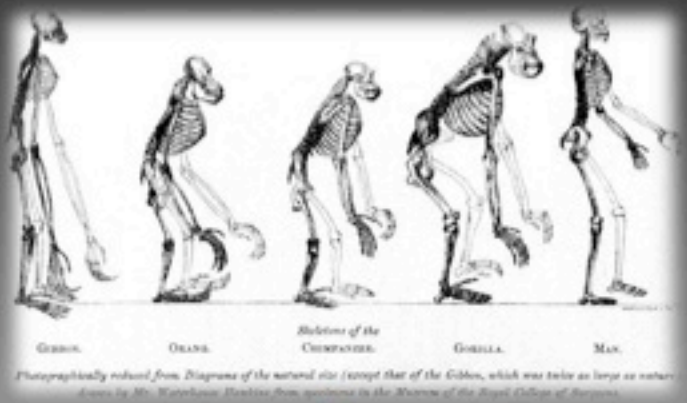
EVOBODY

New Principles of Unbound Embodied Evolution

"to organise consultations of multi-disciplinary communities to formulate novel and widely supported FET research topics, initiatives and modalities in support of foundational research that could open up radically new avenues for future ICT."

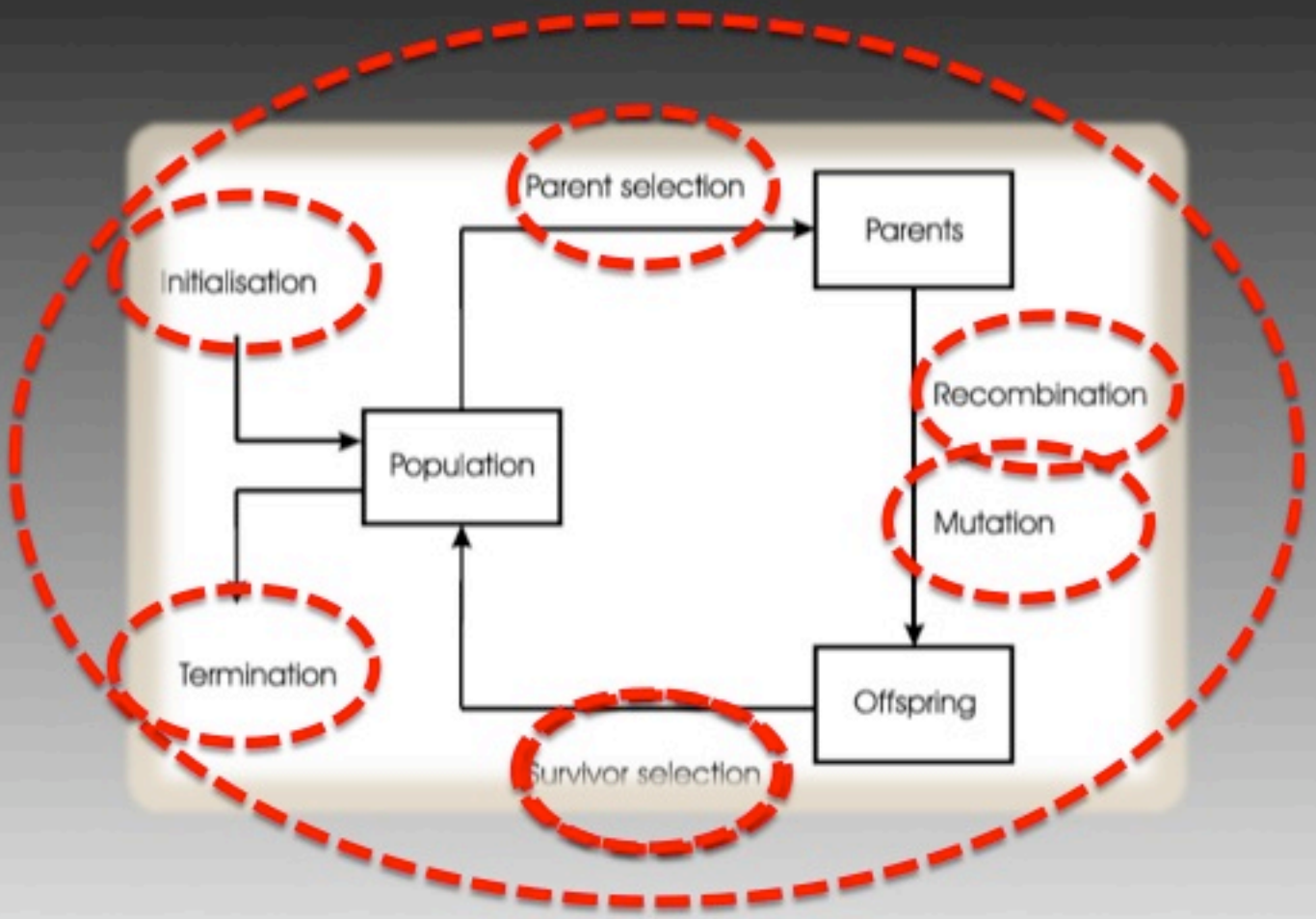
FIRST:
Unbound
Embodied
Evolution


Gibbon.
Orang.
Skeletons of the Chimpanzees.
Gorilla.
Man.

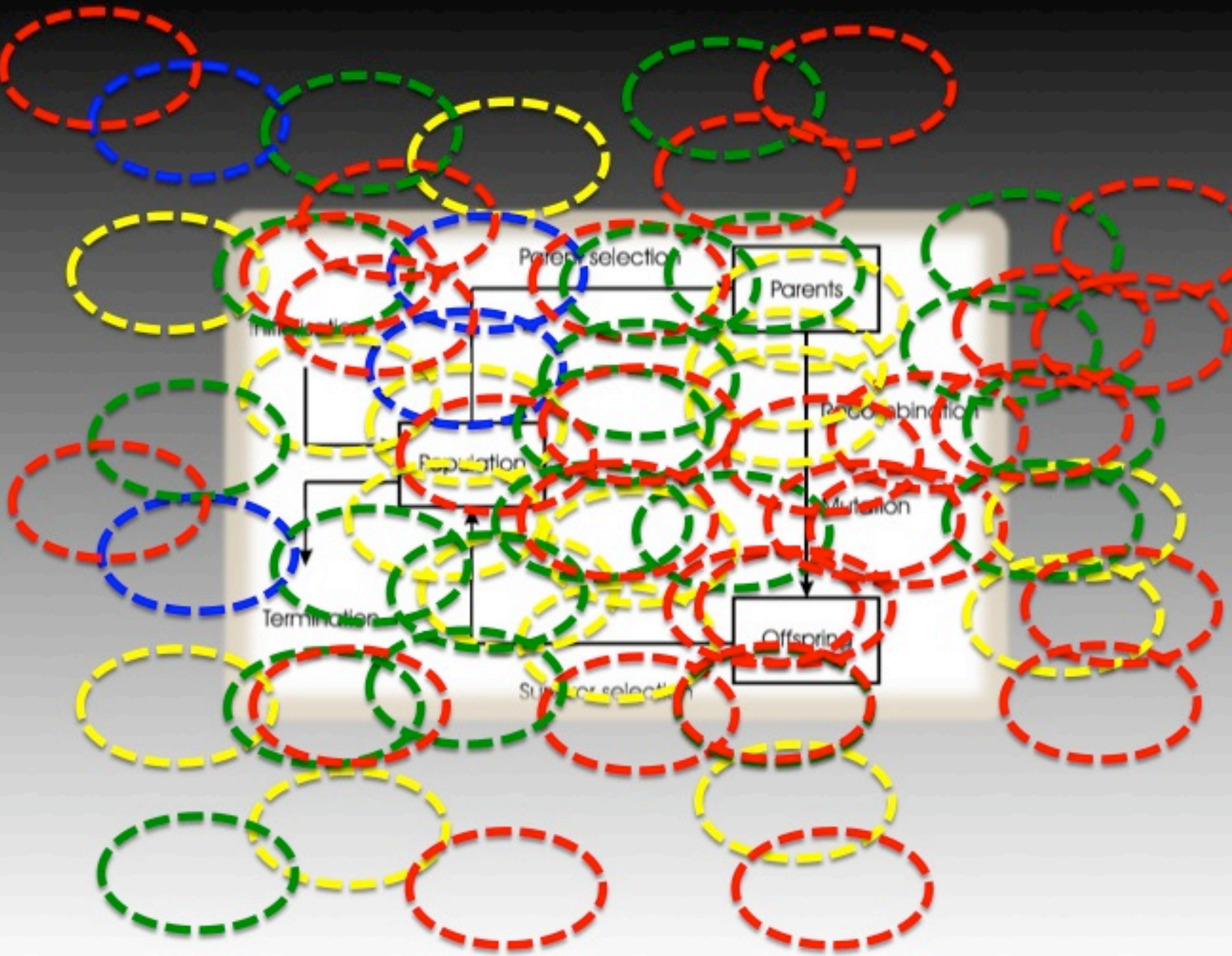
?

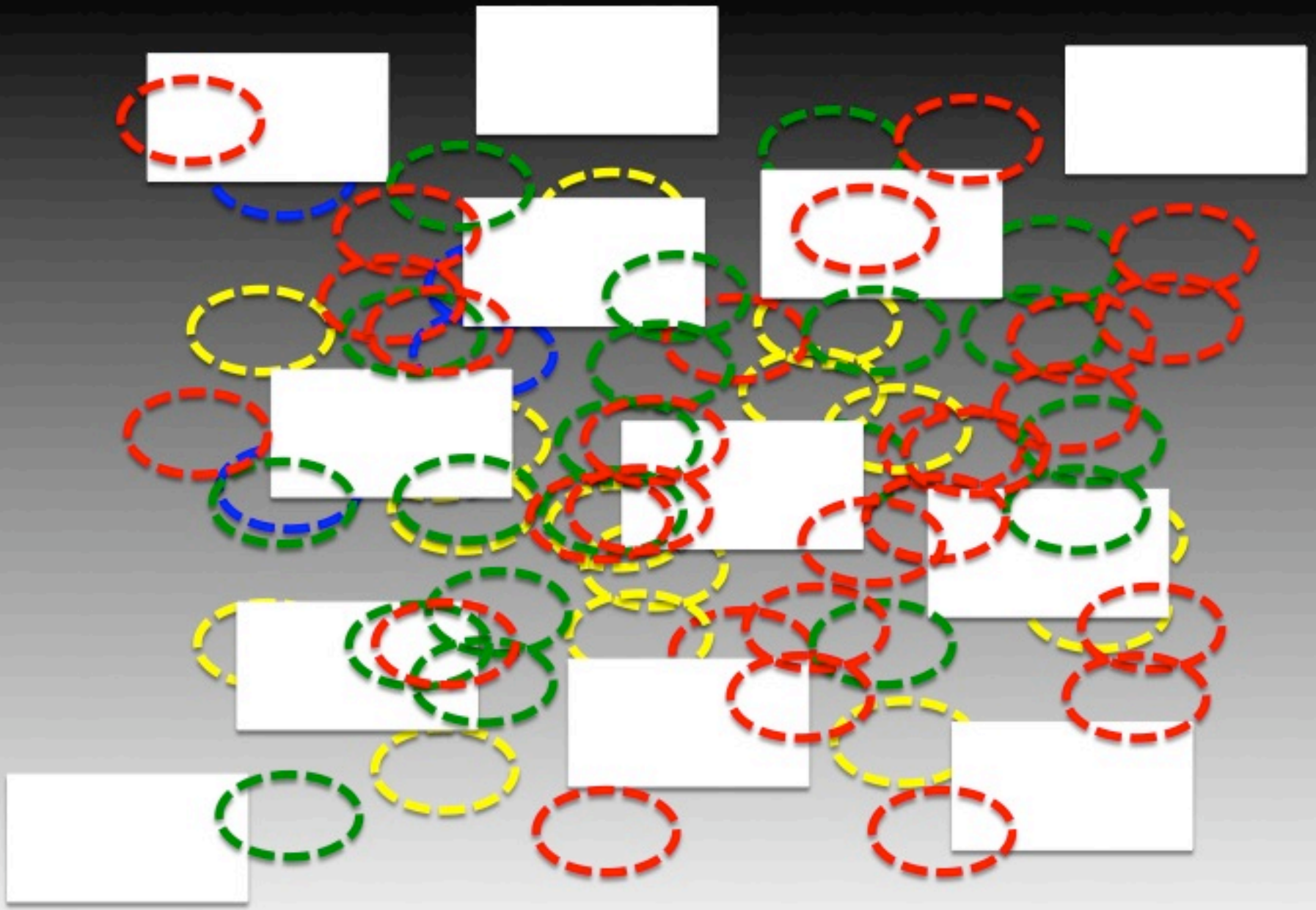
2 perspectives

• New computing paradigm
• New experimental medium
for biologists



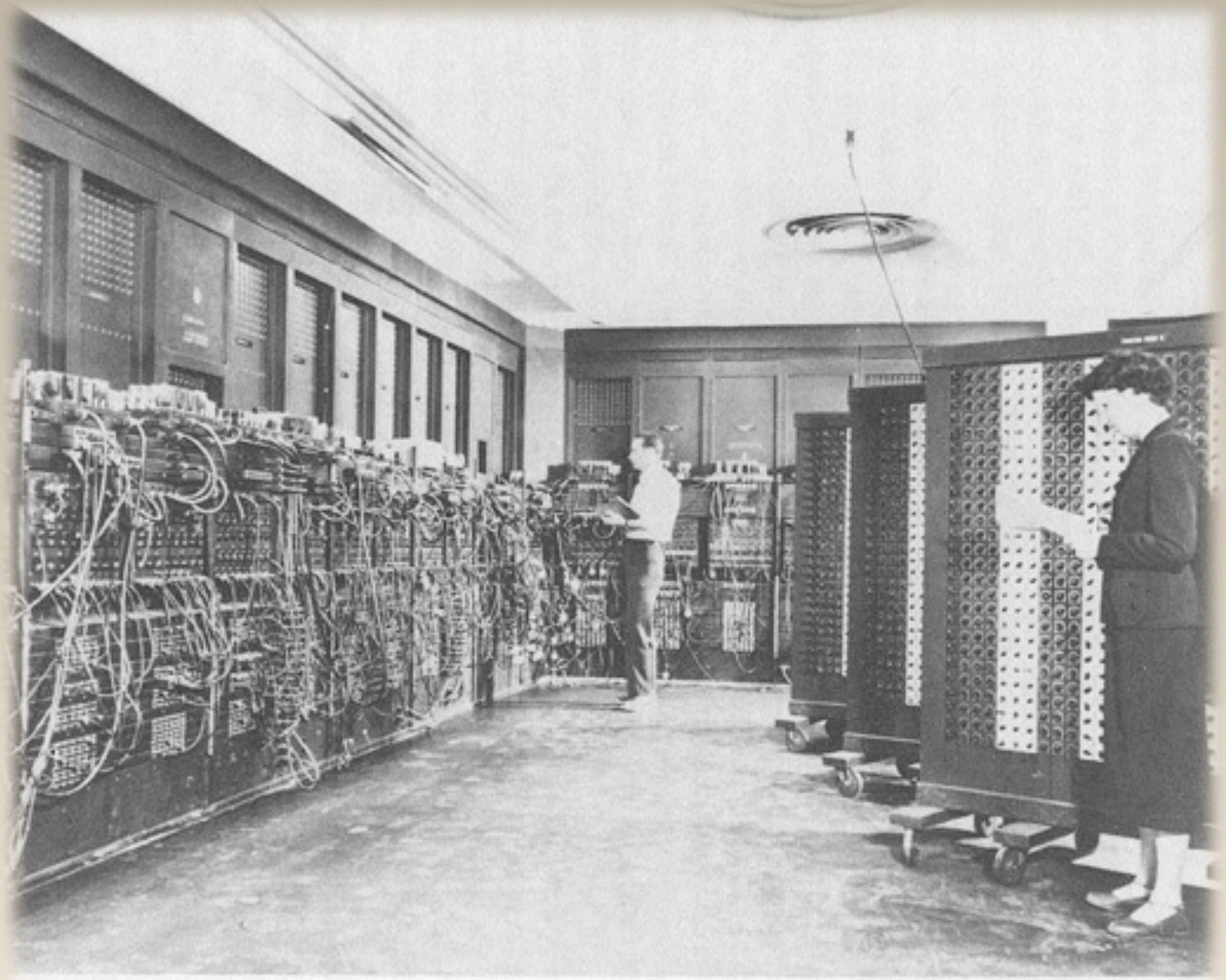
Autonomous and asynchronous


Parent selection
Parents
Population
Mutation
Offspring



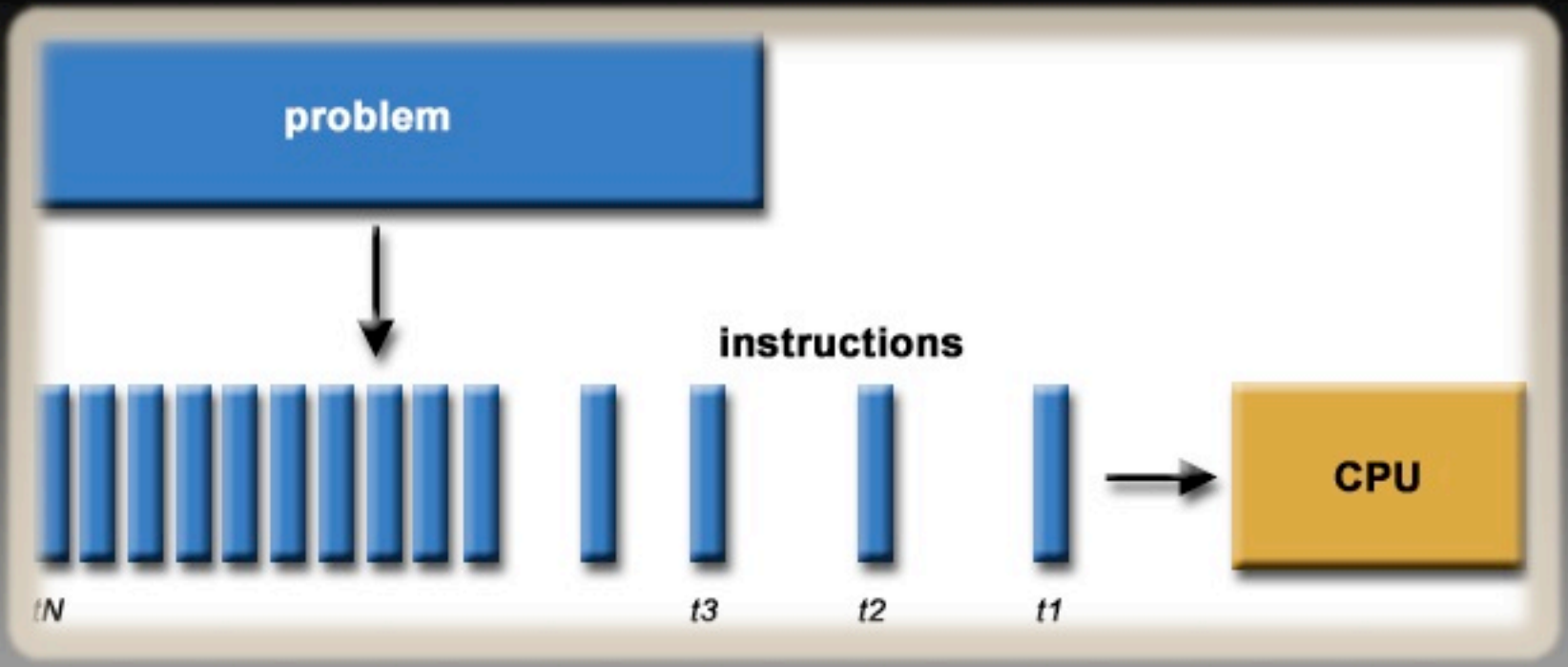
Long term vision

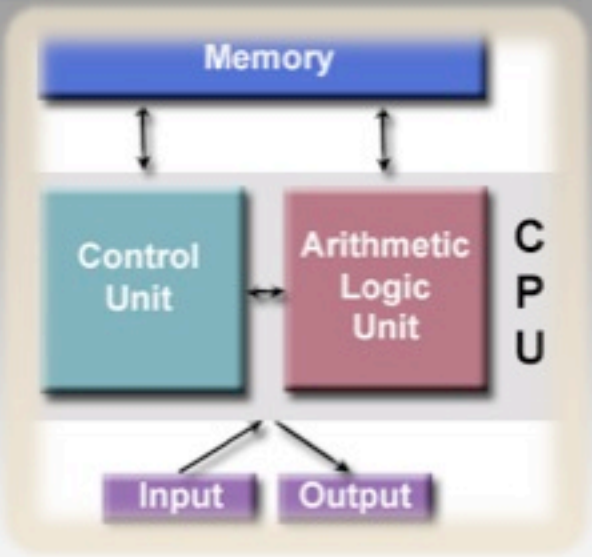
- Artificial evolutionary systems for information processing (computing):
- the units (individuals, agents) are **physical objects, not just pieces of code in a computer**
- **asynchronous and autonomous selection and reproduction** executed by the units themselves, without central control
- **reproduction creates new objects,** rather than replaces existing ones
- **survivor selection terminates objects** so that they really cease to exist
- **selection is geared towards**
  - **survival in general** as well as
  - **user preferences** that represent a given computing task
- **open ended evolution** (survival in general) biased **towards improving computing capabilities**

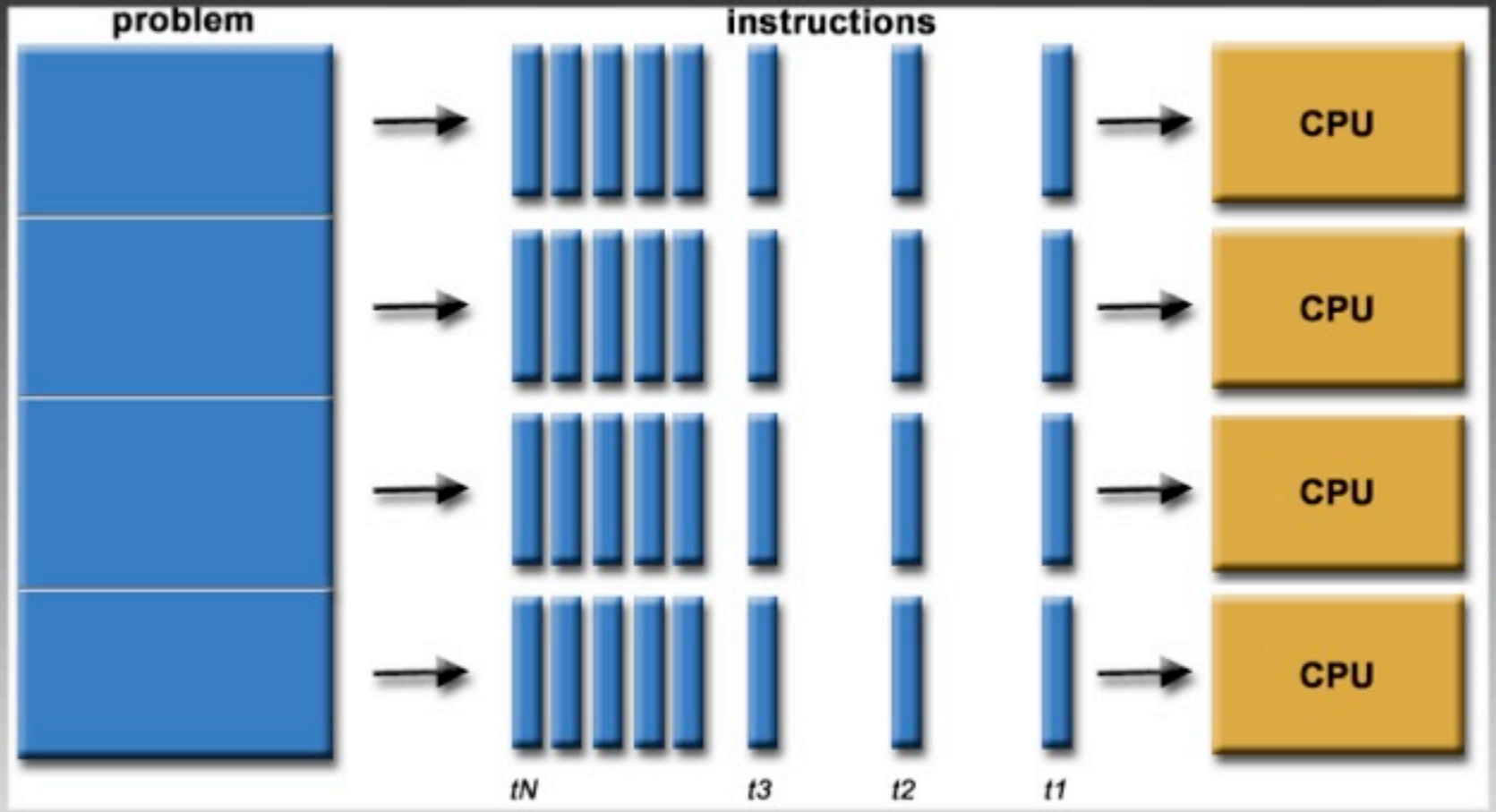


The ENIAC.

Smithsonian Institution Photo No. 53192


problem
instructions
CPU
tN
t3
t2
t1


Memory
Control Unit
Arithmetic Logic Unit
CPU
Input
Output


problem
instructions
CPU
CPU
CPU
CPU
tN
t3
t2
t1

- **regulate available computing power** through adjusting the population size to the requirements of the moment
- **optimise energy and material consumption** by producing units when needed and terminating units when they are not necessary anymore ("feasibility formula" = …)
- **continuously improve their computing capabilities** through evolution
- **solve various user defined problems** (of what kind?)

New non von-Neumannian computing

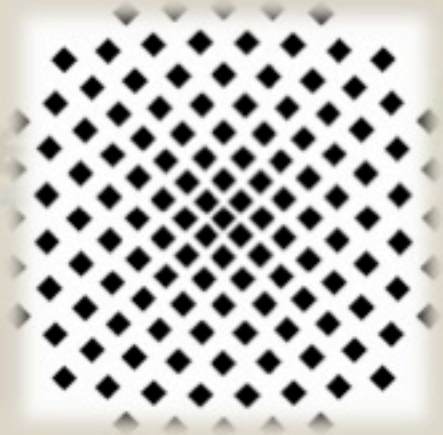
Major S/T challenges

- **designing and manufacturing the physical units** (that can be electro-mechanical, bio-chemical, hybrid of these two, or what else is possible???)
- equipping the units with **computing capabilities** of their own and make the population one big computational entity that is more than the sum of its parts
- inventing **reproduction and inheritance** mechanisms
- **managing the population size** to prevent explosion and implosion (selection)
- **interfacing the user's computational task to the evolutionary system**
- striking a good **balance between general and task dependent fitness**, i.e., between the driving forces towards general survival (improving computing capabilities) and task dependent qualities

NEXT:
The project itself

GUSZ

MARTIJN



SERGE

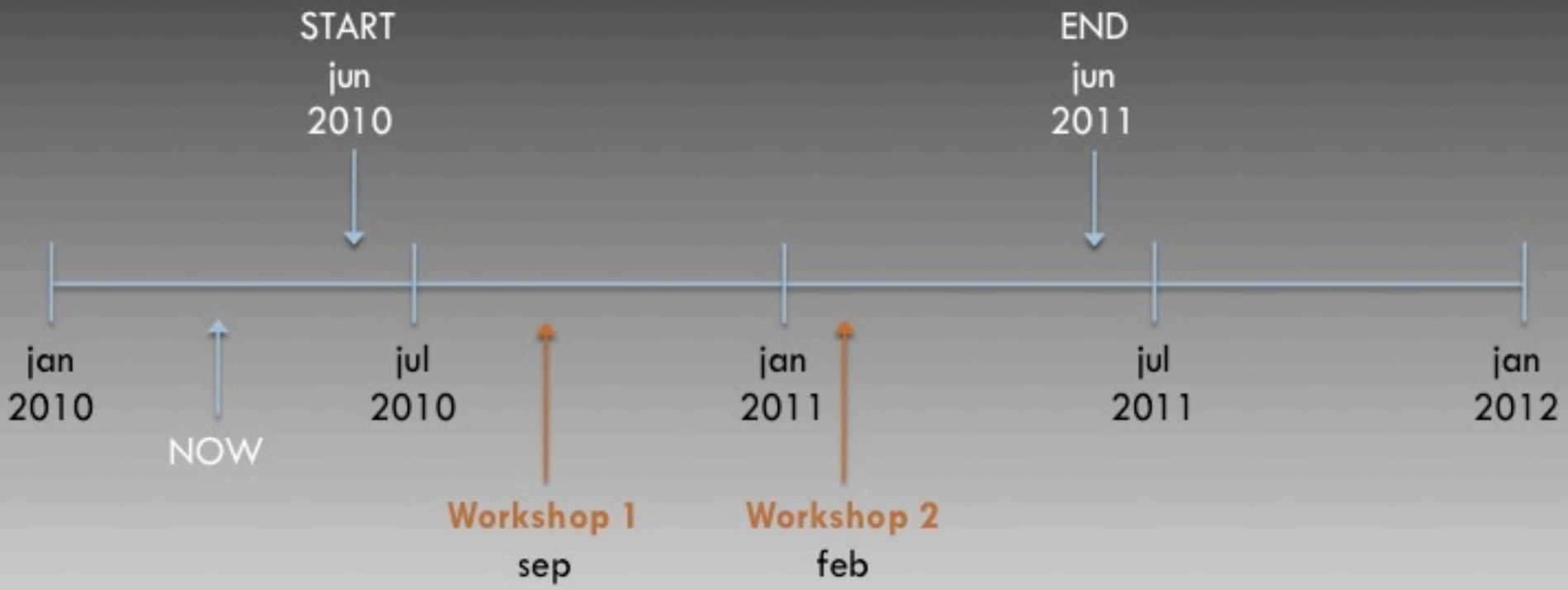
REPORT :
FET FLAGSHIP INFODAY

22 January 2010 – Brussels

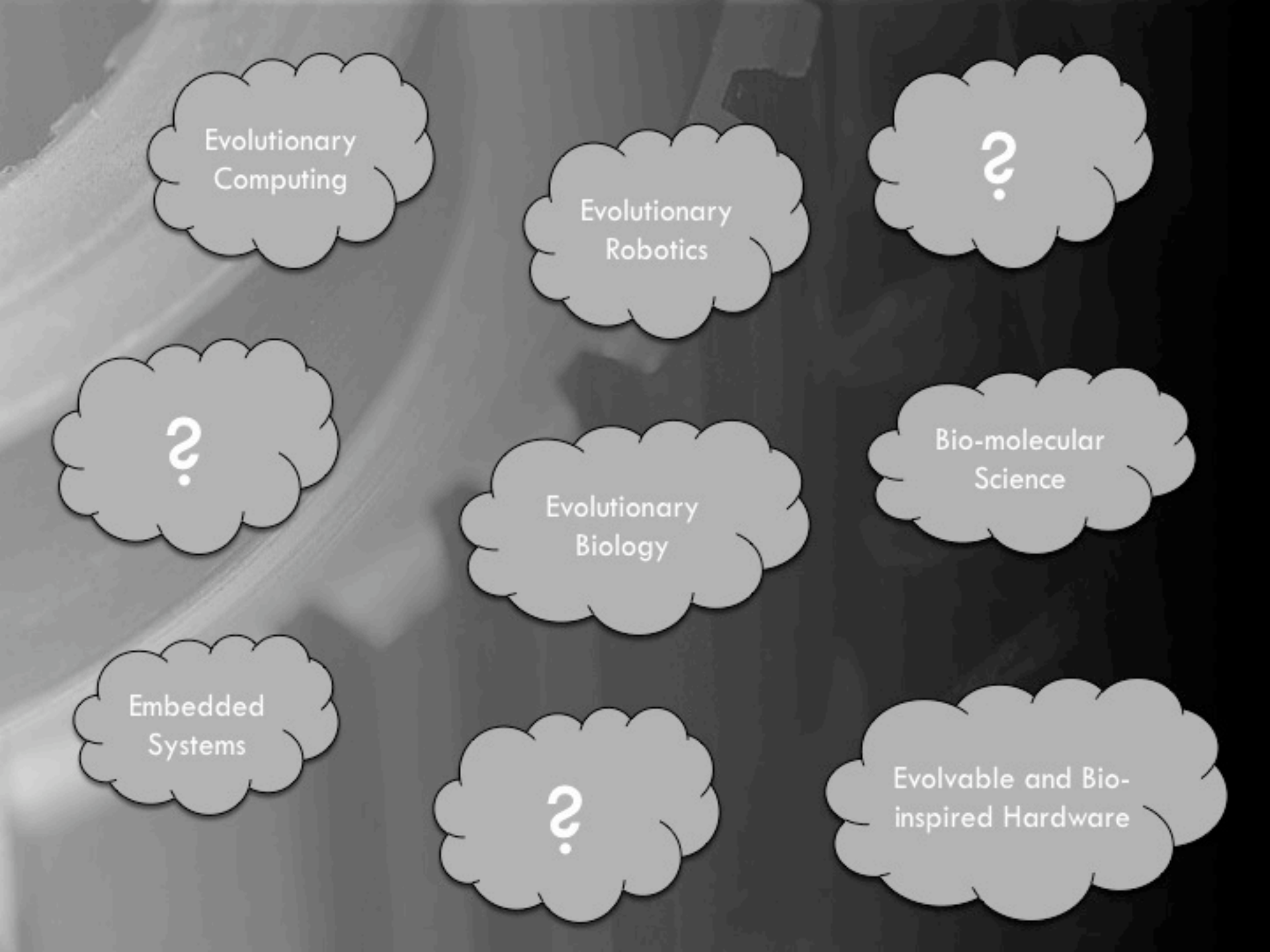
Future & Emerging Technologies Unit
http://cordis.europa.eu/fet

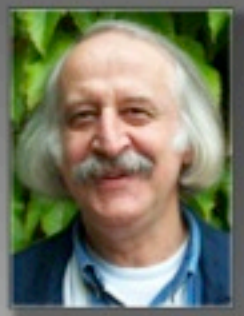
NEXT:
Activities

We'll organise
2 workshops


START
jun
2010
END
jun
2011
jan
2010
NOW
jul
2010
Workshop 1
sep
jan
2011
Workshop 2
feb
jul
2011
jan
2012

We'll do
site visits


Evolutionary Computing
Evolutionary Robotics
?
?
Evolutionary Biology
Bio-molecular Science
Embedded Systems
?
Evolvable and Bio-inspired Hardware



We'll have
web-enabled
discussions

You'll see us at
conferences
and workshops

End product:
EU report

FINALLY:
Discussion

- strategic
  - real-world **adaptive** systems
  - meso- and nano-scale **bio-molecular systems**
- technological
  - processing **computing systems**
- social
  - **conceptualisation** of subject matter

Expected impact

collectivae.net

on Collective Intelligence

recent posts about

About

Collectivae.net is an international and interdisciplinary conversation about collective systems. We have the goal to establish a collaborative forum in order to foster research and industrial efforts on the development of these systems (see below for an elaboration of what we consider what these are). On this website, we gather recent news and articles **from the web** (from news headlines, blog posts and various RSS and Atom feeds), chapter and conference **calls**, as well as gradually create an overview of **books**, **conferences**, scientific **journals** and **organisations** (research institutes, university labs, companies) in the emerging area of interest. Additionally, we ourselves also publish and write **articles** related to collective systems*.

You can contact us at **info@collectivae.net** and follow us on twitter **@collectivae**.

But **what are collective systems** anyway? There are three main dimensions along which we can look at such systems. Firstly, from an *organizational* point of view, organizations are considered in which we are involved with in every day life (from company to government). The main challenge to think about is how to make these organizations flexible and scaleable; and keep them manageable at the same time. A practical example of this is the flexible-work model where employees get to make up their mind more themselves, while keeping the business a profitable one. Secondly, the *technical* perspective looks at how to design large artificial systems (computer networks, unmanned aerial vehicles, robotic systems). The challenge here is to look at Nature and society to find inspiration for developing such systems. An example of this is the maintenance of large distributed computer networks based on the principles of every-day gossiping. Finally there is the *personal* or individual level. With the upcoming of Web 2.0, the internet becomes the platform for new kinds of collaborative interaction; but little is yet known how to use these novelties effectively. An

Want more?
@collectivae