33rd Annual **INCOSE** international symposium

hybrid event

Honolulu, HI, USA
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Preventing MBSE Amnesia Through Role-Based Knowledge Management

Shoring Up Atlantis

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MBSE: Why Your Company's Progress Is Slow

- Digital Engineering is a hot new trend.

- Companies are expanding its use.

- MBSE practitioners work in every field of engineering.

| We don't yet know (as an industry) how to do it well. |

| We don't yet have enough people for the work. |

| When people leave, their knowledge disappears |

Historically, This Isn't New

Innovation is most vulnerable:
- When "leavers" are proficient
- When employees leave early in project development
- When remaining employees are novices
- When firms are not able to hire comparable skill
- When "leavers" are part of a core task

Where to Store Data

Role-Based

Searchable

Interactive

Flexible
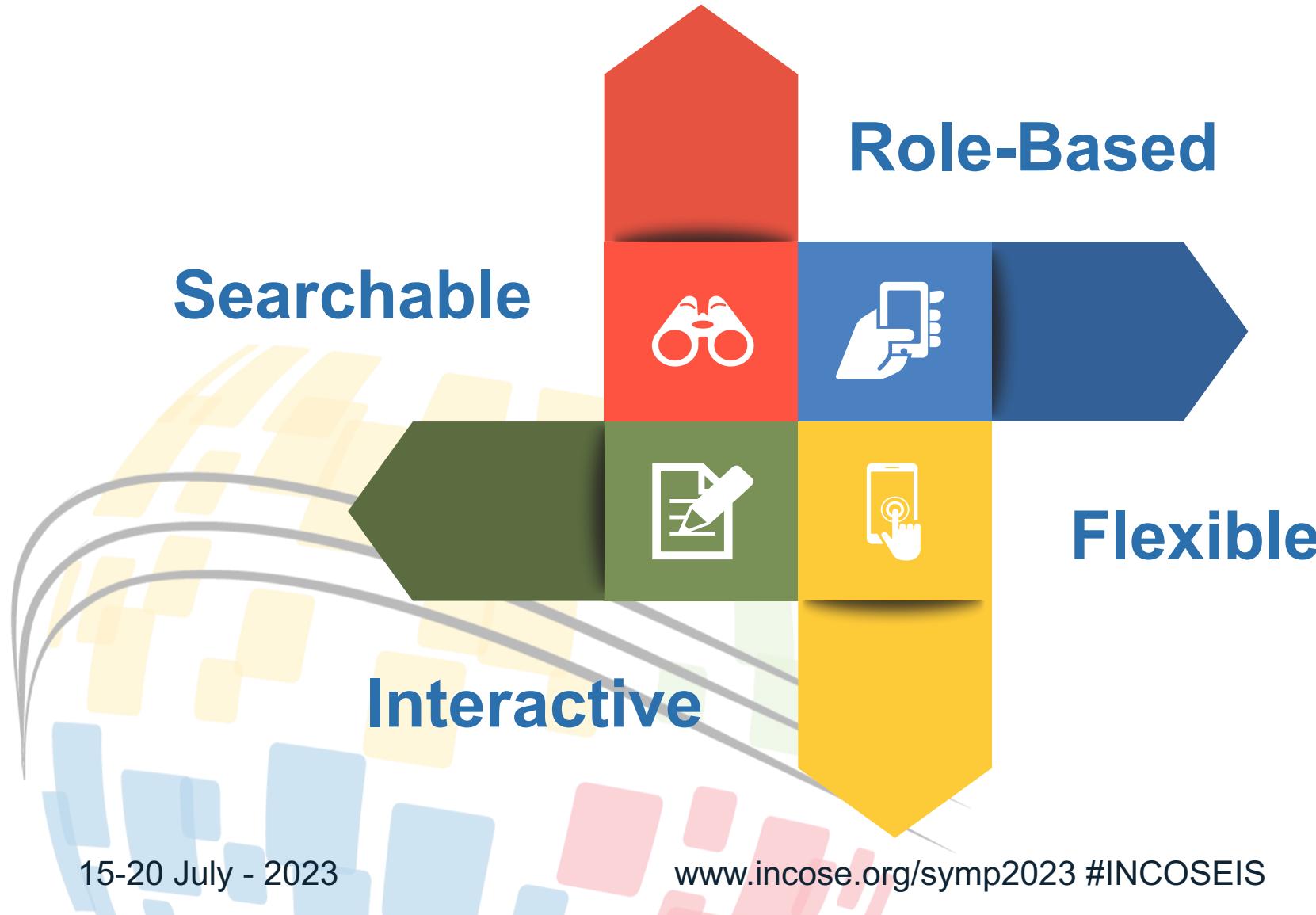
"Just put it on SharePoint" is equivalent to not capturing the data at all.

Choose an appropriate KM tool to avoid the SharePoint / Confluence "black hole."

Quantitative Literature Review Methodology

1	2	3	4	5
Read 400 Abstracts	Keep relevant: 312	Actors (Roles)	Actions (Tasks) and Purposes (Goals)	Analysis
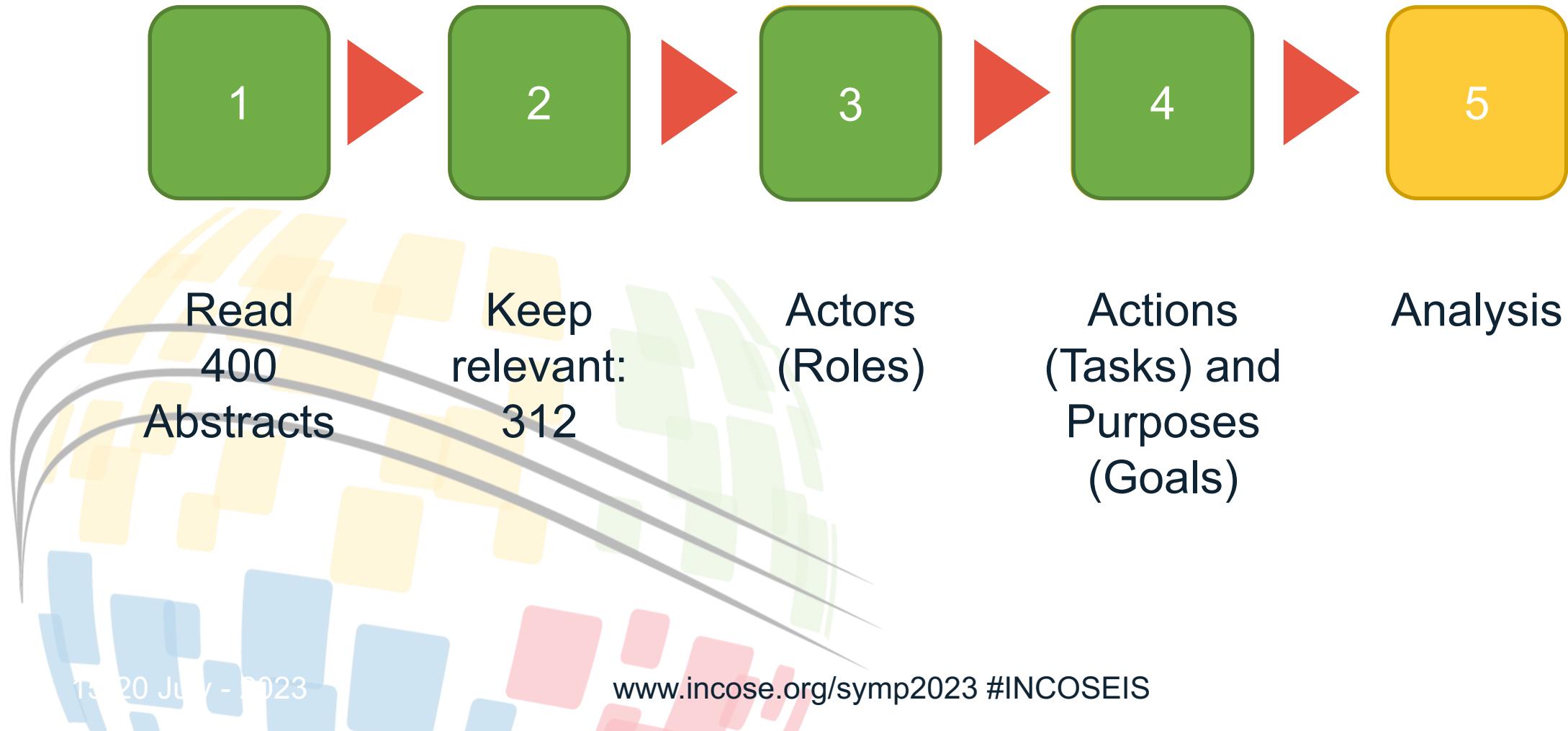
What are the Roles?

15 roles

Cybersecurity Engineers

Data Engineers

Human Systems Engineers

Interface Engineers

Knowledge Management Professionals

Leadership (Managers / Executives)

Legal Teams

Marketing And Adoption

Network Engineers

Process Improvers

Safety Engineers

Software Engineers

Sustainment Engineers

Systems Engineers

Test Engineers

What are the Tasks?

Sample tasks include

21 tasks

Task	Description
Analyze systems of systems	Understand system context and mission impact
Analyze upgrades	Change impact analysis for system upgrades
Model business process	Examine engineering processes through modeling
Track requirements	Create traceability between system design and requirements
Simulation	Use model to simulate system behavior for early verification
Understand cyber resilience	Discipline-specific analysis of system resilience against threats and vulnerabilities
Improve interoperability	Improve system interoperability through interface management

What are the Goals?

Goals describe what your Role-based users are trying to accomplish when they finish the **task**.

29 goals

Roles

Goals

Tasks
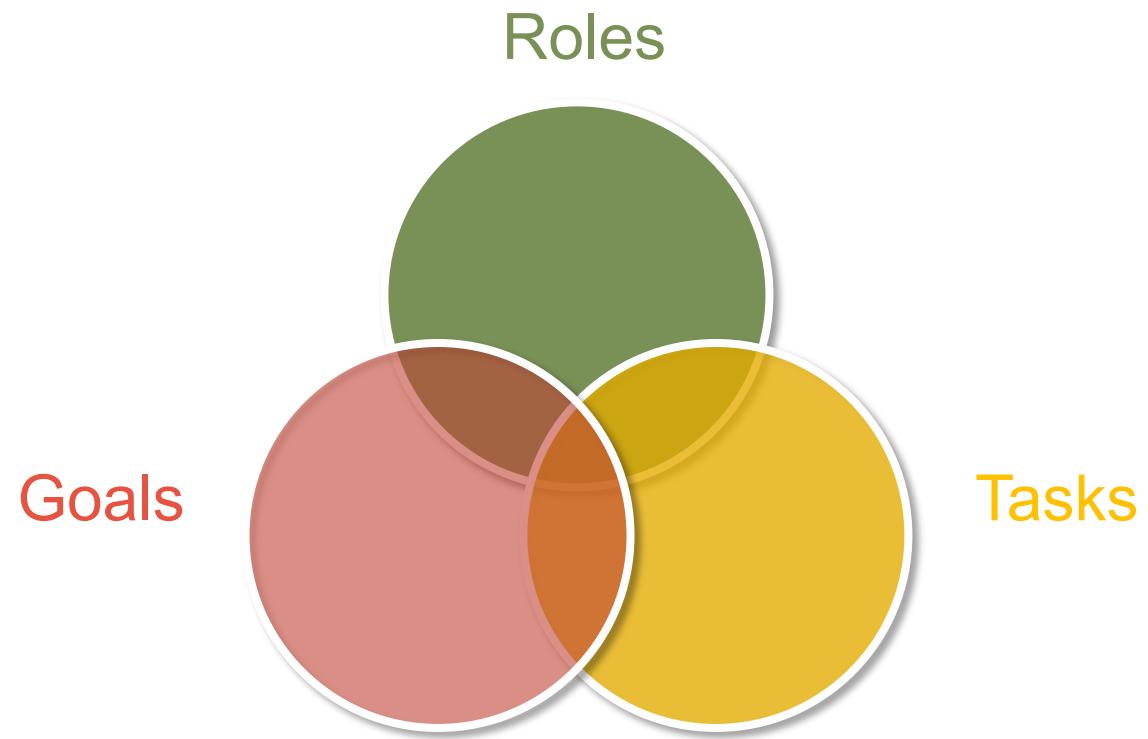
Effective knowledge management evaluates KM content against the user's goals.

Role-Based Groups

Leadership
How do I measure program success?

Sustainment Engineers
How do I support entire system lifecycle?

Test Engineers
How do I simulate system performance?

Specialty Engineers
How do I answer my specific question?

Big-Picture Engineers
How do I analyze systems of systems?
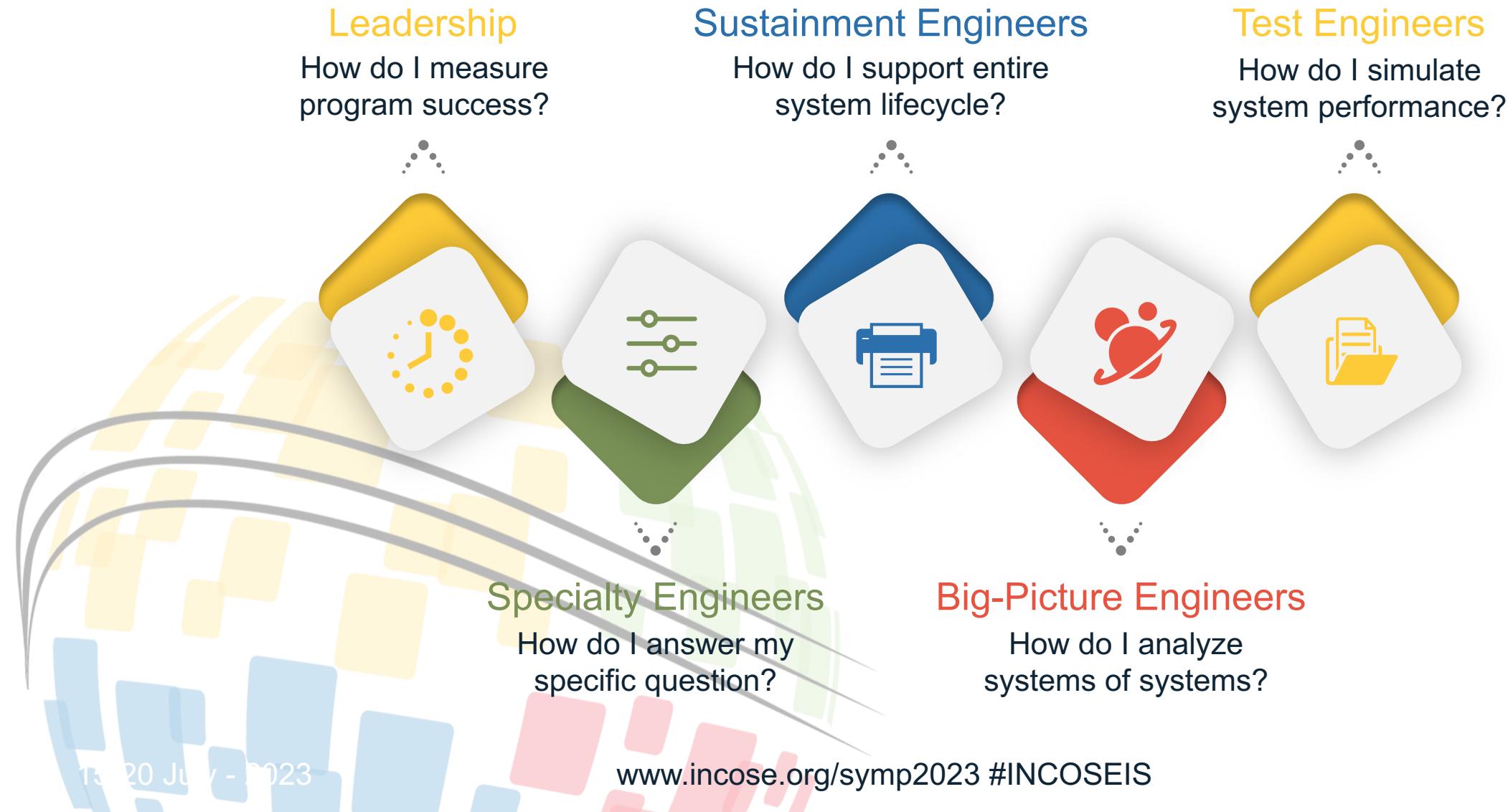
Leadership

- Modeling engineering processes, and changes to previous engineering processes, from a decision-making perspective.

- Ways and timelines for developing modeling methods.

- Business process modeling.

- Using a model for decision making.

- Return on investment for implementing MBSE.

Managers
Executives

Cost Savings / Efficiency
Decision Making

Specialty Engineers

- Methods for modeling each specialty engineering domain specifically.

- Methods for modeling requirements that need to be captured and met within that domain.

- Evaluation methods, particularly simulation tools, for determining that the system meets requirements.

- Risk assessment methods for specialty engineering.

Cybersecurity
Human Factors
Safety
Software

Increase / Improve Communication
Map between tools or methods

Sustainment Engineers

- Modeling methods for sustainment engineering concerns, including supply chain / change impact.

- Modeling methods for variant management using a model.

- Lifecycle usage of the MBSE model for sustainment activities.

Sustainment

Higher Quality Design
Change Impact Analysis

Big-Picture Engineers

- Modeling and analysis methods for understanding systems of systems

- Methods for understanding mission impact

- Methods of modeling interfaces

Cybersecurity
Interface Engineers
Systems Engineers
Network Engineers
Leadership

**Interoperability / Systems of Systems Analysis
Trade Studies**

Test Engineers

- Using a MBSE model for simulation and test.
- Efficiency gains of using the model in lieu of testing.

Cybersecurity Test
Interface Test
Mission Test

Evaluate System Capabilities
Reusability of Model Data

Conclusion

- Keep your MBSE people happy – but also "shore up Atlantis" by:
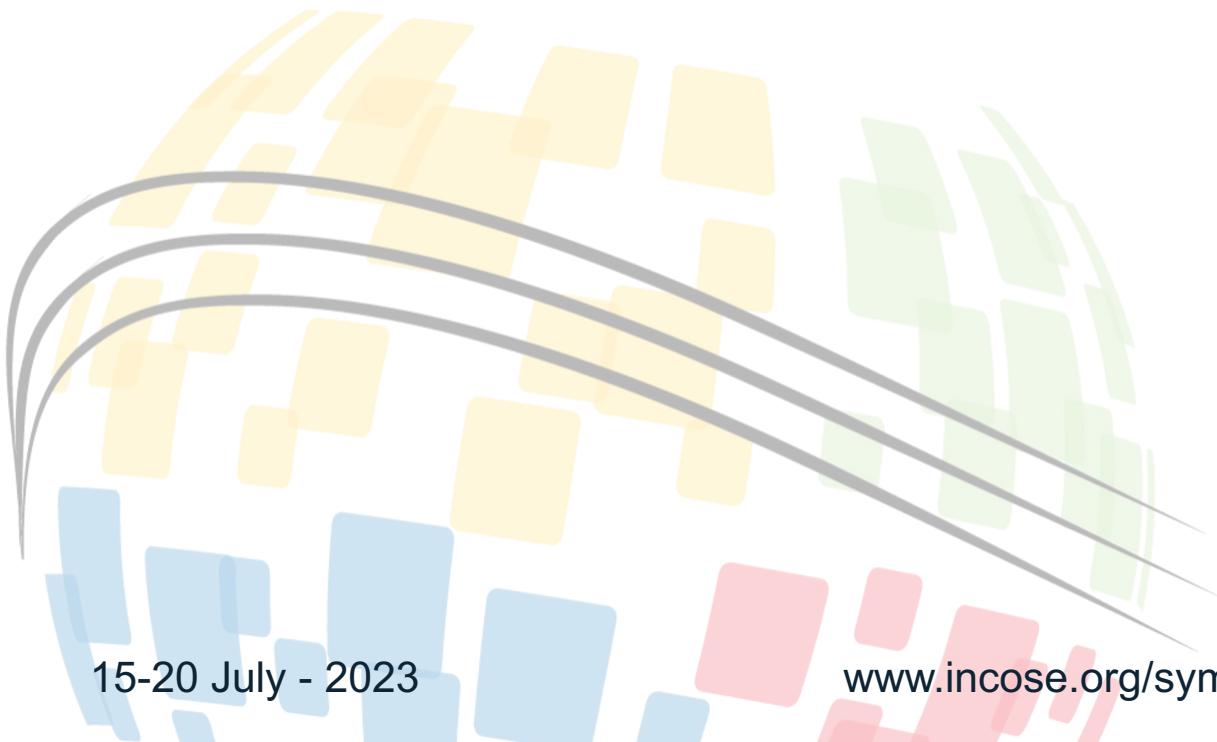
- Choosing an appropriate tool for KM.
- Create roles appropriate to your organization (or use these).
- Determine the primary goals of those in the roles.
- Tailor role-based knowledge management to tasks and goals.

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