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Systems and software engineering — Taxonomy of systems of systems

Ingénierie système et logiciel — Taxonomie des systèmes de systèmes

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Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**
3.1 General terms ... 1
3.2 SoS types ... 2

4 Concepts and application ... **3**
4.1 Overview ... 3
4.2 Importance of taxonomies to SoS ... 3
4.3 Use of SoS taxonomies ... 3

5 Taxonomies for systems of systems ... **4**
5.1 General ... 4
5.2 Taxa: directed, acknowledged, collaborative and virtual ... 4
5.2.1 Overview ... 4
5.2.2 Description of the taxa ... 4
5.2.3 Examples of potential application of the taxa ... 5
5.2.4 When to use ... 5
5.2.5 How to use ... 5
5.2.6 Why to use ... 6
5.2.7 Limitations ... 6
5.2.8 Benefits of use ... 6

Annex A (informative) **Summary of SoS taxonomies** ... **7**

Bibliography ... **8**

IEEE notices and abstract ... **9**

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Foreword

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This corrected version of ISO/IEC/IEEE 21841:2019 incorporates the following correction:

— The publication date on the cover page has been corrected.

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Introduction

Systems of systems engineering (SoSE) is a concept that is increasingly thought of as a discipline important for the realization and sustainability of large and persistent sociotechnical systems in areas as diverse as healthcare, transportation, energy, defense, corporations, cities and government.

While SoSE applies broadly to hardware, software, middle-ware as well as embedded, cyber-physical and digital systems, the importance of SoSE has been heightened in the last fifteen years by the rapid increase in the pervasiveness of information technology (IT), illustrated by new technologies and paradigms such as Sensor Networks, Cloud Computing, the Internet of Things, Big Data, Smart Devices and Artificial Intelligence. It is, for instance, the application of these technologies to cities that transform them into “smarter” cities.

This pervasiveness of IT was not only driven by the availability of these technologies, but also more importantly by the requirements in our resource and environmentally-constrained world for increased and sustainable economic development and, ultimately, personal well-being.

SoSE goes well beyond IT and potentially applies to all types of systems, including hardware and cyber physical systems where IT is an enabler. SoSE addresses functionality, performance and interdependencies of the systems as well as their connectivity. The interconnectivity of systems has become pervasive in large command and control systems, defense systems, communications systems, transportation systems and medical/health systems, among others. The accelerating need to share information and leverage capabilities from other systems has changed how systems need to be viewed and engineered.

Taxonomies provide a means in many fields to classify and describe the relationships among the relevant elements being studied. The elements of a taxonomy, or taxa, form a partitioning or means of classification within that body of knowledge. In the context of systems of systems (SoS), the relevant elements of the system of interest are, by definition, systems themselves. Using essential characteristics to partition the various types of SoS provides an abbreviated nomenclature for thinking about SoS. Based on taxonomies, different approaches to the engineering of systems of systems are possible, improving the efficiency and effectiveness of systems of systems engineering.

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Systems and software engineering — Taxonomy of systems of systems

1 Scope

This document defines a normalized taxonomy for systems of systems (SoS) to facilitate communications among stakeholders. It also briefly explains what a taxonomy is and how it applies to the SoS to aid in understanding and communication.

2 Normative references

There are no normative references in this document.

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