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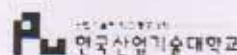
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A Survey on Standardization for Ubiquitous Agent

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ABSTRACT

In near future it seems to move from IT paradigm to Ubiquitous computing technology (uT) environment in the world. Current IT leading scientists strongly focused on developing and implementing their own technical idea, but we argue that it is more important to move towards standardization of their own technique and be adopted as international standardization. Actually future uT is expected to success if most of IT technical elements are standardized and integrated very well. We worked to survey standardization of core techniques of IT fields and to analyze the prioritization and the importance of most IT developing topics (approximately 50 topics under development) in near future [1]. As a result, we reported the maturity level of the current domestic/international techniques of IT fields and alluded to give the direction and target of standardization based on the international trend of current IT fields. In this paper we mention only one field, that is, standardization for Ubiquitous Agent

Keywords: Ubiquitous Computing technology, Standardization, Agent

1. Introduction

In Korea, it is actively being in progress to transfer paradigm from IT computing environment to newly ubiquitous computing technology (uT) environment for creating new business & jobs and for pioneering the next generation uT in the world. Current IT leading nations strongly focus on developing and implementing their own techniques and also consider more important to make its standardization of their own technique and be adopted as international standardization. Actually future uT be expected to success one of three ways that most of IT technical

elements are globally standardized, only integrated very well or both standardized and integrated.

Our selab lab had one project, that is, Ubiquitous standardization Roadmap from the Ubiquitous Autonomic Computing and Network (uAuto) project which is one of the 21st century frontier R&D programs supported by the Ministry of Science and Technology (MOST) in Korea, 2004. This project was focused on surveying the standardization of the original core technique of IT fields and analyzed the prioritization and the importance of them. We only mention about standardization of uT-agent, one of approximately 50 in table 1. After this project, we recognize the maturity level of the current domestic/international techniques of IT fields and allude to give the direction and target of standardization based on the international trend of current IT fields. This paper is organized as follows. We introduce related works in Section 2, and in Section 3 we mention essential elements for uAgents. In Section 4, we analyze standardization for Ubiquitous agent, and we will conclude in Section 5.

Table 1. The overview of sub-projects [5]

Technology Fields	Sub-Projects
uT services & system	uT-Service: Human Life Modeling and uT Service Scenario Design uT-System: uT System Integration/Testbed & Standardization/Certification
uT Context Aware Multimodal Interaction Real- time Processing	uT-Interaction: Semantic Context-based Multimode Interaction Framework uT-Agent: Distributed Processing for Intelligent Real-Time Service

uT Computing Engine / Platform	uT-S-Engine: Micro Smart Sensing Engine uT-Platform: Intelligent Low-Power Module uT Computing Platform uID: Platform for Intelligent Multimodal Ubiquitous-ID(uID)
UT Infra-Networking Access	uT Scale-free Mobile Access Network uT-Gateway: Adaptive uT Network Access Technology

2. Related works

2.1 Standard vs. Standardization

[ISO/IEC Guide 2:1996] defines a standard as a document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. The standard represents a level of know-how and technology which renders the presence of industry to its preparation indispensable. The standard is never neutral.

The classification of standard is described as follows:

-National standards:

The standard is a collective work. The national standard is programmed and studied under the authority of the national standards body. It is published by the latter. It is therefore protected, as early as at the draft standard stage, by a copyright belonging to the national body.

-International standards:

From the stage of Committee Draft (CD), international standards are protected by the copyright of the international standards body (ISO, IEC). The exploitation right of this copyright is automatically transferred to the national standards bodies which comprise the membership of ISO or IEC, for the purpose of drawing up national standards. The national standards body is under obligation to take all appropriate measures in order to protect the intellectual property of ISO and IEC on the national territory. Each draft International Standard and each published International Standard bears a copyright statement with the international copyright symbol, the publisher's name and the year of publication.

Standardization is today recognized as being an essential discipline for all players within the economy, who must strive to master its motivating forces and implications. Today, companies have integrated standardization as a major technical and commercial element. They are aware that they must play an active role in this field, or be prepared to accept standardization that is established without them, or without consideration of their interests.

It is very important to be adopted his/her own standardization before someone pre-empt. Otherwise, we just

follow his/her standard or have result in useless technique even if we have already worked our own technique.

2.2 Organizations for Standardization

Even if there are a lot of organizations for standardization in figure 1, but in a practical manner, we use de facto standard, that is, a format, language, or protocol that has become a standard not because it has been approved by a standards organization but because it is widely used and recognized by the industry as being standard. Some examples of de facto standards include: Hewlett-Packard Printer Control Language (PCL) for laser printers, and PostScript page description language for laser printers.

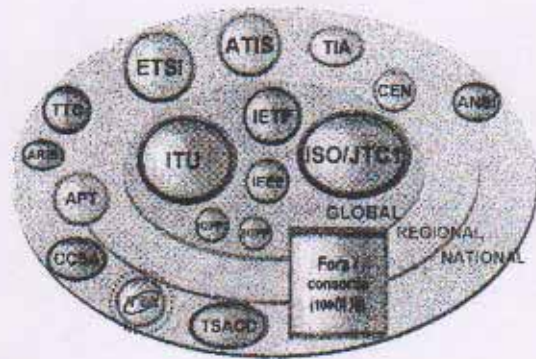


Figure 1. Organizations for Standardization

Note:

Global(International) organizations:

ITU(International Telecommunication Union), IEEE(Institute of Electrical and Electronics Engineers), ISO/IEC JTC1(International Organization for Standardization/International Electrotechnical Commission), 3GPP(Third Generation Partnership Project), 3GPP2(Third Generation Partnership Project2)

Regional organization:

ETSI(European Telecommunication Standards Institute),

National organization:

TTA(Telecommunications Technology Association), CCSA(China Communication Standard Association), ARIB(Association of Radio Industries and Business), TSACC(Telecommunication Standards Advisory Council of Canada)

3. Essential elements for uAgent

In this section, We only mention about standardization of uT-agent, one of sub-projects within the Ubiquitous Autonomic Computing and Network (uAuto) project which is one of the 21st century frontier R&D programs supported by the Ministry of Science and Technology (MOST) in Korea, 2004 in Table 1. We survey the standardization of the original core technique of Ubiquitous agent (uAgent or uT agent) related fields and analyze the prioritization and the importance of them.

uAgent maybe mean an abstraction model to standardize certain aspects of information (component, message, object,

etc) exchange through facilitating interoperability and integration of diverse heterogeneous intelligent mobile agent platforms on Ubiquitous Computing Environments.

Current uAgent mechanism will successfully be worked with uT agent platform, uT intelligent associated technique, and uT distributed adaptive system.

For uAgent platform, ORB, interoperability, and uT platform service fields will be achieved.

For uT agent platform, real time service processing, intelligent agent security, discovery engine, and agent migration also achieved.

For uT distributed adaptive system, intelligent system, context adaptive system, and distributed intelligent agent also achieved.

It shows standards fields and standard context of uT agent standardization in Table 2

4. uAgent Standardization Analysis

Through surveying and analyzing standardization of core techniques of IT fields , we can mention the prioritization and the importance of most IT developing topics(approximately 50 topics under development) in near future [1].

Table 2 Related uT-Agent Standardization

Standard fields	Standard Context
Agent	- FIPA (Foundation for Intelligent Physical Agents) - MASH
Agent based Service Discovery and Management Technique	- Agent Naming Technique - DF Management Technique - Ontology based Service Description
Agent Interoperability	- Agent Management - Agent Communication Language - Message format - Transmission rules
CORBA, Agent interoperability	- CORBA Middleware Spec. Definition - Standard IDL definition for Agent's Interoperability
IETF MANET,	- Routing protocols
Distributed Middleware	- CORBA (Common Object Request Broker Architecture) - DCOM (Distributed Component Object Model)

In this section, we only mention standardization for uAgent(Ubiquitous Agent), that is, uT Discovery, uAgent Platform, and uT distributed adaptive system fields.

Table 3,4,5 show the maturity level of the current domestic/international techniques of uAgent related fields. We also allude to give the direction and target of standardization based on the international trend of current uAgent related fields.

We give an integer number (01,2,3,4,5) per all criteria of importance, priority, standard maturity (international, domestic), technical level (international, domestic) on each analyzed diagram in the bottom of tables 3, 4, and 5. An integer number is 5, that is, very high priority, very high importance, very high maturity. Other integer number is 0, that is, very low priority, very low importance, very low maturity level.

The row of Table 3 is assigned as core techniques, that is, service discovery and security management.

The column of Table 3 is assigned as classification. On the classification, there is technical context, priority, importance, standard maturity (international, domestic), technical level (international, domestic), possible filed for IPR, market trend. The bottom of table 3 is presented an analyzed diagram which includes importance, priority, standard maturity (international, domestic), technical level (international, domestic) based on each core technique.

We can give a guideline with level of standard maturity, technical level (international, domestic), and priority on table 3. On uT discovery, that is, service and security management, we can mention that it is very important but international standard maturity is middle level. Therefore domestic researchers can attempt to research into this area, but it is low priority.