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Data Management of Information Projects and ICT Equipments: Focused on KISTI Case

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Abstract

The data management of public institutes funded by governments should be done in well-organized way to response for the regular requests of central governments as well as to utilize its data in other business purposes. The data requests of information resources recently have been increased due to new law establishment and the data management has become one of routine works. This paper describes the kinds of request from government agencies, the data management problems of information projects and ICT equipments, and some ideas to improve the data management work in KISTI.

Keywords: Collaboration, Component, Data Standard, Information Resources, Process, Request, Response

1. Introduction

KISTI, a government-funded research institute, receives many official documents about survey, statistics, data uses related to information resources, like information projects and ICT equipments, from external organization, such as Ministry of Government Administration and Home Affairs and Ministry of Science, ICT and Future Planning. KISTI then should send the result data back to these ministries. The category of requests mainly can be classified as information system management, information system security, information projects, ICT equipment, databases or Open APIs for Government 3.0. To response these requests efficiently, not only the internal data management standards, data management practices and collaboration among concerned departments should be operated but also the approval processes from the planning, to the operation, and to the disuse of ICT products or projects should be well-established. This paper discusses the data management practices of information resources, especially focusing on data management of information project and ICT equipments, the roles of information management department and effective ways to deal with these requests in KISTI.

2. Data Management Problems

Central government frequently requests various kinds of data related to information resources. Four main data to respond recently are Enterprise Architecture (EA) data, information projects data, ICT equipment data and public open data. The other data to send back are the statistics of mobile app, the maintenance costs of ICT equipment, data quality and management survey, the number of database administrators, and data center (building) operation status. When these requests are arrived in KISTI, the department responsible for overall Information and Communication Technology (ICT) management responds them. If there are central databases managing these requested data or previous data that can be modified, it is possible to respond to these requests quickly by manipulating the relevant data. However, KISTI does not currently manage these databases due to several reasons.

2.1 The ICT Data Management Practices are not well Established

Although recently the external data requests related to both information projects and ICT equipment have

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increased, the data management task has not been recognized as important work within the organization. For example, in order to report the expected budget of information projects and ICT equipments next year to the requesting agency, like National IT Industry Promotion Agency (NIPA), these data should be collected from the each department, stored in standardized format and processed in the requested format. However, the document format of KISTI R and D business plan does not provide appropriate items, formats or explanation to store the data of SW projects and ICT equipments. The format should contain the classification category for information projects and ICT equipments, which should conform to the category of government agencies. The concerned departments need to collaborate to improve this situation.

The purchase process also does not manage ICT equipment data well conforming to the data format of government request. In KISTI, most administration and data management work are done in KISTI Smart Work Online (KISOL), a kind of groupware system. The problem is that staff in contract department manages the data in the perspective of contract, not considering the later response of these requests. Currently the data items to insert for the purchase of ICT equipment in KISOL are managed in different format, which causes rework to respond external requests. It seems that these inefficient business processes derive from insufficient communication among concerned departments.

After the purchase of ICT equipment, the data about software, hardware, and network equipment are managed only from the perspective of asset management, which makes it even difficult to response the external request as the ICT staff cannot derive the appropriate data from the asset database. As there are not enough data to manipulate, then the information management department has to forward the request again to all the other departments and collect the relevant data. One way to solve this problem would be to make one department manage the ICT data and respond external request.

2.2 All Information Projects Data are not Managed

KISTI only has managed Enterprise Architecture (EA) data for only several selected SW projects with the EA management policy since 2013. This practice caused incomplete data statistics to be produced about EA. For example, if National Information Society Agency (NIA), a kind of government agencies responsible for national EA data, requests 'open data' lists, due to insufficient data managed, the information management department forwards the data request to all the other departments concerned. This 'forward practice' causes time-consuming work for some staff and insufficient response. Some R and D staff frequently asks whether his or her project is subject to the EA management list to avoid submitting the EA data after the completion of information system project.

2.3 Silo Data Management Practices are done

The information projects and ICT equipments data managed by each concerned departments are not shared among concerned departments. Each staff in concerned departments seems to do his/her role but has not shown much concern managing overall data necessary to make efficient external response which requires filling the gaps above and collaborating with each other. In other words, there are some responsibility discrepancies. For example, one department is responsible for contracting ICT projects or ICT equipment but does not respond to ICT contract requests. The other department hosts a committee of ICT equipment but does not manage the ICT equipment database at all. These silo data management practices overall hinder the efficient responding works. It is notable that a new discipline, Enterprise Engineering[2], is emerging to improve these organizational data and ICT problems.

3. Efficient Data Management Method

Currently EA management practices are enforced in government ministries, public institutes and public agencies. The EA data, however, does not cover all the external requests as each government agency requests ICT data based on the different laws. If central government agencies collaborate each other to make one standard data format covering all the survey about software projects or ICT equipment, then the responding work of public institutes, like KISTI, would be dramatically lessened. As it seems that these works may not be done in the near future, KISTI should establish its own management practices. To solve above problems, we propose three main ideas.

3.1 Establishment of Data Management Standard

Several departments including ICT department, contract department, and asset department manage the data of information projects and ICT equipments for their internal uses. Although many external requests had been received, there was not an initiative to make data management standards to efficiently respond them from external public agencies. To improve this situation, KISTI needs to establish data standards for the management of information resources.

There would be several ways to make data management standards such as making it from scratch or extending some widely used standards. We propose the latter way to make data management standards of KISTI. Currently three main data standards exist to collect information projects or ICT equipment in ministerial level. First, EA metadata model[1] has been widely used in ministerial level to collect national data of information resources in Ministry of Government Administration and Home Affairs. Second, in the research equipment area, National Research Facilities and Equipment Center (NFEC) distributedata standard guidelines managing R and D facilities and equipment[4]. Third, NIPA annually collects

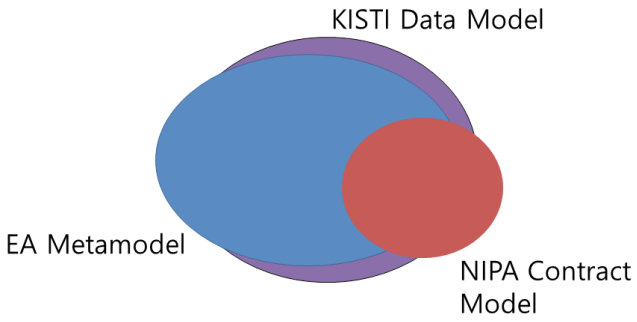

Figure 1. The concept of KISTI data model.

software projects and ICT equipment (hardware and software) contract data about annual planning and results for industrial manufactures and vendors.

Among these data collection models or formats, EA metadata model includes comprehensive data items necessary to manage IT resources. So it would be a good start to choose this EA metadata model as the basic data model of KISTI and add some items to it to respond other frequent requests. This establishment and application of KISTI data management standard would make the data management work efficiently. So, we propose KISTI data management standards for information projects and ICT equipments. Table 1 shows data standards for information

Table 1. Information project data model

Data Management Agency	Data Items
NIA – Gov. EA Information Projects (17)	Information Project Name, Information Project Summary, Information Project Category, Information Project Contract Org., Information Project Start Date, Information Project End Date, Information Project Order Cost, Gov. Registered Information Project, Unclassified Information Project Category, HW Purchase/Lease Order Cost, SW Purchase Order Cost, System Development Order Cost, Consulting Order Cost, Information Resource Maintenance Order Cost, Information System Maintenance Order Cost, Information System Management Order Cost, Information Project Contract Cost
NIPA – Software Project Contract (17)	SW Project Name, SW Project Summary, SW Project Classification, SW Project Category, SW Project Order Date, SW Project Started, SW Project Order Org., SW Project Start-End Date, SW Project Budget, HW-SW Separate Order, HW-SW Separate Order Budget, HW Purchase, HW Purchase Percentage, HW Maintenance Percentage, Commercial SW Purchase, Commercial SW Purchase Percentage, Commercial SW Maintenance Percentage
KISTI – Information Project (24)	Information Project Name, Information Project Summary, Information Project Classification, Information Project Category, Information Project Order Date, Information Project Contract Org, Information Project Start Date, Information Project End Date, Information Project Order Cost, HW-SW Separate Order Budget, HW Purchase Percentage, HW Maintenance Percentage, Commercial SW Purchase Percentage, Commercial SW Maintenance Percentage, Gov. Registered Project, Unclassified Information Project Category, HW Purchase/Lease Order Cost, SW Purchase Order Cost, System Development Order Cost, Consulting Order Cost, Information Resource Maintenance Order Cost, Information System Maintenance Order Cost, Information System Management Order Cost, Information Project Contract Cost

projects, Table 2 for software product and Table 3 for hardware product.

In this model, if we can derive some data value from the existing data, we omitted the data item. We also omitted non-relevant data items, like NtopsComponentID which only is relevant to government ICT center. In case of hardware, we did not include the NFEC data model as the data request is limited to the R and D facilities that cost more than 30 million won. The concept of KISTI Data Model can be depicted as Figure 1.

In biodiversity information management sector, both Global Biodiversity Information Facility (GBIF) and Korean Biodiversity Information Facility (KBIF) use biodiversity data standards (for example, DarwinCore) and protocols (for example, DiGIR) to share its data as well as make its data available to public[3].

If this KISTI Data Model is adopted and applied, the data can be used to summarize the history of information projects or the purchase of ICT equipment every year in KISTI Strategic Management System[5] for executives.

Table 2. Software data model

Data Management Agency	Data Items
NIA – Gov. EA Software (21)	Software Name, Software Category, Software Purchase Cost, Software Classification, Software Category Unclassified, Software Vendor, Software Vendor Unclassified, Software Product Full Name, Domestic Product, Asset Status, Software Version, License Policy, License Policy Unclassified, Number of License, Purchase Date, NtopsComponentID, Installation Place, Installation Place Detail, Operation Department, Operation Staff, Current Information System
NIPA – Commercial Software (7)	Product Name, Product Category, Product Budget, Product Budget Quarterly, Order Date, Order Cost, Contract Date
KISTI – Software (22)	Software Name, Software Category, Software Purchase Cost, Software Classification, Software Category Unclassified, Software Vendor, Software Vendor Unclassified, Software Product Full Name, Domestic Product, Asset Status, Software Version, License Policy, License Policy Unclassified, Number of License, Purchase Date, Installation Place, Installation Place Detail, Operation Department, Operation Staff, Current Information System, Order Date, Order Cost

Table 3. Hardware data model

Data Management Agency	Data Items
NIA – Gov. EA Hardware (29)	Hardware Name, Hardware Category, Hardware Category Unclassified, Hardware Operation Category, Upper Hardware Name, Hardware Category Detail, Hardware Vendor, Hardware Vendor Unclassified, Hardware Product Full Name, Domestic Product, Asset Status, OS, OS Unclassified, Total Storage Space, Number of CPUs, Average CPU Uses, Memory Space, Average Memory Uses, Disk Space, Dual System, Purchase Date, Purchase Cost, NtopsComponentID, NtopsAssetID, Installed Place, Installed Place Detail, Operation Department, Operation Staff, Current Information System
NIPA – Hardware (11)	Product Name, Product Category, Number of Product, Product Budget, Product Budget Quarterly, Order Started, Contract Org., Leased, Order Date, Order Cost, Contract Date
NFEC – Hardware (28)	Korean Name, English Name, Hardware Product Full Name, Purchase Method, Hardware Category, Main Hardware, Manufacturer, Manufacture Nation, Photograph, Use Range, Hardware Use, Hardware Status, Year Used, Purchase Date, Purchase Cost, Asset ID, Installed Place, Hardware Staff Name, Hardware Staff Telephone, Hardware Staff Email, Hardware Staff Email Open, Hardware Staff Mobile Phone, Hardware Staff Mobile Phone Open, R and D Project Number, R and D Project Ministry, R and D Hardware Description, 6T Classification, 5 Main Investment Area
KISTI – Hardware (33)	Hardware Name, Hardware Category, Hardware Category Unclassified, Hardware Operation Category, Upper Hardware Name, Hardware Category Detail, Hardware Vendor, Hardware Vendor Unclassified, Hardware Product Full Name, Domestic Product, Asset Status, OS, OS Unclassified, Total Storage Space, Number of CPUs, Average CPU Uses, Memory Space, Average Memory Uses, Disk Space, Dual System, Purchase Date, Purchase Cost, Installed Place, Installed Place Detail, Operation Department, Operation Staff, Current Information System, Number of Product, Contract Org., Order Date, Order Cost, Product Budget Quarterly, Leased

3.2 Establishment of Data Management Process

In order to manage required data for external response and apply KISTI data model for information resources, we need to change some KISTI business processes. First, we need to add relevant data items to the document guideline of KISTI R and D business plan necessary for the management of information projects and ICT equipments. Then the staff in each department should insert the relevant data so that the ICT staff can collect, process, and manage the data from the documents. Without this process, the ICT staff would have to spend much time to collect, process, and send the result data back.

Second, the purchase process for ICT equipment should be changed so that relevant data items are collected whenever purchase approval process occurs in KISOL. It is not easy to collect the basic data of information resources after they are purchased or deployed. KISTI R and D staff purchasing these items usually focuses on using the information resources, not data. When staff requests purchase of ICT equipment, KISOL should provide the standardized data items. These data insertion work should be done not only the initial purchase process, contract process but also the management and the disuse process. Without these systematic processes, the data management of information resources would be difficult due to the insufficient data collection or incorrect data value. From our experiences of EA construction for several years, it was really time-consuming work to collect the data of information resources, like purchasers, operators, maintenance costs, operation costs, manufacturers, outputs, and outcomes. The contract process for information project should also be changed as the purchase process explained above.

In order to make these processes change effective, the proposed KISTI data model of information resources should be applied to the KISOL. For example, the purchase request format in KISOL should be changed to get relevant items. It is understandable that the system was designed without these considerations but as the government requests are received periodically, the work process and KISOL should evolve. For example, if the item of purchase request is related to the ICT equipment, the KISOL should show the appropriate category and data items. The number of purchase contract for ICT equipment almost amounts to 800 cases in 2014. A staff in KISTI can easily insert data of her intended purchase of ICT equipment within a short time when he or she requests to the purchase of those equipments. However, if the staff responding the ICT equipment data inserts those data, it not only takes too much time but also the data may be inserted incorrectly as he or she does not remember or understand the correct purpose of that equipment.

Third, the staff responding the external request should have the authority to view the data of SW projects and ICT resources in KISOL for easy processing of external data requests. The ICT staff currently requests the contract data via official document or mail, filters irrelevant data, and sums up the total amounts of ICT equipment or information projects. If the ICT staff has the view authority, the data processing work can be done without the waiting time. This business process change will make the work of external response fast and lessen the work of concerned staff among the related departments.

3.3 Clear Role and Responsibility

To make data management of information resources effective, the necessary roles should be identified and assigned to relevant staffs. First, the purchasing staff should do his or her role inserting initial data items for information resources in KISOL. The staff or manager responsible for executing information project also should do the similar work. Second, the contract role for ICT equipment and information projects is needed in inserting contract data. Third, ICT asset management role is needed for owning, placing, changing or disuse management of ICT equipment. Finally, ICT data management role for ICT equipment and information projects is needed for responding external data request. This role should control overall data design and management work. If the staff does his or her job through the data management process with other R and D staff, the data can be accumulated consistently and correctly. This work should be supported with information systems and robust database design. This will lead to the efficient response.

4. Limitations

Some staff may resist the above proposed ideas as they need to do some work and invest time completing the data approval process. For example, they need to classify

or insert the relevant data. This complaint or resistance may be decreased if the process is mature among the staff and consistently applied.

The proposed KISTI data model is not a perfect model and should be evolved as the external requests may be changed with new law establishment or law change.

5. Conclusion

We described the problems of data management of information resources for external requests and proposed three main ideas to improve it. Establishment of data management standard, data management process, and clear roles and responsibility of staff in KISTI are the key ideas. With these works, the response time would be reduced and the staff could manage the data of IT resources correctly. Other public institutes may use these ideas to improve their internal processing for external requests. Future research would be the evaluation of reduced time by applying these proposed ideas and the pros and cons of KISTI data management standards.

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