ISSN 2354-0082

Designing Information Product (IP) Maps On the Process of Data Processing and Academic Information

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Accepted on April 26th, 2017
Approved on June 12th, 2017

***Abstract*— Information Product Approach (IP Approach) is an information management approach. It can be used to manage product information and data quality analysis. IP-Map can be used by organizations to facilitate the management of knowledge in collecting, storing, maintaining, and using the data in an organized. The process of data management of academic activities in X University has not yet used the IP approach. X University has not given attention to the management of information quality of its. During this time X University just concern to system applications used to support the automation of data management in the process of academic activities. IP-Map that made in this paper can be used as a basis for analyzing the quality of data and information. By the IP-MAP, X University is expected to know which parts of the process that need improvement in the quality of data and information management.**

Kata kunci : IP Approach, IP-Map, information quality, data quality.

I. INTRODUCTION

The Information owned by an organization should be managed as a product. Capital is no longer the only major resource that must be owned companies. But, the information that was the main resource that must be owned. Data were processed incorrectly, can produce false information, and of course difficult to expect the correct decision if built on bad information. So, the data needs to be managed properly. Managing data is not just how to provide and sort through the data, but also how to have data that is accurate and free of errors, and how to do it. For this reason, the information possessed by the organization must be managed as a product in various ways. In this perception, the focus is product information, not the system that produced the product.[1][2][3]

Information management approach as a product called (IP Approach). IP approach is a very different approach to information management approach that has been done by the organization, known as by product approach. Organizations that use the by product approach, place the application as the end product of the information system, not information itself. In table 1 below, described some of the things that distinguishes between IP approach to by-product approach.

Tabel 1. Differences Between IP *Approach* And *By-Product Approach*

	IP *Approach*	***By-Product Approach***
What is managed?	Information; product information life cycle.	Hardware and software; system life cycle
How to manage?	Integrated, cross-functional approach that cover the entire parts of the organization.	Stove-pipe systems, the control of individual components, costs control.
Why should manage it?	Provide high quality information to the users of the information.	implement a high quality hardware and software system
What are the success criteria?	Provide quality information throughout the product lifecycle, No Garbage In Garbage Out (GIGO).	The system worked well, and no bugs.
Who is managing it?	CIO, *Information product manager*.	CEO, IT director, the database administrator.

X University is an educational institution that organizes higher education in Bandung, Indonesia, and has been using information technology as the core of its business, as well as facilities and infrastructure to provide services to students, faculty and the entire staff as well as support the implementation of activities in all units. The importance of the use of information technology in the implementation of each activity, requires X University to perform data and information management appropriately.

In previous research [5], measurement of data and information quality has been done to the process of academic data management, which includes student registration process, guardianship, value. The process involves several existing entities, namely X Center (UC), Academic Administration and Students Affair (BAAK), and Department (major). The result of measurement of the quality of information done by using CALDEA and EVAMECAL method shows that the quality of data and information of X University for the process of information management (IMP) of academic activity has not reached the definition level with the ML-IQV value of 6.33. It said a data and quality information for the processing of information (IMP), if ML-IQV reaches a value of more than 90.

Low levels of quality information that is because the X University has not given his full attention to the quality of the information it holds. X University more attention in the development of systems, such as IT infrastructure and applications of information systems. X University has not considered the information is as a product, which must be managed.

In this paper, the IP approach will be to manage the quality of data and information on the IMP academic activities. In the last part, will be described IP-Map of academic activities carried X UNIVERSITY today. IP-Map that can then be used as a guide to improve the quality of data and information management X University in the future.

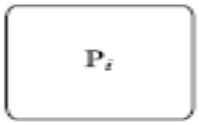
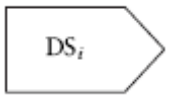
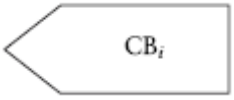
It is important in the management of information as a product requires a paradigm shift in the organization of the information itself. The main principle in the IP approach in this regard, ie : [1] [3]

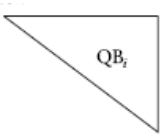
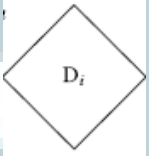
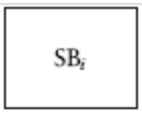
1. Understanding the needs of users of information.
2. Managing the information as a product, resulting from the production process is well-defined.
3. Managing information as a product that has a life cycle.
4. Pointing information product manager to manage product information.

The Four Principle is the key to maintaining the quality of the information. To implement IP approach, organizations not only need a philosophical understanding, but also require models, device support, and techniques of IP approach. *Product Map* (IP-Map) provides a set of tools to implement the IP approach, and support the continuity of data quality. IP-Map is a toolkit that is used to manage the information product and the analysis of data quality. IP-Map is a toolkit that is used to process the product of the information and analysis of quality data. IP-Map is a systematic representation of a process for making or creating a product of the information using a standard set of symbols and rules. It should be understood that the standards development process in the manufacture of IP-Map is still being developed, and will continue to evolve. Standard Group is a committee of academics and practitioners of data quality, has created a standard in the manufacture of IP-Map. [2]

In IP-Map, known definition that is commonly used by IP-Map user organizations. This definition is the data elements and products of the information. Data element is the smallest unit of data that has meaning in the context of the operational environment. Data elements can include attributes of an entity, a field within a record or form [2][3][4]. Examples of data elements that student registration number, name, date of birth, etc. While the product of information (information product) is a collection of instances of data elements that meet the specific needs of the use of data [2][3][4]. The data requirements for example for reporting or decision-making process. Examples of product information are transcripts, study results card, etc.

Tabel 2. IP-Map Basic Symbols [2][3]

Construct Description	Construct Item
Function or process block : Task that describes any transformations, manipulations, or calculations performed (i.e., What should be done ? Example :Create purchase order, Update database)	
Source (raw input data) block : This block is used to represent the source of each raw (input) data that must be available in order to produce the information product expected by the consumer.	
Customer (output) block : This block is used to represent the consumer of the information product. The consumer of the information product. The consumer specifies in this block data elements that constitute	

the "finished" information product.	
Data quality Block : This block is used to represent the checks for data quality on those data items that are essential in producing a "defect-free" information product. Therefore, associated with this block is a list of data quality checks that are being performed on the specified component data items.	
Data storage block : This block is used to represent the capture of data otems in storage files or database sp thet they can be available for further processing.	
Decision block : In some complex information manufacturing systems, depending on the value of some particular data item(s), it may be necessary to direct the data items to a different set of blocks down stream for further processing. In such cases, a decision block is used to capture the different conditions to be evaluated and the corresponding procedures for handling the incoming data items based on the evaluation.	
Business boundary block : The business boundary block is used to specify the movement of the information product (or raw/component data) across departmental or organizational boundaries. The role of the business boundary block in the IP-Map is to highlight the data quality problems that might arise when	
accrosing business unit boundaries and therefore assign accountability to the appropriate business unit.	
Information system boundary block : This block is used to reflect the changes to the raw input data items as they move from one information system to another type of information system (Example : Paper to Electronic). These system changes could be intra or inter-business units.	
There are circumstances where the raw input data items or component data items go through both a business boundary and a system boundary change. The combined business-information system boundary block is defined for this purpose.	

There is a similarity between the IP-Map with Data Flow Diagrams (DFD). But, IP-Map is not merely describing the flow of data as well as DFD. IP-Map provides information on collector information, maintainer information, and users of information. Information about the level of participation and the role of stakeholders in the process of producing the information to be written. Similarly, the information on the infrastructure of a system, organizational infrastructure, and certain functions in the organization. IP-Map combines the information in the dimensions of data quality. Dimensions of data quality, timeliness especially can be combined into a number of blocks of IP-Map.

II. IP-MAP CONSTRUCTION PROCEDURE

Standard Group proposed procedures to establish IP-Map. The stages are contained in the IP-Map construction procedure is as follows [2]:

Stage 1 : Selecting IP to be mapped. Select the data elements are dominant in the IP. There are several ways to get this data element. The first way, the data

elements obtained by examining and decomposing IP. The second way, if the IP could not be identified or described clearly, it is done bottom-up approach to select one or more data elements are critical of the IP. A set of data elements can be further used or disposed of during the IP-Map was developed

Stage 2 : Identification of parties responsible for creating, collecting, enter data, maintain data, and who will use the data.

Stage 3 : Describing between data elements, transformation, and connectivity between the data stream.

Stage 4 : Identify the functional roles. Identification of individual involvement and responsibilities of each.

The information obtained from each stage are combined in IP-Map. Usually performed in the following order:

1. Drawing workflow
2. Drawing data flow
3. Drawing system infrastructure
4. Drawing infrastructure and roles within the organization.

Furthermore, collection of the IP that can be used to manage information.

III. RESULTS AND DISCUSSION

Based On IP Approach Principle described in section 1, X University need to do the following :

1. Understanding the needs of users of information. X University need to understand the needs of users of information in the process of data management academic activities. User information in academic activities in X University identified as students, faculty trustee, Vice Rector III, Chief BAAK, Chairman Prodi. While the product of the information needed by the users of such information is the Student Registration Statements, the Trust List Students, Student Study Cards (KSM), Card Study Results (KHS), the Academic Progress Report, Student Transcript.
2. Managing the information as a product, resulting from the production process is well-defined. The process of academic activities has been well defined by X University. Academic activities started from the student registration process, followed by the trusteeship process and taking courses, and ends with the evaluation process that was marked by the release of study result card and Academic Progress Report. Parties X University Center, BAAK, and Prodi have databases that are connected, so that the data owned by the three entities is consistent.
3. Managing information as a product that has a life cycle.
   Information must be managed as a product that has a life cycle. Starting from the information created or collected and managed, stored in a storage area (file or database), henceforth be given to those in need. X University has been doing these activities, but did not give great attention to the quality of the information being managed. X University more attention to the development of applications for data management automatically in supporting the implementation of academic activities, regardless of the quality of the data itself.
4. Pointing information product manager to manage product information.
   X University has not had a team that handles the management of the quality of information separately. As described in previous research, quality management of information made by a team that also serves as a guarantor of the curriculum team. Therefore, X University need to form a special team to handle the product quality information, and appoint a person in charge of the team.

III.1 DEVELOPMENT IP-MAP DATA ACADEMIC PROCESSING

Academic data management process, including the process of student registration, trusteeship, and processing of students' academic value data. The process that occurs involves some existing entity that X University Center, BAAK, and Prodi-study programs. Network architecture that is in X University is divided into multiple networks according to existing study programs, which are connected together on the computer network of data centers in X University Center. The network is also integrated with BAAK. The permissions of each study program is governed by an administrator who manage all of the existing network in X University.

a. IP-Map of Student Registration

Student registration process produces information in the form of Student Registration Report that Given to the BAAK head and Vice Rector III, as well as the Student Trusteeship list given to every faculty trustee.

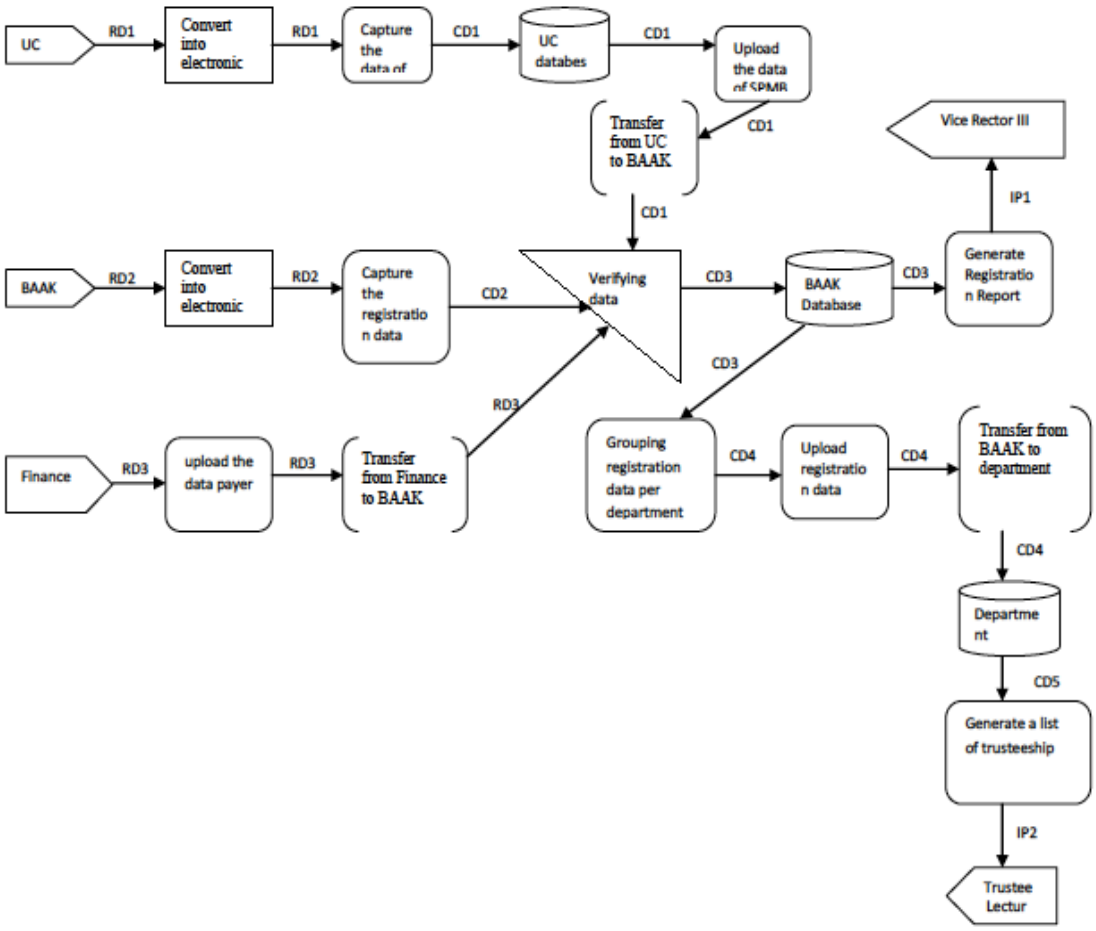


Image 1. IP-Map of Student Registration

RD1 : The SPMB Result of SPMB Committee
RD2 : Student registration data
RD3 : College payment data from banks
CD1 : SPMB result data
CD2 : Registration data
CD3 : Valid registration
CD4 : Student registration data per department
CD5 : Student registration data of the department
IP1 : Student registration report
IP2 : Trusteeship list of students

b. IP-Map Of Student Trusteeship

Student trusteeship process produces information product such as KSM that given to students and faculty trustee as proof of taking the course. Management of information products for students trusteeship process can be drawn in the IP-Map in image 2.

Image 2:

RD4 : data of trusteeship
RD5 : data of taking courses
CD6 : data of trusteeship
CD7 : data of taking courses
CD8 : data of taking courses that validated by rusteeship data and registration data
IP3 : Student Study Cards (KSM)

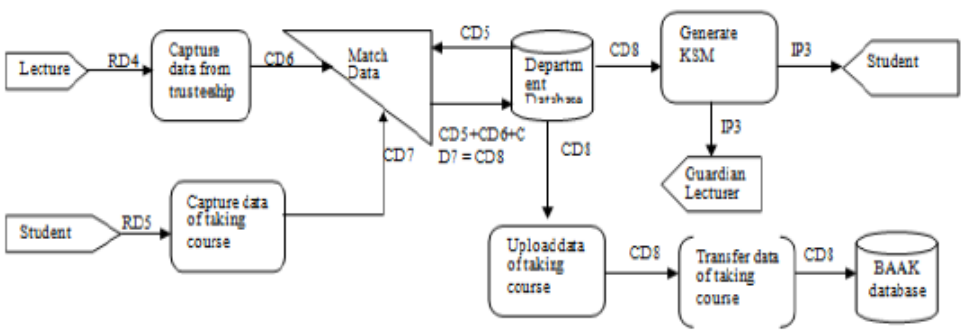


Image 2. IP-Map of Student Trusteeship

c. IP-Map of Student Value Management

The Management process of Student Value produce information product such as KHS which given to students and faculty trustee, and Report of Academic Progress given to the Vice Rector III. Data of student value is also used by BAAK to make transcripts of students. Management of product information for the student evaluation process can be drawn in the IP-Map in Image 3.

Image 3.

RD6 : Students value data per class
CD8 : Students value data
CD9 : Student value data validated
CD10 : Final Students Value Data per student
CD11 : Final Students Value
IP4 : Study Result Card (KHS)
IP5 : Transcripts

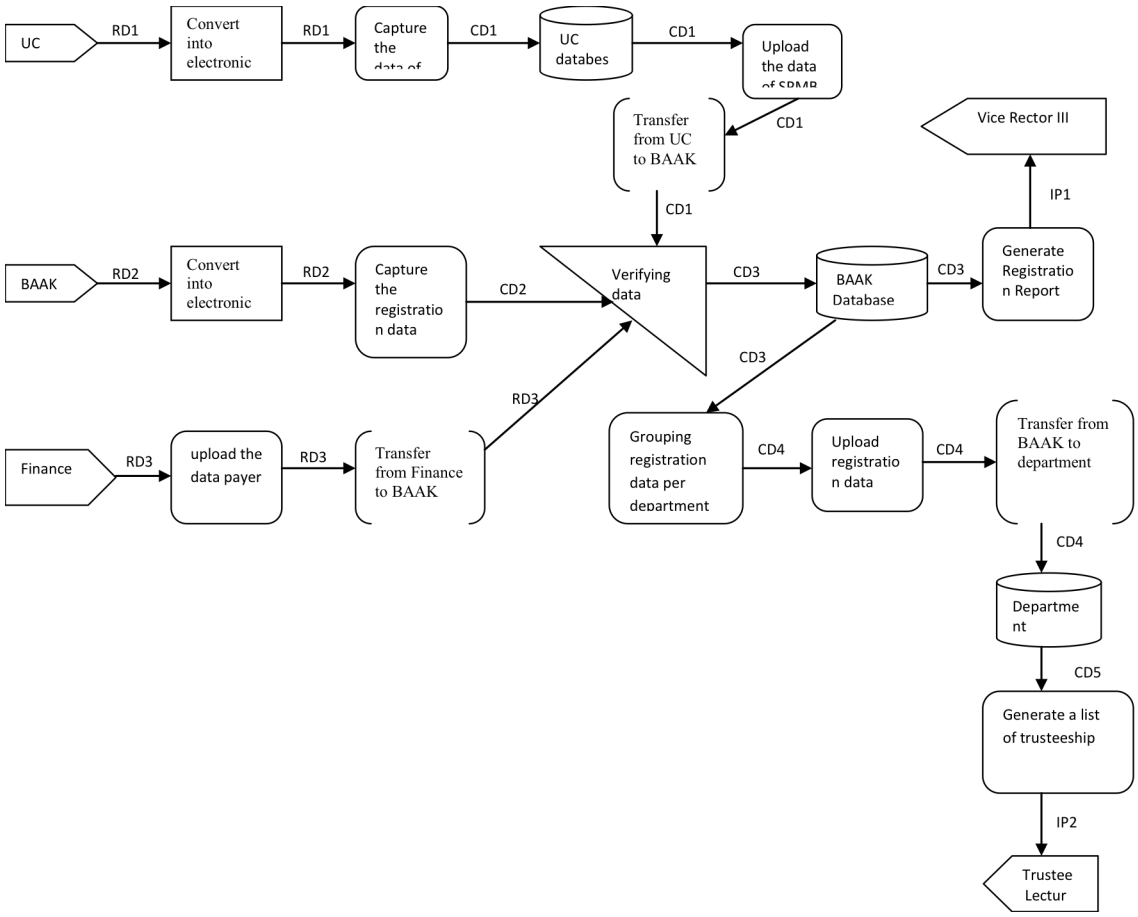


Image 3. IP-Map of Student Value Management

IV. CONCLUSION

During this time, X University only give attention to the application system used to support the automation of data in the process of academic activities. IP-Map made in this paper can be used as a basis for analyzing the quality of data and information. By looking at the IP-Map is expected X University parties can know which part of the process that need improvement in the quality of data and information management.

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