International Council on Systems Engineering
A better world through a systems approach

A Survey on MBSE Adoption Challenges in the INCOSE Asia and Oceania Sector

Dr. Mohammad Chami, SysDice
Marco Forlingieri, PTC Inc.
Habibi Husain Arifin, Dassault Systemés
Dr. Quoc Do, Frazer-Nash Consultancy

INCOSE International Symposium 2025 | Ottawa, Canada

Today's Agenda

- Introduction & Background
- MBSE Adoption Challenges
- Hofstede's Cultural Dimensions
- Survey Methodology and Results
- Cultural Impact on MBSE Adoption
- Conclusion and Future Work

Icebreaker

"What would the implications be if we applied this to countries in the Asia-Pacific region?

Heaven is
Where the Police are British
The Chefs French
The Mechanics German
The Lovers Italian &
All is organized by the Swiss

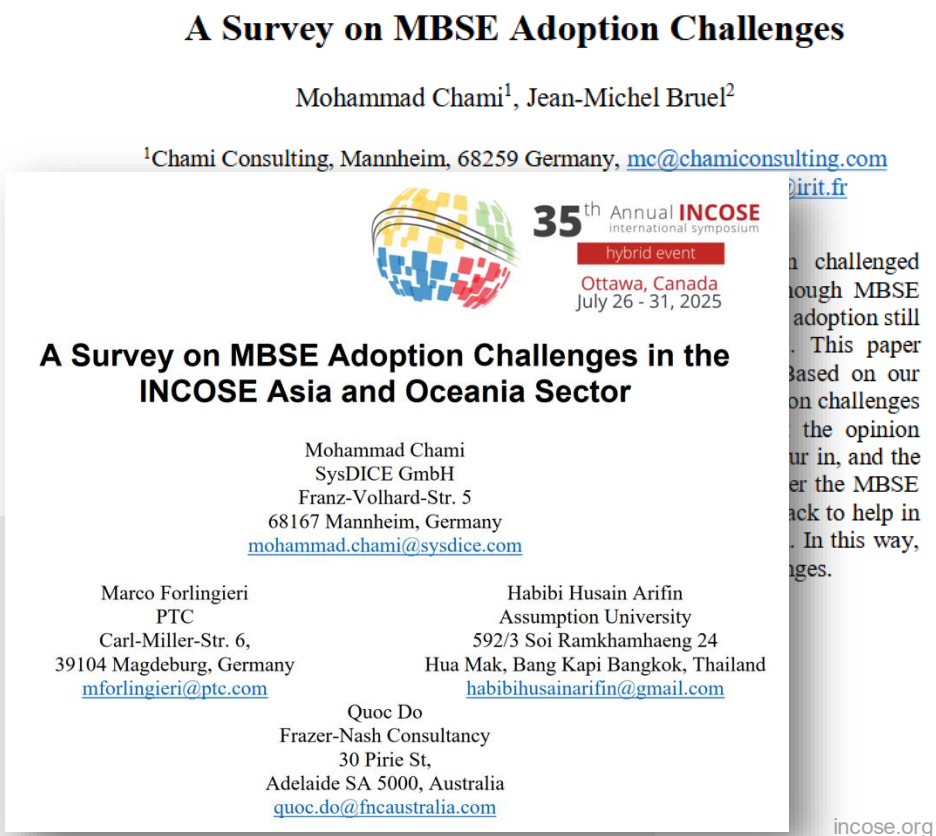
Hell is
Where the Chefs are British
The Mechanics French
The Lovers Swiss
The Police German &
All is organized by the Italians

Introduction & Background

This **research builds upon previous work examining MBSE adoption challenges in the Americas and EMEA regions.**

Now focusing on the rapidly growing **Asia-Oceania sector.**

A comprehensive survey exploring the unique cultural and regional factors affecting **MBSE adoption across the Asia-Oceaniasector, comparing challenges** with those in **Americas and EMEA regions**.



A Survey on MBSE Adoption Challenges

Mohammad Chami[1], Jean-Michel Bruel[2]

[1]Chami Consulting, Mannheim, 68259 Germany, mc@chamiconsulting.com

irit.fr

35th Annual INCOSE international symposium
hybrid event
Ottawa, Canada
July 26 - 31, 2025

A Survey on MBSE Adoption Challenges in the INCOSE Asia and Oceania Sector

Mohammad Chami
SysDICE GmbH
Franz-Volhard-Str. 5
68167 Mannheim, Germany
mohammad.chami@sysdice.com

Marco Forlingieri
PTC
Carl-Miller-Str. 6,
39104 Magdeburg, Germany
mforlingieri@ptc.com

Habibi Husain Arifin
Assumption University
592/3 Soi Ramkhamhaeng 24
Hua Mak, Bang Kapi Bangkok, Thailand
habibihusainarifin@gmail.com

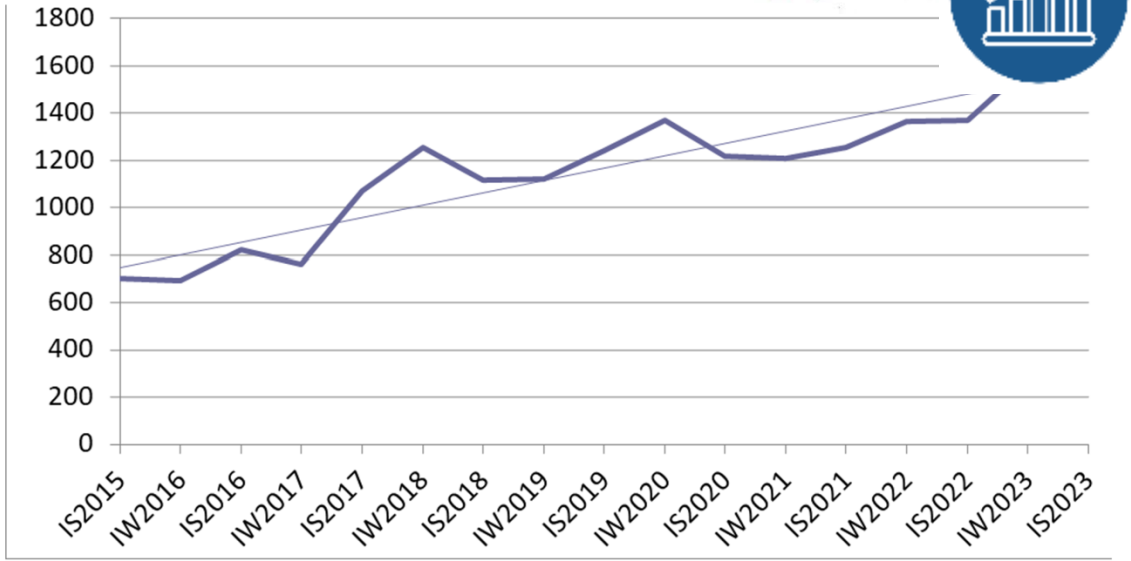
Quoc Do
Frazer-Nash Consultancy
30 Pirie St,
Adelaide SA 5000, Australia
quoc.do@fncaustralia.com

challenged
ough MBSE
adoption still
. This paper
ased on our
on challenges
the opinion
ur in, and the
er the MBSE
ack to help in
. In this way,
ges.

Growing Importance of MBSE in Asia-Oceania

The **INCOSE Asia-Oceania sector** has experienced **significant growth**, with **membership increasing from** approximately **700 to 2219 members** between **2015-2025**. This growth is accompanied by:

- **Increased SEP certification** applications (**2,055**) by December 2024.
- **20+ systems engineering conference**s and events from 2022-2025
- **Rising MBSE activities** across India, Japan, China, Korea, Thailand, Vietnam, Singapore, New Zealand and Australia



INCOSE Memberships within the Asia-Oceania sector over the past decade (INCOSE 2023)

MBSE Adoption Challenges

Financial & Strategic

Upfront Investment

Adoption Strategy

Executive Level Sponsorship

Human Factors

Awareness & Change Resistance

Purpose & Scope Definition

Competence Development & Language Barriers New

Technical Factors

Method Definition & Extension

Modularity & Reusability

Complexity Management

Tool Dependency & Integration

Previous research by Chami & Bruel (2018) found that **human and technological factors were the most challenging in early MBSE adoption phases**, with adoption strategy, method definition, and tool selection becoming significant in later phases.

Other studies by **Henderson et al. (2024) and Akundi et al. (2022)** identified **organizational resistance, leadership support, tool integration, and learning curve** as **common challenges** to MBSE adoption success.

Hofstede's Cultural Dimensions

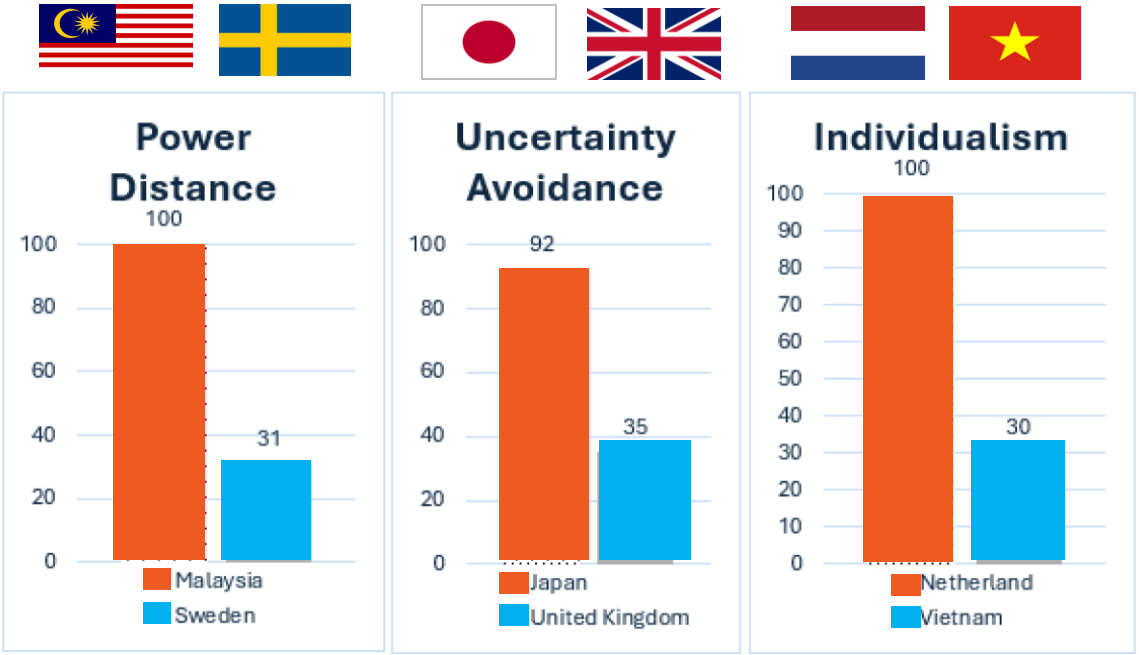
Hofstede's cultural dimensions provide a **framework** for understanding how cultural differences **impact organizational behavior** and **technology adoption**

https://geerthofstede.com

0 ← HOFSTEDE'S CULTURAL DIMENSIONS → 100

LOW POWER DISTANCE	PDI	HIGH POWER DISTANCE
COLLECTIVISTIC	INV	INDIVIDUALISTIC
Not Used		
LOW UNCERTAINTY AVOIDANCE	UAI	HIGH UNCERTAINTY AVOIDANCE
SHORT TERM ORIENTATION	LTO	LONG TERM ORIENTATION

Hofstede's Cultural Dimensions



Cultural dimensions comparison between European and Asian countries

Survey Methodology and Objectives

- Three-Phase Approach:
  - **Design & Validation**: Initial survey design with feedback from MBSE leaders
  - **Survey Administration**: Broader distribution to systems engineering practitioners
  - **Cross-Checking**: Analysis of results against Hofstede's cultural dimensions
- Survey Objectives:
  - **To confirm and contextualize the relevance of previously identified MBSE adoption challenges to the Asia-Oceania sector**
  - **To identify new challenges unique to the region as reported by participants**
  - **To collect demographic data for analyzing correlations between participant profiles and the MBSE challenges experienced**

The scope of the survey's regional demographics encompasses the Asia-Oceania region, including India, Australia, Japan, China, and Southeast Asia (ASEAN) countries.

Survey Results

- **Human Factors Lead**:

87% of respondents identified **"Awareness and Change Resistance"** as the principal challenge, followed by **"Adoption Strategy" at 86%**.

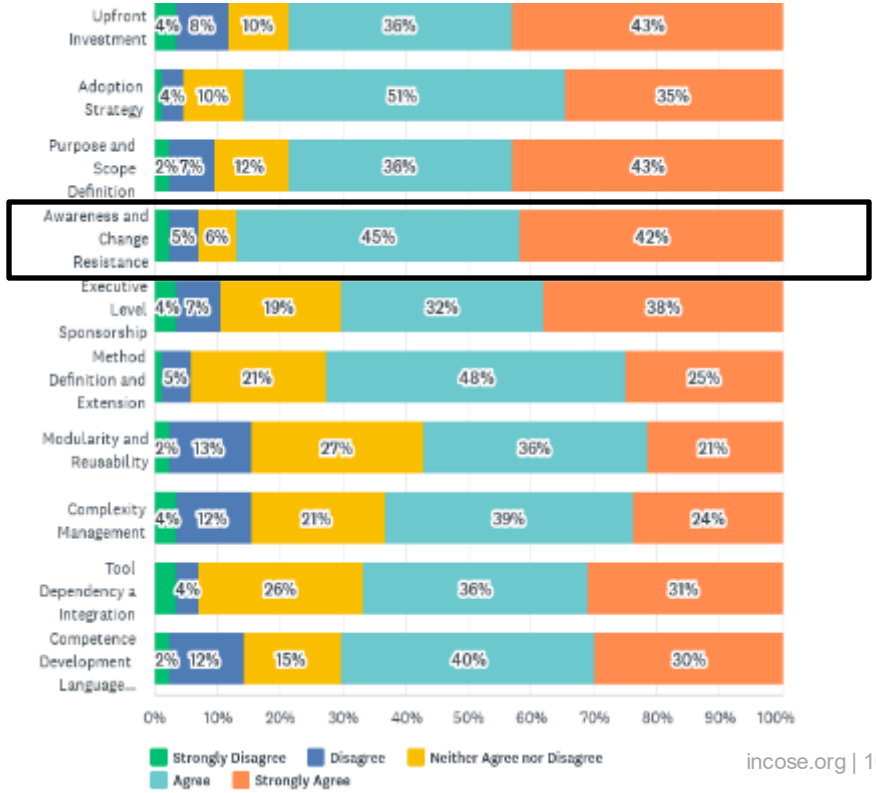
- **Financial Concerns Follow**:

79% highlighted **"Upfront Investment"** and **"Purpose and Scope Definition"** as significant barriers, reflecting the business dimension's importance.

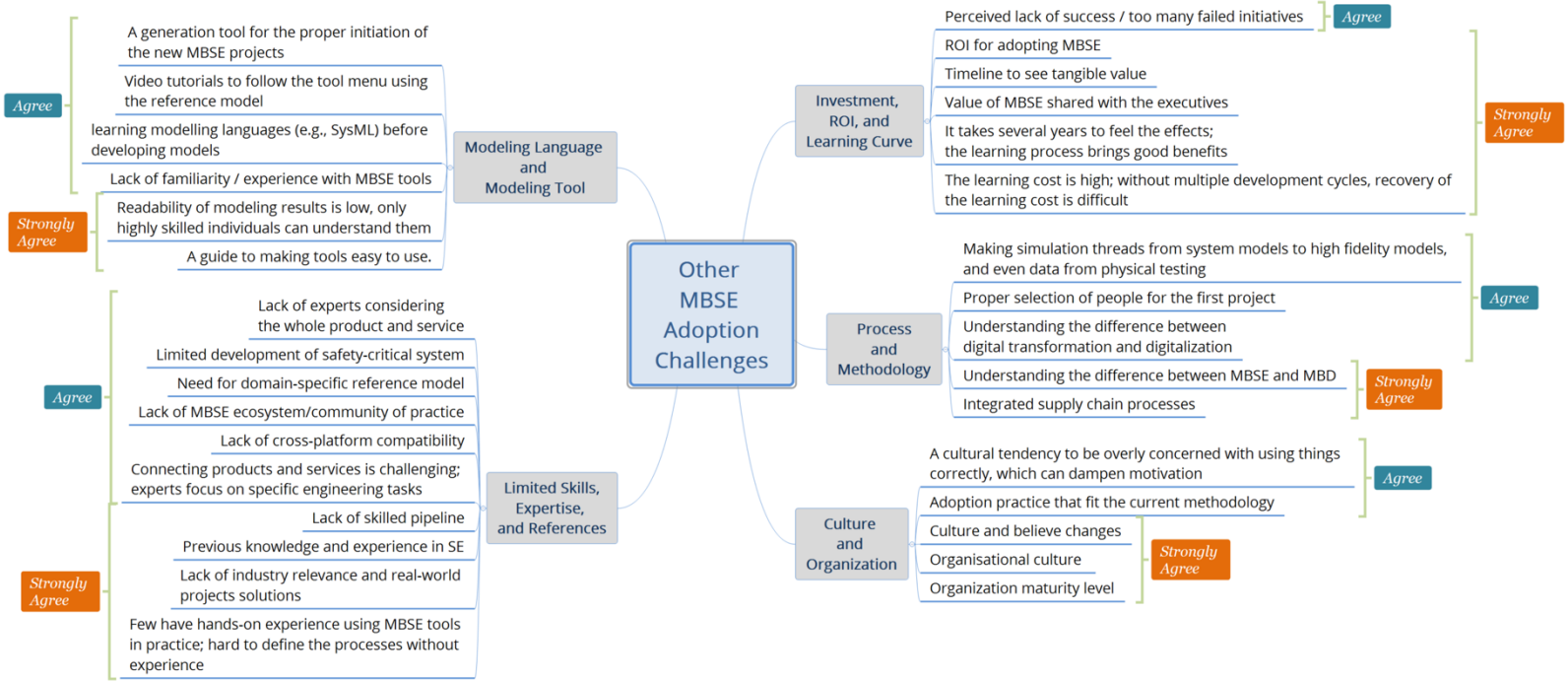
- **Technical Challenges Less Significant**:

"Modularity and Reusability" and **"Complexity Management"** showed the highest disagreement rates **(15-16%)**, suggesting technical barriers are less formidable than cultural and business factors.

Q1 Please indicate your level of agreement or disagreement if the following challenges are related to MBSE adoption in your Asia Pacific and Oceania Region:



Additional Challenges Identified



Additional Challenges Identified

Investment & ROI: Most recurring concerns related to upfront costs, return on investment, and learning curve challenges.

Limited Expertise: Significant gap in skills, expertise, and reference materials for MBSE implementation in the region.

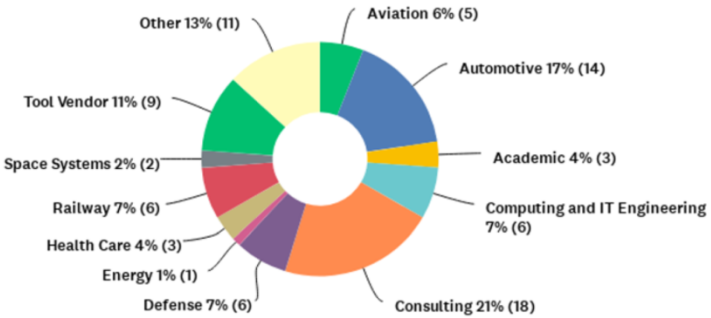
Process Integration: Difficulties integrating MBSE into existing organizational processes and project contexts.

Tool & Language Issues: Concerns about modeling languages and tools, particularly regarding expertise gaps.

Survey Demographics

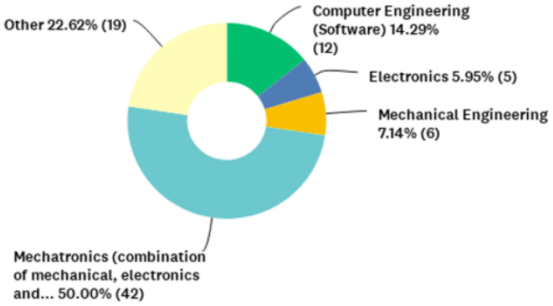
- **37%** from **Japan**, **17%** from **Australia**, **11%** from **Singapore**
- **21%** in Consulting, **17%** in **Automotive**, **6%** in **Defense**
- **23%** with **>10 years MBSE experience, 41%** with **3-10 years**
- **52%** are **INCOSE members**

Q3 What type of industry does your company represent?



Other responses:
- Semiconductor Manufacturing
- Artificial Intelligence
- Transport
- Consumer goods

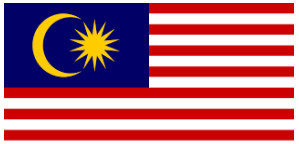
Q4 Which of the following engineering disciplines best describes your system-of-interest (i.e., Product) you are using MBSE for?



Other responses:
- System Engineering
- System of the Systems for Defense Application
- Enterprise Architecture Design
- Transport system
- Human factors engineering
- Operational Technologies

Cultural Impact on MBSE Adoption

Power Distance



100

80

77

Upfront Investment

Executive Sponsorship

High Power Distance in Asian countries (Malaysia: 100, China: 80, India: 77) correlates with challenges in securing Upfront Investment and Executive Sponsorship due to hierarchical barriers.

Cultural Impact on MBSE Adoption

Uncertainty Avoidance

92

85

Awareness & Change Resistance

High Uncertainty Avoidance in Japan (92) and South Korea (85) contributes to stronger Awareness & Change Resistance, while lower scores in China (30) and India (40) facilitate faster MBSE adoption.

Cultural Impact on MBSE Adoption

Individualism

18

20

30

Collective Effort

Lower Technical Barriers

Low Individualism scores in South Korea (18), Singapore (20), and China (30) suggest technical challenges are more readily overcome through collective effort, explaining lower concern for technical barriers.

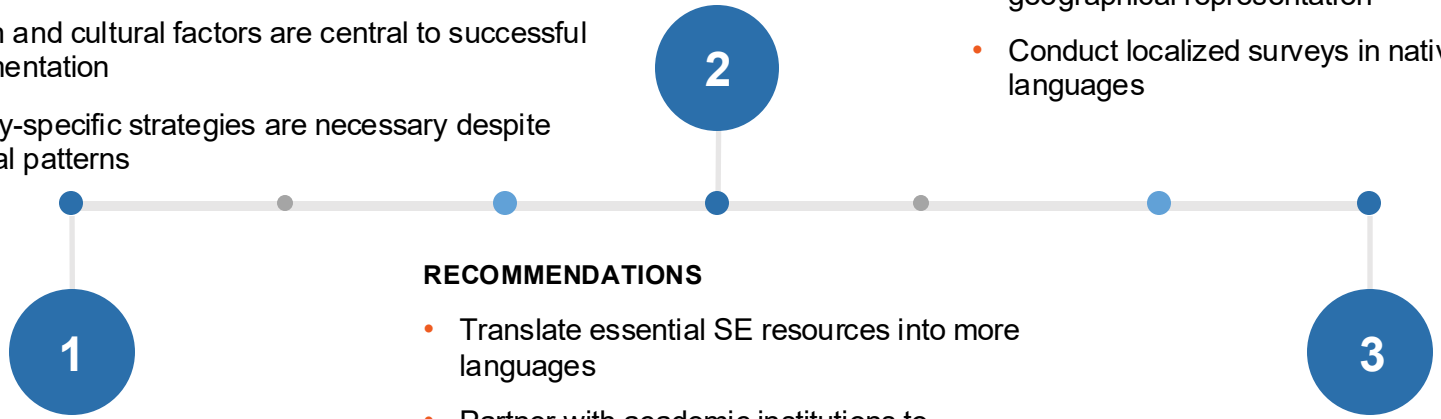
Conclusion and Future Work

KEY FINDINGS

- Culture significantly influences MBSE adoption, yet many challenges remain consistent worldwide
- Human and cultural factors are central to successful implementation
- Country-specific strategies are necessary despite regional patterns

FUTURE WORK

- Expand survey scope to achieve greater geographical representation
- Conduct localized surveys in native languages



RECOMMENDATIONS

- Translate essential SE resources into more languages
- Partner with academic institutions to establish equivalency programs
- Develop tailored approaches for different cultural contexts

Acknowledgments

The authors would like to thank all anonymous survey participants and MBSE leaders/experts for their time, expertise, and valuable survey comments.

We also extend our thanks to Hidekazu Nishimura, Midori Daida (**INCOSE Japan**), Jawahar Bhalla (**INCOSE Australia**), Jessica Tucker **(INCOSE New Zealand**), Joongyoon Lee (**INCOSE Korea**), Kelly Lunney (**INCOSE Australia**), Midori Daida (**INCOSE Japan**), Mudit Mittal (**INCOSE India**), Robert ONG (**INCOSE Singapore**), Serge Landry (**INCOSE Singapore**), Thomas Manley (**INCOSE Australia**), and Vorachet Jaroensawas (**INCOSE Thailand**) for their helpful feedback on the survey work.

THANK YOU!
Questions?

35th Annual INCOSE international symposium

hybrid event

Ottawa, Canada
July 26 - 31, 2025