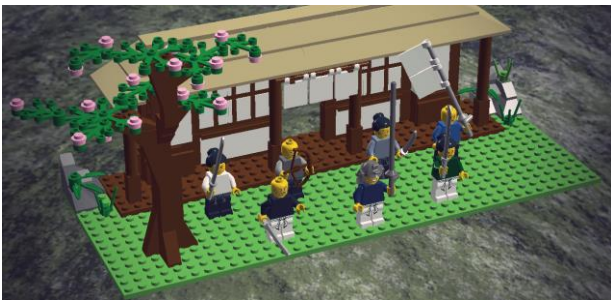




Return of the Seven Samurai

Systems Thinking for Safety Change

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Martin, J. N. (2004). The Seven Samurai of Systems Engineering: Dealing with the Complexity of 7 Interrelated Systems. Presented at the 2004 Symposium of the International Council on Systems Engineering (INCOSE).



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Case 1: Nighttime runway closure



- Context of the change
- Problem 1 - The incident
- Change 1 – Intervention
 - Intervention, Realisation, Deployment, Modified Context, Problem 2, Competing systems
- Change 2 – Modified intervention
 - Intervention, Realisation, Deployment, Modified Context, Problem 3, Competing systems
- Change 3
 - Intervention, Realisation, Deployment, Modified Context



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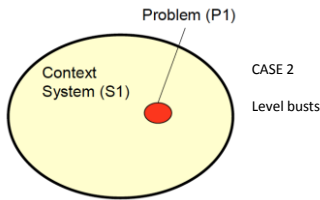
Case 2: Standard pressure setting



- Context of the change
 - Busy and complex airspace, regular and irregular users, low atmospheric pressure
- Problem 1 – Level busts
- Change 1 – Intervention
 - Intervention, Realisation, Deployment, Modified Context , Problem 2, Competing systems, Collaborating systems, Sustaining systems
- Change 2 – Reversal of intervention
 - Intervention, Realisation, Deployment

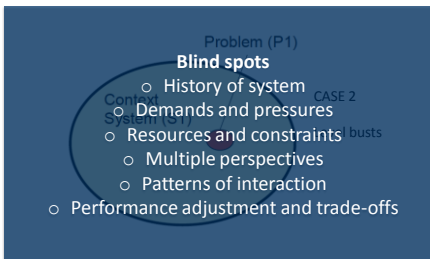


Context system (S1)



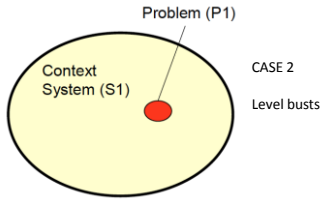


Context system (S1)

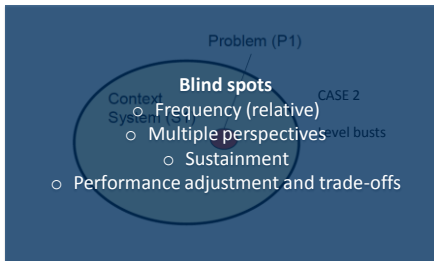




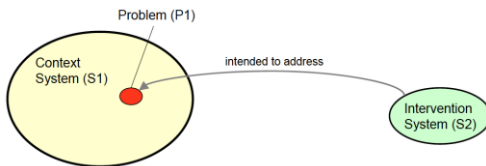
Problem (P1)



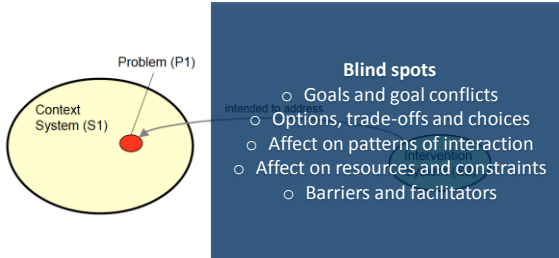
Problem (P1)



Intervention system (S2)

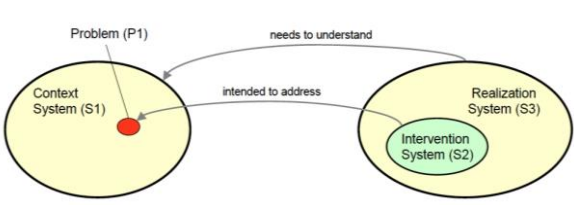


Intervention system (S2)

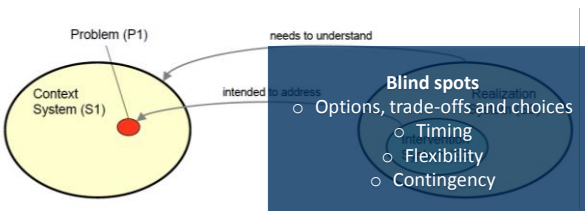


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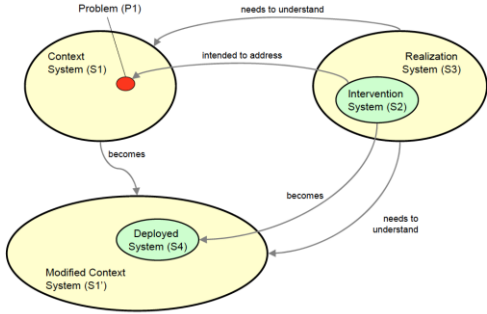
Realization system (S3)



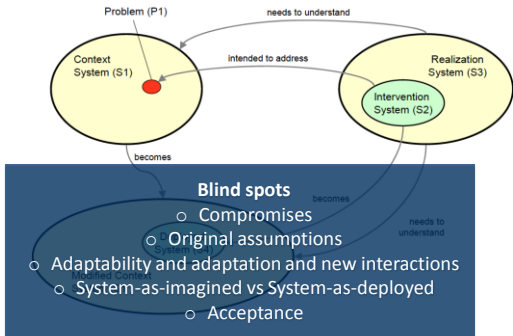
Realization system (S3)



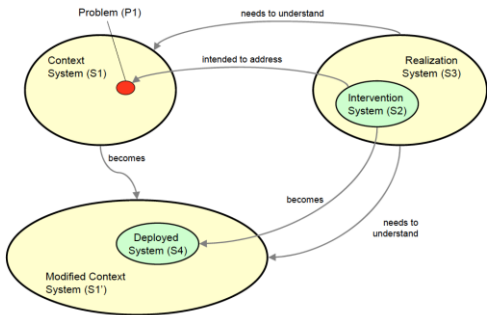
Deployed system (S4)



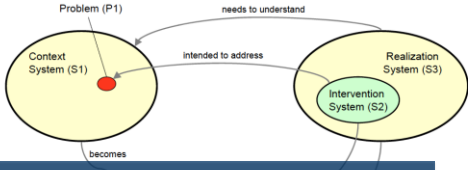
Deployed system (S4)



Modified context system (S1')



Modified context system (S1')

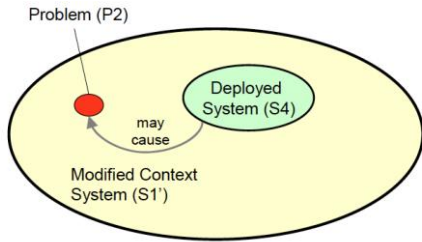


Blind spots

- New goal conflicts
- Affect on demand and pressure
- Affect on resources, constraints and environment
- Affect on patterns of interaction
- Performance adjustment and trade-offs



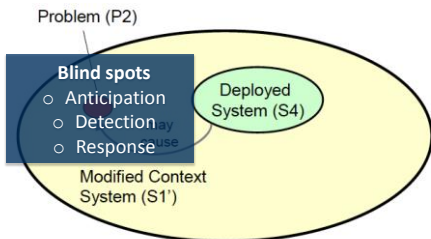
Problem (P2)



Moving forward with Safety-II

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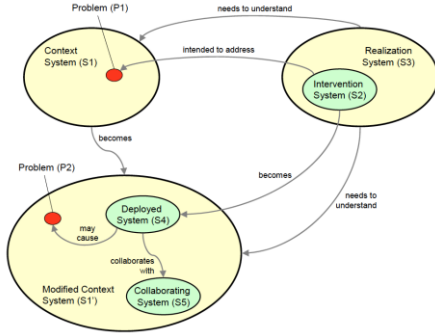
Problem (P2)



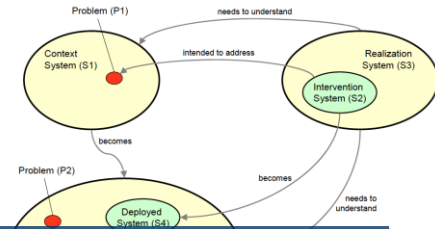
Moving forward with Safety-II

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Collaborating system (S5)



Collaborating system (S5)

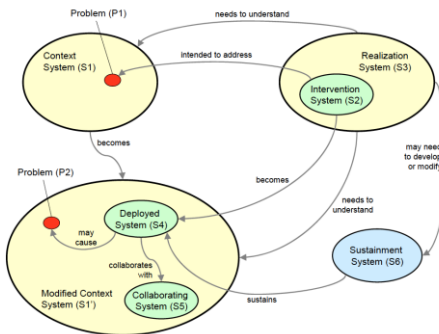


Blind spots

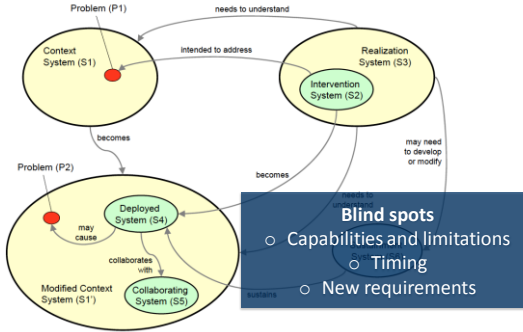
- Unanticipated changes to collaborating systems
- Unintended collaborations and new interactions
- Functional takeover



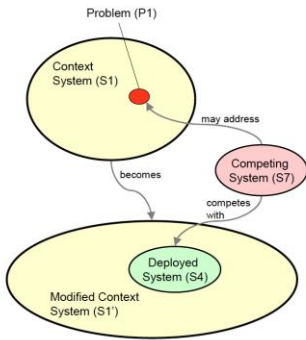
Sustainment system (S6)



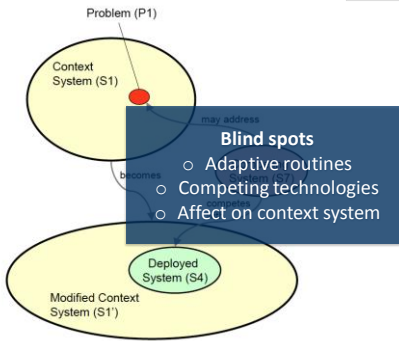
Sustainment system (S6)



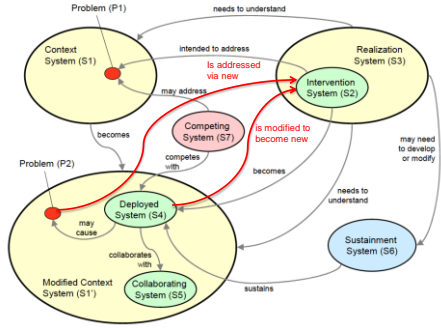
Competing system (S7)



Competing system (S7)



Seven Samurai – some more interactions...



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