



# TEC-FORM-05

## INCOSE International Symposium

### Submission Review Categories

#### Introduction

##### Objectives

This document defines the Systems Engineering (SE) domains and topics that are used to categorize submissions for the Annual INCOSE International Symposium (IS). The domains and topics are used to:

- allocate skilled reviewers to submissions
- facilitate compilation of the IS program.

#### Submission and Review Categories

##### Application of Categories

SE domains and topics are implemented in EasyChair as submitter and reviewer selections. When making a submission, submitters are encouraged to pick more than 1 but no more than 3 SE domains and topics in order to sufficiently categorize their submission. Reviewers are encouraged to pick all topics and all domains in which they have expertise. The Events Committee uses these selections to match reviewers to submissions. Manual quality checking is also performed after the automatic assignment of reviewers to submissions. While these categories were tested for compatibility with EasyChair, this document is meant to define the categories independent of the tool.

##### SE Topics

Topics are selected from the following list:

1. SE Theory
  - 1.1. Complexity
  - 1.2. Cybernetics
  - 1.3. Natural Systems
  - 1.4. Systems Dynamics
  - 1.5. Systems Science
  - 1.6. Systems Thinking
2. SE Technical Practice
  - 2.1. Business or Mission Analysis
  - 2.2. Manufacturing Systems and Operational Aspects



- 2.3. Needs and Requirements Definition
- 2.4. System Architecture/Design Definition
- 2.5. System Integration
- 2.6. Verification/Validation
- 3. SE Management
  - 3.1. Acquisition and/or Supply
  - 3.2. Configuration Management
  - 3.3. Decision Analysis and/or Decision Management
  - 3.4. Information Management Process
  - 3.5. Technical Leadership
  - 3.6. Measurement and Metrics
  - 3.7. Project Planning, Project Assessment, and/or Project Control
  - 3.8. Quality Management Process
  - 3.9. Risk and Opportunity Management
- 4. SE Specialty Engineering
  - 4.1. Human-Systems Integration
  - 4.2. Life-Cycle Costing and/or Economic Evaluation
  - 4.3. Reliability, Availability, and/or Maintainability
  - 4.4. Resilience
  - 4.5. Competency/Resource Management
  - 4.6. System Safety
  - 4.7. System Security (cyber-attack, anti-tamper, etc.)
- 5. Cross-Cutting Systems Engineering
  - 5.1. Agile Systems Engineering
  - 5.2. Lean Systems Engineering
  - 5.3. MBSE
  - 5.4. Modeling/Simulation/Analysis
  - 5.5. Processes
  - 5.6. Product Line Engineering
  - 5.7. Software-Intensive Systems
  - 5.8. Systems of Systems (Internet of Things, cyber physical systems, etc.)
  - 5.9. Teaching and Training
  - 5.10. Diversity (cultural boundaries, diverse engineering teams, training underserved groups, etc.)
  - 5.11. Artificial Intelligence, Machine Learning
  - 5.12. Automation



## Application Domains

Domains are selected from the following list:

1. Academia (curricula, course life cycle, etc.)
2. Aerospace
3. Automotive
4. Biomed/Healthcare/Social Services
5. City Planning (smart cities, urban planning, etc.)
6. Defense
7. Emergency Management Systems
8. Energy (renewable, nuclear, etc.)
9. Enterprise SE (organization, policies, knowledge, etc.)
10. Environmental Systems and Sustainability
11. Information Technology/Telecommunication
12. Infrastructure (construction, maintenance, etc.)
13. Maritime (surface and sub-surface)
14. Autonomous Systems
15. Oil and Gas
16. Rail
17. Sustainment (legacy systems, re-engineering, etc.)
18. Service Systems
19. Very Small Enterprises
20. Industry 4.0 & Society 5.0
21. Urban Transportation Systems
22. Social/Sociotechnical and Economic Systems

## Primary Sector of Submitter or Reviewer

Sectors are divided into the 3 pillars of INCOSE listed below. The submitter or reviewer should select the sector with which they are primarily associated. Only one sector can be chosen. This categorization is not used in the automatic assignment process; it is used during manual quality checking to help ensure a balanced set of reviewers is selected for each submission.

1. Government
2. Industry
3. Academia



## Student

Paper submitters are asked to indicate whether they are a registered student. The definition of a student is now aligned to INCOSE student membership; a student must be currently enrolled in at least 2/3 full-time undergraduate, graduate, or post-graduate studies. This field is used to identify candidates for the Brian Mar Best Student Paper Award.

## Future Revisions

To keep the list of SE domains and topics up to date, a yearly review of this document will be conducted under TechOps leadership and will take into consideration the “Other” categories submitted, activity levels of categories, and anticipated new categories. To help ensure INCOSE governance alignment, TechOps will request the Board of Directors and Events Committee provide a formal review of subsequent revisions, ensuring that key roles in their organization are included as appropriate.

## Revision History

Date	Version	Primary Authors	Primary Sources and Changes
2010	1.1	Yoshi Ohkami, Nobuaki Minato	Initial recorded version based on INSIGHT Vol.(13), I(1), p. 13-15
29 Sep 2011	1.2	Quoc Do	Updates for domains & enablers with input from Anne O'Neil, Eileen Arnold and Terje Fossnes
10 Jul 2017	2.0	David Endler, Mike Celentano	<p>Input elicited from TechOps, Board of Directors, Events Committee, Industry Outreach Board, and version 1.2 contributors.</p> <p>Reduced jargon by changing “Enablers” to “Topics” and “Sectors” to “Domains”.</p> <p>Increased scope to reflect current usage of these categories for papers, panels &amp; tutorial submissions.</p> <p>Domains were changed to reflect currently active and anticipated areas of SE work. 12 domains were added, 7 were clarified, and 1 was retired.</p> <p>Topics were changed to reflect a balanced list based on the active and emerging topics as well as key areas of the SE Handbook, 15288, and Vision 2025. 10 topics were added, 12 were clarified, and 3 were retired.</p> <p>“Other Topic” and “Other Domain” choices will now require the submitter to enter a word or phrase to help with reviewer allocation and life cycle management of these categories.</p> <p>To help the submitters &amp; reviewers understand some categories, examples are given in parentheses.</p>



Date	Version	Primary Authors	Primary Sources and Changes
30 Jul 2018	2.1	Mike Celentano	Document reformatted with minor wording changes and to accommodate additional submission types. Eliminated the choices for “Other SE Topic” and “Other Application Domain” to simplify the management of categories.
08 Sep 2021	2.2	Ramakrishnan Raman, Olivier Dessoude	Added application domains 20, 21 and 22, used for IS 2021. Minor changes in category names. Document now identified as TEC-FORM-09.

### Approach to Version 2.0

An update of the domains and topics was necessary to ensure alignment with ISO 15288:2015 and INCOSE SE Handbook v4. Furthermore, INCOSE Technical Operation (TechOps) was restructured in 2016 and additional working groups were founded since the last revision of this document. This revision also considered the strategic objectives defined in INCOSE Vision 2025.

Version 2.0 attempted to reduce jargon by using “Topics” instead of “Enablers” and “Domains” rather than “Application Sectors”. Parentheses next to the category are now reserved for category examples, useful to clarify sub-topics to be included in some categories. Selection of the “Other” category now requires a description of the missing category. The existing student selection is now documented and better defined. The existing primary sector selection is now documented.

The update included comments from various SE experts across INCOSE TechOps, Board of Directors, Events Committee, Industry Outreach Board, and contributors to the previous version. All comments were carefully evaluated by TechOps leadership and balanced against one another. The resulting categories were prototyped in EasyChair to help ensure tool compatibility. However, the categories defined in this document are meant to be independent of the tool.

The following table provides a top-level summary of the changes made for Version 2.0:

Modification			Rationale
Retired	3	Topics	Lowest 10% of submissions in last 3 years
Retired	1	Domain	Lowest 10% of submissions in last 3 years
Added	10	Topics	Popular and SE Handbook topics were missing
Added	12	Domains	Popular and emerging domains were missing
Changed	12	Topics	Clarified, updated, and separated as needed
Changed	7	Domains	Clarified, updated, and separated as needed