14. Division of Information and Communication Systems

The Department of Information and Communication System (ICS) has been founded in 2014, in order to develop and maintain the information and network systems of NIFS efficiently. All the experts of information system in the NIFS belong to the ICS although they are concurrent. There are four TASK groups which correspond to the classification of jobs in the NIFS. The Network Operation task group manages and maintains the communication systems in the NIFS such as E-mail system including the 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 outputs. Atomic and Molecule Database task group maintains the atom and molecule database which is open for the worldwide researchers.

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

In the NIFS, three research projects run 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.

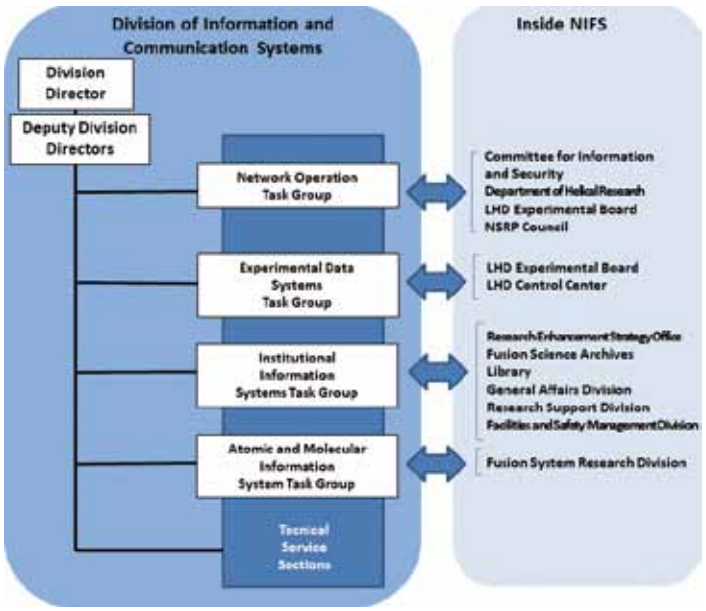

Fig. 1 Structure of Division for Information and Communication Systems.

Information Network Task Group

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

Notable activities in FY 2016 by Information Network Task Group;

1. Research Information Cluster involves a PC based authentication network. These network environments were updated for new released OS, such as Mac OS X 10.12. UTP cables in "Research Building, II" were exchanged with category-6 cables to ensure the giga-bit connections
2. Core L3 switches on LHD Experiment Cluster were upgraded to support 40 GbE for handling massive experimental data streams. Before the LHD experiment campaign, the security condition of every PC were checked to keep the safety network without a malware.
3. Security incidents were treated with malware detection system and held the lectures for information network and its security. A drill for a security incident was also accomplished to ensure the communication route.

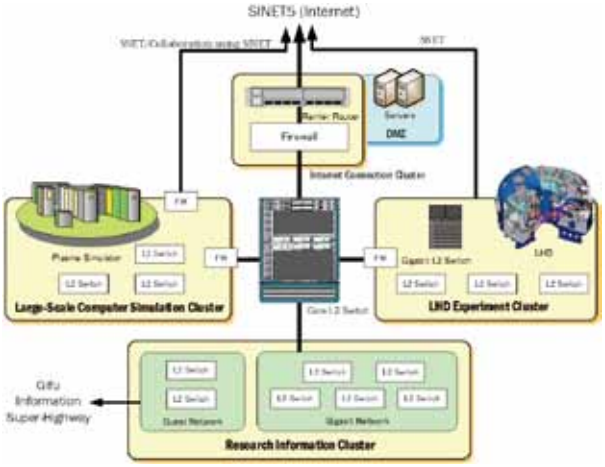

Fig. 2 Block diagram of NIFS campus information network, which consists of three autonomous clusters that have their own purpose and usages.

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 means of providing better computational services for research and official works.

As for the experimental information systems (EIS), a number of LHD related subsystems have been renewed for starting the deuterium experiments in March 2017. One of the new implementation is the integrated radiation monitoring and interlock system. The number of the data acquisition nodes running on the LHD sequence has been reduced about 15 % for rearrangement of the plasma diagnostics for the deuterium experiments; however, the total amount of the acquired raw data keeps almost the same as before.

The most innovative achievement in the institutional information systems (IIS) was the complete renewal of the NIFS atomic and molecular (A&M) database system. A number of old C-based CGI codes have been rewritten by using modern technology, such as Ruby on Rails and popular plotting libraries, for improving the maintainability and network security as an open web service. Another big project has started that full codes and functionalities of Nicollas (NIFS collaboration database system) will be ported to the NINS open use system (NOUS). It plans to cover all the NINS institutes and centers in four years.

(S. Ishiguro)

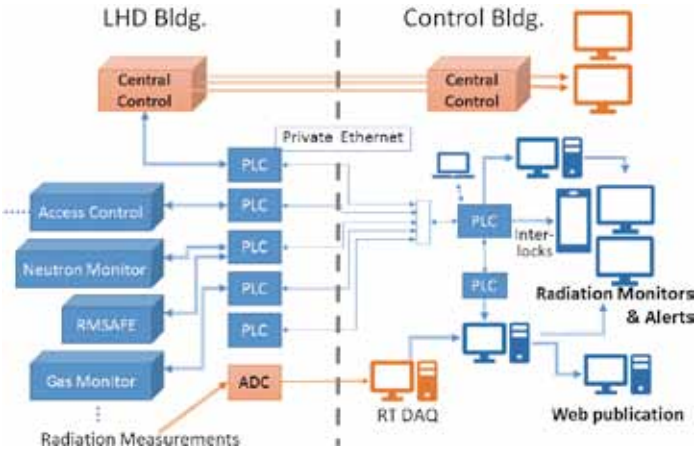

Fig. 3 Schematic diagram of the newly implemented integrated radiation monitoring and interlock system