

# Governing Emerging Technologies – The need to think out of the black box

Pierre-Benoit Joly, INRA/SenS and IFRIS

2012 SNet Conference, University of Twente

25 oct. 2012

# Introduction

- The semantics of emergence
  - Complex system dynamics
  - Unpredictability (behaviour of the system cannot be deduced from the analysis of the parts)
- ‘Emerging technologies’ as specific situations characterised by: novelty, uncertainty, unpredictability, potentialities, etc. Major stakes socio-economic stakes.



# Introduction

- The semantics of emergence
  - Complex system dynamics
  - Unpredictability (behaviour of the system cannot be deduced from the analysis of the parts)
- ‘Emerging technologies’ as specific situations characterised by: novelty, uncertainty, unpredictability, potentialities, etc.
- ‘Emerging technologies’ as a symptom of contemporary societies:
  - Technology is the solution (Cf. European Knowledge Society). Our future is there!
  - Society has to adapt

- Contemporary discourses on emerging technologies:
  - applies for both technology and society.
  - key importance of discourses: characterised by tensions between promises and prophecies of doom (discourse on risk).
- ‘Governing Emerging Technologies’
  - Oxymore? governing ungovernable, predicting unpredictable (or governing without possibilities to predict?)
  - Governing:  
Not « What is the good decision? »  
But  
How the technology is *de facto* governed?  
How it might (should) be governed?

# Outline

- From unpredictability of scientific impact to social control of technology
- What do we know on Tech & Society interactions? Is it useful?
- From social control to government of (emerging) technology

# From unpredictability to social control of technology? (1)

Unpredictability, unintended consequences,  
Path dependency

Two different views:

- Polanyi vs. Soddy on the social responsibility of science
- David Collingridge on social control of technology

# From unpredictability to social control of technology? (2)

## Polanyi vs. Soddy on the social responsibility of science (Guston 2012)

- Michael Polanyi – « any attempt at guiding scientific research towards a purpose other than its own is an attempt to deflect it from the advancement of science (...) You can kill or mutilate the advance of science, you cannot shape it. »
- Frederick Soddy (Nobel Prize of Chemistry – 1921) – responsibility of scientists in relation for the applications of their discoveries. Unpredictability is not a good reason for not envisioning the possible impacts of research.

# From unpredictability to social control of technology? (3)

## David Collingridge on social control of technology (1980)

- to control, we need to: (i) know the consequences, (ii) have the possibility to act
- Control Dilemma

In the early phases, technology is highly flexible: we can control it but we lack knowledge to predict its impacts. In the later phases, we have necessary information and knowledge on the impacts but, as technology has become entrenched, control or change is hardly possible.

# From unpredictability to social control of technology? (4)

## Two possible solutions:

- Forecasting?

« to be of any use, a forecast of future unwanted social effects from a technology now in its infancy must command sufficient confidence to justify the imposition of controls now. » (...)

« such a forecasting capacity is well beyond our possibilities »

Why? Because of a lack of understanding of Tech and Society interactions

- Alternative way: the need to ensuring that the technology remains controllable despite diffusion

« We have to look at ways of avoiding overdependence on the technology which would make it difficult to control. »

/In modern words : path dependency, lock-in effects, governance of discontinuation, etc. /

# From unpredictability to social control of technology? (5)

GM Plants example:

The issue is not to foresee future applications (e.g. from Watson and Crick discovery of DNA to Bt Corn)

But

To figure out possible socio-technical problems « we » do not want to have, identify vulnerabilities, things which are under possible threats.

For instance:

- Low diversity of crops and traits
- High technological and industrial concentration (partly related to patents)
- Gene flows which make it difficult to maintain non-GM production
- Marginalisation of small peasants, growing inequalities
- Etc.

# What do we know on Tech & Society interactions? Is it useful? (1)

S&TS legacy on T&S interactions:

- Neither technological determinism, nor social determinism but co-production
- There is not something like *Technology* as opposed to something called *Society* but heterogeneous socio-technical assemblages
- Importance of contingencies and local situations, instead of forces of necessity in the history of technology
- Wide spectrum of technological choices, alternatives, and branching points within patterns sometimes thought to be necessary

# What do we know on Tech & Society interactions? Is it useful? (2)

## Example of GMO's

- The US – Product regulation / invisibility of GMO's
  - Asilomar Conference (1974)
  - Rejection of Democrats' attempts to regulate genetic engineering (1977)
  - Coordinated Framework (1986), FDA on substantial equivalence (1992)
- Europe – Process regulation in a precautionary framework
  - Directive on GMO's 1990
  - De facto moratorium (1999)
  - Regulations on traçability, labelling, co-existence (2003)

# What do we know on Tech & Society interactions? Is it useful? (3)

## GM Plants in Europe

- Construction of the informed citizen (right to be informed, compulsory labelling)
- Co-existence of GM/Non GM
  - Technological pluralism
  - Reversibility

## COEXISTENCE DES CULTURES OGM ET NON OGM : LE SYNDROME "TCHERNOBYL", VERSION AGRICOLE !

Au delà de cette limite  
le vent tombe  
le pollen devient stérile  
les abeilles font demi-tour  
Pas de contamination possible !

Maïs non OGM

Maïs OGM

Distance de séparation des cultures préconisée par les experts (25 à 50 m)



# What do we know on Tech & Society interactions? Is it useful? (3)

## GM Plants in Europe

- Construction of the informed citizen (right to be informed, compulsory labelling)
- Co-existence of GM/Non GM
  - Technological pluralism
  - Reversibility
- Epistemic subsidiarity (transfer of authorization of cultivation to MS)



**MEPs vote to 'nationalise' GM crop production**

# What do we know on Tech & Society interactions? Is it useful? (4)

Langdon Winner (1993)

“the interesting questions have nothing at all to do with any alleged self-generating properties of modern technology. Instead they have to do with the often-painful ironies of technical choice.”

“the key question is not how technology is constructed but how to come to terms with ways in which our technology-centered world might be reconstructed. Faced with a variety of social and environmental ills, there is growing recognition that what is needed is a process of redirecting our technological systems and projects in ways inspired by democratic and ecological principles.”

# What do we know on Tech & Society interactions? Is it useful? (5)

## Construction of intermediate notions:

- Technological paradigms and technological trajectories (Dosi 1982)
- Technological frames (Bijker 1987)
- Technological regimes (Rip & Kemp 1998)
- Sociotechnical regimes (Geels 2002)

# What do we know on Tech & Society interactions? Is it useful? (7)

How the sociotechnical regime locks out agro-ecology?

Determinants of innovation in Agricultural Research Systems that induce an imbalance between genetic and agroecological engineering.

Categories	Subcategories	Determinants of innovation
(1) Agricultural science policies	<ul style="list-style-type: none"> <li>Research orientations</li> <li>Relationships between public &amp; private sectors</li> <li>Influence of lobbies</li> <li>Media</li> </ul>	<ul style="list-style-type: none"> <li>Focus on growth, competitiveness and biotechnologies</li> <li>Public-private partnerships</li> <li>Public-private division of innovative labour</li> <li>Imbalance in the power of lobbies</li> <li>The media channel public opinion towards a single paradigm</li> </ul>
(2) Private sector	<ul style="list-style-type: none"> <li>Research orientations</li> </ul>	<ul style="list-style-type: none"> <li>Focus on biotechnologies and importance of patents</li> </ul>
(3) Public sector	<ul style="list-style-type: none"> <li>Cultural and cognitive routines (Values and world views of scientists)</li> <li>Organization within research systems (rules of the game)</li> </ul>	<ul style="list-style-type: none"> <li>Assumptions on current and future agricultural systems</li> <li>Assumptions on past agricultural systems</li> <li>Assumptions on the nature and value of innovations</li> <li>Views of complexity and framing of agricultural research</li> <li>Assessment of the performance of agricultural innovations</li> <li>Specialisation vs. interdisciplinarity</li> <li>'Publish or perish'</li> <li>Technology transfer mission: patents, spin-offs and extension</li> </ul>

From: Vanloqueren and Barret (2009)

# What do we know on Tech & Society interactions? Is it useful? (7)

Is there a difference in the determinants of innovation in Europe, as compared to the US?

- Focus on growth, competitiveness? (CAP on multifunctionality)  
Related to a socio-technical imaginary of agriculture and rural space: Regional policies, IGP, Terroirs, etc.

But

Same drivers

- Focus on molecular biology, genomics, etc.
- PPP
- Publish or perish
- IPRs
- Etc.



« Nouvel acte de Résistance à l'encontre de l'occupant Monsanto : 60 faucheurs volontaires ont neutralisé (...) »

# From social control to **government** of (emerging) technology (1)

Collingridge: reference to decision theory

Governing:

Not « What is the good decision? »

But

How the technology is *de facto* governed?

How it might (should) be governed?

# Ways of governing?

<b>National technocratic order</b>	<b>Global neo-liberal order</b>
<ul style="list-style-type: none"><li>• Strong (Welfare) National State</li><li>• Double delegation</li><li>• The future is planned</li><li>• Definition of what is good for society (link with « intérêt général »)</li></ul>	<ul style="list-style-type: none"><li>• Distributed power in a globalised world / Subpolitics</li><li>• Market forces, responsible science, technoscientific citizenship</li><li>• SELF-regulation</li><li>• Externalities as the collective burden</li></ul>

# Analysis of Governance or analysis of forms of government?

<b>Governance</b>	<b>Government</b>
<p>Collective action Distributed power Emerging social order</p> <p><i>Co-production means</i> Collective exploration, Building a common world</p> <p><i>Public participation means</i> technical democracy, opening up</p>	<p>Asymetries of resources and power Some forms of stabilities (interests, unequalities, etc.)</p> <p><i>Co-production means</i> Shifting Knowledge/Power relations</p> <p><i>Public participation means</i> managing acceptability, building legitimacy, etc.</p>

# From social control to **government** of (emerging) technology (4)

Beck (1986) on the raise of subpolitics.

The key issue is the balance between:

- technico-economic subpolitics

And

- socio-cultural subpolitics

A matter of strength and independence of  
media and legal systems

# Conclusion



*Un site pour apprendre -  
questionner - être informé -  
dialoguer sur la **biologie de synthèse**.*

Accueil >

- L'Observatoire
- Qu'est-ce que la biologie de synthèse?
- Objet des recherches et des débats
- Comprendre les sciences et technologies derrière la biologie de synthèse

- [Qu'est ce que la biologie de synthèse ?](#)
- [Pourquoi créer un Observatoire de la biologie de synthèse?](#)
- Quels sont [les fondements](#) de la **biologie de synthèse**?
- Quelles sont [les recherches](#) et les [applications](#) de la **biologie de synthèse** et leurs [bénéfices et risques](#) ?

**POUR ALLER PLUS LOIN DANS LA REFLEXION SUR LES ENJEUX ET QUESTIONNEMENTS POSES PAR LA BIOLOGIE DE SYNTHÈSE**

*... cliquez sur un rouage*

#### A la une

◆ **Rencontres du Café des techniques + Biologie de synthèse ou l'art de fabriquer le vivant**  
15 novembre 2012

◆ **Les assises du vivant + Que vaut la vie 2.0?**  
30 novembre 2012

◆ **Colloque 2012 + La biologie de synthèse entre sciences et société**  
4 décembre 2012

Rechercher dans les pages du site

ok



**Vos questions et commentaires**

**Découvrez notre veille sur la biologie de synthèse**

**Formation  
Recherche**

**Applications**

# Conclusion

- Think out of the (black) box
  - Take some distance with the idiom of emergence / stabilities matter!
  - Match micro-studies with socio-historical analysis
- What do we have to know to make the technology governable?
- « Upstream » is a key phase of co-production (« constitutional moments »), but which does not happen in a vacuum!