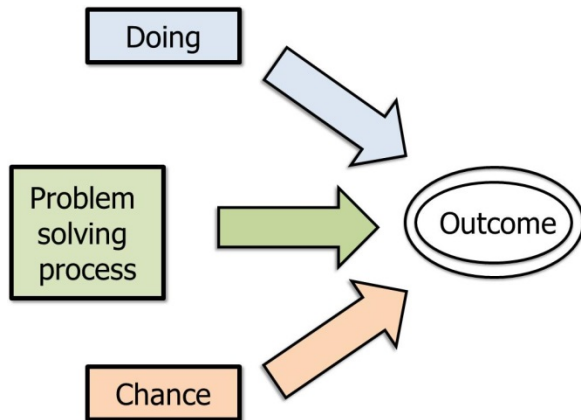


Professor L. Alberto Franco

# PROBLEM STRUCTURING



## Problem solving *outcome*

## Problem solving *process*

	<i>Good</i>	<i>Bad</i>
<i>Good</i>	Deserved success	Bad break
<i>Bad</i>	Dumb luck	Poetic justice

Plans are nothing.  
Plan*ning* is  
everything.



Dwight D. Eisenhower  
(1890-1969)

# OR-supported problem solving interventions: Two dimensions of skill (Eden 1990)

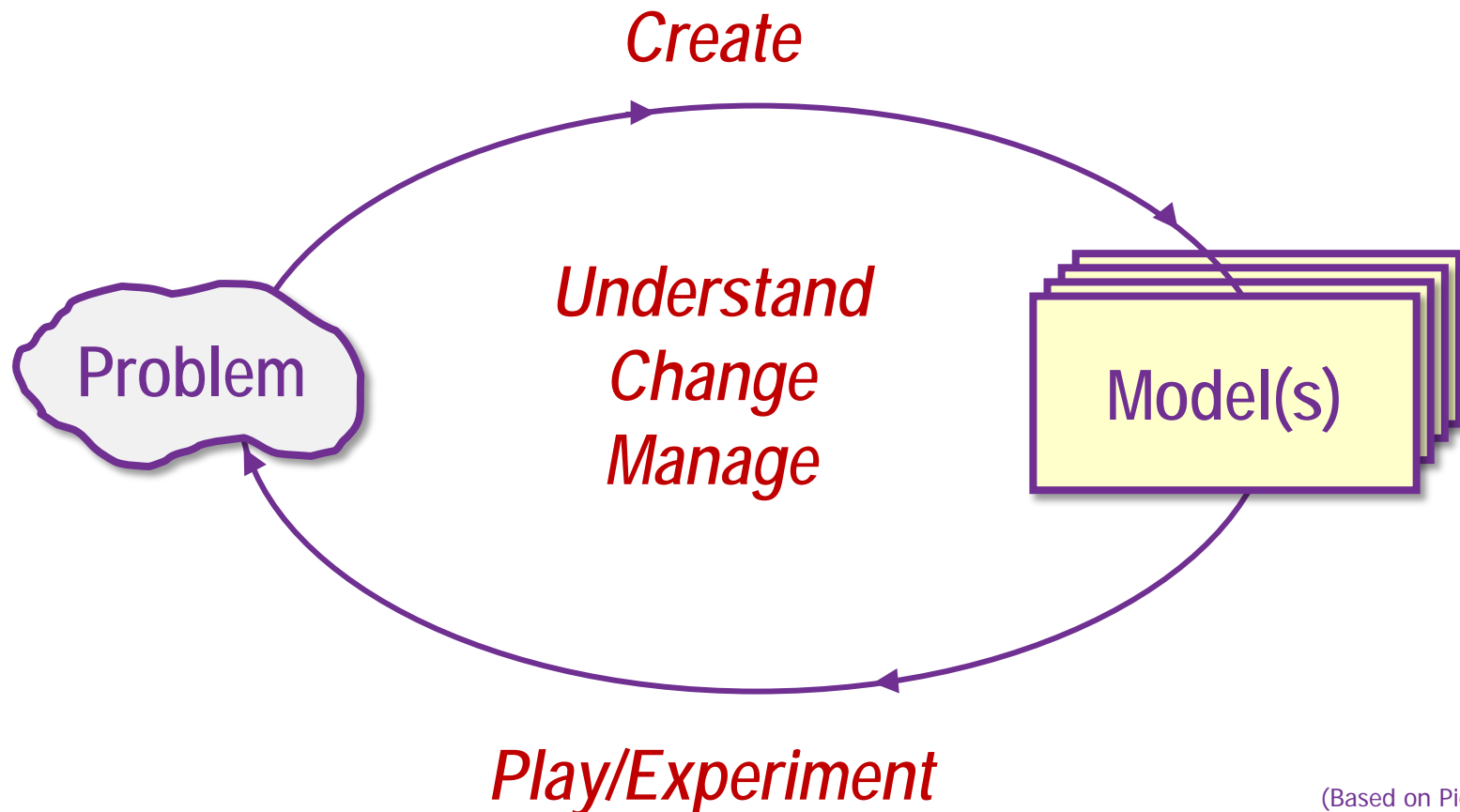


***Modelling content***



***Managing process***

# Modelling content



(Based on Pidd 2009)

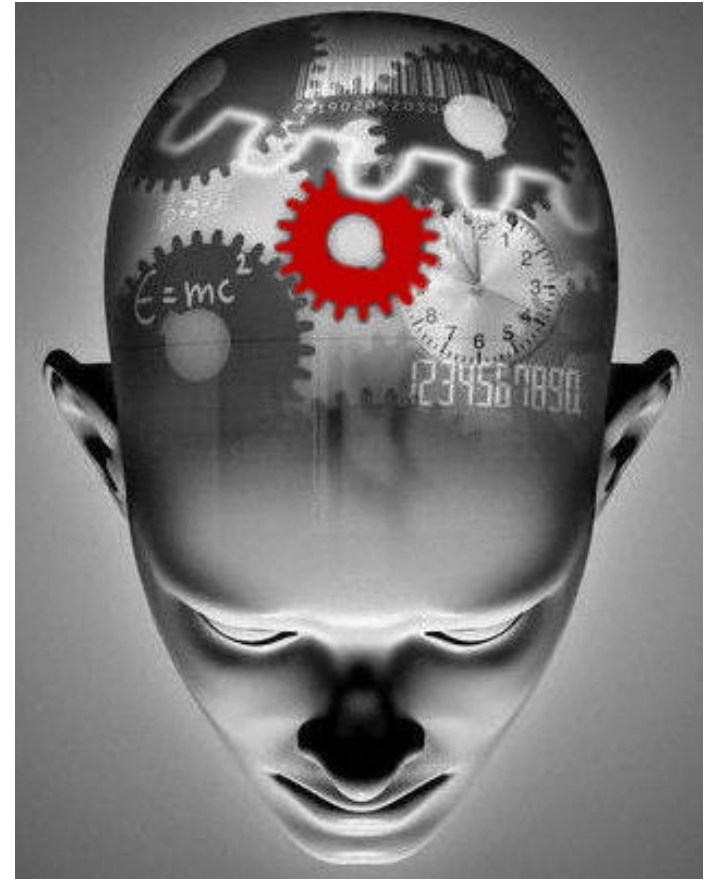
# Modelling content

- What you actually model within an OR-supported intervention is influenced by:
  - the **frames** being used by those with a stake in the problem.



# Framing

- A ***cognitive*** process:
  - ***Perceiving*** –information processing.
  - ***Interpreting*** –sense making.





## Framing as cognitive process: *Perceiving*

- Our experience and expertise influences:
  - what we see;
  - what we don't see.
- ***Claims*** about ***what*** problems to solve, and ***how*** solve them, are all underpinned by our perceptions of what we see (or not).





# The nature of frames

- Mental structures that simplify and guide our understanding of reality (Russo & Schoemaker 2002).
  - ***Filtering in*** rather than filtering out.
- Frames force us to view the world in a particular, and limited, perspective.



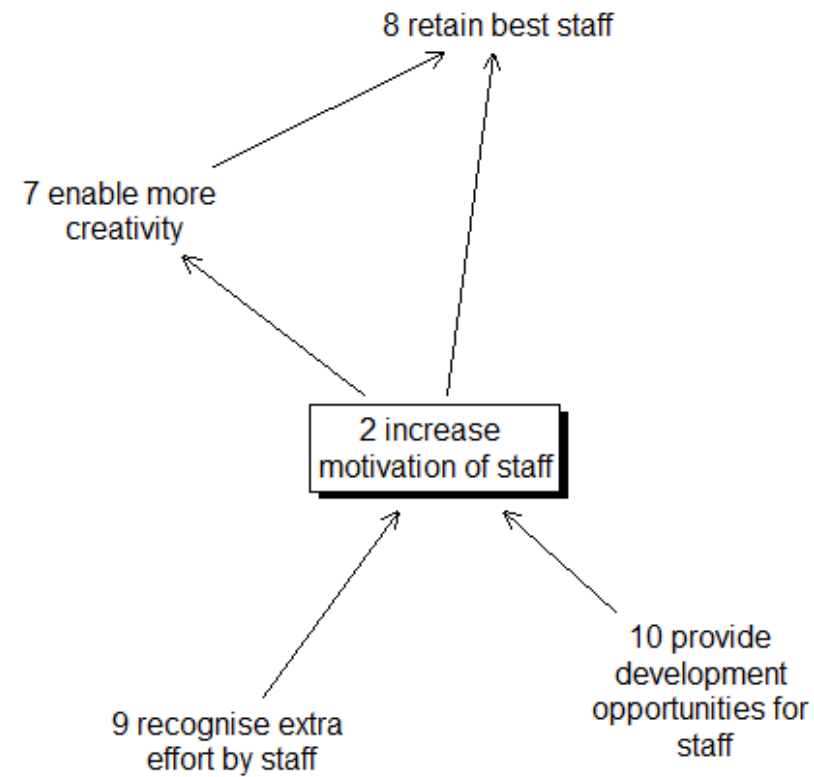
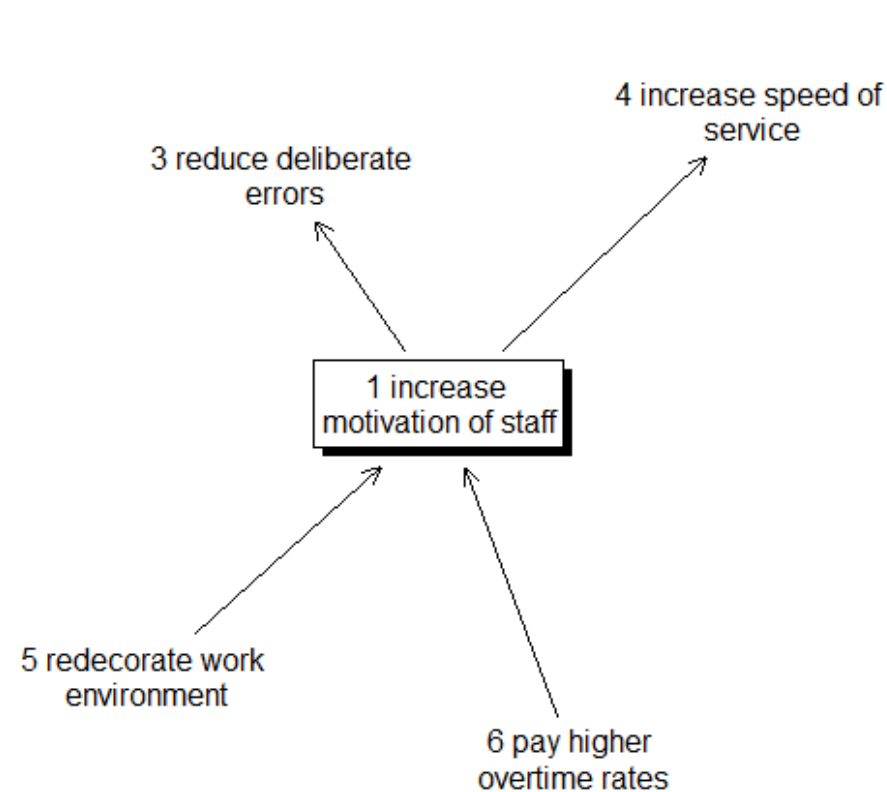


## Framing as cognitive process: *Interpreting*

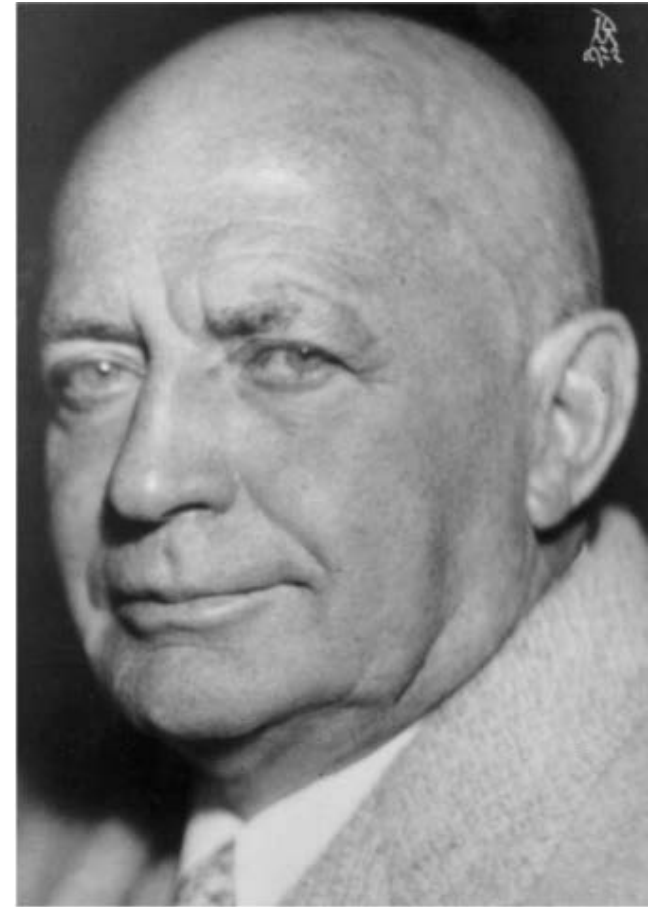
- Giving meaning to what we see.
- Context matters!



# Revealing different *frames*



“It is not important whether the interpretation is correct: if men define situations as real, they are real in their consequences.”



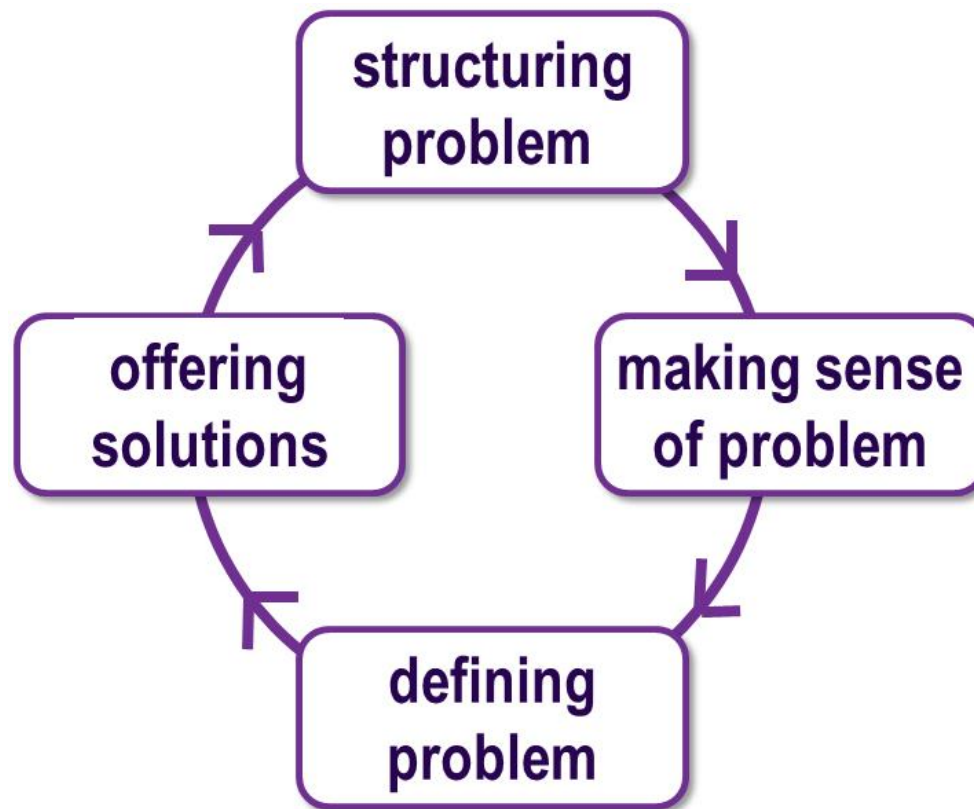
(W I Thomas 1863-1947)

# Framing as a (deliberate) *meaning-making* process

- **Defining** the (problem) situation **here** and **now** (Fairhurst 2011).
- Building reality **for others**.



## Framing in problem solving: Both, a cognitive and a meaning-making process

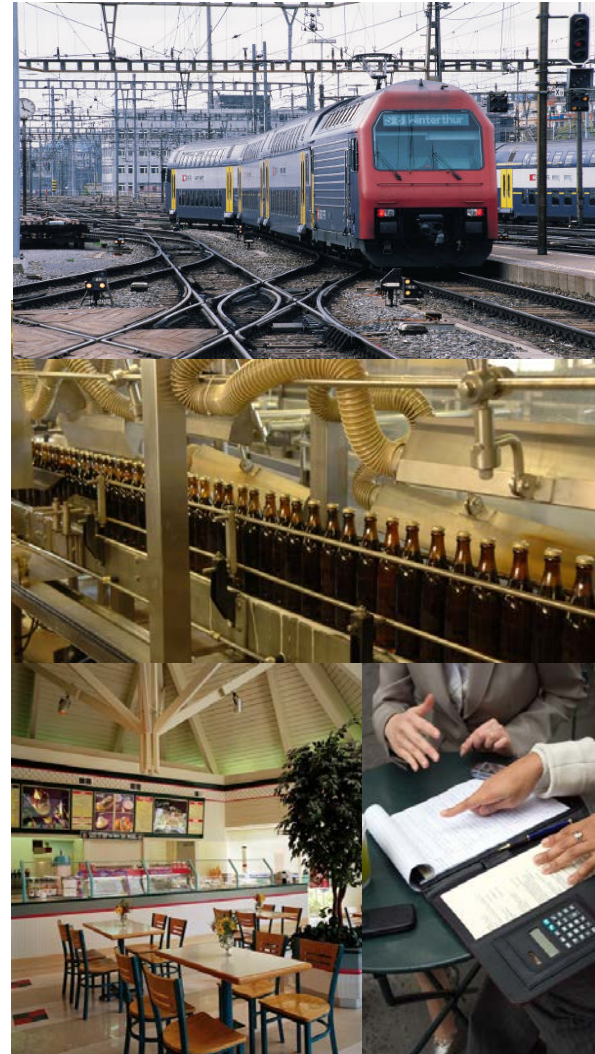


Source: Eden & Ackermann (1998)



## *Tame* problems (Rittel & Webber 1973)

- Complicated but relatively well-defined.
- Have an expiry date.
- Likely to have occurred before.
- Analyst's role is to provide the appropriate solution to these problems.



## *Wicked problems* (Rittel & Webber 1973)

- Complex, ill-defined, and contested.
- No 'stopping' point –any apparent 'solution' often generates other problems.
- No 'right' or 'wrong' answer – only better/worse alternatives.
- Analyst's role is to ***facilitate*** a ***collaborative problem-solving*** effort



“Managers are not confronted with separate problems but with situations that consist of complex systems of strongly interacting problems. I call such situations ***messes***.”



Russell L. Ackoff  
(1919-2009)

# Modelling content

- What you actually model within an OR-supported intervention depends on:
  - what *frames* are being used by those with a stake in the problem;
  - who is your client (i.e. the *problem owner*).



## Problems are ‘owned’ (Eden & Sims 1979)

- You cannot think and talk about the ‘problem’ without ascribing one or more owners to it.
- Different versions of the problem are likely to exist.
- Problem presented to you is likely to have been *(re)negotiated*.





# Modelling content

- What you actually model within an OR-supported intervention depends on:
  - what *frames* are being used by those with a stake in the problem, and therefore what *type of problem* is presented to you;
  - who is your client (i.e. the *problem owner*);
  - what *intervention mode* you wish to adopt.



## OR intervention modes (Franco & Montibeller 2010)

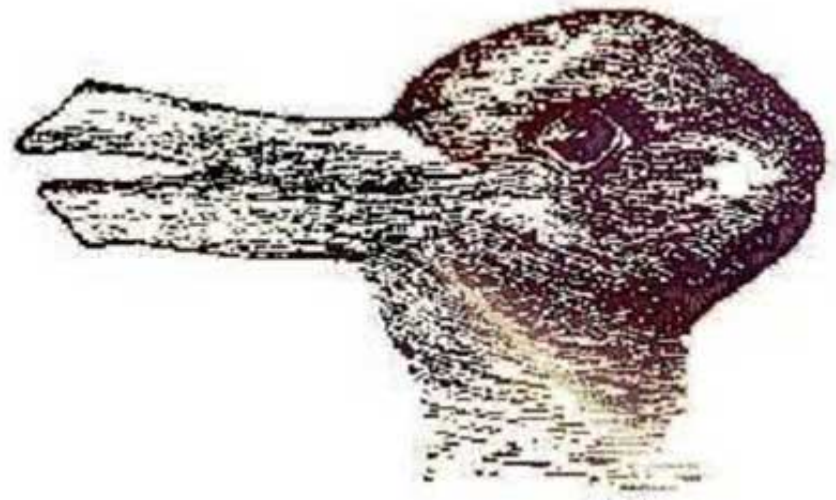
- **Expert** mode:
  - selling and telling;
  - problem diagnosis using generic templates, and providing ready-made solutions.
- **Facilitative** mode:
  - diagnosing and solving problem together with client.
  - Likely to involve workshops.





# Implications for OR practitioners

- Be **aware** of what problem frames you and others are using.
- **Compare** and **contrast** frames:
  - pay attention to the **language** used to describe each frame.
- **Agree** on a particular frame.
- Note that you can re-negotiate the definition of the problem.



# OR-supported problem solving interventions: Two dimensions of skill (Eden 1990)



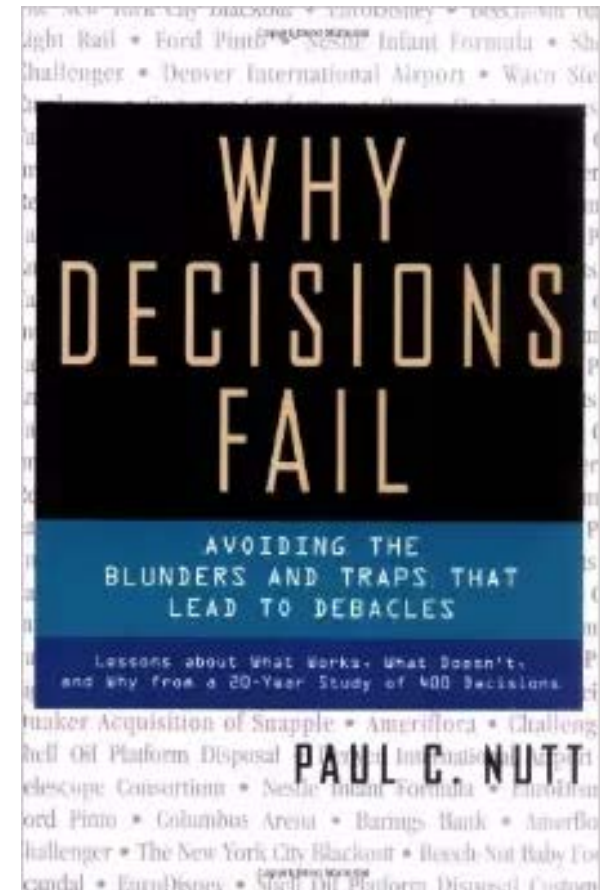
***Modelling content***



***Managing process***

# Managing process

- An effective problem solving process increases implementation success chances by **50%**.
- A problem solving process is effective when (Nutt 2002; Garvin & Roberto 2001):
  - it is perceived as *fair*;
  - it *stops* at the *right time*;
  - *claims* about '*what the problem is*' are *reconciled*.

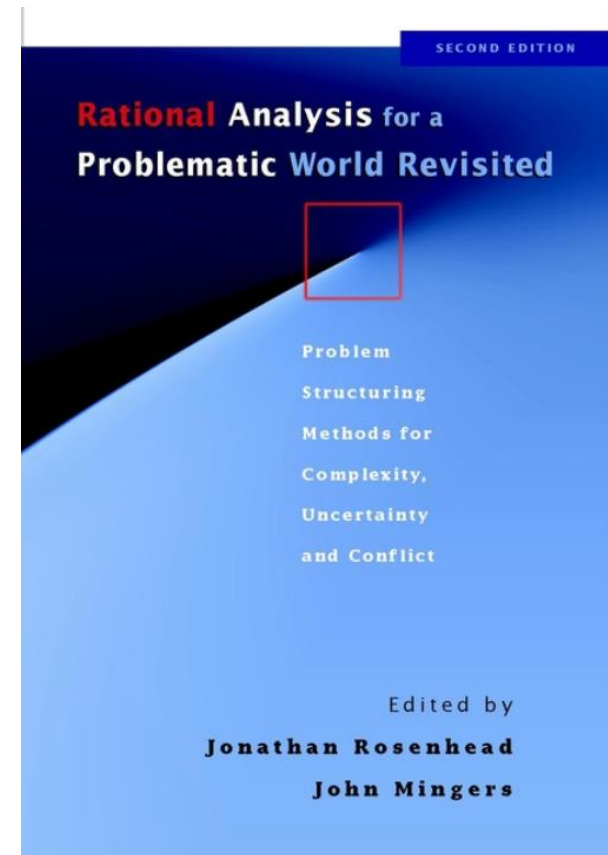


## Problem structuring

- Aims is to provide a structure for thinking about ‘what the problem *is*’.
- Source comes from where claims are shared, debated, contested, defended, etc.
- Typically, a problem structure is related to a particular (quantitative) OR approach.
- In some cases, structure is an end in itself.
- Structuring always involves some form of ***coding*** and, sometimes, ***formal modelling***.

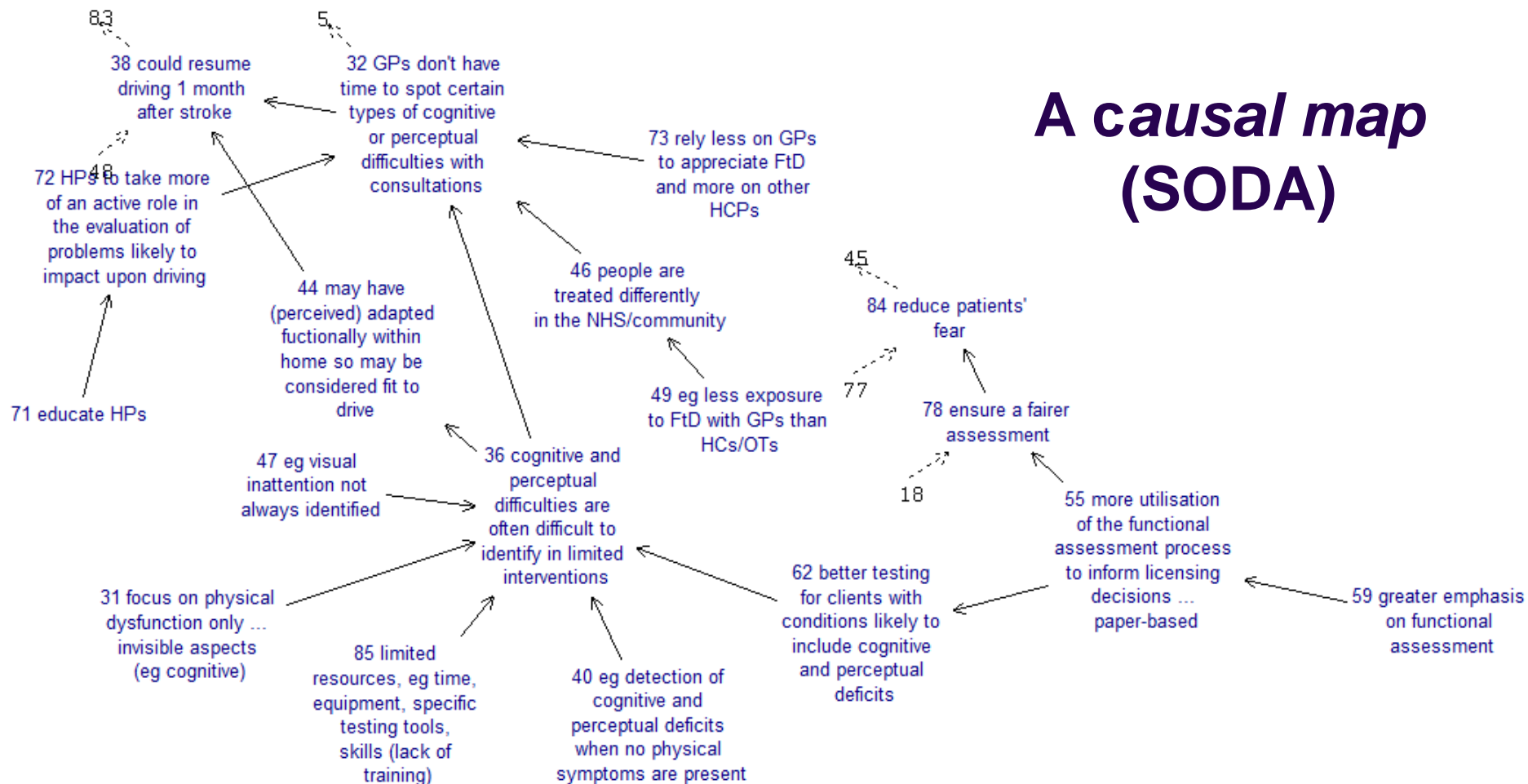
## A sample of problem structuring methods

- **SODA & cognitive/causal mapping** (Ackermann & Eden 2011)
- **Value-focused brainstorming** (Keeney 2012)
- **Strategic Choice Approach (SCA)** (Friend & Hickling 2005)
- **Group Model Building (GMB)** (Vennix 1996)



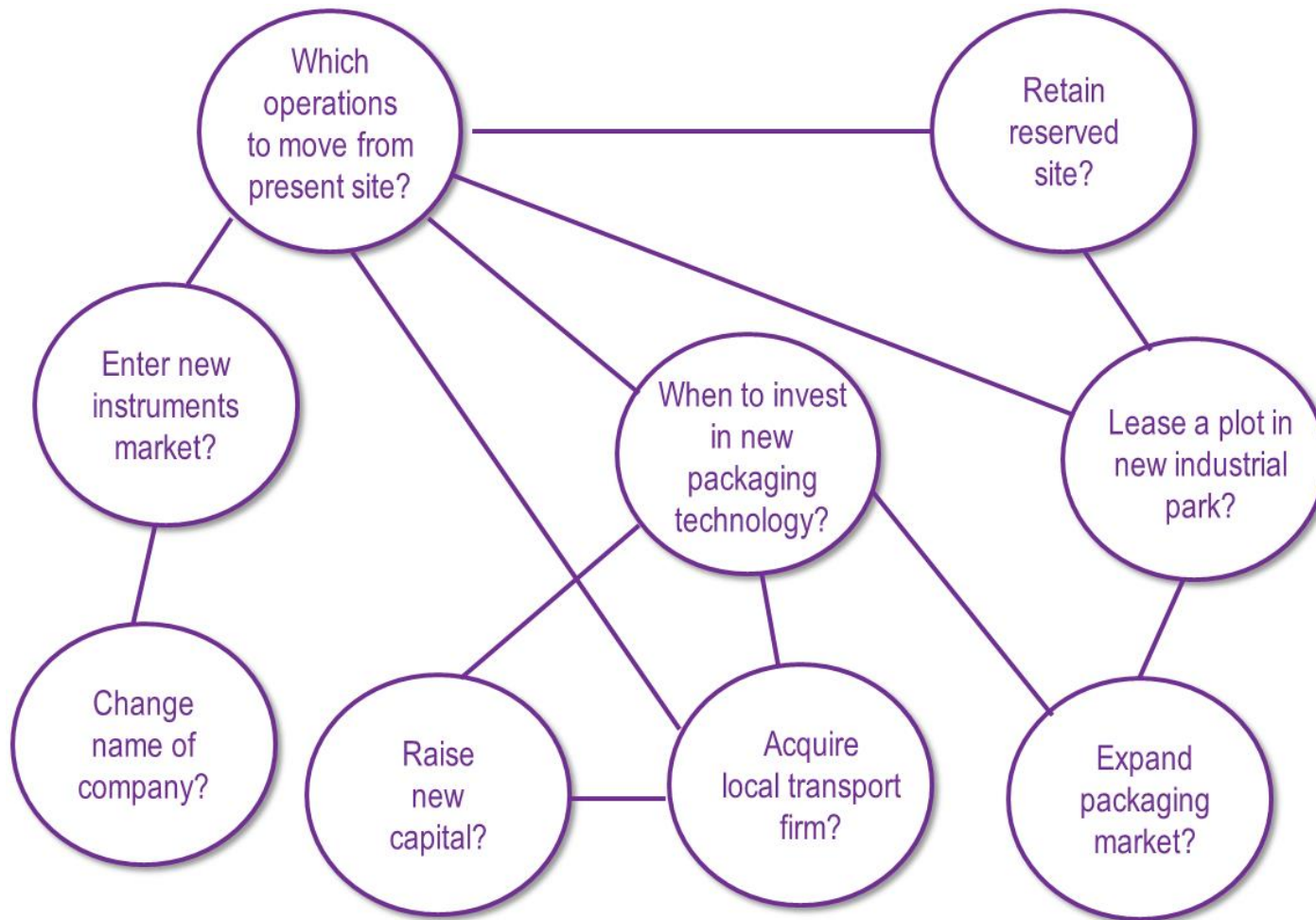


## A causal map (SODA)





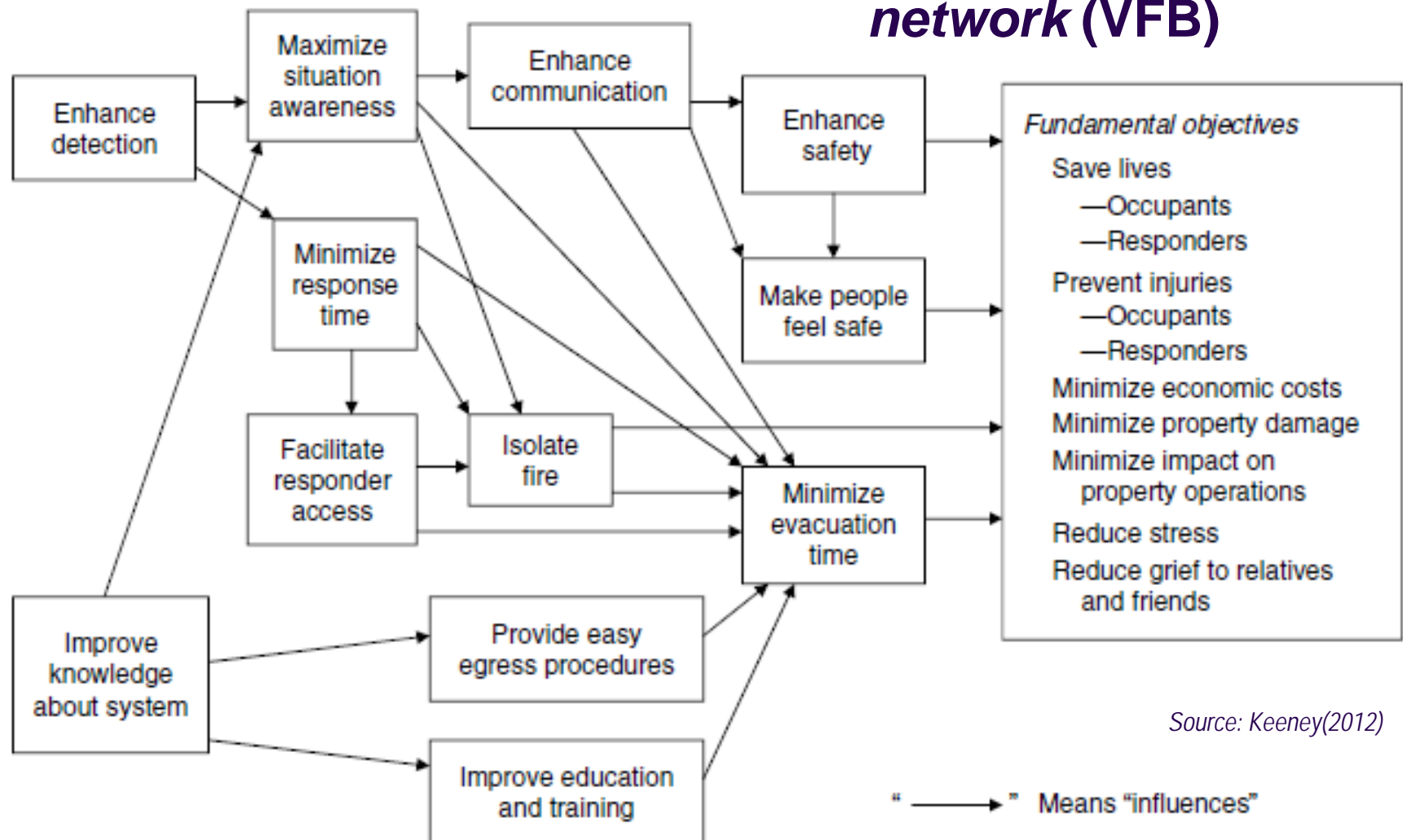
## A decision graph (SCA)



Source: Friend (2001)

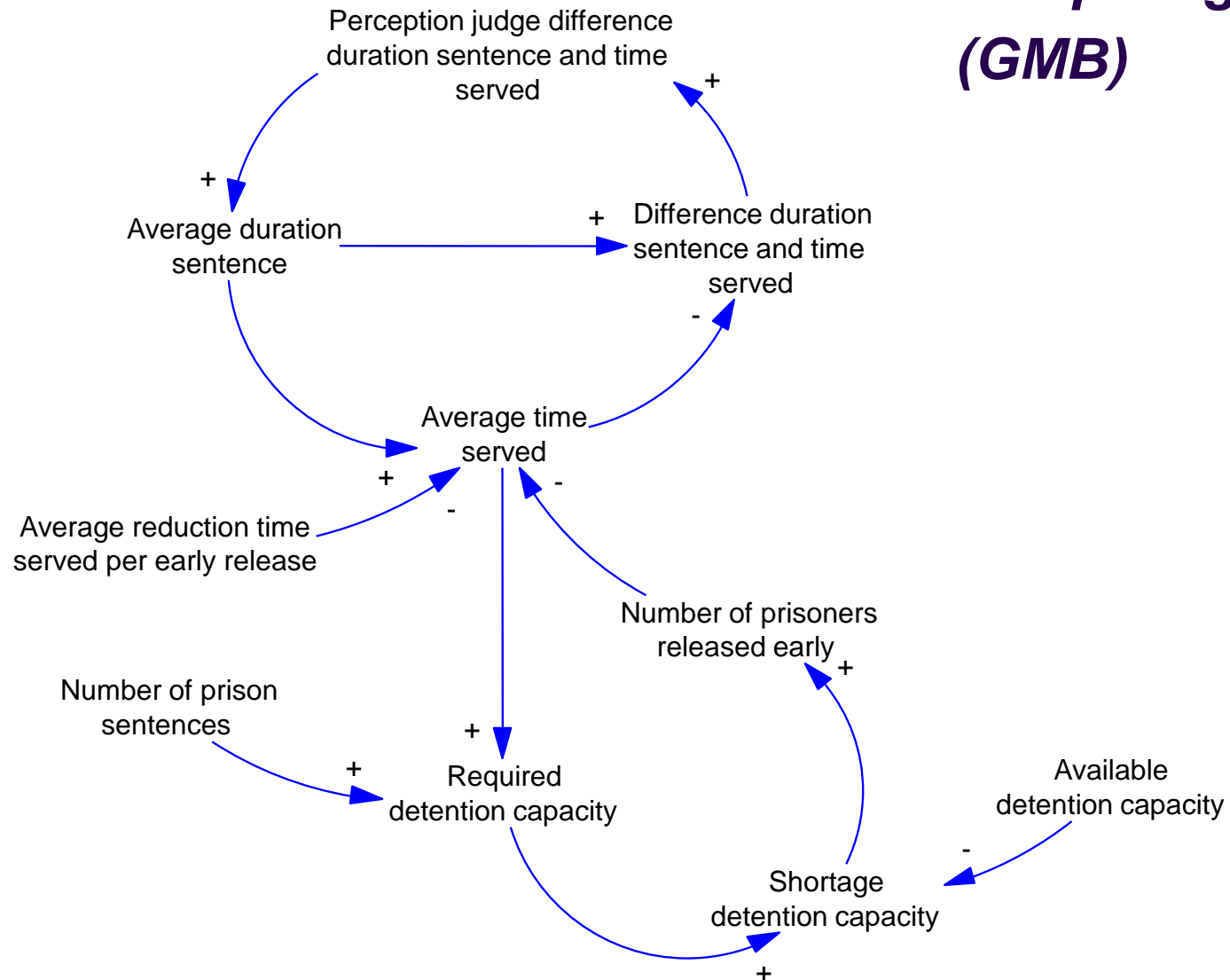


## A means-ends objectives network (VFB)



Source: Keeney(2012)

## A causal loop diagram (GMB)



## Four sins to avoid in problem structuring

- No ***burning platform*** (Kotter 1995).
- No ***psychological safety*** (Edmonson 1999).
- None or too much ***conflict*** (Eisenhardt et al 1997).
- ***Meaningless*** and/or ***inflexible*** model (Franco 2013).



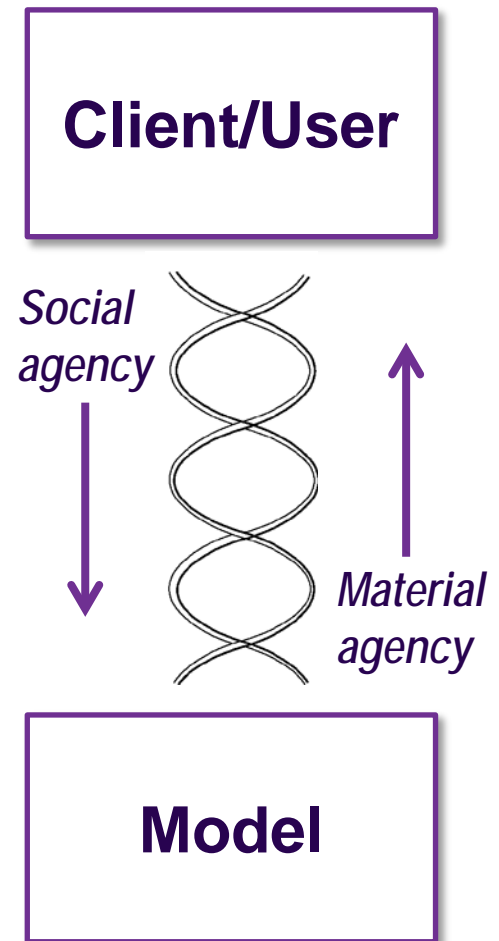
## Sample of behavioural studies

- Materiality and affordances of models (Franco 2013).
- Facilitated modelling practices and knowledge creation (Tavella & Franco 2015).
- Need for closure and model-supported conflict management (Franco, Rouwette & Korzilius 2016).



# Materiality of models (Franco 2013)

- Models have ***material properties***, e.g. tangibility, associability, editability, traceability, anonymity.
- These properties make certain actions possible, and others impossible (or difficult to achieve).
  - ***same properties*** can afford ***multiple actions***.
  - ***not all properties*** matter to a client at a given time.



## Model affordances (Franco 2013)

- What a model ***affords*** (or not) has direct consequences for:
  - how OR-supported interventions unfold in practice;
  - how they are perceived/evaluated by clients/users.



# Map affordances

*“I think it allowed for some more free thinking, I don’t think when you work for local authority you do it very often...it was helpful because it obviously meant **I got my point across in terms of the work I do with young people and more involvement with young people, young people’s perspectives on delivering programmes. Once it was up there [on the map] people obviously had to take note of it.** That was good and actually what I found since then was **when we had strategy meetings people would say it rather than it’d always be me saying ‘what about young people, what do they think’.** Usually it’s me who has to say that kind of stuff and **[the mapping] kind of raised their awareness a little bit more.** I’ve worked on the board for 3 years so it’s **quite nice to know that if I’m not there somebody else will bring it up**” (Young Parent’s Support representative).*

Source: Franco & Lord (2011)



## Evaluation model affordances

*“I think it’s just sort of trying to apply some science to it really, making us think in more detail about which bits of our programmes are having an affect...., because some of them are quite small, **what affect are they having proportionately on the overall outcome?** Which it’s sort of a **scientific approach** I think.....*

*...the bit that added kind of most weight to it was the scoring at **the end**, I think that because that’s where people felt they had a real impact into the model...Yes doing the weighting etc... and all the other scoring, I think **everyone else found the other bits quite useful, the interviews, the maps, etc... but the kind of end model...I think was all about that scoring for people** (TPSG Deputy Chair)*

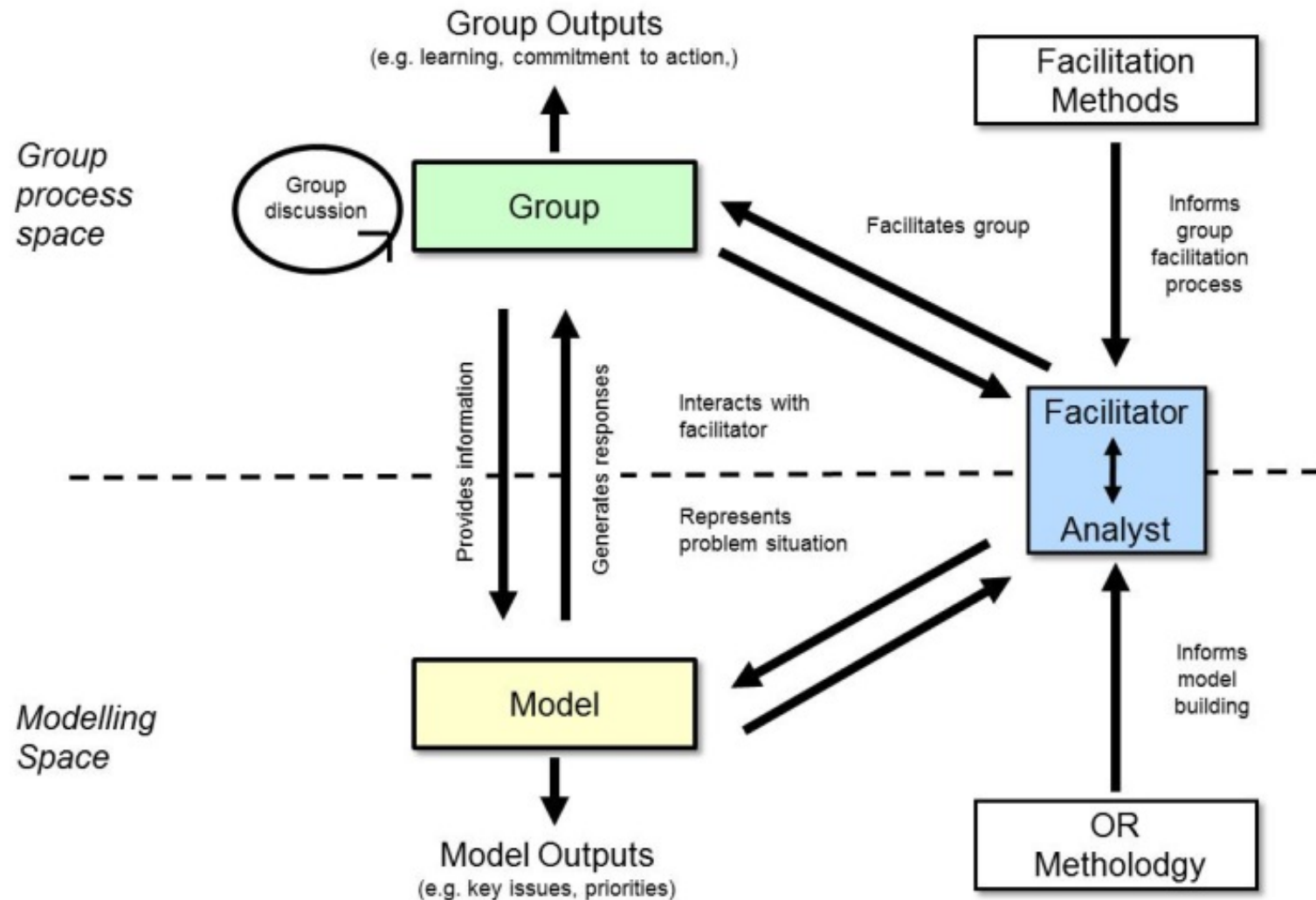
Source: Franco & Lord (2011)

## Evaluation model affordances (2)

*“I think that obviously spending time like that is quite constructive for the kind of group we’ve got anyway in building relationships, etc. I think it gives a framework to have discussion and certainty sets out to give equal weight in terms of opinion...[But] I think **if someone had come out in the mapping exercise and questioned the inclusion of [name of service] having an impact here and there, the idea would have got rubbished...well not rubbished but it certainly wouldn’t have been given the same validity of going through a process of scoring against criteria.**” (TPSG Coordinator)*

*Source: Franco & Lord (2011)*

# Facilitated modelling workshops (Franco & Montibeller 2010)



# Facilitated modelling process guidelines

(Ackermann 1997; Phillips & Phillips 1993):

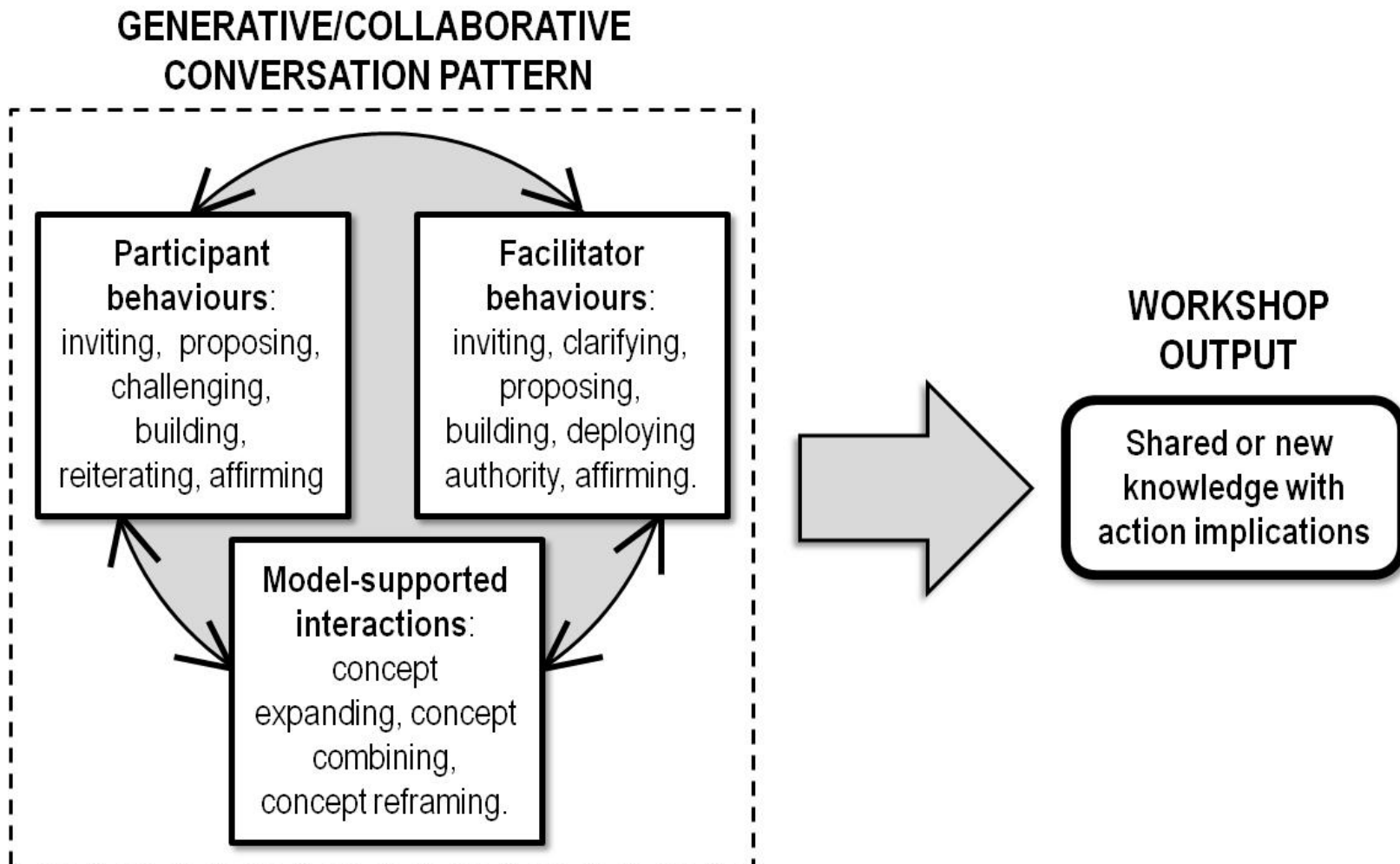
- ***Pacing*** the task.
- ***Directing*** the group to a new activity (inc. progress checking)
- ***Handing back in changed form***
- ***Reflecting back.***
- ***Questioning*** and ***summarising.***
- **Do not** report interpretations of the group's behaviour.



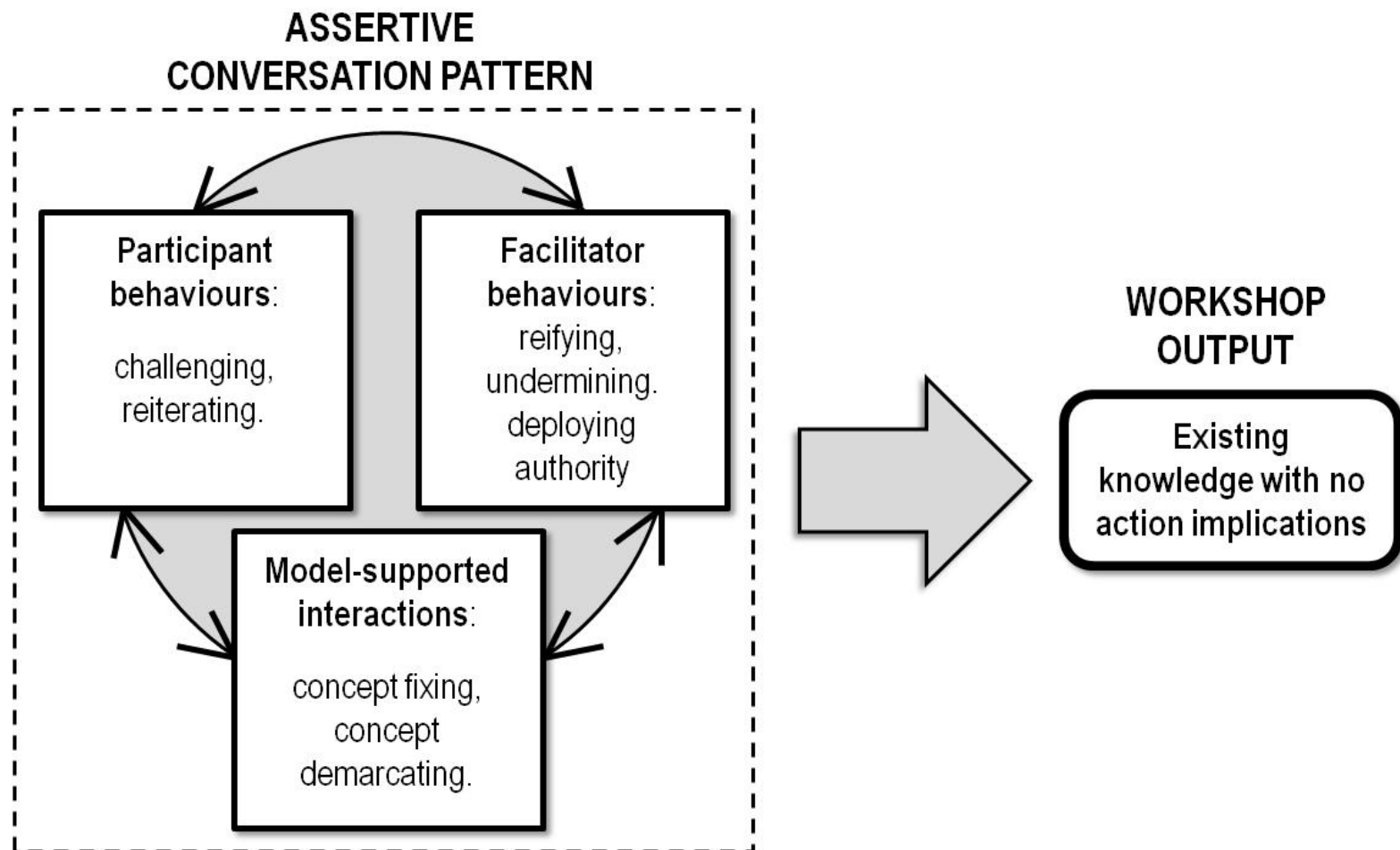
## Typology of communicative behaviours (Thomas et al 2011)

Practice	Description
Inviting	Statements that encourage participation by other actors in negotiation of meanings
Affirming	Statements that agree with alternative meanings proposed by other actors
Clarifying	Questions that open up negotiation of meaning.
Building	Statements that engage with, elaborate, and develop alternative meanings proposed by other actors
Dismissing	Statements that serve to rebuff or ignore alternative meanings proposed by other actors
Reiterating	Statements that return to and repeat meanings
Deploying authority	Statements that contain directives that eliminate alternative meanings proposed by other actors
Invoking hierarchy	Statements that refer to superiors to justify the elimination of alternative meanings proposed by other actors
Reifying	Statements that invoke the culture toolkit to represent a particular, nonnegotiable meaning
Proposing	Statements that introduce a new meaning
Challenging	Statement that reject or critique alternative meanings proposed by other actors
Undermining	Statements that criticize other actors to discredit their proposed meanings
Holding to account	Statements that demand action from other actors (or question a lack of action) to undermine or discredit their proposed meanings

# FM and knowledge creation (Tavella & Franco 2015)



# FM and knowledge creation (Tavella & Franco 2015)









"All those in favour say 'Aye'."

"Aye."

"Aye."

"Aye."

"Aye."

"Aye."

# Need for Closure (NClo) research

(Kruglanski, 1989, 1990, 2004;  
Kruglanski *et al.*, 2006, 2009):

- NClo relates to two broad tendencies:
  - ***Urgency.***
  - ***Permanence.***
- A stable ***trait***, but also triggered by ***context*** .
- It can lead to ***group centrism*** .



# Need for Closure and conflict management in a model-supported environment

(Franco, Rouwette & Korzilius, 2016)



# NClo and conflict management (Franco et al 2016)

- High NClo groups generally:
  - suppressed conflict;
  - failed to use model effectively, switching to other means.
- Low NClo groups:
  - surfaced conflict;
  - used model to inform decision.
- Contrary to expectations, both High and Low NClo groups displayed similar levels of consensus.

