

Roadmap for the Development and Implementation of Standard- Oriented Knowledge Graphs

Industry Connections Activity Initiation Document (ICAID)

Version: 1.0, 3 September 2020

IC20-012-01 Approved by IE&SS SMDC 8 October 2020

Instructions

- Instructions on how to fill out this form are shown in red. It is recommended to leave the instructions in the final document and simply add the requested information where indicated.
- **Shaded Text** indicates a placeholder that should be replaced with information specific to this ICAID, and the shading removed.
- Completed forms, in Word format, or any questions should be sent to the IEEE Standards Association (IEEE-SA) Industry Connections Committee (ICCom) Administrator at the following address: industryconnections@ieee.org.
- The version number above, along with the date, may be used by the submitter to distinguish successive updates of this document. A separate, unique Industry Connections (IC) Activity Number will be assigned when the document is submitted to the ICCom Administrator.

1. Contact

Provide the name and contact information of the primary contact person for this IC activity. Affiliation is any entity that provides the person financial or other substantive support, for which the person may feel an obligation. If necessary, a second/alternate contact person's information may also be provided.

Name: Guan Huang

Email Address: huangguan@cesi.cn

Employer: CESI

Affiliation: CESI(s)

IEEE collects personal data on this form, which is made publicly available, to allow communication by materially interested parties and with Activity Oversight Committee and Activity officers who are responsible for IEEE work items.

2. Participation and Voting Model

Specify whether this activity will be entity-based (participants are entities, which may have multiple representatives, one-entity-one-vote), or individual-based (participants represent themselves, one-person-one-vote).

"Individual-Based"

3. Purpose

3.1 Motivation and Goal

Briefly explain the context and motivation for starting this IC activity, and the overall purpose or goal to be accomplished.

At this stage, the main method for most standard users to acquire relevant knowledge in the standard is through paper form standards and simple machine-displayable electronic documents. The way that users obtain standard-oriented knowledge and the form of knowledge presentation is relatively simple, which is not conducive to the promotion and application of standards to a considerable extent. Standard-oriented knowledge graphs technology can effectively solve this problem and realize the transformation from paper-based and machine-displayable standards to machine-readable intelligent standards.

This IC activity assists organizations or users who develop and apply standard-oriented knowledge graphs to have a basic picture about the framework and general construction method. In addition, it may assist the integrators of knowledge graphs to design a generic interface and follow clarified evaluation metrics. Furthermore, standard-oriented knowledge graphs can be integrated, implemented and applied more simply and efficiently.

3.2 Related Work

Provide a brief comparison of this activity to existing, related efforts or standards of which you are aware (industry associations, consortia, standardization activities, etc.).

Through the research and application of standard-oriented knowledge graphs, the traditional standards based on paper or electronic documents can be processed intelligently after knowledge extraction, knowledge link, knowledge reasoning and knowledge storage, etc. so as to obtain the elements and their relationships of various standards. Furthermore, machines can read and understand these standards intelligently, and recommend necessary elements and contents during development of new standards. This deepens the excavation of knowledge contained in standards and improves the qualities of developed standards. The standard-oriented knowledge graph also helps stakeholders of production, education, scientific research and application to deepen their understanding of standards, strengthens the basic supporting role of standards in smart manufacturing and other fields.

Standards play a key role in the development of smart manufacturing related industries and technologies. However, at this stage, the main method for most standard users to acquire relevant knowledge in the standard is through paper forms and simple machine-displayable electronic documents. Through the research and application of standard-oriented knowledge graphs, the traditional standards based on paper or electronic documents can be processed intelligently after knowledge extraction, knowledge link, knowledge reasoning and knowledge storage, etc. so as to obtain the elements and their relationships of various standards.

3.3 Previously Published Material

Provide a list of any known previously published material intended for inclusion in the proposed deliverables of this activity.

White paper on artificial intelligence standardization (Kefeng Fan, 2019)

Standardized white paper for knowledge graph (Nan Guo, 2019)

3.4 Potential Markets Served

Indicate the main beneficiaries of this work, and what the potential impact might be.

Standard development institutions, manufacturers, service suppliers, network equipment manufacturers, equipment suppliers, components & parts suppliers, solution providers, government entities, and not-for-profit organizations.

3.5 How will the activity benefit the IEEE?

This activity has the following benefits to IEEE:

Knowledge graphs are a new and innovative approach with the potential to enhance standards development and related techniques. The activity will help IEEE to be positioned as a leader in these new techniques.

Firstly, the application of standard-oriented knowledge graph can promote standard research, application, popularization and implementation. In addition, it can make IEEE standards be more concerned about by enterprises. Secondly, the application of standards knowledge graph can simplify standard scientific research work, it is the basis for the transformation from machine-readable to smart standards. It can be proved that the joining of standards knowledge graph activities will bring a brand new working mode to IEEE. Thirdly, the application of standard-oriented knowledge graph can enhance the internal connection between standards and form a standard knowledge network. Therefore, it plays the greatest value and role.

4. Estimated Timeframe

Indicate approximately how long you expect this activity to operate to achieve its proposed results (e.g., time to completion of all deliverables).

Expected Completion Date:

09/2022

IC activities are chartered for two years at a time. Activities are eligible for extension upon request and review by ICCOM and the IEEE-SA Standards Board. Should an extension be required, please notify the ICCOM Administrator prior to the two-year mark.

5. Proposed Deliverables

Outline the anticipated deliverables and output from this IC activity, such as documents (e.g., white papers, reports), proposals for standards, conferences and workshops, databases, computer code, etc., and indicate the expected timeframe for each.

White papers (09/2022)

"Standard-oriented Knowledge Graphs White Paper" introduces the background, requirements, driving factors, main technologies, application scenarios, advantages and challenges, and prospects for the future of the standard-oriented knowledge graphs. Through the research and application of the standard knowledge map, deepen the excavation and publicity of the knowledge contained in the standard, help stakeholders in production, education, scientific research, and application to deepen their understanding of the standard, and strengthen the basis of the standard in scientific research and production activities. Standardization would then further enable the development of industry and technology.

5.1 Open Source Software Development

Indicate whether this IC Activity will develop or incorporate open source software in the deliverables. All contributions of open source software for use in Industry Connections activities shall be accompanied by an approved IEEE Contributor License Agreement (CLA) appropriate for the open source license under which the Work Product will be made available. CLAs, once accepted, are irrevocable.

Will the activity develop or incorporate open source software (either normatively or informatively) in the deliverables?:

No

6. Funding Requirements

Outline any contracted services or other expenses that are currently anticipated, beyond the basic support services provided to all IC activities. Indicate how those funds are expected to be obtained (e.g., through participant fees, sponsorships, government or other grants, etc.). Activities needing substantial funding may require additional reviews and approvals beyond ICom.

The activity will primarily be supported using the typical support provided by IEEE SA staff for Industry Connections activities.

Any costs associated with in-person meetings will be addressed via meeting fees or via support of meeting host companies.

7. Management and Procedures

7.1 Activity Oversight Committee

Indicate whether an IEEE committee of some form (e.g., a Standards committee) has agreed to oversee this activity and its procedures.

Has an IEEE committee agreed to oversee this activity?

Yes

If yes, indicate the IEEE committee's name and its chair's contact information.

1. C/SM has agreed to be the oversight standard committee. Chair of C/SM (Sha Wei) also welcomes other co-oversight, anticipating this project would be of wider interest.

C/SM has experience in:

It has been overseeing 3 knowledge graph standards projects: IEEE P2807 and P2807.1 and P2802.2;

Machine readable standards have been used in smart manufacturing

IEEE Committee Name: C/SM

Chair's Name: Sha Wei

Chair's Email Address: weisha@cesi.cn

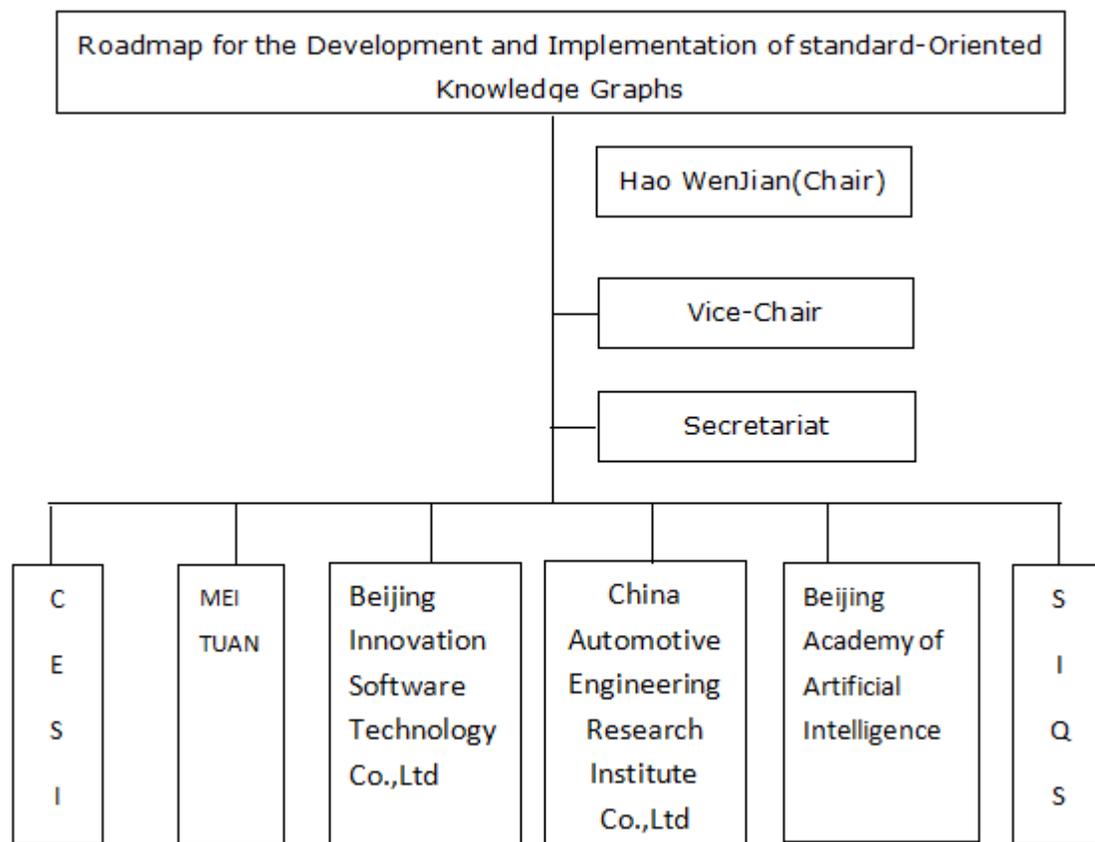
Additional IEEE committee information, if any. Please indicate if you are including a letter of support from the IEEE Committee that will oversee this activity.

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7.2 Activity Management

If no Activity Oversight Committee has been identified in 7.1 above, indicate how this activity will manage itself on a day-to-day basis (e.g., executive committee, officers, etc).

Activity Management structure:



7.3 Procedures

Indicate what documented procedures will be used to guide the operations of this activity; either (a) modified baseline *Industry Connections Activity Policies and Procedures*, (b) Standards Committee policies and procedures accepted by the IEEE-SA Standards

Board, or (c) Working Group policies and procedures accepted by the Working Group’s Standards Committee. If option (a) is chosen, then ICCom review and approval of the P&P is required. If option (b) or (c) is chosen, then ICCom approval of the use of the P&P is required.

IEEE-SA Baseline Policies and Procedures for Industry Connections Activity – Individual Method P&Ps

8. Participants

8.1 Stakeholder Communities

Indicate the stakeholder communities (the types of companies or other entities, or the different groups of individuals) that are expected to be interested in this IC activity, and will be invited to participate.

Artificial intelligence and related companies; University and research institutes; Related experts

8.2 Expected Number of Participants

Indicate the approximate number of entities (if entity-based) or individuals (if individual-based) expected to be actively involved in this activity.

20

8.3 Initial Participants

Provide a number of the entities or individuals that will be participating from the outset. It is recommended there be at least three initial participants for an entity-based activity, or five initial participants (each with a different affiliation) for an individual-based activity.

Use the following table for an entity-based activity:

| Entity | Primary Contact | Additional Representatives |
|---------------|------------------------|-----------------------------------|
| Entity Name | Contact Name | Name |

Use the following table for an individual-based activity:

| Individual | Employer | Affiliation |
|-------------------|---|---|
| WenJian Hao | CESI | CESI |
| Rex Fang | MeiTuan | MeiTuan |
| Bin Man | Beijing Innovation Software Technology Co.,Ltd | Beijing Innovation Software Technology Co.,Ltd |
| JunJie Shen | SIQS | SIQS (Suzhou Institute of Quality and Standardzition) |
| Meng Zheng | China Automotive Engineering Research Institute Co.,Ltd | China Automotive Engineering Research Institute Co.,Ltd |
| Gang Cao | Beijing Academy of Artificial Intelligence | Beijing Academy of Artificial Intelligence |