Digital Transformation in Complex System Engineering – Mind the gaps

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Why it matters: Challenges of our times

- Increasing **Complexity**

How to do more with less?

- Rising **expectations**

Constant need for Automation

- **Sustainability**

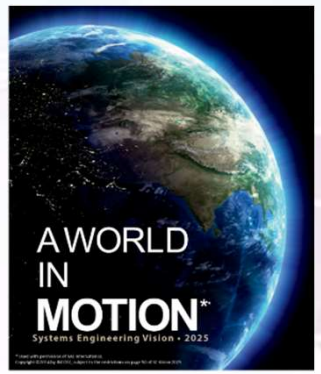
Dwindling planet resources

- **Project success**

Agility yet Control

Hence the increase interest in:

- Dealing with **Complex Systems**
- Embracing **Digital Transformation**
- **Re-use/Innovate**



Session Outline

- Digital Transformation and Failure
- Learning from others
- Focusing on the most promising value
- Key take-aways
- Questions and Feedbacks

Digital Transformation and failure

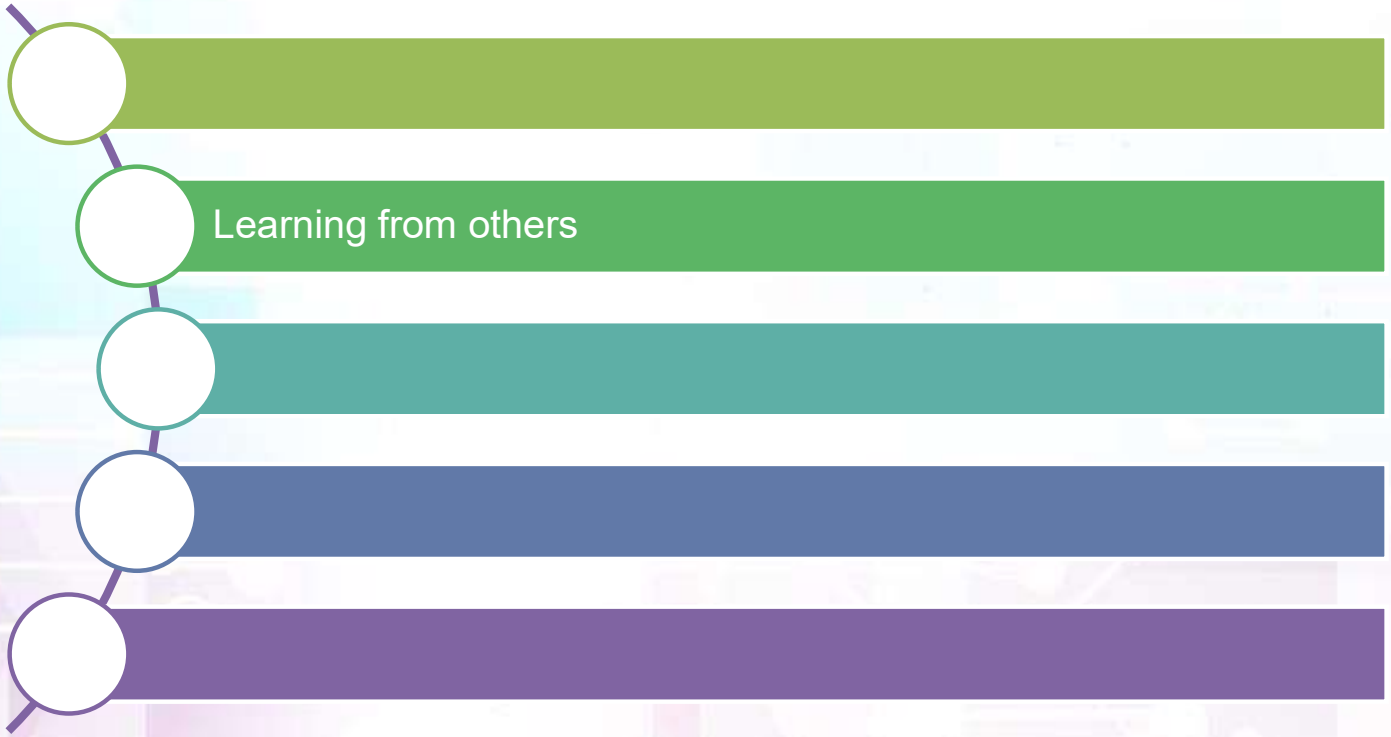
More the 70% of Enterprise Digital Transformation fail.

What about Operational Technologies?
Increasing complexity => increasing failure rate

A gap between:

- The **great expectations,**
- And the current **outcome**

Outline: where are we?



Learning from others #1

Recommendations

- improve business insights & customer experience
- Cost and downtime reductions
- Efficiency & productivity gains
- Asset tracking & waste reduction
- New Business models

Recipes for transformation

- Reviewing processes
- Innovating
- Gaining competitiveness
- With the help of technology

Learning from others #2

Lesson learnt

- First wave – focused on products, services and business processes

- Second wave – focused on AI to improve the quality of decision making, optimize operation efficiency and build closer relationship with customer

- Where to start?

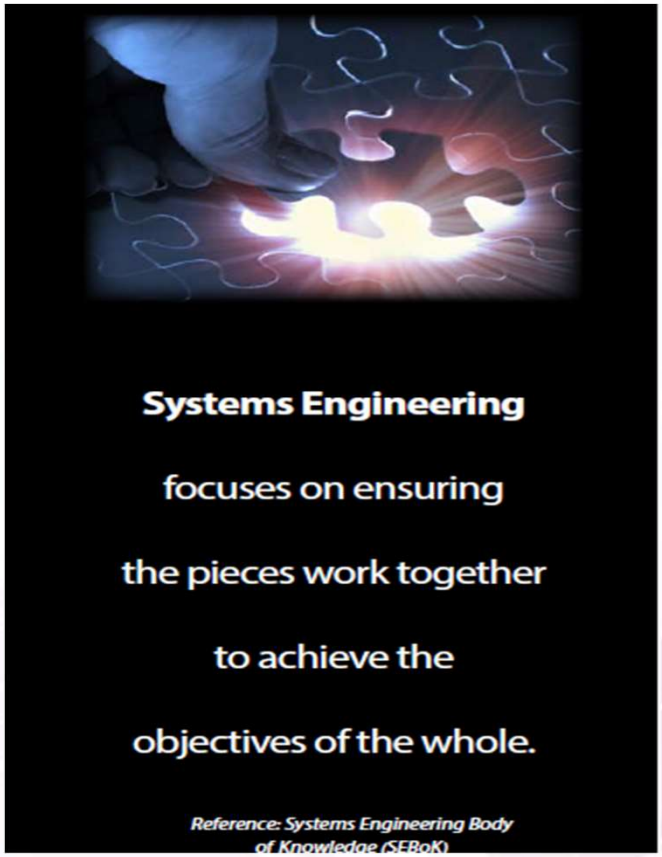
1- Omni channel customer services
2- Personalized connection
3- Consumer engagement and insight
4- Automation

Outline: where are we?

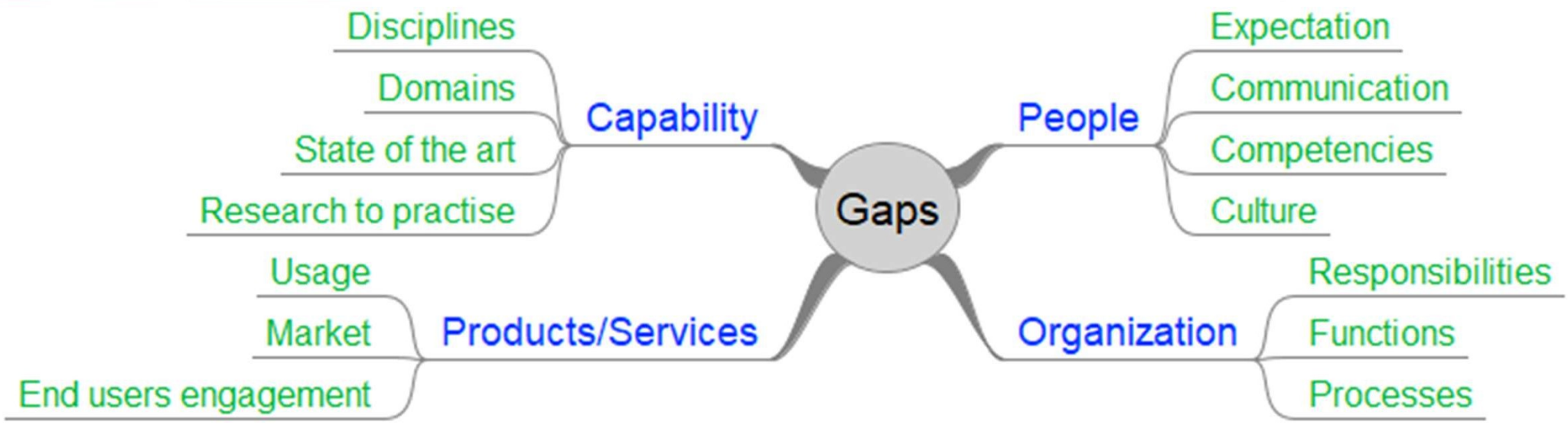
System Engineering and the Gaps

"The most interesting thing are usually found within the gaps"

Review of gaps around Digital Transformation



Identifying Gaps



Expectation Gaps

From dream to reality – crystalizing stakeholders expectations

Go in with eyes wide open:

- Understand your risk, acknowledge the need experimentation and failure
- Define the problem(s) to be solved, focus
- Where and when to stop? Define what success means
- Prepare to fail (early), plan possible recoveries, learn
- Persevere
- Allocate resources – empower your staffs

Set an ambitious vision, but define regular deliverables and track progress.

Little reward without risk

Competencies Gaps

People

- Current Strengths
- Experience level
- Domain experience/knowledge
- Innovation capabilities
- Keeping current with latest technologies
- Balance of expertise

Cultural Gaps

People

- Risk appetite
- Communication style
- Mode of operation
- Change management
- Multi cultural teams
- Attitude from ‘I have no problem’ to seeking feedback and ideas – “let me share where I think I might be need of improvement”
- Fault finding culture versus reward culture

Discipline/Domain Gaps

Disciplines

- Balanced solution across disciplines
- Shared model to address all the point of views
- Model as the reference for all disciplines
- Large scale simulation to understand the overall capabilities and limitations
- Automating the System Engineering process
- Virtual everything – from prototypes to full staging environment
- Massive scale simulation – pre-empt unforeseen issues and reproduce real world problems

Domain

- Optimize Engineering versus Domain point of views
- Operational knowledge coupled with technology capabilities

Market understanding Gaps

Global Market/Competition

- Understand addressable market – Market Sgmentation
- Define new niche to be addressed
- Define risk/reward per addressable market

End User expectations

- Engage with your existing customer base
- Compile trends
- Gather feedbacks

Dream versus Reality Gaps

Understand new deployment(s) impact

- Continuous monitoring / expected results. What works, what doesn't
- Minimum Viable Product
- 'Connected' everything – feedback channel from customers/end users
- Analytics
- Does you Product deliverer your expected benefits
- Unexpected behaviors identification
- Non deterministic system monitoring – deviation alerts
- Measure the gap of your new solutions / expectations => define adjustment
- Learn from failures
- Monitor your progress – adjust, fine tune, persevere
- Product families – verify how existing customer react to new features

State of the Art gaps

Keeping current with the state of the art

- Human centered interface
- Digital twins
- Large scale virtualization
- Virtual Reality
- Immersive simulations
- Cyber
- AI
- IOT
- Experiment
- Look at new technologies applied in new ways/applications.

Research to practice gaps

Create opportunities for researcher to engage with practitioner and end users

- Brainstorming
- Immersive prototypes
- Massive scale simulation – inject new ideas to see how they fit
- Interaction with legacy system
- Interaction with real world – Minimum Viable Products

Session Outline

Key Take Aways

Seek to understand the success and failure of Enterprise Digital Transformation and derive what can be re-used.

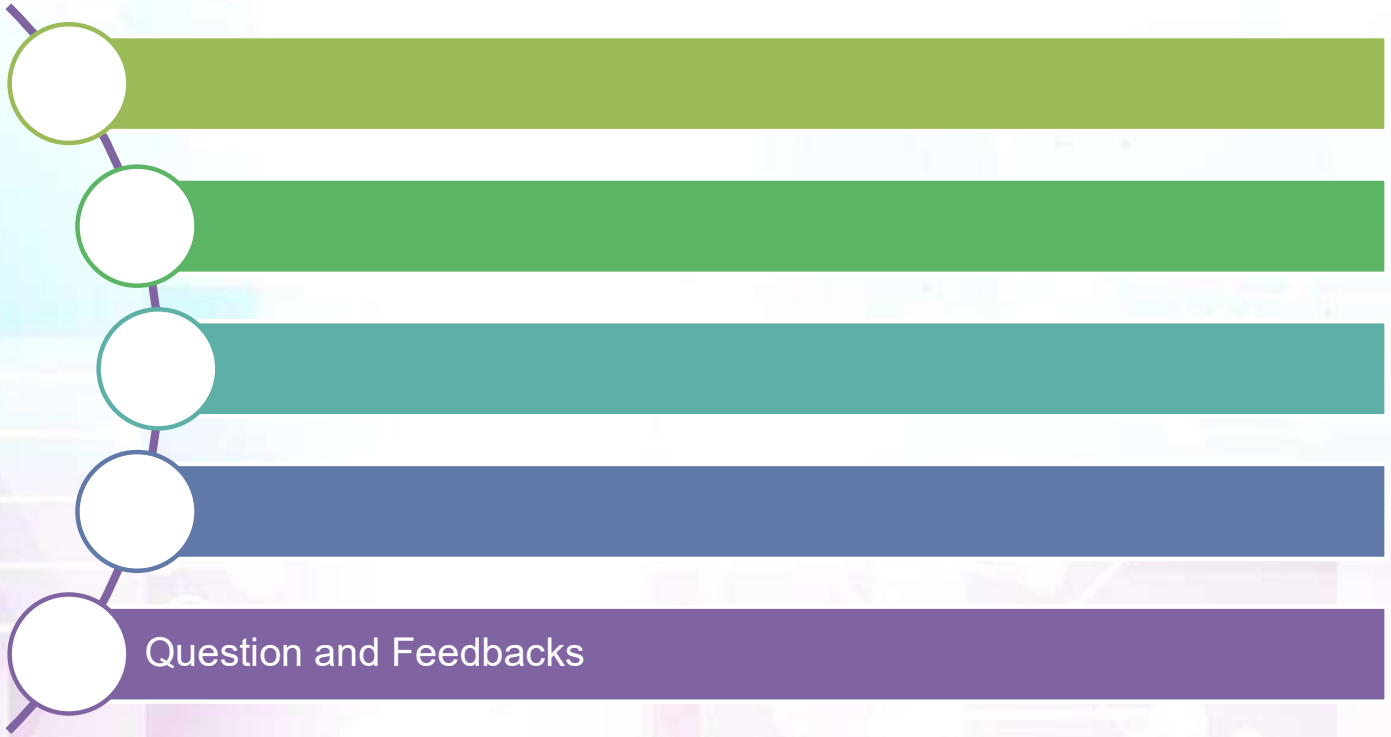
Define where you need - Study your current position and identify and prioritize your gaps to be addressed

Plan your journey, allocate resources and track your progress. Try, measure, adjust and persevere.

Don’t forget Change Management

Consider Continuous Digital Transformation

Session Outline



Questions & Feedbacks

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Acknowledgments & References

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References

- INCOSE (2014). A World in Motion, Systems Engineering Vision 2025