



Soft Systems Methodology

Presented by: Bohan Yang; Kaiyu Wang



In everyday life, we may face some problematical situations....

- A university may feel that its student intake is too biased towards students from middle-class homes. What are the implications of changing that?
- A local council may be receiving complaints that the delivery of its services is not sufficiently 'citizen-friendly'. What should it do?
- A head teacher may wonder how to decide whether to take on the responsibility for providing school meals or to leave that function to the local education authority.

Bitcoin





Could be solved by...

- Appealing to previous experience
- Randomly thrashing about
- Responding emotionally

Or

Could be addressed by using SSM

What is SSM?

SSM is **Soft Systems Methodology**, it is an **action-oriented** process of inquiry into **problematical situations** in the everyday world.

Users **learn their way** from finding out about the situation to defining/taking action to **improve** it.

The learning emerges via an organized process in which the real situation is explored, using as intellectual devices – which serve to provide structure to discussion – models of **purposeful activity** built to encapsulate pure, stated **worldviews**.

---Peter Checkland & John Poulter

What will we usually do to evaluate a system

1. Conduct a BPMN or UML to evaluate the system sequence
2. Conduct a DFD analysis to evaluate the data flow
3. Conduct a i* model to evaluate the dependency relationship among different actors.



Hard System Thinking

What will we usually do to evaluate an industry or a company ?

1. We will collect the data related to the industry
2. Conduct the analysis using the statistical models
3. Get a conclusion of the past and present performance, and give an estimation of the future operation.



Hard System Thinking

What is SE?

Systems Engineering (SE) is a process of **naming a 'system'**, defining its objectives, and then using an array of techniques to **'engineer' the system** to meet its objectives.

---Peter Checkland & John Poulter

However, it was too thin...not rich enough to deal with social complexity

Systems Engineering  **Soft Systems Methodology**

Soft Systems Approach

- Engineering approach can be inappropriate for 'soft problems' (with fuzzy requirements).
- Soft systems approaches (Soft Systems Methodology, Soft OR) assume:
 - organisational problems are 'messy' or poorly defined
 - stakeholders interpret problems differently (no objective reality)
 - human factors important
 - creative, intuitive approach to problem-solving
 - outcomes are learning, better understanding, rather than a 'solution'

Hard Systems Approach

- Hard systems approaches (systems analysis (structured methods), systems engineering, operations research) assume:
 - Objective reality of systems in the world
 - Well-defined problem to be solved
 - Technical factors foremost
 - Scientific approach to problem-solving
 - An ideal solution
- More traditional way of viewing systems in Computing Science

What can SSM be used for?

➤ **Why widely used:**

The SSM is a process of learning your way through problematical situations.

This learning is organized and structured by using models of purposeful activity.
The sheer generality of purposeful action makes the application area so huge.

➤ **SSM can be used in...**

Small/Large corporations; private/public sectors. Ex. National Health Service

SSM can also be used in information systems and information technology

SSM vs SE & others

SSM abandon the idea that the world is a set of systems.

The (social) world is taken to be very complex, problematical, mysterious, **characterized by clashes of worldviews.**

It is a methodology, not a method or way to solve problems.

There is no certain solution to a “problem”, however, there is an improvement on “problematical” situations.

A cycle of learning which goes from finding out about a problematical situation to defining/taking action to improve it

SE is an archetypal example of what is now known as ‘hard’ systems thinking.

Belief: the world contains interacting systems. They can be ‘engineered’ to achieve their objectives.

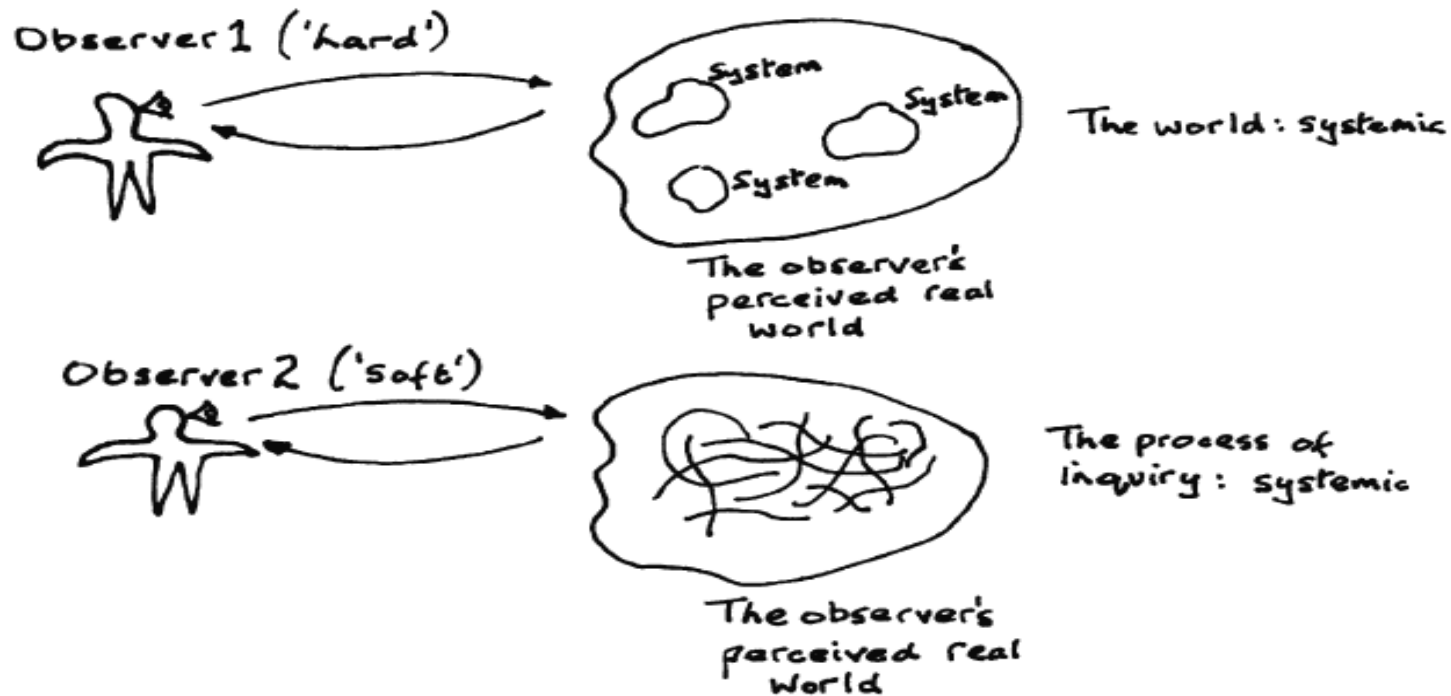
The belief also applies to other approaches.

Ex. the Viable System Model, the classic Operational Research...

Related problem could be solved within certain technical area

None of these approaches pay attention to the existence of **conflicting worldviews.**

How the 'soft' systems see the world...



Observer 1 'I spy systems which I can engineer.'

Observer 2 'I spy complexity and confusion; but I can organize exploration of it as a learning system.'

Fig. 5.4 The 'hard' and 'soft' systems stances

By introducing the term 'worldviews'...

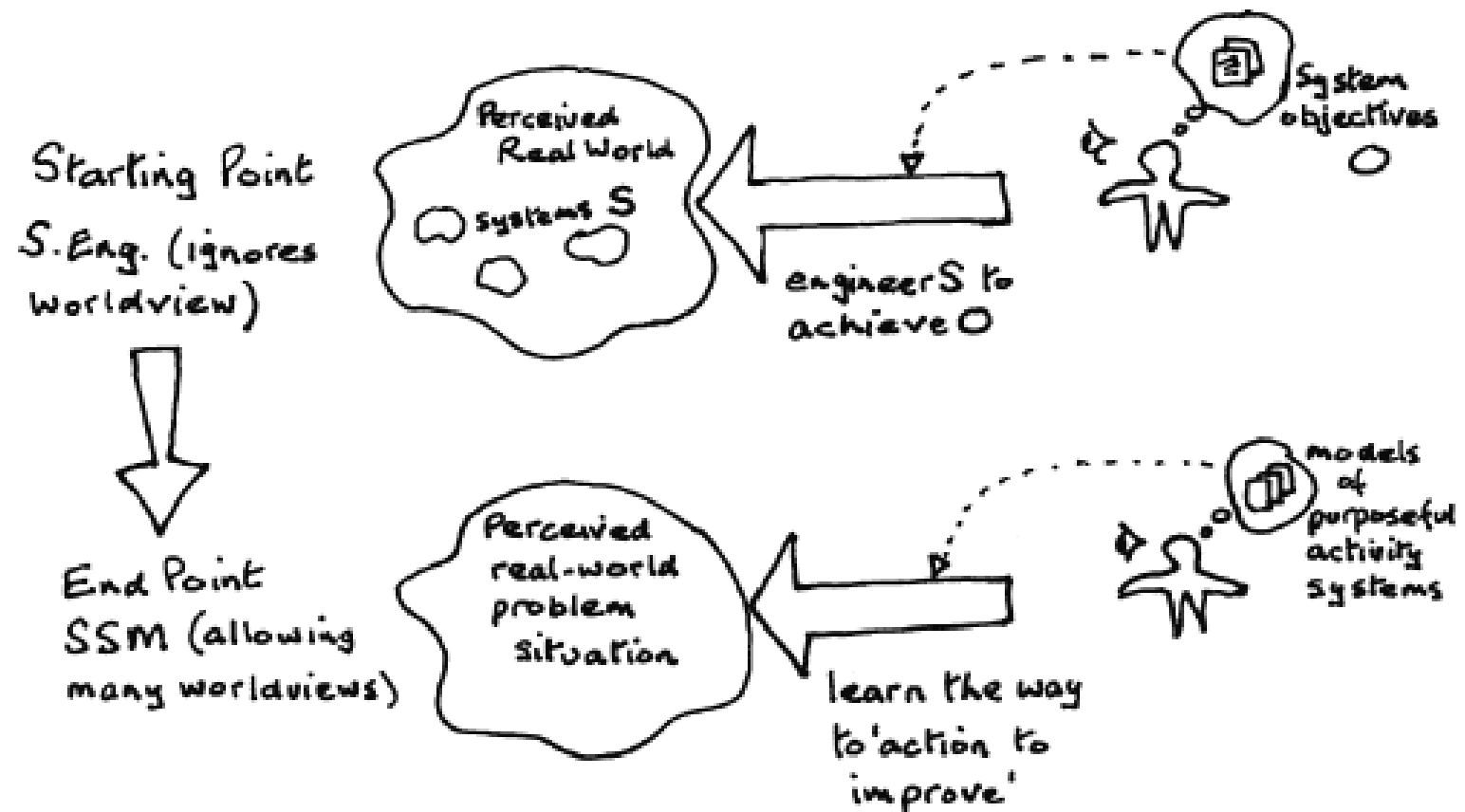


Fig. 5.2 The shift in thinking entailed in developing SSM



Soft System Methodology

1

The problem situation unstructured

2

The problem situation expressed

3

Root definitions of relevant systems

4

Develop conceptual models

5

Compare the conceptual model with the real world

6

If changes are arguably desirable and culturally feasible

7

Action to improve the problem situation

7 Stages of SSM

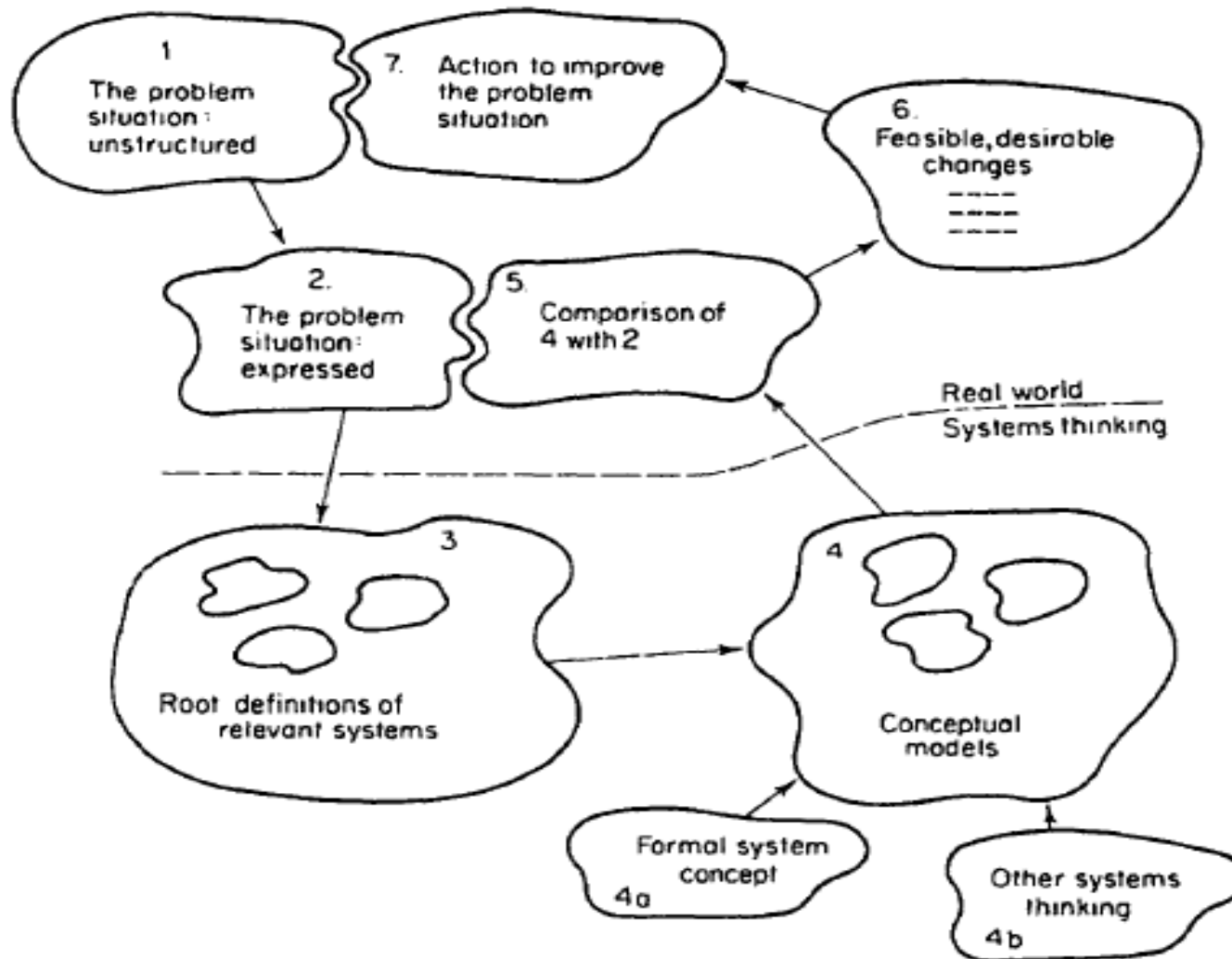


Fig. 1. The seven stages of Checkland's Soft System Methodology (from Checkland, 1981).

SSM learning cycle

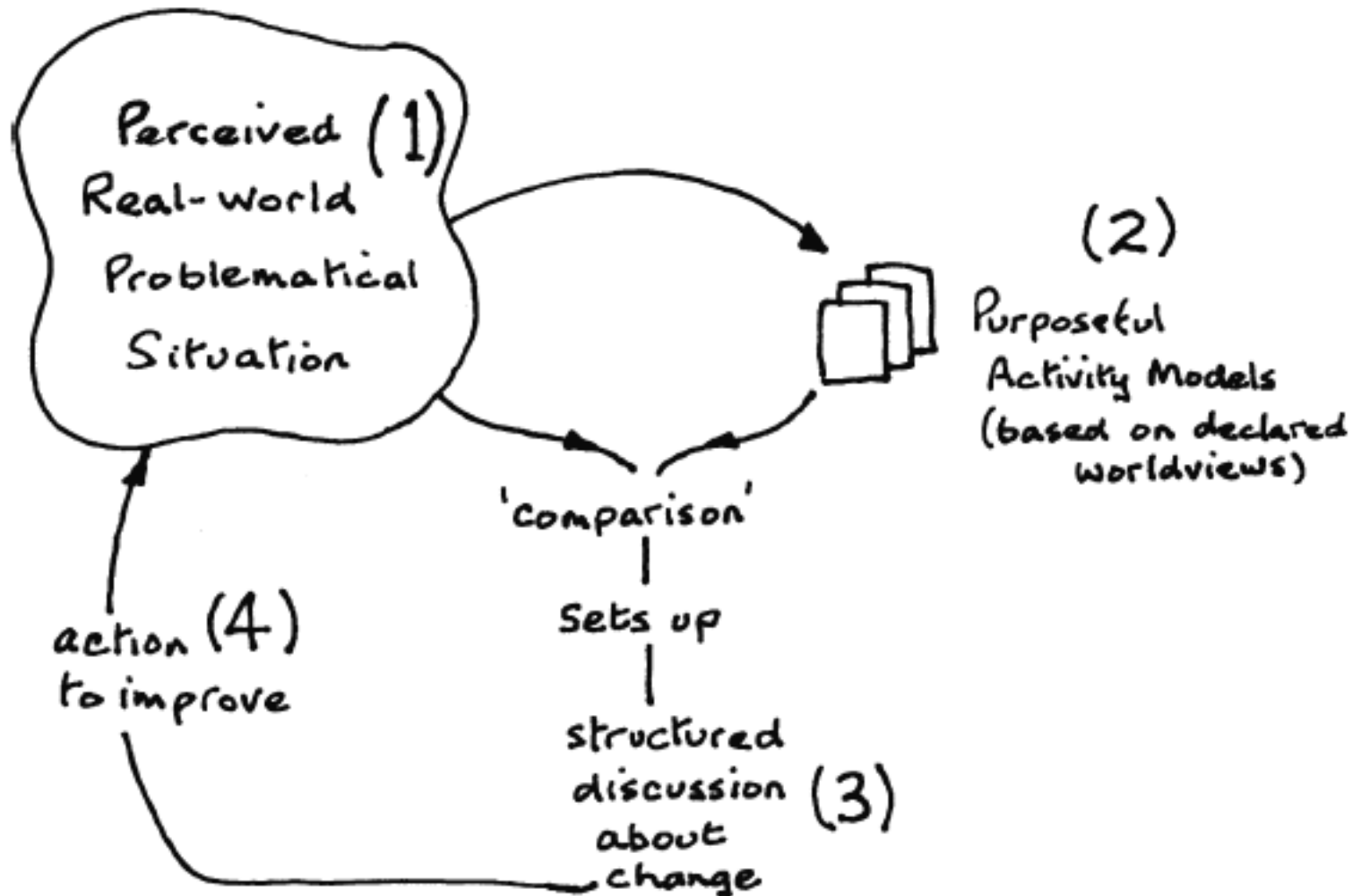


Fig. 5.9 The iconic representation of SSM's learning cycle

- 
1. The problem situation unstructured
 2. The problem situation expressed

- The first thing to express:
Why is a problem
- It is recommend to use affinity diagrams

Rich picture vs. real-world problematical situation

The newly appointed head teacher of an 11s-to-18s school, which has overspent its budget in the last year or two, finds herself, in her first term, facing an issue concerning the provision of school meals. Currently these are provided by the county education authority through their catering services company, the contract being renewed annually. A member of that company who is leaving to set up her own catering company urges the head teacher to make a contract with her instead of the county, suggesting the school could save money on this. Some staff members agree with this, others want to stick with the status quo. Some parents, alerted by a national debate about school meals, want more nutritious meals as long as they don't cost more. Pupils say: 'We like burgers and chips.' The school governors are discussing this issue; the Chairman, himself MD of a catering company, is urging the head teacher to be entrepreneurial and to take on responsibility for the provision of school meals, believing this could be profitable for the school.

Rich picture Example

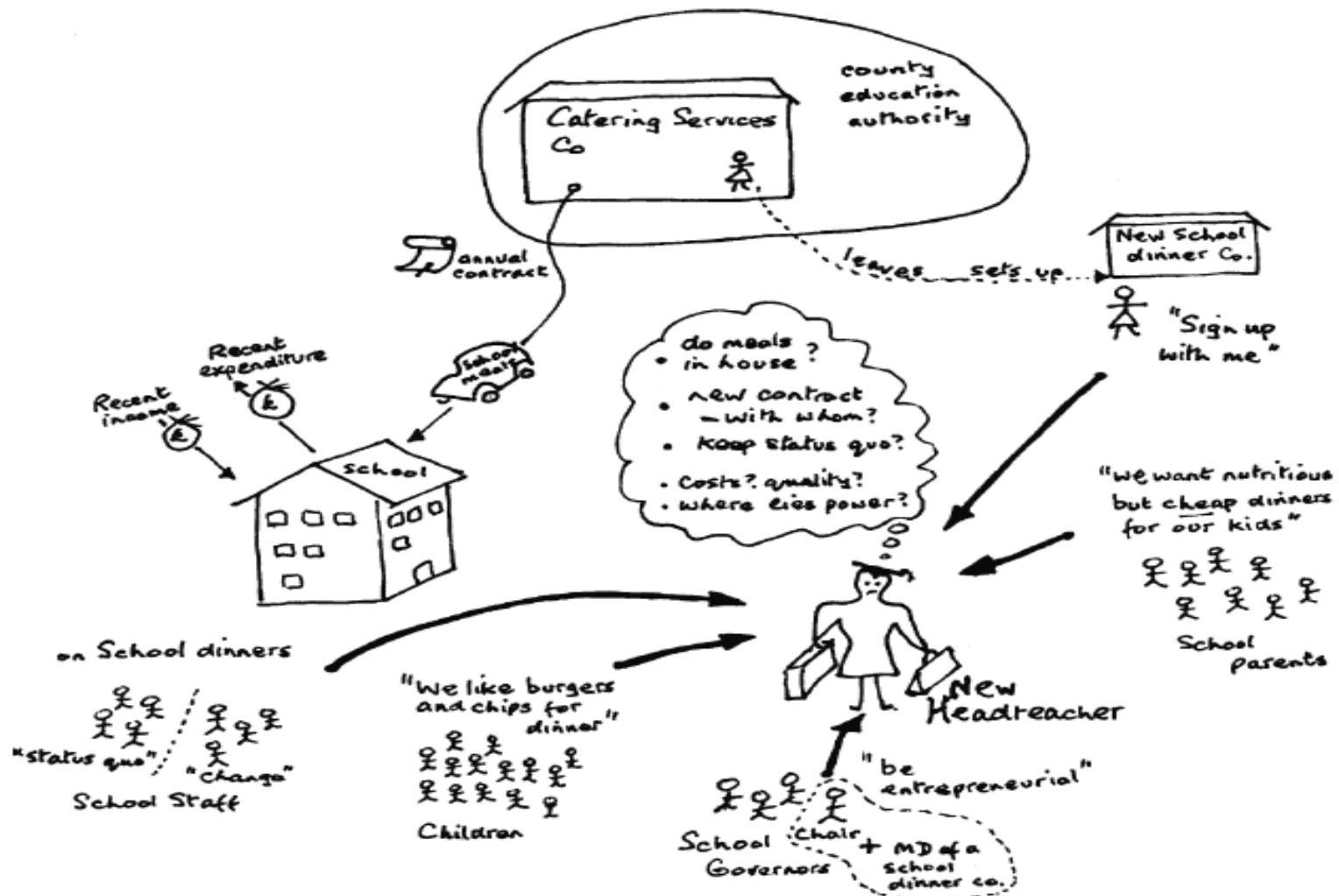


Fig. 5.11 A rich picture of the situation described in the text

Rich picture

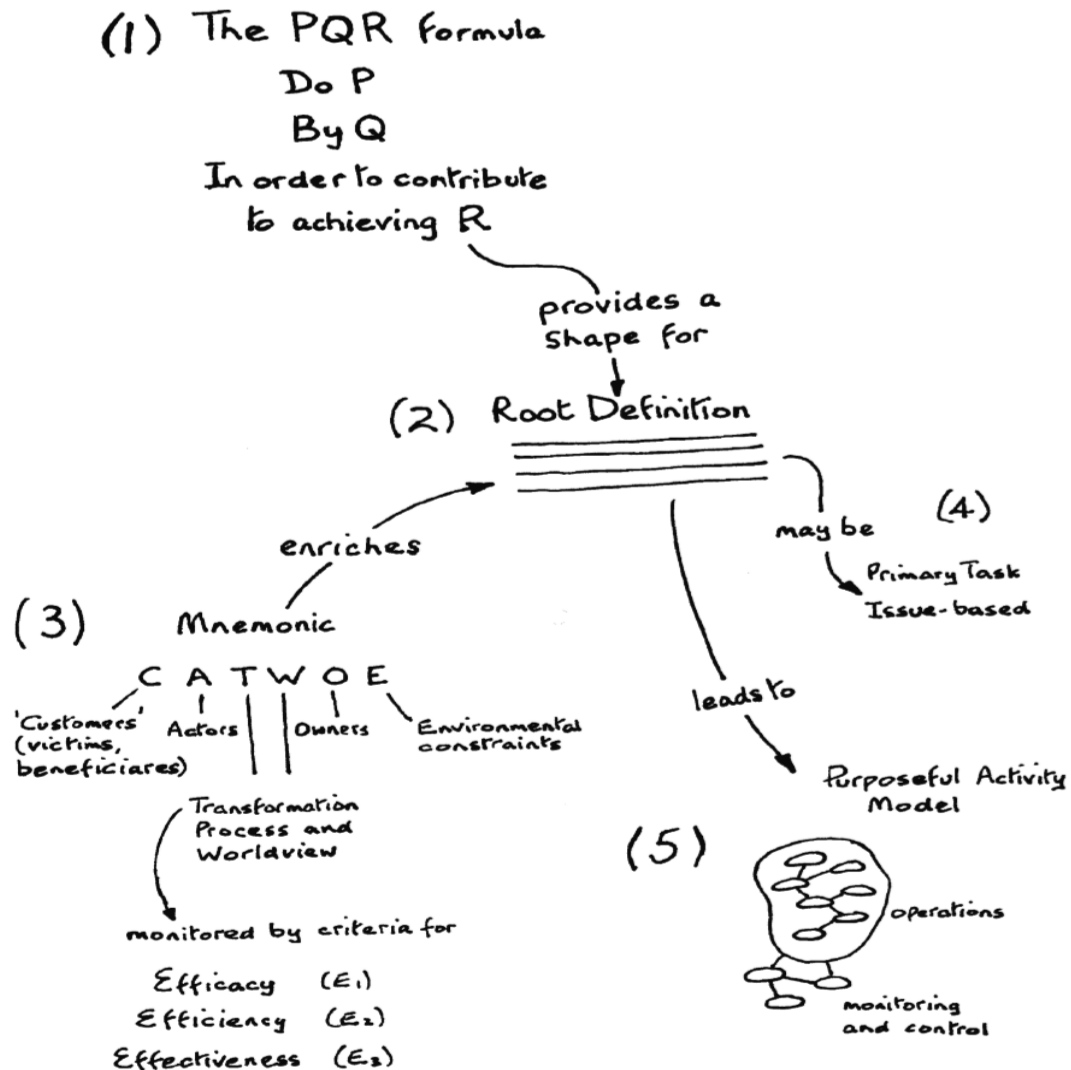
- The complexity of human situations is always one of multiple interacting relationships. A picture is a good way to show relationships.
- In making a Rich Picture the aim is to capture, informally, the main entities, structures and viewpoints in the situation, as well as the processes going on, the current and any potential issues

Rich picture

- Structure
- Process
- Worries
- Use the language of those in the problem
- Use mostly figures, and little text

<https://www.youtube.com/watch?v=39XSlzLuzKg>

3. Root definition of relevant systems



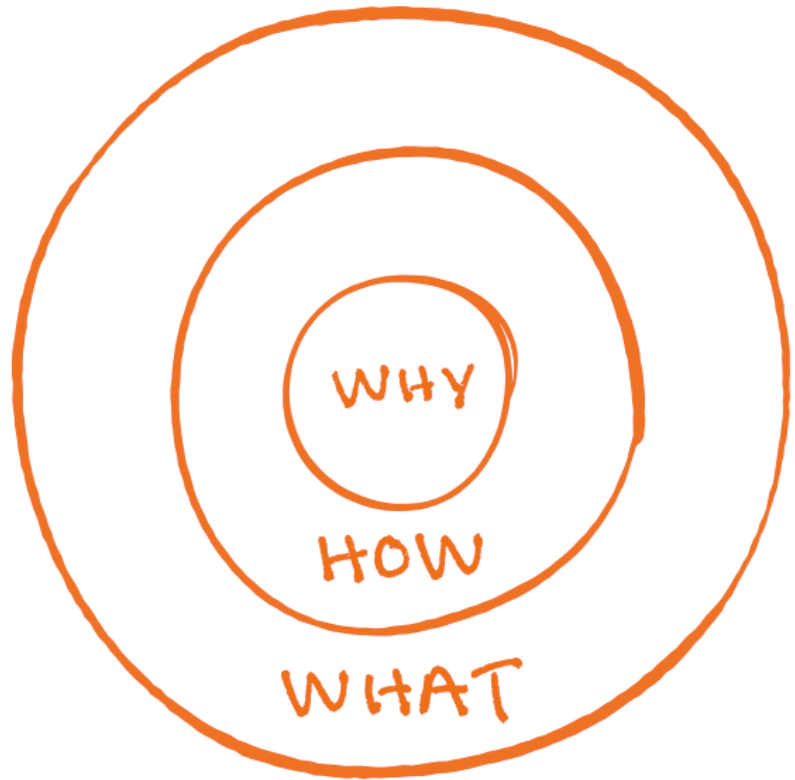
The PQR Formula

The PQR formula

Do P

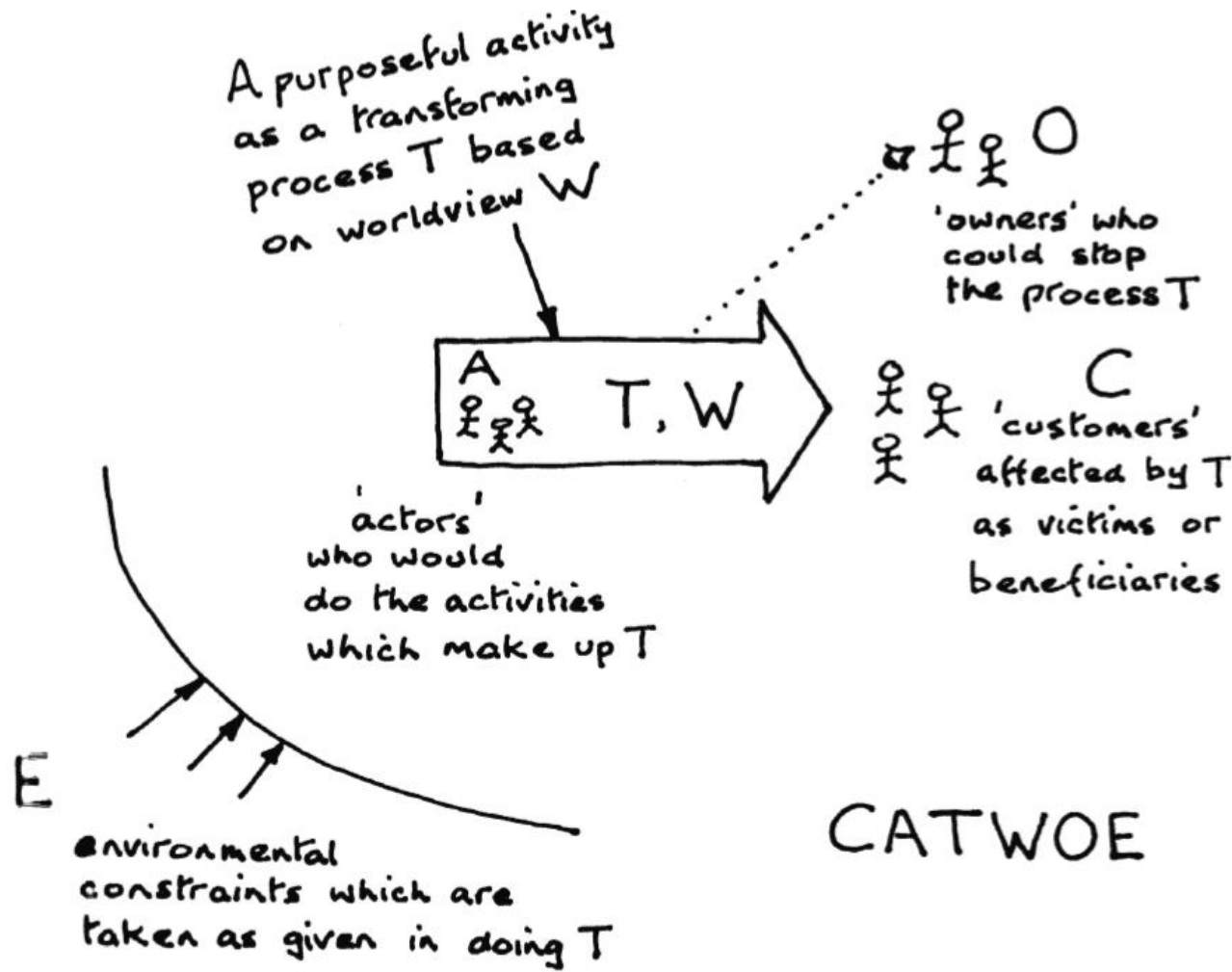
By Q

In order to contribute
to achieving R



CATWOE

- C: Clients [third step]
Who are the victims or beneficiaries of T
- A: Actors [fourth step]
Who make T possible
- T: Transformation process [first step]
The conversion of input and output
- W: Weltanschauung (What is intended to achieve) [second step]
The worldview which makes T meaningful in a context
- O: Owner [fifth step]
Those who have the power to stop or to change T.
- E: Environmental constraints [sixth step]
Internal and External constraints



Root Definition

- | | | |
|-----------------------------|----------|-----------------|
| • What is trying to Achieve | W | Weltanschauung |
| • How? | T | Transformations |
| • What constrains it? | E | Constraints |

Horizon on Harbord Street

System that seeks to provide different types of gas to the customers, who lives near U of T or work at U of T in order to save their time; taking into account issues such as : demand budget, traffic situation, gasoline price, etc.

Let's Play a Game



1. Problem

Kyrie, a first year international student in iSchool, was injured when playing basketball in the university's division. Unfortunately, his ACL and meniscus has been torn. Even though most of the medical fee has been covered, he waited 2 months to get a MRI, and doctor said, he needs to wait for 4 months for surgery. In addition, he cannot get the best surgeon in Toronto area since the surgeon can only be referred by doctors.





How to improve health-care system in Canada fair ?

(Think from different perspectives)

1. Draw a Rich Picture

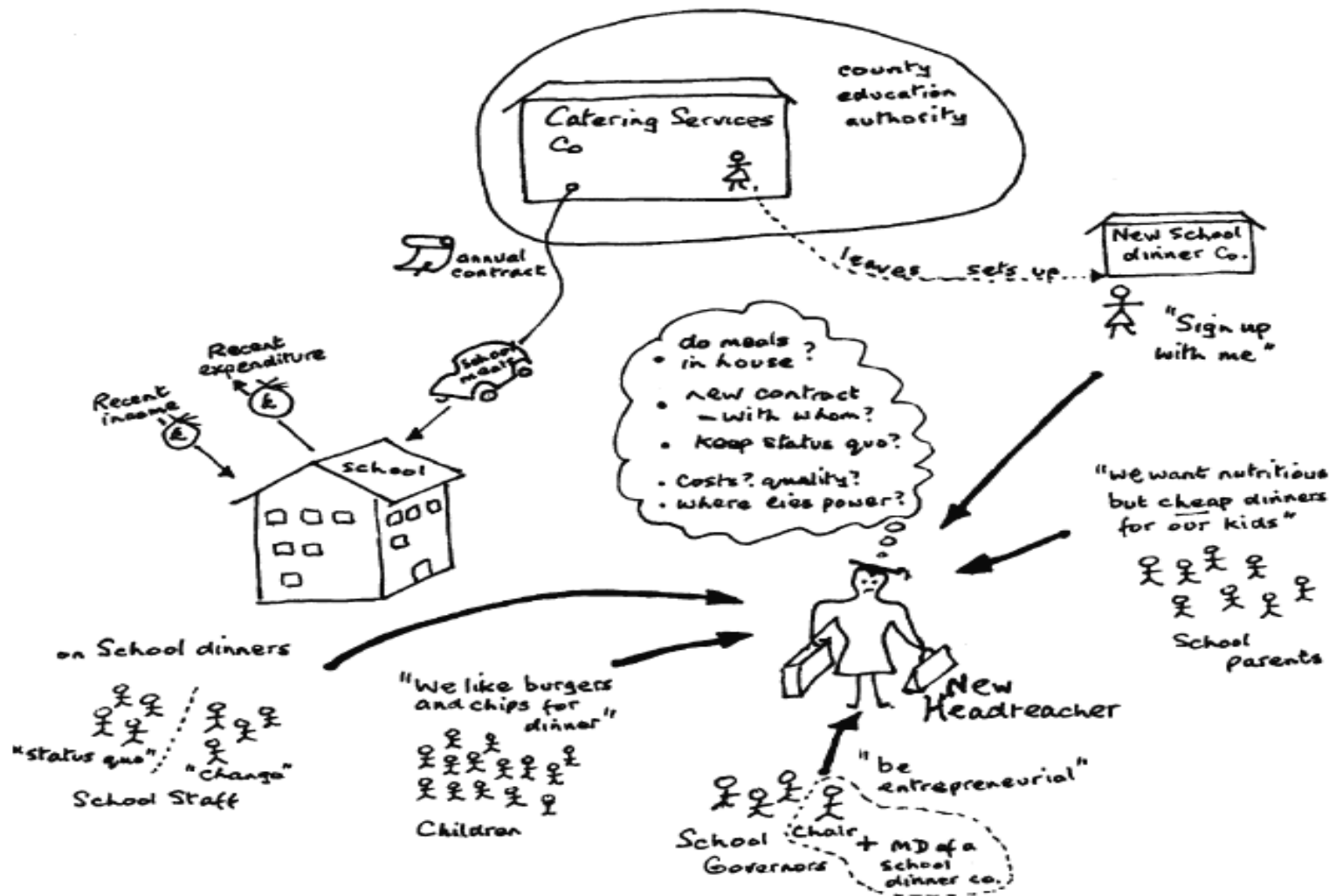
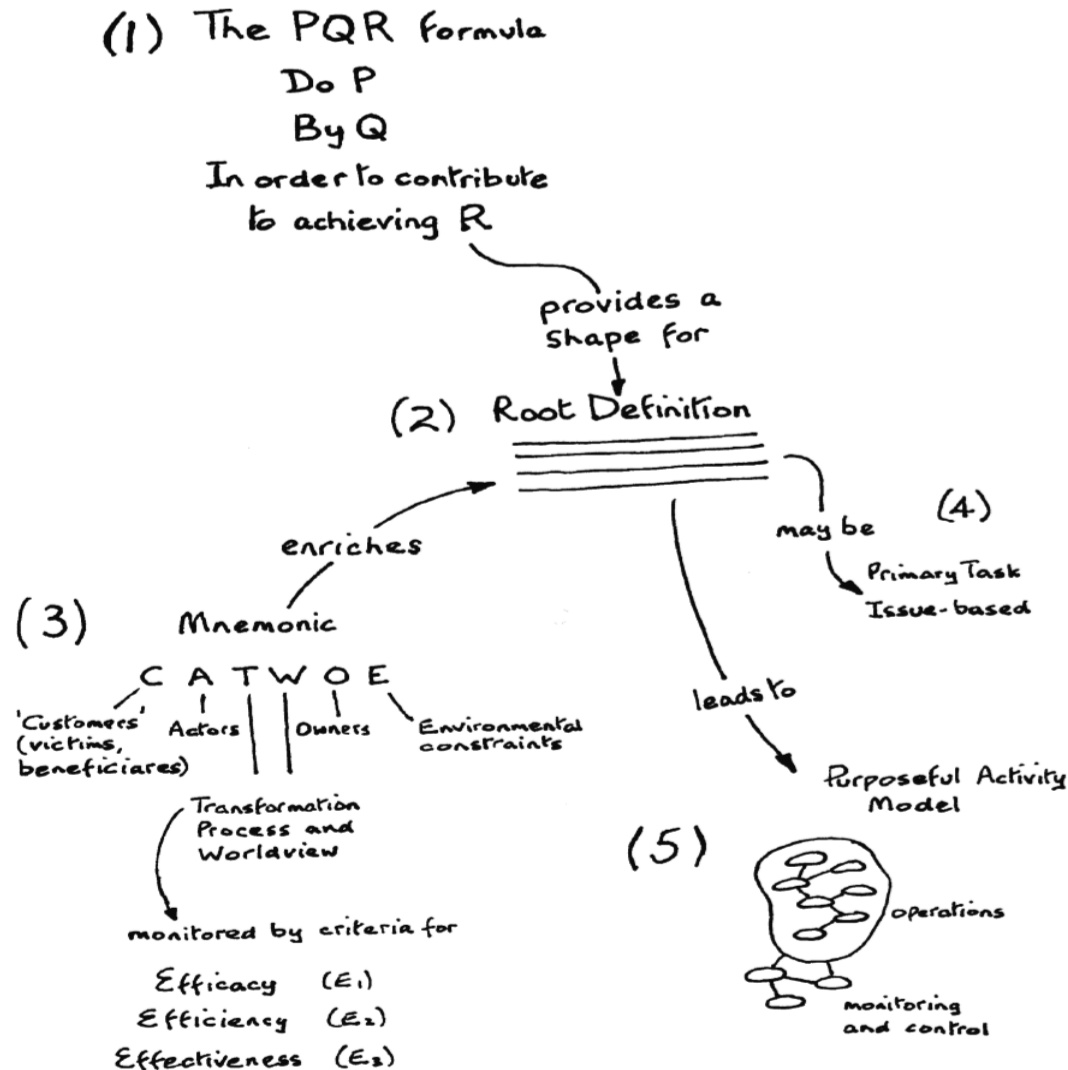


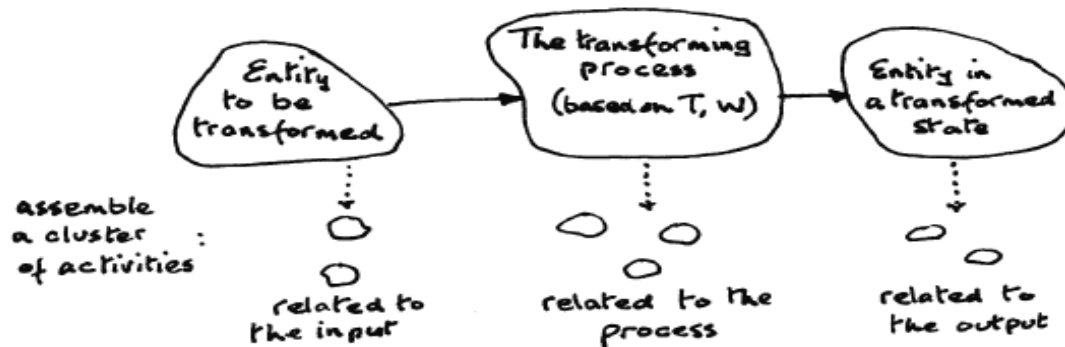
Fig. 5.11 A rich picture of the situation described in the text

2. Conduct a root definition



4. Develop conceptual models

1. Assemble guidelines :
T and W
PQR ; PT/IB
CATWOR , E, E₂ E₃
2. Starting from T and W name the purposeful action as a transformation:



3. Structure the activities according to dependency of one on another



4. Add the monitoring and control activities



5. Check the mutual dependency of guidelines and model

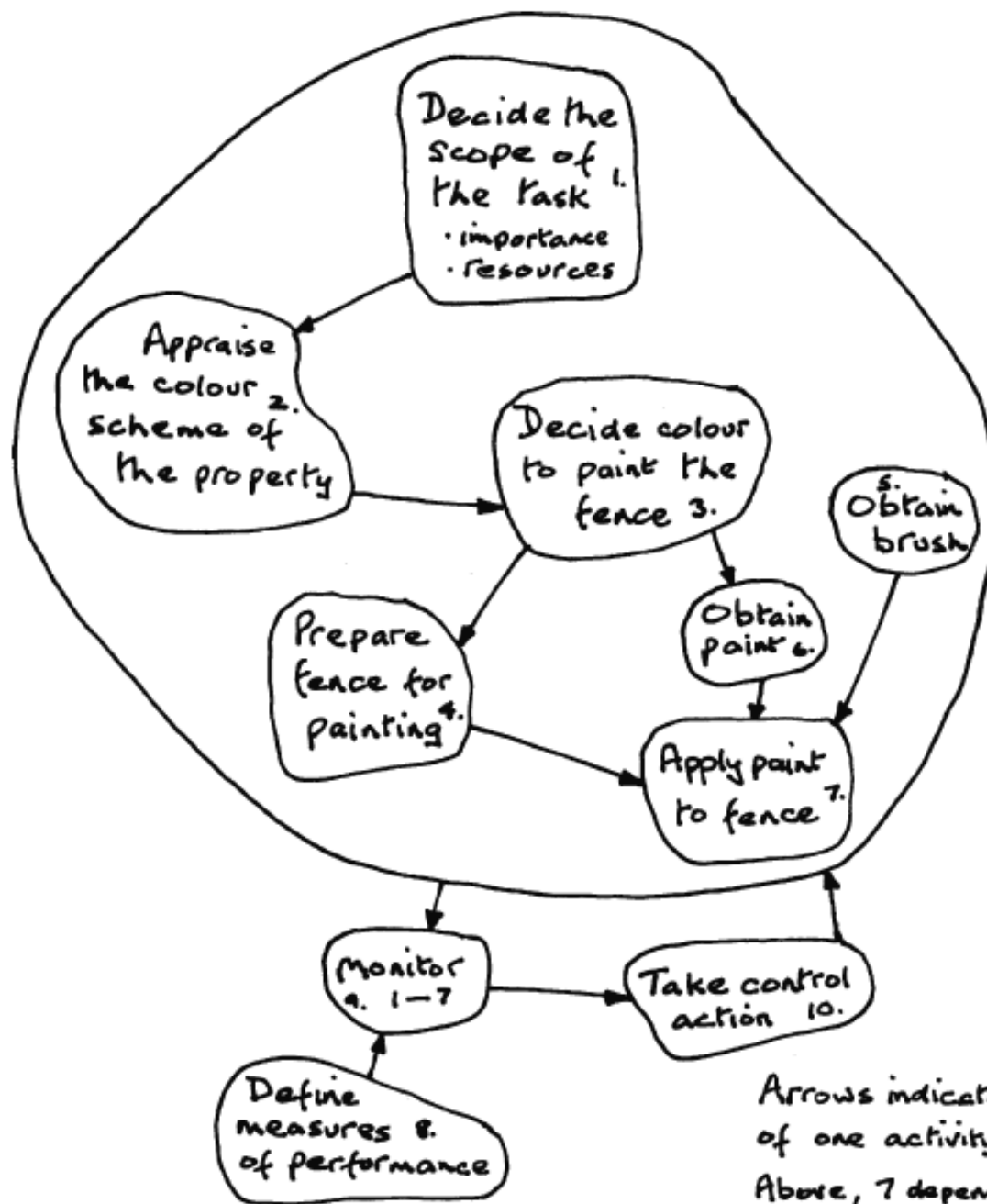


Fig. 5.7 A simple example of an activity model: a system to paint the garden fence by hand painting

Back to Game



5. Compare the conceptual model with the real world

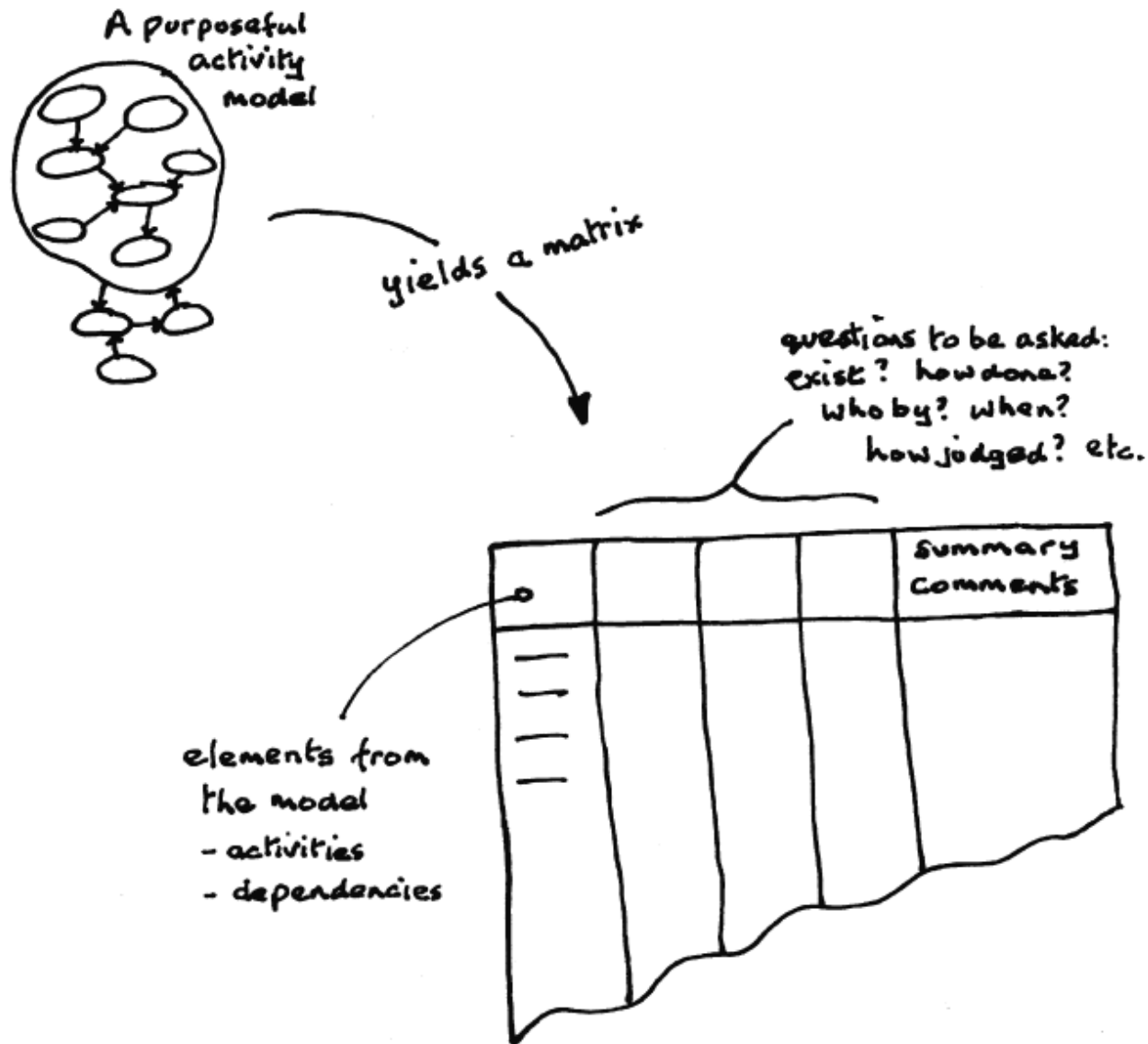
Remember: The models are the devices which enable that discussion to be a structured rather than a random one.

Models as a source of questions to ask about the situation.

Several ways:

- Using flip charts on the wall (informal)
- Create a chart matrix (formal)
- Scenarios

5. Compare the conceptual model with the real world



7. Action to improve the problem situation

- Individuals have different genetic dispositions and experiences in the world.
- It is better to find an accommodation. That is to say they will have to find a version of the situation which they can all live with.



In summary...

Seven Principles

1. The idea 'real-world problem' is subsumed in the broader concept of 'real-world problematical situation'.
2. All thinking and talking about problematical situations will be conditioned by the worldviews of people doing the thinking and talking.
3. Every real-world problematical situation will contain people trying to act purposefully.
4. Discussion and debate about such a situation can be structured by using the models in (3) as a source of questions to ask about the situation.



In summary...

Seven Principles

5. Acting to improve a real-world situation entails finding, in the course of discussion in (4), accommodations among different world-views.
6. The inquiry created by principles above is a never-ending process of learning. New situation will be created!
7. Explicit organization of the process which embodies principles above enables conscious critical reflection about both the situation itself and also about the thinking about it



In summary...

Five Activities

1. Finding out about a problematical situation
2. Making models relevant to exploring it, based on different worldviews
3. Questioning the situation using the models (find desirable & feasible changes).
4. Taking action to change the situation in order to improve it.
5. Critical reflection on the whole process (from the 7th principle)

Five activities

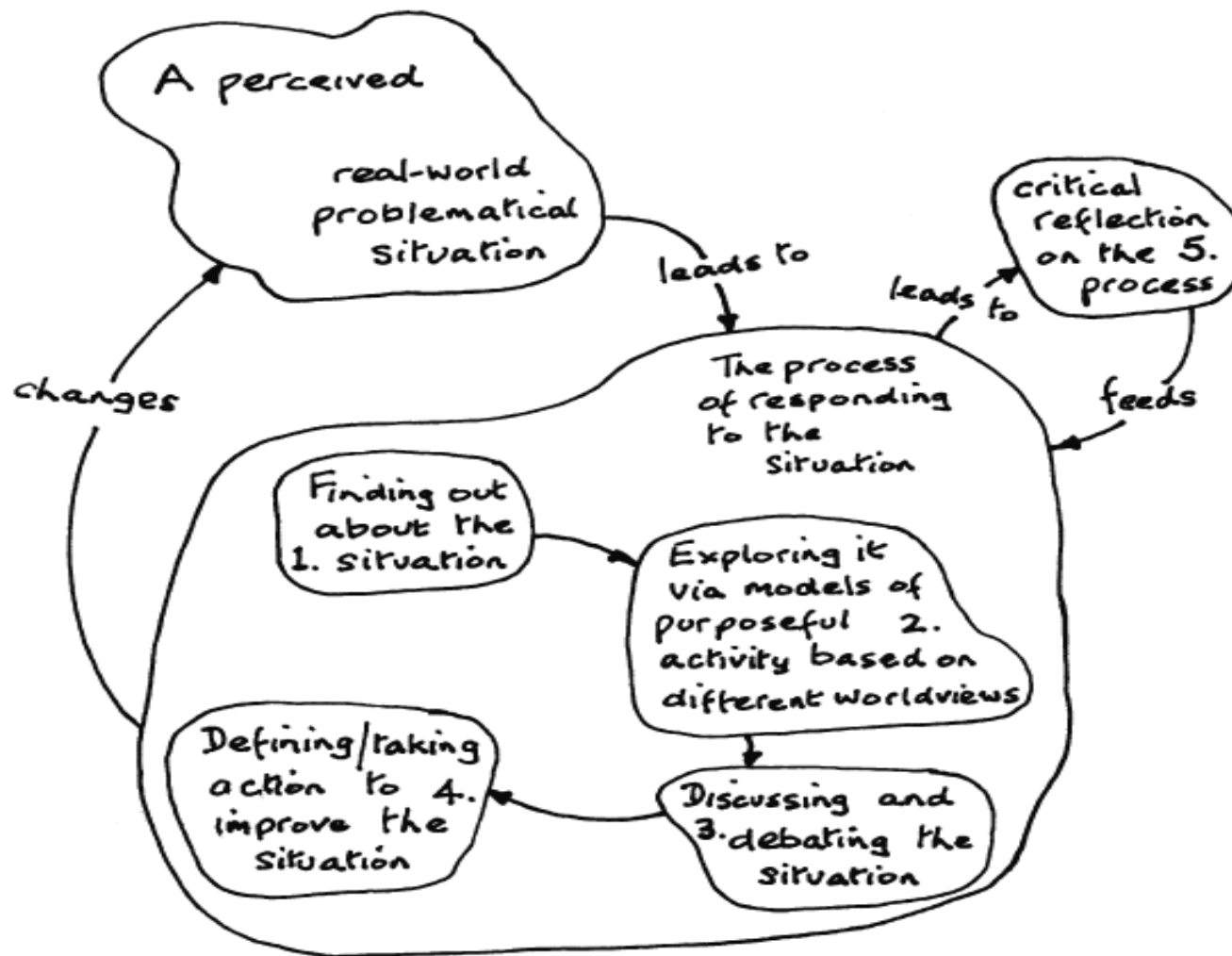


Fig. 5.26 The five activities which flow from SSM's seven principles



Repeat some core Ideas..

It does not seek 'solutions' which 'solve' real-world problems.

In the real world, things will be more complicated.

SSM focuses on the process of engaging with that complexity.

It is an organized process of thinking that enable groups of people to **learn** their way to taking '**action to improve**'.

SSM is a methodology, not a method or a way to solve problems.

References

Checkland, P., & Poulter, J. (2010, January 08). Soft Systems Methodology. Retrieved January 23, 2018, from https://link.springer.com/chapter/10.1007%2F978-1-84882-809-4_5

Checkland, P. (1981). Systems Thinking, Systems Practice, Wiley, Chichester.

Kish, K., Bunch, M. J., & Xu, B. J. (2015, June 23). Soft Systems Methodologies in Action: Environment, Health & Shanghai's Elderly. Retrieved January 23, 2018, from <https://link.springer.com/article/10.1007%2Fs11213-015-9353-4>

Sinn, J. S. (n.d.). A Comparison of Interactive Planning and Soft Systems Methodology: Enhancing the Complementarist Position. Retrieved January 23, 2018, from <https://link.springer.com/article/10.1023%2FA%3A1023098025076>



THANK YOU