14. Division of Information and Communication Systems

The Department of Information and Communication System (ICS) was founded in 2014 in order to develop and maintain the information and network systems of NIFS efficiently. All of the information system experts in NIFS belong to the ICS. There are five TASK groups which correspond to the job classifications in NIFS. The Network Operation task group manages and maintains the communication systems in NIFS, such as the E-mail system including security issues. The Experimental Data System task group performs operation and development of data acquisition systems for the LHD experiment. The Institutional Information Systems task group carries out the maintenance and development of the management systems for collaboration research and its output. The Atomic and Molecule Database task group maintains the atom and molecule database which is open to researchers around the world. The Integrated ID Management and Authentication System task group manages integrated ID and authentication systems.

The ICS works as follows: the request for the maintenance, improvement, and development of the information and communication system from each section is submitted to the ICS. The deputy division directors of ICS check all the requests, establish the priority among them, and assign them to the appropriate Task Group. Because all the experts belong to the Technical Service Section of ICS, each Task Group Leader asks the Section Leader to allot the required number of experts for a prescribed period of time so as to finish the job.

In NIFS, three research projects extend across the research divisions. It can be said that the ICS is another "project" which lies across all the divisions in the institute for keeping the information and communication systems stable, secure, and up-to-date.
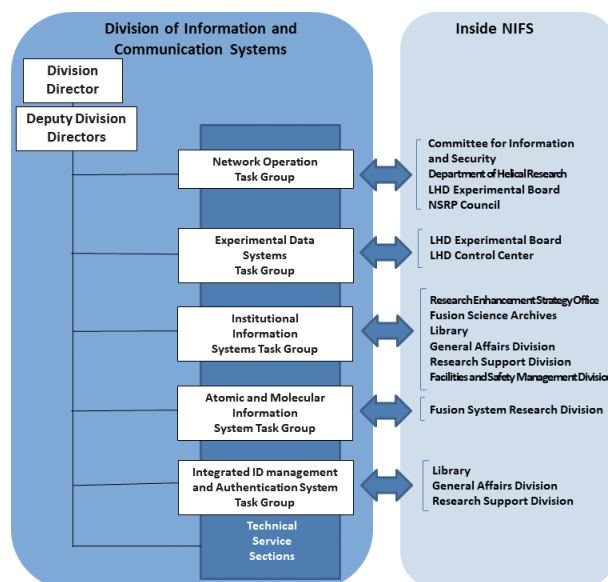

Fig. 1 Structure of Division for Information and Communication Systems.

Information Network Task Group

The information network is a foundation for research activity. The Information Network Task Group operates the advanced NIFS campus information network named "NIFS-LAN," which contributes to the development of fusion research, with strong security systems.

Notable activities in FY 2018 by the Information Network Task Group:

- The backup system for the virtual foundation system of the Research Information Cluster has been
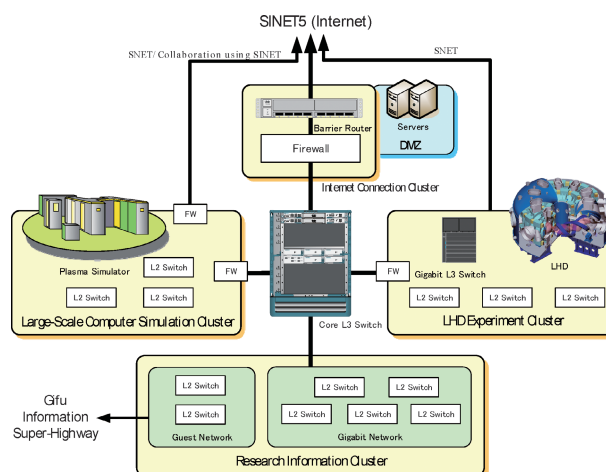

Fig. 2 Block diagram of the NIFS campus information network, which consists of three autonomous clusters that have their own purposes and usages.

upgraded. The malware detection appliance has been upgraded. New appliance has virtual PC running not only Windows OS but also Mac OS X to detect malware.

- The core switch of the LHD control LAN on the LHD Experiment Cluster has been upgraded. Before the LHD experiment campaign, the security condition of each PC was checked in order to keep the safety network free of malware.
- Security incidents were treated with a malware detection appliance and the firewall. Lectures were held regarding the information network and its security. An informational system audit held by NINS was also accomplished.

Experimental and Institutional Information Systems Task Groups

The objective of these Task Groups (TGs) is to promote the research activities in both the LHD experiment and the NIFS institutional aspects by providing better computational services for research and official work.

Regarding the experimental information systems (EIS), a number of LHD-related computer subsystems were successfully operated in the 20th campaign until February 2019. It had more than 9000 plasma discharge experiments (shot no. 144105–153366). The accumulated raw data amount is approximately 683 TB. Since the beginning of the 20th campaign, a pair of fast SSD arrays has been installed as the preceding part of the main HDD storage. Two SSD storages are directly connected via 40 Gbps Ethernet and provides 11 and 9 GB/s read/write speeds. They are one-digit faster than HDDs and therefore suitable for I/O rush after every discharge end.

Another innovation in the institutional information systems (IIS) is a new version 3.5 of NIFS Article Information System (NAIS). Figure 3 shows the brand-new user interface of the article search. It has been equipped with the new "free-word" search, which can be switched over to the advanced search. Almost all the related bibliographic variables can be set in search conditions. The free-word search and the advanced search are expected to improve the usability for novice and professional users, respectively.
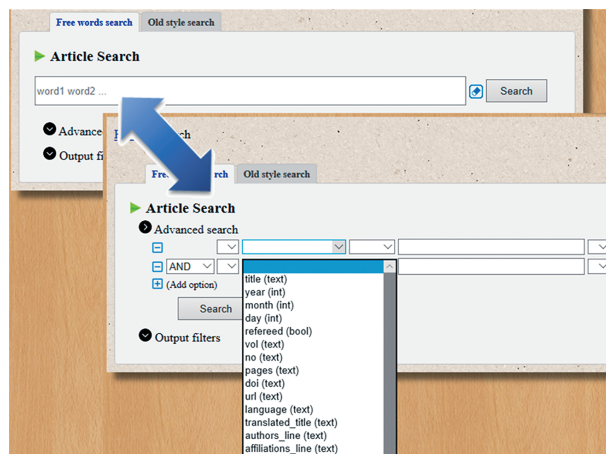

Fig. 3 New user interface for article search in NAIS: New free-words search can be switched over with the advanced search where any number of search conditions can be set. Quick searches and conditional searches are enabled respectively.

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