FET Flagship Pilot session

IT Future of Medicine - ITFoM

IT and computing have, in the past, been primarily driven by requirements of "large" physics as well as by a broad spectrum of commercial applications including entertainment, while medicine has only played a minor role. This is going to change, due to the development of a new, data-rich, individualised medicine, likely to surpass the demands of all other IT development fields. As data-intensive analysis and computer intensive modelling technologies become common clinical practice, IT capacity and organization will become key limiting factors in medicine, resulting in shifts of resources from personnel intensive to IT intensive application.

Data-rich, individualised medicine poses unprecedented challenges for IT, in hardware, storage and communication. ITFoM proposes a data-driven, individualised medicine of the future, based on molecular/physiological/anatomical data from individual patients. ITFoM shall make general models of human pathways, tissues, diseases and ultimately of the human as a whole. Patient individualised versions of the models will then be used to identify personalised prevention/therapy schedules and side effects of drugs.

To develop this IT driven, data rich, individualised medicine of the future, ITFoM will prepare for the amalgamation of four major areas: medicine, from sample and diagnosis provision to clinical practice and patient consent, analytical techniques, covering functional genomics and imaging technology analyses on a routine basis, IT developments required to address the computational challenges, and integration, developing interfaces, modelling and machine learning tools required to integrate the data generated through different analysis streams, and to inform relevant health providers.

This is the first time that huge IT implications of worldwide individualized patient care will be addressed in combination with genomics and medical requirements. The project outcomes will enable calculation of health, disease, therapy and its effects for individual patients. These may revolutionize our health care with enormous (i) benefits for health (prevention, diagnosis and therapy), (ii) reduction in cost by individualising combinations of a limited number of drugs, and (iii) new commercial opportunities in IT, analytics and health care.

The ultimate goal of ITFoM is twofold: the first goal being to drive a revolution in ICT technologies so that relevant computing, storage, networking, and modelling technologies are developed to allow each patient's treating physician to have at minimum the power of analysis of a personal human genome project at every juncture of disease management i.e. through diagnosis, treatment, and follow-up. The second goal being a revolution in integrative information management and decision making that will allow for the first time the seamless connection of high throughput bio-molecular characterization and clinical imaging technologies to all fields which will benefit from this connection i.e. the patient and his doctor in clinical applications, the drug researcher in both the discovery and development phases, the epidemiologist attempting to analyze health trends, and the health and human services secretary in developing effective national and EU wide health policies. This entails nothing less than the transformation of biomedical science from empirical and stochastic to fact based and knowledge driven i.e. based on an ICT paradigm.

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