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Research on asset administration shell standard system architecture

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中國地質大學

RESEARCH ON ASSET ADMINISTRATION SHELL STANDARD SYSTEM ARCHITECTURE



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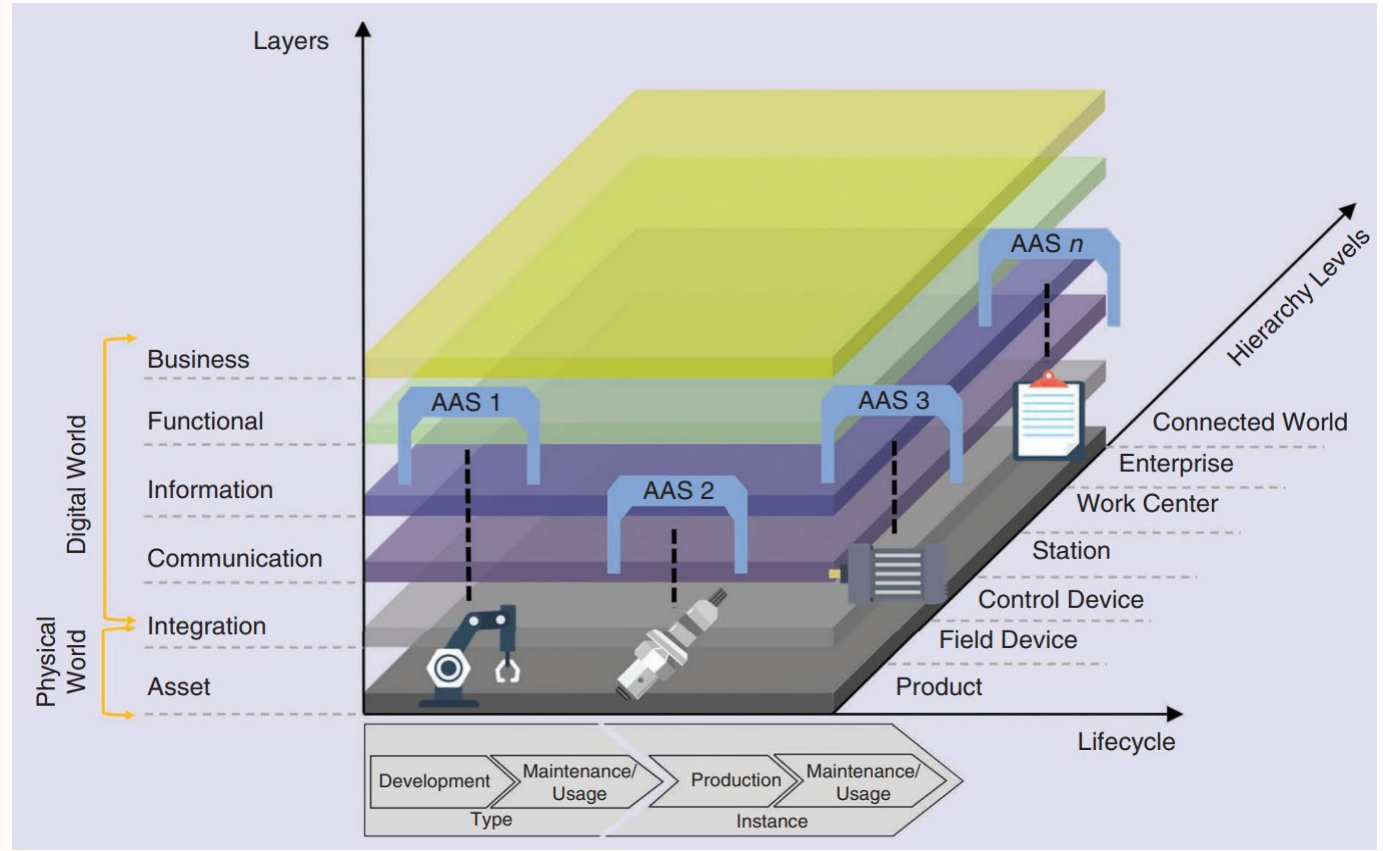


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Background

AAS is an important technology to depict, simulate, optimize, and visualize the physical world in the information world. It provides an effective way to realize the global industrial and social development trends such as digital transformation, intelligence, services, and green sustainability. At present, AAS technology is widely concerned and studied by industry and academia. According to statistics, 134 researchers from 22 countries, including the United States, South Korea, and Italy, and more than 103 institutions have carried out AAS theory and application research. Relevant research results have been published. At the same time, ABB, Bosch, Amazon, FESTO, and other world-famous companies carried out the implementation and application of AAS in related fields. For example, in the manufacturing field, Siemens in Germany have studied the application of AAS technology to the whole life cycle process of a product (e.g., product design, production, manufacturing, operation, services, and recycling).





Background

1.

The standard lack of AAS-related terms, system architecture, and application results in users' different understanding of AAS from different technical requirements.

2.

The standard lack of AAS-related models, data, connection, and services has led to problems, such as difficult integration, poor consistency, low compatibility, and difficult interoperability between models.

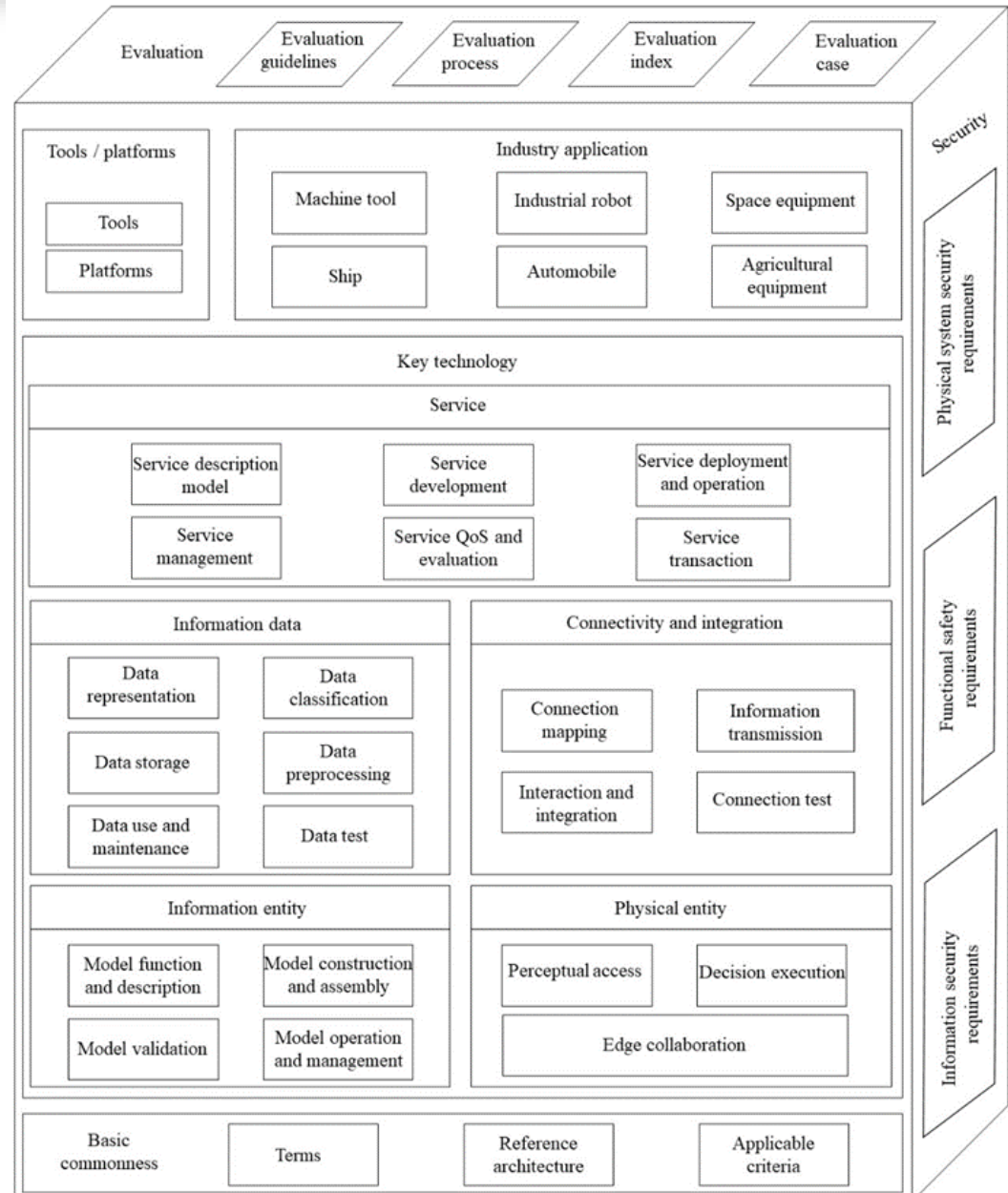
3.

The standard lack of AAS tools and platforms results in users' confusion about the use of AAS.



Research Questions

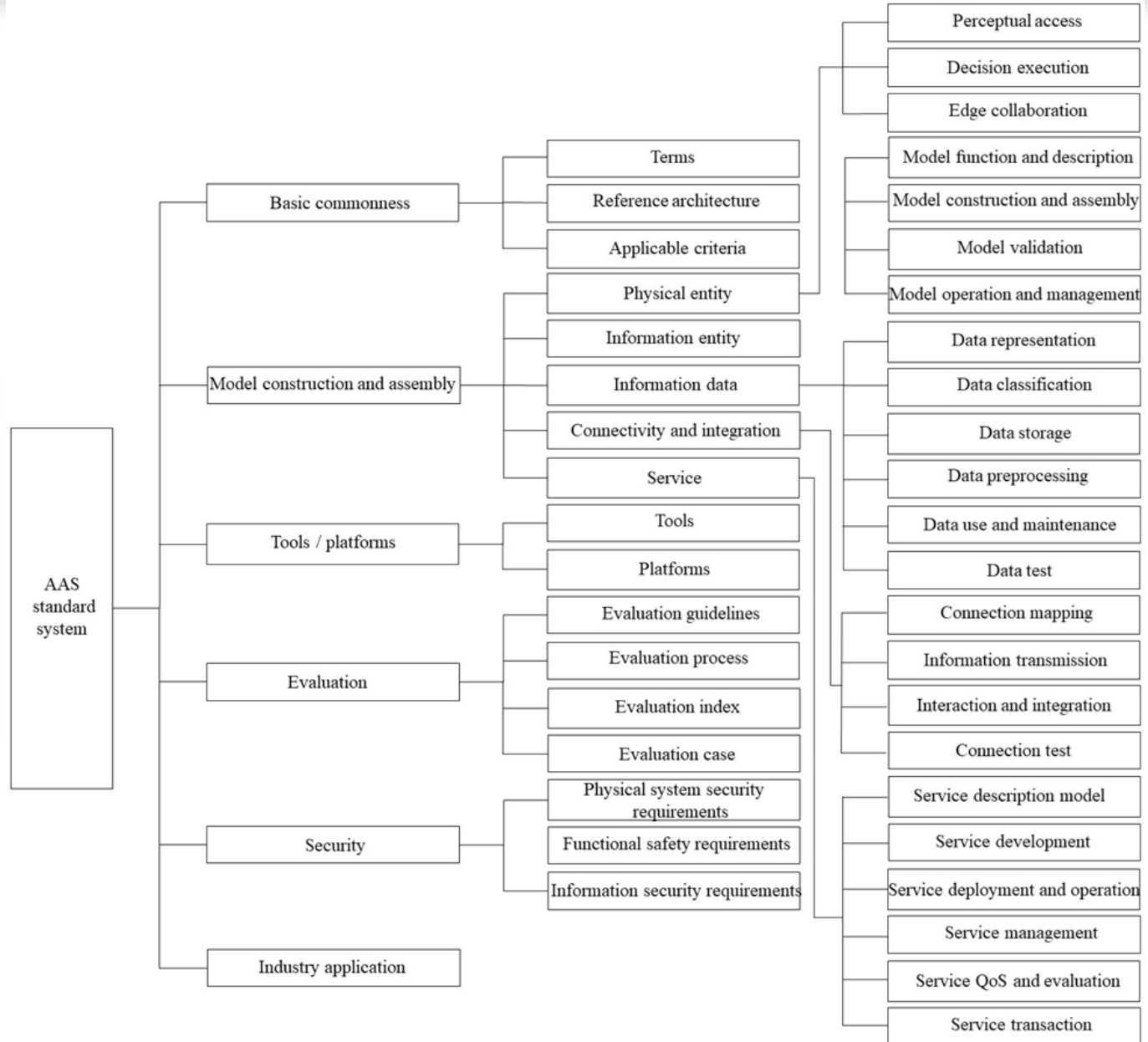
According to the above demand analysis on the AAS standard system, we take into account the rationality, integrity, systematization, and availability of the standard system. The AAS standard system framework is designed as shown in the Figure. It gives standard guidance from six aspects: basic common standards, key technology standards, tool/platform standards, evaluation standards, security standards, and industry application standards.





Research Questions

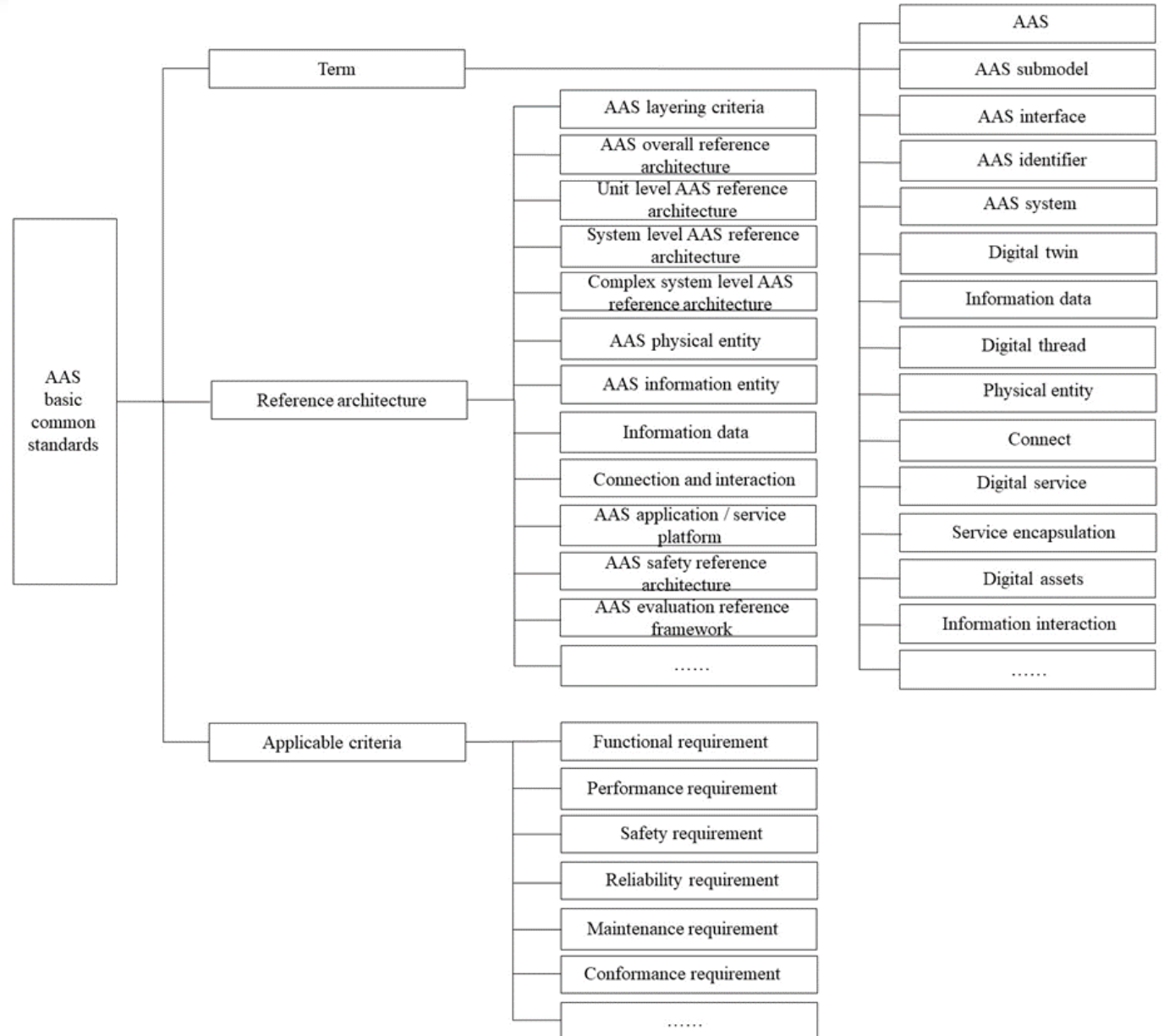
The AAS standard system consists of various substandard systems of AAS. The AAS standard system structure is shown in the Figure, including six parts: basic common standards, key technology standards, tool/platform standards, evaluation standards, safety standards, and industrial application standards.





Research Questions

AAS basic common standards mainly regulate the basic and general standards of AAS. The relevant standards and main contents are shown in Figure 3, including the following aspects:





Research Questions

The AAS standard system architecture can help develop the AAS tool /platform. Therefore, according to AAS standard system architecture, we have design an AAS configuration tool. It can describe an entity asset in accordance with the AAS standard specification, and it can be recognized by the AAS operation tool. The AAS configuration tool needs to meet the characteristics of standardization, scalability, compatibility, interoperability, and closed-loop. The AAS configuration tool is shown in Figure 4.

The screenshot displays the AAS configuration tool interface, which is organized into several functional areas:

- Left Panel (Tree View):** Titled "manage shell libraries", it shows a hierarchical tree structure. The "station" folder is expanded, revealing sub-items like "car station", "milling station", "part", and "production line".
- Center Panel (List):** Titled "manage shell modeling design tools", it contains a vertical list of blue buttons representing various submodels and tools, such as "ACV scheduling su...", "BOM submodel", "HTTP communicati...", "OPC UA communic...", "Layout submodel", "Map submodel", "Work step model", "Process route sub...", "Functional function...", "Real time database ...", "Data submodel", "Characteristic sub...", "Assembly guide su...", and "Composition subm...".
- Diagram:** A central diagram shows a purple box labeled "car station" with four arrows pointing to blue boxes: "BOM submodel", "Layout submodel", "Real time database ...", and "Map submodel".
- Right Panel (Form):** Contains a "Submit The form" button at the top right. Below it are several input fields and buttons:
 - "component identification" field with value "1637548076737".
 - "component model" section with an "upload the model" button and a 3D grid visualization.
 - "component photos" section with an "upload an image" button and a photo of a machine.
 - "the english name" field.
 - A "complete the configuration" button at the bottom right.



Conclusion

This paper analyzes and discusses the construction requirements of AAS standards from three dimensions: AAS concept, the implementation of AAS key technologies, and AAS application. This paper explores and establishes a set of AAS standard system architectures, and expounds the standard system from six aspects: basic commonality, key technologies, tools/platforms, evaluation, security, and industry application. It is expected that relevant work can play a role in the research and formulation of AAS standards.



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COMMITTEE DRAFT (CD)

| | |
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| PROJECT NUMBER: IEC 63278-1 ED1 | |
| DATE OF CIRCULATION: 2020-10-30 | CLOSING DATE FOR COMMENTS: 2020-12-25 |
| SUPERSEDES DOCUMENTS: 65/761/NP, 65/780A/RVN | |

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| IEC TC 65 : INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION | |
| SECRETARIAT: France | SECRETARY: Mr Rudy BELLARDI |
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TITLE:
Asset administration shell for industrial applications – Part 1: Administration shell structure

NOTE FROM TC/SC OFFICERS:



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Thank you for your advice

Thank you!