

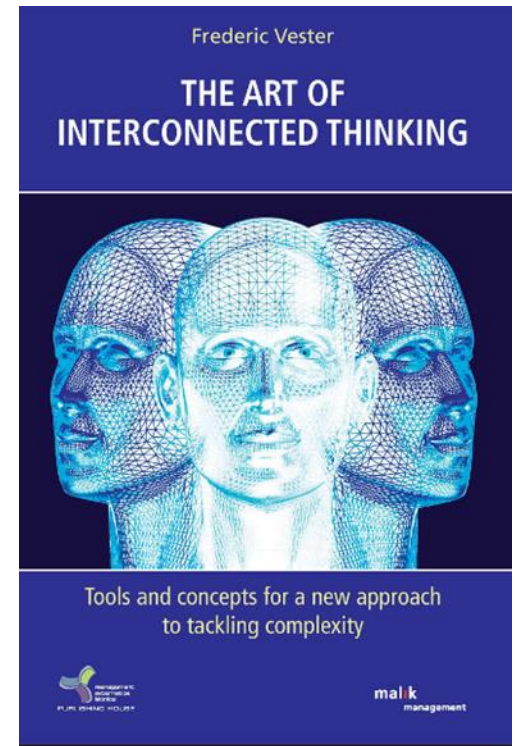
Resilience of (in) the SEA process: evidence from Sensitivity Analysis



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Sensitivity analysis

- how different parts interact
- differentially affect output (EI)
- ranges of input for which output max or min
- process sensitivity = response to change
- Self-regulation – circular logic - cybernetics





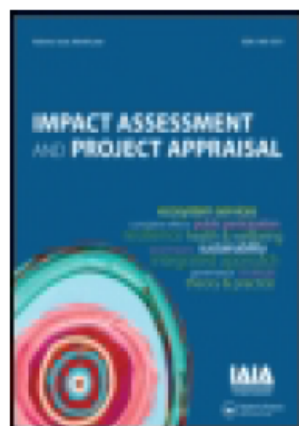
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Enhancing environmental integration in strategic environmental assessment (SEA): insight from sensitivity analysis

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Exploring the strategic environmental assessment (SEA) process behaviour using sensitivity analysis

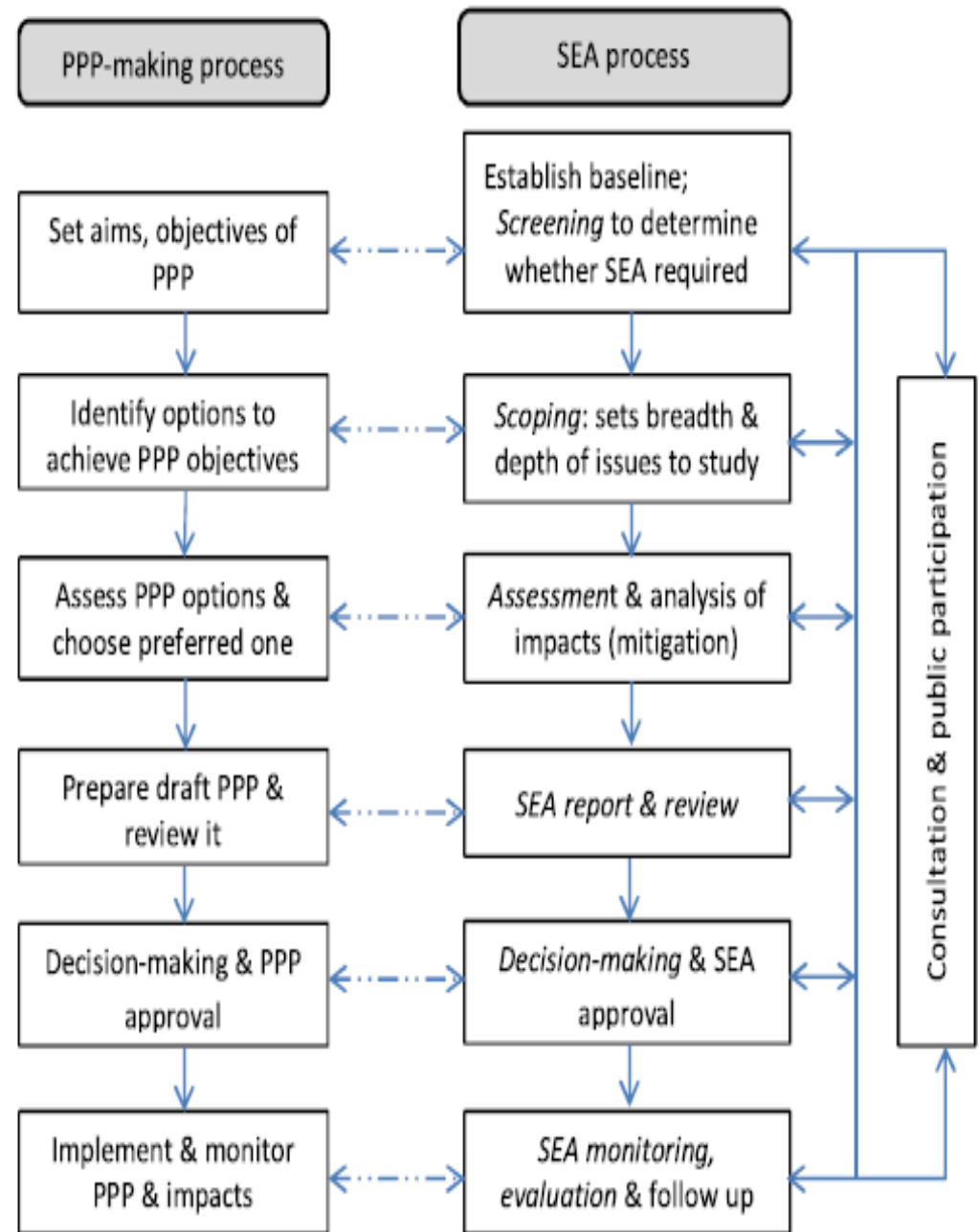
“system” (Hall and Fagan 1956).

- structured functional unit
- holistic + interdependent + interacting parts
- parts of other systems
- Interdependence / inter-relations (complexity)

Underlying assumptions...

SEA process:

- Systematic
- Complex
- Iterative, flexible, adaptable
- Feedbacks
- Goal = EI



Research questions

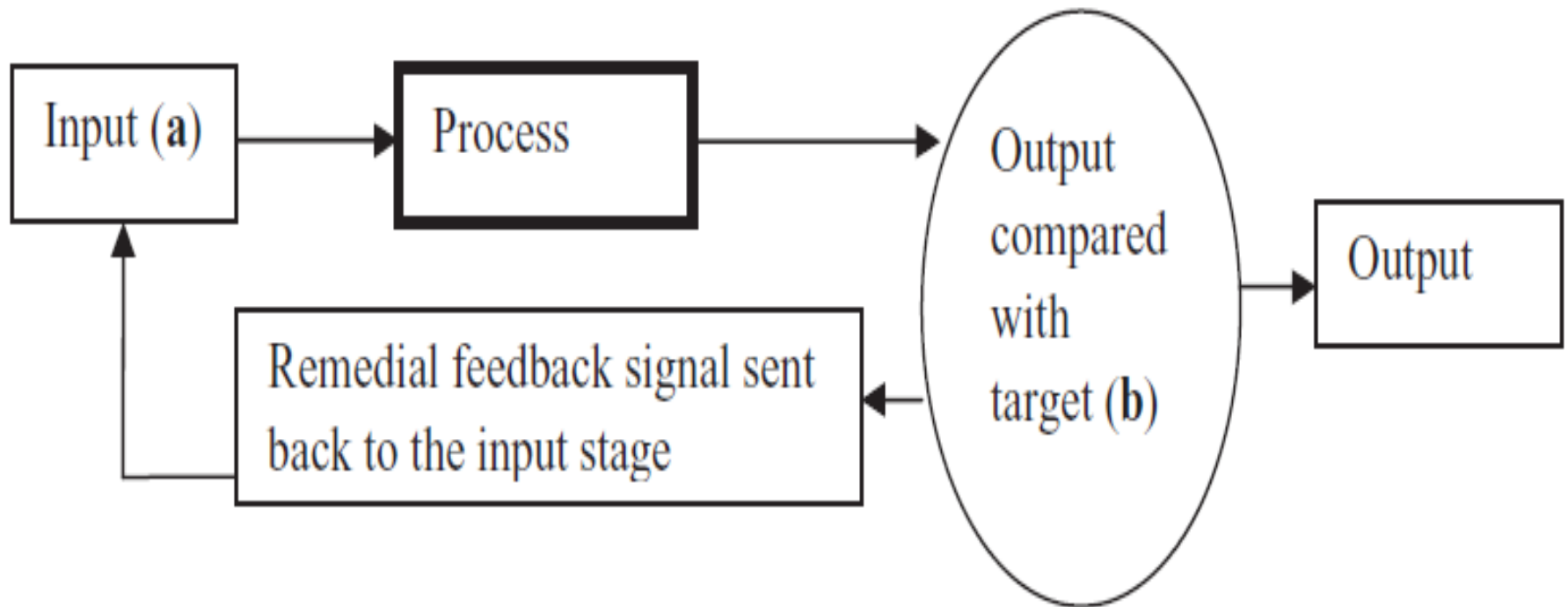
- Extent SEA process self-regulating?

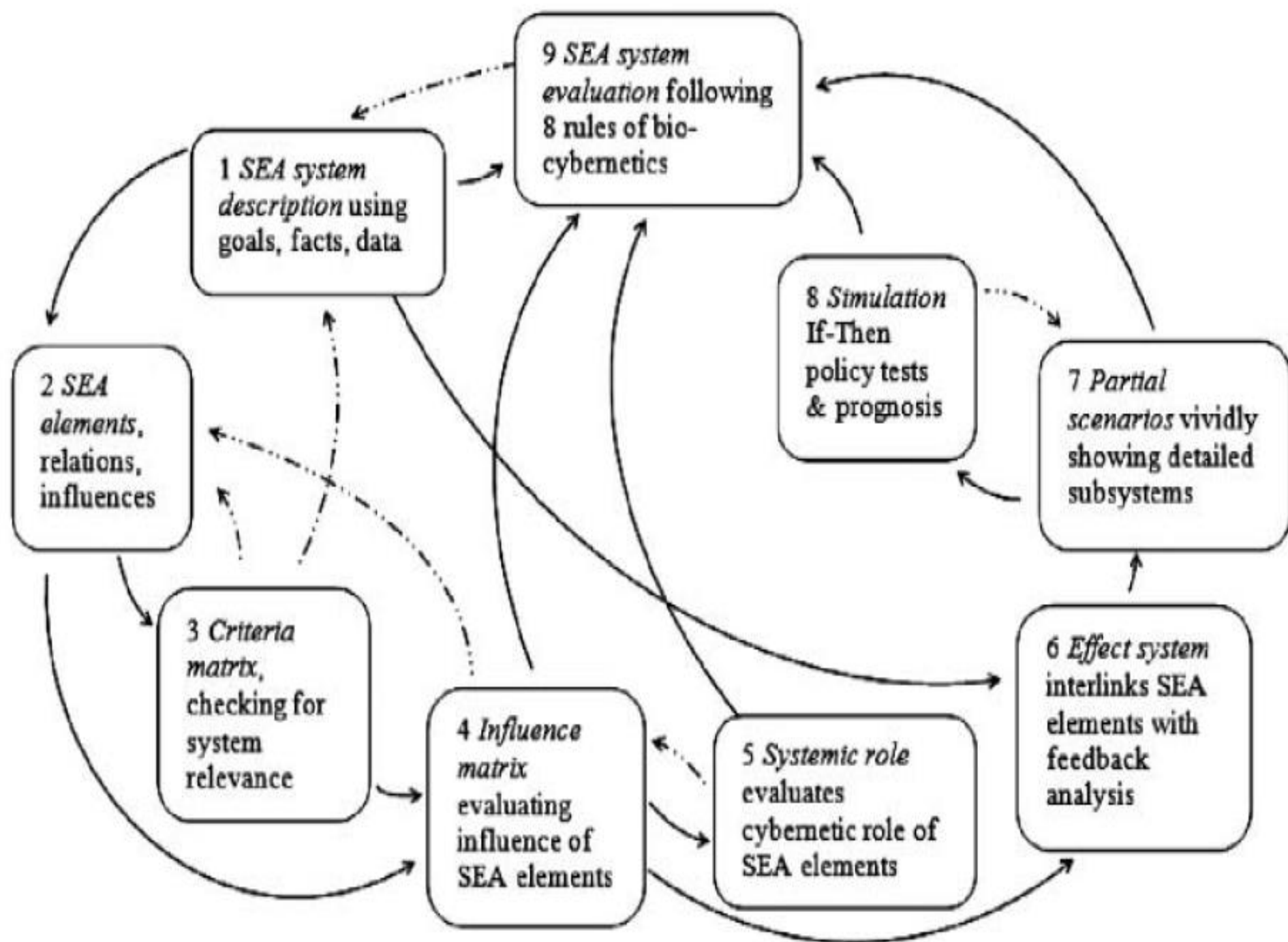
– Evidence?

– What characteristics?

- Hypothesis:
 - more self-regulation
 - = more resilient

Self-regulation





Key outputs

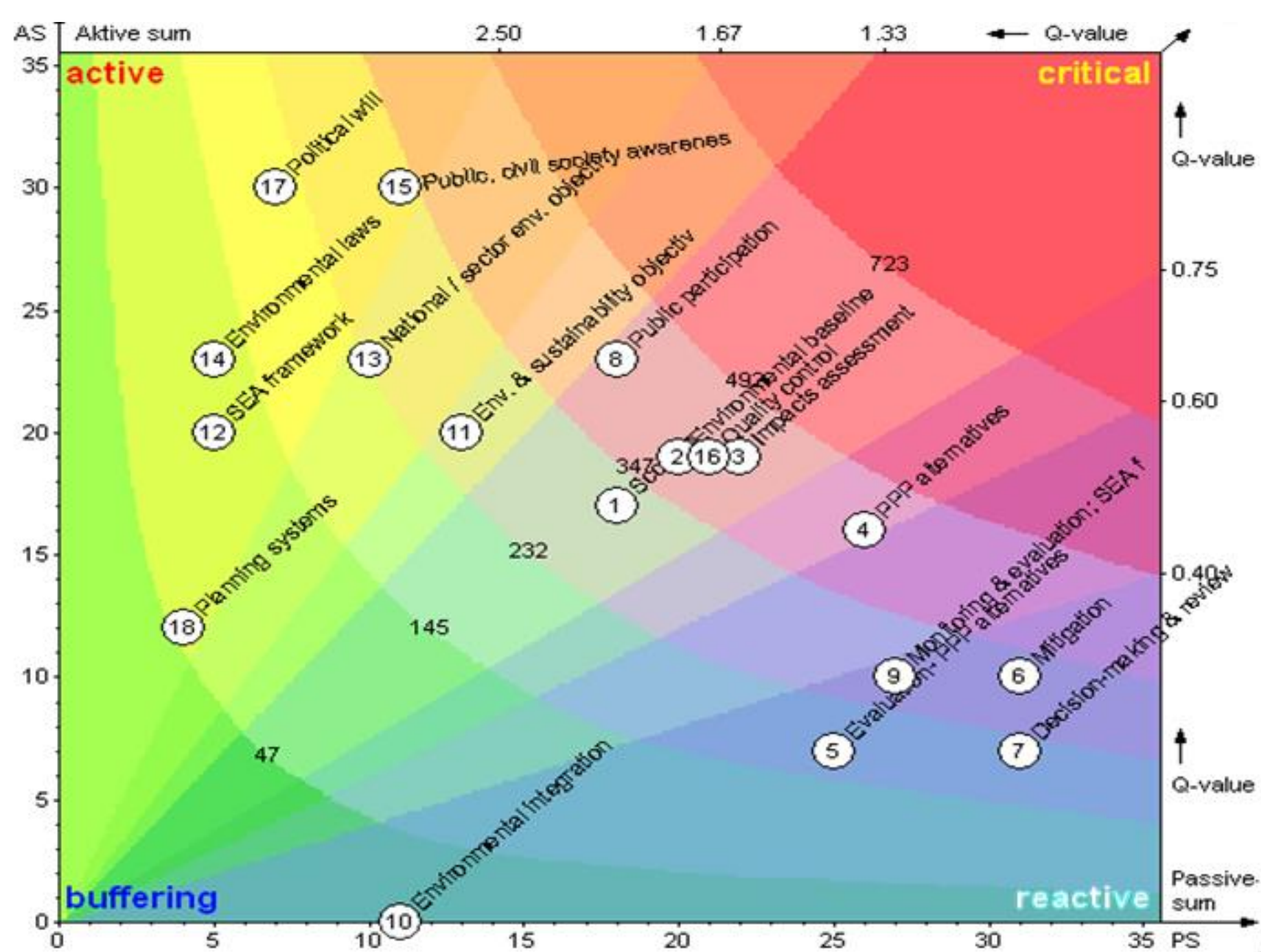
- Resilience in structure and function
- Blue-print / DNA of process
- Systemic behaviour – not single SEA exercise

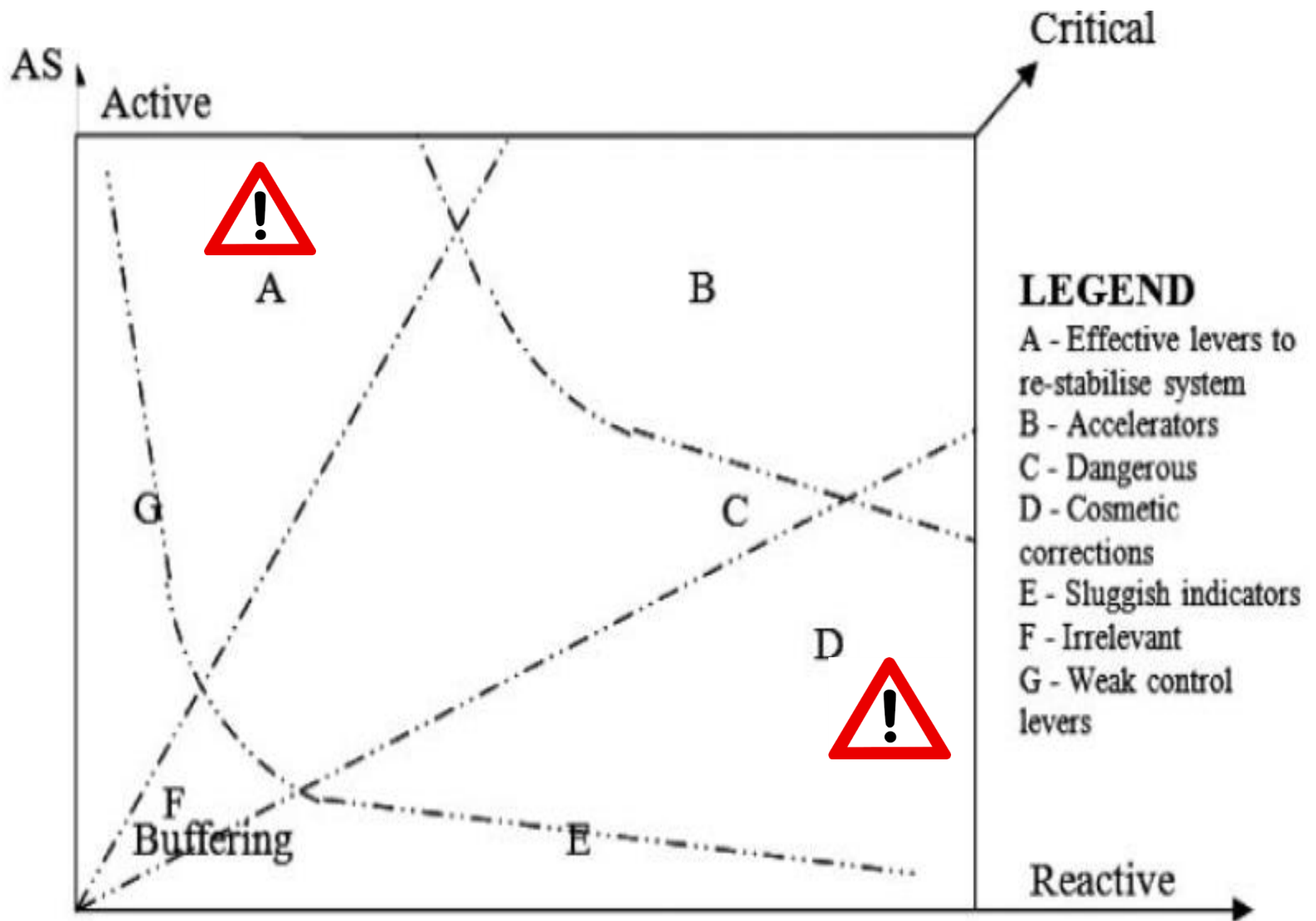


AKTIVE ----- PASSIVE		Q-Value
HIGHLY ACTIVE		
14 Environmental laws		4.60
17 Political will		4.29
12 SEA framework		4.00
18 Planning systems		3.00
15 Public, civil society awarenes		2.73
AKTIVE		
13 National / sector env. objecti		2.30
SLIGHTLY ACTIVE		
11 Env. & sustainability objectiv		1.54
NEUTRAL		
8 Public participation		1.28
2 Environmental baseline		0.95
1 Scoping		0.94
16 Quality control		0.90
3 Impacts assessment		0.86
SLIGHTLY PASSIVE		
4 PPP alternatives		0.62
PASSIVE		
-		

CRITICAL ----- BUFFERING		P-Value
HIGHLY CRITICAL		
-		
CRITICAL		
-		
SLIGHTLY CRITICAL		
3 Impacts assessment		418
4 PPP alternatives		416
8 Public participation		414
16 Quality control		399
2 Environmental baseline		380
NEUTRAL		
15 Public, civil society awarenes		330
6 Mitigation		310
1 Scoping		306
9 Monitoring & evaluation; SEA f		270
11 Env. & sustainability objectiv		260
SLIGHTLY BUFFERING		
13 National / sector env. objecti		230
7 Decision-making & review		217
17 Political will		210
5 Evaluation- PPP alternatives		175



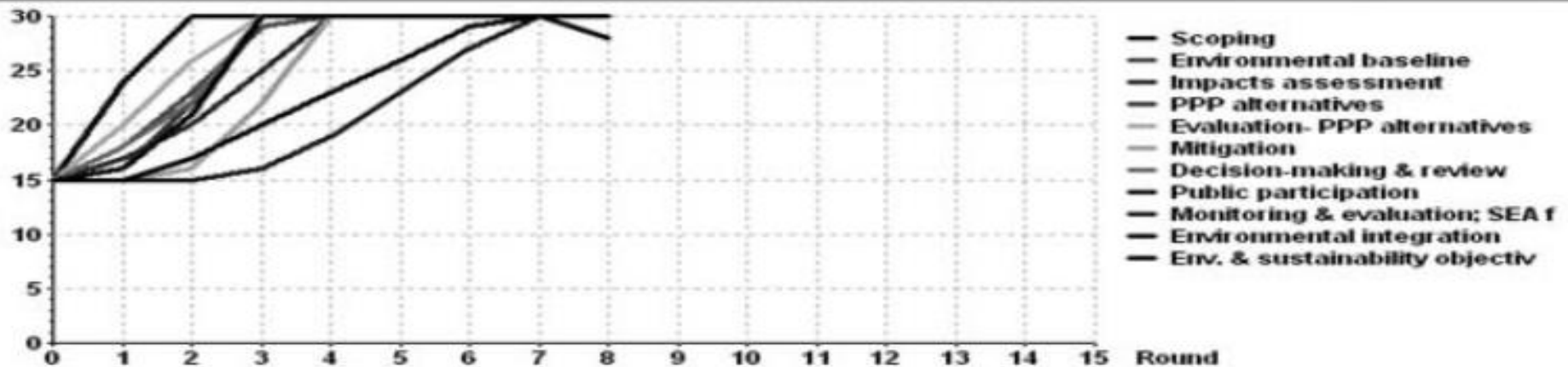




List of feedbacks	
Negative Feedbacks (8)	Positive Feedbacks (7)
1→ 8→ 1	1→ 2→ 9→ 1
1→ 2→ 9→ 15→ 8→ 1	1→ 6→ 9→ 1
1→ 6→ 9→ 15→ 8→ 1	1→ 2→ 6→ 9→ 1
1→ 2→ 6→ 9→ 15→ 8→ 1	1→ 11→ 2→ 9→ 1
1→ 11→ 2→ 9→ 15→ 8→ 1	1→ 2→ 3→ 6→ 9→ 1
1→ 2→ 3→ 6→ 9→ 15→ 8→ 1	1→ 11→ 2→ 6→ 9→ 1
1→ 11→ 2→ 6→ 9→ 15→ 8→ 1	1→ 11→ 2→ 3→ 6→ 9→ 1
1→ 11→ 2→ 3→ 6→ 9→ 15→ 8→ 1	



Development of the chosen variables during the simulation

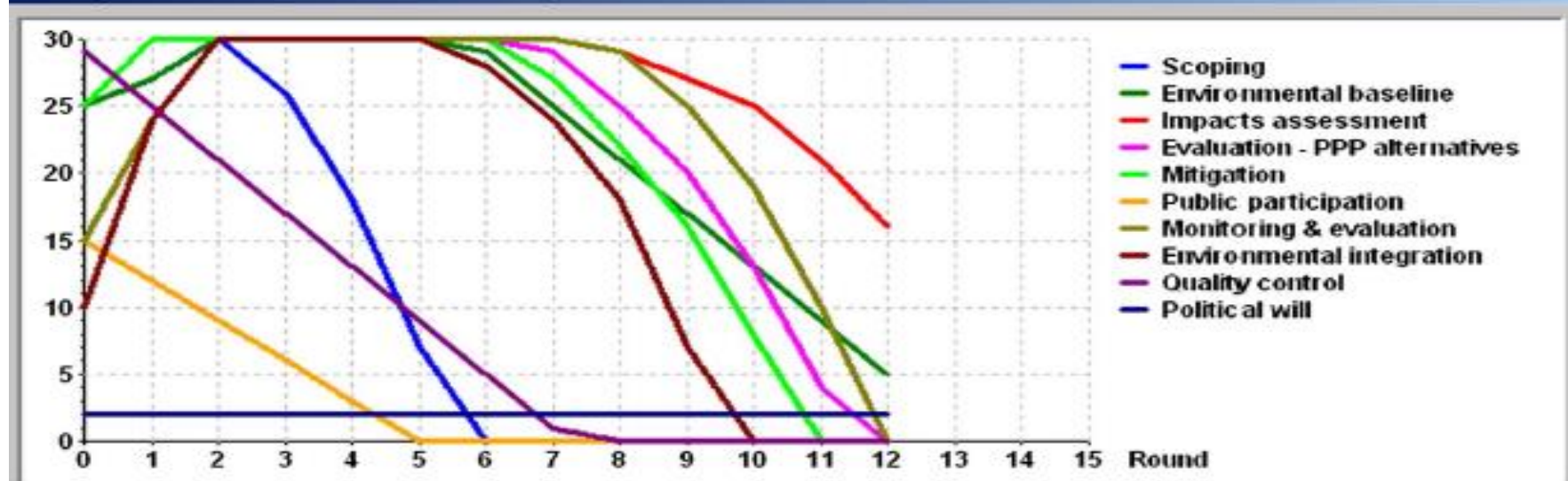


Development of the chosen variables during the simulation



Thresholds + simultaneity (political will)

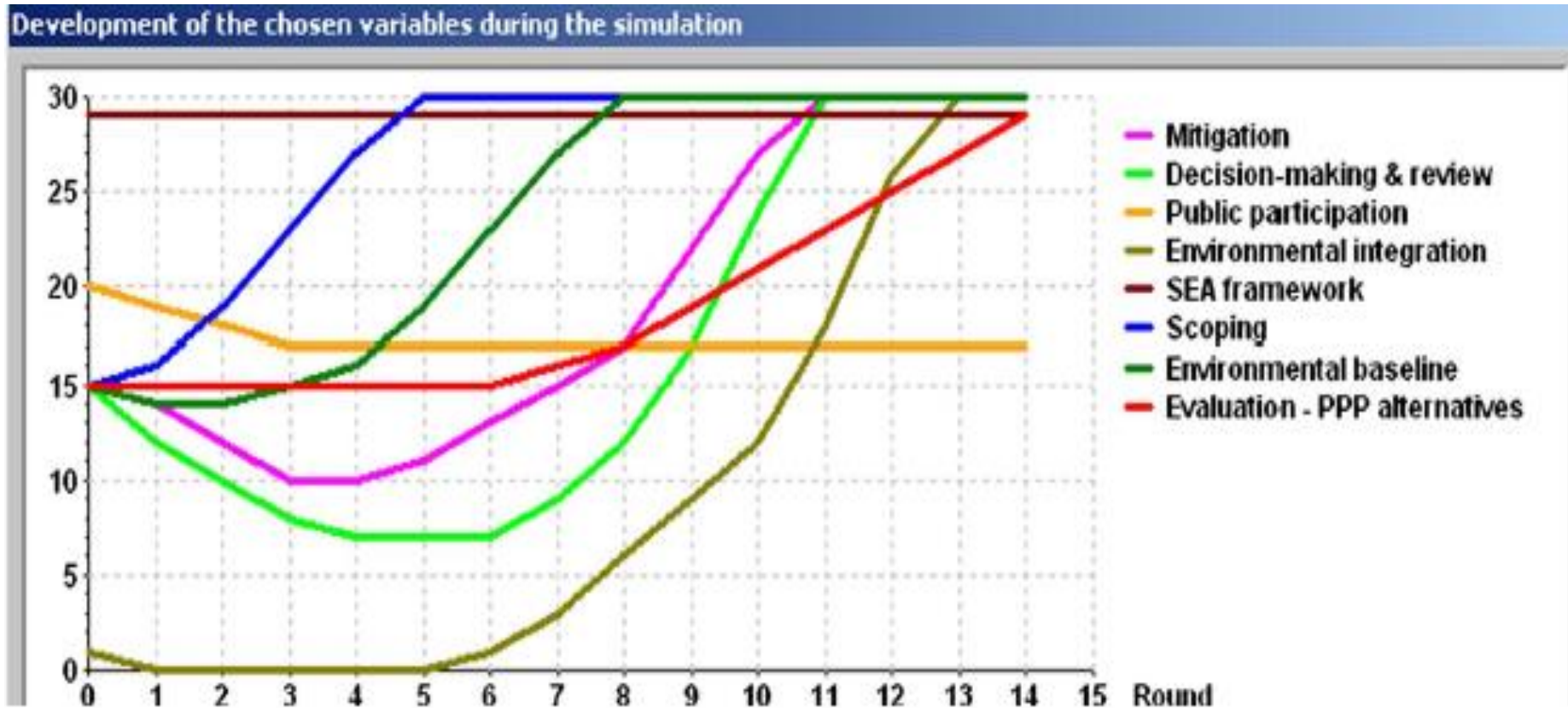
Development of the chosen variables during the simulation



Development of the chosen variables during the simulation



Compensatory effect (to slow!!)



Compensatory effect

- Equifinality = alternative ways to same objectives (convergence);
- Multifinality = alternative objectives from same inputs (divergence).
- key to 'complex adaptive system' (see Holland 2006)
 - adaptive learning
 - resilience

Research objectives

How do SEA elements behave?

How does the process respond to change?



What are the limitations and constraints in process response?

Findings from study

- No 'highly critical' or 'critical' elements to steer process activities and output
- Five key behavioural characteristics of process elements
- Process is fairly stable, exhibits inertia
- Reacts slowly to change, has low capacity for self-regulation
- Heavily reliant on external factors
- Starting conditions are critical determinants of process behaviour
- Compensatory mechanisms take too long
- Threshold limits exist, above which certain effects are triggered