



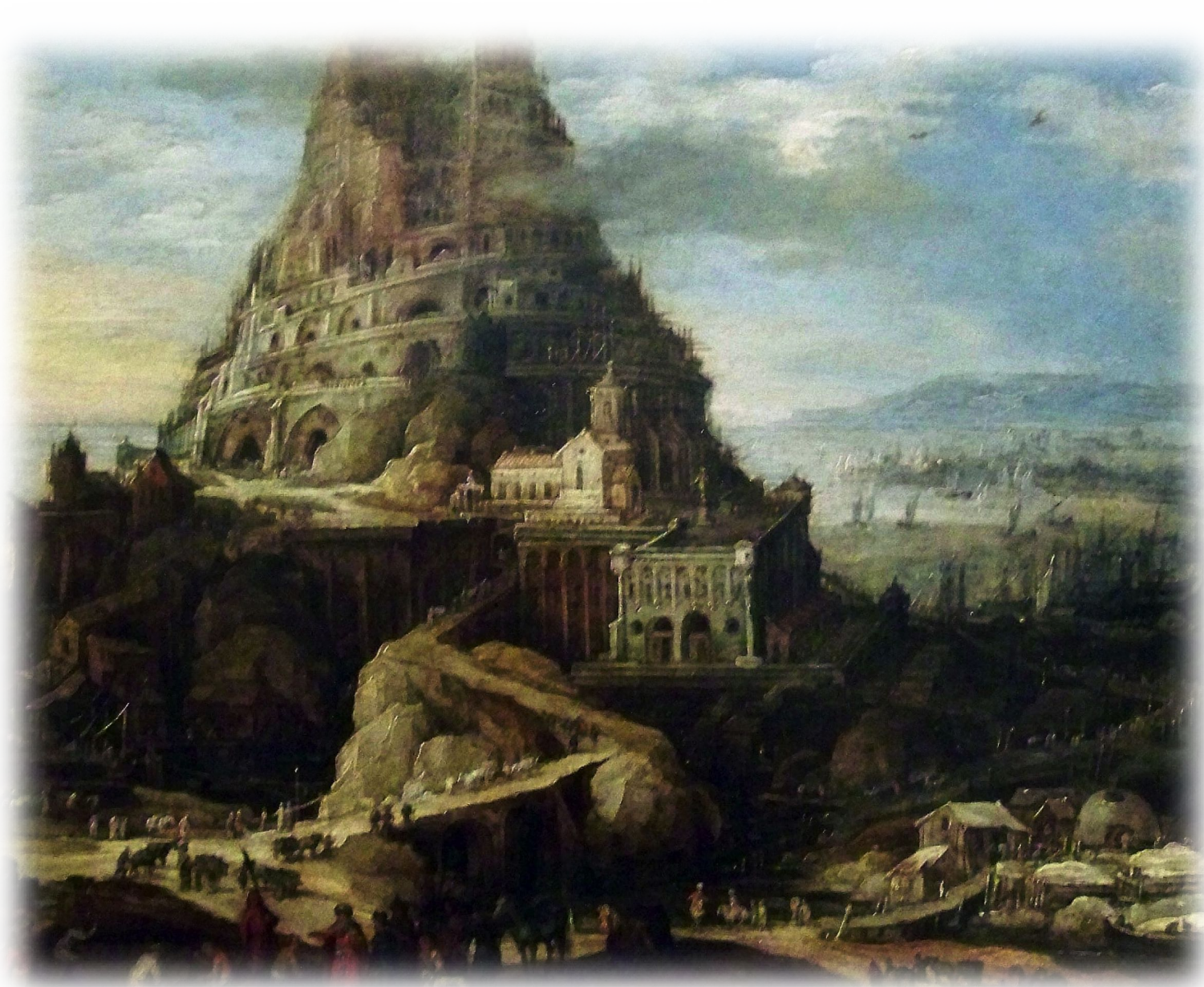
29th Annual **INCOSY**
international symposium

Orlando, FL, USA
July 20 - 25, 2019

Speaking in Tongues

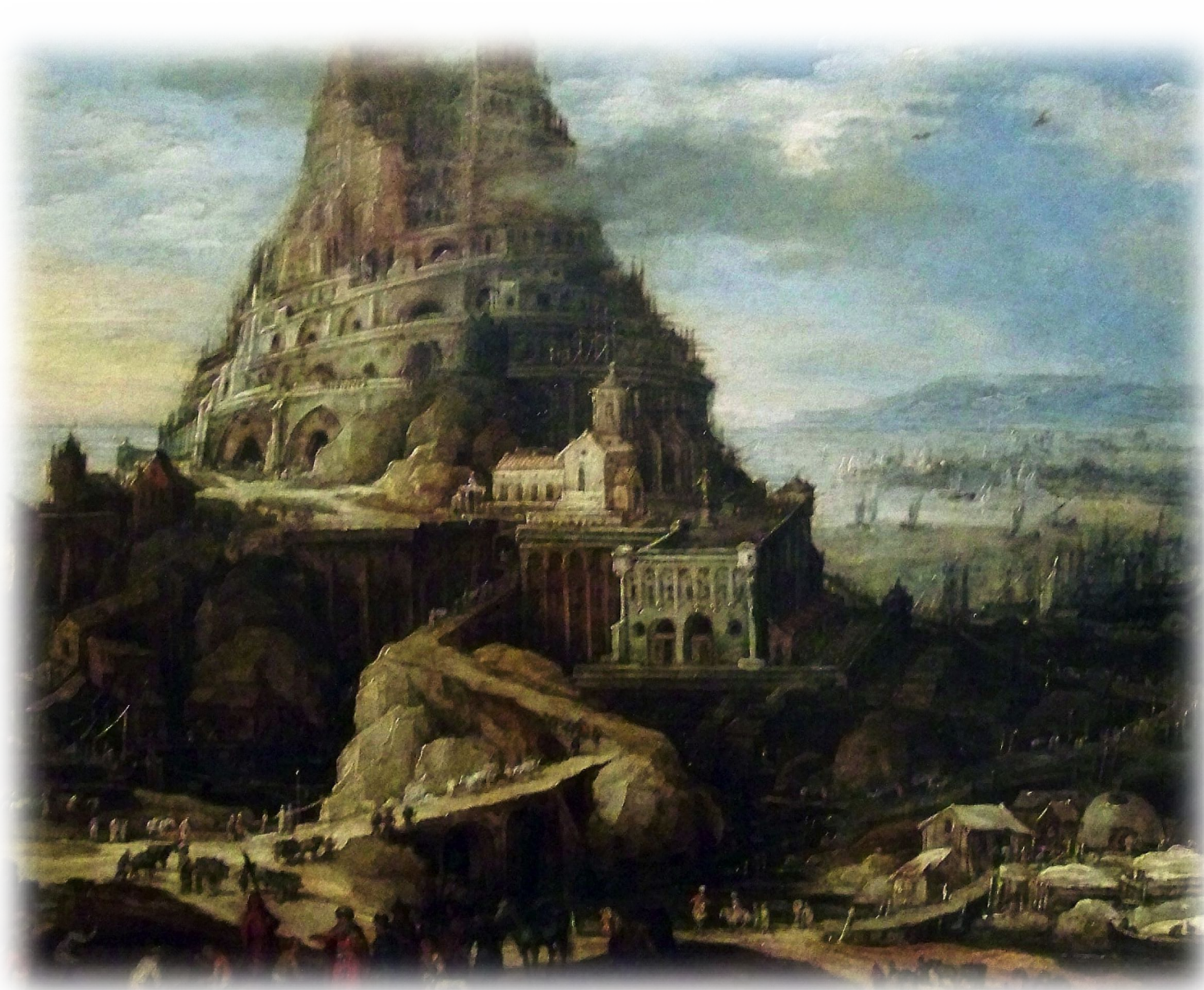
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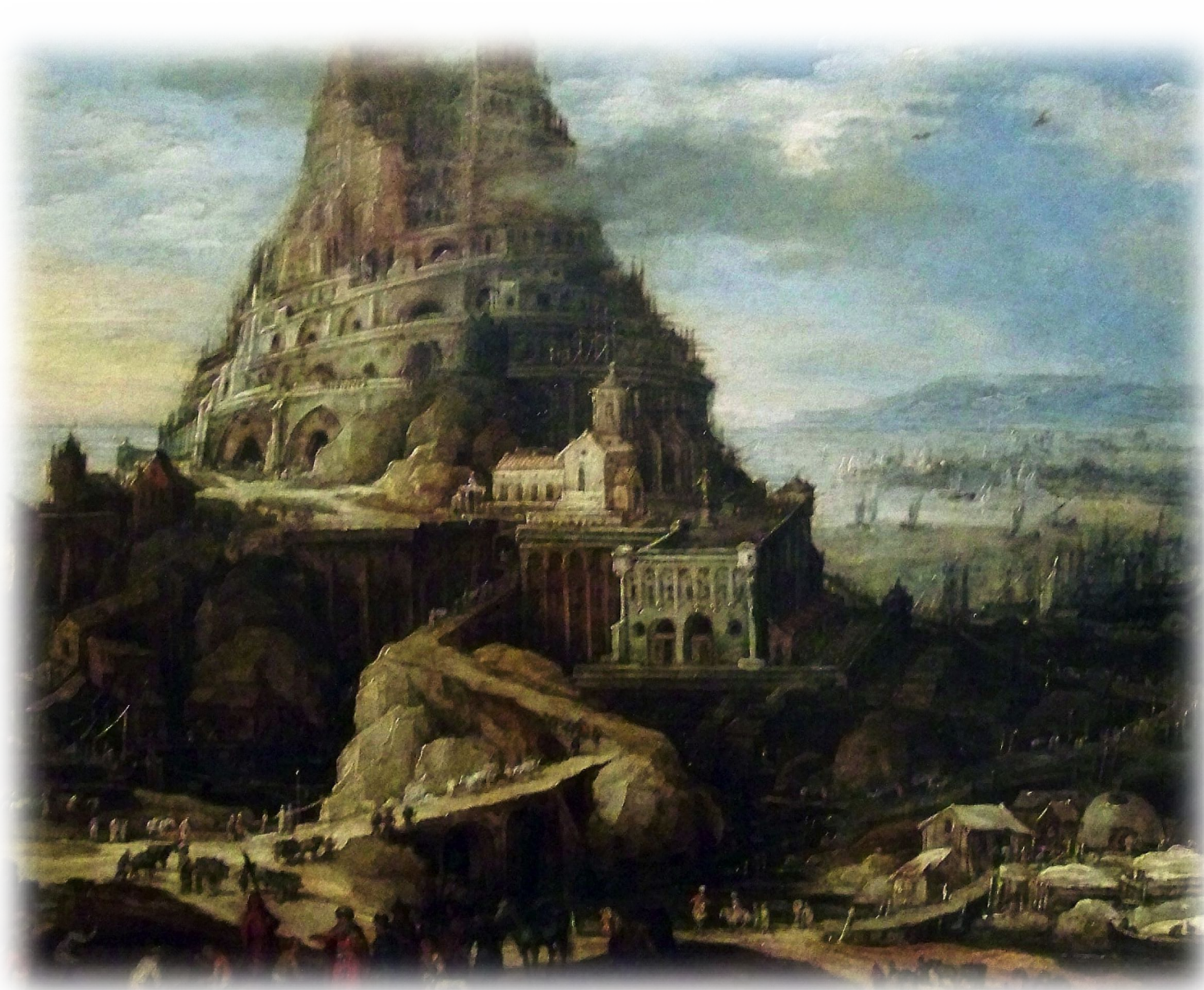
PROJECT:

Build a tower to
reach God for direct
access



Stakeholder:

GOD- Not
interested in
disrupting the
culture by changing
the relationship

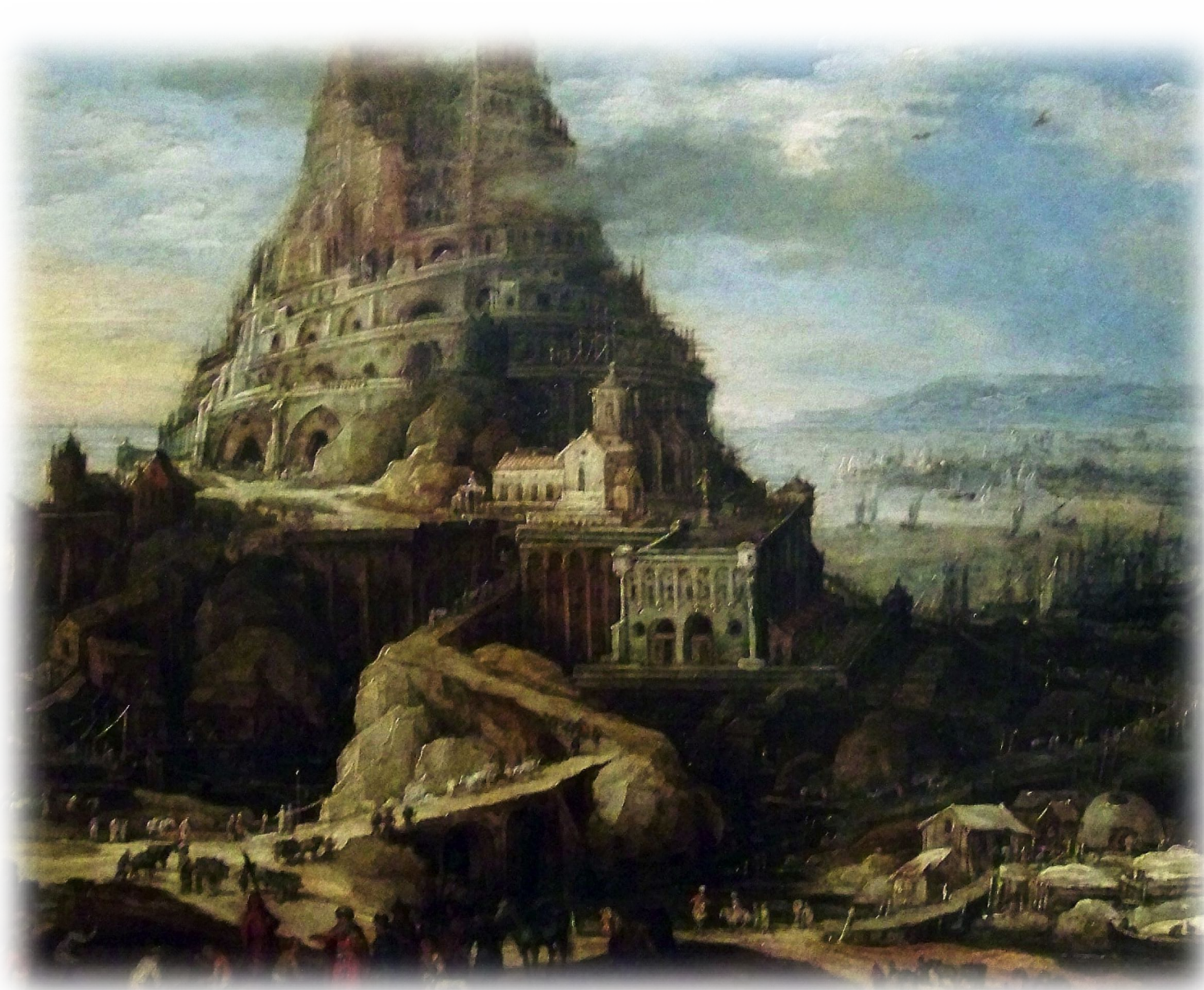


Analysis of Alternatives

Fire (No)

Flood (Not again)

Need something
subtle but devastating



Plan:

Disrupt the project
by destroying the
ability to
communicate

Collaboration?



Commu

nication

Dè a tha i a
'feuchainn
ri ràdh?

Idomu, ar ji
supranta





Why are we concerned?

- 3 Vision 2025 imperatives-
 - Expanding the APPLICATION of systems engineering **across industry domains**.
 - Embracing and learning from the **diversity** of systems engineering APPROACHES.
 - Applying systems engineering to help shape policy related to **SOCIAL AND NATURAL SYSTEMS**.
(INCOSE 2014)



Domains



Transportation



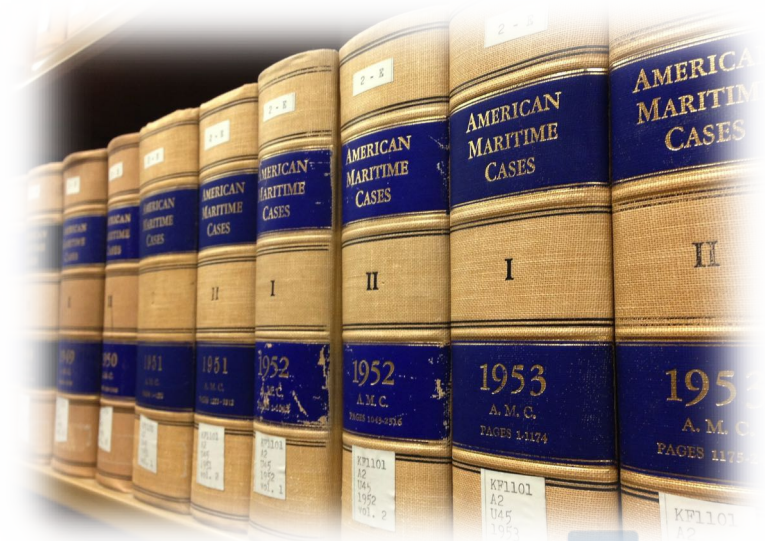
Agriculture



Water



Policy

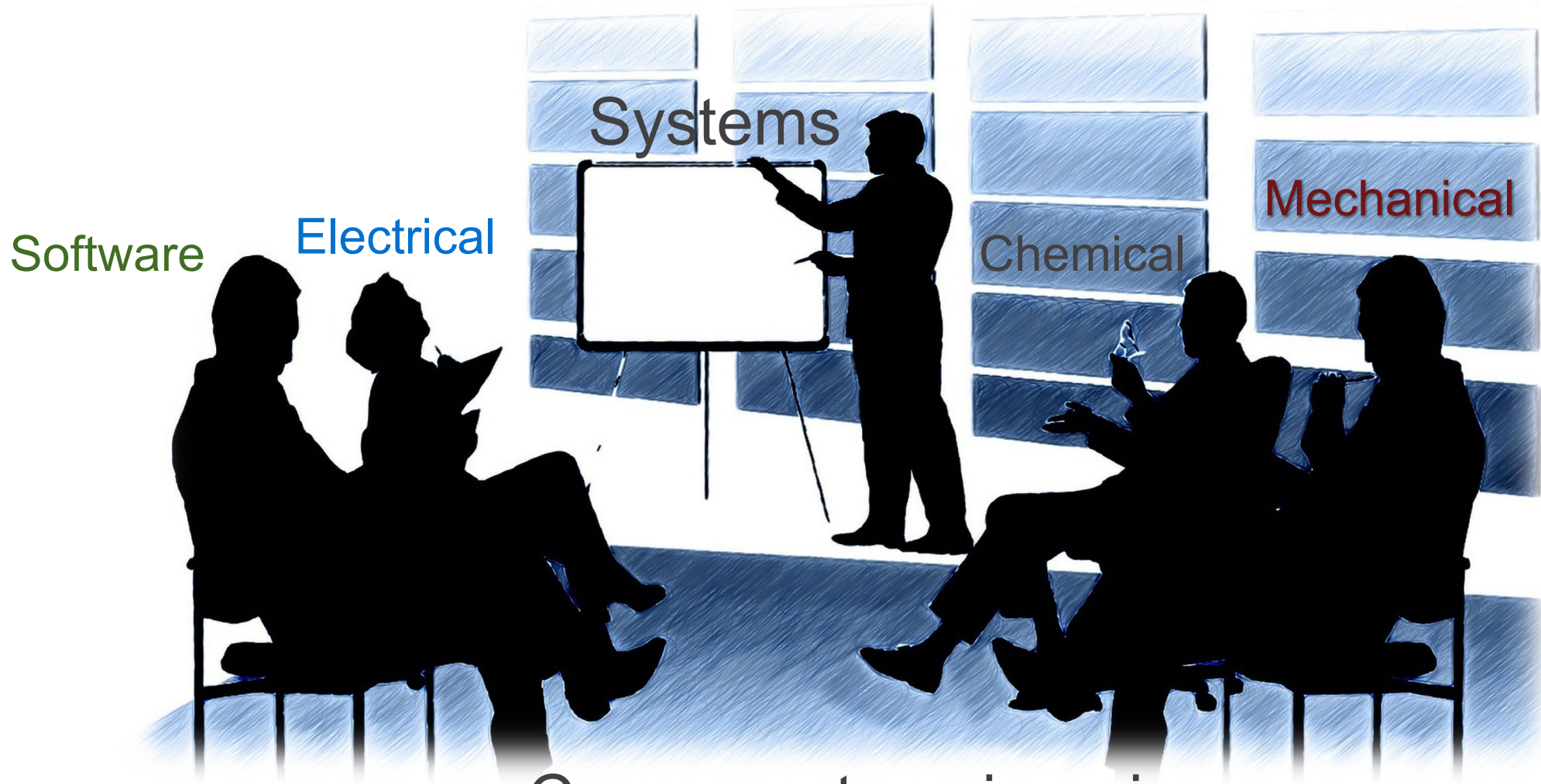


Healthcare





Interdisciplinary Connections



Concurrent engineering

www.incose.org/symp2019



Transdisciplinary Systems

Software

Electrical

Chemical

Mechanical

“crosses many disciplinary boundaries to create a holistic approach.”



Solution:

- Make everyone speak SE – NOT!

Not so much . . .

“You know, if these schools keep it up pretty soon no one will be able to read cursive . . . Uh, I mean hieroglyphics”



Arcane
Esoteric

Standards can be counterproductive



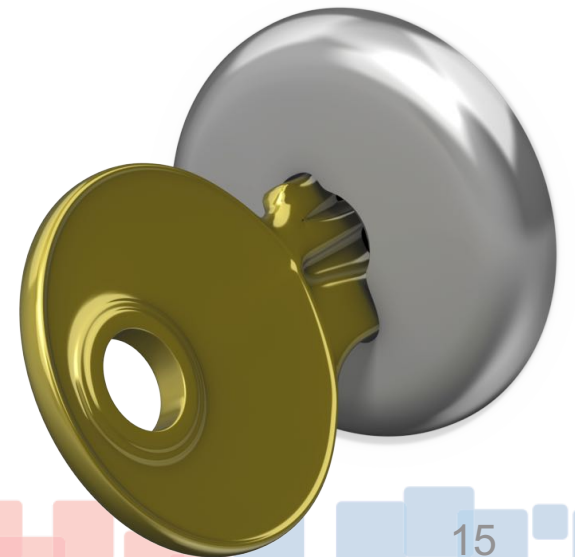
Solution:

- Make everyone speak SE – NOT!
- Learn to translate!



Translation

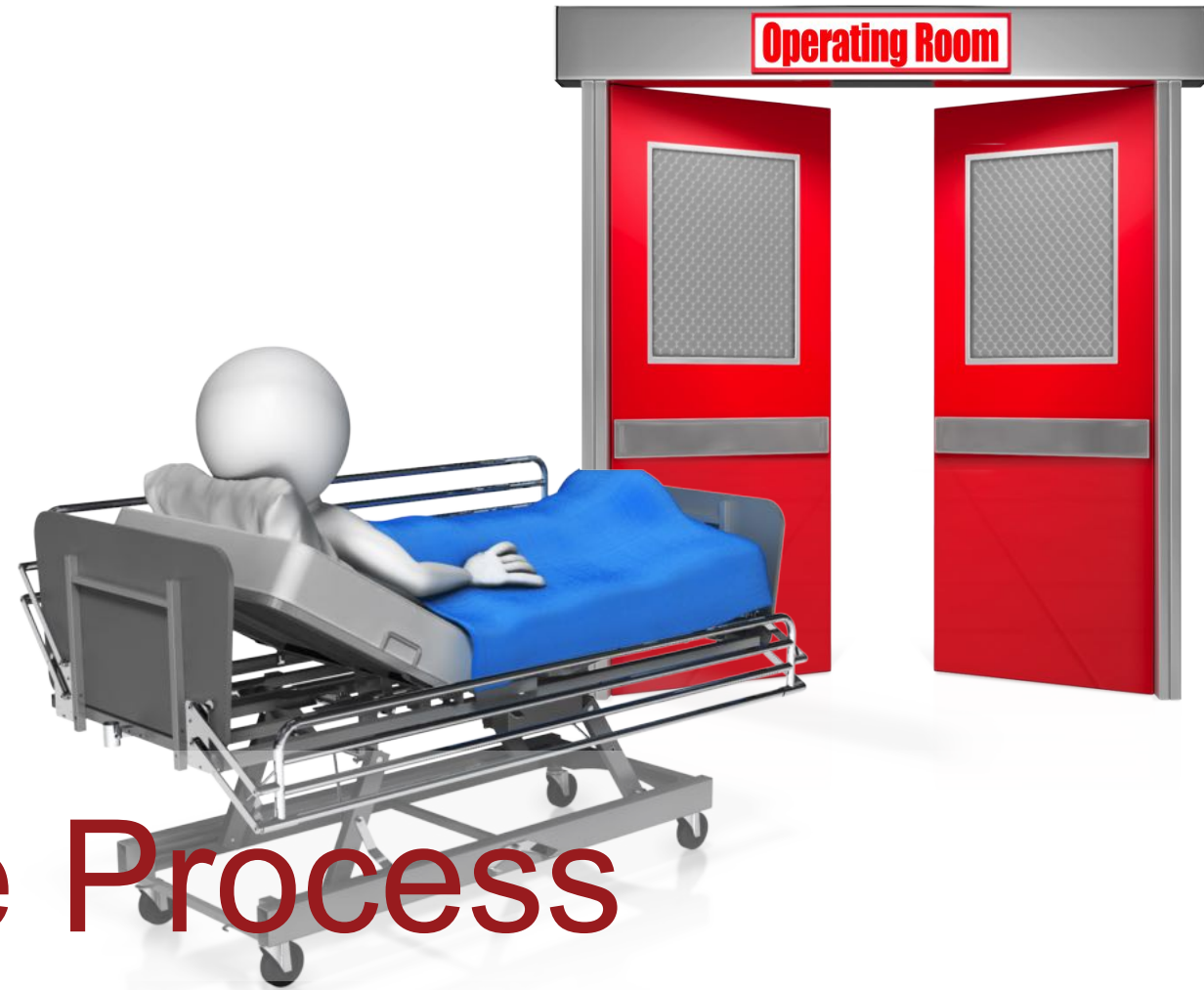
- Learn the language
 - Translate concepts
- Obstacles
 - SE heritage
 - Disciplinary indoctrination





Example

Perioperative Process



Successful translation



Bonzo, S.; McLain, D.; and Avnet, M.
Systems Engineering
Volume 19, Issue 3, May 2016,
Pages: 267–277

Using the design structure (DSM) and multi-domain (MDM) matrices to capture and analyze the operating room processes



Recognizing the Problem

“While attempts have been made to translate best practices from engineering, manufacturing, and other fields, their value has been limited because they are applied with minimal modification for contextual differences in healthcare.”

Gather data from OR Staff



Collect in OR



DSM Process



Transport Previous Pt Out System Context			1										
	Take History and Physical System Context	1											
	1	Pre-op Pt Prep System Context					1						
			OR Cleaning System Context				1						
				Instrument/Equip Setup System Context			1						
					Supplies Prep System Context		1						
				1	1	Room Setup System Context	1						
		1					Pt Transport (Preop to OR) System Context	1					
								Pt Position & Preparation System Context	1				

Translate to Industrial Engineer

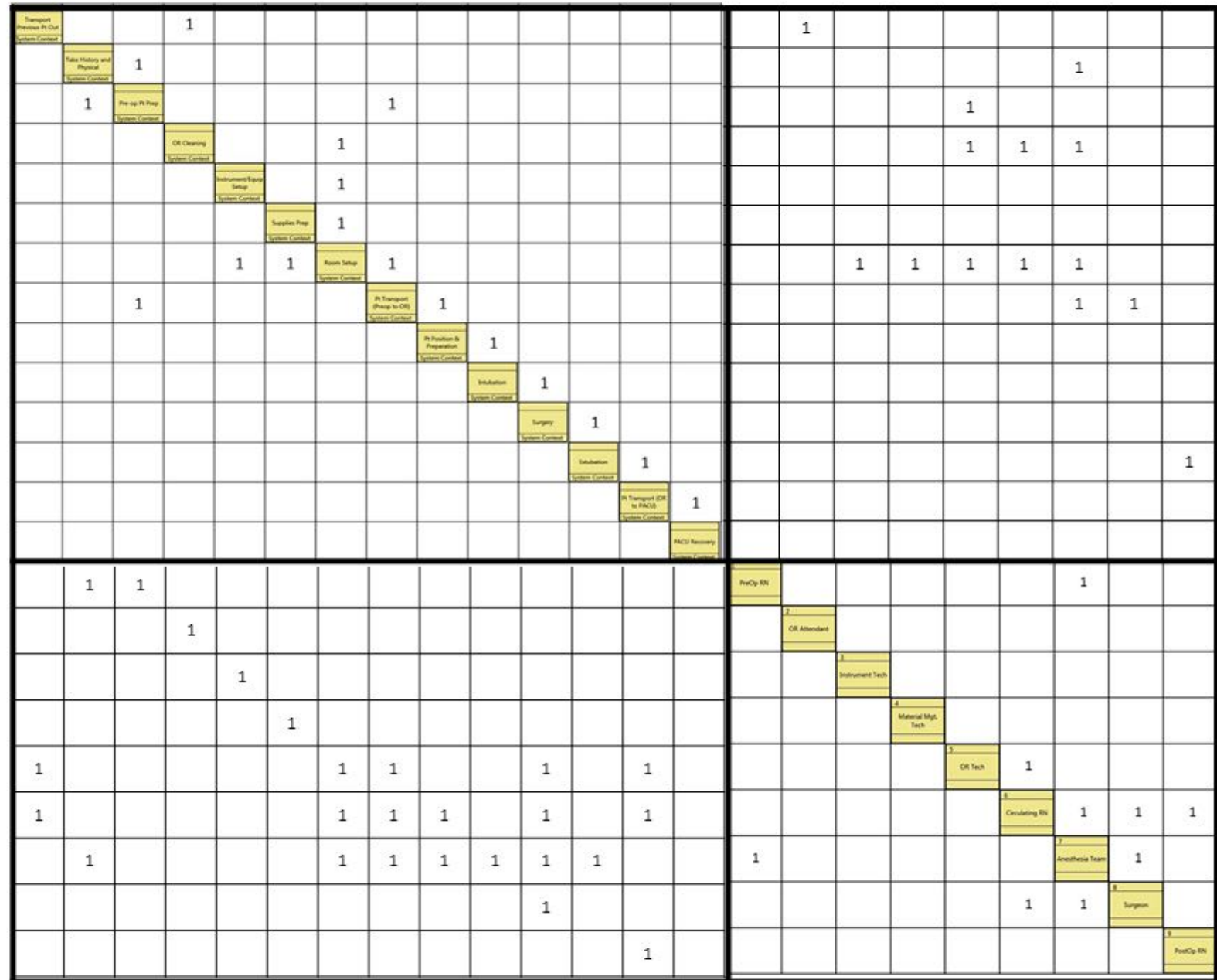
											Extubation System Context	1	
												Pt Transport (OR to PACU) System Context	1
													PACU Recovery System Context

DSM Staff



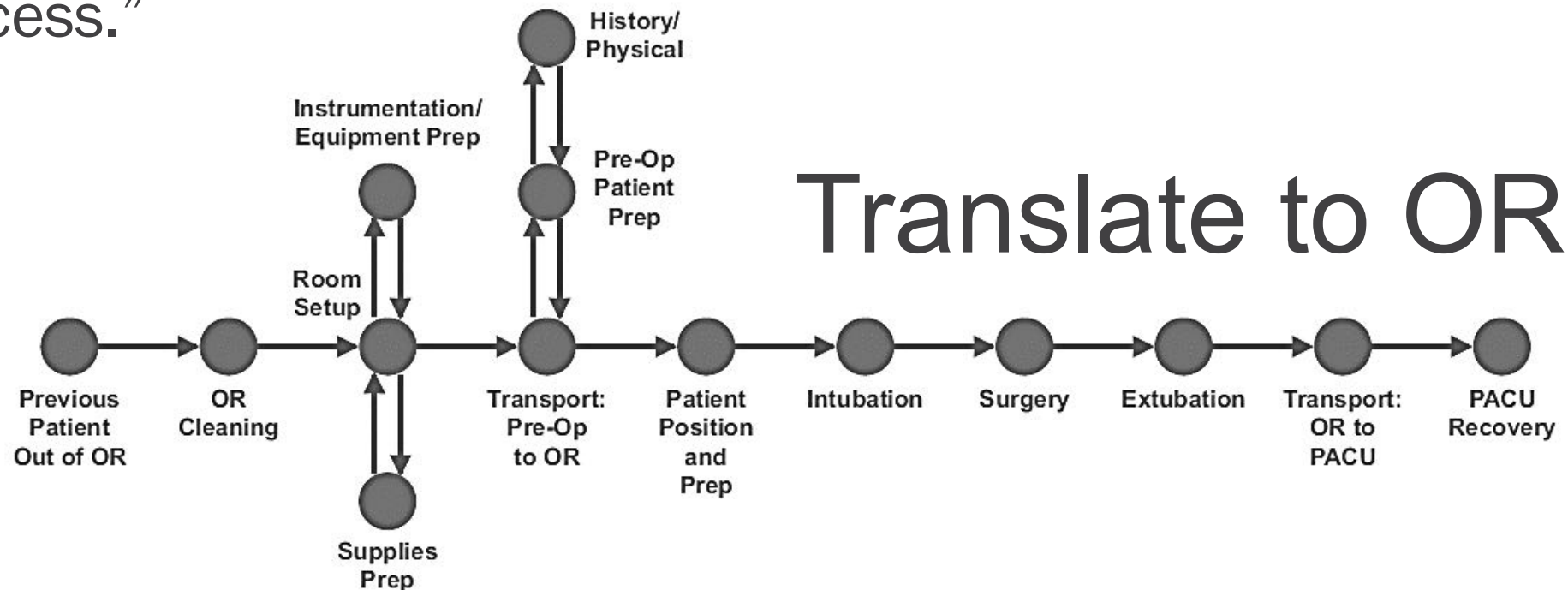
1 PreOp RN						1		
	2 OR Attendant							
		3 Instrument Tech						
			4 Material Mgt. Tech					
				5 OR Tech	1			
					6 Circulating RN	1	1	1
1						7 Anesthesia Team	1	
					1	1	8 Surgeon	
								9 PostOp RN

MDM Staff Process





“While the DSM provides a valuable tool for visualizing complex processes, it actually is **not the most intuitive means** of graphically displaying dependencies in simpler systems like this one. A network representation of this process is shown (below). As is apparent from this figure, this graphical format more effectively communicates the actual process.”



Value Add



“Analysis of process metrics demonstrate that merely engaging the surgical staff in building the MDM can itself lead to performance improvement.”

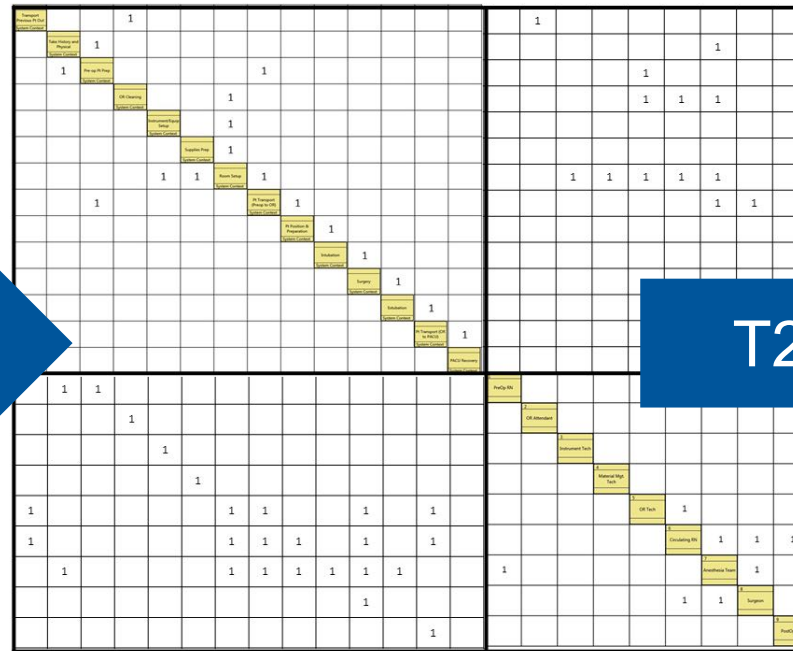
Two translations



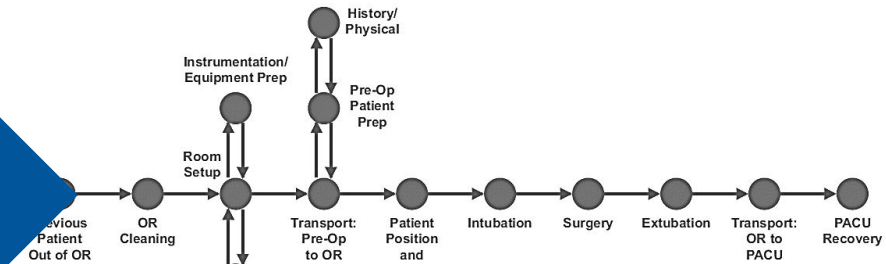
OR Staff

Industrial Engineers

T1



T2

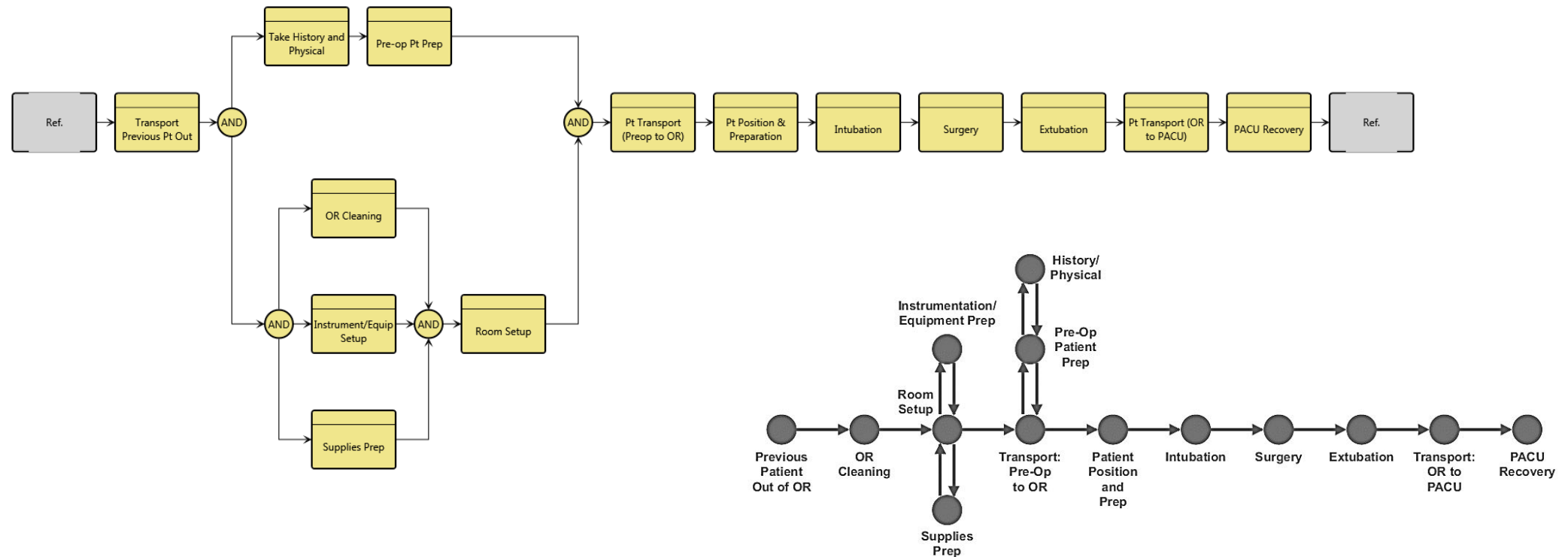


OR Process Owners

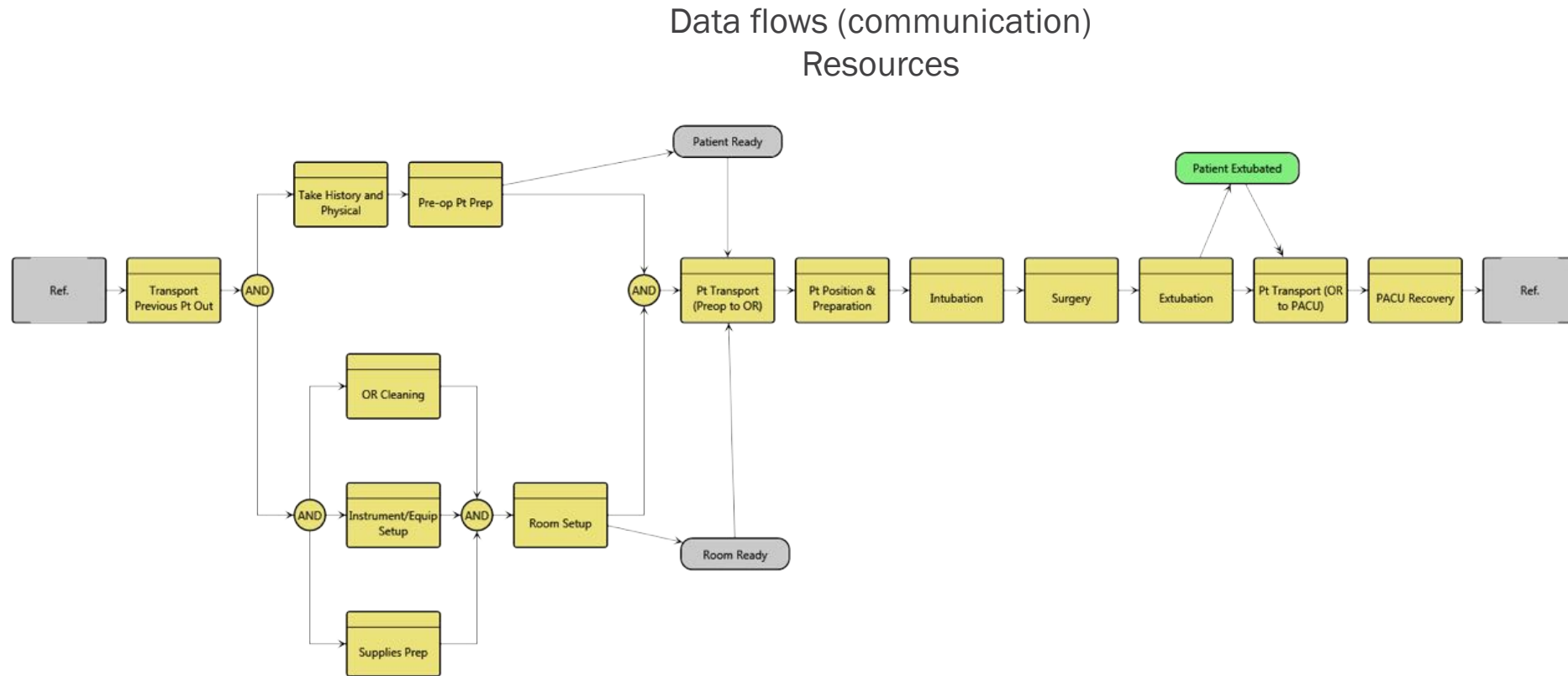
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Translation #3- IE to SE model



SE Value-add



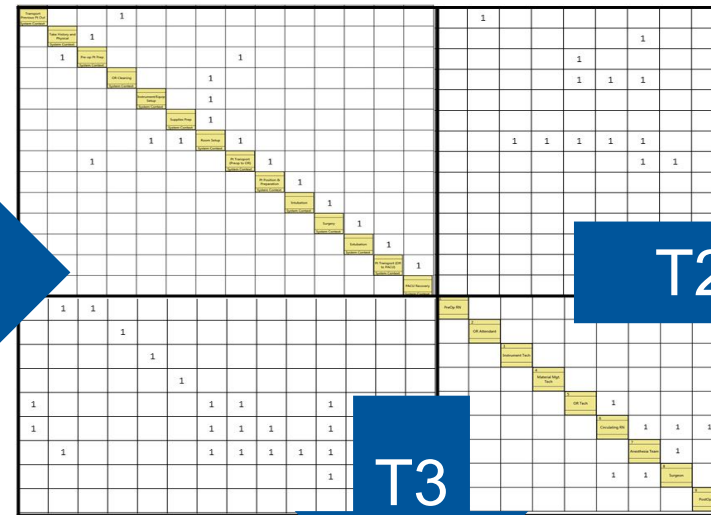


Three translations



OR Staff

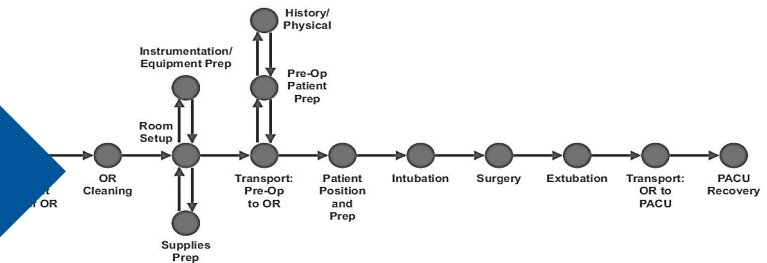
Industrial Engineers



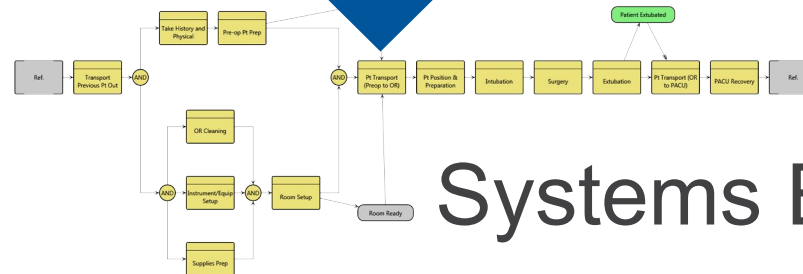
T1

T2

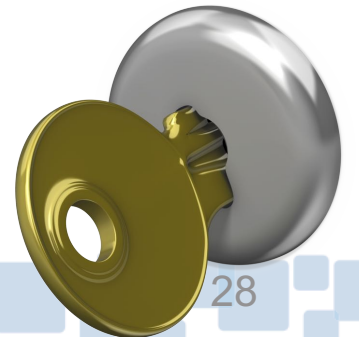
T3



OR Process Owners



Systems Engineers





Summary

- Communication & collaboration
- Across disciplines AND domains
- Translation is key
- Responsibility is ours!



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