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Understanding Systems - a very short introduction [Part 1]

Purpose of this session

This short introduction is designed for those new to Systems and those who are curious.
It is important that the serious studier of this domain acquaints themselves with both the modern origins and development of some of the ideas and the apparently simple but fundamental building blocks on which good practice is based. There are two sessions planned. The first the Systems epistemology and what it means in practice and the second some examples of 'Systems' tools

Useful references for these two sessions are:

Checkland, P.B.(1999), *Systems Thinking, Systems Practice*, includes 30 year retrospective, Chichester: Wiley and Sons.

Stowell, F.A. and Welch, C. (2012) *The Managers Guide to Systems Practice, Making Sense of Complex Problems*, Wiley Chichester,

Why do we think the way that we do?

Reductionism & science

"…the very paradigm of what it means to think and be intelligent" (W&F, 1986)

But "… science has no adequate way of studying the elusive, since it always aims for precision, and hence in some real sense science is alienated from nature" (Churchman 1971).

SCIENTIFIC METHOD

Generation of hypothesis and testing them. The accumulated data gained from objective observations leads to the generation of scientific law.

Tends to exclude environment such that all that is left are the elements of the problem that can be manipulated and investigated in detail.

Artificially restricts some elements of the 'system' and becomes ill-matched to meet the problems of a 'real world' outside the 'laboratory'. Sociological and

Behavioural 'problems' do not lend themselves to reductionism

SYSTEMS APPROACH

More able to deal with complex systems. Assimilated large segments of elements from several disciplines.

Terminology:
As with any discipline, 'Systems'
has its own vocabulary.
Some key words to remember are:
   Holism, boundary, environment,
   system, input, output, process,
   transformation, equifinality,
   purposive, purposeful .....

Concepts:
   Operational Research,
   Cybernetics,
   General Systems Theory,
   Critical Systems,
   Open Systems Theory,
   Hermeneutics,
   Soft Systems …

Methodology and Techniques:
Application of Systems ideas,
Hard Systems Approach, e.g.Viable Systems Model, Systems Dynamics.
Soft Systems Approach, e.g. SSM, AIM.

After Checkland

1. What is 'Systems'?

2 What is a 'System'?

3 What is a Systems Thinking?

4. What is Systems Practice?

System

The noun System comes from the Greek, **"Syn",** to declare; addition, i.e. the action of putting something (s) together and **"Histemi",** which means "to stand", so

Systima (the combining of Syn and Histemi), means to put something together that **"stands"** (i.e. **has a purpose**),

Those who subscribe to the notion of wholeness refer to it by the noun <u>System</u>.

What is a System? –a selection of some views

The synthetic unity of structure and its functions which affects the parts and their functions or activities without their loss or destruction

[After Smuts 1925, pp.123-124]

A complex of interacting elements   [After Bertalanffy, 1971]

A configuration of elements grouped together for a purpose and stable enough to give it form

[After Vickers 1983 p120]

A model of a whole entity – emergence hierarchy communication and control –
but when applied to artificially made entities **emergence** is the most important characteristic

[After Checkland 1999 p318]

A system whose entities are given a real-world interpretation by the employed measuring instruments or by our own sensors   [After Klir ed. 2001 p97]

What is a System? Cont'd

A system is a system because we say it is.

This has some validity because from an observer's point of view -
A grouping of any kind will be recognised as something that gives it a meaning for them.

For the observer it is a recognisable entity – it is in the observers mind.

This observation highlights the fact that everyone has a general, uninspected, idea of what it means; consequently, it is exceptionally difficult to pin down a sharp definition.

subjectivity

Systems Thinking

A systems thinker must always remember that they are an agent looking at the world from a particular epistemological approach

How we make *sense of the 'world' is uniquely different, since each* person's view of a situation is shaped by their **appreciative settings** (their unique experiences, values and biases)

The importance of Subjectivity

See Stowell & Welch pp.37&94-95

When we look at a 'system' we think 0f it in terms
of Transforming something into something else [PP52-53]
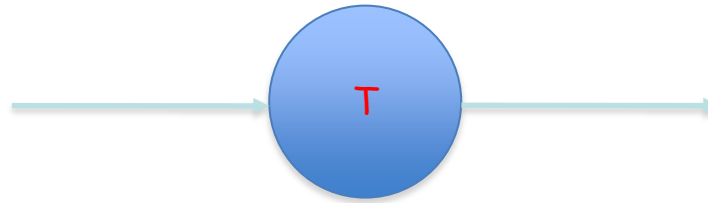
But we recognise that this may be our perception, our 'worldview'.
What we call Weltanschauungen [pp 75&233]

Strands of Systems Thinking - A personal view

1. GST - '*hard*' systems ideas

Cybernetics -feedback

Scientific models – Psychology, Biology

Mathematical models – isomophy of concepts

Operational research -optimisation

2. Philosophy – Phenomenology, Sociology

3. 'Political' – Critical theory, emancipation

4. Soft Systems – Subjectivity; cycle of learning;

Systems Thinking

The notion of Systems is a way of understanding the world it is:

A Conceptual tool (an epistemology)

"…an approach to the study of physical and social systems which enables complex and dynamic situations to be understood in broad outline"

(Bullock and Trombley, (2000)

Summary -There is no concrete and universal model of the world or systems within [although there may certain characteristics]

Observation – importance of the framework of ideas to your choice of method/methodology/technique ie. F M A
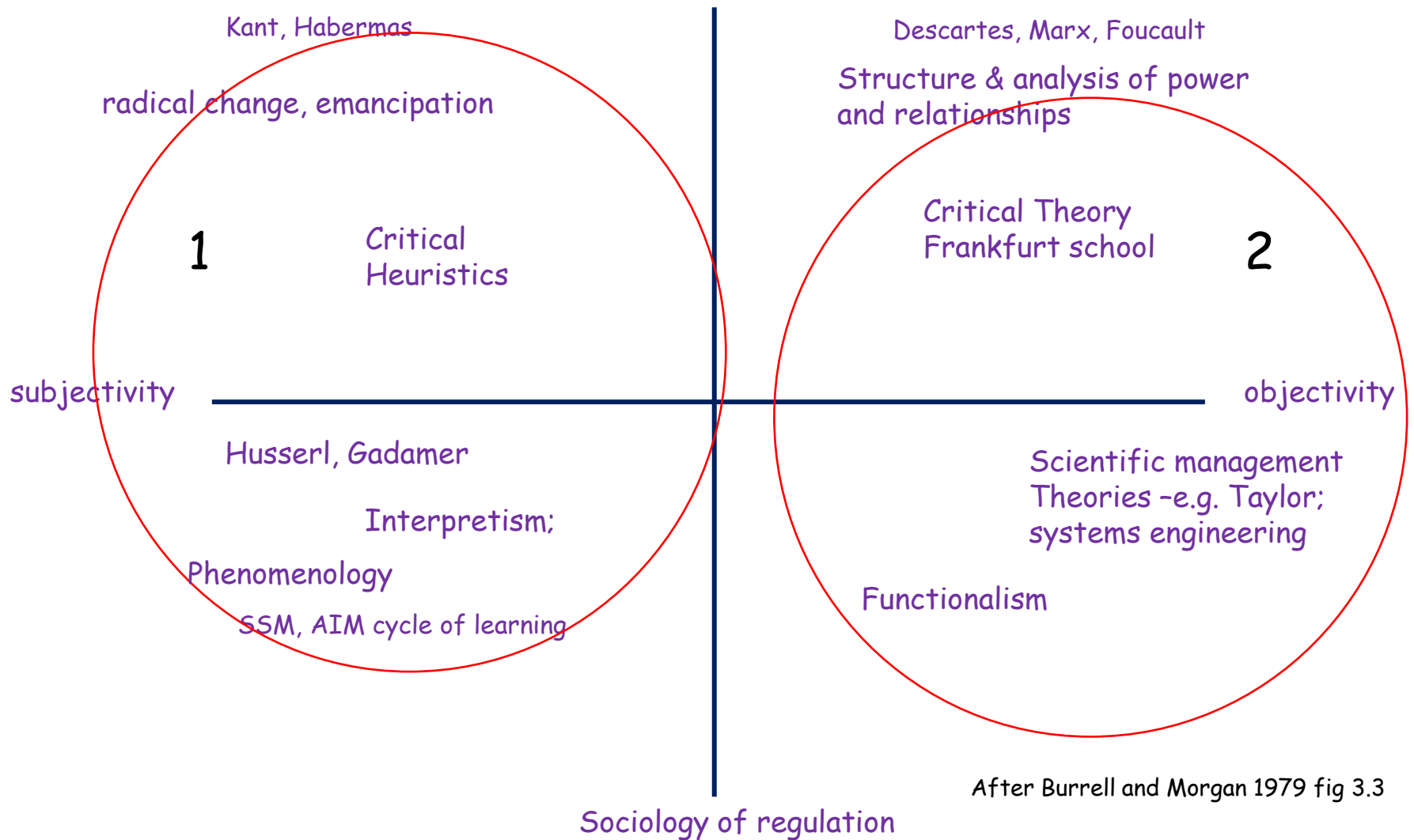
Systems Practice

Hard systems '...assumes that the world contains systems which can be 'engineered' hence the models of those systems can be made; it talks the language of problems and solutions which eliminate problems.'

Soft Systems '...regards systems models as models relevant to arguing about the world, not models <u>of</u> the world; this leads to 'learning' replacing 'optimizing' or 'satisficing'; this tradition talks the language of 'issues' and 'accommodations' rather than 'solutions'...

(Checkland,1985, p.765)

Sociology of radical change

Kant, Habermas

radical change, emancipation

Descartes, Marx, Foucault

Structure & analysis of power and relationships

1

Critical Heuristics

Critical Theory Frankfurt school

2

subjectivity — objectivity

Husserl, Gadamer

Interpretism;

Phenomenology

SSM, AIM cycle of learning

Scientific management Theories –e.g. Taylor; systems engineering

Functionalism

After Burrell and Morgan 1979 fig 3.3

Sociology of regulation

functionalist and interpretive paradigms –some considerations

- **Interpretive** (*Soft* Systems)
  - Reality
    - perceived by individual; created by perception and interpretation
  - Knowledge
    - accept complexity of perceived reality - create tools/ways of thinking to help manage complexity
  - Human nature
    - non-deterministic, free-will, capricious

- **Functionalist** (e.g. *Hard* Systems)
  - Reality
    - exists external to human being
  - Knowledge
    - universal laws govern behaviour; use scientific approaches to uncover
  - Human nature
    - deterministic

1

2

After Checkland

How do we decide what is our system of interest? -

Some Simple rules

1. Always give the system a name

    i.e. Agree the name of the system to which **you are all** referring

    Decide upon your systems boundary

Identifying a 'system' of interest?

But why do we need a boundary?
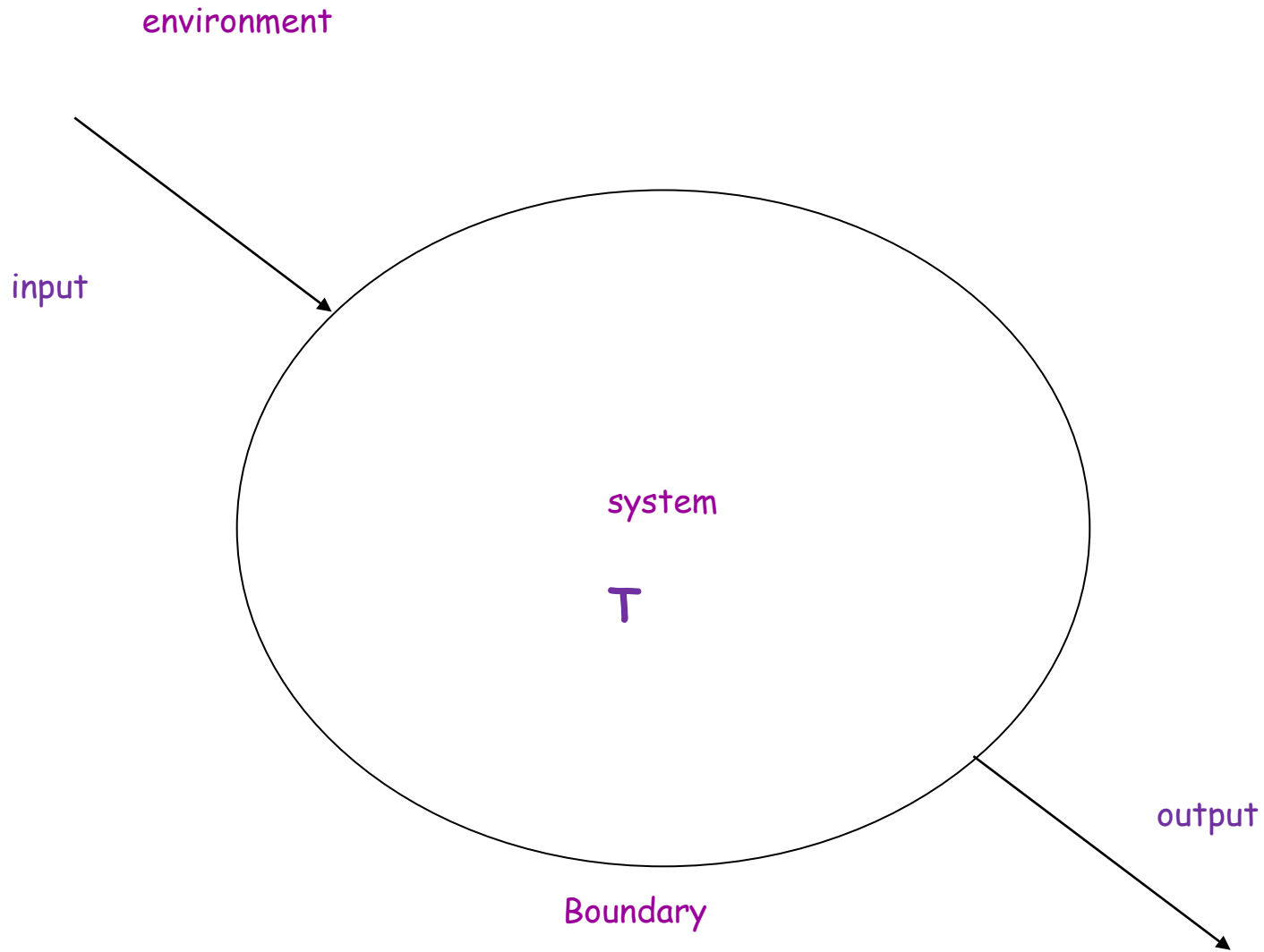
Start by defining the Boundary

How do we draw our boundary?

Who decides what to include and what to exclude?

See Stowell and Welch 2012 pp4-7 & 74-77 + p67-68

The importance of boundary

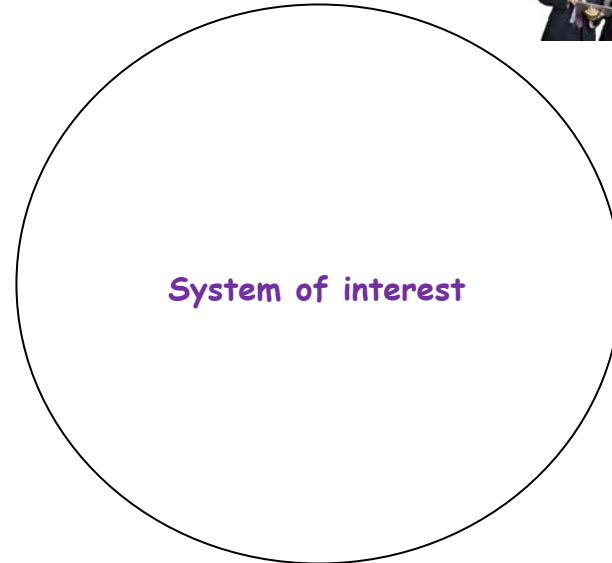# System Boundary–

Two perspectives

Observing - from outside

being a part

System of interest

System of interest

Systems theorist and Practitioner task :

Can be described as seeking to create order out of a 'mess'

To do this we need tools – tools that are suitable for such a complex task

Summary of important things to remember from our meeting today

1. The notion of 'a system' may vary with each observer

2. There are several strands of system thinking and practice

3. Where are you in the intellectual universe? FMA useful here

4. Always give your system a name

5. The importance of boundary. PEArL useful here

UKSS @ http://www.systemsforum.org
[Estab. c1976]

'SYSTEMS' THINKING IS A WAY OF VIEWING THE WORLD - THERE ARE SPECIALISMS WITHIN - BUT THEY ALL SHARE THE SAME NOTION OF HOLISM

GOOD SYSTEMS THINKING!

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