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A proposal for a core research paper relating to the following themes: Conditions for Degrowth; Democracy and Beyond; Infrastructure and Public Services; Transforming education.

Socio-cybernetics and Degrowth

In this paper it will be argued that it is vitally important to include among research seen as crucial to degrowth:

1. Research designed to generate new governance arrangements grounded in sociocybernetic thinking.
2. Research to map, and finding ways of intervening in, the network of social forces which have the future of mankind and the planet in their grip.

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KEYWORDS: Sociocybernetics, Social Forces, Sustainability, Governance, Thanatosian (as opposed to Gaian), Autopoietic.

Overview

I begin with a strong statement: Apart from the possibility of some kind of Phoenix arising from the ashes of the impending crash, we will not get a sustainable society unless we study, map, and find ways of intervening in, an invisible network of social forces which previous research has shown have the future of mankind and the planet in their grip.

Bookchin\(^1\) has shown that, apart from the remarkable survival of a few organic societies in such places as the Himalaya, all previous demonstrations of the value and viability of alternative, more sustainable, societies and organisations have been eliminated by the onward march of centralisation and hierarchy.

This hierarchy, which has the recursive effect of compelling everyone to participate in itself, is based on the creation of endless senseless work which legitimises and constitutes hierarchy. It is this senseless work that is destroying our habitat, thereby contributing to our extinction as a species.

\(^1\) A summary will be found at [http://eyeonsociety.co.uk/resources/Bookchin.pdf](http://eyeonsociety.co.uk/resources/Bookchin.pdf)
The nature of the network of social forces involved first became clear to us as we mapped the autopoietic network which drives education out of schools and substitutes a system which is mainly concerned with legitimising and contributing to hierarchy.

While there is a need for many systems-oriented interventions based on an understanding of relevant systems processes in this system, it rather surprisingly emerged that two sets of problems were of particular importance.

One was the design of the formal governance (cybernetic) system employed to manage both the educational system and the wider society of which it forms a part. This turned out to be grossly unfit for purpose.

The second was a network of opaque social forces which have the governance system – and human behaviour much more generally – in their grip.

None of the well-intentioned small scale projects advanced by degrowthers and others have the slightest chances of survival, never mind generalising, unless they come to terms with this network of forces.

This network of forces can be conceptualised as an autopoietic, Thanatosian, as opposed to Gaian, network.

We felt we made reasonable progress toward designing an alternative, more organic, less hierarchical, governance system based on multiple feedback (socio-cybernetic) processes. My book The New Wealth of Nations: The Societal Learning Arrangements Needed for a Sustainable Society provides the background to this and discusses its operation in some detail. Nevertheless we would greatly profit from discussion with others struggling to work in the area.

But we were much less happy with our systemogram of the Thanatosian network that is propelling us toward our own extinction as a species (carrying the planet as we know it with us), still less with our suggestions for how to intervene in it.

To be honest, we also greatly underestimated its importance.

My aim in giving this paper is, therefore, to make one further attempt to find collaborators in taking this work forward. It is a Herculean enterprise of similar magnitude to that which Newton undertook in conceptualising and measuring physical forces and showing that they

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2 See [http://eyeonsociety.co.uk/resources/fulllist.html#managing_education](http://eyeonsociety.co.uk/resources/fulllist.html#managing_education) for a summary.
3 Systems-oriented interventions need to be sharply distinguished from centrally-decreed system-wide interventions grounded in ideology and “common sense”.
4 See again [http://eyeonsociety.co.uk/resources/fulllist.html#managing_education](http://eyeonsociety.co.uk/resources/fulllist.html#managing_education)
5 See [http://www.eyeonsociety.co.uk/resources/scio_unpublished.pdf](http://www.eyeonsociety.co.uk/resources/scio_unpublished.pdf) and [http://www.eyeonsociety.co.uk/resources/SCiO_newsletter_V2.pdf](http://www.eyeonsociety.co.uk/resources/SCiO_newsletter_V2.pdf)
6 Death oriented.
7 [http://eyeonsociety.co.uk/resources/fulllist.html#new_wealth](http://eyeonsociety.co.uk/resources/fulllist.html#new_wealth), especially chapters 19 to 25.
could be mapped and measured to understand the movements of the planets and harnessed to get sailing boats that could sail into the wind.

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The Problems.

The problem to be addressed in the governance area has been highlighted by the Committee on the Political Economy of the Good Society (PEGS) in the formal statement below. Unfortunately, a worrying insight into why the situation is as it is comes from the fact that, in the quarter century the Committee have pursued this objective through their journal, The Good Society, virtually no progress has been made.

PEG’s statement reads:

(There is widespread recognition that) many of the major problems facing today's societies reflect existing political and economic structures and cannot be resolved without significant changes to these underlying institutional arrangements. Such problems as increasing disparities in economic and political power, environmental damage, welfare dependency, growing bureaucratization, and political alienation can be seen as inherent features of existing institutional arrangements that the institutions themselves help to propagate.

Nevertheless, institutional analysis and reform currently receive little attention, and existing political and economic theories offer insufficient guidance on how alternative institutional arrangements might avoid or reduce these major social problems.

Cybernetics is concerned with the study and design of the guidance and control (governance) systems of animals and machines. One has to mention the animals to underline that cybernetics includes the study of complex organic systems having multiple feedback loops.

So socio cybernetics becomes the study of the, largely invisible, feedback systems which control the operation of society … and the design of better socio-cybernetic (governance) systems.

Through earlier research we have:

1. both (a) articulated some parameters which may be helpful in guiding the quest for more appropriate public management (socio-cybernetic) arrangements, and (b) used those parameters to help us sketch out a basis on which alternative public management (socio-cybernetic) arrangements might be built. And
2. highlighted the importance of, and generated a preliminary sketch (or systemogram) to depict, the network of social forces which seem to have continuously undermined the evolution of more appropriate arrangements in both large and small organisations and which point to the need for unexpected developments.

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8 Managing Education for Effective Schooling (http://eyeonsociety.co.uk/resources/fulllist.html#managing_education) and The New Wealth of Nations: The Societal Learning Arrangements Required for a Sustainable Society http://eyeonsociety.co.uk/resources/fulllist.html#new_wealth A short, if somewhat inadequate, summary of this work will be found in the Journal of the Committee on the Political Economy of the Good Society http://www.eyeonsociety.co.uk/resources/GS09.pdf

9 The New Wealth of Nations, chapter 20: http://eyeonsociety.co.uk/resources/NWNChap20.pdf
My aim here is to find ways of advancing work in these two areas.

There appear to be two ways in which this might be done. One would be via the contribution of collaborators, including research students, in universities, research institutes, and elsewhere who are able to devote time and energy to either contributing directly to these two activities or who are able to help us secure the funding required to do so\(^{10}\).

The second involves raising the funds needed to implement the work either via the traditional funding arrangements or via “crowd funding”\(^{11}\).

**Background.**

Briefly, our work on the educational system\(^{12}\) unexpectedly threw light on the topics identified in the title.

That work, and its implications for the two topics we are now seeking to progress, is briefly summarised in an article entitled *Advancing and defeating the PEGS agenda: Socio-Cybernetics and Murray Bookchin* in PEGS’ journal, *The Good Society*. A pre-publication version of this is available at [http://eyeonsociety.co.uk/resources/GS09.pdf](http://eyeonsociety.co.uk/resources/GS09.pdf)

That research showed that, while there are multiple reasons\(^{13}\) why the educational system fails to achieve its manifest goals\(^{14}\)\(^{15}\) (each of which, as with other problems which have been studied in systems terms, demand for their resolution major, targeted, research-based, systems-oriented, intervention [which is to be sharply distinguished from ideologically-based system-wide intervention]), **these various processes do not operate independently but form a mutually supporting, autopoietic, self-elaborating, and self-extending (viz organic) system.**

This system operates in such a way that it either negates well-intentioned, common-sense based, single-factor interventions or leads those interventions to have unintended, counterintuitive, and usually undesired and undesirable, consequences.

A systemogram mapping these interactions is shown in Figure 1.

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\(^{10}\) The process of securing funding is not limited to that of obtaining funding, from, eg, Research Councils, to progress a particular proposal but may also include progressing our work whilst contributing to research being undertaken for other reasons. In fact, virtually all the work I have been able to do in the past has been done in the second way.

\(^{11}\) An example of one project relying on the latter may be found at [http://www.kickstarter.com/projects/605480326/beyond-connecting-the-dots](http://www.kickstarter.com/projects/605480326/beyond-connecting-the-dots)

\(^{12}\) This is best summarised in my book *Managing Education for Effective Schooling*, several chapters from which can be found at [http://eyeonsociety.co.uk/resources/fulllist.html#managing_education](http://eyeonsociety.co.uk/resources/fulllist.html#managing_education)

\(^{13}\) See, for example, [http://eyeonsociety.co.uk/resources/fulllist.html#managing_education](http://eyeonsociety.co.uk/resources/fulllist.html#managing_education) or [http://eyeonsociety.co.uk/resources/CPDAPA_REVISED_FULL_VERSION.pdf](http://eyeonsociety.co.uk/resources/CPDAPA_REVISED_FULL_VERSION.pdf) for lists of these reasons.

\(^{14}\) The main goals of education are widely agreed to include nurturing the wide variety of talents that different pupils possess and especially to nurture high level talents like initiative, ability to work with others, and ability to understand and influence the way organisations work.

\(^{15}\) So far as we can make out, it achieves its latent *sociological* goals (mainly legitimising and implementing hierarchy) very well. So well, in fact, that the second … and major … component of the research proposed here yis to understand, and find ways of influencing, the social forces which irrevocably perpetuate a divided society.
Figure 1 makes it very clear that, while numerous developments are required (such as development of the understandings and tools required to nurture and credential multiple talents), two central problems are:

(i) To design an alternative management (socio-cybernetic) system to manage the educational system [and public provision more generally] more effectively. This will involve finding an alternative to that which lies behind the network of notions listed in the central box in Figure 1.

(ii) To understand, map, and find ways of intervening in, the network of (“sociological”) forces which primarily determine what happens both within the educational system and society more generally (right hand box in Figure 1).

Current position.

On the basis of the understandings we have built up in the course of our work, it seems that it is necessary to evolve a public management system which will, in the case of education:

1. Put in hand the research needed to intervene in the network of social forces which corrupt the widely agreed goals of education (ie to develop such qualities as initiative,
self-confidence, ability to problematize, ability to understand and intervene in networks of social forces) into a system which essentially pursues the sociological function of legitimising, and contributing to the entrenchment of, hierarchy.

2. Nurture the research needed to develop better ways of thinking about, nurturing, and credentialing the wide range of talents pupils possess.

3. Encourage teachers to experiment with a wide variety of educational programmes designed to nurture multiple talents and offer parents and pupils the opportunity to choose between those programmes.

4. Arrange for comprehensive\(^\text{16}\) evaluation of those experiments and feed that information back into the experimental programmes so that they can be improved. (Formative evaluation).

5. Document the short and long term, personal and social, consequences of each of those programmes for a cross section of pupils having different talents and values and feed that information outward to parents and pupils so that they can make informed choices between them. (This is to be sharply contrasted with arrangements to feed such evaluation upward in a bureaucratic hierarchy to elected representatives who, guided by personal motives and values and political ideologies, make decisions binding on all.)

6. Change the criteria against which teachers are evaluated in such a way as to make it possible for them to get credit for engaging in the difficult, demanding, and often personally threatening (eg from colleagues’ reactions to “failed” experiments), activities that are required if they are to creatively seek to act to further the long term public interest and that of each of their pupils.

7. Find ways of ensuring that action is taken on the basis of such information instead of accumulating in the drawers of filing cabinets. John Stuart Mill suggested that this is to be done by exposing peoples' behaviour to the public gaze. As he put it, the function of citizen assemblies is, not to govern, but to make visible to everyone who did everything and by whose default anything was left undone. The problem is that there is no way in which modern elected assemblies, responsible for the spending of some 70% of GNP\(^\text{17}\), could do this. It could, however, be done via networks of overlapping open supervisory groups.

Note that many of these recommendations involve the evolution of new understandings of democracy, bureaucracy, and citizenship.

Attention may also be drawn to the similarities and differences between these recommendations and Adam Smith’s suggestion that the way to promote a society which innovates, learns, and evolves without central direction is by embracing the market mechanism as a self-organising information management system\(^\text{18}\).

\(^{16}\) “Comprehensive” because what is good for the individual in the short term may be bad for him or her in the longer term and what is good for the individual may be bad for society. Unfortunately, pursuit of comprehensive evaluation involves moving away from a reductionist to an “ecological” image of science.

\(^{17}\) The calculations leading to this figure will be found in *The New Wealth of Nations*.

\(^{18}\) Smith’s reasons for making this proposal are rarely understood. Suffice it to say that making people financially well off was not one of them. His aim was to design an organic societal management system (or, rather, self-organising system) with multiple feedback loops between widely dispersed, incomplete, constantly changing, and mutually interacting, bits of information. One of our fundamental problems now is that his proposal, like so much else in modern society, has been corrupted into its opposite by the very social forces we so urgently need to understand, map and harness.
This is not the place to go into the problems with Smith’s proposal. Those who are interested will find a discussion in *The New Wealth of Nations*, especially Chapter 8\(^{19}\). Suffice it to say that it is now everyone’s every day experience (as the committee on the PEGS observed) that neither current forms of market management nor current forms of democratic-bureaucratic management serve the public interest even moderately well.

Our proposals based on the observations summarised above were elaborated at some length in chapters 19 to 25 of *The New Wealth of Nations*\(^{20}\) and condensed into the diagrams shown in Figures 2 and 3.

Figure 2, previously Diagram 25.1

![Diagram 25.1](http://eyeonsociety.co.uk/resources/NWNChap8.pdf)

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\(^{19}\) [http://eyeonsociety.co.uk/resources/NWNChap8.pdf](http://eyeonsociety.co.uk/resources/NWNChap8.pdf)

\(^{20}\) These are available at: [http://eyeonsociety.co.uk/resources/fulllist.html#new_wealth](http://eyeonsociety.co.uk/resources/fulllist.html#new_wealth)
Figure 3 (previously Diagram 20.5)

**DIAGRAM 20.5 NEW SOCIETAL MANAGEMENT ARRANGEMENTS**

**CREATION OF A SUSTAINABLE SOCIETY**
- One which offers more, more satisfying, less energy-consuming work.
- One which develops, utilizes and rewards all available talents.

**NEW BELIEFS ABOUT HOW SOCIETY SHOULD WORK**
- Recognition of the need to co-operate in the process of innovation.
- Recognition of the need for participatory 'paradox organisation' activity to generate innovation.
- Recognition of the need for network-based and multidisciplinary supervision of both the public service and so-called 'private organisations' in new forms of 'democracy' and 'citizenship'.

**RESEARCH to develop**
- A better understanding of the necessary organisational arrangements.
- The tools required to hold public servants and other managers accountable for exercising high level talents and expertise for doing such things as creating times of innovation, initiating systems-oriented experiments, and monitoring the effects of and learning from the effects of their actions.
- The tools required to generate public servants and other managers accountable for exercising high level talents and expertise for doing such things as creating times of innovation, initiating systems-oriented experiments, and monitoring the effects of and learning from the effects of their actions.

**DISSEMINATION of what we already know about**
- The rules of competences and its development and assessment.
- The roles to be performed by managers - to:
  - create pervasive climates of innovation
  - create developmental environments and their uses, pace, direction and utilisation of the talents of subordinates
  - seek out information and take good discretionary decisions
  - anticipate the impacts of their actions and change appropriately
  - initiate evaluation studies
  - study, and detect and influence "external" social and economic conditions
  - study the nature and workings of society.
  - The nature of management.
  - The nature of public management.
  - The nature of innovation - parallel/organised activity.
  - The processes which advance scientific understanding.

**MOTIVES TO DISSEMINATION**
- Recognition of collapse of environment and the future.
- Awareness of non-sustainability.

Recognition of failures of current: economic system, governmental system, local management of schools initiative

Recognition of role of TNOs (and fear of them)

(But the problem is that most of these fizzle out into "The government should" and disengagement. The question then is: "How can we harness these motives?")

Ver: 25 June 1995
What now needs to be done is for a number of people to come up with alternative designs, grounded in socio-cybernetic thinking, which would meet the parameters identified above (together with others not listed here).

The task is of inestimable importance. The problems of which we have spoken are by no means limited to the educational system and virtually all government activity but plague the management of all complex organisations … such as hospitals\(^2\) and Telecom companies … never mind the management of health, communication, and financial services more generally.

What is being suggested here is that a collective attempt to sketch the networks of feedback processes (better termed “Dynamic Systems Models) lying behind the (often dysfunctional) operation of a variety of such organisations and networks together with the problems they encounter\(^2\) will, even without recourse to strict, quantified, systems models, lead to greater clarity about the problems and hence to the creation of alternative societal learning and management arrangements.

Mapping, measuring, and harnessing the social forces which have the future of mankind and the planet in their grip.

I turn to what might be regarded as the second of my proposals: viz the need to generate a dynamic systems map of the forces perpetuating and elaborating a hierarchical society which has the effect of compelling everyone (often against their better judgment) to participate in the endless senseless work\(^2\) of which modern society is so largely composed. (This despite the fact that such work contributes little to human health and happiness while nevertheless destroying our habitat, thereby contributing to our extinction as a species, at an exponentially accelerating rate.)

It is this network of forces – indicated in the right-hand box in Figure 1 – which, in essence, forces the “educational” system to concentrate on activities which not only legitimise social hierarchy but also to actually arrange pupils in an apparently unarguable hierarchy of “ability” which feeds directly into the operation of a competitive hierarchical society.

It is perhaps useful to elaborate on the importance of the topic a little more.

The Deming Learning Network (Scotland) set up a loose network entitled Learning Society (Scotland) with the objective of trying to create a pervasive climate of innovation in Scotland.

\(^{21}\) Hornung (http://eyeonsociety.co.uk/resources/InvitMC.pdf) provides a number of links to his papers describing the problems encountered in hospital systems.

\(^{22}\) These include such things as mutually incompatible “targets” having [on the basis of command-and-control {Weberian} images of “good” management] been set for different sub-systems.

Without realising the minefield\textsuperscript{24} into which it was walking, one component of this was seen to involve persuading more people to recognise the importance of, and themselves more often engage in, “systems thinking”.

More specifically, their objective was taken to involve (among other things) disseminating what could be learned from a number of organisations that were seen to be organised on a more “organic” than hierarchical, command-and-control, basis.

But, as the Society reviewed these “more organic” organisations and what they had achieved, one question became ever more intrusive: If there were so many good examples of the effectiveness of what was deemed good practice, why did those practices not percolate through the rest of society? And why, if one adopted a longer time perspective, were they invariably eliminated?

This question intruded \textit{a fortiori} with the (re)publication of Bookchin’s \textit{Ecology of Freedom: The Emergence and Dissolution of Hierarchy}\textsuperscript{25}.

What Bookchin shows is that, while many so-called “primitive” societies were, and are, organised on an “organic” basis, these have mostly inexorably drifted toward centralised, hierarchical, organisation at every choice point in their evolution ... or else they have been eliminated by the advance of more destructive, command and control, arrangements dependent on unsustainable exploitation of their manpower and habitats.

Endless thoughtful people have, over the millennia, pointed to the short- and long-term disbenefits of hierarchical organisation, including lowered quality of life, inefficiency, and destruction of habitat. And there have been endless demonstrations, some dealing with more delimited organisations (such as workplaces) and others with whole communities, of the effectiveness, benefits, and viability of more organic arrangements. But one after another they have been eliminated.

Bookchin was content to attribute this inexorable drift to a “self-organising” process.

But this is clearly inadequate as an explanation ... especially if one wishes to intervene in the network of forces responsible before it reaches its limits and destroys us as a species carrying the planet as we know it with us.

So, arising out of our work on the educational system and our reflections on the nature of the governance/management/sociocybernetic system required if we are to create a more sustainable society\textsuperscript{26}, we generated a tentative model/systemogram of the network of social forces and feedback loops which appear to perpetuate this process (Fig 4).

\textsuperscript{24} The term “systems thinking” is used to refer to a wide variety of different processes each of which is vigorously defended by its adherents, often without knowledge of the other claimants to the throne. A map of these different interpretations, perhaps best described as the “Systems Minefield” available at \url{http://www.eyeonsociety.co.uk/resources/systemsGenealogy.pdf}

\textsuperscript{25} \textit{Opus. Cit.} But see \url{http://eyeonsociety.co.uk/resources/Bookchin.pdf} for a summary.

\textsuperscript{26} See my \textit{New Wealth of Nations} (opus cit.)
An enlargeable version of this diagram is available at: http://www.eyesociety.co.uk/resources/diagram%2020.6.pdf
The task now is to undertake the Herculean\textsuperscript{27} task of translating these and related systemograms into socio-cybernetic diagrams analogous to the diagrams (or dynamic systems models) of the cybernetic systems which control the operation of computers, the multiple feedback networks which control the functioning of animals, and the movements of the planets\textsuperscript{28}.

**Why go to the bother of transforming systemograms into formal socio-cybernetic models?**

Problems with systemograms include their failure to: (i) give any indication of the relative strength of the various forces involved; (ii) highlight nodes at which intervention could most profitably be made; and (iii) make it possible to assess the probable effects (both desired and desirable and undesired and undesirable) of any particular intervention.

One illustration of the kind of dynamic systems map or model that might be envisaged is given in Figure 5\textsuperscript{29}

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\textsuperscript{27} The task is of similar magnitude to that which Newton undertook by conceptualising the invisible forces that control the operation of sailing boats and the planets and showing how they could be mapped, measured, and harnessed. (See Raven & Gallon \url{http://www.eyeonsociety.co.uk/resources/scio_unpublished.pdf} for a fuller discussion.)

\textsuperscript{28} See Raven & Gallon \url{http://www.eyeonsociety.co.uk/resources/scio_unpublished.pdf} for more detail.

\textsuperscript{29} Readers may find it helpful to know that a standard convention for representation of the symbols in this and subsequent figures seems to be emerging.

A **circle** is a representation of an amplifier/signal damper (AKA “Converter”) [I am not entirely sure how this differs from a valve] but in some cases seems to be used as a representation of a dial; a meter. A measure of current \textit{rate of flow}/strength of signal.

A **rectangle** is a representation of a \textit{cumulative level} (often referred to as “stock”) that has been built up over time: eg extent of environmental degradation or innovative capacity of a workforce or society. Such stocks or cumulative levels may be increased or diminished via an \textit{inflow} or \textit{outflow}.

A **double sided triangle \(\triangleleft\triangleright\)** is a \textit{flow} (signal) control mechanism (AKA a “valve”). The \textit{flow} in question should have a name and the exogenous and endogenous variables which determine the setting of the control mechanism are indicated by the arrows entering the triangles from either side. (Actually, I am not sure why the arrows can enter from either side.)

Endogenous variables are those entering from other parts of the system map and determined by whatever happens in the system … which may itself be influenced by exogenous variables at some other control valve indicated in the system. Exogenous variables are those not documented in the system diagram … and may include such things as legal arrangements.

A **cloud or turbine** represents some kind of exogenous input not documented on the diagram or some kind of output with which those drawing the map are not concerned at the present time.
Fig. 5 Simplified World Model Forrester constructed to analyse the effects of changing population and economic growth over the next 50 years. The model includes interrelationships of population, capital investment, natural resources, pollution, and agriculture and background variables which influence, and are influenced, by them.
It is possible to see in real time the effects of any intervention that it may be proposed to make in the above “Club of Rome” network by going to www.Vensim\models\sample\WRLD3-O03\World3_03_Scenarios.wmfView.

The problem with the Forrester/Meadows *Limits to Growth* map of the network of relevant feedback loops is its failure to identify the very networks of social forces with which we are concerned here and how they interact with the points in the model at which “exogenous intervention” occurs and further intervention might be possible.

As a result, the authors of *Limits to Growth* weakly conclude that we “lack the political will” to enact the policies to which their research points.

As an aside, we may note three more things. One is that the way their conclusion is phrased assumes that someone … some authority … will implement their recommendations. In other words it is assumed that the way forward is via the very hierarchical command and control based interventions that are a major source of the problem. No central group could possibly envisage all the actions and experiments that are needed … still less monitor the effects of those actions and follow through with further (corrective?) action. (Hence the need for a new image, or vision, to guide the development of more appropriate public management arrangements.)

If my observation about the implied assumption about the perceived way forward is correct, it prompts a related observation. A fundamental conclusion derived from studies of systems operation is that it does little good to, for example, shout at teachers or the managers of the educational system. Their behaviour is primarily determined by the operation of the system itself. It would seem to follow that even some of those most deeply involved in systems thinking seem to have been trapped into common-sense thoughtways when it comes to making recommendations.

By the same token, it seems that the authors of *Limits to Growth* have failed take on board another central observation about systems: Single interventions rarely produce the desired results. Instead one requires multiple systems-oriented interventions targeted at the points at which exogenous intervention can be seen to be possible. These are actually designated with appropriate symbols in the Forrester diagram but are more clearly visible in the STELLA diagram which follows.

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Unfortunately, this link does not always seem to work. If it fails, it is necessary to go to the basic link and work through the network of options. The online, interactive, version of the model *is* there!
Figure 6

STELLA World Model

STELLA Flow Diagram of SDSIM Version 1.0

RECTANGLES are LEVELS (cumulatives), VALVES are RATES (flows), CIRCLES are variables or constants used to formulate the RATES as functions of the LEVELS at TIME = t for the iteration t+dt, where t=1950, 1951, ..., 2199, 2200 and dt=1
Harich provides another diagram which at least makes a (somewhat minimalist) attempt to represent the kinds of social forces and feedback loops we are concerned with here and how they interact with the possibilities of intervention in the biological/economic system.

It is perhaps important to introduce a caveat at this point. These models are not carved in stone. They can always be drawn in different ways, and the different representations often end up drawing attention to very different things. For example, we have ourselves developed a much fuller diagram of the workings of the educational system and its role in society … but we rarely use it because it does not so neatly illustrate the points made above.

The objective here is not to produce a complete, last word, map but to produce something usable.

**Last major leap forward.**

The transformation in our thinking (which stemmed from Luciano Gallon’s inducement to embark on this adventure) is more fully discussed in Raven and Gallon.

The procedures required to take the work forward have been outlined by Albin.

Our own attempt to use them resulted in a felt need to break down many of the large chunks in the diagram in Figure 4. This resulted in a sinking feeling as we realised the enormity of the task. My current assumption is that one of the key tasks involved in moving forward is to come up with concepts at an appropriate level of analysis … as in the distinction between the two “education” diagrams. We are seeking here neither to produce a comprehensive map nor to make accurate predictions. Merely to produce something which is useful.

At which point it is, perhaps, appropriate to mention that drawing Fig. 4 did not advance our thinking as much as had been hoped … although it did highlight the importance of thinking through the recursive (co-creative) process (represented as an induction coil in the diagram) whereby myth alters reality and reality selects appropriate myths.

I would love to hear from anyone interested in progressing this work and would greatly appreciate it if they would contact me at jraven@ednet.co.uk.


32 Raven and Navrotsky [http://eyeonsociety.co.uk/resources/RVNAVSC%20landscape.pdf](http://eyeonsociety.co.uk/resources/RVNAVSC%20landscape.pdf) To obtain the whole article it is unfortunately necessary also to open the supporting PDFs listed in the entry in the “Full List” at [www.eyeonsociety.co.uk](http://www.eyeonsociety.co.uk).

33 Raven & Gallon [http://eyeonsociety.co.uk/resources/scio.pdf](http://eyeonsociety.co.uk/resources/scio.pdf)


35 Many of these myths constitute fundamental obstacles to degrowth. They include: (i) the belief that wealth derives from work with the corollary that those who do not contribute to such (senseless and destructive) work not only have no right to a share in communal wealth, including food and shelter, but actually need to be subject to demeaning and degrading treatment in order to compel them to participate in that work; (ii) the belief that, through representative democracy, one can have a significant impact on the huge range of processes under government control; (iii) the belief that, by and large, representative democracy promotes highly able people who share a commitment to the long term public interest; (iv) the belief that a voting system confers the right of a majority to impose their views on minorities; (v) the belief that it is more important to obey, rather than challenge, the law; (vi) the belief that many of the problems of the world are attributable to a few “power hungry” individuals rather than the operation of a pervasive social system.