PROJECTS – WHY DO THEY SO OFTEN GO HORRIBLY WRONG: the role of systemic risk management

Colin Eden

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Why listen???

- Analysis of 12 major projects that went wrong
- Expert witness in litigation
  - Last one: nuclear power station in Finland - €3bn claim
  - Involved simulation modeling and evaluation of risk assessments
- Worked with several corporations on project risk management
  - For example: Bombardier (aerospace, rail, IT projects)
- Relevant Articles in: Project Management Jnl; International Jnl of Project Management, Construction Law Jnl, Jnl of the Operational Research Society, European Jnl of Operational Research

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“Projects don’t go wrong, they start wrong”

Well known adage

Attain more while risking less

- No risk = No Profit
- Being in business means taking risk
- Success in business means managing risk better than competitors
- Risk Assessment & Management is designed to pull risk levels down to an acceptable point without the cost of doing so wiping out profit

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"they start wrong…"
two key factors

- no attention to the systemicity of risks - ***systemic* risk assessment**

- not enough attention to the power of the **Rework Cycle**
  - under-estimation
  - change orders/variation orders

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The Significance of the Rework Cycle

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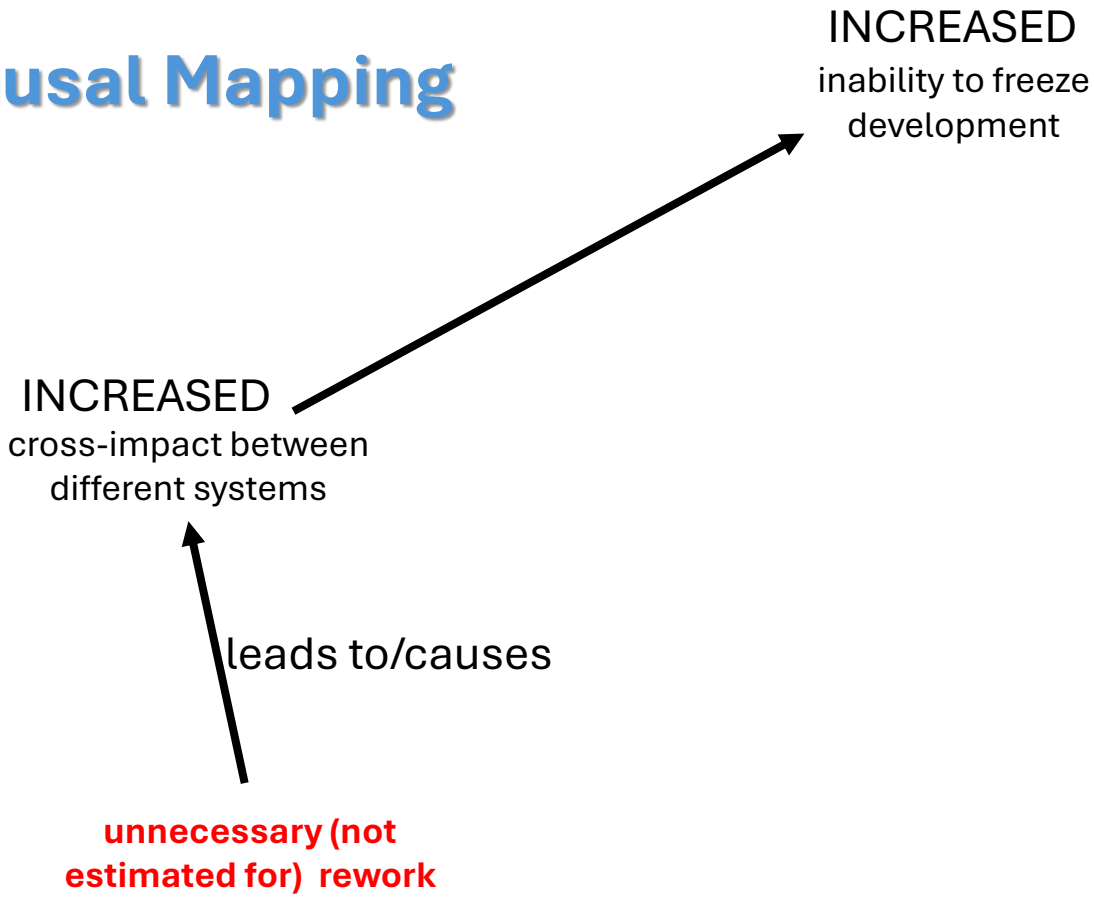
Causal Mapping



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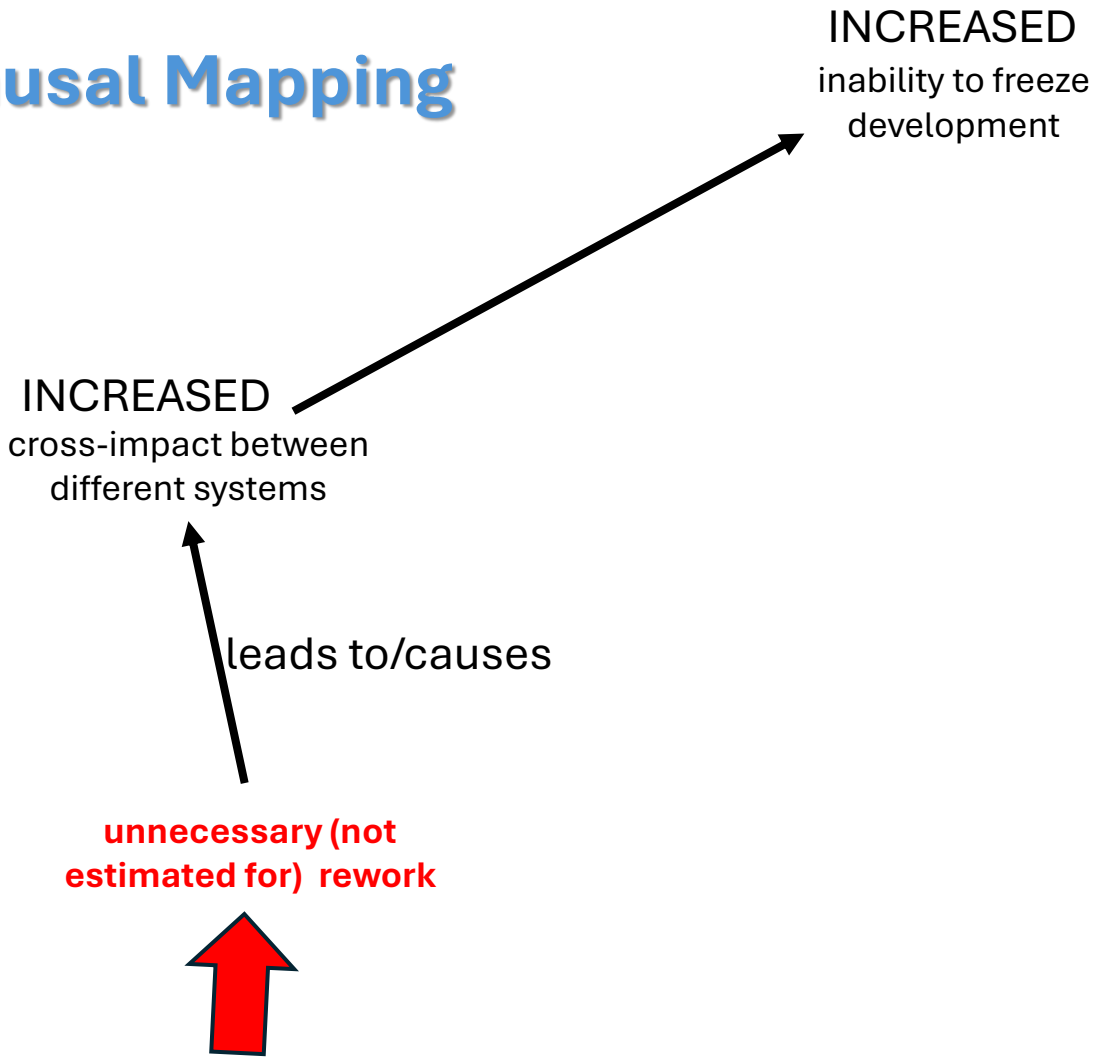

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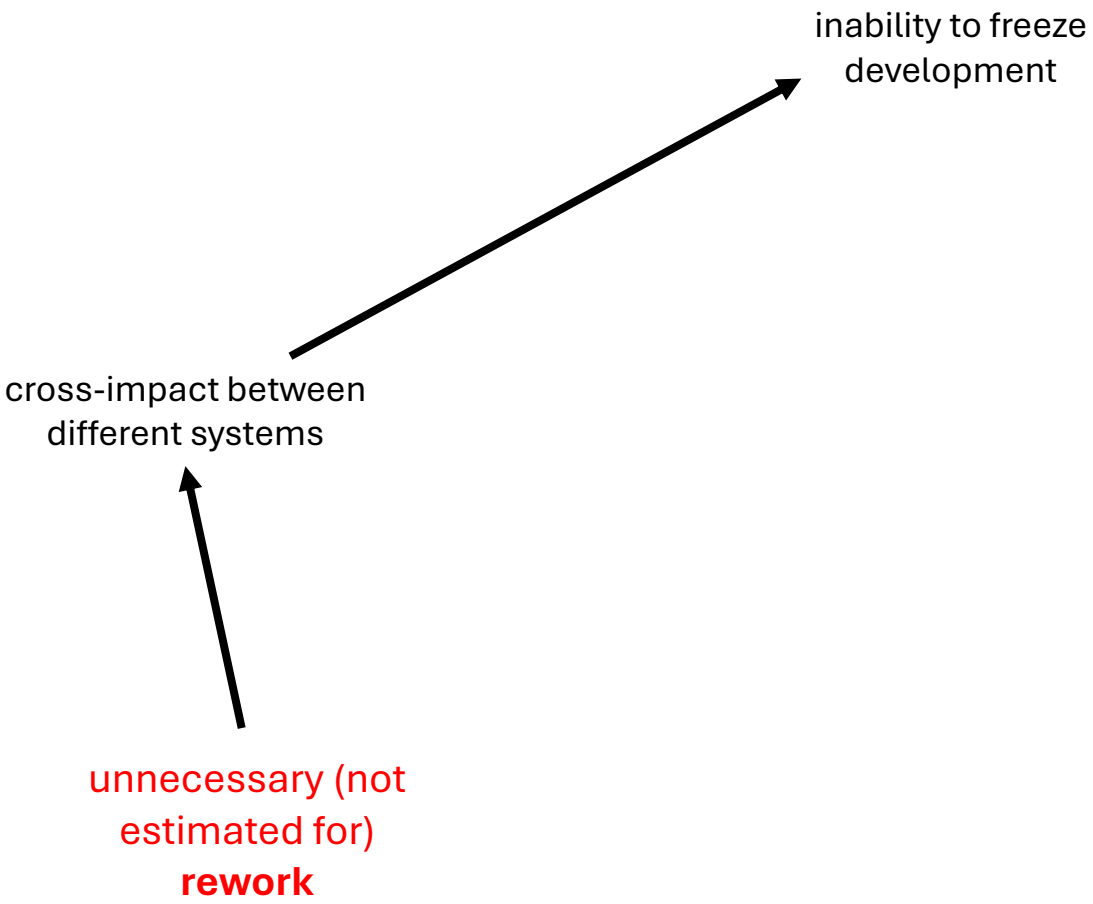

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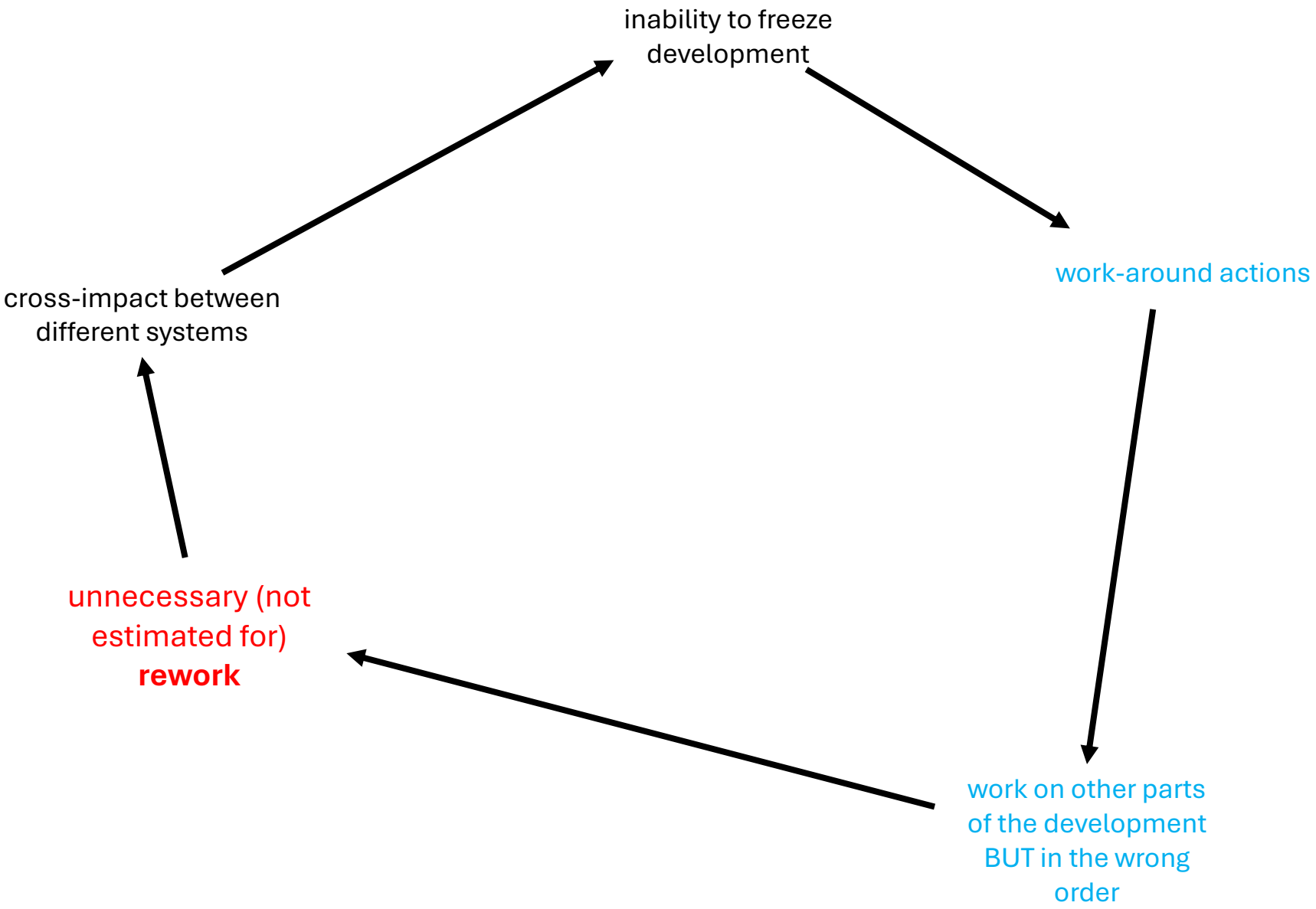

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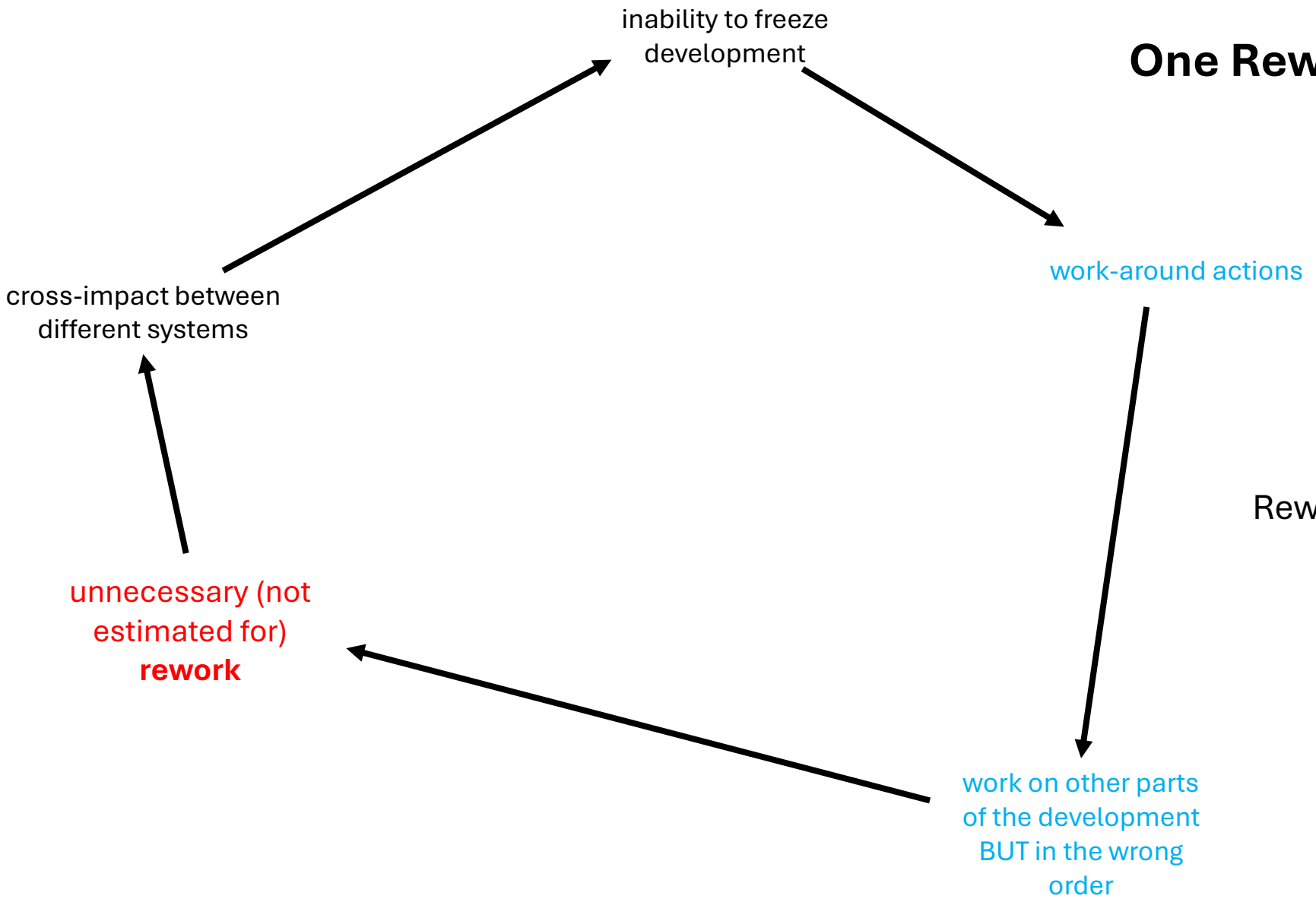
One Rework Cycle



Rework feeds rework

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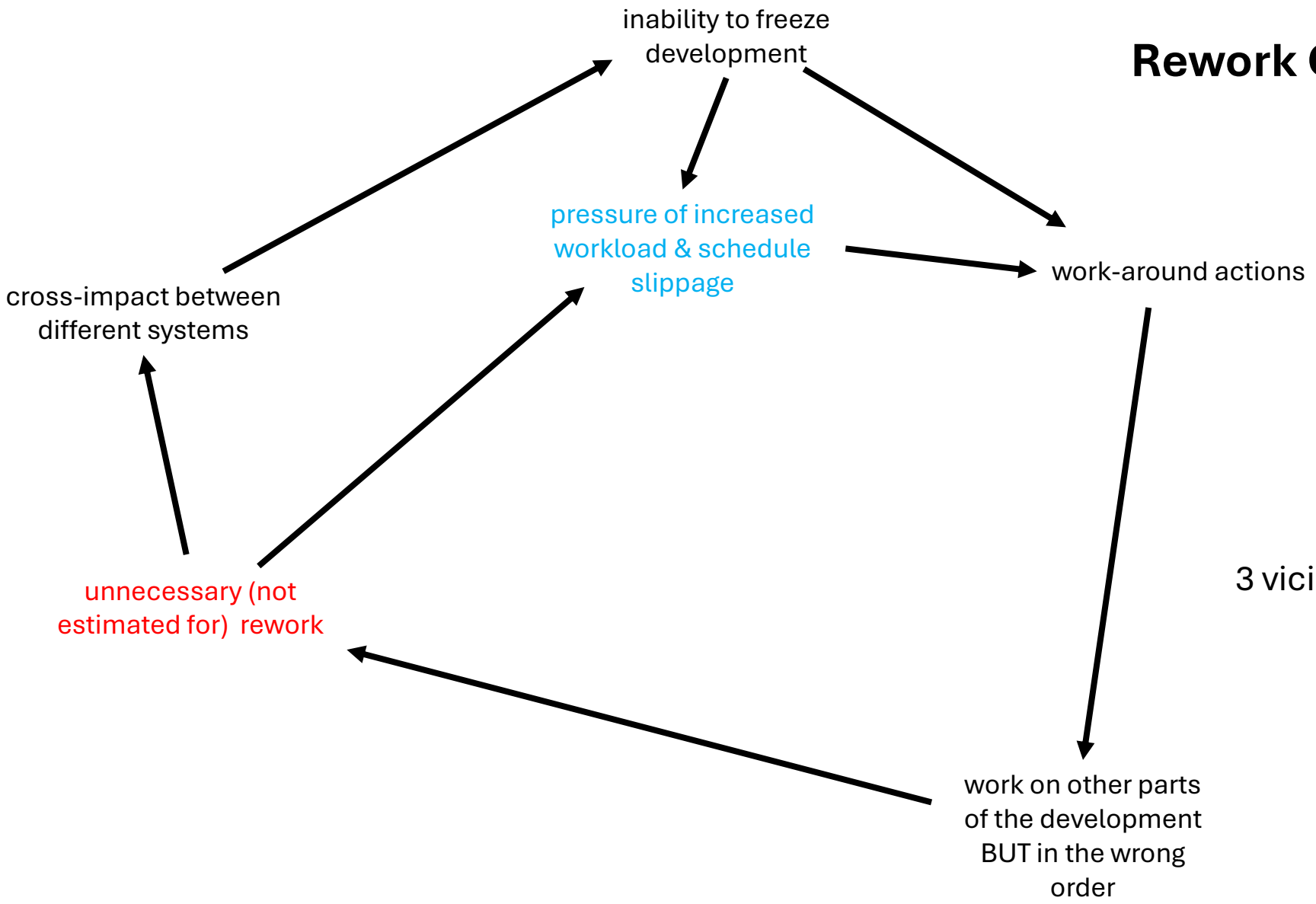
Rework Cycles



3 vicious cycles interacting

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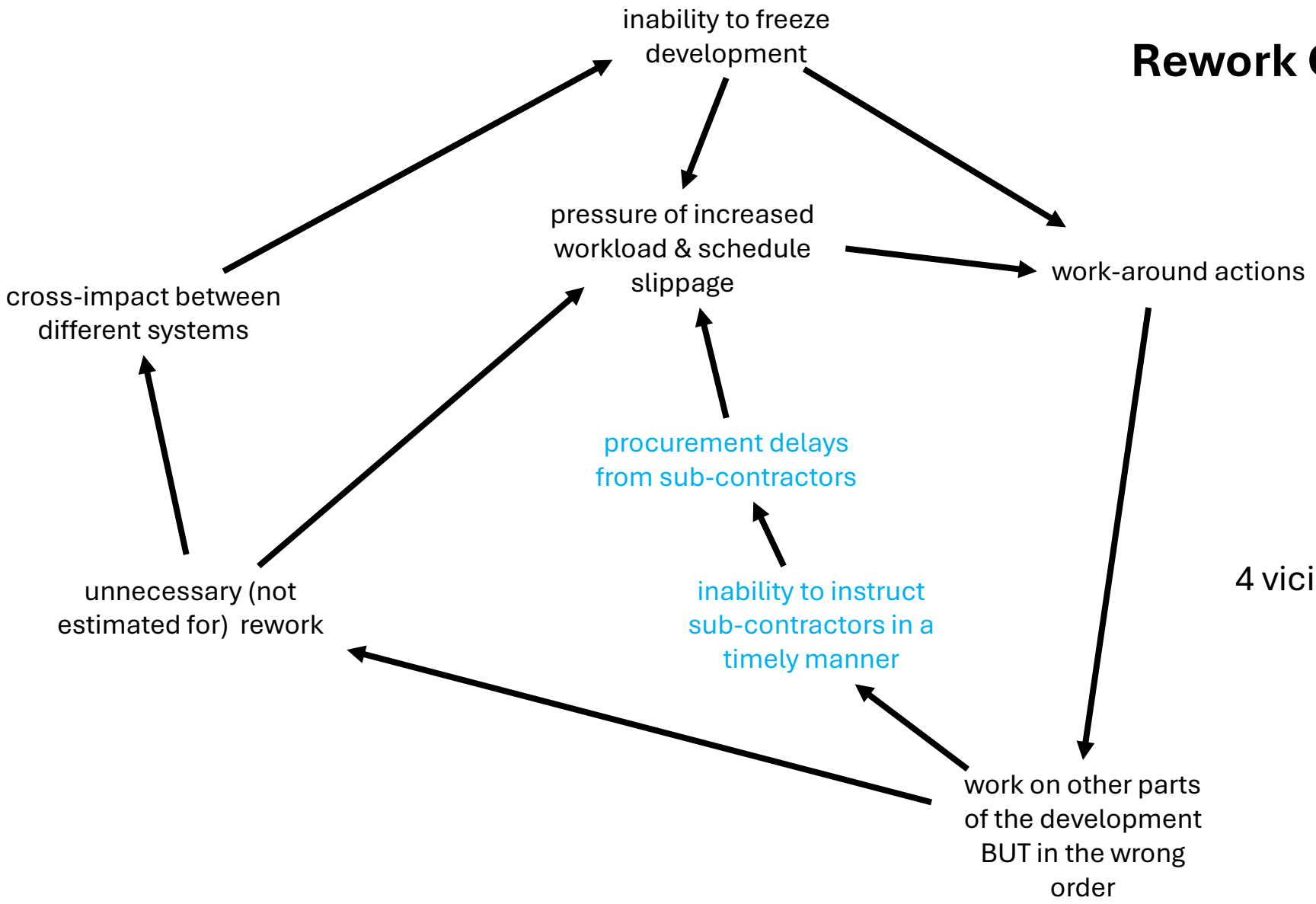
Rework Cycles



4 vicious cycles interacting

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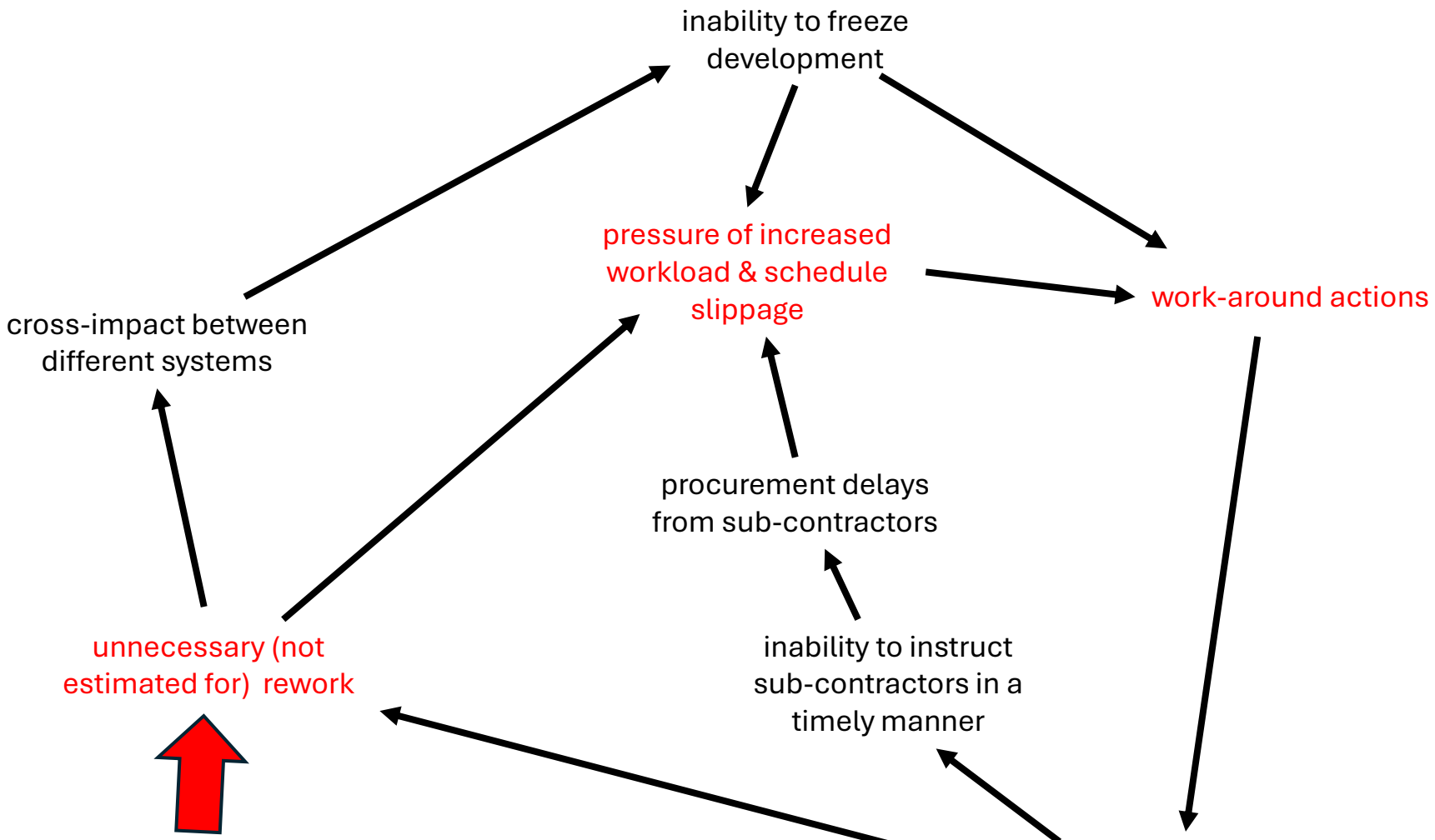

Under-estimation

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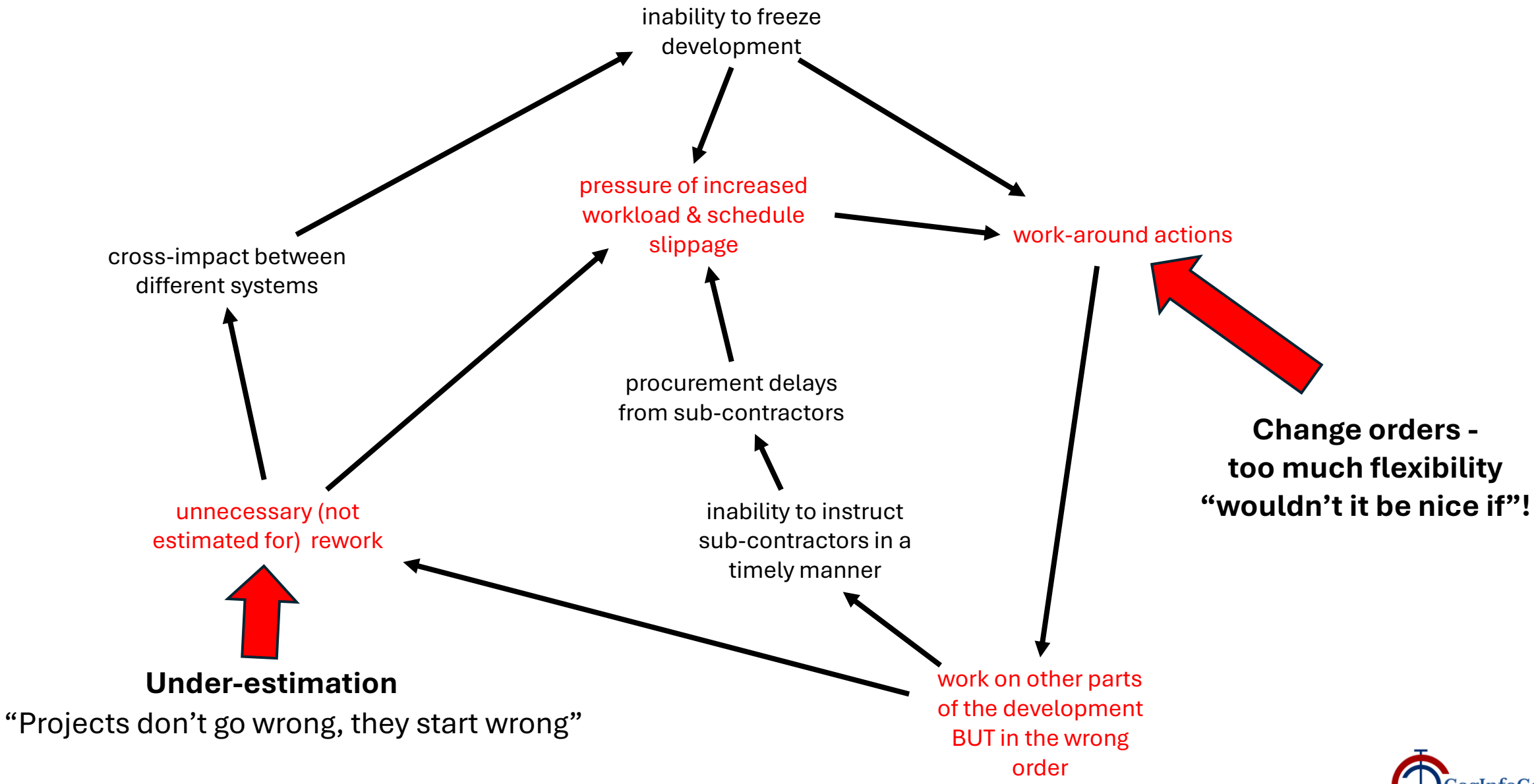

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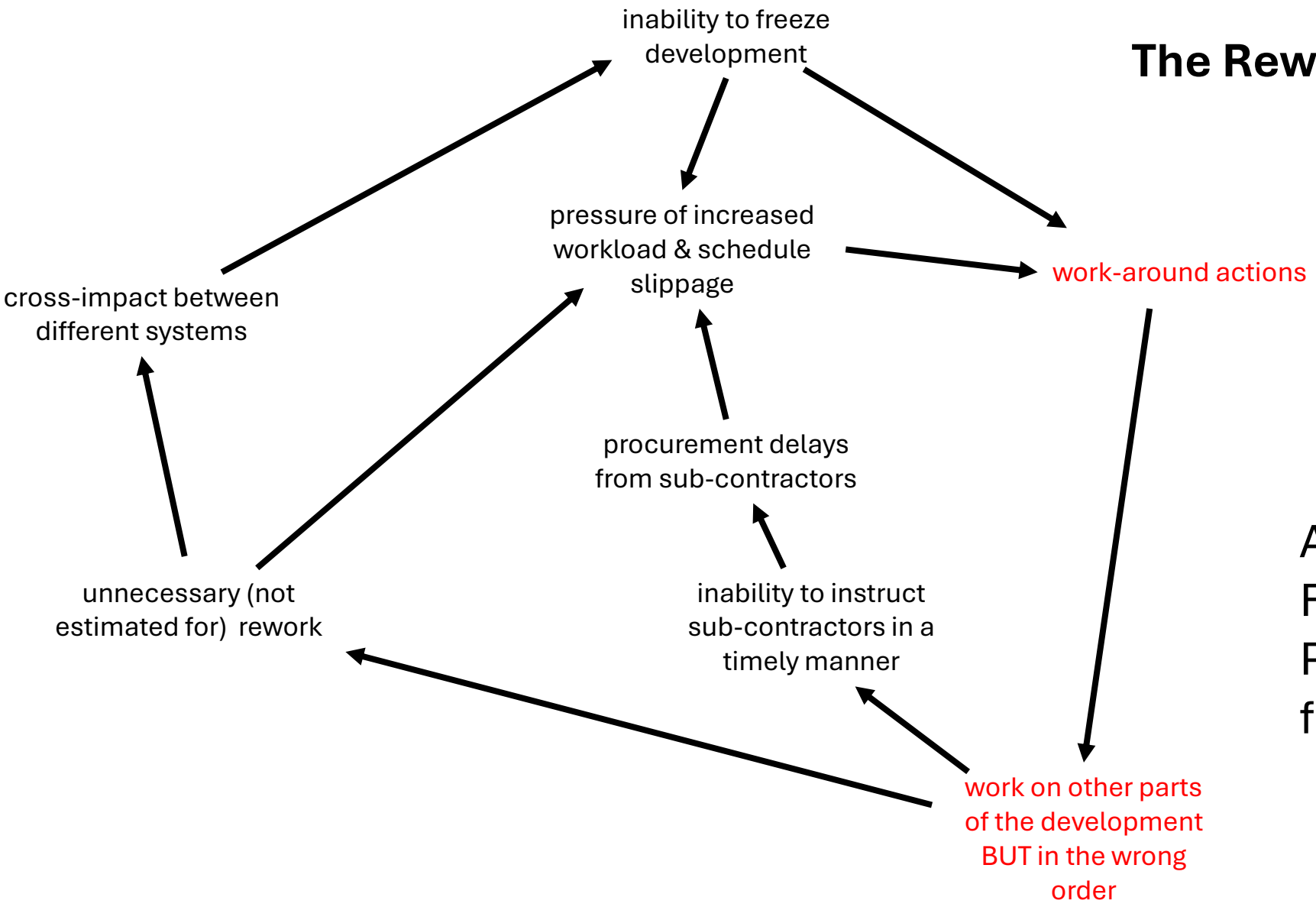
The Rework Cycles



Analysis of Feedback Finds Potent Focus for Mitigation

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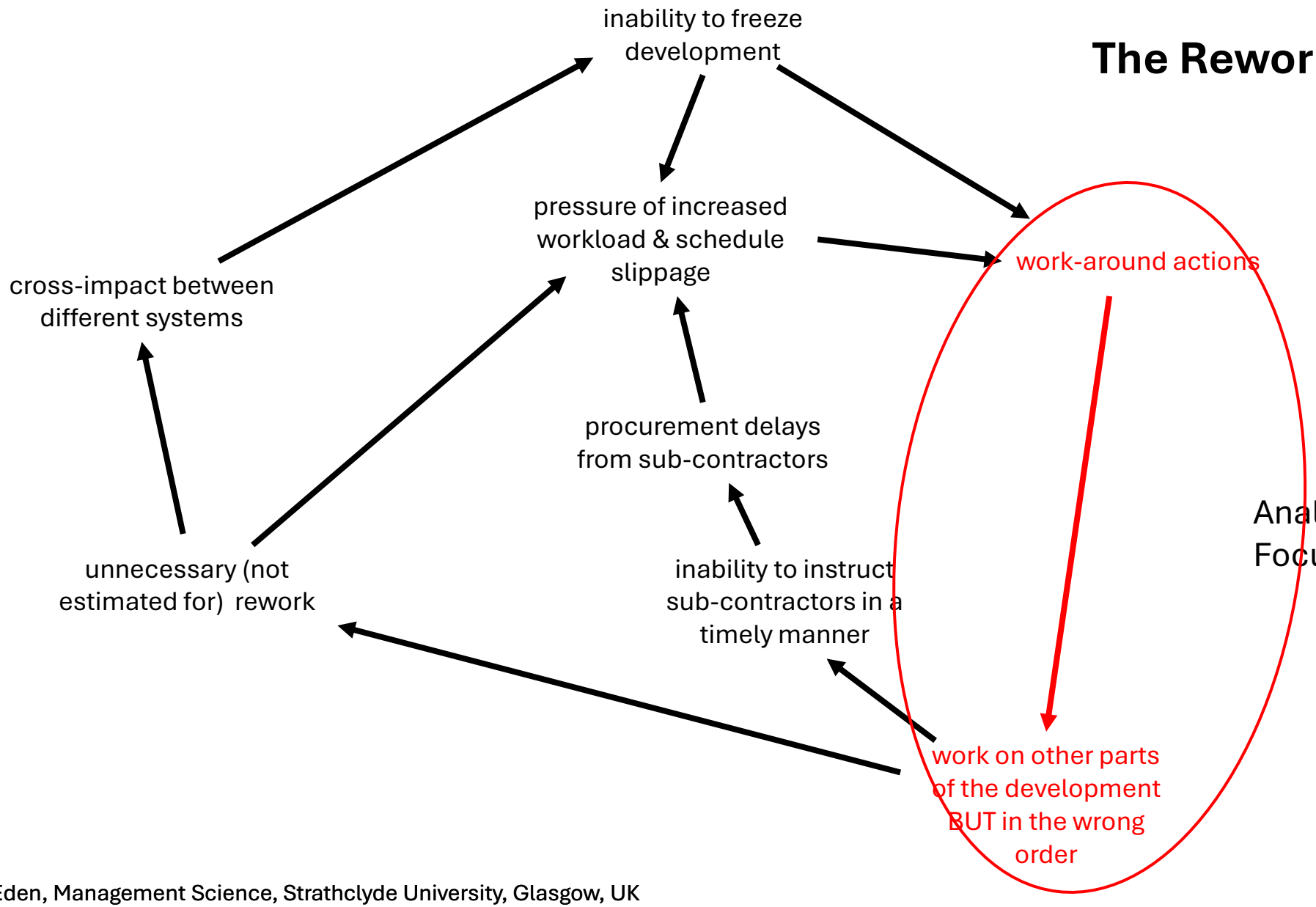

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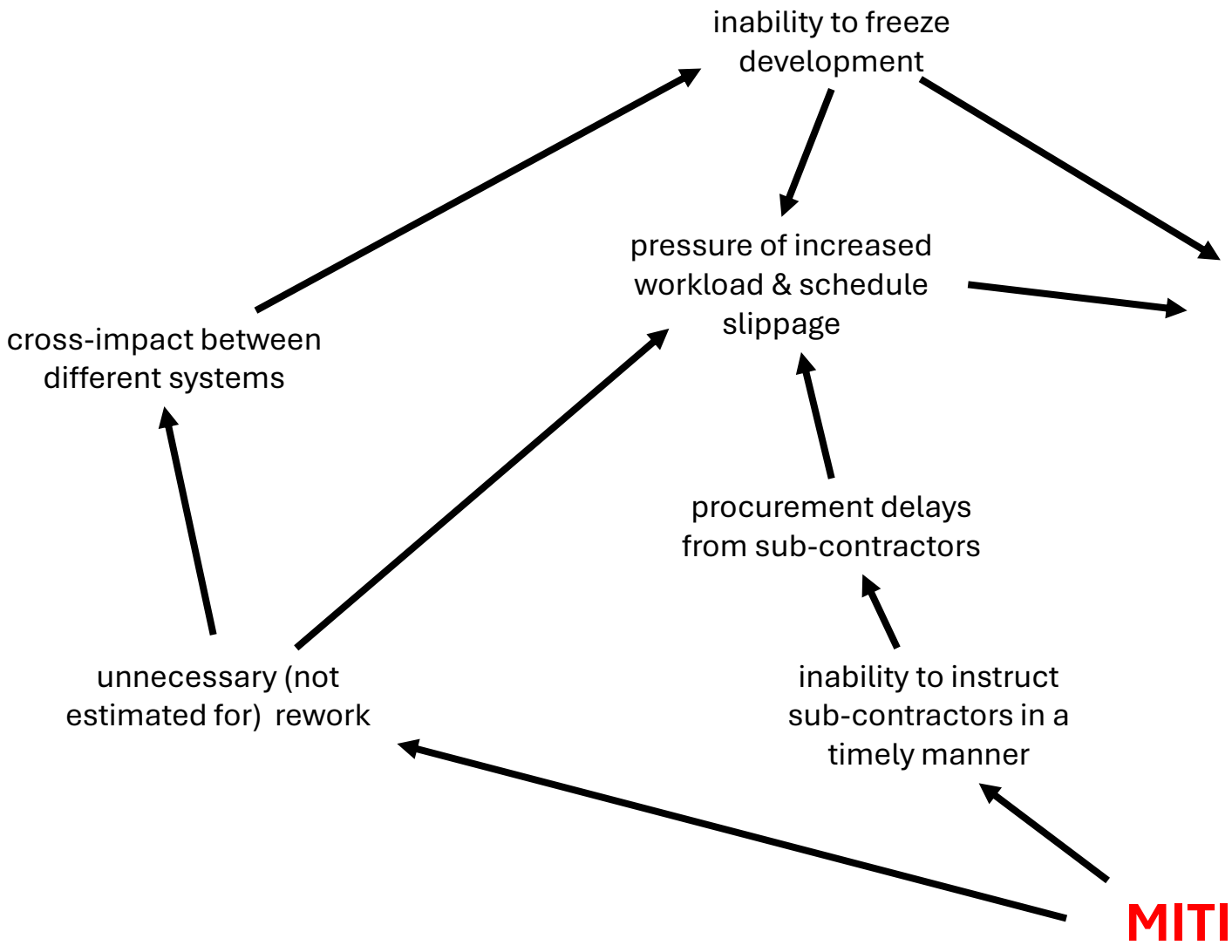

NO vicious cycles

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Risk Assessment & Management

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What is systemic risk?

- A **system of risks** shows:
  - the causal links between risks – risks as a linked network
  - the outcomes of risks are also risks
  - risk systems usually encompass many feedback cycles: mostly vicious cycles
- A single risk can cause a plethora of other risks, and, in particular, cause vicious cycles of risks
- Vicious cycles escalate the risks
- A vicious cycle is a big risk because it is dynamic deterioration over time

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Project Risk Registers (PRRs)

Most common risk assessment method (PRR)

typically only consider up to 100 risks

No interaction between risks

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Case Example: Risk register as a Risk system

RISK	PROBABILITY	IMPACT
lack of customer furnished information (CFI)		
excessive rework		
other project demands interfere with work flow		
design errors		
bad weather affects commisioning		
[PRODUCT] becomes overweight		
cannot find enough new good designers		

Military aircraft refurbishment contract

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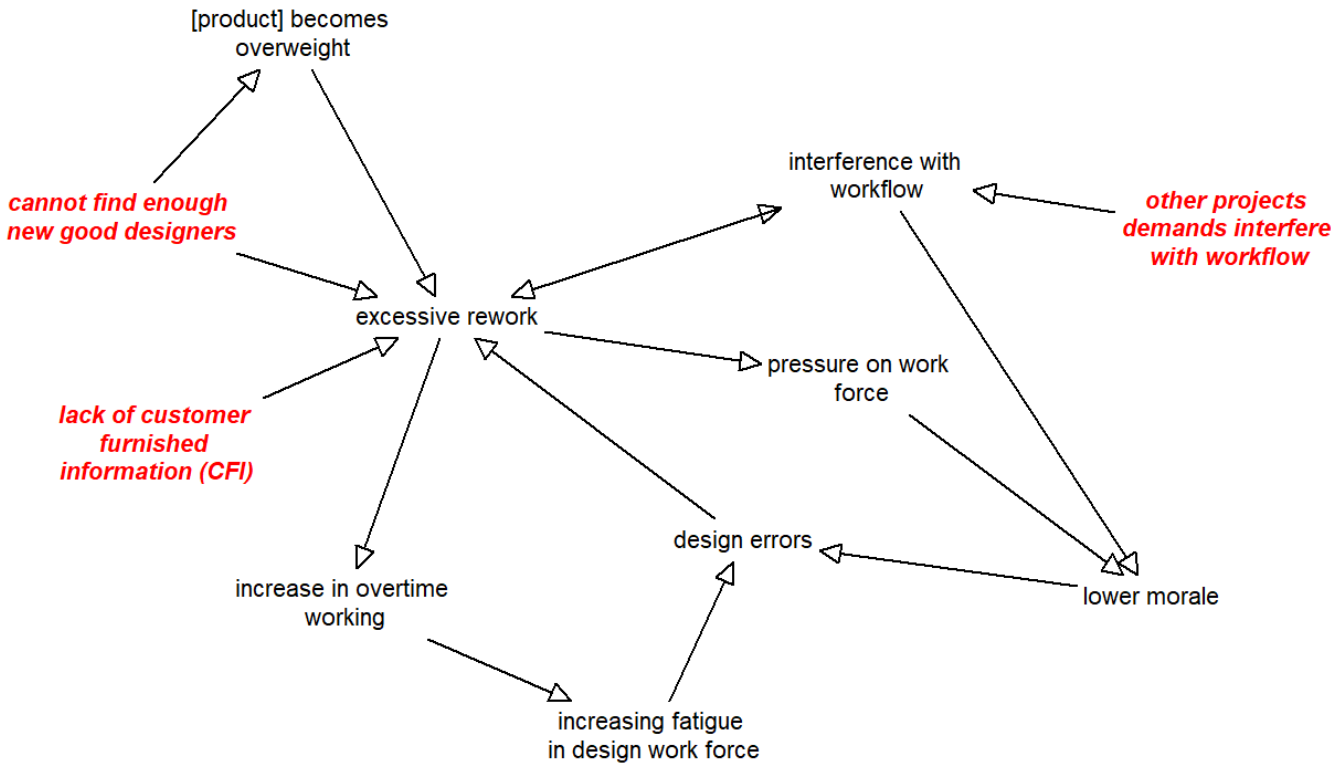

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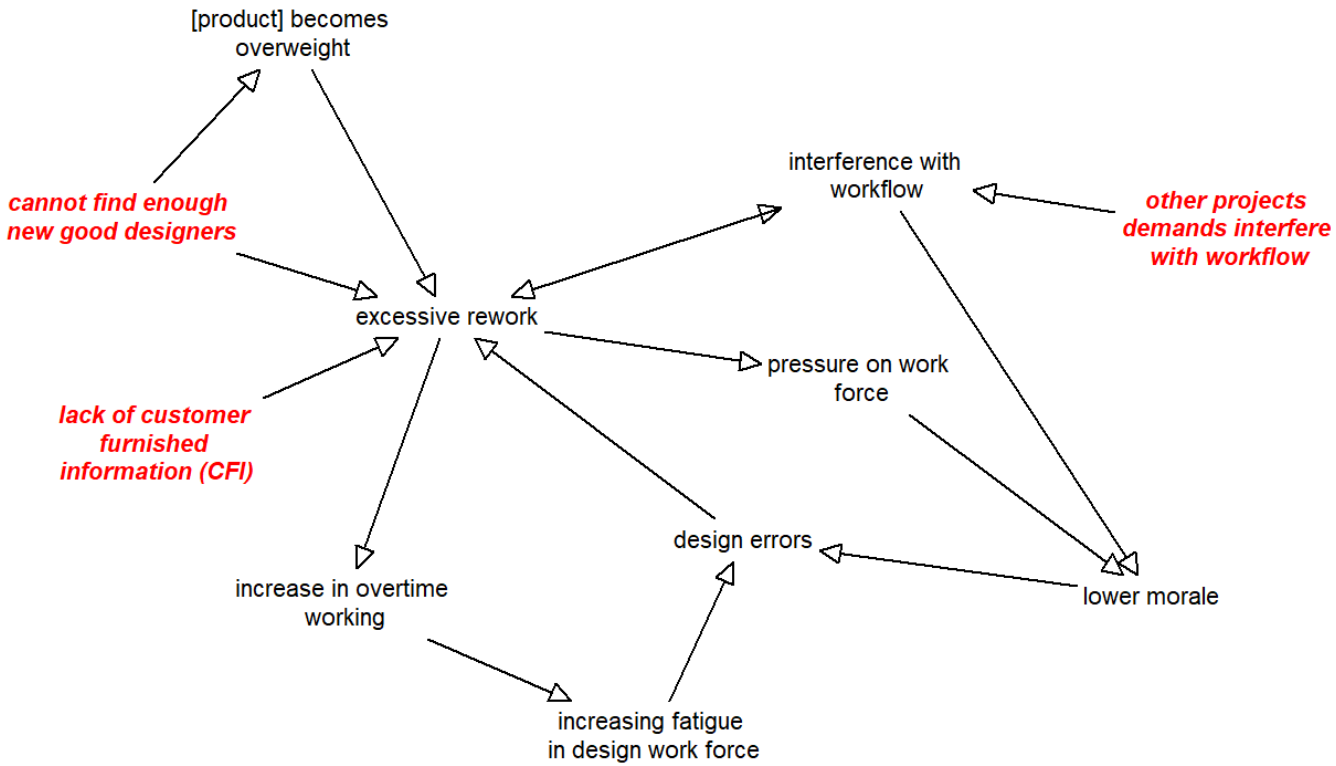
This quick, 'rough and ready', causal map fundamentally ***changed the view of the project team***: 4 vicious cycles – understanding problem escalation



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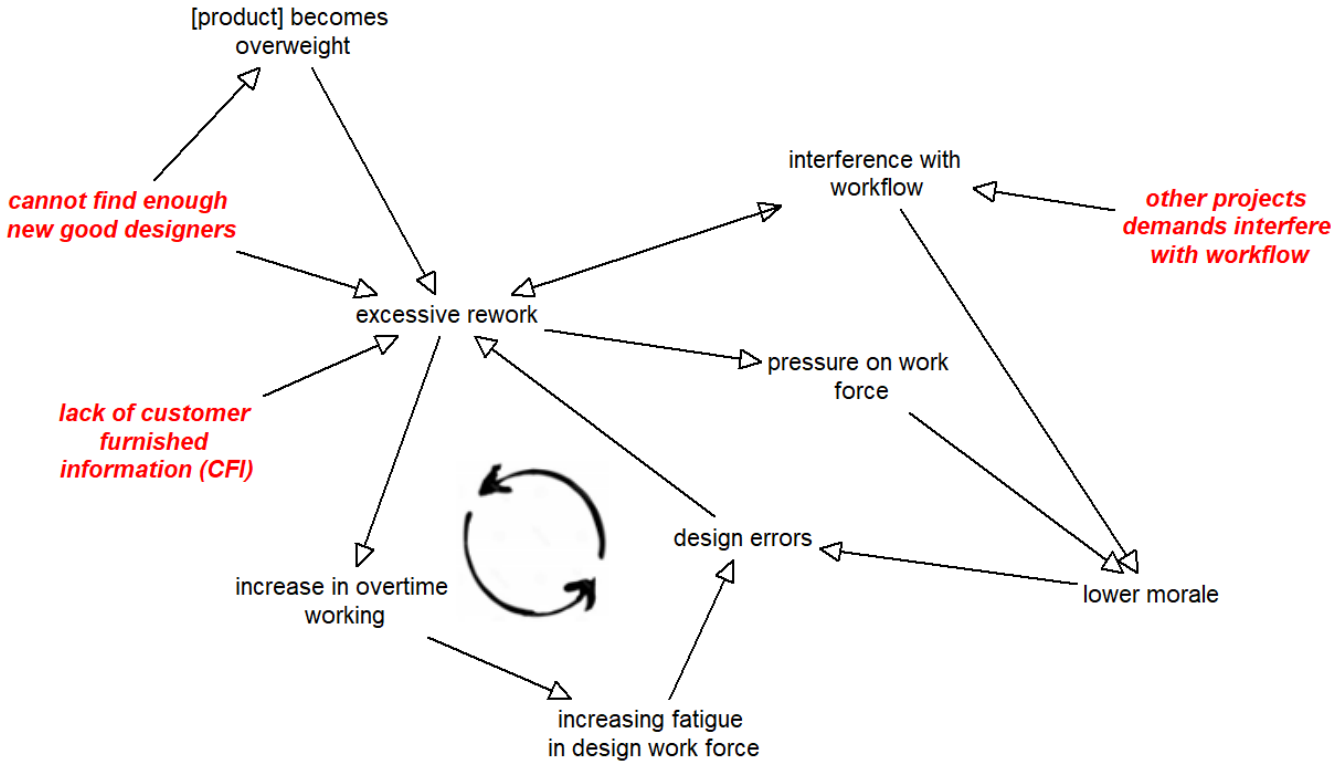

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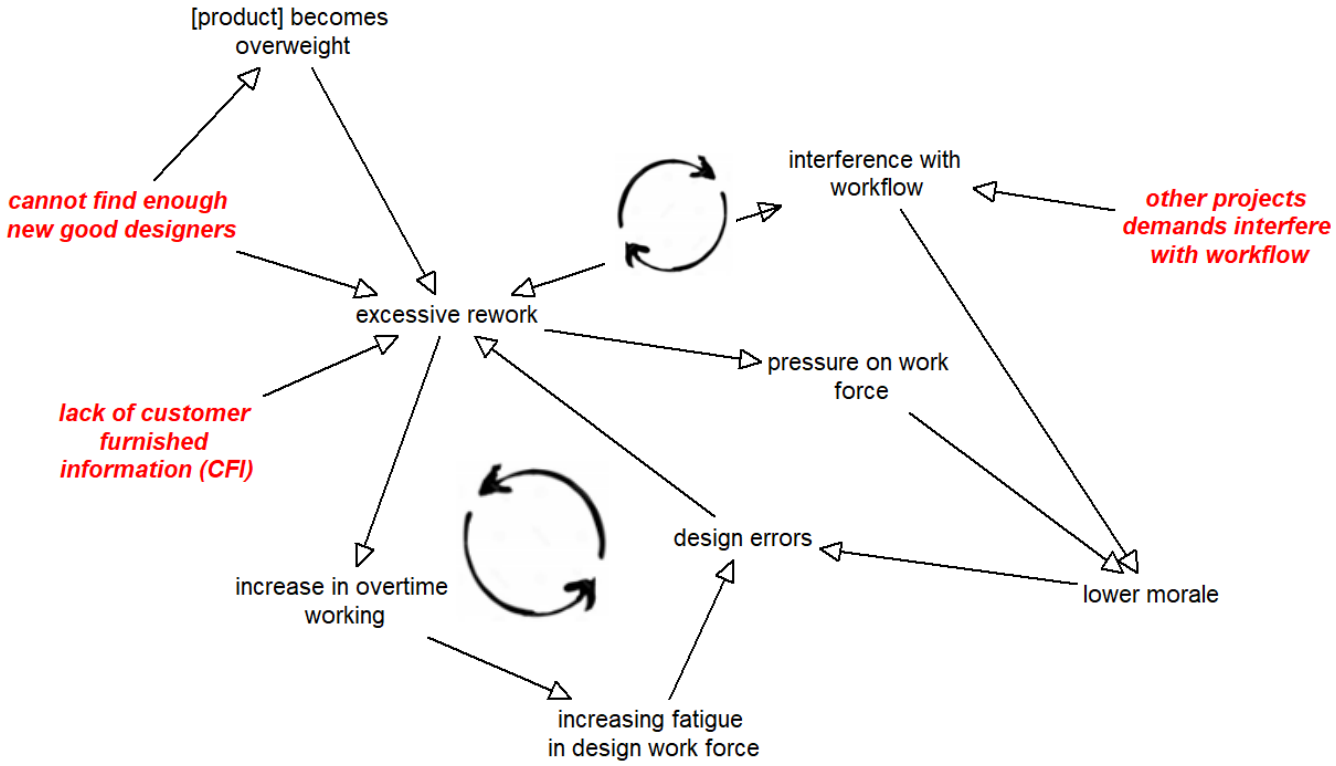

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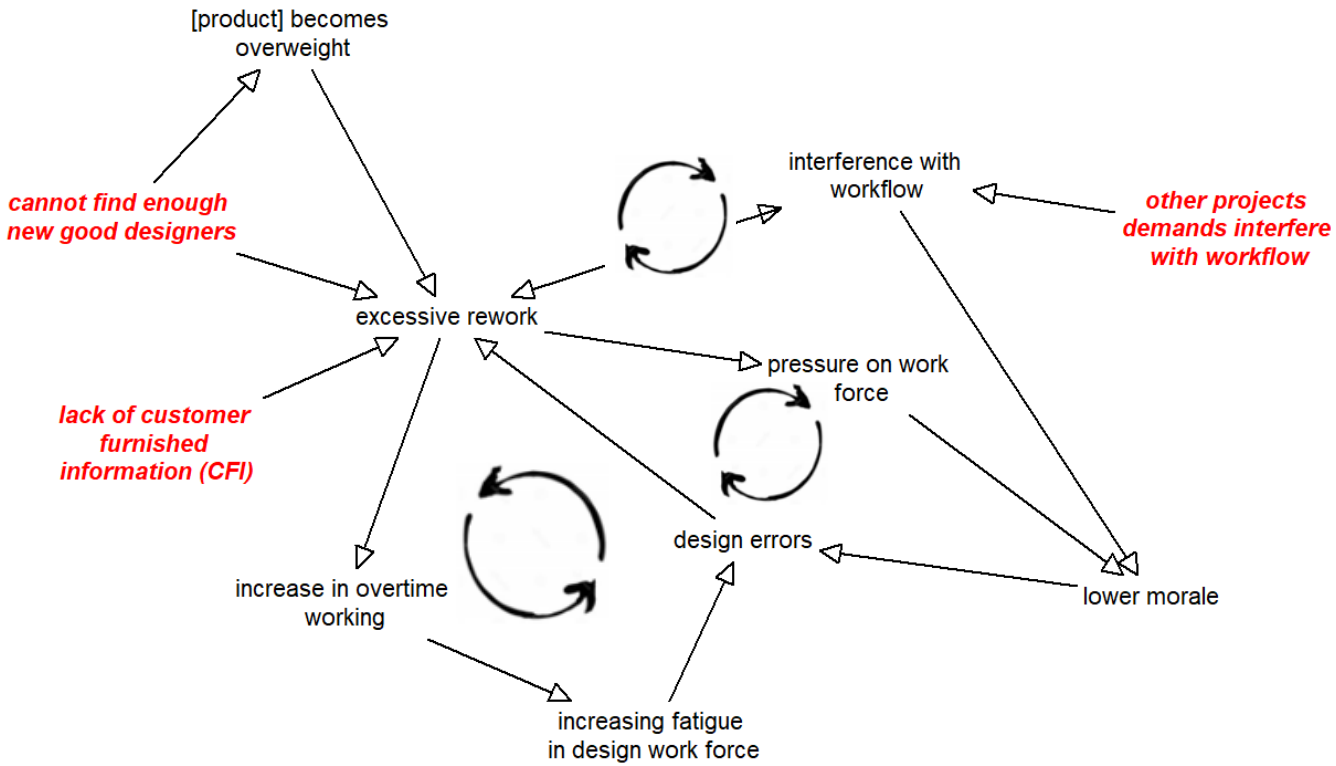

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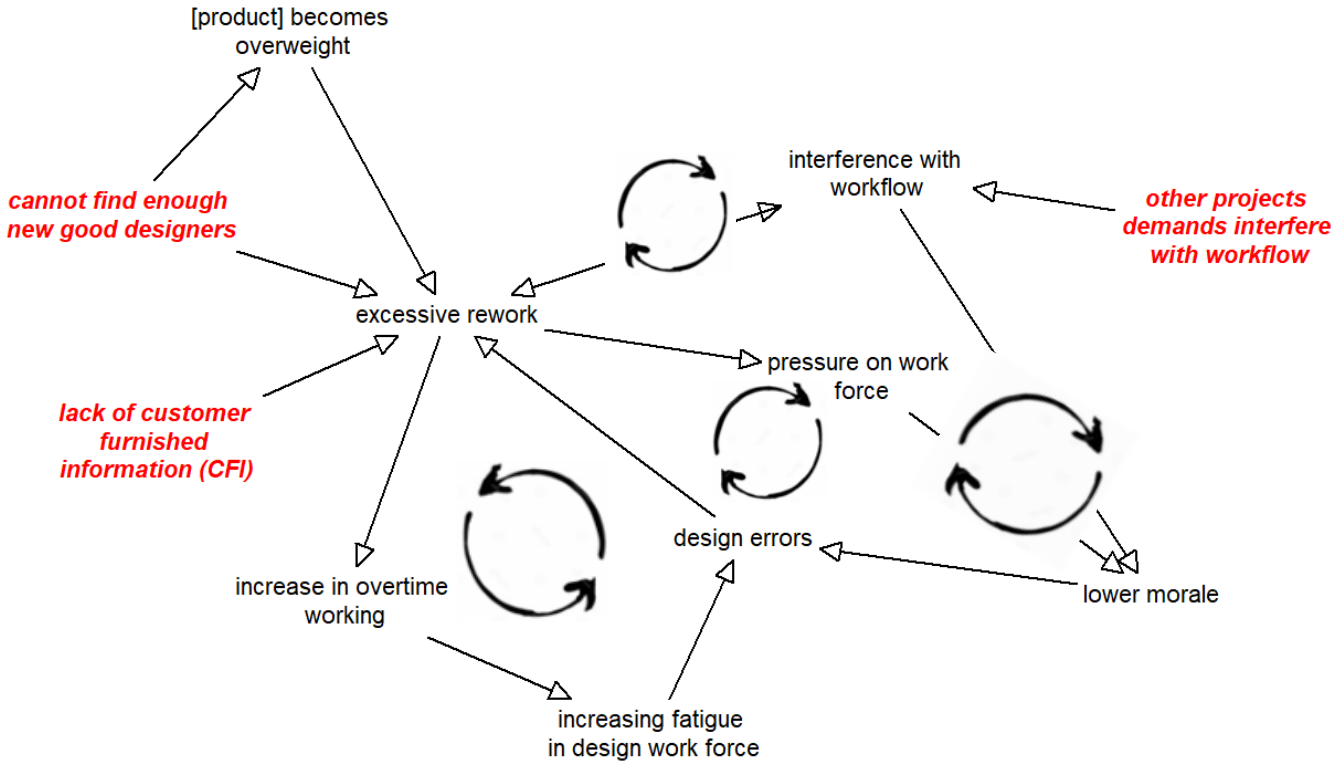

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Systemic Risk Assessment and Mitigation

Using Causal Mapping and *Strategyfinder*

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‘Fast and Furious’ (2hr)… the *Strategyfinder* Risk Management Method for effective risk mitigation

- Identify an interdisciplinary team for risk assessment and mitigation
- Use *Strategyfinder* ‘blind gather’ to get **independent perspectives** on possible risks from each team member
  - Team members work together but can be located anywhere with an internet connection
- Cluster them into topics/themes, discuss and edit

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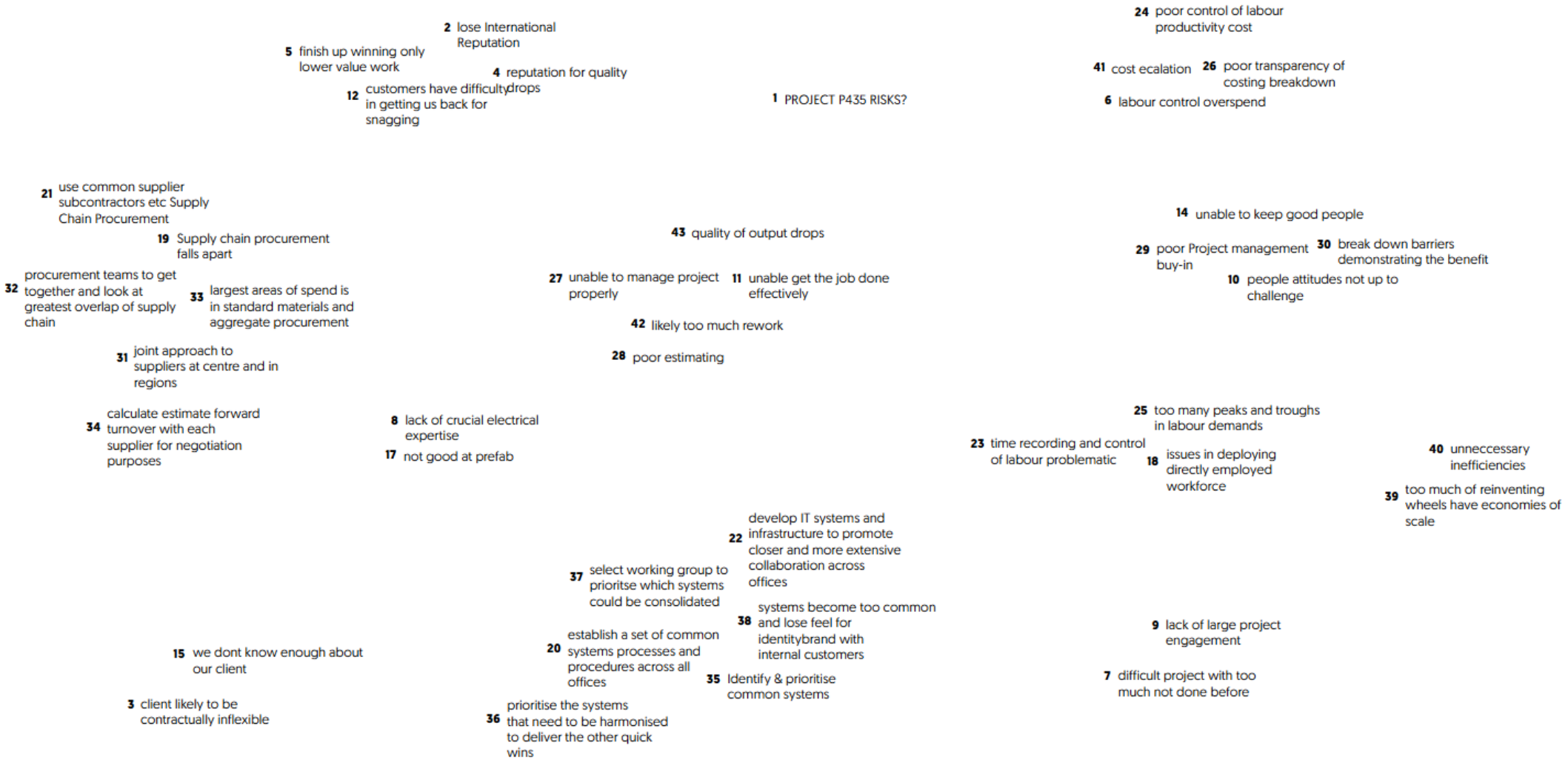
Initial Clustered Gather (18mins/ 9 participants/ 37 risks)



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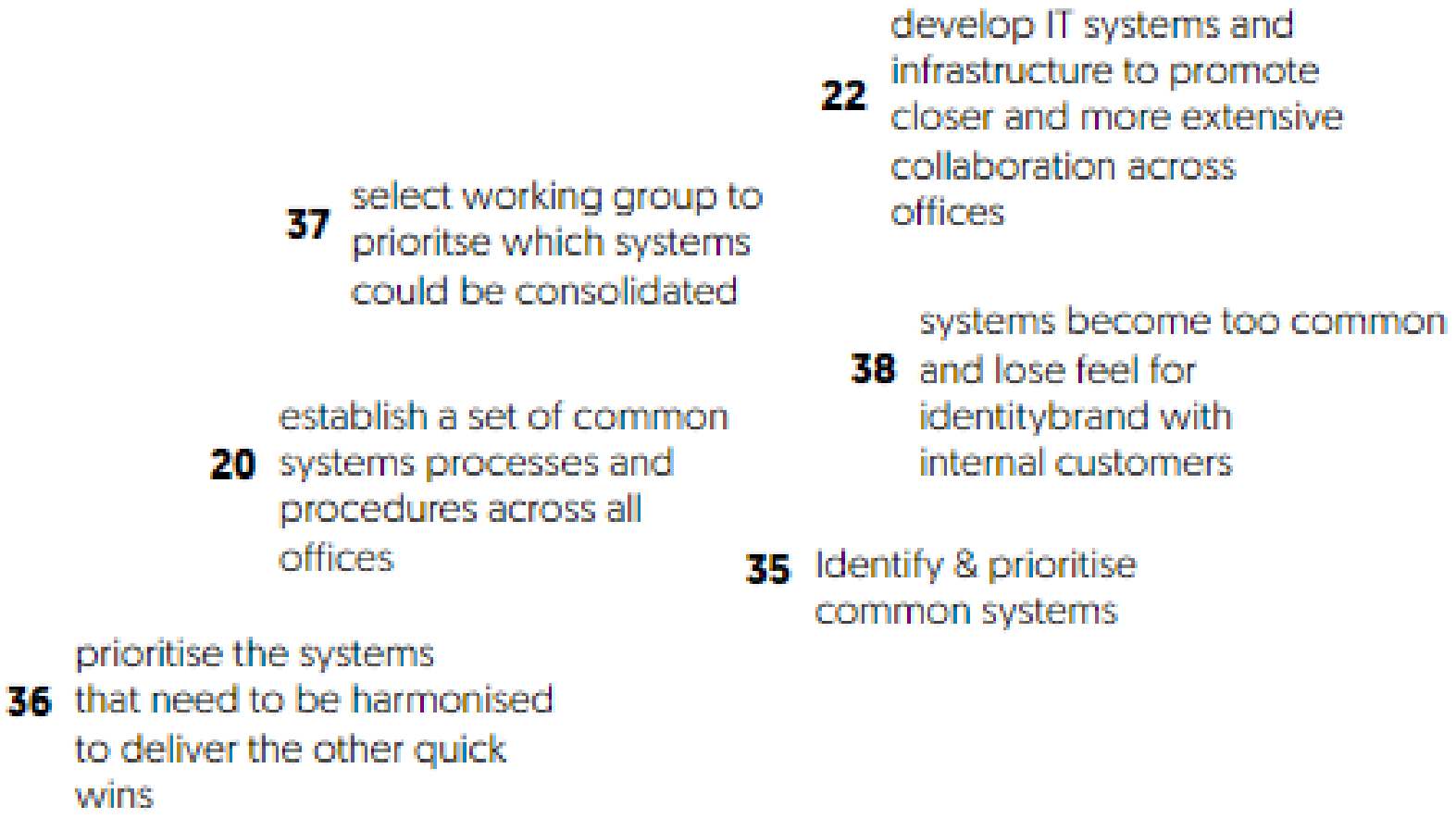
One of the clusters related to ‘systems’/ ‘collaborative working’

[numbers act as easy reference]



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Why ‘blind gather’ is important…

- **Anonymity**
  - Opens up risks, particularly when group is interdisciplinary

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  (~50 risks in 20mins)

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and participants can be anywhere with an internet connection

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- Create the likely system of risks
  - Gather views on causal links [arrows showing causality]

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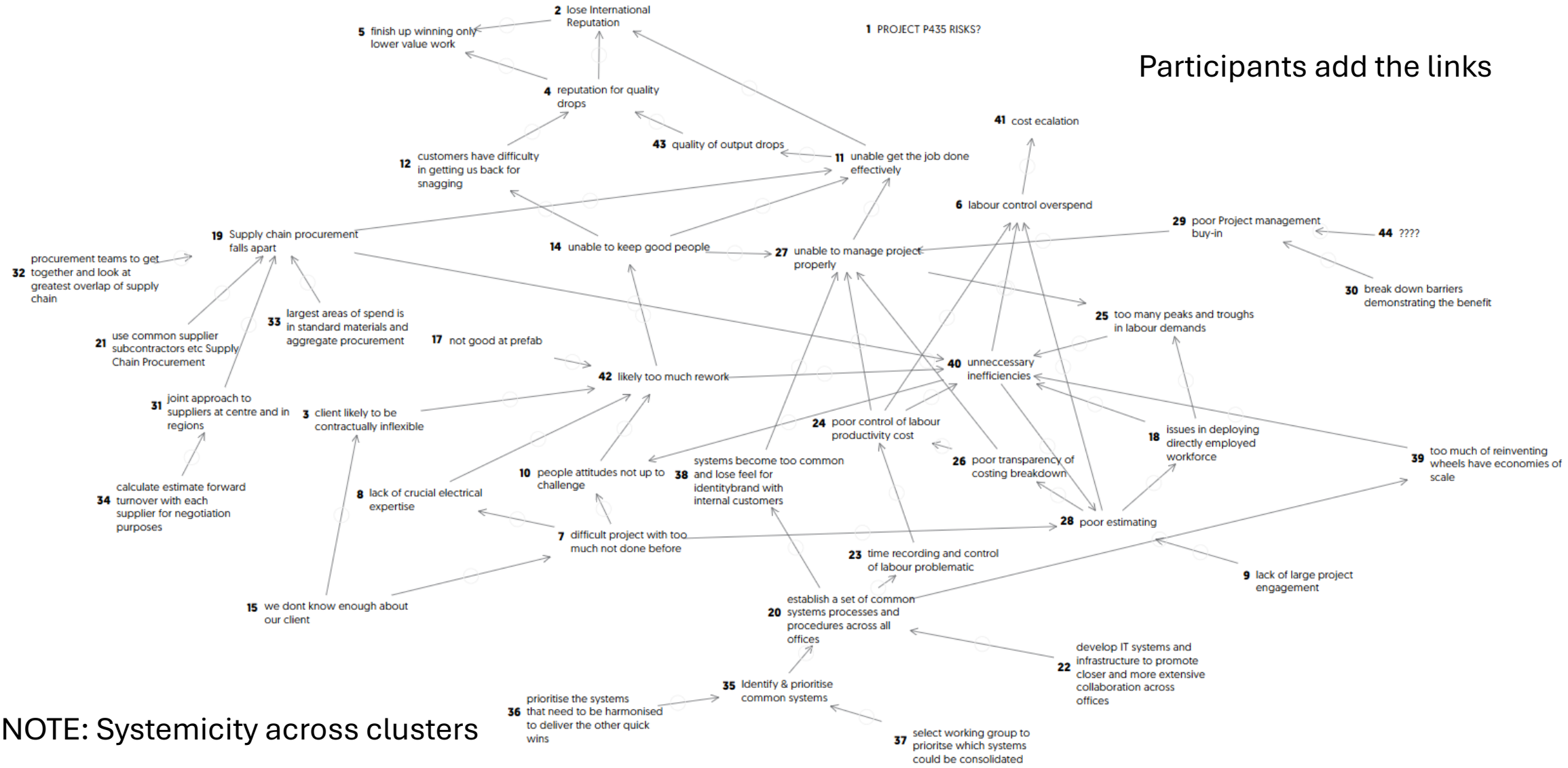
Initial gather linked



Participants add the links

NOTE: Systemicity across clusters

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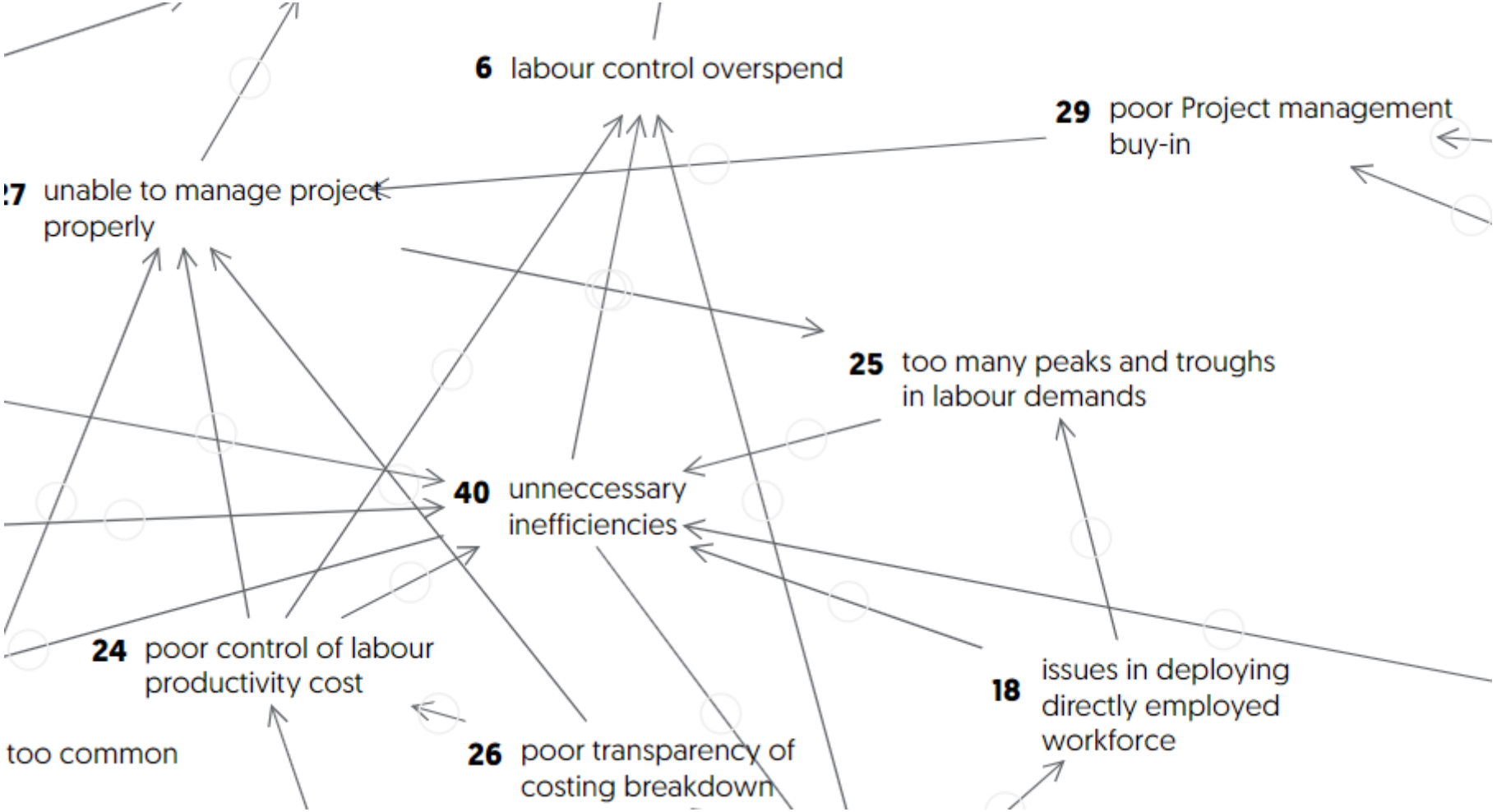

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- Find i) vicious cycles - where risks escalate over time and ii) those risks that impact the most critical outcomes

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Vicious/Virtuous feedback must be a primary focus for mitigation

- Feedback is *dynamic* - it keeps reinforcing itself
- Vicious cycles most common in risk systems
- Vicious gets more vicious – so **kill it or turn it virtuous**
  - Kill it by mitigation that 'deletes' a causality (arrow) or a risk
  - Turn it virtuous by 'flipping' it – but difficult
- **Virtuous should be exploited** – so make it work harder/faster/more robustly

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‘Fast and Furious’… the *Strategyfinder* Risk Management Method for effective risk mitigation

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Strategyfinder analysis tools:

  - Analyse the system for potent risks that drive the most vicious cycles
  - Analyse the system for the potent risks that impact the most outcomes and through the most paths
  - Analyse the system to find the most central risks at the core of the system

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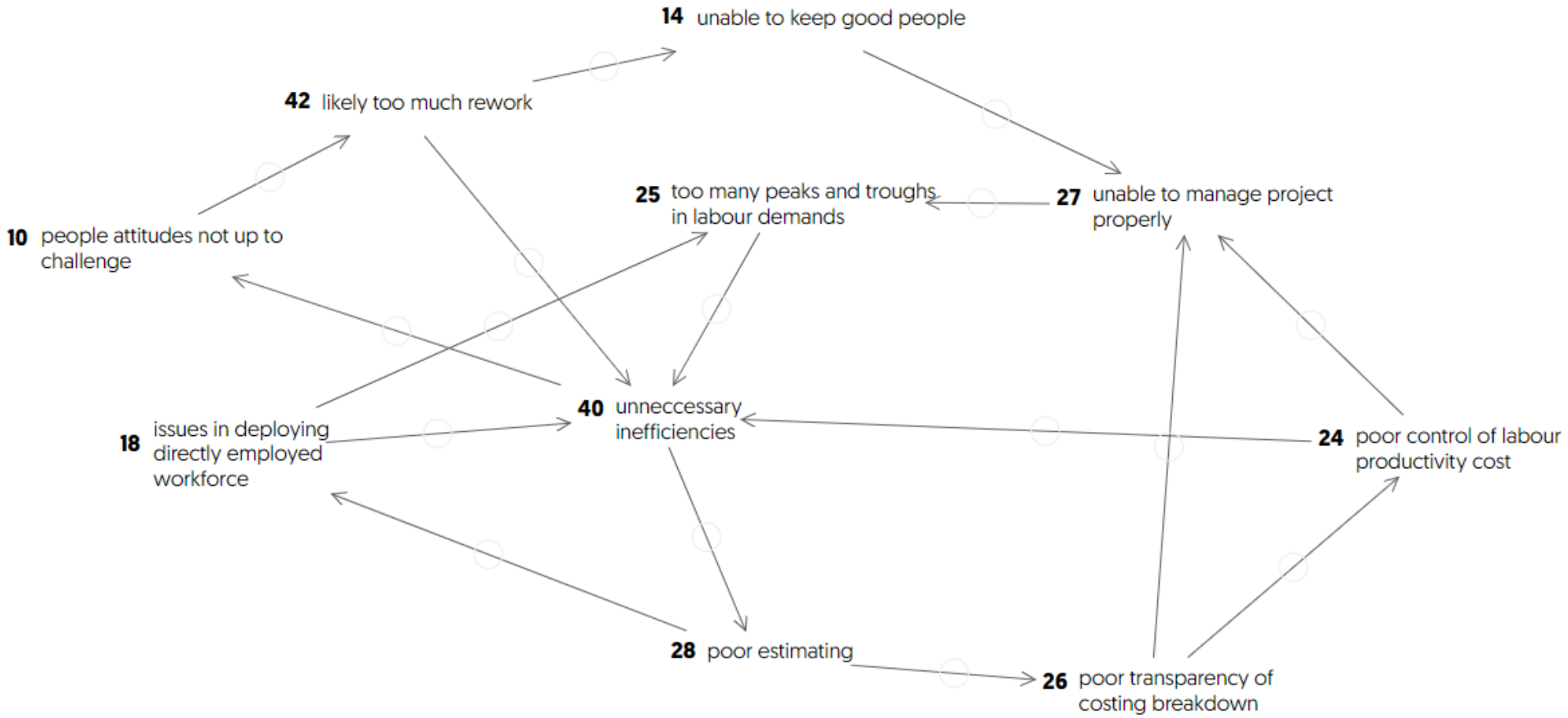
Feedback loop analysis

Summary	Loops	Potency nodes

Strongly connected components: 0
Loops: 7

Top 5 potency nodes:

Potency	#	Statement
7	40	unneccessary inefficiencies
5	28	poor estimating
4	25	too many peaks and troughs in labour demands
3	27	unable to manage project properly
3	26	poor transparency of costing breakdown



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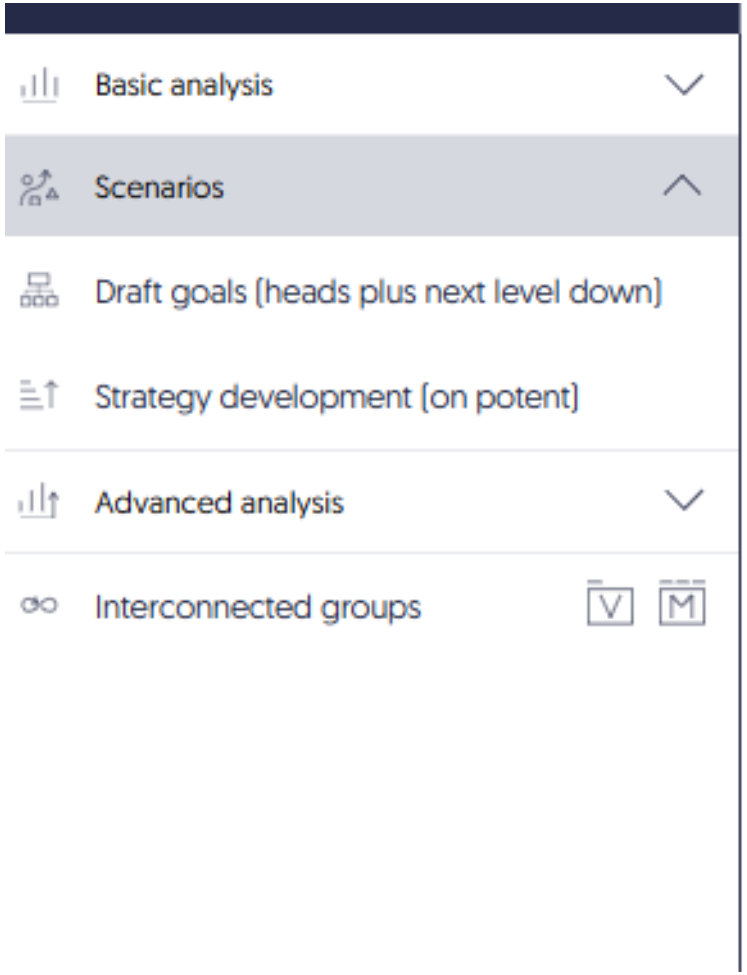
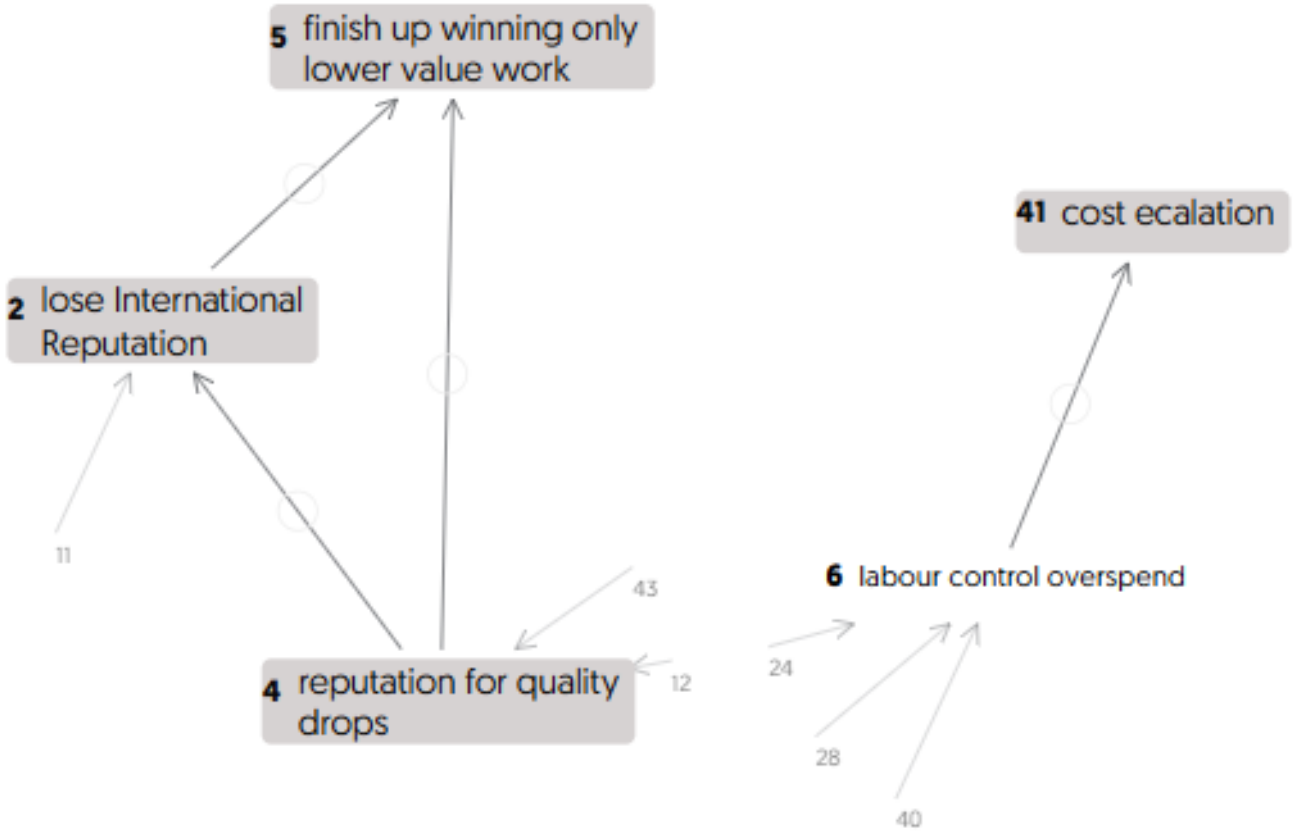
Outcomes/Goals – via automatic scenario analysis





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Risk mitigation

- Develop **action portfolios** for potent risks
- Potent risks identified through analysis of the risk system
  - risks that have the biggest impact on **reducing the most vicious cycles**
  - risks that have the **biggest impact on project goals**, and are **most robust** – many possible ways of impacting goals

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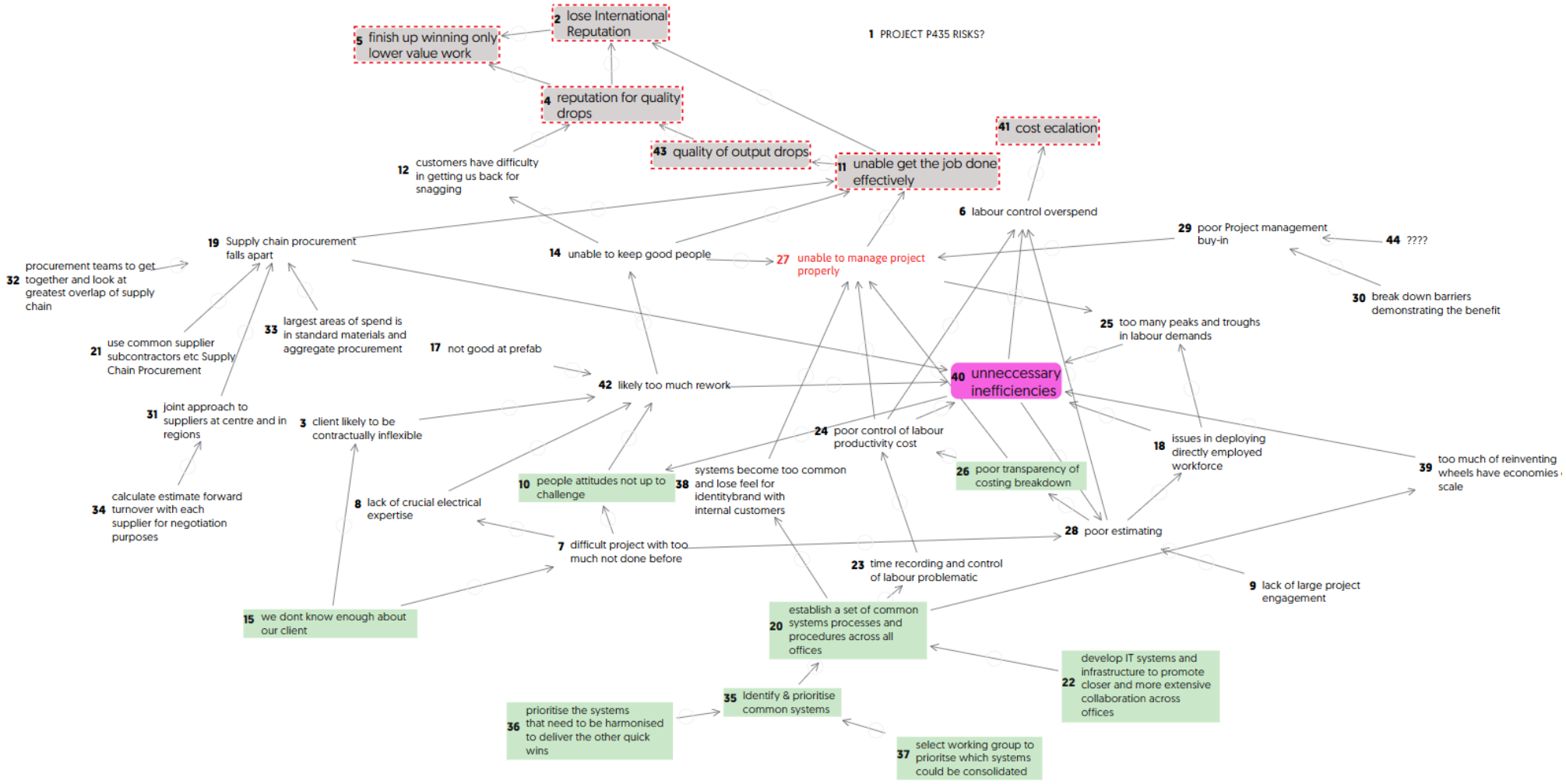
Hierarchical potency on Project Outcomes/Goals

H. potency	#	Statement
100	15	we dont know enough about our client
82	7	difficult project with too much not done before
50	20	establish a set of common systems processes and procedures across all offices
46	28	poor estimating
34	18	issues in deploying directly employed workforce
29	26	poor transparency of costing breakdown
23	24	poor control of labour productivity cost
21	19	Supply chain procurement falls apart
18	42	likely too much rework
17	40	unneccessary inefficiencies
10	14	unable to keep good people
10	27	unable to manage project properly
2	12	customers have difficulty in getting us back for snagging



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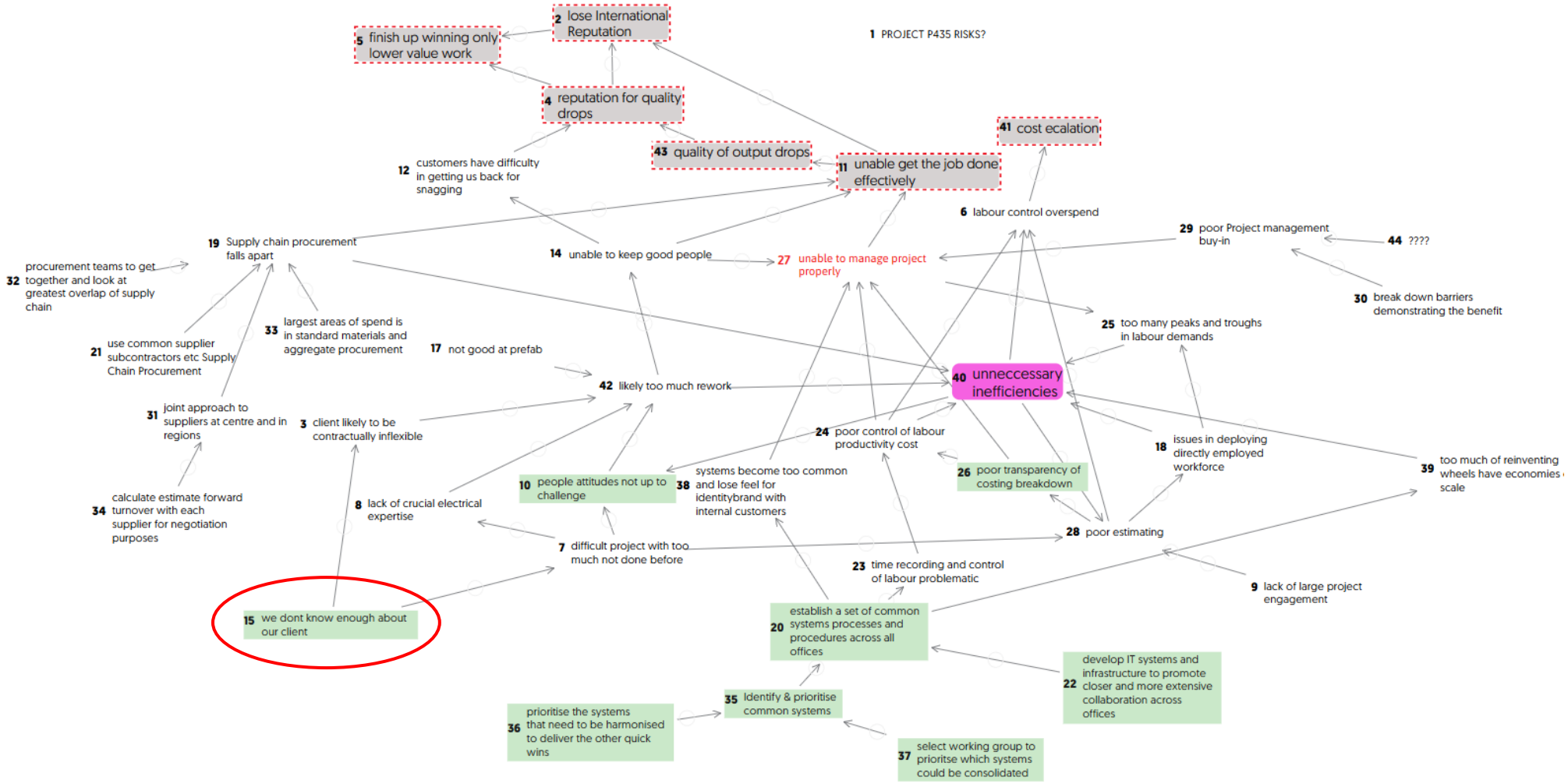

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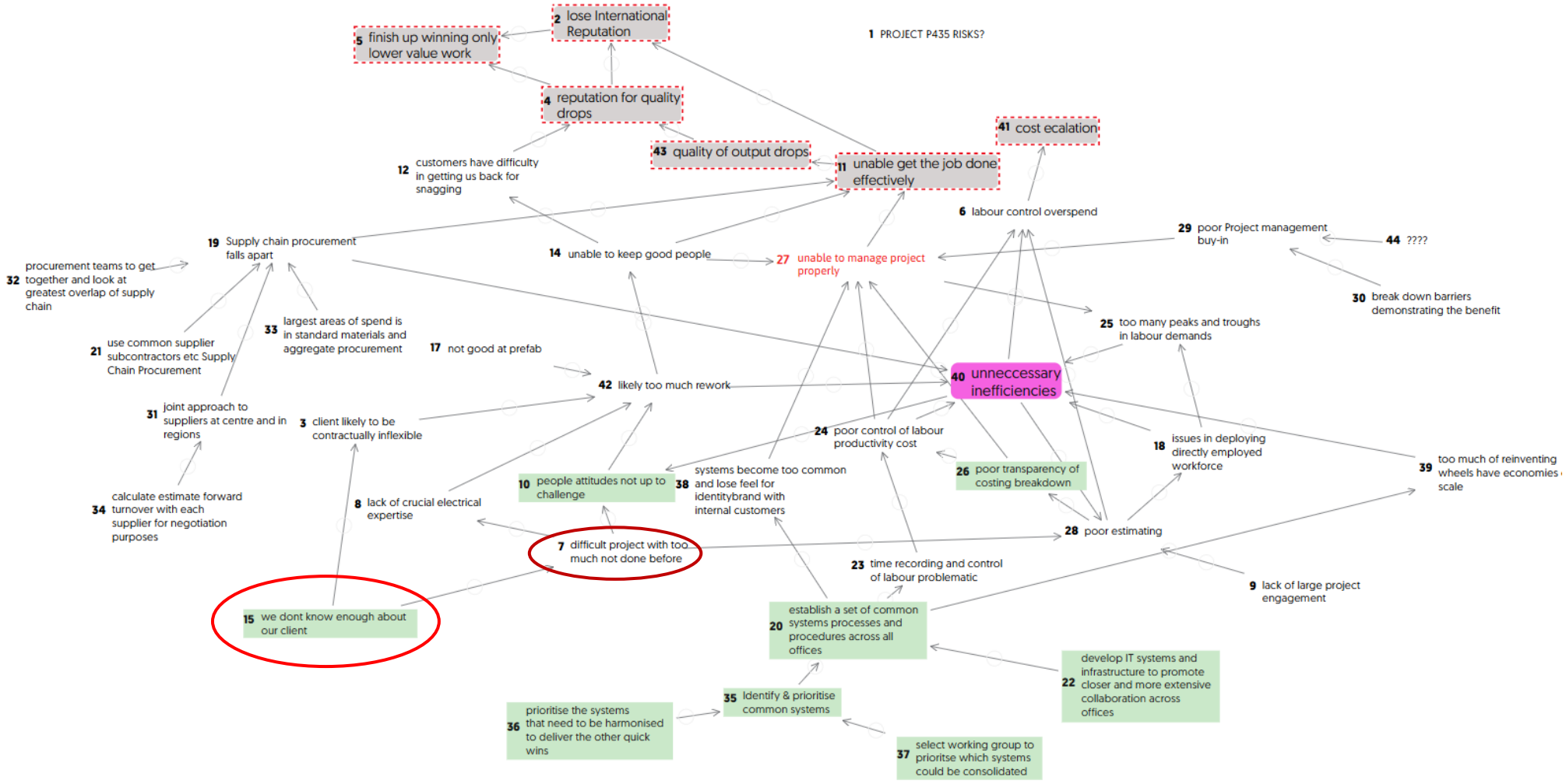
Hierarchical potency on Project Outcomes/Goals

H. potency	#	Statement
100	15	we dont know enough about our client
82	7	difficult project with too much not done before
50	20	establish a set of common systems processes and procedures across all offices
46	28	poor estimating
34	18	issues in deploying directly employed workforce
29	26	poor transparency of costing breakdown
23	24	poor control of labour productivity cost
21	19	Supply chain procurement falls apart
18	42	likely too much rework
17	40	unneccessary inefficiencies
10	14	unable to keep good people
10	27	unable to manage project properly
2	12	customers have difficulty in getting us back for snagging



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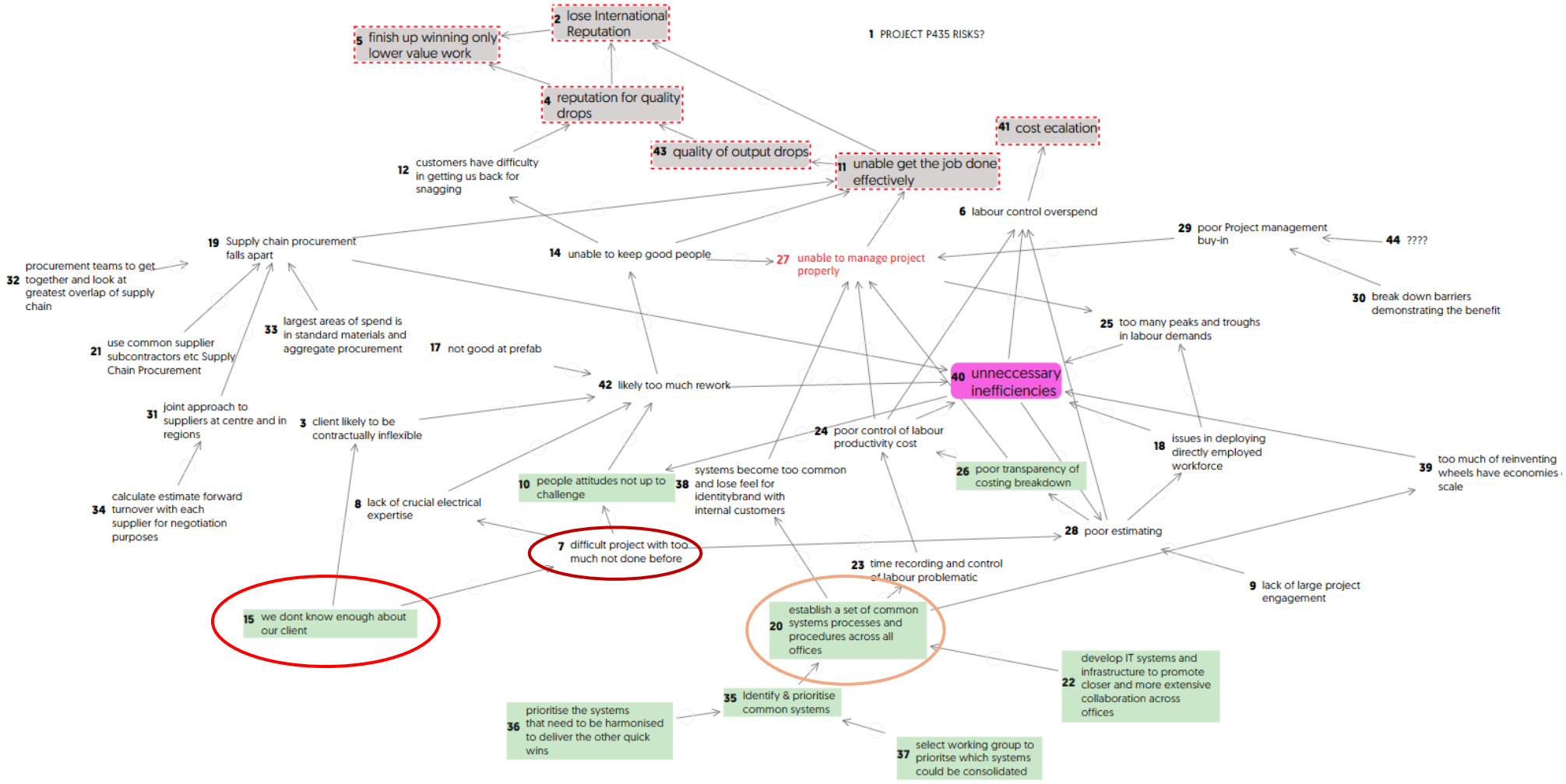

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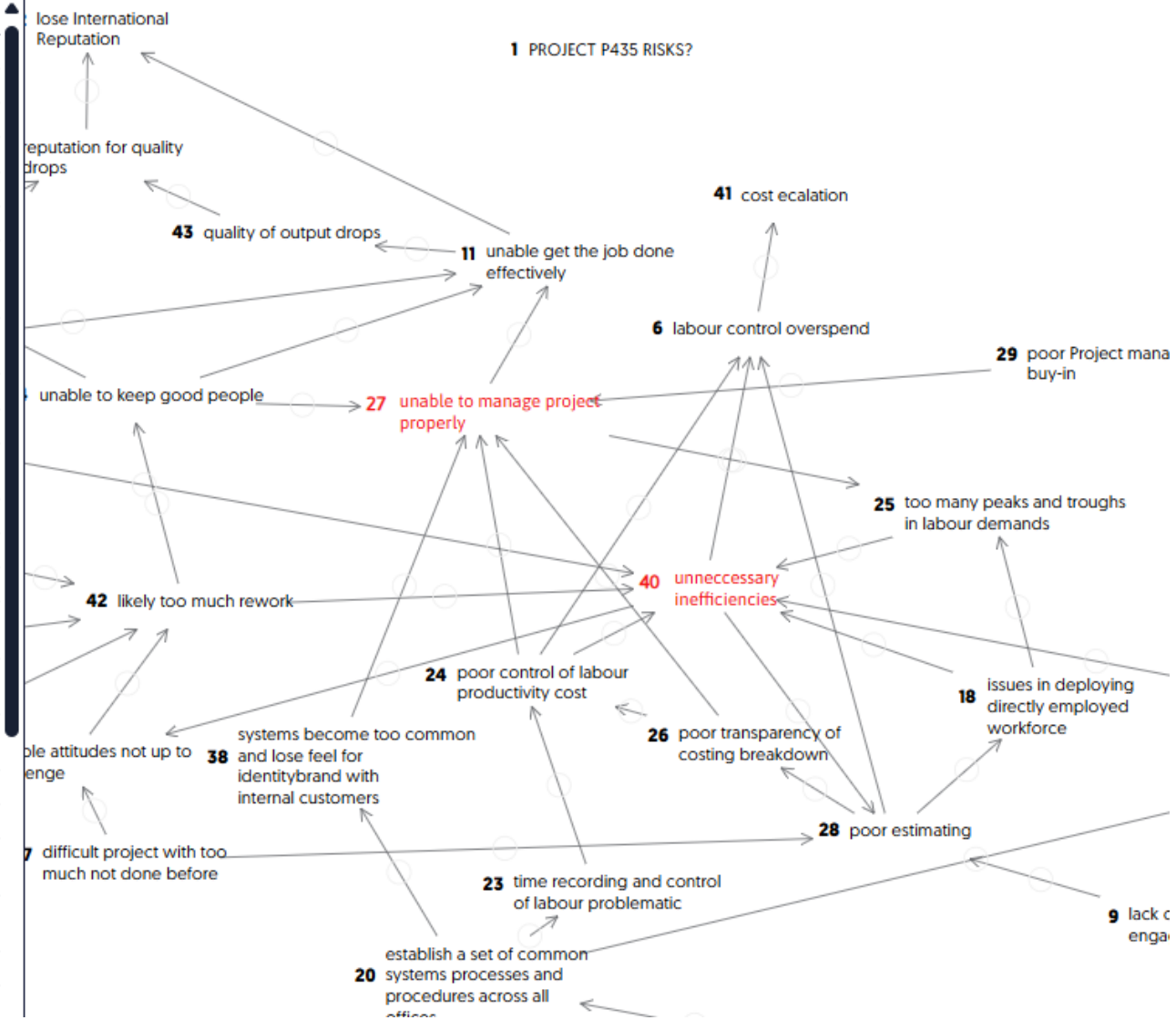
Ins/Outs centrality

Outgoings | Ingoings | Ins/Outs

Links	#	Statement
9	40	unneccessary inefficiencies
7	27	unable to manage project properly
6	19	Supply chain procurement falls apart
6	28	poor estimating
6	42	likely too much rework
5	11	unable get the job done effectively
5	20	establish a set of common systems processes and procedures across all offices
5	24	poor control of labour productivity cost
4	4	reputation for quality drops
4	6	labour control overspend
4	7	difficult project with too much not done before
4	14	unable to keep good people
3	2	lose International Reputation
3	10	people attitudes not up to challenge
3	18	issues in deploying directly employed workforce
3	25	too many peaks and troughs in labour demands
3	26	poor transparency of costing breakdown
3	29	poor Project management buy-in
3	35	Identify & prioritise common systems
2	3	client likely to be contractually inflexible
2	5	finish up winning only lower value work
2	8	lack of crucial electrical expertise
2	12	customers have difficulty in getting us



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‘Fast and Furious’… the *Strategyfinder* Risk Management Method for effective risk mitigation

- Identify an interdisciplinary team for risk assessment and mitigation
- Use Sf blind gather to get independent perspectives on possible risks from each team member
  - Team members work together but can be located anywhere with an internet connection
- Cluster them into topics/themes, discuss and edit
- Create the likely system of risks
  - Gather views on causal links [arrows showing causality]
- Find i) vicious cycles - where risks escalate over time and ii) those risks that impact the most critical outcomes
- Use *Strategyfinder* analysis tools to:
  - Analyse the system for potent risks that drive the most vicious cycles
  - Analyse the system for the potent risks that impact the most outcomes and through the most paths
  - Analyse the system to find the most central risks at the core of the system
- Explore possible mitigation strategies for these potent risks
- Evaluate possible strategies to find the strategies with both high impact on outcomes and practicality
  - Use *Strategyfinder* evaluation tools: rating and preferencing

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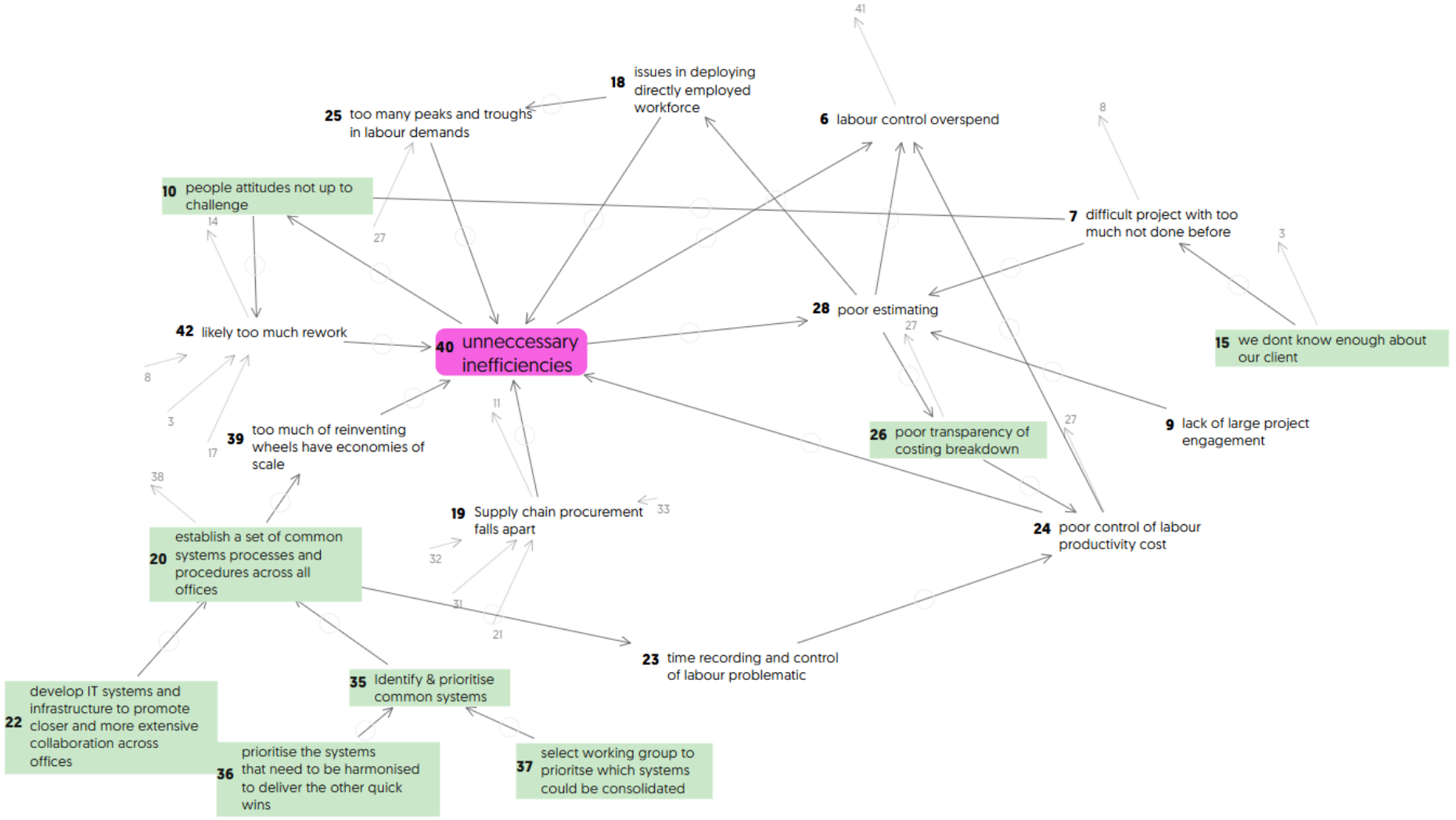
Option development focused on most potent risk



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Evaluating mitigation options

- *Strategyfinder* 'preferencing'
  - Allocating restricted resources to achieve both:
    - Relative impact on outcomes
    - Relative practicality on achievement
- *Strategyfinder* 'rating'
  - Against an anchored scale

- Both show average scores and degree of consensus

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Risk workshop took 1.5hrs

(inc 10min break)

Involved 9 cross-disciplinary people (VP Projects, in-house contract lawyer, sales person, 2xprocess estimators, expected project manager, 2xdesign engineer, HR manager)

Plan for next 3hr workshop to mitigate next level of potent risks

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Closing comments

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Systemic Risk assessment

- Do it pre-bid (effective process in 3hrs with the right group using *Strategyfinder* method)
  - But danger of being over frightened and so never bidding
  - Thus, ensure potential optimal mitigation is considered
- Do it at handover from bid team to project team – contract 'kick-off'
- Do it at regular intervals as a part of good project management
  - Mark disappeared risks, executed strategies, new risks, etc
  - Keep history of risk models after each project t review meeting
- Organisational learning

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Selected Reading...

- Eden, C., Ackermann, F. and Williams, T. (2005) The Amoebic Growth of Project Costs. *Project Management Journal* ***36, 15-27***
- Ackermann, F., Eden, C., Williams, T. and Howick, S. (2007) Systemic Risk Assessment a case study. *Journal of the Operational Research Society* ***58, 39-51.***
- Eden, C., Williams, T.M., Ackermann, F. and Howick, S. (2000) The role of feedback dynamics in disruption and delay on the nature of disruption and delay (D&D) in major projects. *Journal of the Operational Research Society* ***51, 291-300.***
- Howick, S. Eden, C. (2001) The Impact of Disruption and Delay when Compressing Large Projects Going for Incentives?, *Journal of the Operational Research Society*. ***52, 26-34***.
- Williams, T.M., Ackermann, F., Eden, C. Howick, S. (2004) Learning from Project Failure, in P. Love, Z. Irani, P. Fong (Eds.), *Management of Knowledge in Project Environments*, Elsevier/Butterworth-Heinemann, Oxford, pp. 219-236.

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