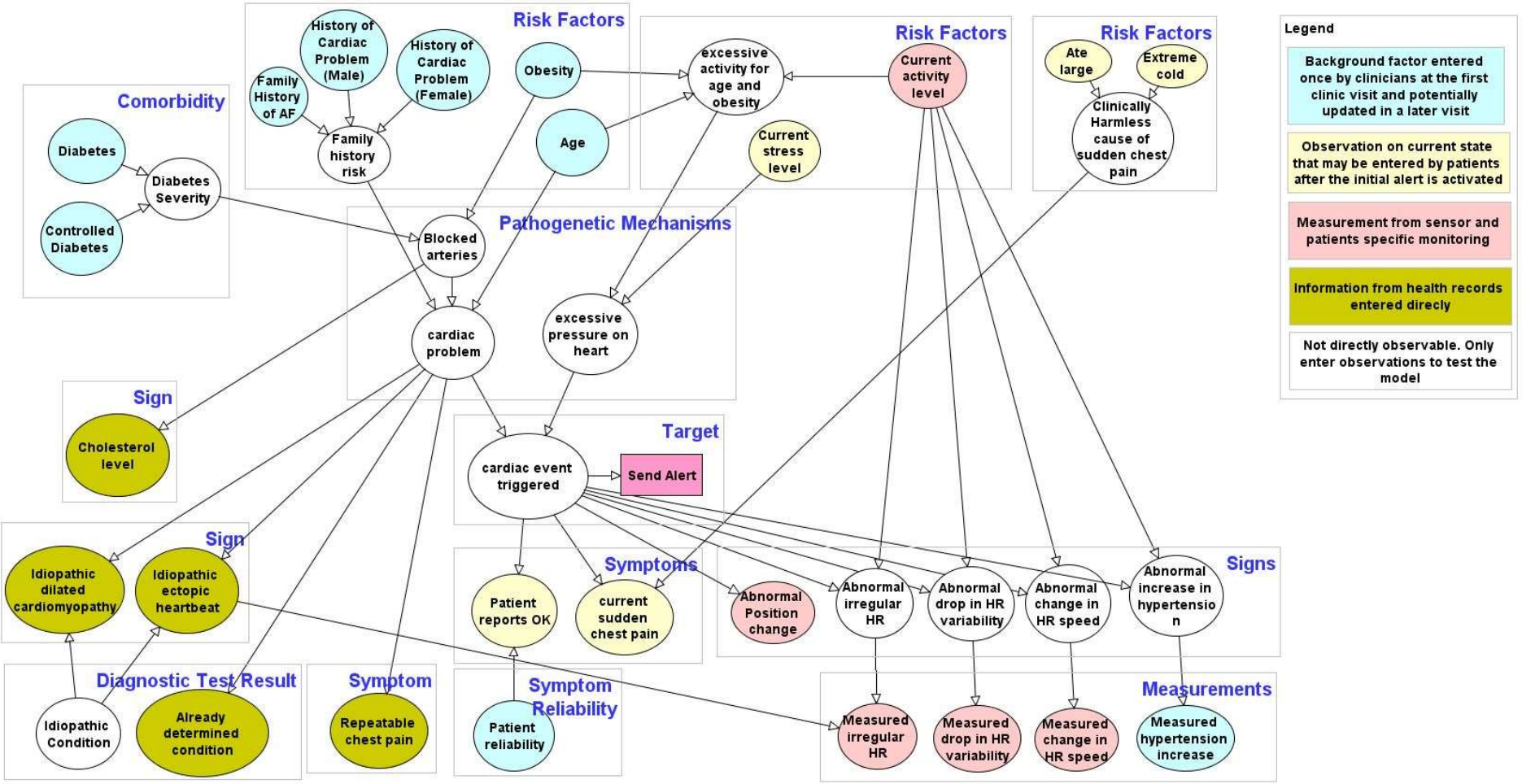


Note:
Developing these models requires a smart data approach not a big data machine learning approach

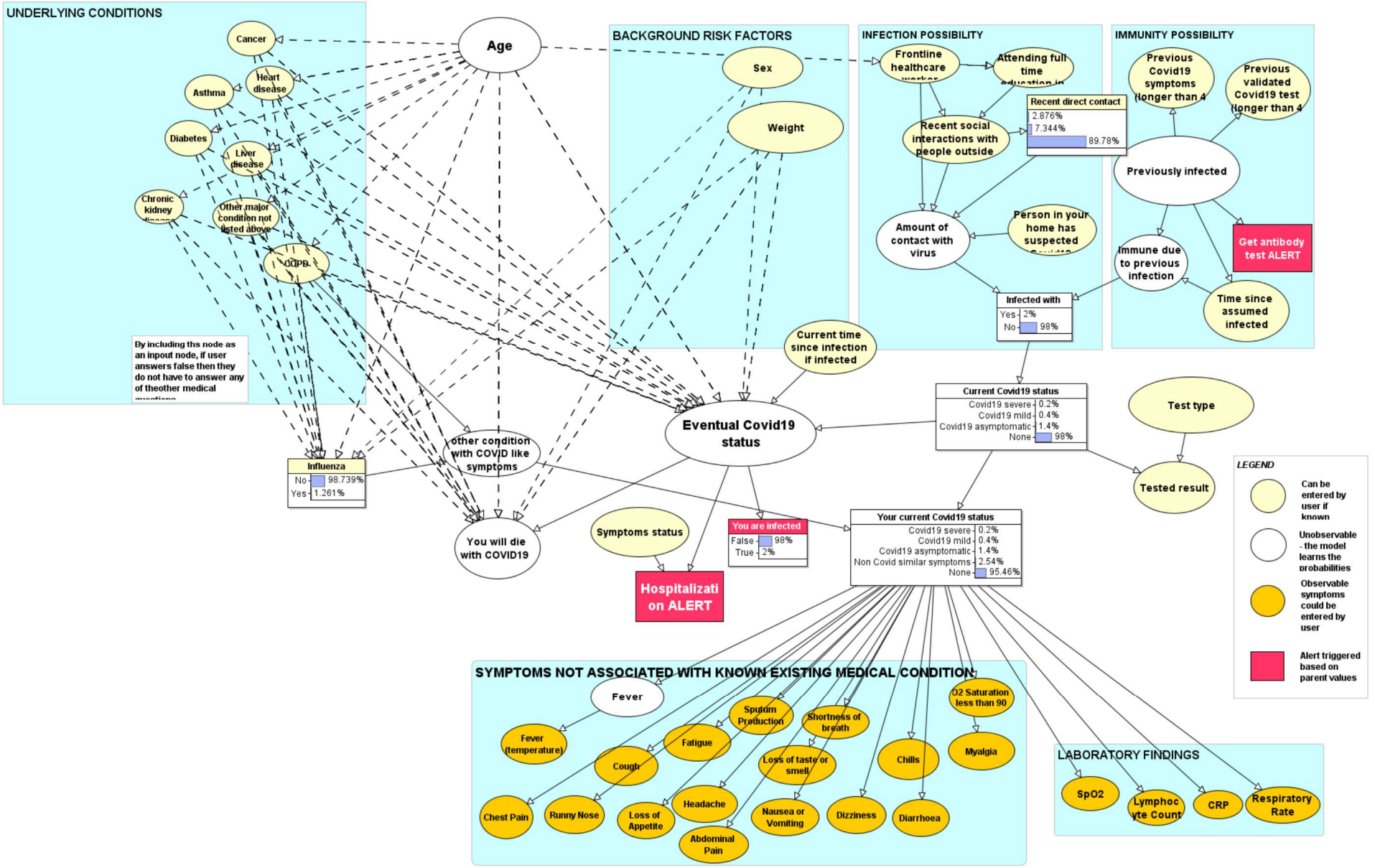
Specific project objectives

- Develop working Bayesian network (BN) models for Gestational Diabetes (GDM) and rheumatoid arthritis (RA)
- Develop improved (generic) methods for efficiently building medical BNs
- Apply method to chronic heart disease prototype example with full end-to-end technology implementation
- Extend the state-of-the-art of BN algorithms to enable them to run efficiently in real time over the web and on mobile devices

Cardiology BN model

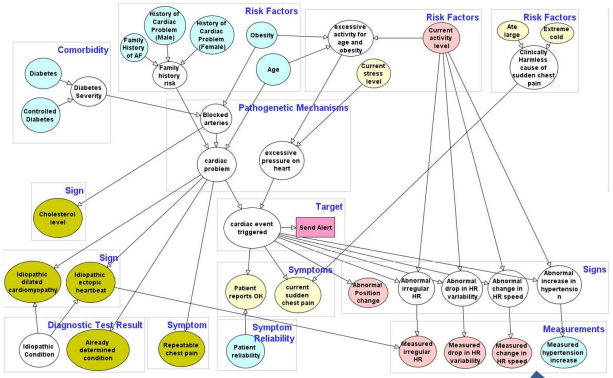


Covid-19 BN model

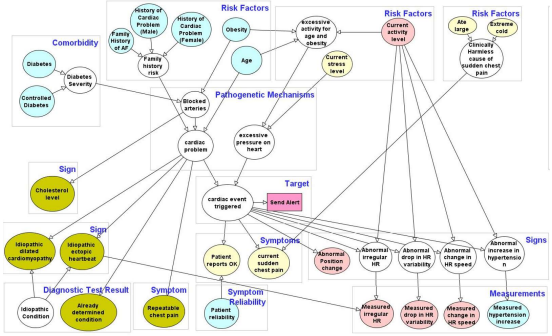


Dynamic BN model

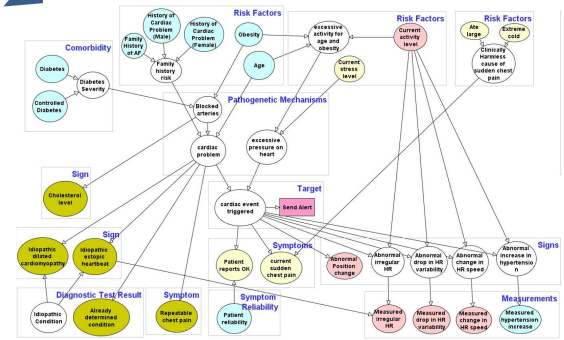
Patient status time t_0



Patient status time t_1



Patient status time t_n



Project achievements

- Working models for GDM and rheumatoid arthritis (RA)
- Ongoing integration work with *Living With* to extend and deploy RA model
- RA patient and clinician views of opportunities and barriers to smart technology supported care.
- Created a set of design personas around sufferers of RA
- Idioms-based method to make it simpler to build BN-based medical decision support systems
- Method applied to chronic heart disease prototype example with full end-to-end technology implementation
- Method applied to new chronic conditions (multiple sclerosis and pelvic floor syndrome with extensive clinical knowledge and validation)
- Advances in Bayesian network algorithms
- Developed a caremap method for specifying clinical care processes that integrates with BNs
- Cs4fn special issue published
- Systematic review leading to improved understanding of the challenges of adopting BN-based medical decision support systems
- Research from the project has been used to better inform the public about Covid-19 risk – also produced personalised Covid-19 risk assessment online system
- Over 60 research articles published (see pambayesian.org)

Schedule

2.10-2.20 Overview of the BN clinical models

2.20 – 3.10 Rheumatoid arthritis case study

3.20- 3.50 GDM case study

3.50 –4.10 Extensions of PAMBAYESIAN

4.10-4.30 PAMBAYESIAN BN technology

4.30-4.40 PAMBAYESIAN impact and outreach