



32nd Annual **INCOSE**
international symposium

hybrid event

Detroit, MI, USA
June 25 - 30, 2022

Sandra Dawson

Empowering Engineers in a Digital Engineering Transition

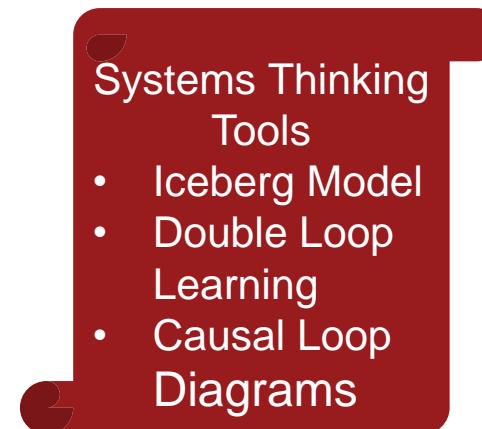
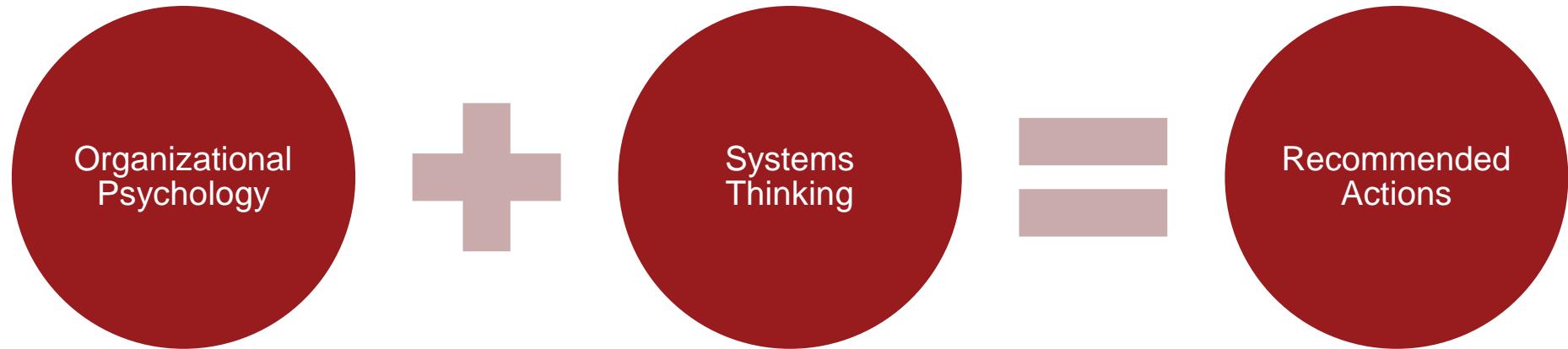


Agenda

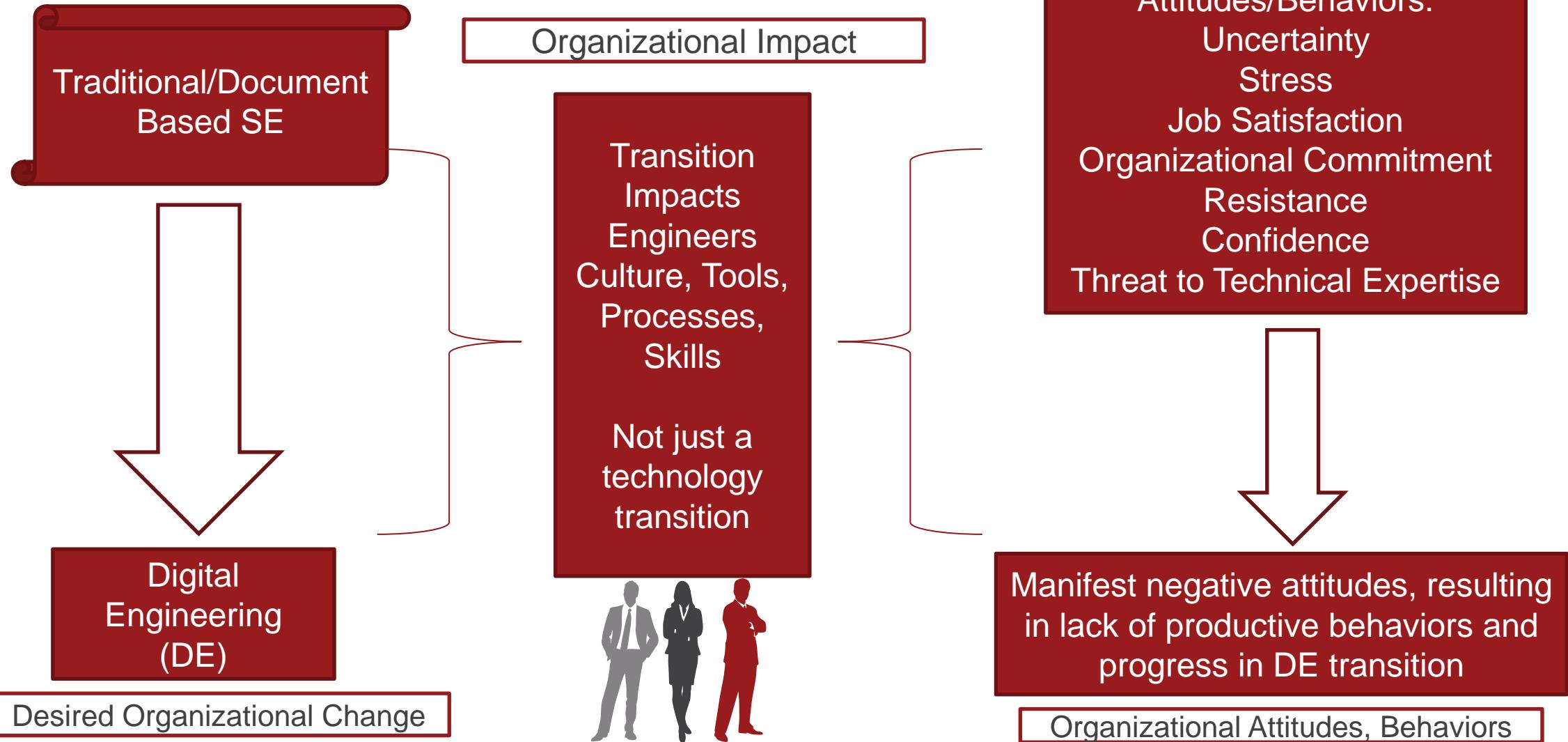
- Introduction
- Organizational Psychology Approach
- Systems Thinking Approach
- Recommended Actions
- Challenges
- Conclusion



Introduction - Approach to Problem

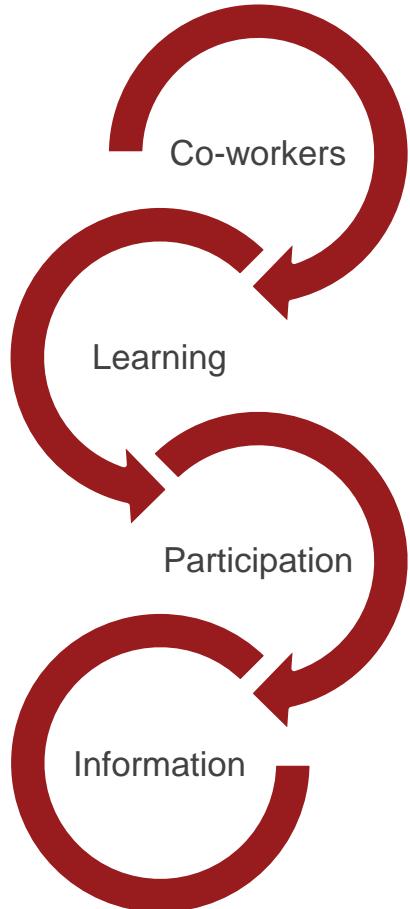
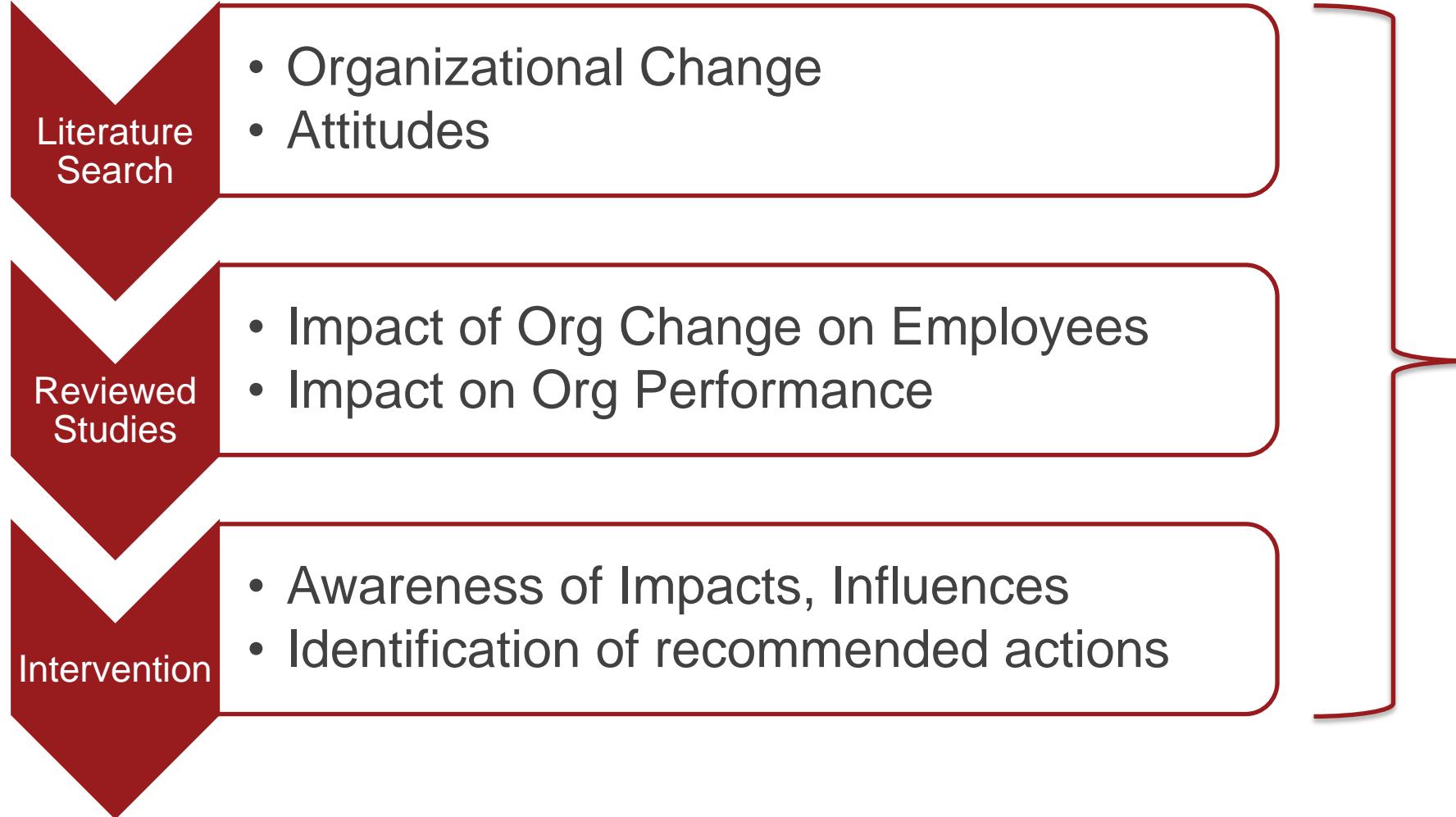


Introduction – Organizational Perspectives





Organizational Psychology Approach



Systems Thinking Approach



System Context = DE Transition across Product Development Lifecycle

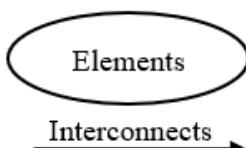
System of Interest = Culture of Engineers in DE Transition

Engineers' attitudes

Engineers' skills and effort

SE tools and processes

DE tools and processes



Enabling System = Organization

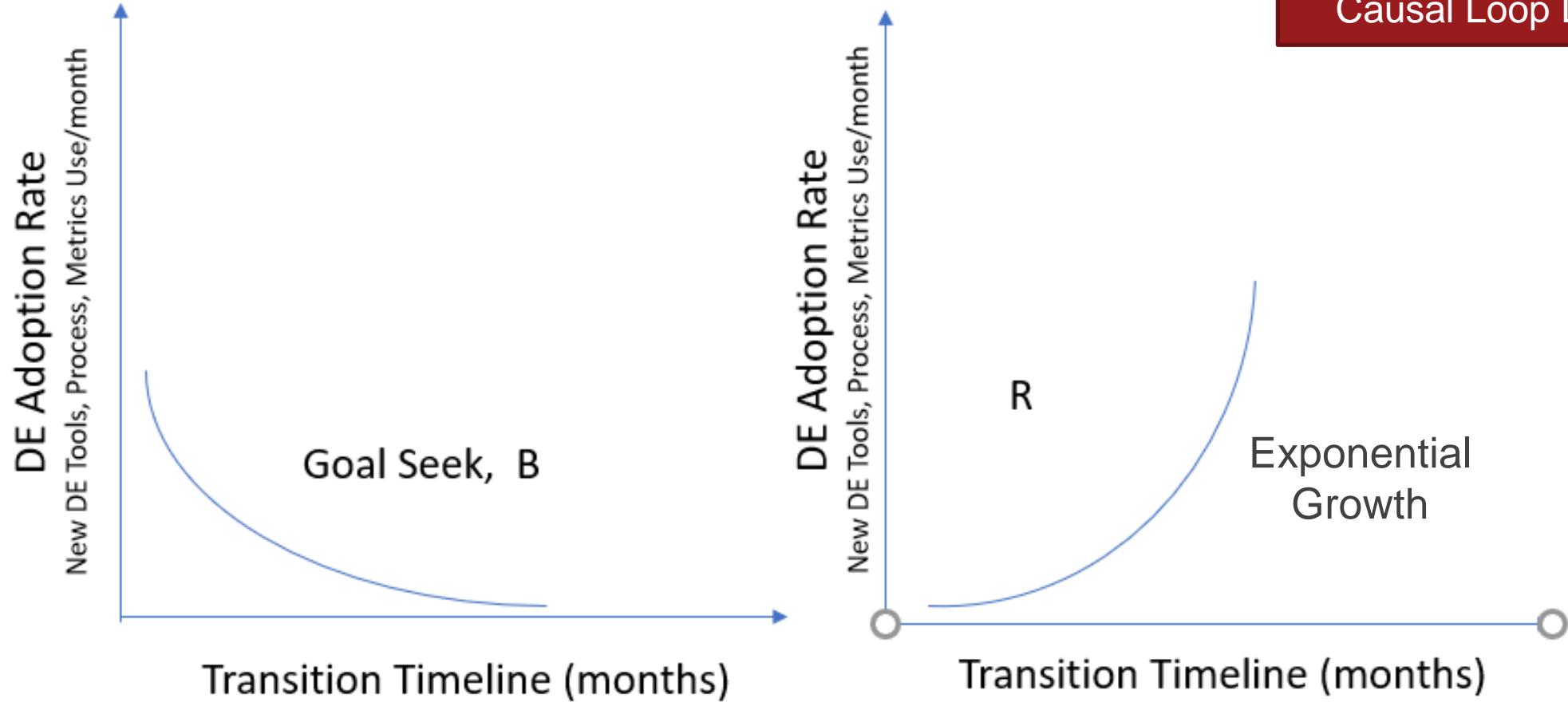
Systems Thinking Tools

- Iceberg Model
- Double Loop Learning
- Causal Loop Diagrams

Systems Thinking Approach – Define problem

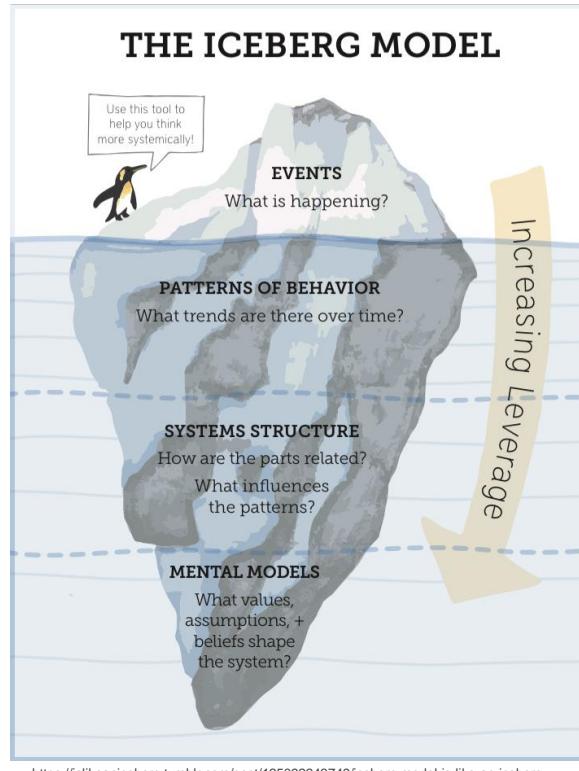


Behavior Changes and
Causal Loop Diagrams



Difference between current behavior (left) and desired behavior (right) is the organizational problem

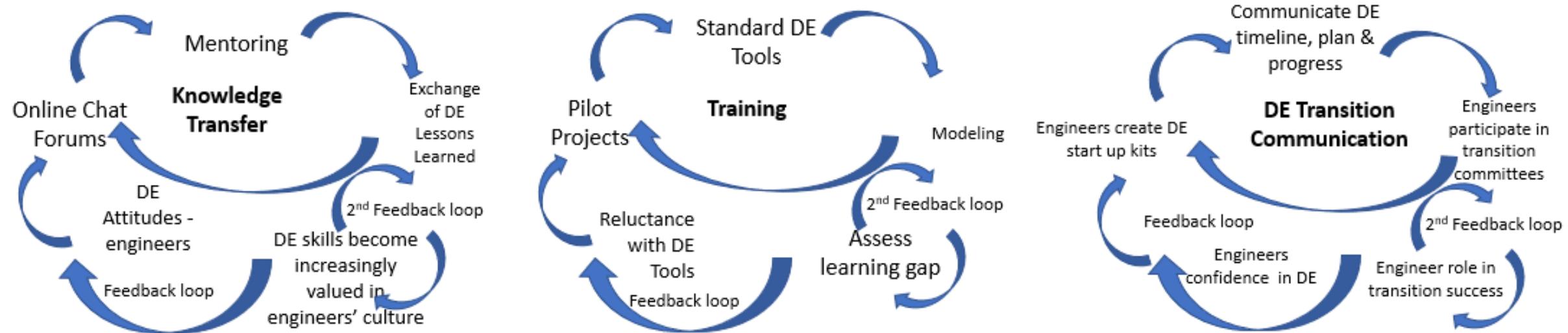
Systems Thinking Approach – Iceberg Model



	Current	Desired
Events – what is happening		
Patterns of behavior, trends over time		
System Structure – influences patterns		
Mental Models – values, beliefs		

Actions to drive change from current to desired state – Engineers' Culture and DE Transition

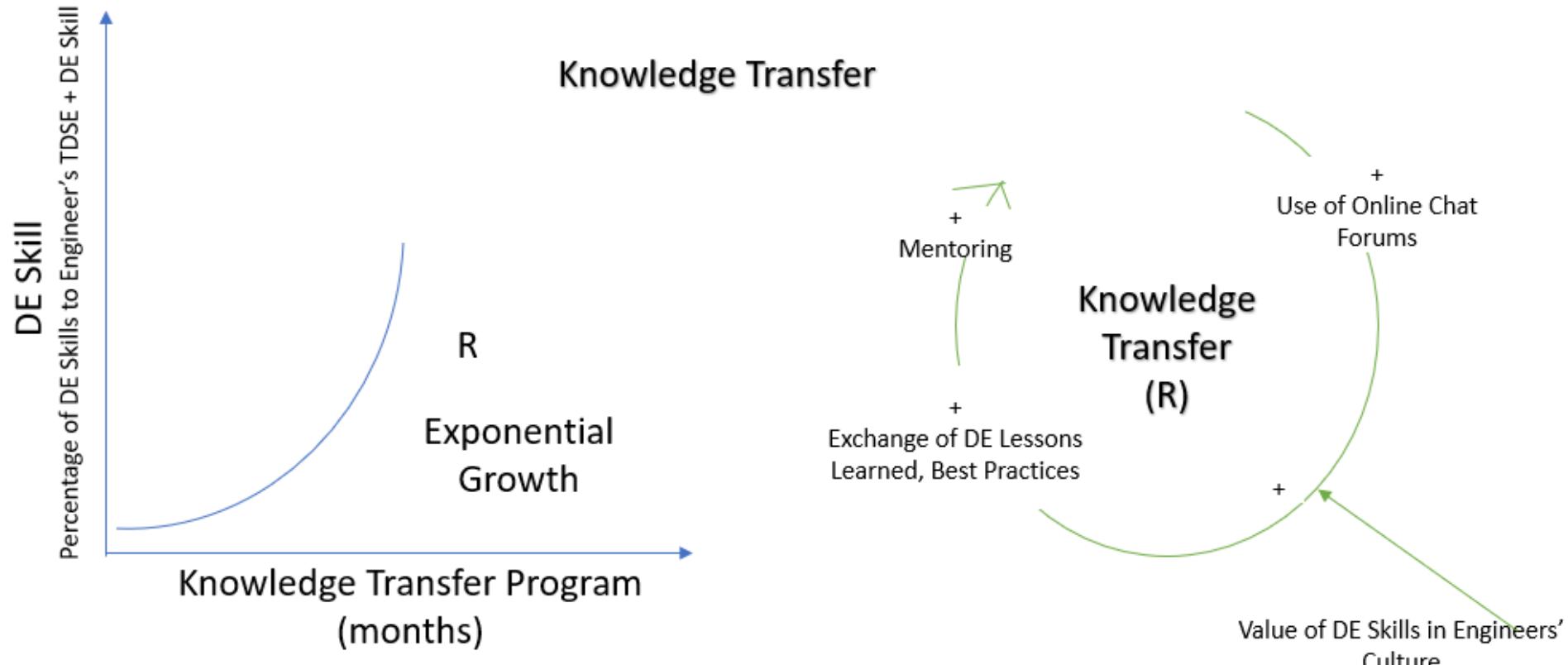
Systems Thinking Approach – Double Loop Learning



Assess Transition Progress using Feedback Loops

Systems Thinking Approach - Causal Loop

Knowledge Transfer

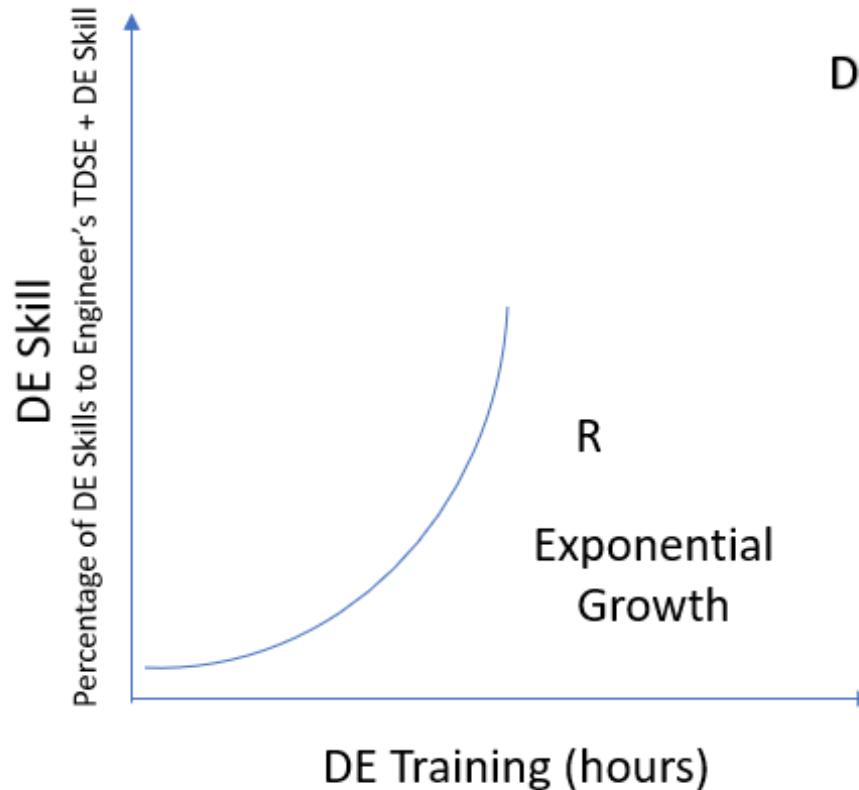


Impacts Attitudes – Decrease resistance, stress and Increase satisfaction

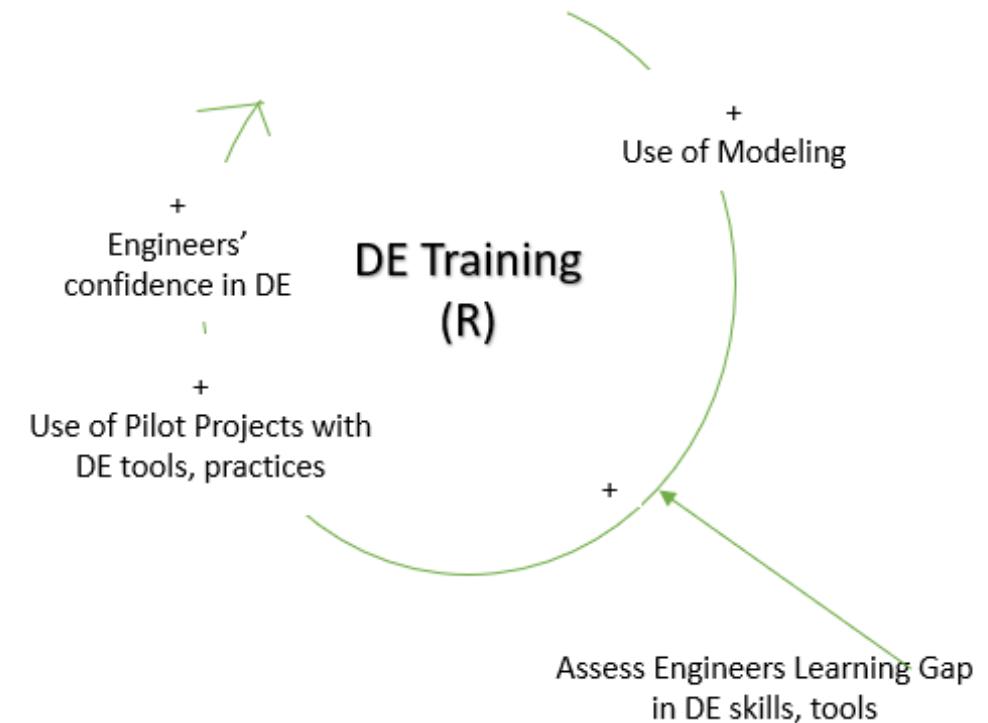
Systems Thinking Approach - Causal Loop



DE Training

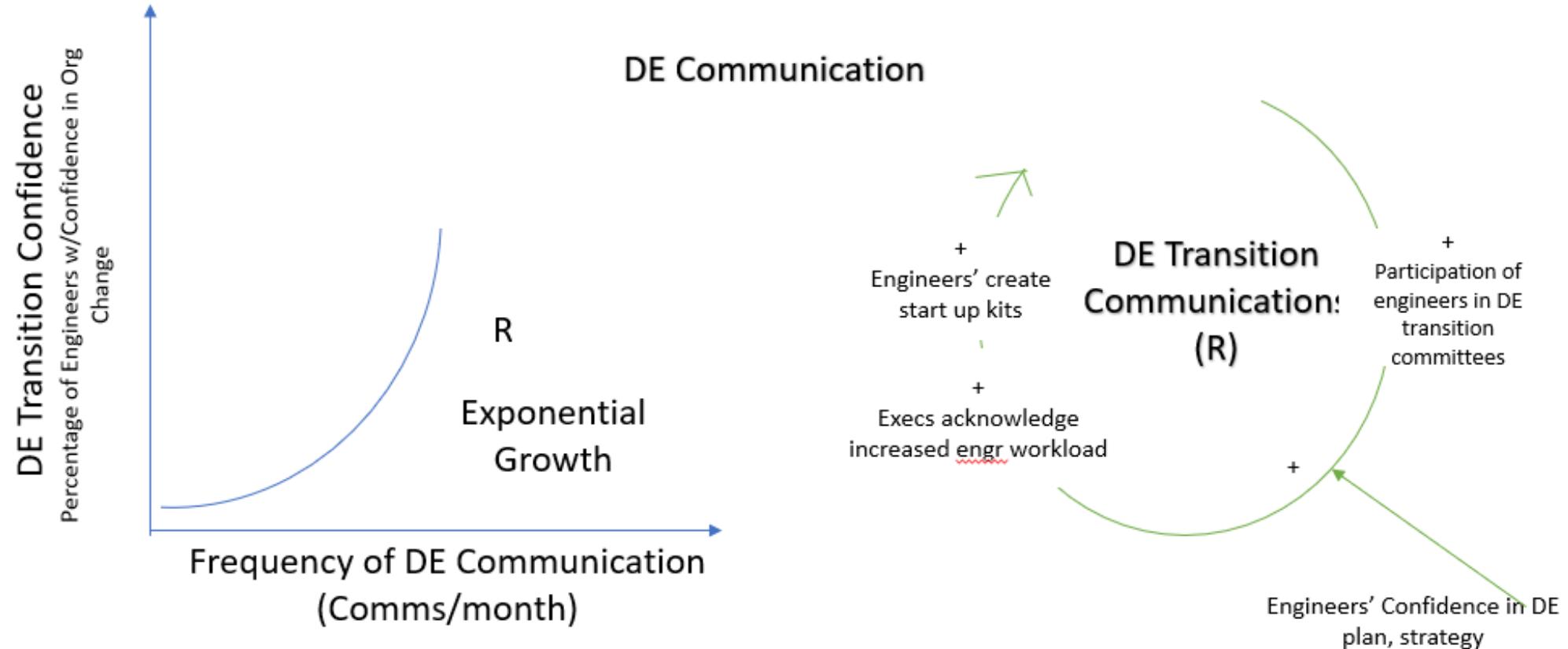


DE Training



Impacts Attitudes – Decrease uncertainty, threat and Increase trust, motivation

Systems Thinking Approach - Causal Loop Communication



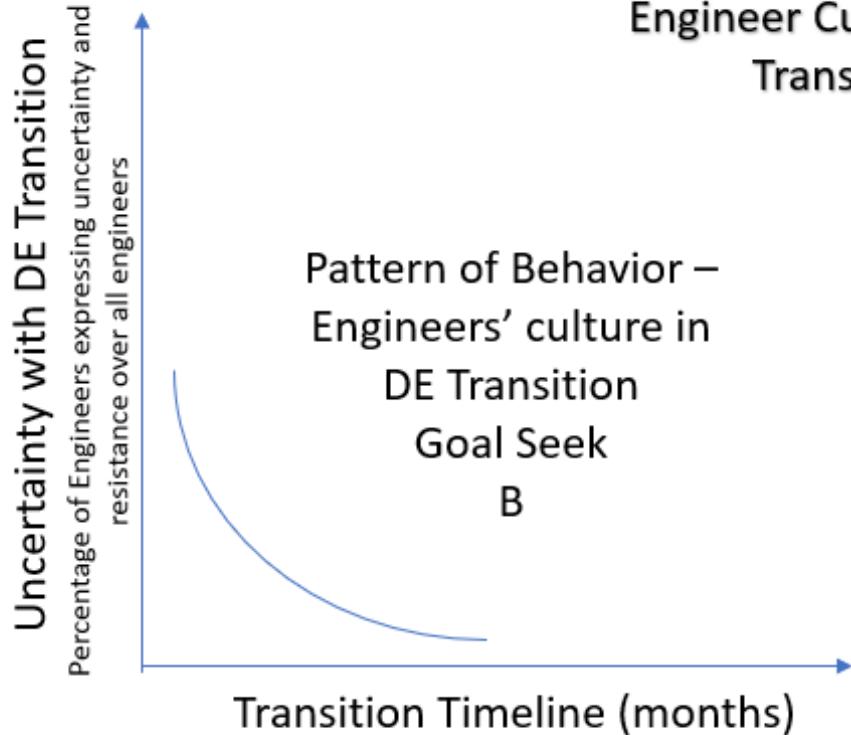
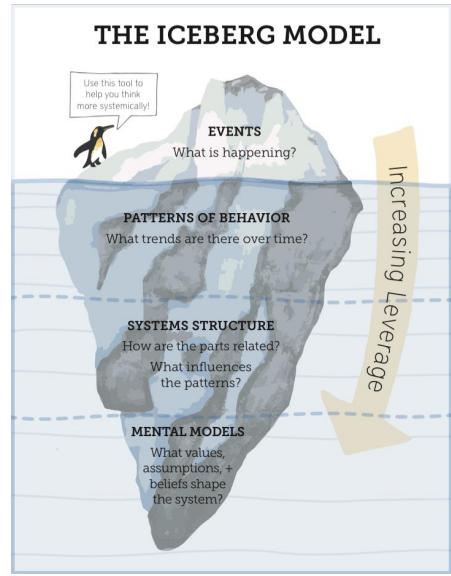
Impacts Attitudes – Decrease threat (expertise, status) and Increase confidence, participation, feedback

Systems Thinking Approach - Causal Loop

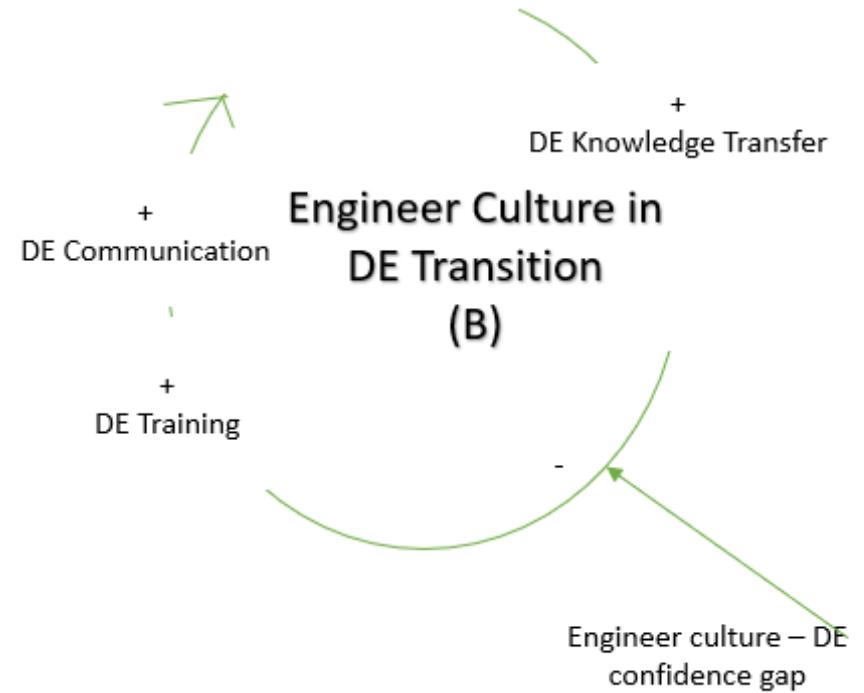
Culture Impact



Systems Thinking Tools



Engineer Culture in DE Transition



Impacts Culture (Mental Model) - Positive Attitudes, Productive Behaviors Enable Successful Transition



Interventions/Recommended Actions Summary

Knowledge Transfer	Training	Communication
Mentoring <ul style="list-style-type: none">• Surveys• Kickoff• Evaluations (feedback)• Job Redesign (Sr/Jr)	Training Options <ul style="list-style-type: none">• Assessment -gap analysis• Interviews, surveys (feedback)• Training Plan• Tool and workflow specific	Communicate organization's vision, strategy, timeline, plan for DE transition and tailor to lower levels
Social Support Options <ul style="list-style-type: none">• Peer to Peer on tools, process, expertise• Forums (incl online) to share Lessons Learned, Best Practices, seek advice	Seek pilot projects to demonstrate new DE tools, processes	Frequency – continual and assess timeliness and usefulness (feedback)
Transition Discussions <ul style="list-style-type: none">• Tools Evaluation• Tool Selection• Create/update processes	Surveys as feedback loop post-training and pilot projects	Acknowledge increased workload w/change <ul style="list-style-type: none">• Evaluation, selection of tools• Creation of new processes• Assist by creating start-up kits (recommended tools, processes, training, guidance)



Challenges to Actions

Challenge	Mitigation
Lack of organizational goal	<p>Clarified executive communication on timeline, objectives and expectations</p> <ul style="list-style-type: none">• Feedback from engineers builds trust
Uncertainty of how to grow DE skills	<p>External 'expert' to conduct 'train the trainer' for building internal expertise, monitor feedback</p> <ul style="list-style-type: none">• Growing DE skills builds confidence
Impact to engineer's daily job performance	<p>Transition committees address impacts and details as implementation plans are developed</p> <ul style="list-style-type: none">• Participation in DE builds trust and confidence

There is unknown complexity with pushing engineers to just 'accept' the DE transition



Conclusion

Organizational Change

Enable TDSE -----DE Transition

Organizational Psychology

Change Negative attitudes -----Positive

Systems Thinking

System Elements & Tools to Identify Actions

Recommended Actions to Empower Engineers

Knowledge Transfer, Training, Communication

Empowering
Engineers in a
Digital Engineering
Transition





32nd Annual **INCOSE**
international symposium
hybrid event

Detroit, MI, USA
June 25 - 30, 2022

www.incos.org/symp2022