

Environment and Technology

An Economic Policy Perspective

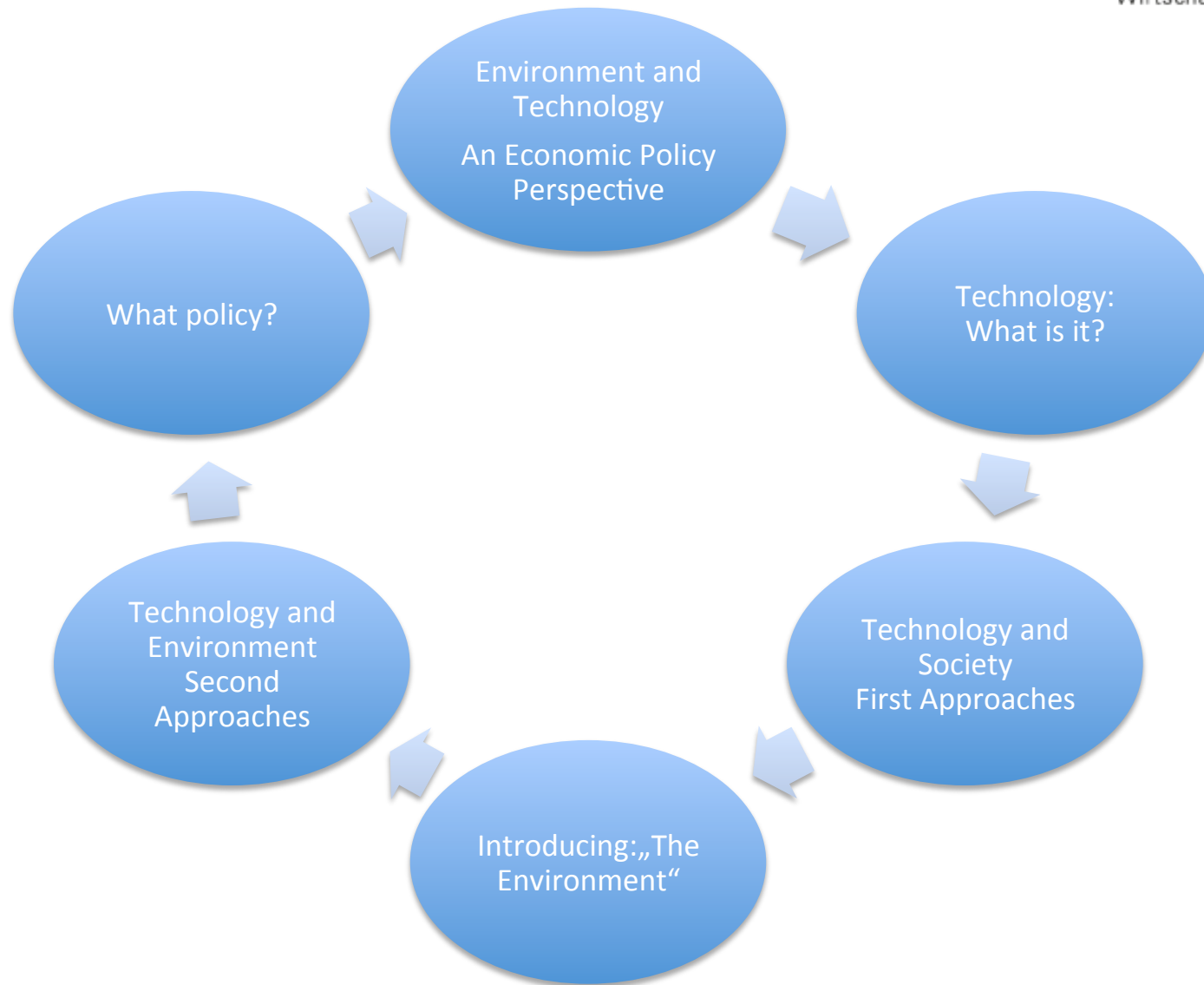


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Agenda



What "is" Technology?

τέχνη (téchnē)
art, skill, craft

λογία (logía)
study of...

**Technology as the study of
arts, skills and crafts**

What "is" Technology?

Tangible

Tools, Machines,
Blueprints, Operating
Manuals, Prototypes

Physical artifacts

Intangible

Techniques, Crafts,
Methods, Consultancy

Knowledge

Application

Goal-oriented mental and
physical efforts, using
tangibles and intangibles
to produce more tangibles
and intangibles

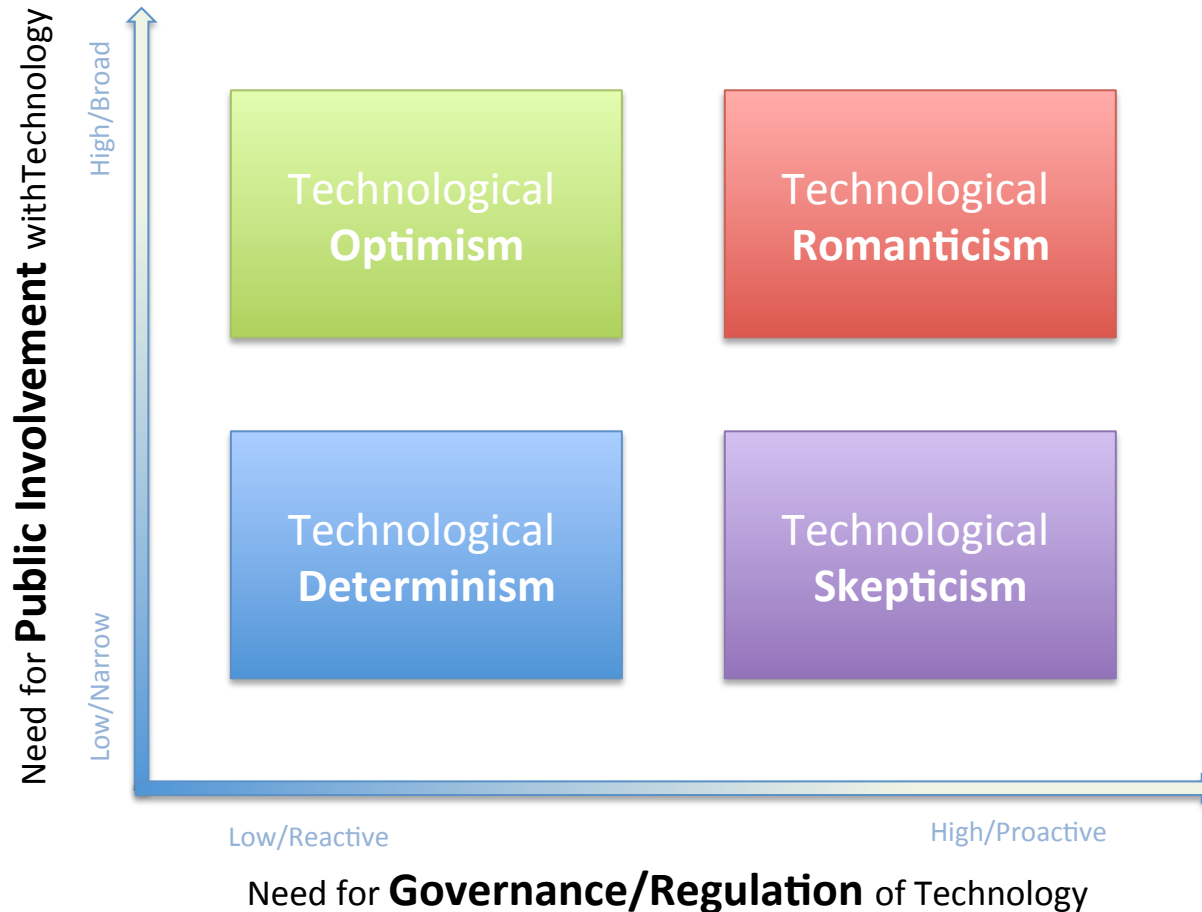
Process

Technology can be viewed as a process that forms and changes culture

cf. Borgmann, Albert (2006). Technology as a Cultural Force: For Alena and Griffin. The Canadian Journal of Sociology 31 (3): 351–360

Technology and Society

Views on Technology



Technology and Society

Social Construction of Technology

Human action shapes technology

Technology is **embedded** in a social context

Example:



<http://www.guardian.co.uk/technology/2012/may/06/sms-text-messages-20th-birthday>

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Social Construction of Technology

Interpretative Flexibility

- Meanings of technology are observer-dependent
- Alternative meanings of technology generate different problems to be solved

Design Flexibility

- Realization of technology can differ significantly
- One problem, many technological solutions
 - > many different views of the problem
 - > even more different solutions

Relevant Social Groups

- Users (different socio-economic groups, different adaptation speed)
- Producers (economic competition, first vs. late movers)
- Societal stakeholders (politics, media, “the public”)

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Social Construction of Technology

Stabilization of Technology

Rhetorical Closure

If relevant social groups “agree” that the problem at hand is **solved** by a certain technology, rhetoric will reemphasize the problem as being solved

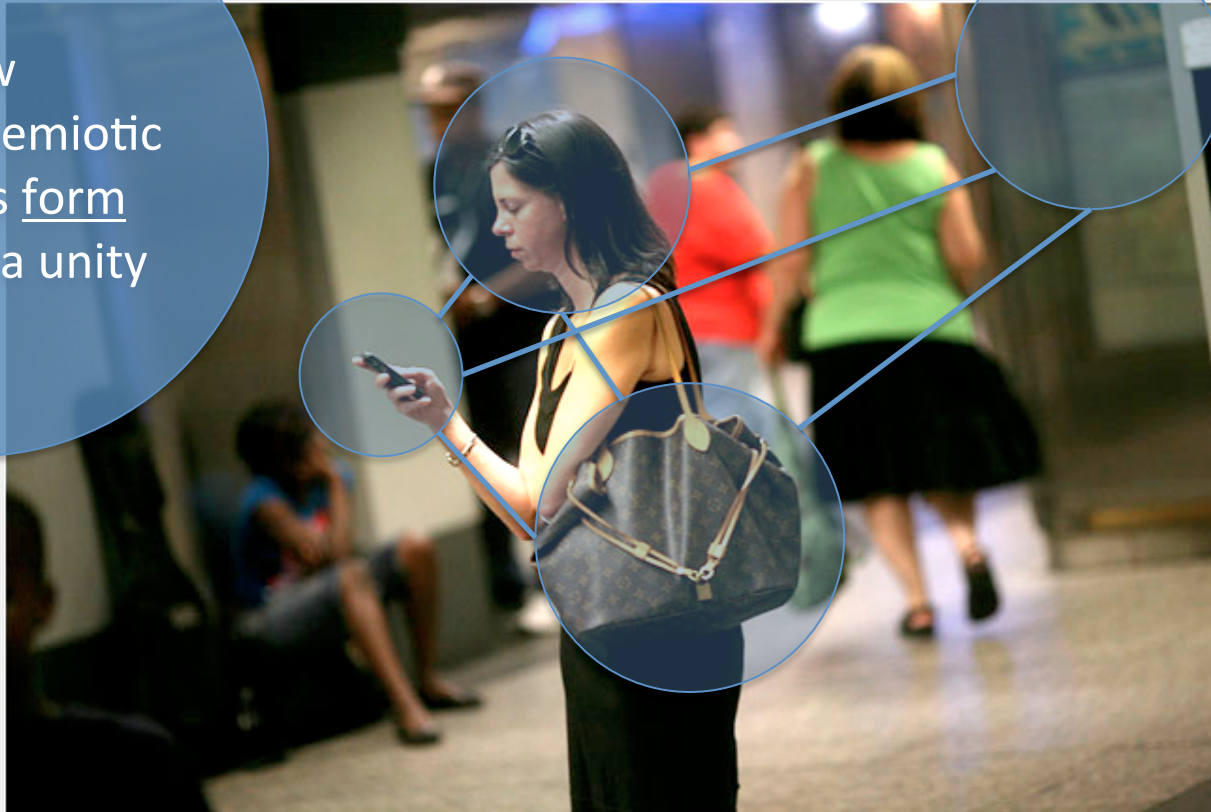
Redefinition of the Problem

If relevant social groups “agree” that the problem at hand is **not the problem** but something else is, no interpretative or design flexibility remains

Certainty, Unambiguity

ANT or: love your Bruno Latour

How
material-semiotic
networks form
an act as a unity



Technology and Society

Thorstein Veblen



- American economist and sociologist (1857-1929)
- *The Theory of the Leisure Class* (1899)
- **Technological determinism:**
 - Technology develops along its own evolutionary trajectory
 - Independent from politics or culture
 - Society is shaped by technology in order to support its further development

Technology marches in seven-league boots from one ruthless, revolutionary conquest to another, tearing down old factories and industries, flinging up new processes with terrifying rapidity. (Charles A. Beard)

Technology and Society

System Theory (aka Luhmann)



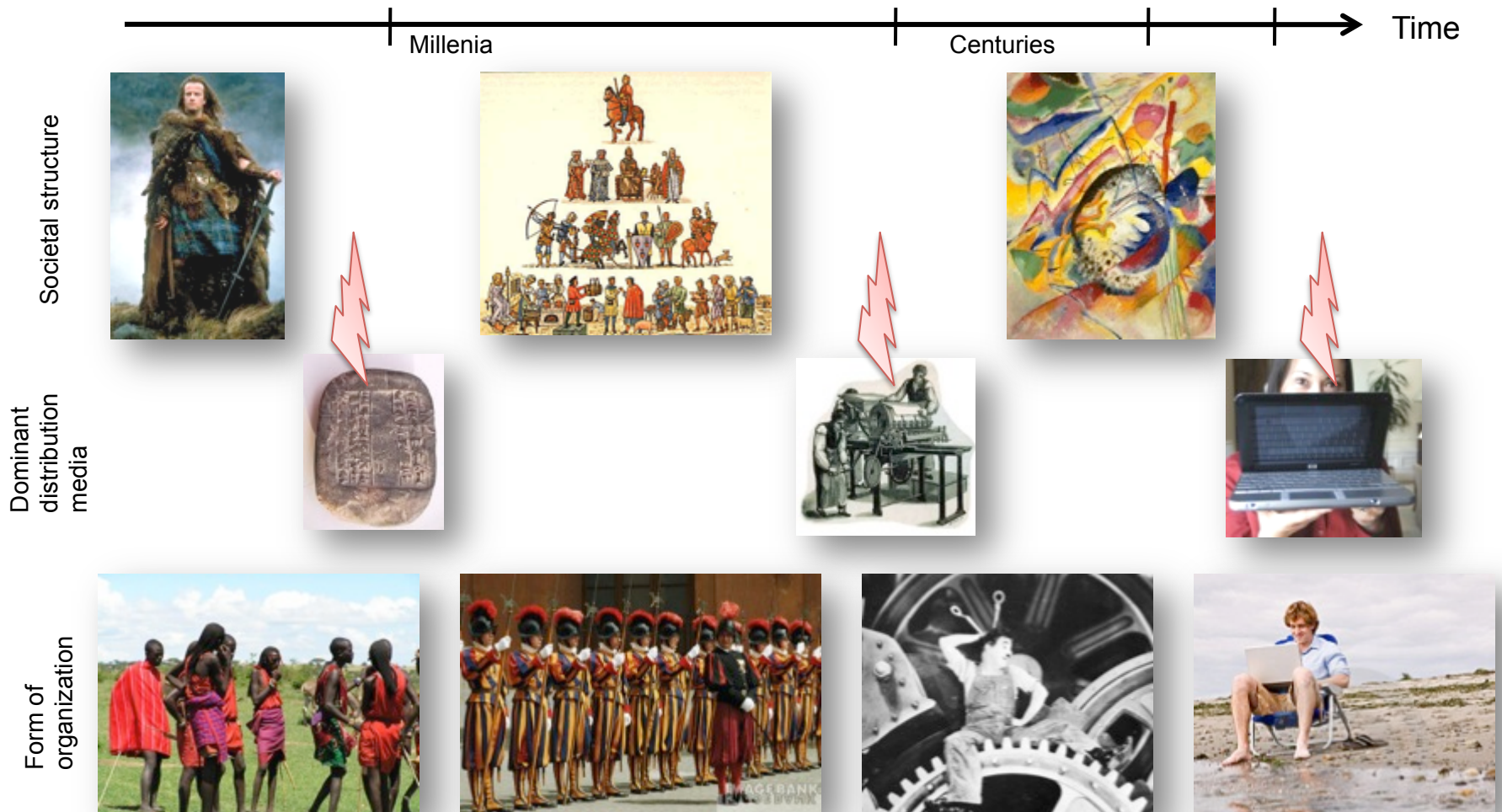
- German sociologist (1927-1998)
- *Soziale Systeme* (1984) / *Social Systems* (1996)
- *Gesellschaft der Gesellschaft* (1997)

*My proposal is that we make the concept of **communication** the basis and thereby switch sociological theory from the concept of action to the concept of **system**. This enables us to present the social system as an operatively closed system consisting only of its own operations, reproduced by communications from communications. With the concept of action external references can hardly be avoided. An action requires, since it must be attributed, reference to socially constituted complexes: a subject, an individual, for all practical purposes even a living body, that is, a place in space. Only with the help of the concept of communication can we think of **a social system as an autopoietic system**, which consists only of elements, namely communications, which produce and reproduce it through the network of precisely these elements, that is, through communication.*

- There are empirical phenomena with certain features justifying to observe them as **systems**
- No system can exist independently from its environment, because it comes into being when its **operations draw a boundary** that **differentiates** the system from what it is not
- Focus on social systems as systems of **communication**
- Communication media as drivers of **societal evolution**
 - Language as medium
 - Generalized communication media
 - **Societal distribution media**

Technology and Society

System Theory (aka Luhmann)



Technology and Society

System Theory (aka Luhmann)

Technology as system: towards an autopoietic theory of technology

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Abstract: This contribution develops a new notion of technology based on core ideas of Niklas Luhmann's sociological system theory. Technology will be conceptualised as a self-making, self-referencing system, distinct from society and the human individual. Its basal operation is information in the medium of operativeness, processing along the binary code of work/fail. Through close coupling with social systems as well as with human developers and users of technology, technological evolution is ensured as a co-evolutive network of technology and society. Thereby technology irritates society in a way that social reality is created by technology and all progress in technology as well as in society is now decided through technological means. This has great effects when dealing with the ecological crisis and the need for sustainable development. This will be illustrated with the example of the automobile in past, present and possible futures.

Technology and Environment

Introducing “The Environment”

The “paradox” of the environment

Pristineness and nobility: Nature as culture

Is this beautiful?



Technology and Environment Old Limits and New Insights

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A comparison of *The Limits to Growth* with 30 years of reality

Graham M. Turner*

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ABSTRACT

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Keywords:
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In 1972, the Club of Rome's infamous report "The Limits to Growth" (Meadows, D.H., Meadows, D.L., Randers, J., Behrens, W.W. (1972). *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. Universe Books, New York) presented some challenging scenarios for global sustainability, based on a system dynamics computer model to simulate the interactions of five global economic subsystems, namely: population, food production, industrial production, pollution, and consumption of non-renewable natural resources. Contrary to popular belief, *The Limits to Growth* scenarios by the team of analysts from the Massachusetts Institute of Technology did not predict world collapse by the end of the 21st century. This paper focuses on a comparison of recently collated historical data for 1970–2000 with scenarios presented in the *Limits to Growth*. The analysis shows that 30 years of historical data compare favorably with key features of a business-as-usual scenario called the "standard run" scenario, which results in collapse of the global system midway through the 21st century. The data do not compare well with other scenarios involving comprehensive use of technology or stabilizing behaviour and policies. The results indicate the particular importance of understanding and controlling global pollution.

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1. Introduction

In 1972, a team of analysts from the Massachusetts Institute of Technology published "The Limits to Growth" (Meadows et al., 1972). This well-known and controversial book documented for the general public the results of the MIT study carried out by Meadows et al., who had been commissioned by The Club of Rome to analyse the "world problematique" using a computer model called Wold3 developed at MIT. The Wold3 model permitted Meadows et al. to examine the interactions of five subsystems of the global economic system, namely: population, food production, industrial production, pollution, and consumption of non-renewable natural resources. The time scale for the model began in the year 1970 and continues until 2100. Historical values to the year 1970 are broadly reproduced in the Wold3 output.

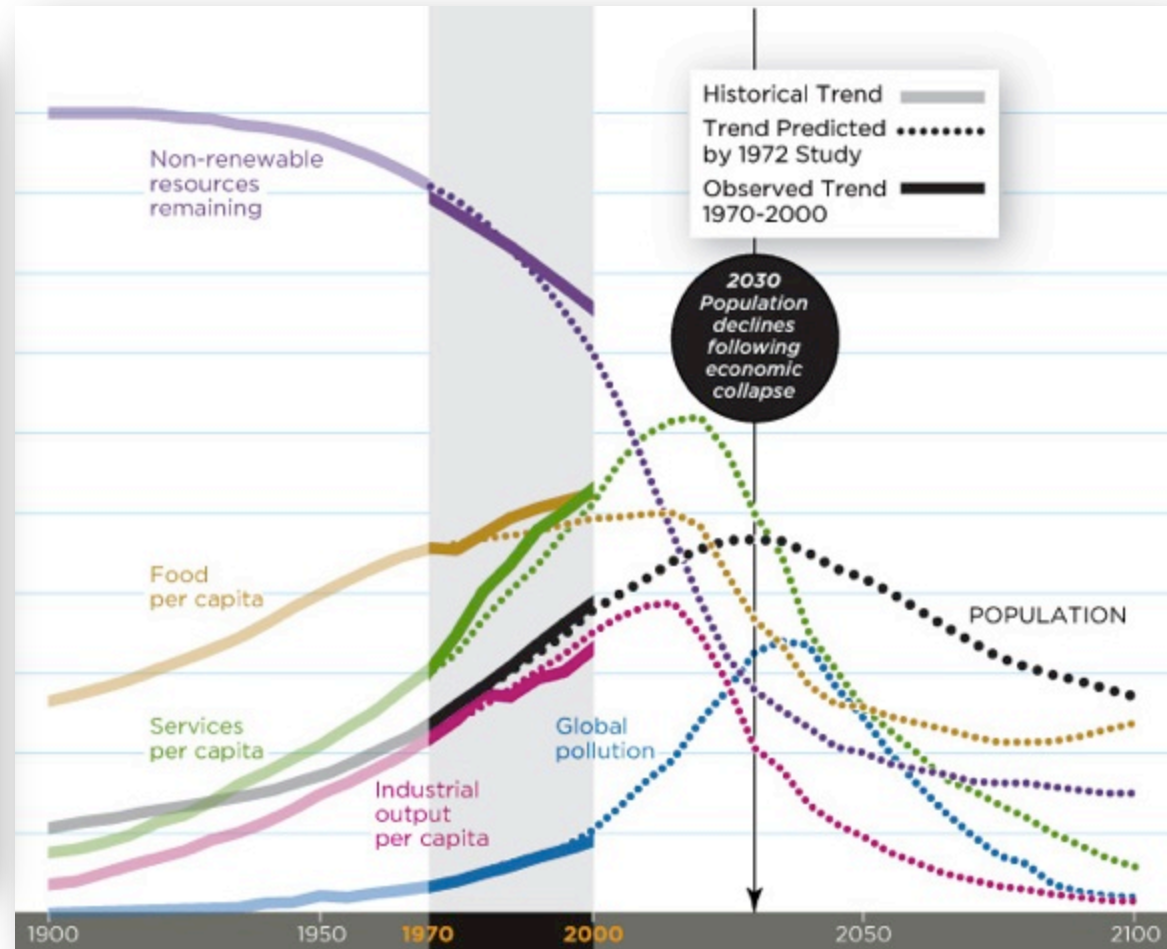
A description of the background that led to the *Limits to Growth* (subsequently abbreviated as: LIG) is given elsewhere (McCutchion, 1979). This reference also briefly summarizes the LIG publication (pp. 7–14). A detailed description of the model, the supporting data, and an analysis of how the model behaves was also published (Meadows et al., 1974).

The release of the LIG in 1972 had immediate and ongoing impacts. Environmental issues and the sustainability debate were further popularized as millions of copies were sold, and translated into 30 languages. Scientifically, it introduced Jay Forrester's newly founded computational approach of "system dynamics" modelling, and quantitative scenario analysis, into the environmental discipline. By linking the world economy with the environment, it was the first integrated global model (Costanza et al., 2007). The salient message from the LIG modelling was that continued growth in the global economy would lead to planetary limits being exceeded sometime in the 21st century, most likely resulting in the collapse of the population and economic system, but also that collapse could be averted with a combination of early changes in behaviour, policy, and technology.

Despite these major contributions, and clear warnings of "overshoot and collapse", the LIG recommendations on fundamental changes of policy and behaviour for sustainability have not been taken up, as the authors recently acknowledge (Meadows et al., 2004). This is perhaps partly a result of sustained false statements that attempt to discredit the LIG. From the time of its publication to contemporary times, the LIG has provoked many criticisms which falsely claim that the LIG predicted resources would be depleted and the world system would collapse by the end of the 20th century. Such claims occur across a range of publication and media types, including scientific peer-reviewed journals, books, educational material, national newspaper and magazine articles, and web sites (Turner, unpublished). This paper briefly addresses these claims, showing them to be false.

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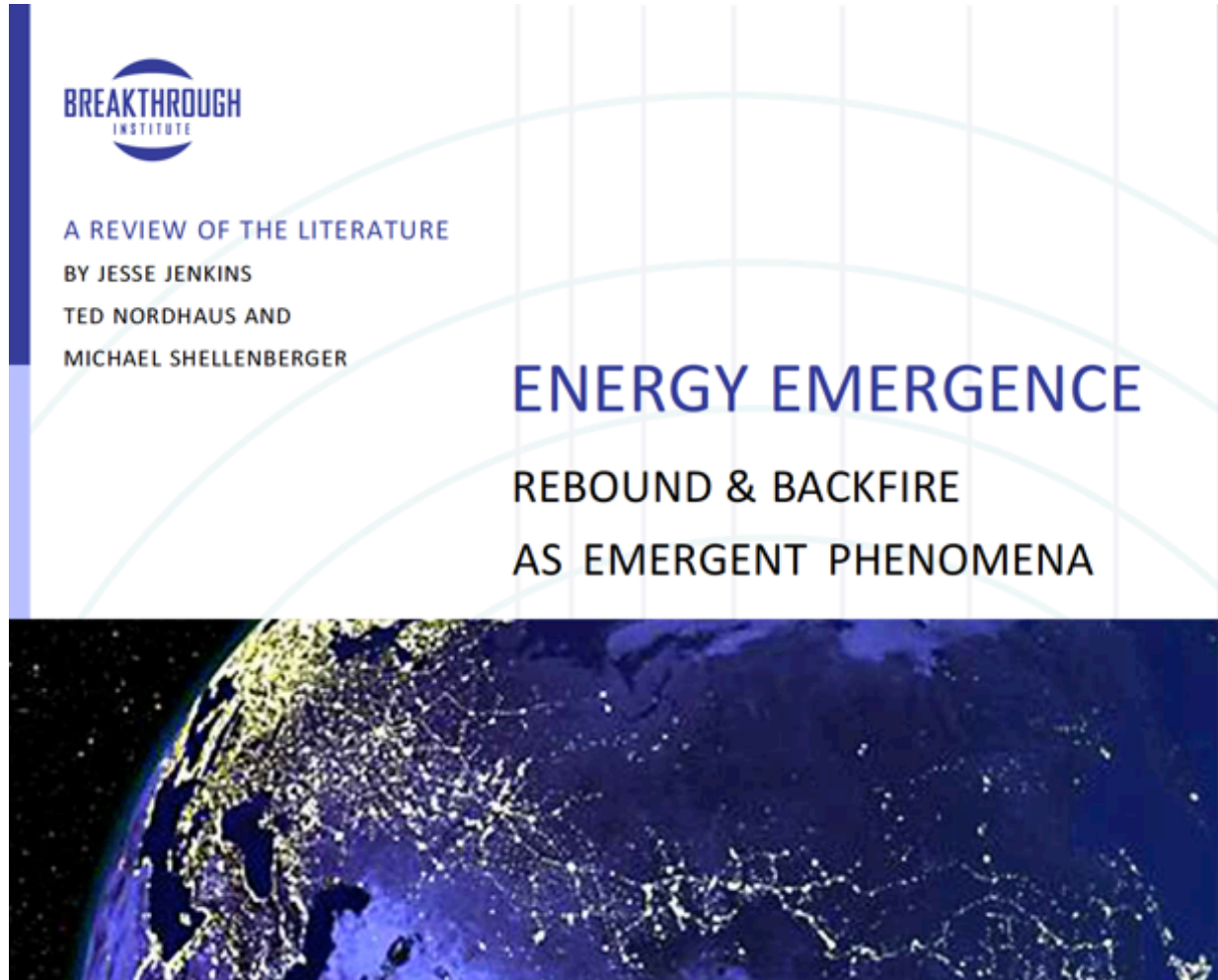


Technology and Environment

Jevons' Paradox and Rebound

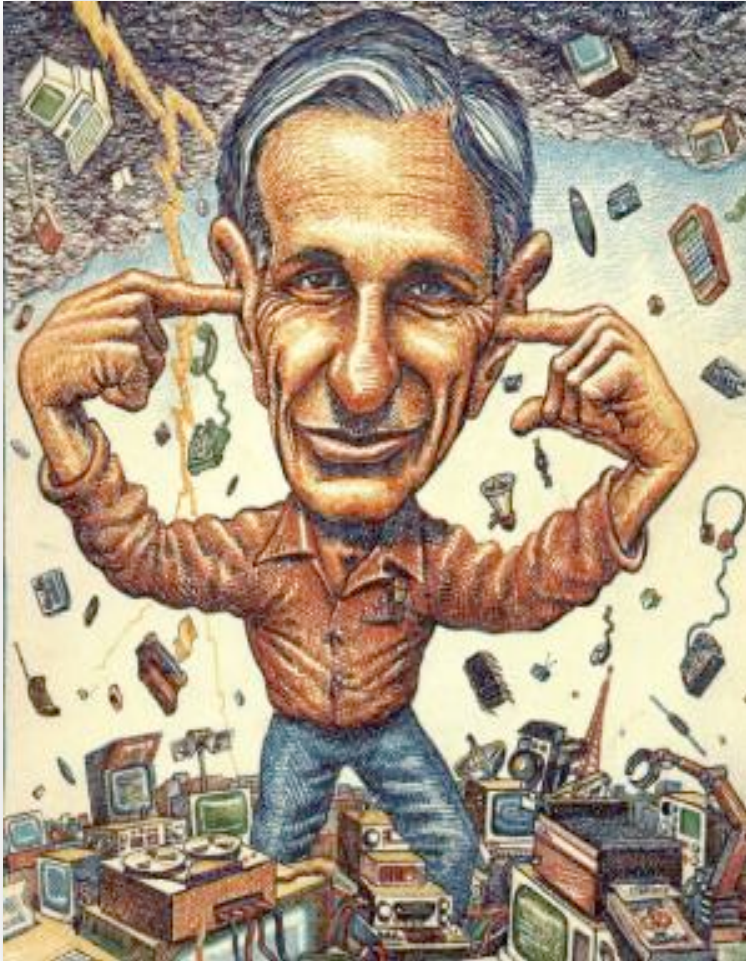
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Technology and Environment

Ivan Illich and “Conviviality”



Austrian philosopher, Roman Catholic priest
(1926-2002)

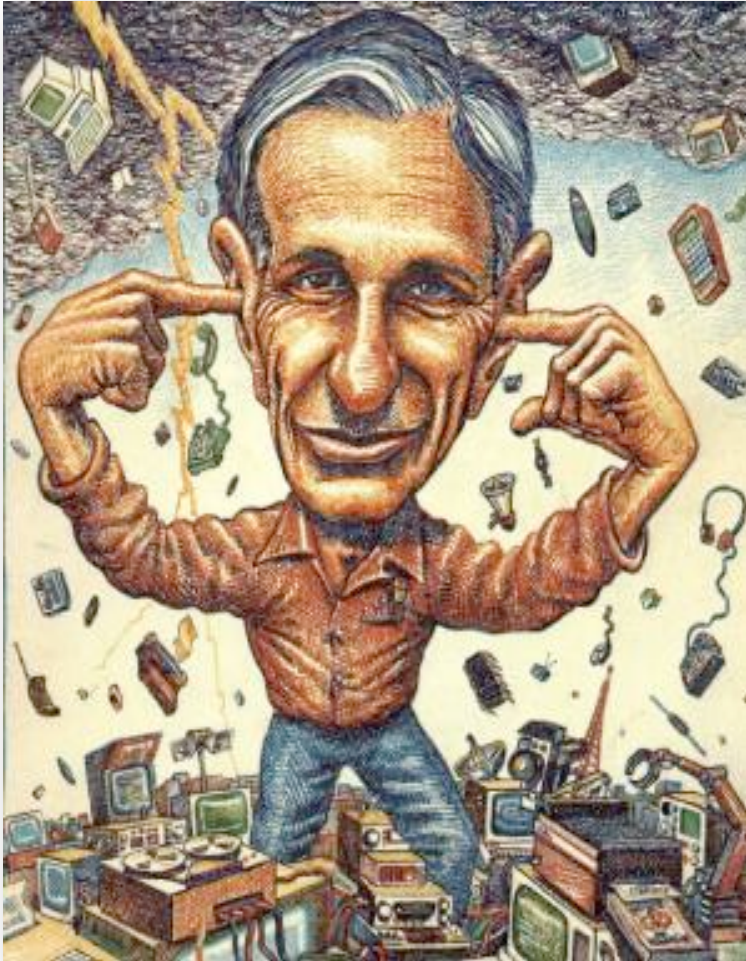
Counterproductivity is the means by which a fundamentally beneficial process or arrangement is turned into a negative one

Specific Diseconomy is a measure of the degree of institutional counterproductivity that is occurring

Radical Monopoly is *“the dominance of one type of product rather than the dominance of one brand. I speak about radical monopoly when one industrial production process exercises an exclusive control over the satisfaction of a pressing need, and excludes nonindustrial activities from competition.”*

Technology and Environment

Ivan Illich and “Conviviality”



*After many doubts, and against the advice of friends whom I respect, I have chosen “convivial” as a technical term to designate **a modern society of responsibly limited tools**... I choose the term “conviviality” to designate **the opposite of industrial productivity**. I intend it to mean **autonomous and creative intercourse among persons, and the intercourse of persons with their environment**; and this in contrast with the conditioned response of persons to the demands made upon them by others, and by a man-made environment. I consider conviviality to be **individual freedom realized in personal interdependence** and, as such, an intrinsic ethical value. I believe that, in any society, as conviviality is reduced below a certain level, no amount of industrial productivity can effectively satisfy the needs it creates among society’s members.*

Technology and Environment

Mumford, Machines & Civilization



American historian, sociologist, philosopher of technology, and literary critic (1895-1990)

Symbols had priority over technology

It is the moral, economic, and political choices we make, not the machines we use, that have produced a capitalist industrialized machine-oriented economy

Technology as arts, skills and crafts

However: Reality of the megamachine

Convergence of science, technics and political power as a unified community of interpretation rendering useless and eccentric life-enhancing values

Technology and Environment

Mumford, Machines & Civilization



Megatechnics

fails to produce lasting, quality products by using devices such as consumer credit, installment buying, non-functioning and defective designs, built-in fragility, and frequent superficial “fashion” changes.

Biotechnics

directs itself towards “*qualitative richness, amplitude, spaciousness, and freedom from quantitative pressures and crowding. Self-regulation, self-correction, and self-propulsion are as much an integral property of organisms as nutrition, reproduction, growth, and repair.*”

Other notions are **Monotechnics** and **Polytechnics**

Jacques Ellul & St. Steve Jobs



Technology and Environment

Jacques Ellul & St. Steve Jobs

French philosopher, law professor, sociologist, lay theologian, and Christian anarchist (1912-1994)

Human action is determined by the system
— first by nature, now by “sacred” technology

Technology is “the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in every field of human activity.”

“Modern technology has become ... the defining force of a new social order in which **efficiency** is no longer an option but a necessity imposed on all human activity... Not even the moral conversion of the technicians could make a difference. At best, they would cease to be good technicians. In the end, technique has only one principle, **efficient ordering.**”



Technology and Environment

Odum's Optimism

American ecologist (1924-2002)

The only technological optimist... in this list!

“The human is the biosphere's programmatic and pragmatic information processor for maximum performance.”

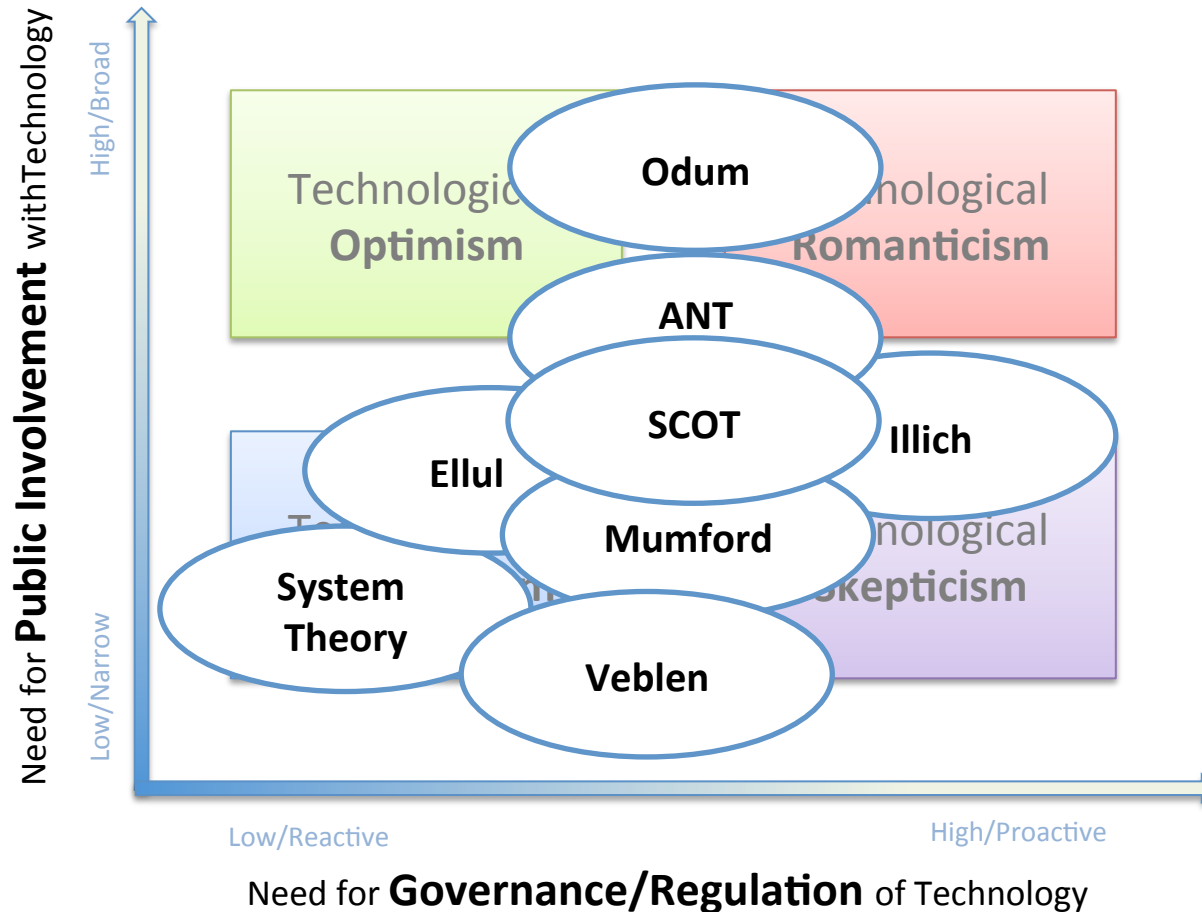
Ecological engineering

- is based on the self-designing capacity of ecosystems,
- can be a field test of ecological theory,
- relies on integrated system approaches,
- conserves non-renewable energy, and
- supports biological conservation.

Technology serves to make energy surpluses accessible to humans via ecological engineering



Technology, Society & Environment Views on Technology



Policy for Technology

What Policy?

Direct Environmental Policy

- “Old School Environmental Policy”
- Liability laws
- Consumer laws
- Subsidies
- Research policies

Indirect Environmental Policy

- Green/Eco Taxes (e.g. fuel tax for consumers, carbon tax for producers)
- Emission permits & trading system
- Feed-in tariffs for renewable energy

Non- Environmental Policy

- Tax laws in general
- Government investment in related fields e.g. transportation and housing
- Labor laws
- Social transfers

“Non-policies”?
(e.g. cultural change from civil society)

Policy for Technology

Discussion questions

1

Evaluate the effectiveness of direct and indirect environmental policies in the light of social constructivism and technological determinism.

- What policies might work and for what reason?
- What policies might fail and what could be done about it?

2

Reflect on the thoughts of either Illich, Mumford, Ellul and/or Odum (one or more of them).

- What room for governing technical change does politics have?
- How would environmental policy have to be formulated in order to deliver better technology and better environmental quality?

3

Freethinking! Reflect on the entire presentation.

- What role can “grassroots” play, be it activists or entrepreneurs, in order to create a more sustainable society?
- Can politics somehow encourage, enable and/or support this?