



34th Annual **INCOSE**
international symposium

hybrid event

Dublin, Ireland
July 2 - 6, 2024

Enterprise: Exploration of Concepts, Perspectives, and Implications for Systems Engineering

Chuck Keating, Ph.D., Old Dominion University
Polinho Katina, Ph.D., Univ of South Carolina Upstate
Joe Bradley, Ph.D., PE, Main Sail, LLC

Richard Hodge, Ph.D., Hodge Nominees Australia Pty Ltd
James Martin, Ph.D., The Aerospace Corporation
Sue Caskey, Sandia National Laboratories

Topics

- **Concept Of 'Enterprise'**
- **Enterprise Importance for SE**
- **Emerging Perspective For Enterprise In SE**
- **Challenges Of Enterprise For SE**

Concept of Enterprise

“The” Enterprise

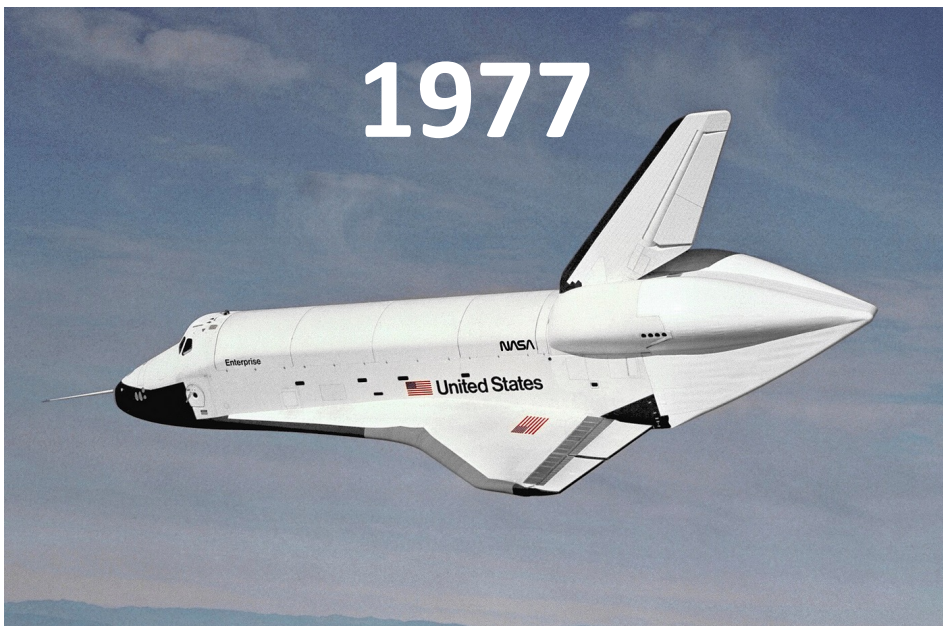
1799



1960



1977



2245

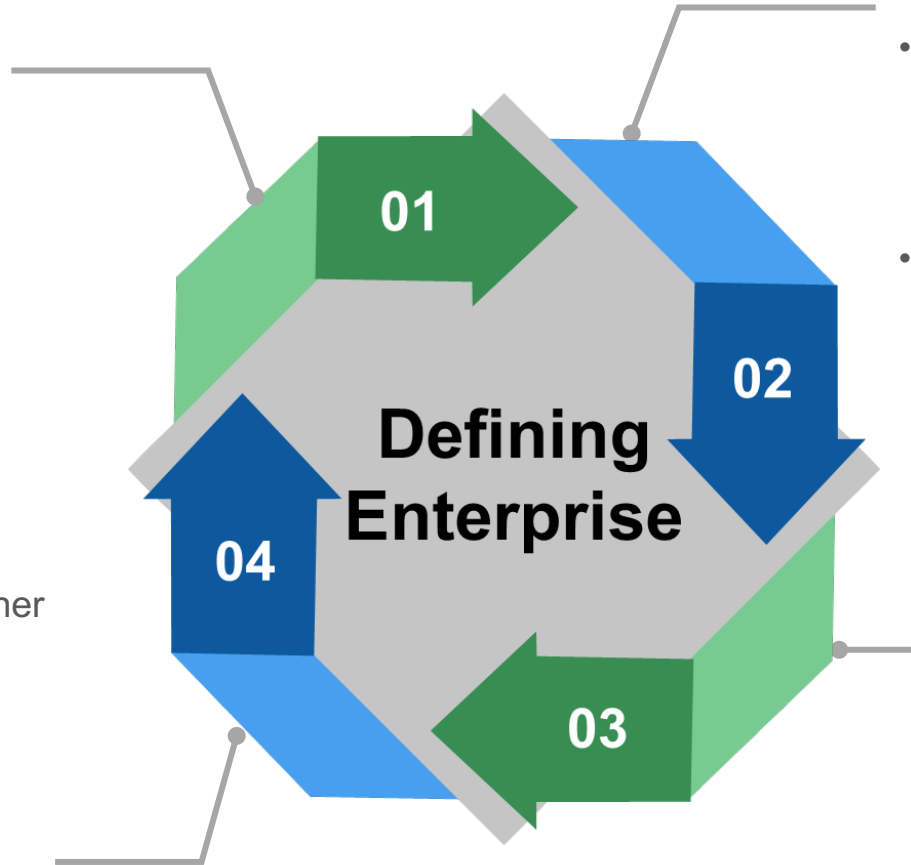


American Heritage® Dictionary

- An undertaking, especially one of some scope, complication, and risk.
- A business organization.
- Industrious, systematic activity, especially when directed toward profit.
- Willingness to undertake new ventures; initiative.

Wiktionary

- A company, business, organization, or other purposeful endeavor.
- An undertaking or project, especially a daring and courageous one.
- A willingness to undertake new or risky projects; energy and initiative.
- An active participation in projects
- To undertake an enterprise, or something hazardous or difficult.



Century Dictionary

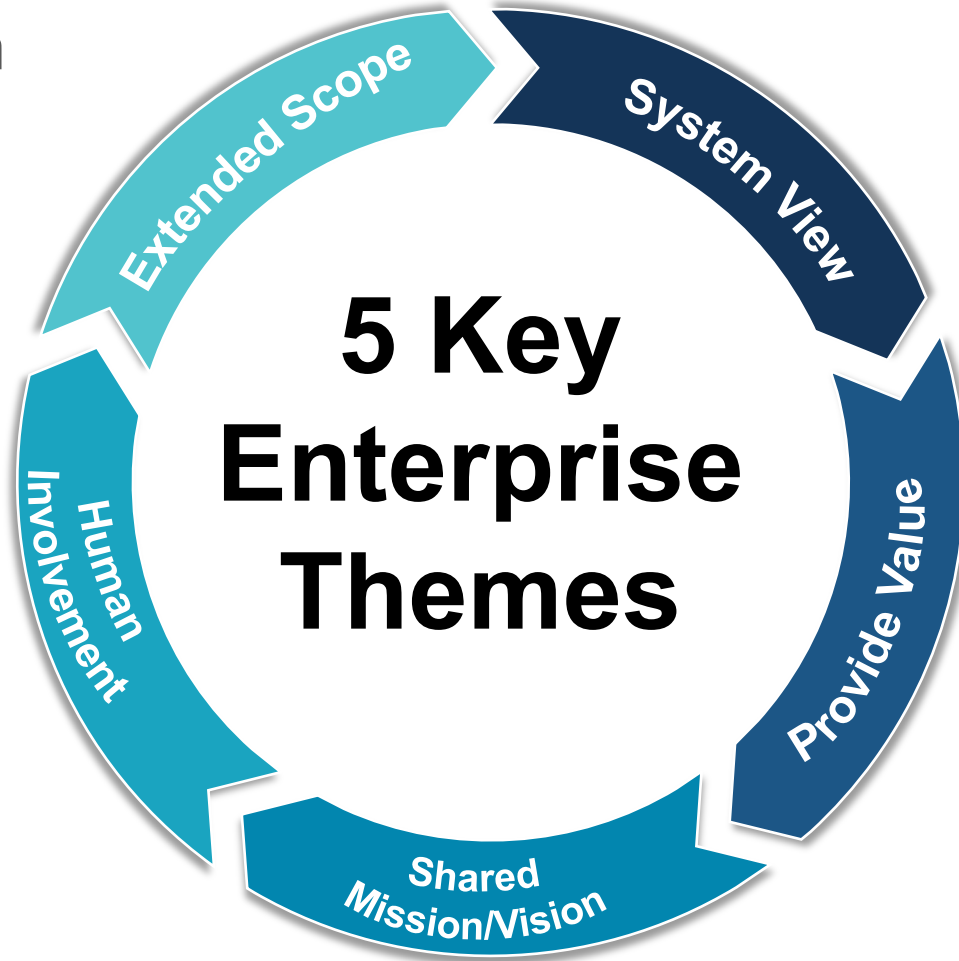
- To undertake; attempt to perform or bring about.
- An undertaking; something projected and attempted; particularly, an undertaking of some importance, or one requiring boldness, energy, or perseverance.
- An adventurous and enterprising spirit; disposition or readiness to engage in undertakings of difficulty, risk, or danger, or which require boldness, promptness, and energy.

Collaborative International Dictionary

- That which is undertaken; something attempted to be performed; a work projected which involves activity, courage, energy, and the like; a bold, arduous, or hazardous attempt; an undertaking
- Willingness or eagerness to engage in labor which requires boldness, promptness, energy, and like qualities.

Purpose and scope
extend more globally in
reach and significance

People largely influence
what the enterprise can
be and the ways it goes
about performing



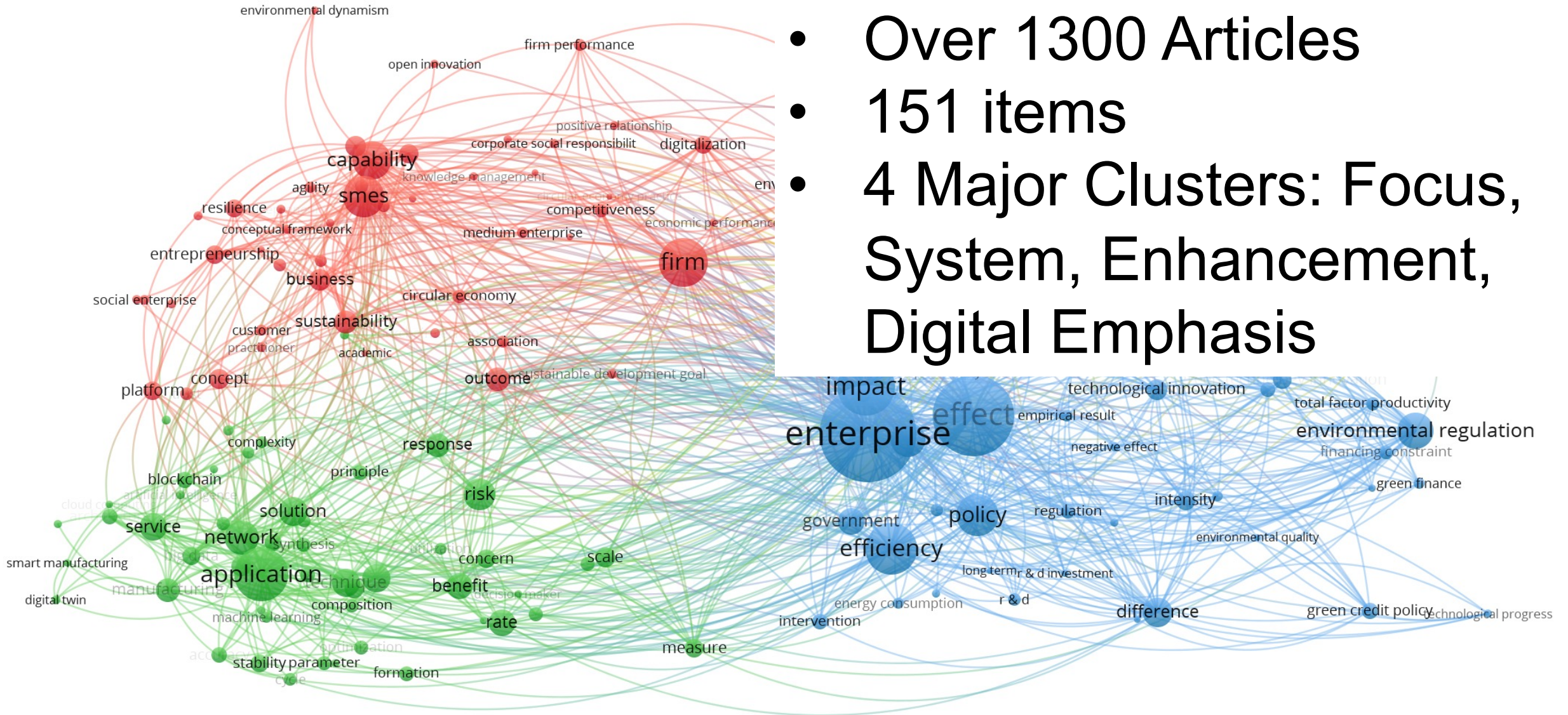
Enterprise can be
thought of as a system –
within limits

Endeavors or entities
providing value (products,
services, information) that
is consumed externally

Central integrating purpose that
serves as a focal point to unify entities

Bibliometric Analysis of Literature

- Over 1300 Articles
- 151 items
- 4 Major Clusters: Focus, System, Enhancement, Digital Emphasis



Digital emphasis is an integral part of enterprise

1

2

Enterprise frequently used in conjunction with other terms (e.g. architecture, business)

Bibliometric Analysis Interpretation

5

3

Enterprise frequently used with a focus → physical (e.g. production units) or conceptual (e.g. architecture)

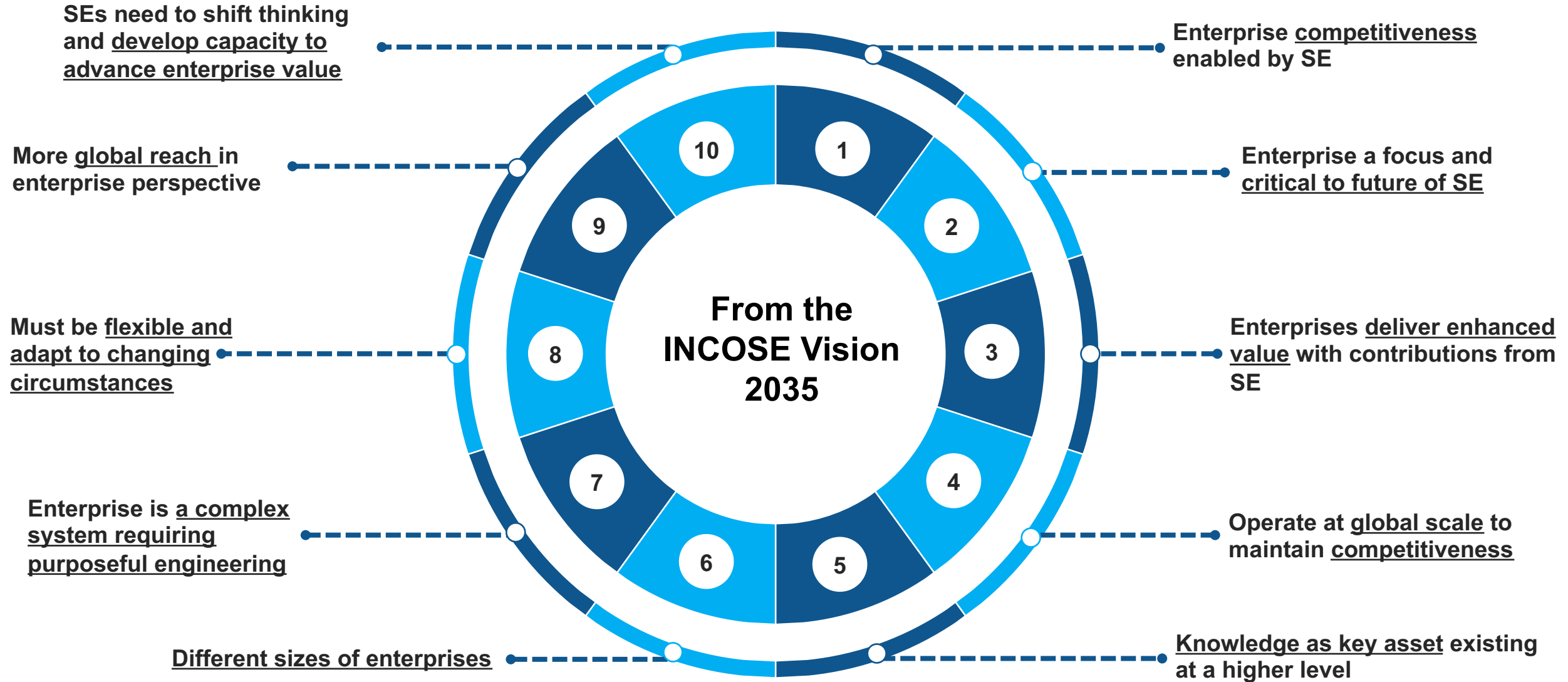
Viewed as 'something' that is enhanced by actions/activities (e.g. technical innovation, policy improvements)

4

System concepts are frequently tacitly embedded

Enterprise Importance for Systems Engineering

10 Key Themes of Enterprise from the INCOSE Vision 2035 for SE



[illegible]

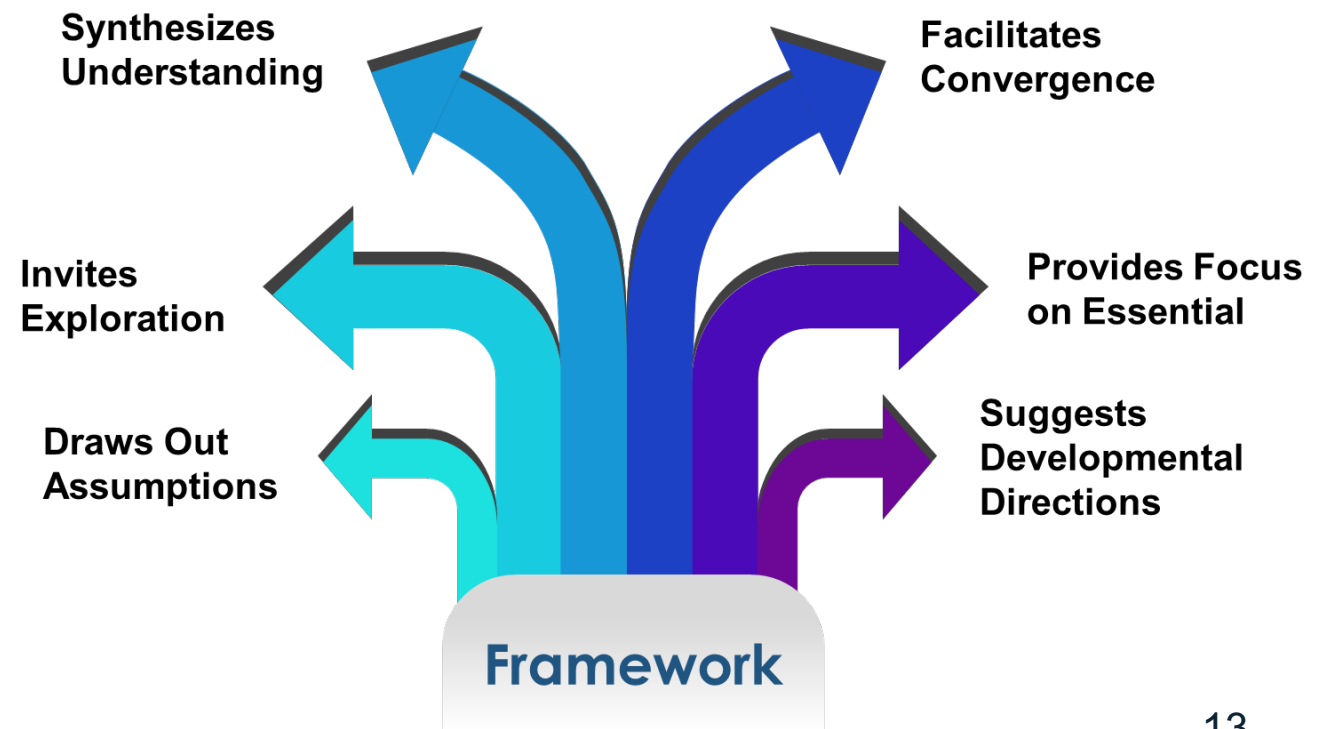
- Point 1:** Essential to SE, but requires different level of thinking, tools, methods, models, and frameworks to fully realize value
- Point 2:** Developmental challenges exist for enterprise in SE, including holistic appreciation of 'hard' and 'soft' system considerations as well as central role in digital transformation
- Point 3:** Rigorous, but different, treatment of 'enterprise' necessary to secure intended gains and contributions for more global reach of SE
- Point 4:** Influences of increased complexity, uncertainty, and ambiguity are compounded at the enterprise level – challenging traditional SE perspectives
- Point 5:** Enable a more expansive notion of 'enterprise' into SE process, methods and tools, and into the broader SE culture and tradition

Enterprise: A Preliminary Framework

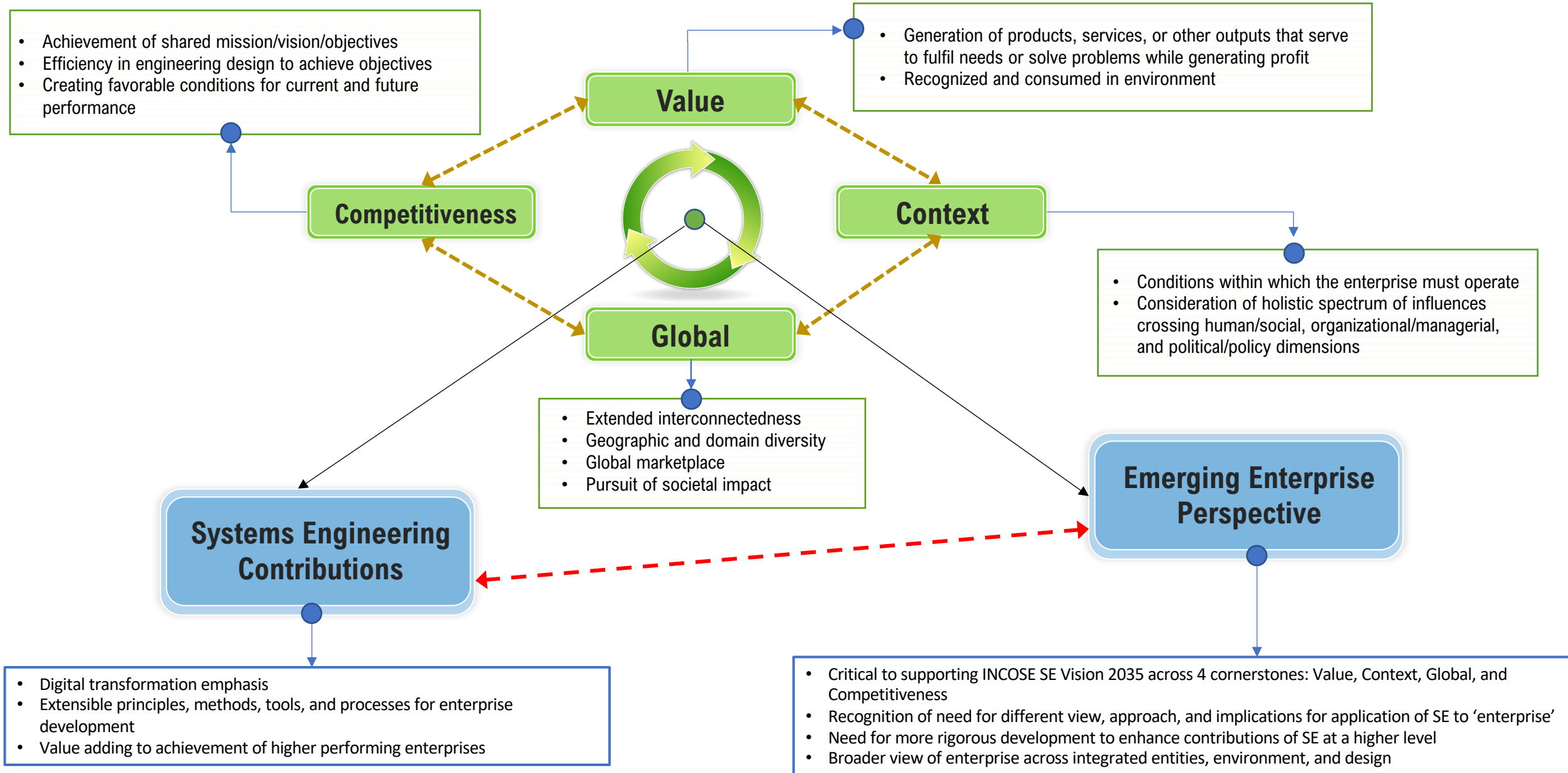
A Preliminary Framework?

Enterprise Framework: An initial synthesis of concepts and ideas that establish a starting point for further elaboration and development, to enhance the Systems Engineering discipline

- ⚙ Represents the current, not final, state of understanding
- ⚙ A first articulation to begin a different conversation
- ⚙ Both correct and incorrect in the formulation at present
- ⚙ Challenging evolution in the work of the INCOSE Enterprise Value Working Group



Emerging Enterprise Perspective to Support INCOSE SE Vision 2035



Challenges for Development of Enterprise for SE

Enterprise focus will require new methods, tools, technologies, and processes to address emerging problems and needs

Enterprise operates at a different level than system, organization, or project/program

Enterprise can be based in the 'systems view', but must complement traditional restrictive 'hard' system perspectives

Enterprise operates across holistic dimensions of technology, human, social, organizational, managerial, policy, and political



Enterprise must be a central focus for coming digital transformation

People Component Challenges for Enterprise in SE



» Expanding Enterprise System Engineering Value

- Application of SE principles, concepts, and methods to the planning, design, improvement, and operation of the enterprise. – enables better tradeoff analyses, including human elements

» Supporting Digital Transformation

- Support of movement from document-driven to model-driven mindset and approaches at the enterprise level for systems engineering value

» Guidance for Standard Practices

- Elaborating guidance (enterprise emphasis) on standard practices for enterprise modeling needs to enable practicing systems engineers

» Enterprise Modeling Capabilities

- Exposure and incorporation of enterprise modeling capabilities for use beyond defense applications, e.g., extending SysML to Unified Architecture Framework Modeling Language

» Expanded Notion of Enterprise Architecture

- Incorporate the expanded notion of EA into SE processes, methods, and tools -- incorporating that into the wider SE traditions and culture.

Questions or Comments



CONTACT:

Chuck Keating, Ph.D.
ckeating@odu.edu
Phone +1.757.412.7104

INCOSE Enterprise Value Working Group CONTACT:

Joe Bradley, Ph.D., PE
josephbradley@leadingchangelc.net
Phone +1.757.815.5987