# §2. Experimental and Institutional Information Systems Task Group

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The two task groups (TGs) that manage various information systems related to the LHD experiment and the NIFS institutional activities have been established since the beginning of the Department of Information and Communication Systems (ICS) in 2013. The primary objective of the TGs is to promote the research related activities in both the LHD experiment and the NIFS institutional aspects by means of providing better computational services to improve the efficiencies in research and official works.

This information systems (IS) TG has been organized based on three computing system groups in LHD; LABCOM<sup>1)</sup>, EG (Kaiseki), and the Control System groups. The new IS-TG covers not only the experiment-related systems but also the institutional ones by the same number of staffs. The details are reported in the following subsections.

(1) Experiment Information Systems (EIS)



Fig. 1. Continuous data growth observed in LABCOM data acquisition (DAQ) system for LHD: The growth fits the Moore's law very well Upper spikes of the data amount correspond to long pulse experiments<sup>1)</sup>, and the double circle symbol shows the world record of 891.6 GB/pulse in fusion experiments (2013).

The prime directive of the EIS-TG is to maintain and operate the related computing systems and make ready for having the plasma experiments in LHD. However, as the LHD plans to start the deuterium experiment in early 2017, many requests have been made to develop new systems and also to improve the existing ones fit for new experimental conditions. For the typical example, some neutron measurements and the 24/7 continuously monitoring systems have been reinforced carefully, in addition with the environmental radiation monitoring and visualizations.

### LHDwork:

The LHD work scheduling system, named "LHDwork", has been newly developed as a web service for properly avoiding any conflicts between a large number of simultaneous works done in the LHD building. It has started the operation since May 2015, and 675 works have been registered in the same fiscal year (FY).



Fig. 2. Main view of "LHDwork"

#### (2) Institutional Information Systems (IIS)

IIS-TG is a brand-new organization established for the purpose of providing better information services to the NIFS itself and also the fusion research community. A cluster of online services have been taken into consideration at the startup as follows:

- i. Collaboration Database  $\rightarrow$  "Nicollas"
- ii. Research Achievement Database  $\rightarrow$  "NAIS"
- iii. Institutional Research Repository  $\rightarrow$  "Repository"
- iv. Conference & Workshop Hosting Support
  - → "Icarus" & "Workshop."

Nicollas:

The NIFS Collaboration Database System named "Nicollas" has been newly designed and developed since 2013 summer to be used for the online submission and judgment of the NIFS collaboration applications for FY 2014. Even the first-year version has properly received and processed more than 500 applications.

For the third year system improvement, the usability has been substantially improved in addition to some bug fixes and the functional upgrade for finer procedures. Then, 527 applications have been approved for FY 2016.



Fig. 3. "Nicollas" primary page for each user

## NAIS:

The NIFS Article Information System is named "NAIS" which has been accumulating the information of research achievements made by NIFS staffs and the collaborators for more than ten years. Through so many years' operation, it has been upgraded several times, and the present software version is Release 3.3. For the latest functional upgrade, the followings have been applied:

- ✓ Edit the personal achievement lists
- $\checkmark$  Enrich the search query conditions
- ✓ Modify the internal approval schemes properly
- ✓ Modify the Help fit for the current version.

It accumulates not only the publications such as scientific journal papers and books but also the presentations at international conferences and annual community meetings. The total number of registered records is more than 18,400, and the access count was about 3,800 for the last year.



Fig. 4. "NAIS" user main page

Icarus:

"Icarus" is a web-based online service for assisting various host operations to hold international conferences. It has been developed originally for the NIFS hosting ones; however, now it is also open for the related research communities. The following functions can be automatically provided to the organizing committee or group:

- ✓ Online registration
- ✓ Abstract submission, review, selection, and notification
- ✓ Electronic account settlement via credit card for registration fees and other optional ones
- ✓ Online subscription for related event participation.

For this FY, Icarus has served for 2 conferences; PET15 and ITC25.

Icarus is a Rails application, and it has been customized for each conference because the payment or abstract submission procedures are different from each other. In order to minimize the customization task, we have made the application into one package. Using the package, it becomes easier to use for various conferences. Currently, the package is built using Rails 3.2. However, because of the termination of the support of the older version, we have been migrating the package into Rails 4.

## NIFS-Repository:

Nowadays Institutional Repository (IR) is recognized as one of the most important infrastructures for universities and institutes. In general, a university IR is defined as "a set of services that a university offers to the members of its community for the management and dissemination of digital materials created by the institution and its community members". In other words, in case of NIFS, IR is required to meet the social accountability of the institute that is carrying out a large-scale project of nuclear fusion research and development.

The first system for NIFS Repository was set up and started its operation at the end of Mar. 2009 by Research Information Office (RIO). The first system had been operated in NIFS based on "DSpace" and it was required to upgrade to the new version. The renewal of the working system needs complex procedure and cost; therefore, we made consideration use of "Software as a Service (SaaS)" for the second system. Utilization of SaaS made the staff free from operation and maintenance of the system. From April 2013, the second system started operation. After RIO was dissolution, the operation and maintenance of the repository system was handed over to the ICS department.

While we operated the repository system with DSpace, the new IR platform that is aimed as "JAIRO Cloud" has been developed by "National Institute for Informatics" (NII) and it started service for renewal users. We compared the merit of SaaS and JAIRO Cloud, and decided to change to JAIRO Cloud. The JAIRO Cloud is based on "WEKO" which is also developed in NII, and it is necessary to convert the dataset from DSpace. The converter was supplied from NII and tested in NIFS using the dataset stored in the first repository system in FY 2014. With this date transfer experience, we found that the data conversion and transfer are not difficult and decided to use the JAIRO Cloud.

In FY 2015, we downloaded and converted the data from the SaaS system and configured the data conversion filter. The all data sets were transferred in March 2016, and the new NIFS Repository system based on the JAIRO Cloud has started its operation.

### Workshop:

The "Workshop" hosting support service has been newly developed by intensive requests from the NIFS collaboration caretakers. Answering some configuration inquiries, the workshop caretakers can automatically build their own websites with necessary online functionalities, such as participant registration. For FY 2015, 13 workshops have been hosted by using the "Workshop" system.



Fig. 5. List page of "Workshop"

1) Nakanishi, H. et al. : IEEE Trans. Nucl. Sci. 63, 1 (2016) 222–227.