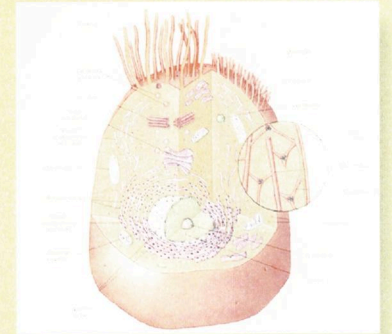# Centrum voor Wiskunde en Informatica

The Silicon Cell
Towards Computing the Living Cell

Silicon Cell Consortium Amsterdam:

Institute for Molecular Biological Sciences (IMBS); Vrije Universiteit (VU)
theoretical and experimental molecular biology
contact: Hans V. Westerhoff; hw@bio.vu.nl; URL: www.bio.vu.nl/html/cell_phy.html

Swammerdam Institute for Life Sciences (SILS); University of Amsterdam (UvA)
theoretical and experimental molecular biology
contact: Roel van Driel; van.driel@chem.uva.nl; URL: www.science.uva.nl/research/sils/research/str/

Informatics Institute (IvI); University of Amsterdam (UvA)
computational physics
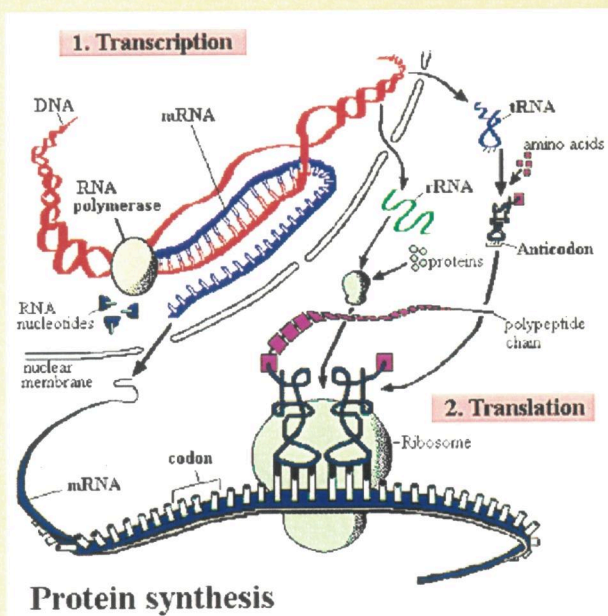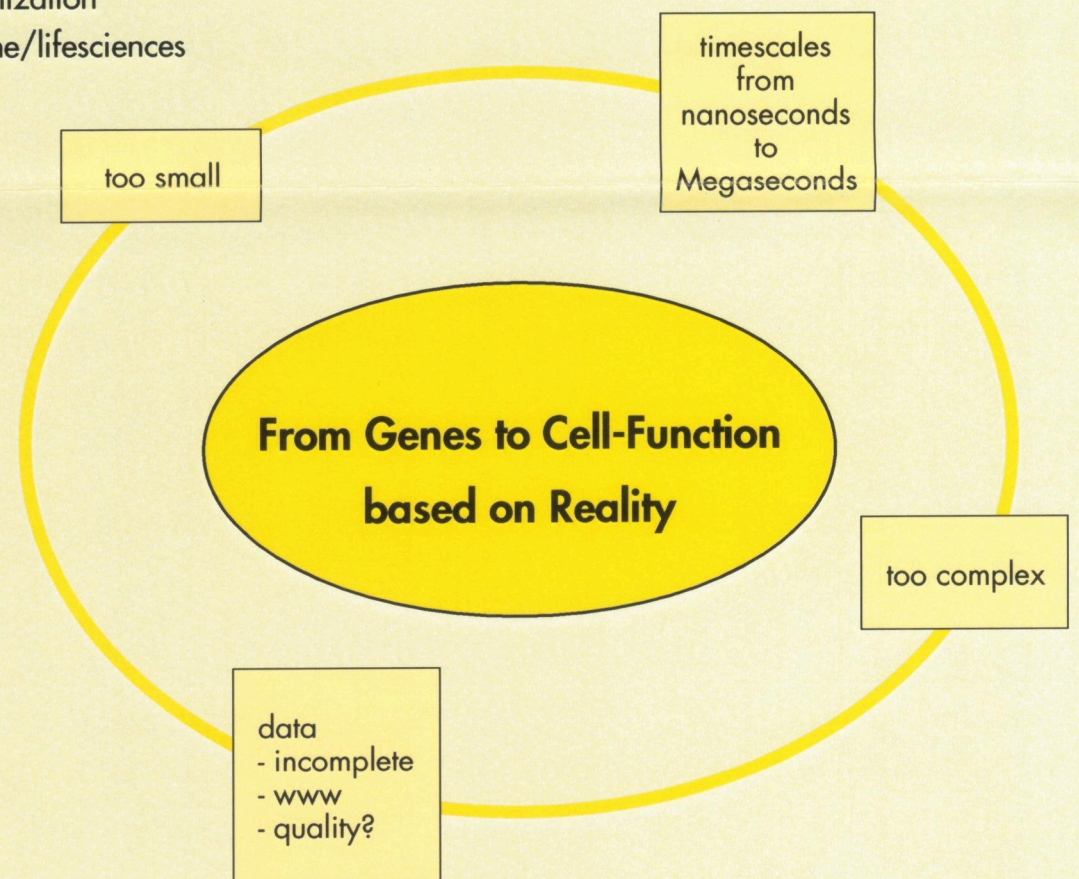contact: Jaap Kaandorp; jaapk@science.uva.nl; URL: www.science.uva.nl/research/scs/

CWI (National Research Institute for Mathematics and Computer Science)
applied and numerical mathematics, control and system theory, visualization
contact: Joke Blom; gollum@cwi.nl; URL: www.cwi.nl/project/by-name/lifesciences

Aim:

The long-term goal of the Consortium is the computation of Life at the cellular level on the basis of the complete genomic, transcriptomic, proteomic, metabolomic, and cell-physiomic information that will become available in the forthcoming years.

too small

timescales from nanoseconds to Megaseconds

From Genes to Cell-Function based on Reality

too complex

data
- incomplete
- www
- quality?

1. Transcription

DNA · mRNA · tRNA · amino acids · RNA polymerase · rRNA · proteins · Anticodon · RNA nucleotides · polypeptide chain · nuclear membrane · 2. Translation · mRNA · codon · Ribosome

Protein synthesis

Research focus
- regulatory networks (metabolic, signal transduction, gene expression)
- structure and functional organization of cell nucleus
- dynamic architecture of cells

Model integration to calculate two real cells:
- E. coli (prokaryote)
- S. Cerevisiae (baker's yeast, eukaryote)

www.cwi.nl