



SYNBIOCHEM

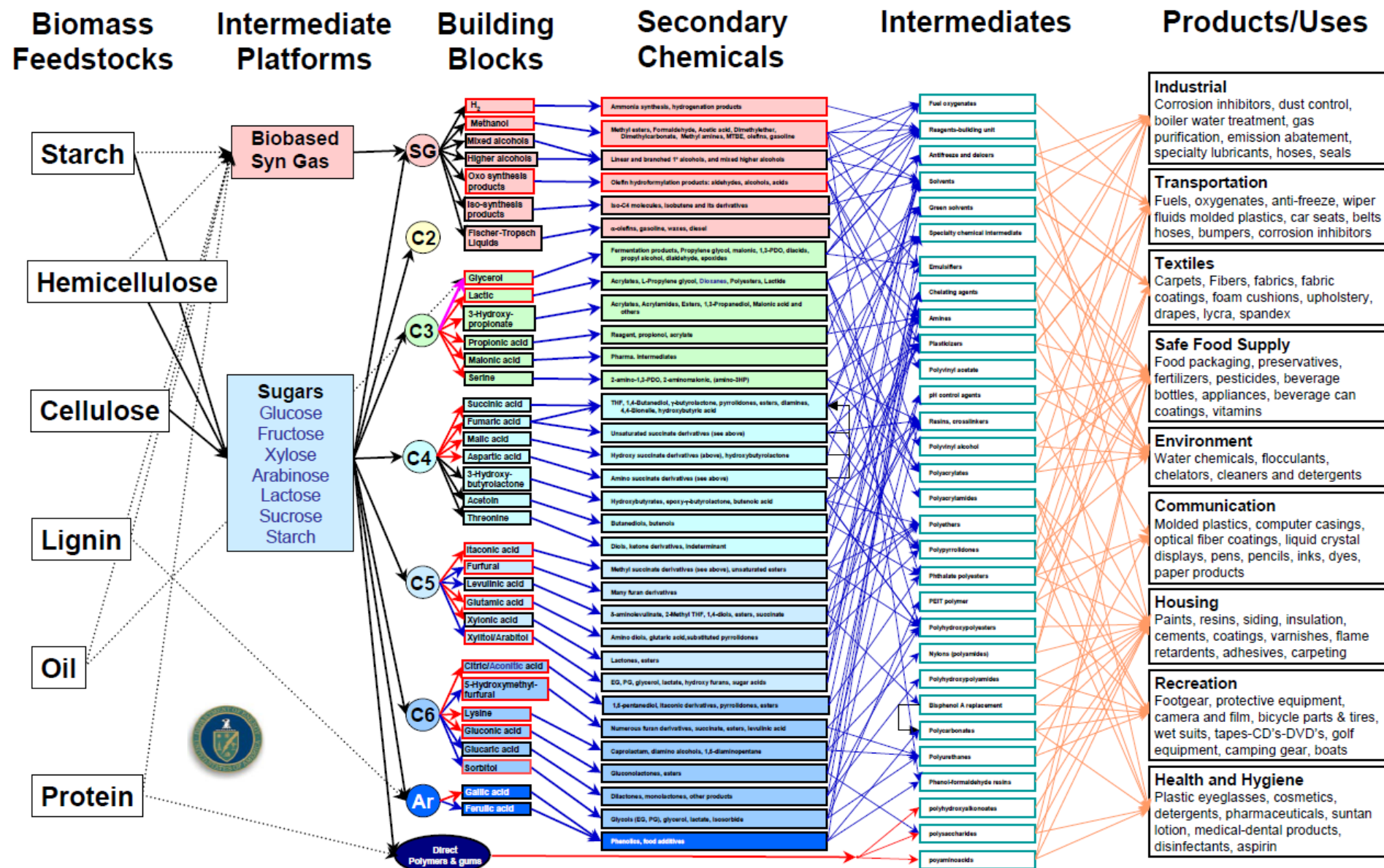
Manchester Synthetic Biology Research Centre  
*for Fine and Speciality Chemicals*

# Synthetic Biology at the University of Manchester

Rainer Breitling

MANCHESTER  
1824

The University of Manchester  
Manchester Institute of Biotechnology

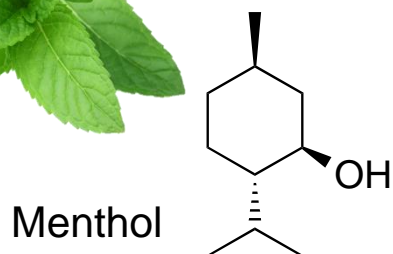


Predicted market value of Biotech by 2016: **\$10.8 billion** (from \$1.6 billion in 2011)





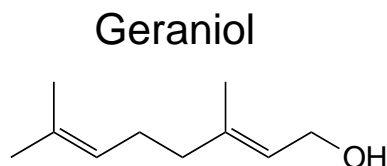
# Mentha



## Menthol



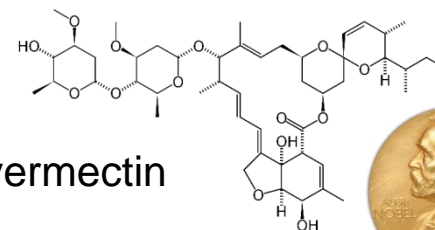
# Rosa



## Geraniol



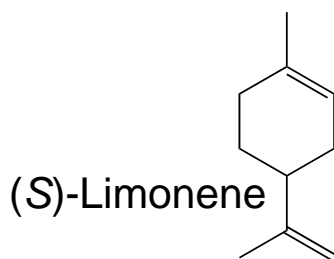
# Streptomyces



## Avermectin



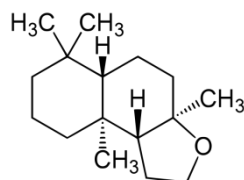
# High-value Natural Products



(S)-Limonene



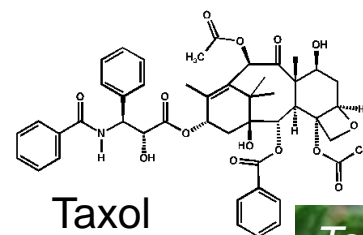
*Citrus × limon*



## Ambroxan



*Sperm whale*



# Taxol



*Taxus brevifolia*





**Food/Beverage  
Flavourings**



**Medicines**



**Perfumes**



**Soap and Cosmetics**

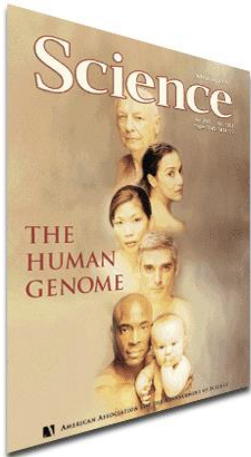


**Agrochemicals**

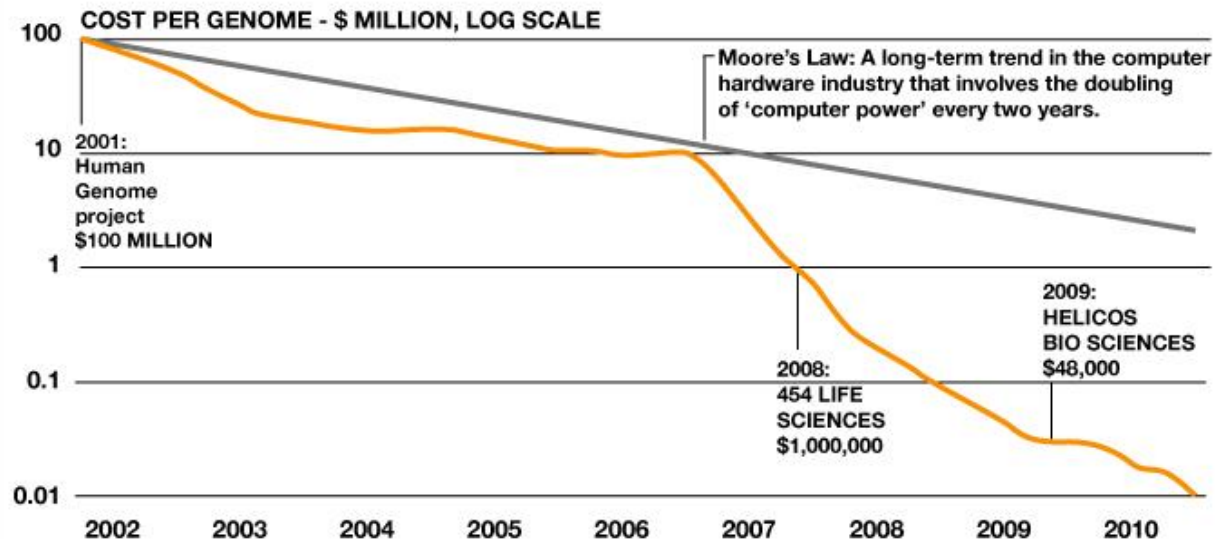
Major demand for  
sustainable,  
resource-efficient,  
bio-based alternatives to  
chemical production

# Synthetic Biology

## Dreams of a new Industrial Revolution



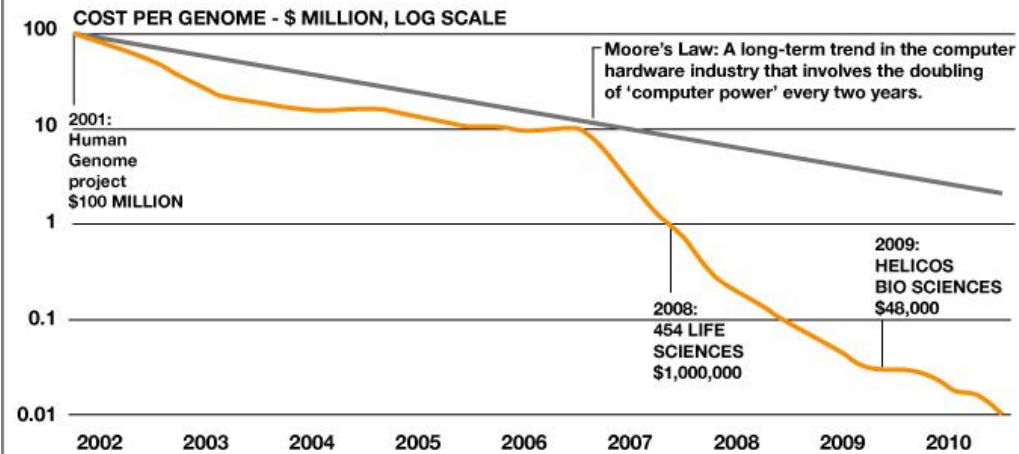
### DNA sequencing costs have gone down



SOURCE : NATIONAL INSTITUTES OF HEALTH



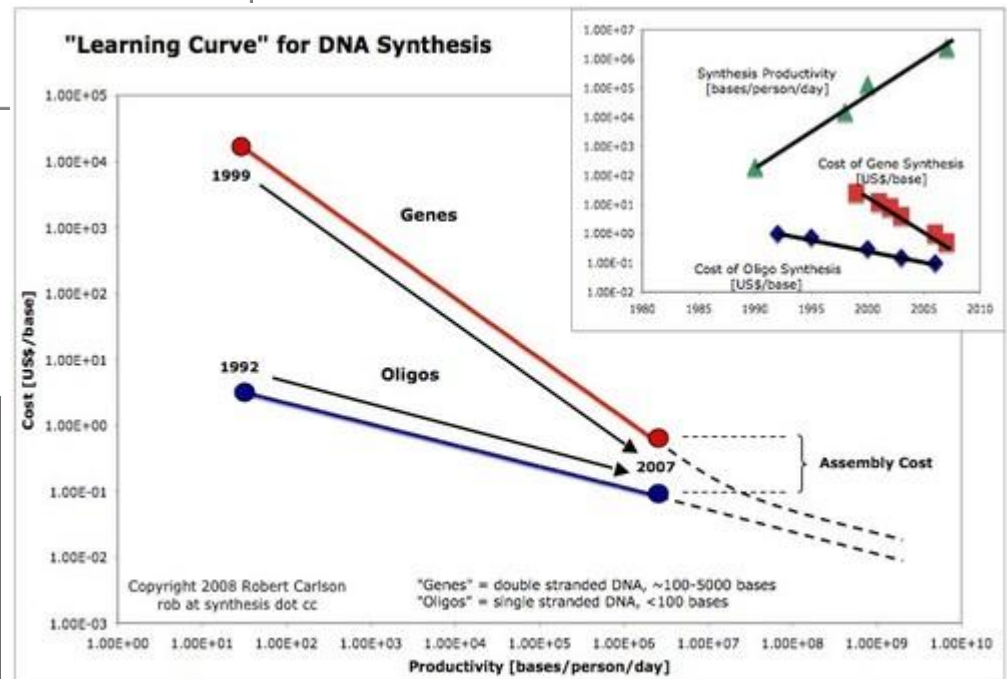
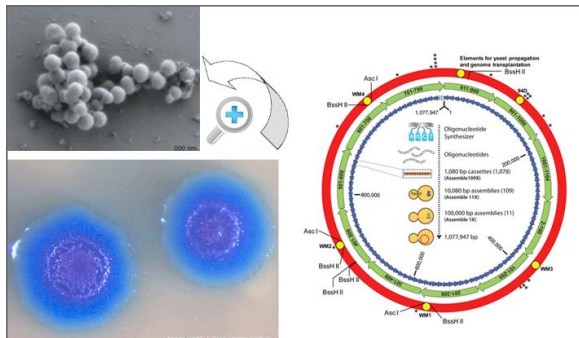
# DNA sequencing costs have gone down



SOURCE : NATIONAL INSTITUTES OF HEALTH

## Reading

## Writing



# Metaphor 1: Cells are like lego kits



**Key words:** Modularity, Composability, Standardization (“biobricks”)

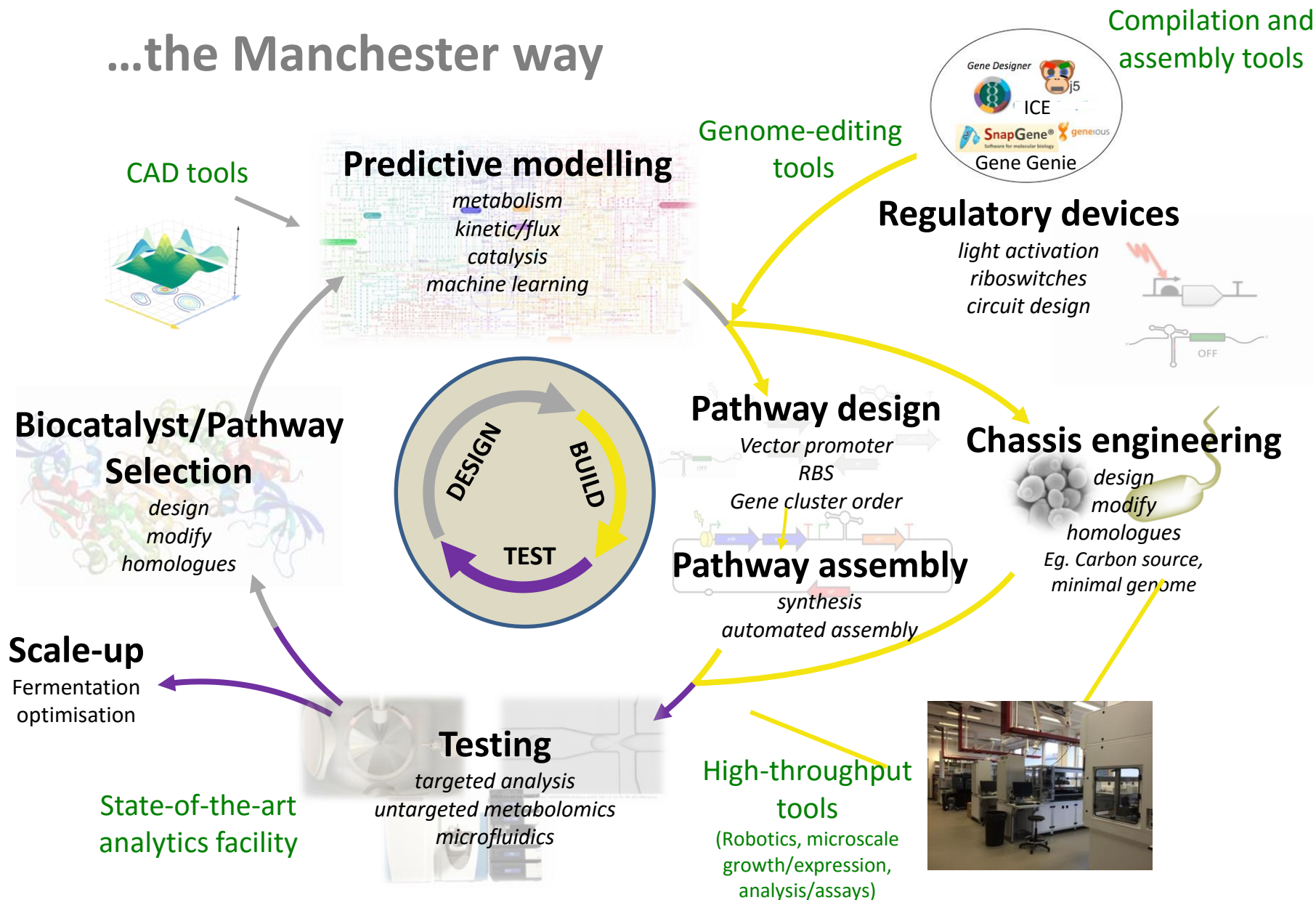
# Metaphor 2: Cells are like electronic circuits

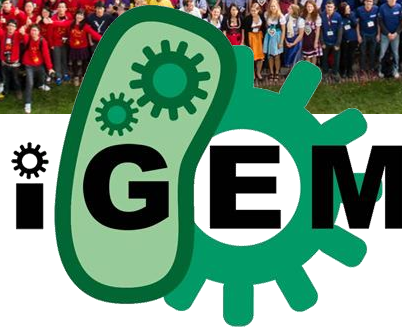
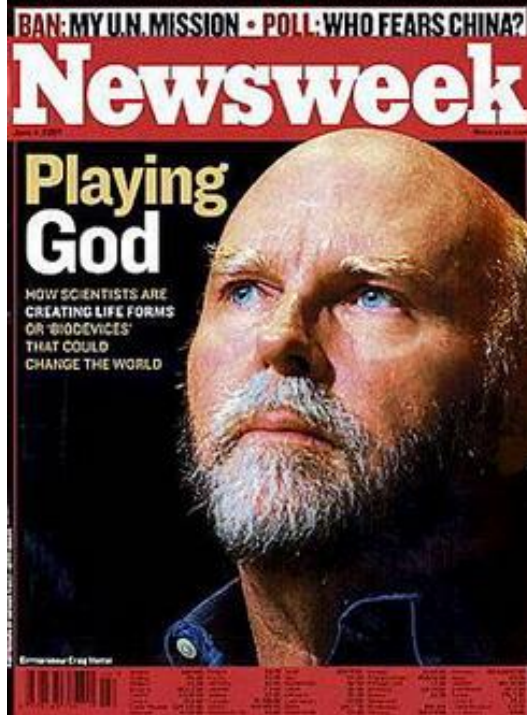


**Key words:** Design, Predictability, Programmability, Refactoring



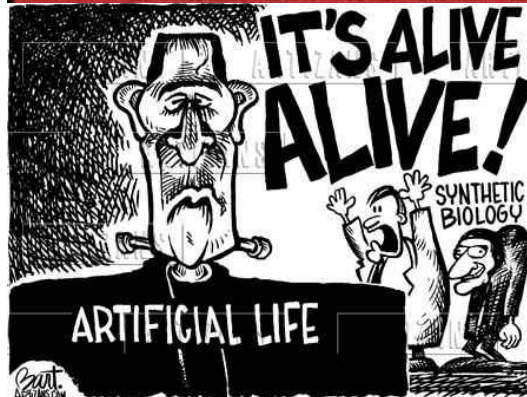
## ...the Manchester way





## EXTREME GENETIC ENGINEERING

*An Introduction to Synthetic Biology*



## Extreme Genetic Engineering in Your Ice Cream?



**TAKE ACTION:** Tell Dryer's, Baskin Robbins, and Haagen Dazs to reject synbio vanilla.

