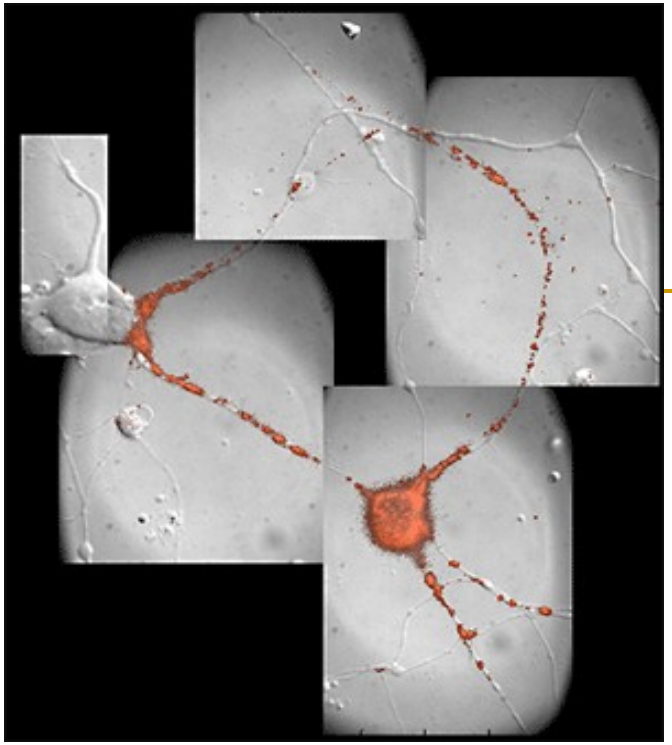
Governing the Making of Life:
Etnographies of Innovative things



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Abstract:

In this presentation I will introduce a methodological approach to produce knowledge about ethical and social aspects of systems and synthetic biology together with scientists in their labs.
We present a post-normal (Funtowicz and Ravetz, 1992) and future oriented way of doing etnography of the laboratory. Inspired by Latour and Woolgar (1986), Knor-Cetina (1999) and Rheinberger (1997), we focus on the making of “innovative things”. They are the things scientists are making in their labs. These are objects that are projected, although not necessarily produced by scientists. In our work with scientists in laboratories, we propose three domains and we ask scientists to “transfer” their innovative things into these domains: “domestic”, “public” and “civic”. Through this “transfer” the scientific ethical and socialcomplexities of scientists’ “innovative things” may become more apparent. Our aim is that, by situating their activities in different contexts of action, scientists and ELSA researchers will co-produce a mapping of the future prospects, applications and implications of systems and synthetic biology.

Overview:

- Background: The “RSB” project
- “The innovative things”: Life sciences in the age of technoscience
- Etnographies of innovative things

Background: “Reflexive Systems Biology: Towards an Appreciation of Biological, Scientific and Ethical Complexity”

- **Integrated** ELSA: producing knowledge about ELS aspects with other actors (scientists).

- The integrated approach should enable a better governance of emergent sciences and technologies (is it so?)

- Producing a mapping of the future of systems and synthetic biology, focus on ethical and social aspects, in collaboration with scientists.

- Our way of carrying out integrated ELSA: “Ethnographies of innovative things”

“The innovative things”: Life sciences in the age of technoscience

- Goal-driven research: context of applicability and patentability.

- Looking at what scientists do and produce: “We look at the materiality of scientific projects: the activities that scientists perform and the material means they use in the making and realisation of a projected goal”

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Every-day activities in labs are organized in accordance to the research-goal:

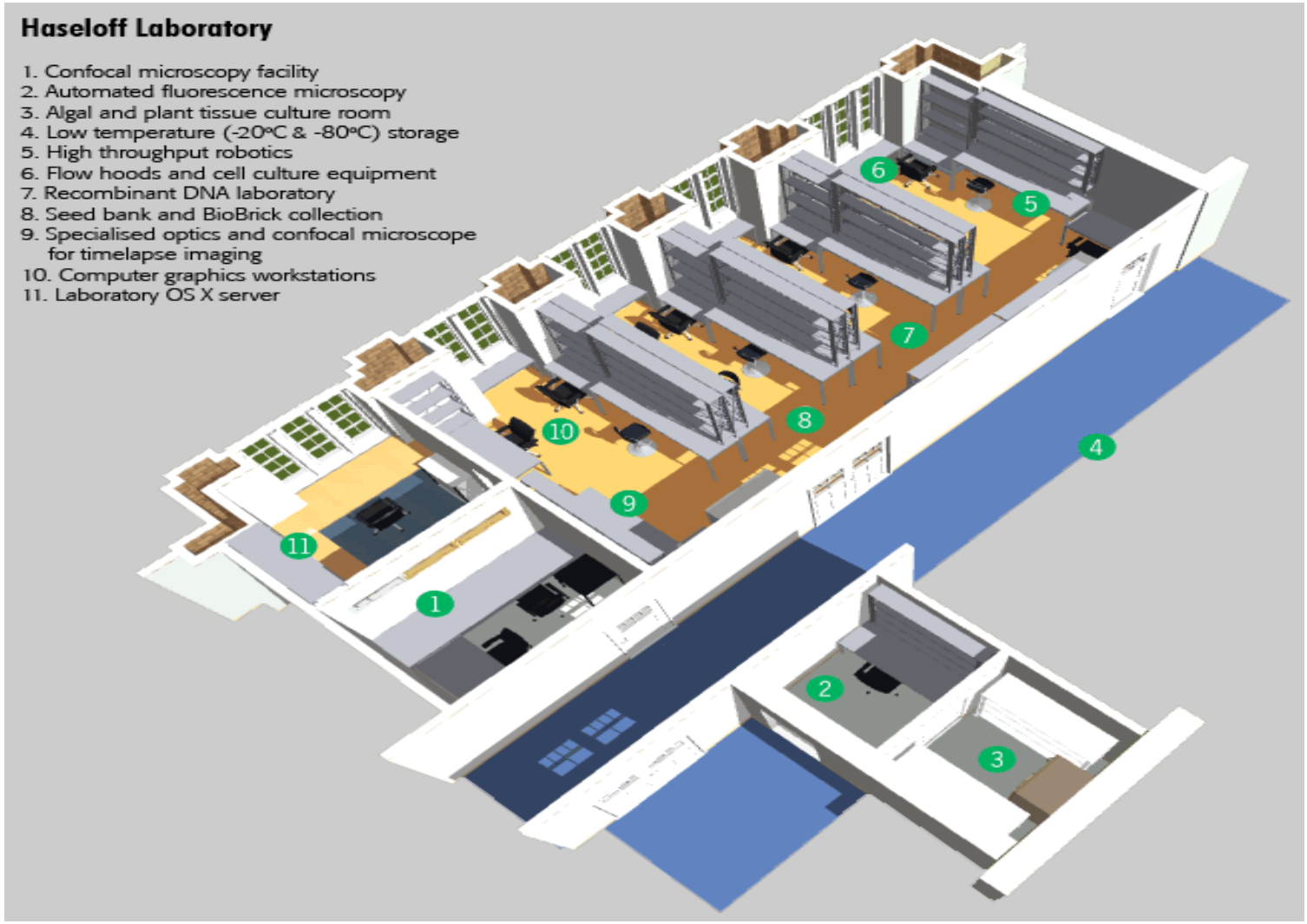


Image of CRG/Seattle institute

What is it???

- **Systems biology**: “involves the goal-oriented and systematic gathering of Knowledge at all levels, from molecules to entire living organisms and the subsequent integration into and quantitative computer models”

(European Science Foundation, 2005: “Systems Biology a Grand Challenge for Europe”)

- **Synthetic biology**: “a) The design and construction of new biological part, devices and systems; b) the re-design of existing natural biological systems for useful purposes” (Source: syntheticbiology.org)

Innovative things??

- Project/projection/purpose

- “Objects that are projected, although not necessarily produced by Scientists”

It is useful for us to think in innovative things:

- It allows us to situate lab practices and production within larger political contexts (innovation policy)

- It allows us to emphasize ethics

Situating lab practices within a larger political contexts

- "Innovative things" emerge within larger context of innovation policy.

- They are particular trajectories (actions and encompassed imaginaries) of knowledge production and productivity.

Context of Innovation: knowledge production and productivity

- Knowledge based economy: context of applicability/patentability

- Economy of expectations: “projection” organizing knowledge production and productivity.

- The “age of technoscience”

The age of Technoscience

"The age of technoscience is characterise as a way of valorising the technosciences. the organising myth of technscientific innovation orients the expectations and priorities of scientists and other social actors just as much or as little as did the powerful myth of scientific Enlightment"

"In the age of technoscience, the ideal of pure science appears to be obsolete. Basic technscientific research is dedicated to the acquisition of basic capabilities of visualisation, manipulation, modeling and control and is not dedicated to the advance Of Enlightenment by way of truth-seeking of the criticism of prejudice and superstition. Even basic research is now application oriented –where the applications are research techniques, proofs of concepts, stepping-stones and toolkits"

(A. Nordmann, forhtcoming)

The life sciences in the age of tecnoscience: systems and synthetic biology

Applications?






Life extreme, by Eduardo Kac

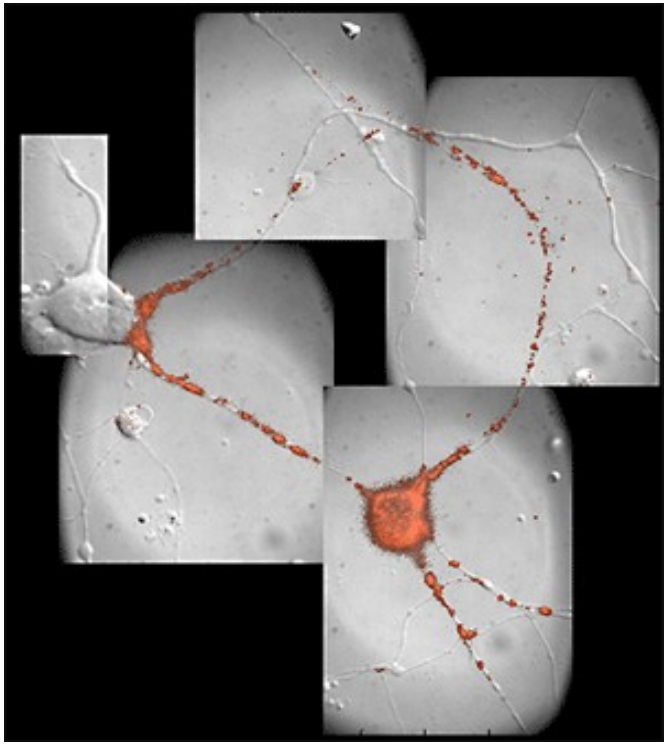
Summing up:

“Innovative things” are projected goals, not realised jet. (i.e. projected creation of a virus in synthetic biology). They can be seen as a particular set of activities in the lab, embedded within larger contexts of innovation”

- Activities of knowledge making in **systems** and **synthetic biology**:

Modelling, simulating, designing:
Three styles of doing Technoscience
(representing & intervening nature)

Producing images of nature:



Total Internal Reflection Fluorescence (TIRF)
for Single-Molecule Imaging. Overlay of DIC and TIRF images of hippocampal neurons developed in primary culture for five days. Endogenously expressed ErbB4 receptors are tagged with fluorescent antibodies (orange).

“Innovative things”: emphasizing ethics in knowledge production

1. Focus on project and projections.

- Bringing together the materiality of knowledge production and the expectations informing those processes.
- Scientists as subjects of ethics: Purpose, judgment, responsibility.
- Innovation entails intention.

2. Focus on images and imaginaries:

- Modeling, simulating and design: activities of imagining.
- Imaginaries: Access to values of nature.

Ethnographies of innovative things

Etnographies of the Innovative Things

- Producing future oriented maps of the ethical and social aspects of systems and synthetic biology with scientists.

- Innovative things “as they are projected and made by scientists, including how scientists make sense of them”.

- Scientists as story-tellers.

Etnographies of innovative things:

- Question: ”If your project works out, how would it behave out There, in a context that is different from the lab?”

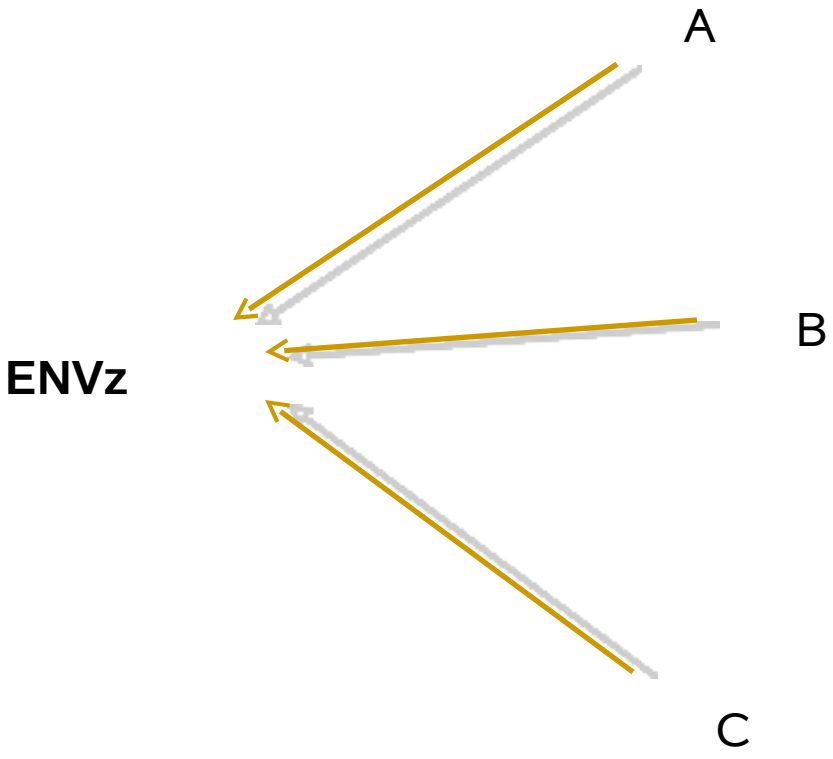
- Domains:
  - Lab
  - Domestic
  - Civic
  - Public

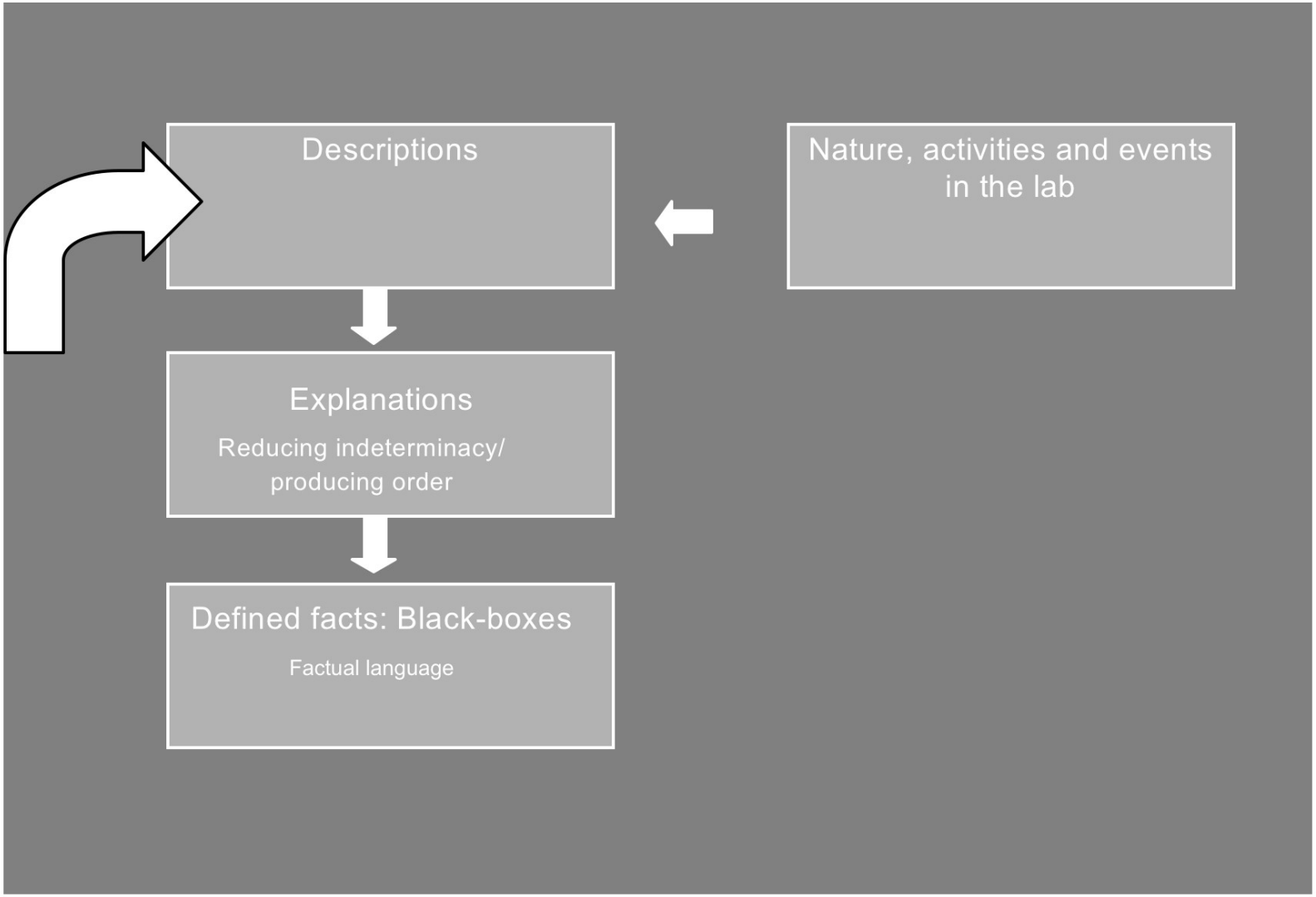
- Displacements/Re-embeddings: *Reflexivity effect?* Opening-up black-boxes.

Shinar and Feinberg´s theorem:

*"A two component regulatory system allows **E. coli** to respond to changes in environmental osmolarity. The **histidine kinase ENVz** responds to a stimulus by transferring **phosphate** from **ATP** to a **histidine residue**. **Phosphornylated EnvZ** then transfers its **phosphate** to an **aspartic acid** on the response regulator, **OmpR**. The regulator then affects gene expression. Shinar and Feinberg´s therorem can be applied to show that the concentration of **phosphorylated OmpR** is the same in any positive steady state (absolute concentration robustness), irrespective of the amounts of network components present" (Gunawardena, Science 328:2010).*

The politics of explanation



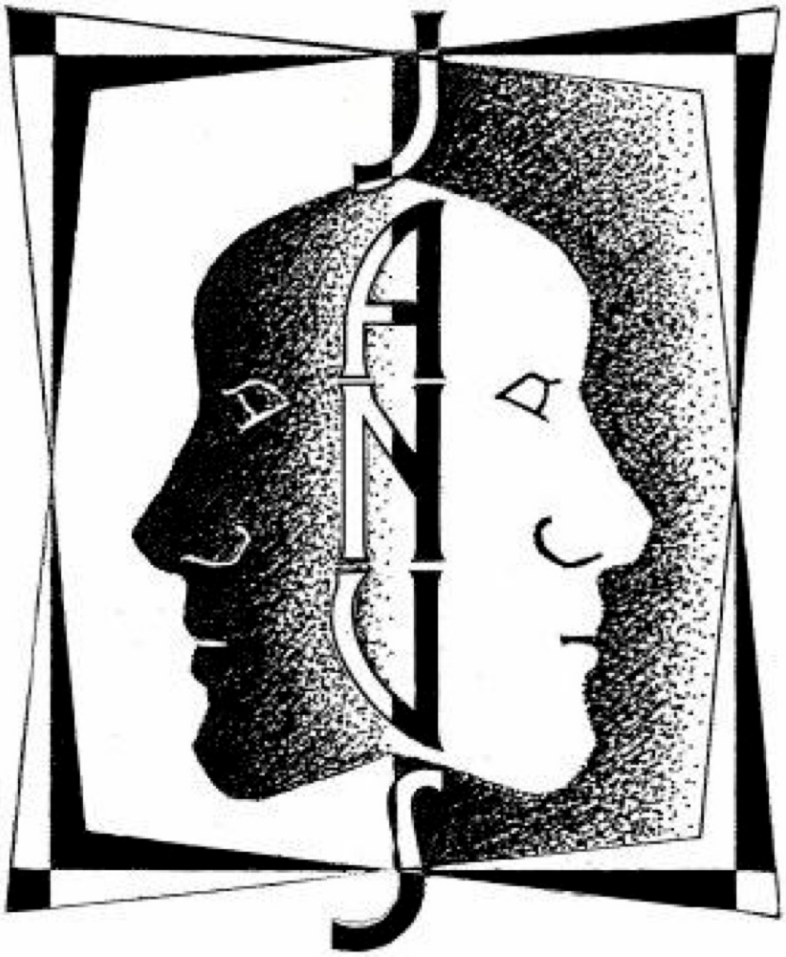

Descriptions
Nature, activities and events in the lab
Explanations
Reducing indeterminacy/ producing order
Defined facts: Black-boxes
Factual language

Shinar and Feinberg´s theorem in a more methaphorical fashion:

*"A two component regulatory system **allows** E. coli to **respond** to **changes** in environmental osmolarity. The histidine kinase ENVz **responds** to a stimulus by **transferring** phosphate from ATP to a histidine residue. Phosphornylated EnvZ then **transfers** its phosphate to an aspartic acid on the response regulator, OmpR. The regulator then **affects** gene expression. Shinar and Feinberg´s therorem can be applied to show that the concentration of phosphorylated OmpR is the same in any positive steady state (absolute concentration robustness), irrespective of the amounts of network components present" (Gunawardena, Nature, April, 2010).*

Janus-faced science

Lab talks



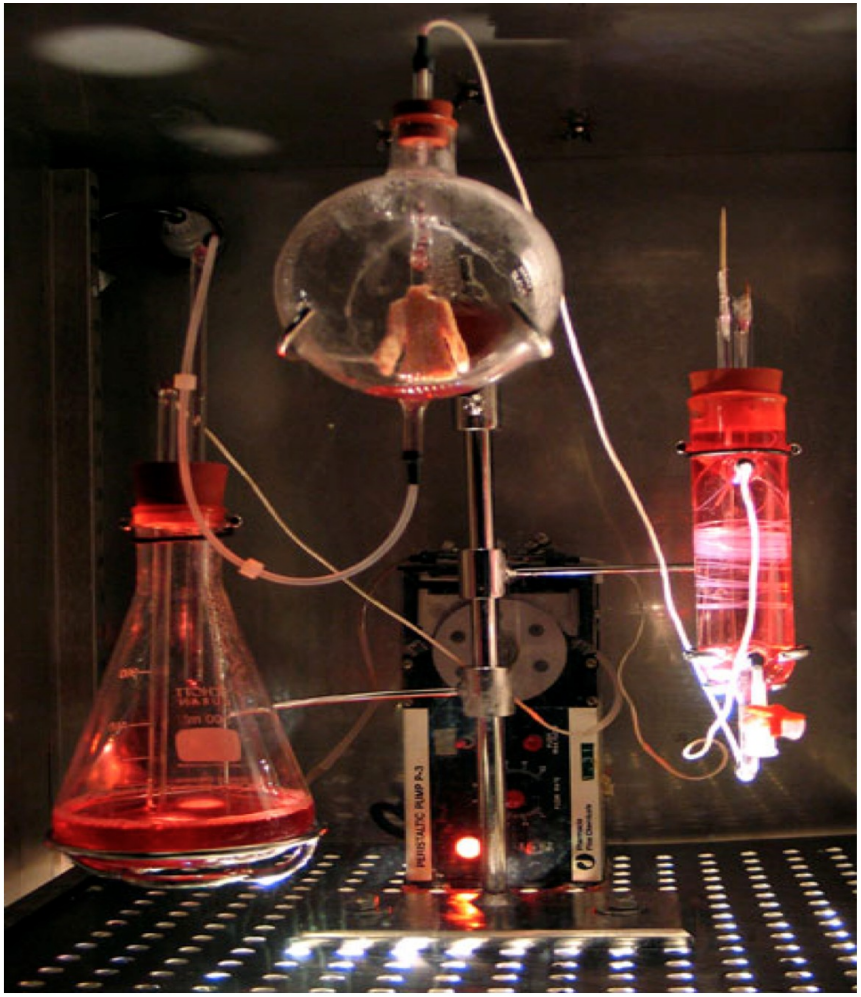
Formal discourse of science

Etnographies of innovative things, in steps:

1) Situating lab within larger networks
(tracking back the trajectory of I.T.)

2) Lab descriptions: Scientists describe what they do in developing their projects.

3) Searching for citizens´ imaginaries on these issues
(through group interviews and popular culture products such as science fiction, art festivals i.e).



Synthetic leader jacked by Oron Catts. From Tissue culture & Art project.

4) Situating the innovative thing within alternative domains: domestic/public and civic.

5) Deliberative mapping on ethical and social aspects of systems or synthetic biology (future oriented).

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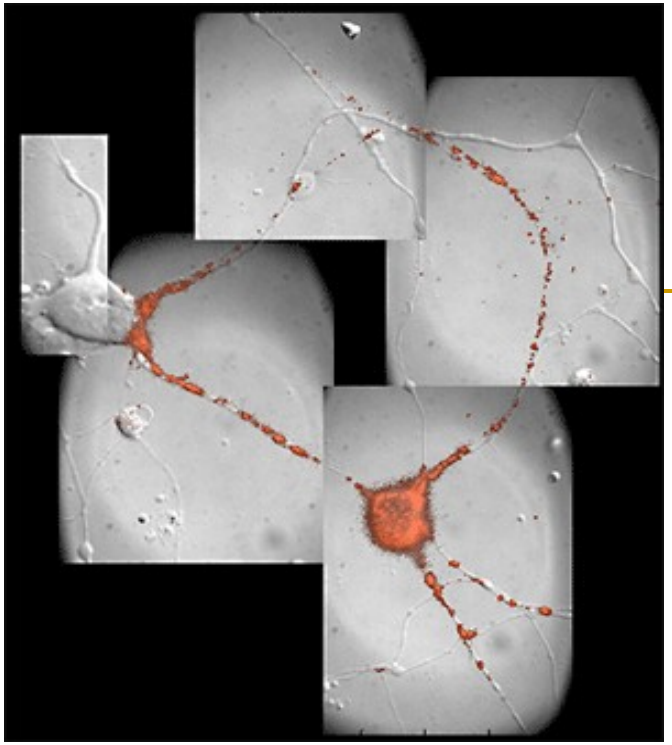

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Thanks!!