Introduction

In recent years, academic societies often use information and communication technologies (ICT) to support conference management, paper reviews, and so on. We think some of the attendances of recent conferences have experience on using and/or implementing such support systems. As well, these days, so many academic societies in Japan are developing their own activity support systems.

However, members of the societies are very different and the everyday activities include so many exceptions. For example, paper review systems, conference supports, accounting, and member services are ever changing. Furthermore, the committee members, managers and staffs of the societies are usually volunteers from academia and/or industries and they contribute on their tasks during very short periods, e.g., only few years. To cope with these problems, we must develop flexible information systems considering the members’ implicit requirements.

Based on the state-of-the-art above, We, members of SICE IT working group, have decided to develop a new integrated support system. This paper proposes PANGEA or Gakkai Net: a general platform for supporting various activities of academic societies. PANGEA or Gakkai Net is a general platform to support various activities of academic societies. The architecture is characterized by i) Database centered system, which contains various aspects of society members’ information, ii) Software agent sub-systems to facilitate the implementation, and iii) Web-based applications for end-users. The paper addresses the basic principles of PANGEA and current status and future plans of SICE information systems.

Key Words: Academic Activity Support, Information Management, Database, Agent-Based Systems

1 INTRODUCTION

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Based on the state-of-the-art above, We, members of SICE IT working group, have decided to develop a new integrated support system. This paper proposes PANGEA or Gakkai Net: a general platform for supporting various activities of academic societies. PANGEA stands for the great integrated continent of various (sub-) continents of various academic activities. GakkaiNet is the Japanese name of the academic society network.

Using PANGEA, we are implementing SICE IT systems for these three years. The SICE IT systems are characterized by 1) Database centered system, which contains various aspects of society members’ information, 2) Software agent sub-systems to facilitate the implementation, and 3) Web-based applications for end-users. The paper will give the basic principles and the framework.

The rest of the paper is organized as follows: In Section 2, we will discuss the background of the development and related work in the literature. Section 3 proposes PANGEA platform. Section 4 explains the sub-systems implemented as SICE IT systems. Summary and concluding remarks will follow in Section 5.

2 BACKGROUND AND RELATED WORK

In June 2005, after several years’ intensive discussions, SICE committee reported the proposal to implement a new business model based on ICT⁴). The proposal contains: i) improvement of review processes, ii) development of match making support for SICE members on their research, iii) development of life-long educational support of the members, iv) internationalization of the activities on measurement, control, and system domains, especially in Asian area, v) establishment of strategic plans of the SICE brand, vi) improvement of the SICE every day business processes, and vii) improvement of the member services to activate and motivate them.

In order to operationalize the proposal, especially for items i), ii), vi), and vii), we are required to develop new systems supported by the state-of-the-art ICT.

Currently, there are several conference management and review support systems available⁶), ⁷), ⁸). Also, experienced people on the WEB applications seem to easily implement such a support system. However, to continuously support the society’s activities, the functionalities of the current systems are insufficient.

For example, the IEEE society often uses ScholarOne system⁶). ScholarOne is very convenient for submission and review activities: paper submission, manuscript management, selections of reviewers, review report handling, and editing. However, the process is independent from the journalling and archiving. The system does not support the Japanese language.

International conferences often uses START-V2 system⁷). The system is well designed for conference management, which includes the process of distribution of CFP mails, information exchanges among PC members and reviewers, submission and review of the papers, and registrations of attendances. However, START-V2 is for one-shot conferences. It is not useful for the continuous society’s activities. The system also does not support the Japanese language.

J-Stage system⁸) is often used among Japanese academic society. However, the main functions is archiving and
distributing the papers in the journals. J-Stage is not adequate for complex paper review management processes.

Therefore, we have decided to develop our own support system to meet the requirements stated in the report 4). The decision have met various difficulties, because of their implicit requirements 1), 2). We have applied agile prototyping techniques (e.g., 3)) and agent-based technologies (e.g., 5)) for the development. In the next section, the general architecture will be described.

3 PANGEA: A GENERAL PLATFORM

In order to meet the requirements mentioned in the previous section, we must develop a new platform with i) flexible centralized databases, ii) various application programs among the databases, iii) interfaces for outside systems, and iv) web-based interfaces for end users, and v) tailored functions for each user.

Figure 1 Outline of PANGEA Framework

i) Databases:
We employ standard relational database management systems. The databases (DBs) include Member DB, Paper DB, Event DB, Accounting DB, and Advanced Information DB. They will store necessary information for very long time.

Most unique points of Member DB are that (1) Unique member ID within/without the society, this means that if someone would attend any events in the society, the ID would be maintained in the DB, (2) Complicated dynamic control of access rights, and (3) pointers to the other DBs and application agents.

The access control mechanisms are critical because the members often change their roles. For example, one member might be tentatively an author of a paper, a reviewer of submitted papers, or a member of editorial board. The access rights must be changed for their own roles. The member information records will be also used as career records of the society.

Paper DB contains (1) archives of the published papers and reports, and (2) papers under the reviews. The former ones are retrieved by various users, however, the latter ones must be carefully managed from the view points of access control mechanisms.

Event DB contains past and current events including conferences and workshops. Information on the annual conferences will be stored in event DB.

Accounting DB contains general information on the accounting activities and related to Member DB.

Advanced Information DB is planned to contain information of education information or match making information for the future academic activities.

ii) Application Programs
In PANGEA platform, we call the application programs as agents, because the functions of the applications are often changed by emerging requirements and each application should have simple functions. The agents utilize the information of DBs to process the tasks.

Currently, we have a plan to implement the seven agents: Paper Manager; Membership Manager, Event Manager, Accounting, Match Making, Intellectual Property Manager, and Journal & Newsletter.

Paper Manager Agent has a similar role of the ones in 6) and 7). However, the agent maintain Member DB, also.
Membership Manager Agent directly control individual information cooperated with Paper Manager and Accounting Agents. 

Event Manager Agent manages various event activities including annual conferences, division conferences, and workshops. The functions are also similar to the ones in 6) and 7).

Accounting Agents manages the financial activities all over the society.

Match Making Agent will be used for advanced services for society members.

Intellectual Property Manager Agent will be used to control the properties and privacy information of the society.

Journal & Newsletter Agent will be used to distribute the contents of Paper DB. The function is similar to the ones in 8).

iii) Interfaces for Outside Systems
There are so many systems outside of PANGEA to support academic activities. These include interfaces for local offices and divisions of the society, society members, credit card companies, printing companies, and so on. The detailed design has not been fully specified, however, these interfaces should be both seamless and strictly guarded for the sub-systems inside PANGEA.

iv) Web-Based Interfaces for End Users
For the end uses of PANGEA, the functions of the components are look like similar to each other. The interfaces should be carefully designed as if they are using the current management systems like 6), 7), and 8).

v) Workspace
The functions of PANGEA are frequently changed when the roles of the end users are changed. To easily control the changes, we have implemented a specialized user interface as Workspace, which is similar to the one provided by Paper Plaza of IEEE 6). Using Workspace, the end users are able to only to access the functions of PANGEA allowed for the specified roles of the users.

The PANGEA or GakkaNet framework is illustrated in Figure 1. We are using freewares to implement the framework. The software architecture used is shown in Table 1.

<table>
<thead>
<tr>
<th>AS: Tomcat</th>
<th>JAVA</th>
</tr>
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<tbody>
<tr>
<td>DB: MySQL</td>
<td>OS: Linux</td>
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</table>

4 SUPPORTING SICE ACTIVITIES

We have implemented previous prototypes directly from the components of PANGEA framework. However, the prototype were not welcome from the SICE committee members, because the functions and interfaces did not meet their implicit requirements. Therefore, as advanced prototypes, we have re-implemented the support systems according to the SICE activities. Currently, we are developing the following sub-systems. They are based on the PANGEA framework, however, the systems are look like independent ones.

i) Annual Conference Support System

Paper submission and publishing management tasks are supported by PANGEA framework. The functions of the review processes are newly developed for the annual conference. Also, the membership management system is interfacing to Member DB. Figure 2 shows the two sample displays of the conference. The upper one is the main entry and the lower one is a sample of the workspace.

Figure 2. Sample Screens of the SICE 2007 Support System

ii) Event Management System

We have used PANGEA framework to develop the conference management systems for various division conferences, meetings, and seminars.

iii) SICE Member Database

Parts of the functions of Member DB is available to manage the annual conference attendance data. Non-members of SICE also register the database for their activities support.
iv) Accounting Support System

Interfaces for Accounting Agents and regional activities are available to exchange accounting information.

v) SICE Transaction Management System

Paper management system similar to 6) and 7) is now under development with testing phases.

vi) SICE Journal Management System

Paper management and editing support system similar to 6) and 7) is also now under development with testing phases.

5 SUMMARY AND CONCLUSION

This paper has described the basic principles and framework of academic activity support system, and explained the functions and current status of the SICE activity support systems.

Comparing with the other efforts of developing such systems out of SICE, it have took much faster time and lower costs of the development. We believe our approach is successful. Although the project have not completed yet, the sub-systems are gradually deployed, e.g., this annual conference, SIG meetings, member database, and so on. We are planning to open the review management systems for SICE journal and transactions within a year.

Future work includes 1) to continue the efforts to improve the functionality and capability of the support systems under the cooperation of SICE members and the ASP services and 2) to distribute the idea of PANGEA to various academic societies so that SICE will take the roles of leading academic society in Japan.

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