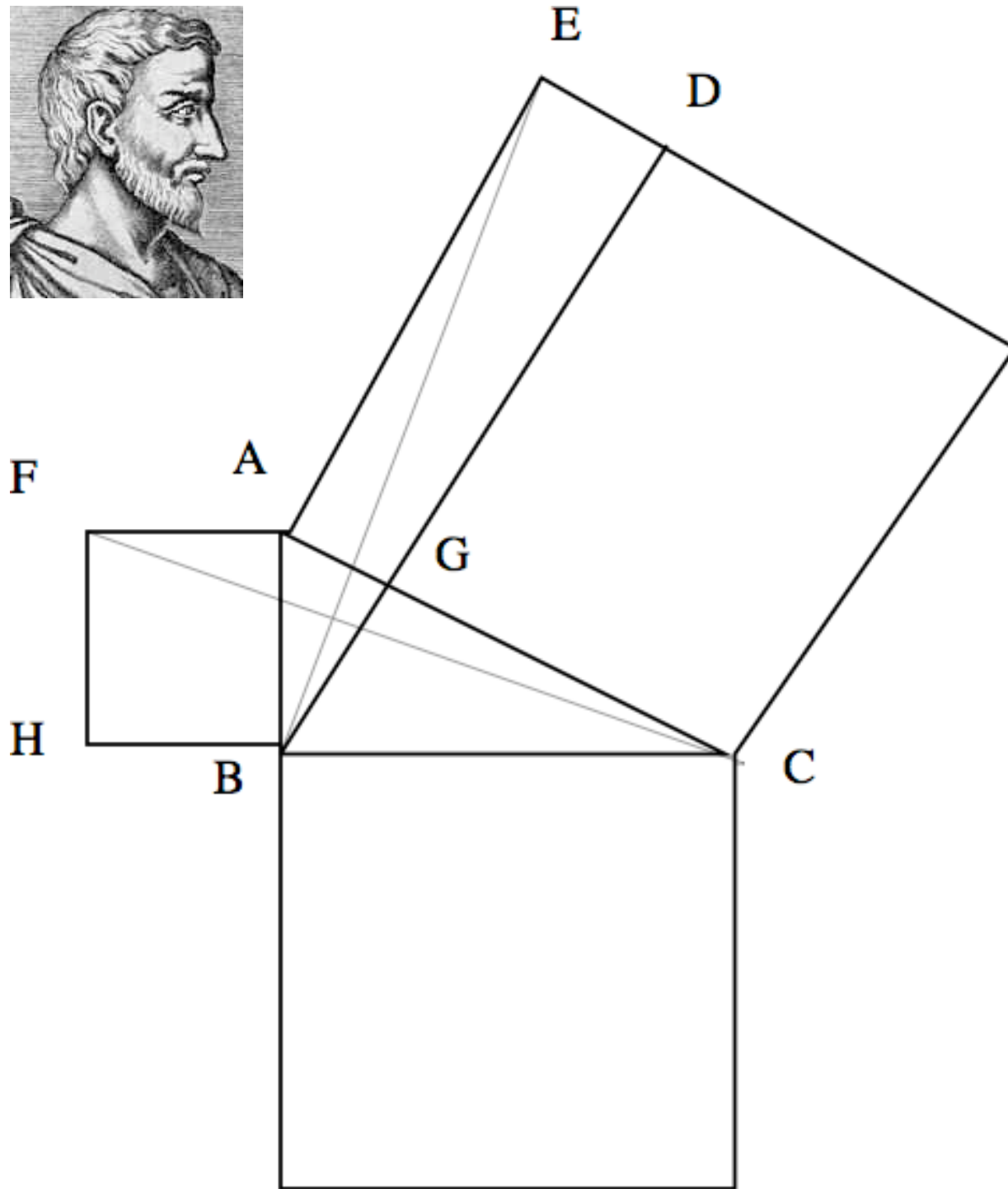




Postmodern datalogihistoria- Några bilder stulna från Internet.

Stefan Arnborg, KTH

<http://www.nada.kth.se/~stefan>



Euclides' proof of the Pythagorean theorem.

Can a computer follow it? The text seems to be internally complete, but a human seems to need the figure to understand it.

Thomas Bayes, amateur mathematician



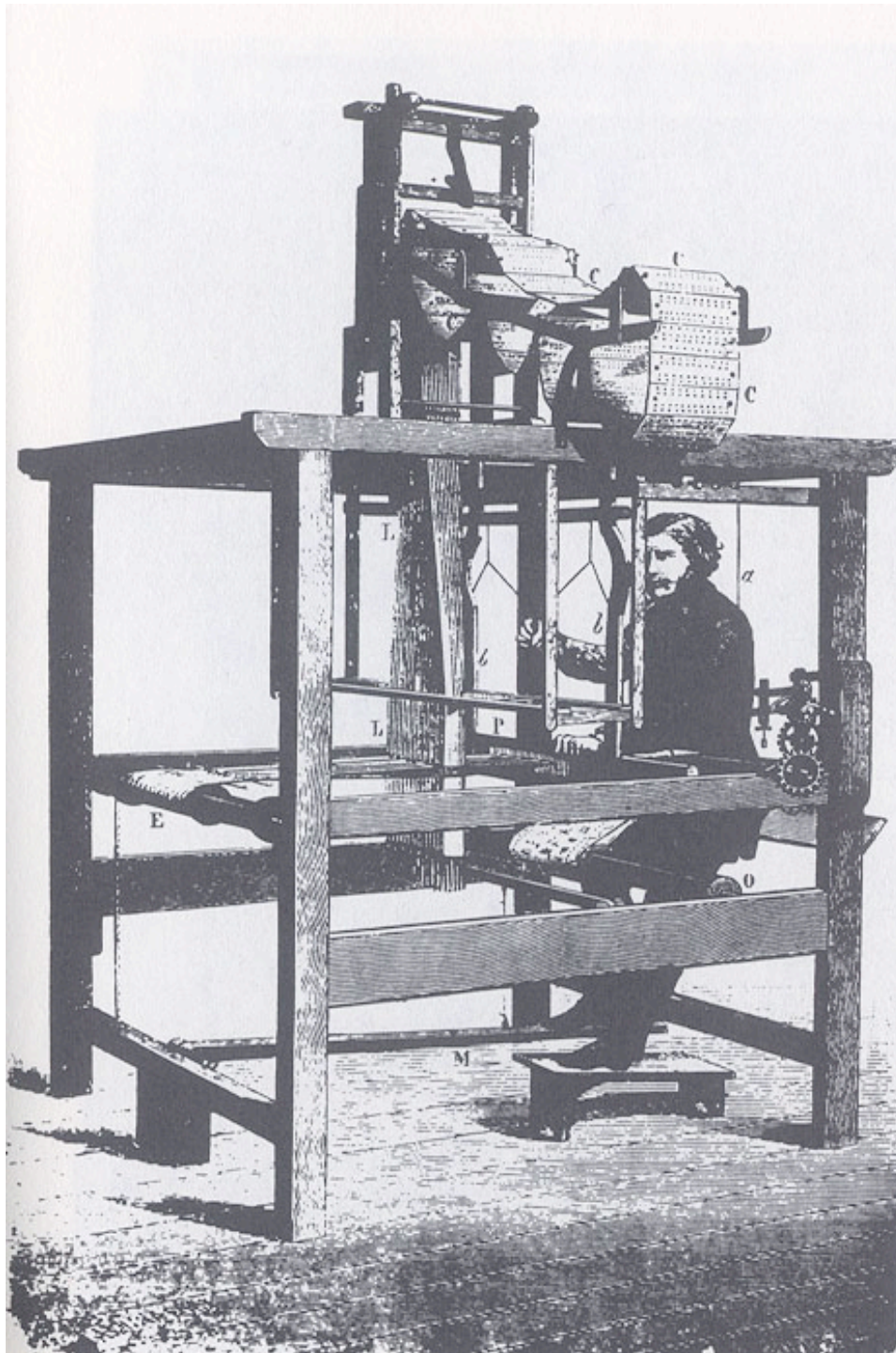
REV. T. BAYES

If we have a probability model of the world we know how to compute probabilities of events (at least, Kolmogorov knew).

But is it possible to learn about the world from events we see?

Bayes' proposal was forgotten but rediscovered by Laplace.

Robotics, AI, decision support, vision, data mining, user modeling



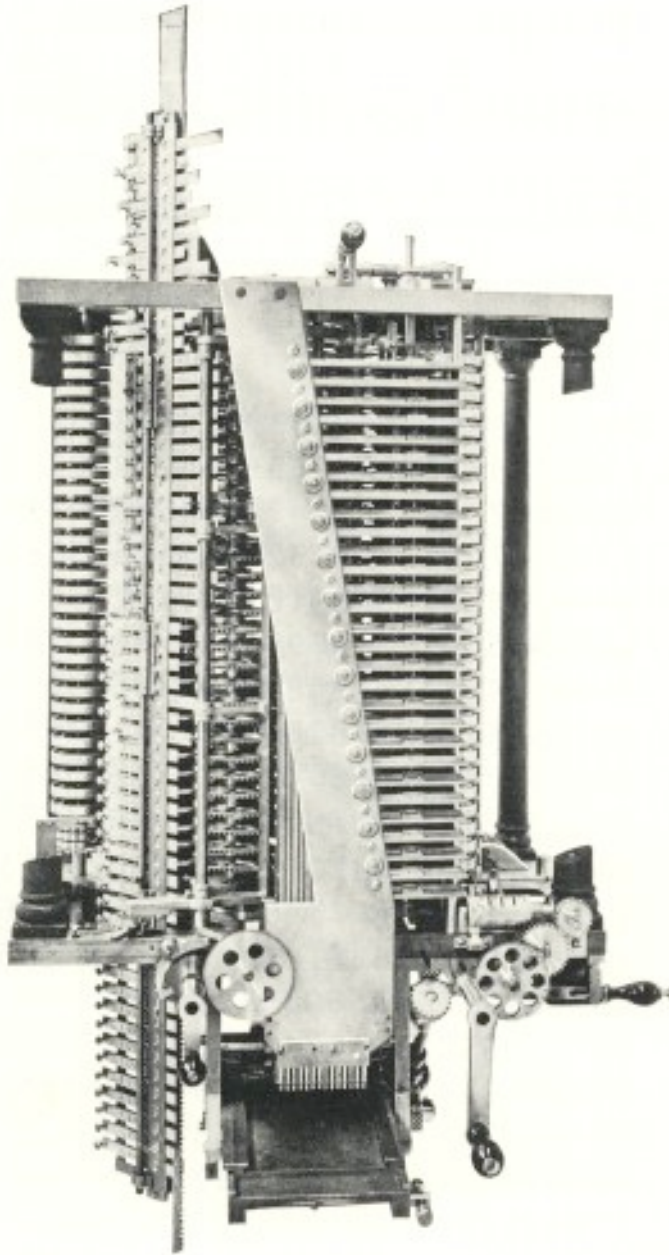
Jacquard invented , in 1804, computerized loom driven by punched program cards. Made possible use of less, and less skilled, labour in textile manufacturing. Punched cards used until 1980:s



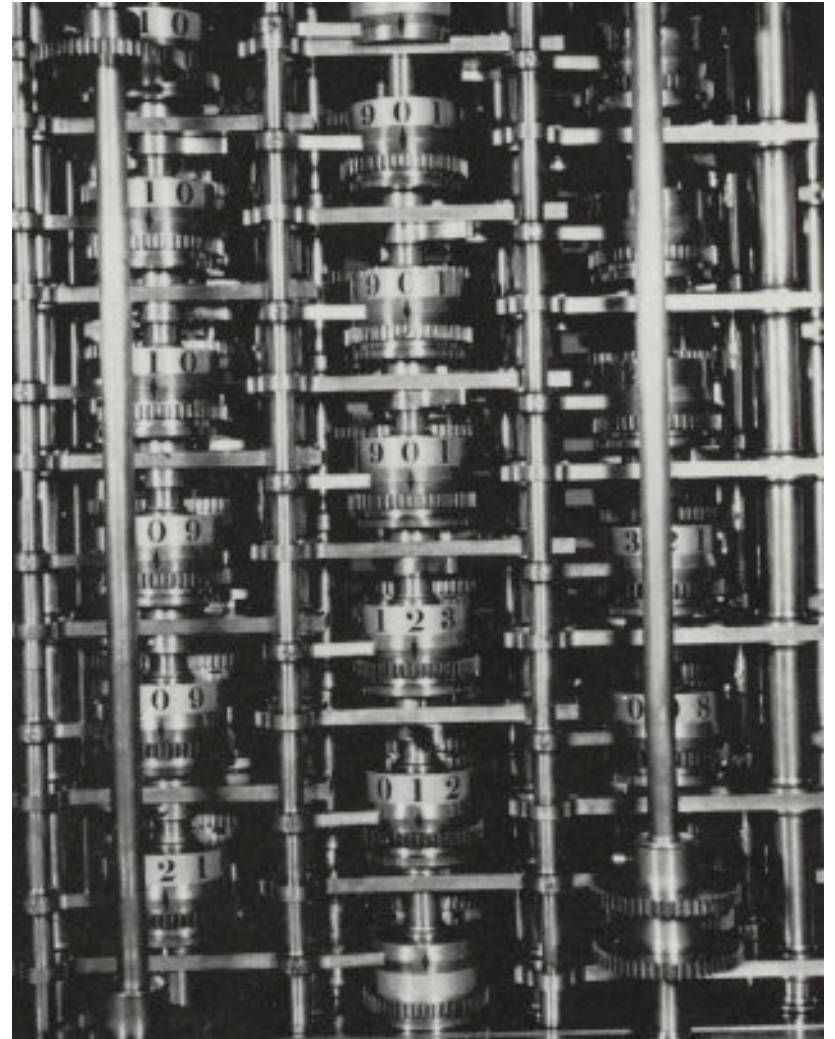


Mary Shelley - urged by Lord Byron -- describes how Frankenstein creates a human-like being from biological materials, and gives it life.
But the being was -- and had to be -- emotionally dysfunctional

Babbage's analytical engine



THE MILL AND PRINTING PARTS OF BABBAGE'S
ANALYTICAL ENGINE.



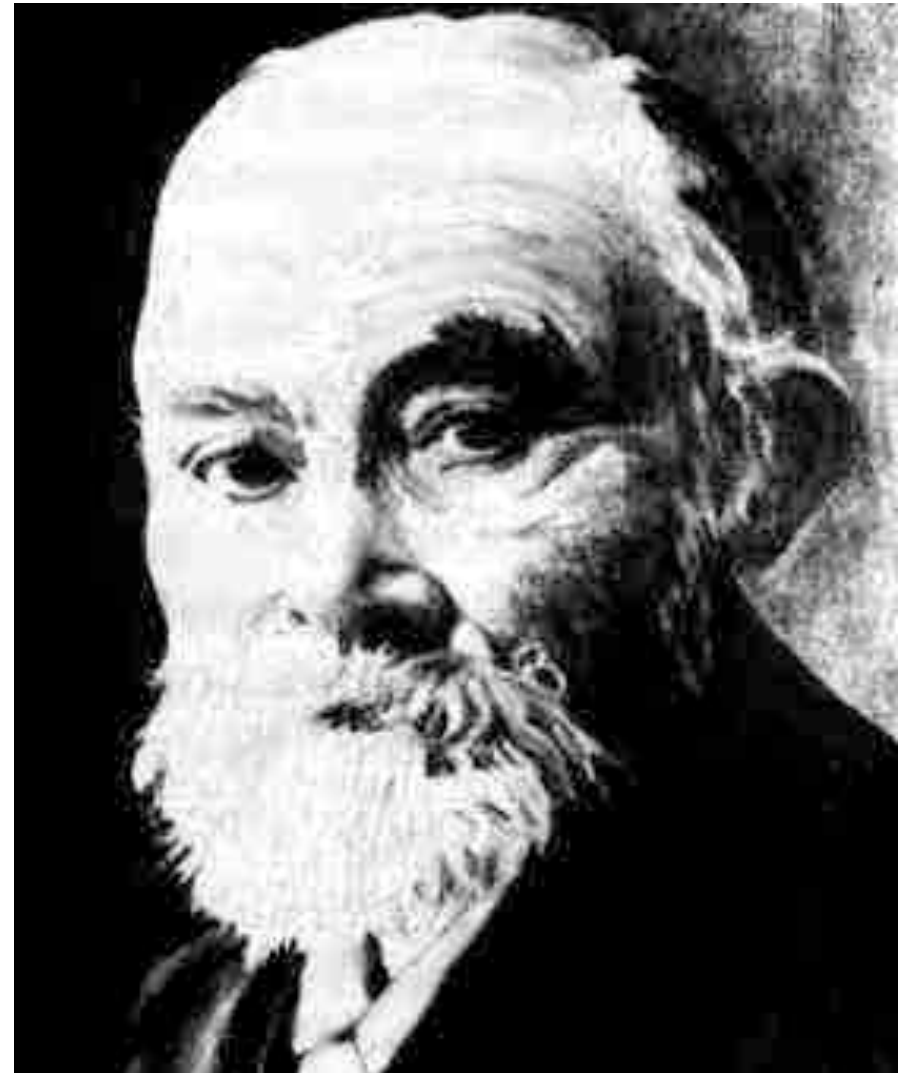
Lord Byron had several connections to computing: In the House of Lords, he took the side of workers destroying Jacquard's invention- first and only popular revolt against computers; Teased Mary Shelley to write Frankenstein; Father of Ada Lovelace Byron, 'first programmer'.



Logic and Foundations of Mathematics: Frege, Peirce..

For 2200 years, investigators had learned Aristotle's logic from Organon -- without questioning it but applying it to problems of interest. Frege, Peirce, Russell investigated logic and its role as a mathematical discipline.

Frege defined modern predicate logic -- unfortunately for him with a rather weird notation.





Pessimistic prediction for 1995, written in 1978

Artificial Intelligence will for the foreseeable future be less frequent than natural stupidity

Possible volume uses of computers:

- writing standard letters with cut-and-paste
- producing texts and signs for OH projectors and posters
- Simple economic calculations, budget, etc.
- Using the computer screen to find out, e.g., news from the steel industry or sports
- Self-going vacuum cleaner
- Interesting development: computer-independent OS, UNIX. Unfortunately built on C, a programming language not available on most computers



Future computer technology:
The limit is set by what users
are willing to pay...



2067 miljarder gick upp i rök
Sex Ericsson försvann i börskaos
Svenska Dagbladet 4 mars 2002

Dataprojektor för färg,
stor som risgryn, för en dollar
Global uppkoppling,
trådlös och fast
Sensorer i sandkornsstorlek
avläser allt, och skickar det
rätt
Mikromekaniska kretsar
reparerar människor.
Åldrandet avskaffas
Daedalus, 2002

Feyerabend - Philosopher at work



Science is an essentially anarchistic enterprise

The only principle that does not inhibit progress is:
ANYTHING GOES

Hypotheses contradicting well-confirmed theories give us evidence that cannot be obtained in other ways

If there is a driving force in science, it is aesthetics.

(Against Method, 1975)

"In the eyes of our critics the ozone hole above our heads, the moral law in our hearts, the autonomous text, may each be of interest, but only separately. That a delicate shuttle should have woven together the heavens, industry, texts, souls and moral law

- this remains uncanny, unthinkable, unseemly."

(We Have Never Been Modern, p. 5)

What would happen to the Great Divide between scientific and prescientific reasoning if the same field methods used to study Ivory Coast fawners were applied to first-rate scientists?



Parmenides
 Aristoteles
 Nietzsche
 Heidegger
 Popper
 Kuhn
 Feyerabend
 Pickering
 Verbeek
 Latour ...

What can anthropologists and
 post-modernists tell us about
 progress in science&technology?

PRESIDENTIAL & ENDOWED LECTURES IN THE HUMANITIES & ARTS

STANFORD HUMANITIES CENTER

Philosopher of Science
Bruno Latour
 Ecole des Mines de Paris

Lecture
 Monday, April 7, 2005, 7 P.M.
 Law School, Room 290

Lecture Discussion
 Tuesday, April 8, 2005, 4 P.M.
 Stanford Humanities Center
 424 San Teresa Street
 Stanford University
<http://hscenter.stanford.edu>

**Why has critical spirit
run out of steam?**

About *Iconoclasm* and beyond

STANFORD HUMANITIES CENTER

Is Praxiteles' work already in the marble?
Is Science&technology present in Nature?

NO: Structure of Science (and Truth) is
the outcome of a practice

Which claims can be resisted?

Which can be made?

Which allies can be brought in?

Which links resist, and which break?

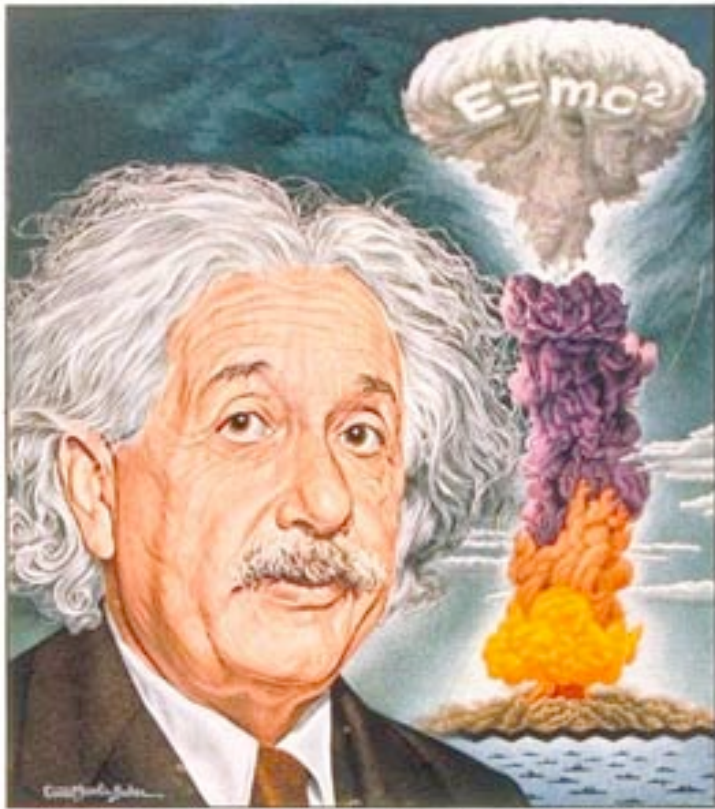
Scientific truth defined
in 'centers of calculation'
and verified in 'galleries' of
a 'community of practice'
extending through society
as a human/artefact 'actor network'

(Latour, Science in action, 1985)



TIME

THE WEEKLY NEWSMAGAZINE



COSMOCLAST EINSTEIN
All matter is speed and flame.

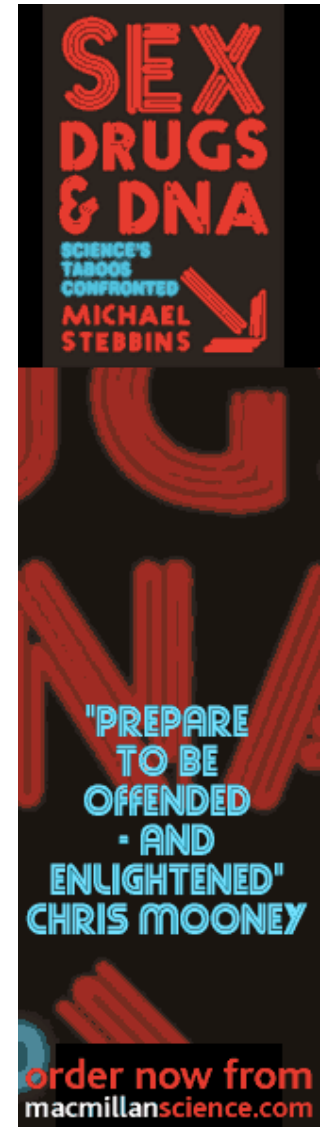
One of the biggest fabrications in science:

Einstein had nothing to do with the development of the scientific base of nuclear energy.

Friedman, Donley, 1985

Microsoft Science 2020:

- Rethink how we educate tomorrow's scientists. The education of today's children is a priority. Teaching of computing should be "more than just 'IT' classes and how to use PowerPoint. Make basic principles of computer science, such as abstraction and codification, a core part of the science curriculum"
- Create new kinds of research institutes... "focused on 'grand challenges' rather than 'grand disciplines' "
- Develop innovative public-private partnerships to accelerate science-based innovation, and better mechanisms to create value from intellectual property



En otidsenlig betraktelse

Människan är ett beundransvärt bygg-geni som på rinnande vatten bygger en katedral av begrepp. Bygget måste vara som av spindelväv, bräckligt nog för att bäras av vågen och stabilt nog att inte blåsas sönder av varje vind



What does a CS dept look like?

Stanford University Computer Science Department

Center for Computer Research in Music and Acoustics (CCRMA)
Knowledge Systems Laboratory (KSL)
Stanford Concurrency Group (Boole group)
Stanford Concurrency Group (Chu spaces)
Stanford Distributed Systems Group (DSG)
Stanford Medical Informatics (SMI)
Stanford Scientific Computing Computational Mathematics Program (SCCM)
Stanford SUIF Compiler Group
Stanford University Database Group

Research Areas:

- [Algorithms](#)
- [Artificial Intelligence](#)
- [BioComputation](#)
- [Database & Information Systems](#)
- [Distributed Systems/Ubiquitous Computing](#)
- [Geometric Computation](#)
- [Graphics](#)
- [Hardware/Architecture](#)
- [Human Computer Interaction](#)
- [Internet Systems & Infrastructure](#)
- [Knowledge Representation & Reasoning](#)
- [Machine Learning](#)
- [Math Theory of Computation](#)
- [Natural Language & Speech](#)
- [Networks](#)
- [Probabilistic Methods & Game Theoretic Methods](#)
- [Programming Languages & Compilers](#)
- [Robotics, Vision & Physical Modeling](#)
- [Scientific Computing](#)
- [Security and Privacy](#)
- [Software/Operating Systems](#)
- [Systems Reliability/Dependability](#)

CS & CSL Research Areas

In the list below we do not partition research areas into categories such as "Artificial Intelligence" or "Computer Systems" since some areas fall into multiple categories. For instance, game theoretic methods could be considered part of AI or part of theory. ([Additional Mapping Suggestions](#))

Research Area

Faculty



Home
Page



Faculty
Profile

Algorithms

Alex Aiken
Leonidas Guibas
Don Knuth
Vladlen Koltun
Rajeev Motwani
Serge Plotkin
Tim Roughgarden

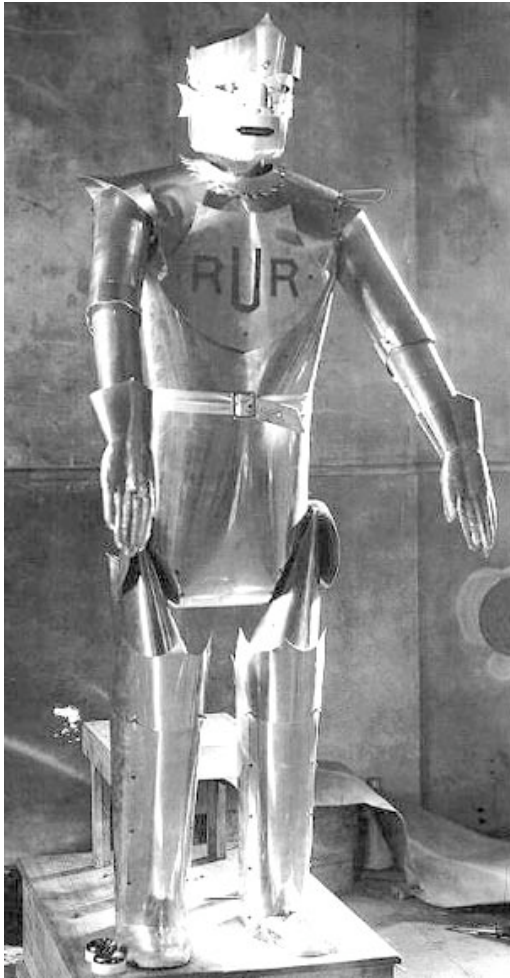


Artificial Intelligence

Research Groups:
[Theory Group](#)
[Bio-X](#)
[Stanford AI Laboratory](#)
[Geometric Computation Group](#)
[Computer Graphics Laboratory](#)
[InfoLab](#)
[Information Privacy](#)

Daphne Koller
Jean-Claude Latombe
John McCarthy
Andrew Ng
Nils Nilsson
Yoav Shoham





Future of Robotics??

Reception Robot **ACTROID®**

KOKORO Co., Ltd. and Advanced Media, Inc. have developed "ACTROID", a female-type reception robot that has been designed as an "Android receptionist bearing a striking resemblance to a woman with a good command of four languages" with the objective of promoting a "System Development toward Practical Use" under the NEDO "2004 Next-Generation Robot Commercialization Project". **ACTROID** serves as a **Robot Information** at the World Expo 2005 Aichi, Japan running from March 25.

ords of the visitors in four languages (Japanese, Chinese, English, Korean). It can carry on conversations with the visitors on various languages in a synthetic but true-to-life voice.

fect analogy to humans. **ACTROID** is capable of text of conversation expressively just like a human-being

(facial expressions, lip motions and behaviors).

ACTROID^{series} information

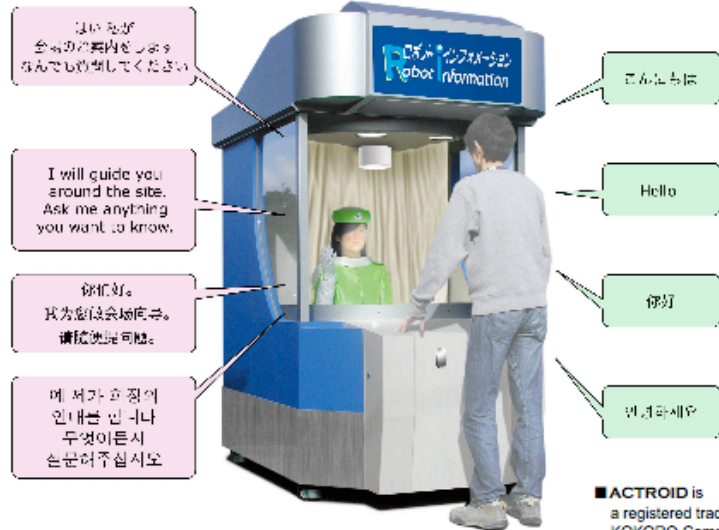


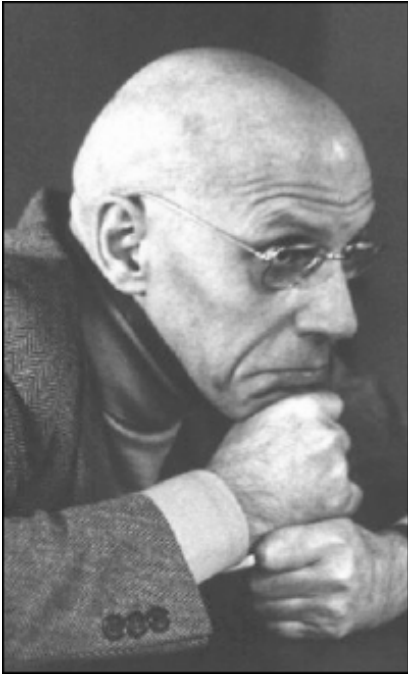
ACTROID

Android that makes conversation with human-like natural expressions and behaviors.
Capable of recognizing four languages such as Japanese, English, Chinese and Korean.

Information Booth

A booth houses at its roof area:
a sound collector microphone for voice recognition;
an all-directional camera for image recognition; and a stereo-camera.
Also, a human-detecting sensor is embedded in a table to detect a person near the booth and identify its position.





Law and bureaucracy:

-- Do the patients and taxpayers
own the health care system?

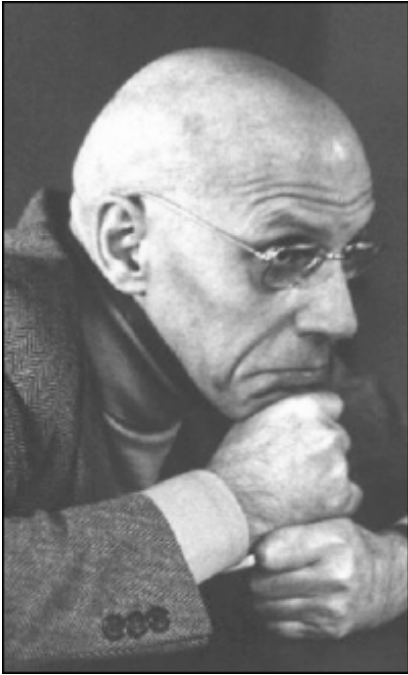
Or is it the opposite way around?

M. Foucault,
Punir et Surveiller:
Panopticon as
symbol for
disciplining humans

System structures determine
who can see what



doug duBois & jim goldberg NYTimes 9-22-2002



M. Foucault,
Punir et Surveiller:
Panopticon as
symbol for
disciplining humans

System structures determine
who can see what

Law and bureaucracy:

-- Do the patients and taxpayers
own the health care system?

Or is it the opposite way around?



*** WIRED on Total Information Awareness**

WIRED (Dec 2, 2002) article "Total Info System Totally Touchy" discusses the Total Information Awareness system.

~~~ Quote:

"People have to move and plan before committing a terrorist act. Our hypothesis is their planning process has a signature."

Jan Walker, Pentagon spokeswoman, in Wired, Dec 2, 2002.

"What's alarming is the danger of false positives based on incorrect data."

Herb Ec



# Hedvig Sidenbladh-Chapman-Kolmogorov

## Dynamic tracking problems

$$f(\lambda_t | D_t) \propto f(d_t | \lambda_t) \int f(\lambda_t | \lambda_{t-1}) f(\lambda_{t-1} | D_{t-1}) d\lambda_{t-1}$$

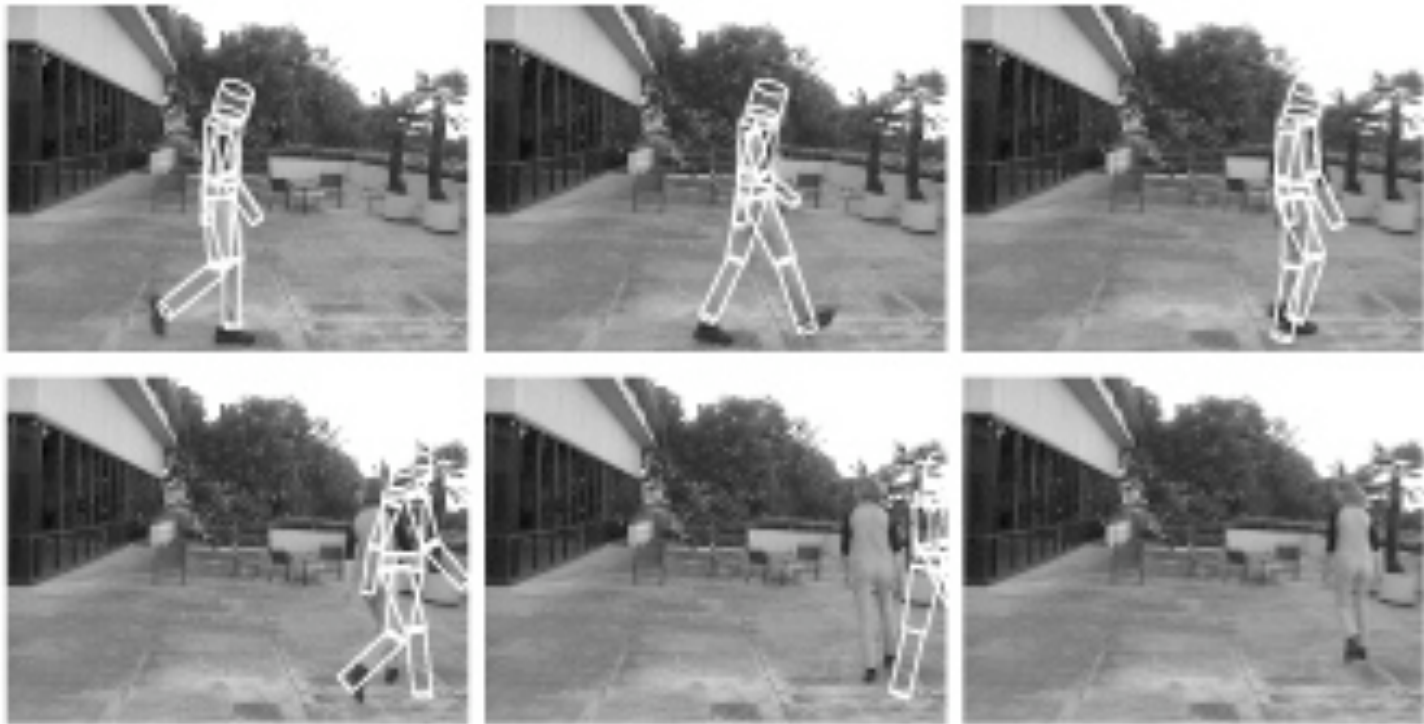
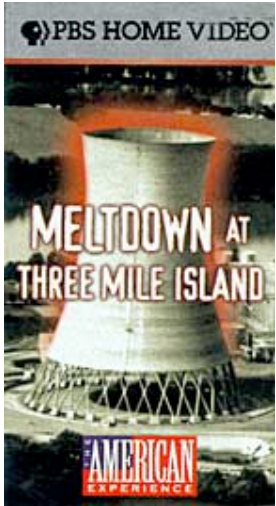


Figure 6.4: How strong is the walking prior? Tracking results for frames 0, 10, 20, 30, 40 and 50, when no image information is taken into account (uniform likelihood function).

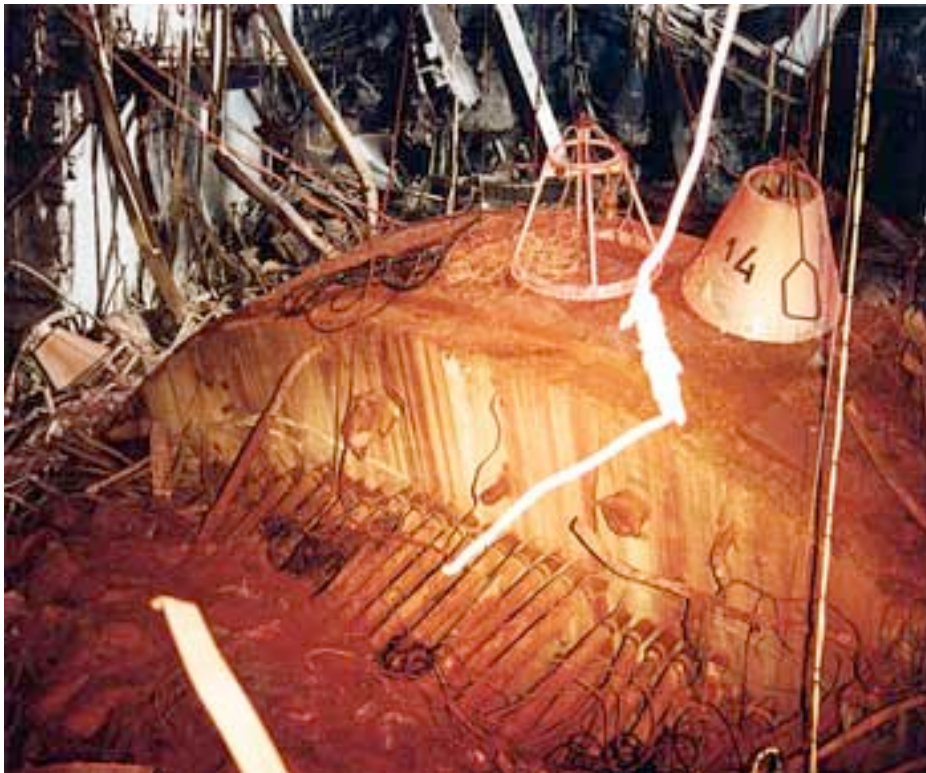
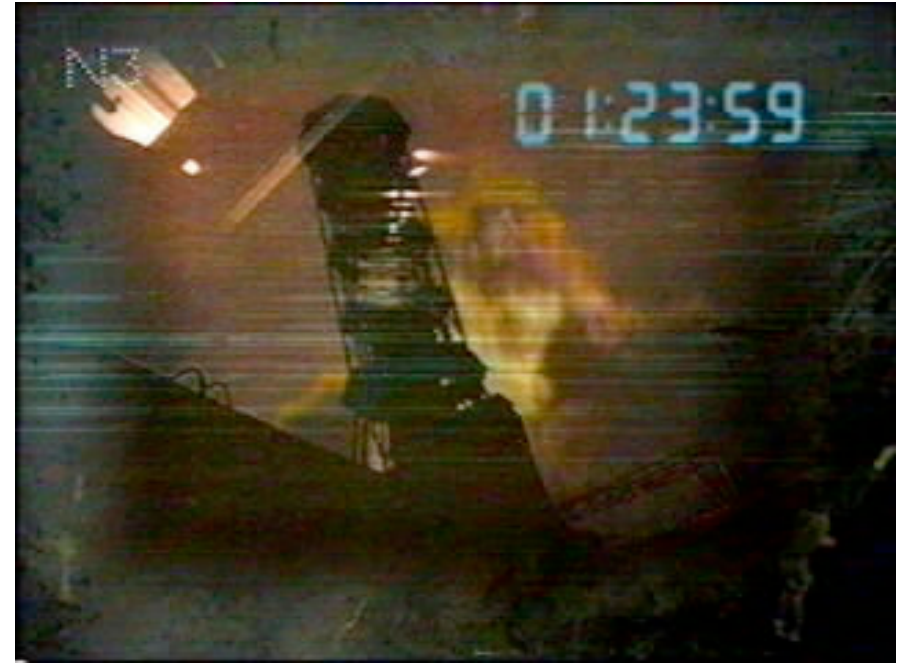




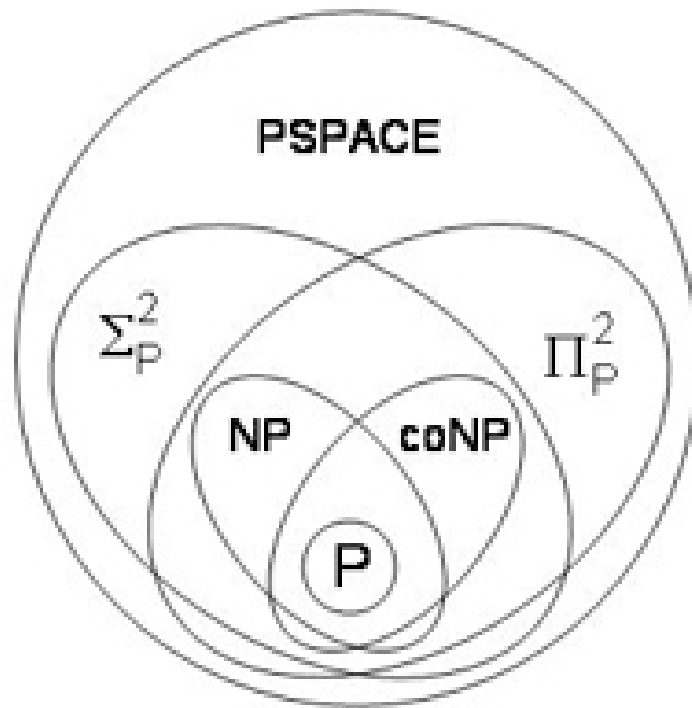




Current analyses did not account for training level of operators at the Three Mile Island plant



Nor the Macho privilege of the chief engineer at Chernobyl to disable the emergency stop system



Opening a combination lock is difficult



Unless you know its combination,  
10 61 78 20 12,  
you must try a billion combinations



# Winners of Cipher Challenge 2001

RSA cryptosystem uses that primality is easy, but factorization is difficult (Rivest, Shamir, Amir, 1971)



Produce two large primes and multiply them. Produce a pair of keys (E,D). With the product and E (public key) you can encrypt messages

but you can only decrypt if you have D and the product, or know E and the factors



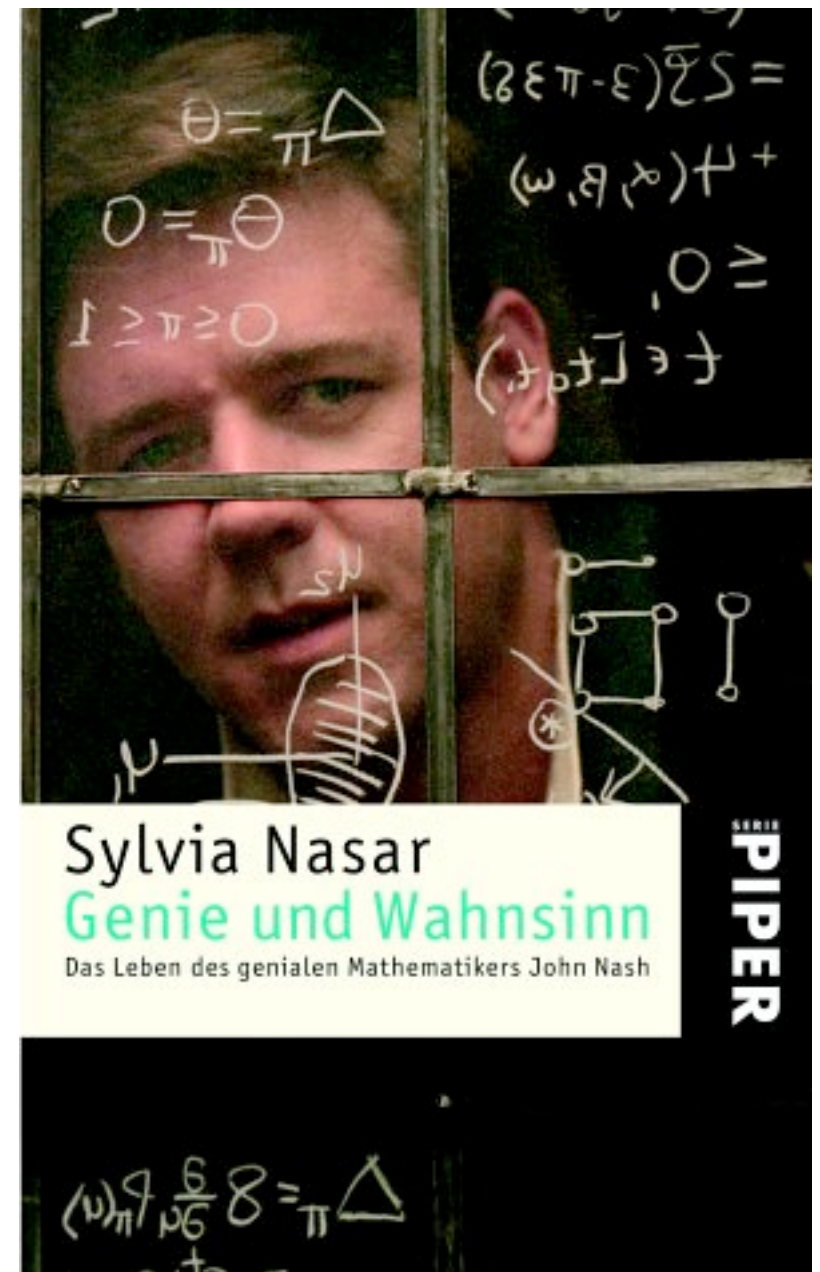
# Game Theory

Understanding competing and communicating agents must be based on models of their goals and capabilities.

Nash equilibria give full account of interactions between resourceful and informed agents

Harsanyi's Bayesian games also account for uncertainties on each others information and goals.

Game theory is important -- because life is a game..





# Project Aims

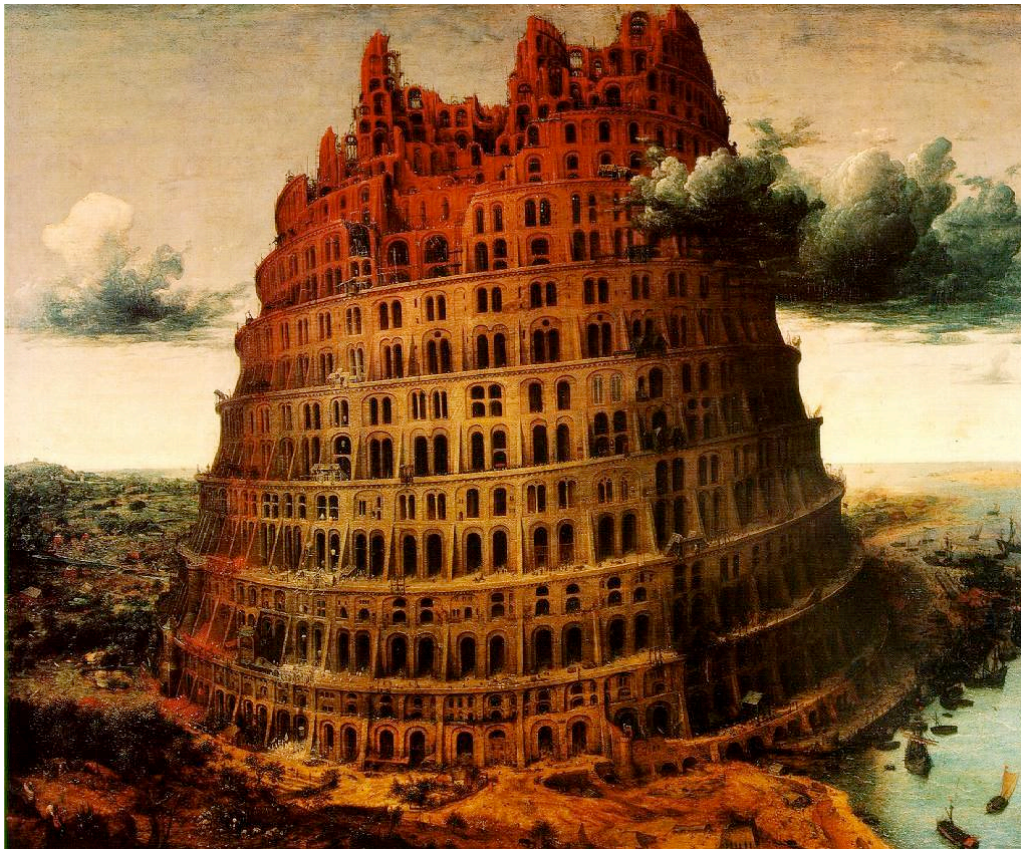


- Support transformation of tasks and solutions in a generic fashion
- Integrate different command levels and services in a dynamic organization
- Facilitate consistent situation awareness

*(Klas Wallenius, 2006)*



Technology --  
Can different systems  
speak with each other?



The Tower of Babel  
was built thousands  
of years ago --  
but is also being  
built today

Maybe something with  
the human genes?



# Challenges in Computer Engineering

- Despite significant recent improvements, we badly need:
- SAFE COMPUTER SYSTEMS
- USABLE COMPUTER SYSTEMS
- SECURE COMPUTER SYSTEMS



# That's all, folks!

