

# VTT Systems Biology and Bioinformatics - a framework for the integration of biotechnology, information technology and engineering

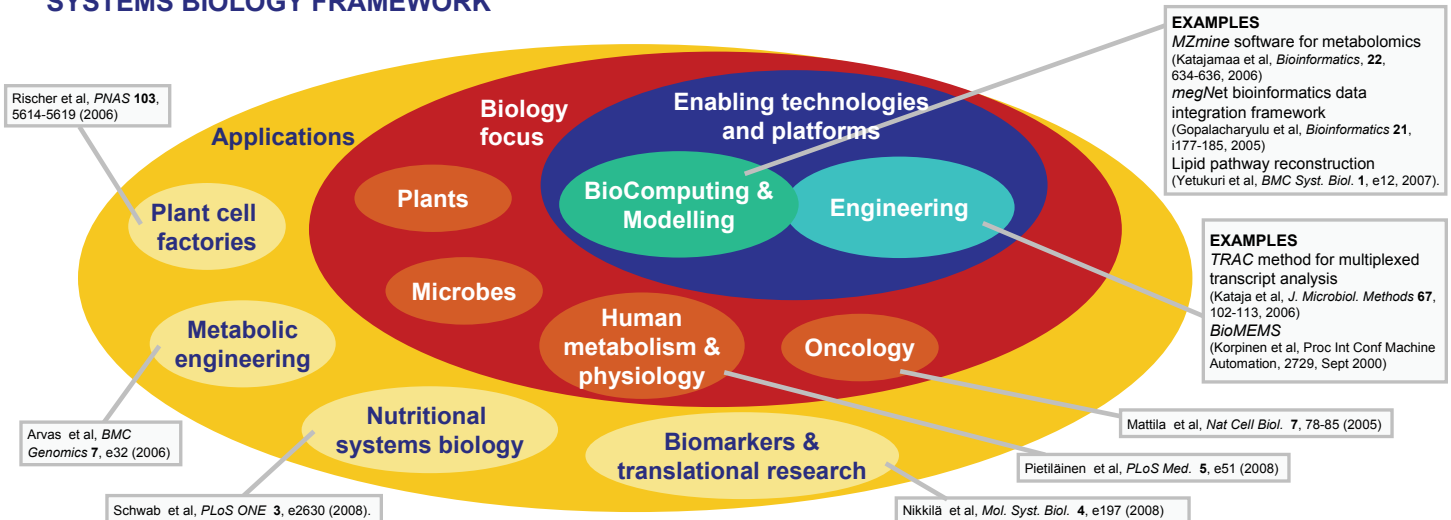
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## BACKGROUND

VTT Technical Research Centre of Finland is an impartial expert organisation. Systems biology at VTT aims to integrate a broad range of in-house expertise. The systems biology platform combines bioinformatics with molecular profiling approaches and new measurement technologies, and benefits from in-house knowledge across information technology, biosensors, microbiology, plants, nutrition, and medical domains.

## SYSTEMS BIOLOGY FRAMEWORK



## PROJECT EXAMPLES

### Industrial Biotechnology

The Finnish Centre of Excellence in White Biotechnology – Green Chemistry (2008-2013)

**MAIN AIMS**

- (1) Eukaryotic microbial hosts for efficient production of novel sugar conversion products
- (2) Chemical conversion to novel polymers

**EXAMPLE REFERENCE**

P. Jouhten, E. Rintala, A. Huuskonen, A. Tamminen, M. Toivari, M. Wiebe, L. Ruohonen, M. Penttilä, H. Maaheimo, Oxygen dependence of metabolic fluxes and energy generation of *Saccharomyces cerevisiae* CEN.PK113-1A. *BMC Syst Biol.* 2, e60 (2008).  
**CONTACT:** Merja Penttilä (merja.penttila@vtt.fi)

### Nutrition

Nordic Center of Excellence "SYSDIET: Systems biology in controlled dietary interventions and cohort studies" (2007-2012)

**MAIN AIMS**

- (1) Exploiting nutrigenomics tools in human dietary interventions, animal and cell culture studies
- (2) To identify novel mechanisms by which Nordic foods and diets could be modified to promote health and prevent chronic diseases

**EXAMPLE REFERENCE**

U. Schwab, T. Seppänen-Laakso, L. Yetukuri, J. Agren, M. Kolehmainen, D. E. Laaksonen, A.-L. Ruskeepää, H. Gylling, M. Uusitupa, M. Orešič, Triacylglycerol fatty acid composition in diet-induced weight loss in subjects with abnormal glucose metabolism – the GENOBIN Study. *PLoS ONE* 3(7), e2630 (2008).  
**CONTACT:** Kaisa Poutanen (kaisa.poutanen@vtt.fi), www.sysdiet.fi

### Virtual Physiological Human

EU FP7: From patient data to personalized healthcare in Alzheimer's disease (2008-2011)

**MAIN AIM**

Development of a standardised and objective solution that would enable an earlier diagnosis of Alzheimer's disease, improved monitoring of treatment efficacy and enhanced cost-effectiveness of diagnostic protocols.

**EXAMPLE REFERENCE**

J.R. Koikkalainen, M. Anttila, J.M.P. Lötjönen, T. Heliö, K. Lauerman, S.M. Kivistö, P. Sipola, M.A. Kaartinen, S.T.J. Kärrkäinen, E. Reissell, J. Kuusisto, M. Laakso, M. Orešič, M.S. Nieminen, K.J. Peuhkurinen, Identification of Early Familial Dilated Cardiomyopathy by Determination of a Disease State Parameter Using Cine MR Imaging Data, *Radiology*, In press (2008).  
**CONTACT:** Jyrki Lötjönen (jyrki.lotjonen@vtt.fi), www.predictad.eu

### Medical Systems Biology

EU FP7: European collaborative project on inflammation and vascular wall remodelling in atherosclerosis (2008-2013)

**MAIN AIMS**

- (1) Identify novel inflammatory mechanisms in vascular remodelling by combining the exploration of human biobanks with animal models and established cellular models.
- (2) Develop new preventive, diagnostic and therapeutic strategies against atherosclerotic cardiovascular disease.

**EXAMPLE REFERENCE**

R. Laaksonen, M. Katajamaa, H. Päivä, M. Sysi-Aho, L. Saarinen, P. Junni, D. Lütjohann, J. Smet, R. Van Coster, T. Seppänen-Laakso, T. Lehtimäki, J. Soini, M. Orešič, A systems biology strategy reveals biological pathways and plasma biomarker candidates for potentially toxic statin induced changes in muscle, *PLoS ONE* 1(1), e97 (2006).  
**VTT CONTACT:** Matej Orešič (matej.oresic@vtt.fi), www.atheroremo.org