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public engagement and the making of place

8-9 August 2014

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REFLECTIONS ON CREATIVITY: PUBLIC ENGAGEMENT AND THE MAKING OF PLACE

PROCEEDINGS

Volume 1:

Creative Engagement Through Design Praxis
Digital Technology Enabling Public Engagement

Editors:
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Architecture Program
School of Architecture, Planning, and Policy Development
Institut Teknologi Bandung
INDONESIA

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Proceedings

Arte-Polis 5 International Conference
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PREFACE

The fifth biennial Arte-Polis International Conference between the 8-9 August 2014 brings together to Bandung, Indonesia, creative champions from different places around the world, to share and learn from each others creative experiences in the making of places.

Under the theme of *Reflection on Creativity : Public Engagement and The making of Place* Arte-Polis 5 underlines the importance of city as more than spatial projections of urban imagination but reflection of the creative energy, network, quality of living and traditions of its people. It refers to Creative Community and Place-Making within the frame of community participation, democratization process and their reflections in spatial structure, planning, ethic, policy-development, education, business, environmental discourse and ICT.

The aim of Arte-Polis 5 is to connect together practitioners, academics, community leaders, government officials, policy-makers, artists and other creative professionals from diverse disciplines and regions around the wh shares concerns about the quality of life and the connected nature of creative communities in urban, rural and pastoral places, particularly in response to contemporary situations of globalization, neo-liberal economy, digital technology, environmental issues and the positions and role of society and public realm in the discourse of creative community.

Keynote and Featured Speakers provide a platform for discussion of Conference theme to be elaborated in parallel sessions of the Conference Tracks:

Christopher SILVER, Prof- Professor and Dean of College of Design, Construction and Planninh, University of Florida, USA
Clorinda ROMO - Co-Founder, City Laboratory of Mexico City, MEXICO
Andrew HUDSON-SMITH, Dr. FRSA. – Director of the Centre for Advanced Spatial Analysis (CASA), University College London, UNITED KINGDOM
Sambit DATTA, Dr. – School of Built Environment, Curtin University, AUSTRALIA
Gianluca N. LANGE. – Autodesk AEC Asia, , HONGKONG
Scott DUNN – Vice President of Development, AECOM in Malaysia
Armein LANGI, PhD. – School of Electrical Engineering & Informatics, Institut Teknologi Bandung, INDONESIA
Ridwan KAMIL ST. MUD, - Mayor of Bandung, INDONESIA
Unggul PRIYANTO, Dr. Ir.MSc. – Chairman Agency For The Assessment Application of Technology, INDONESIA

In this publication, Parallel Session papers are compiled to provide an insight for reflection and sharing of the best practice experiences from over 11 countries. We trust that you will find Arte-Polis 5 International Conference on Arte-Polis 5 *Reflection on Creativity : Public Engagement and The making of Place* a rewarding and enriching learning experience worth sharing.

The Editors
Arte-Polis 5 International Conference

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Digital Technology Enabling Public Engagement: Information System for Design Project Execution in Engineering Office (PT. BITA Enarcon Engineering.)

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ABSTRACT

This paper describes an attempt and implementation of information technology-based knowledge system for project execution in a design consultant and engineering office. We define this system as a collaborative and user-centered design in which all engineers including architects engage to develop a system with single purpose, to increase design quality and decrease production time of the project. The system dubbed as Service-Oriented Customize Knowledge System (SOCKS),is basically a knowledge management system built to assist design process to achieve designated improvements. By the means of digital technology, this system is intended to be delivered through online or Local Area Network in order to be easily accessible by all personnel involved in an on-going project. Other that design tools for handling and completion of the design work, this system is as well used as medium of engagement for parties involved in the project. Engagement activity that is interesting to be mentioned here is the way experts within the company interact with each other, experts from outside the company collaborate with experts within the companies. The beneficial operation of SOCKS that is managed using a digital information system for handling project and design works is obvious through more qualified, faster result and more cost-effective design process.

Keywords: *historical-cultural place, landscape planning and design, revitalization, riparian settlement, traditional aquatic culture*

INTRODUCTION

In the professional practice of engineering consultancy, company's experiences is one of the valuable asset with distinctive characteristic: it grows along with the company. These experiences come in two forms: first the experience related with engineering aspects which involves techniques, technology, materials, systems and methodologies. The other form related to project execution and handling which involves management and administration experiences. In addition, they usually are converted into explicit knowledge by means of workshops of the internal project execution team, series of internal training and inter-relation workflow among designers, engineers and production teams. In the end, the continue-improved engineering products in the form of technical documents are the proof of which experiences and knowledge are well explicitly implemented.

However, as experiences are obtained by personnel, this concept of improvement in the benefit of the company is put on risk by the fact that personnel is a variable asset of the company. In this dynamic world of professional practices, the turning factor is usually high, given to the competitive environment in this sector. One of the company's liabilities is not able to keep its engineers to stay long in order to lead improvement based on their experiences. This condition lead the company to strategically search a method to continually improve its capability while minimize dependency on the personnel's experiences.

On the case study, we investigate the ongoing development of a customize knowledge management system in an engineering consultant with the goal to obtain tacit experiences and improve company capability.

MANAGEMENT INFORMATION SYSTEM IN ENGINEERING OFFICE

The case study is PT. Bita Enarcon Engineering, a private engineering company with more than 25 years of project portfolios at national and international scale. The company held more than 80 engineers including architects, civil and structural engineers, mechanical and electrical engineers, quantity surveyors and production personnel. As the main business to provide engineering services for construction industries, PT. Bita has a long track records of experiences in industrial projects as well as institutional and hospitality projects. In 2011 the company initiated a Service Oriented Customized Knowledge System (SOCKS) which is basically a knowledge management system built to assist design process to achieve designated improvements. By the means of digital technology, this system is intended to be delivered through online or Local Area Network in order to be easily accessible by all personnel involved.

On the surface, the SOCKS is in form of digital repository which compile and record company's product deliveries into an online database. The main factor to distinguish from a common management system is the system designated specifically according to the nature of workflow in the office. The company services derived into several products such as:

1. Architectural concept drawings and preliminary design.
2. Engineering documents in form of tender dossier which consist of Detailed Engineering Drawings in multidisciplinary scope.
3. Engineering calculations for civil, structural, mechanical and electrical works.
4. Material take-off and technical specification.
5. Other engineering analysis related with construction process.

About 90% of company's service to develop engineering documents, whether it is started from conceptual design prepared by in-house architects, or to develop engineering documents from other architectural consultants. In such process with usual tight time-frame, the role of integrated system to provide design libraries on each stage in addition to product and material libraries is significant to increase productivity that is comply with international standards.

The tacit knowledge or experiences usually comes in these form:

1. Senior engineer or architect who engage and involve in the project. This experience obtained during project executions that involve interactions with peoples with different background and expertise. It is worth sharing and usually the most difficult to record since the process to make this explicit occurred when there is interaction between senior engineers and the juniors. In many ways, junior engineers or architects learn the most from such discussion or tutor session than from the reference books. While it seems a tedious task to develop knowledge repository from the event, periodical project technical meeting provide a medium to record technical and non-technical aspect uniquely in a project.
2. Project engagement involving several parties. This experience developed while the company has cooperation with other companies in a particular stage of the project. In such, there are documents and knowledge exchanges in addition to the benefit of this involvement worth sharing and distributed to increase company's competitiveness on particular project stages being executed. With respect to the proprietary rights and objects, the knowledge in form of technical drawings, specification and other form is highly significant to improve design product.

In another way, explicit knowledge comes in regular and increasing updates such as:

1. Material properties and technical specification.
2. Codes and building standards.
3. Method of construction.

The aim of SOCKS in principal is to provide platform and content to support designers and engineers improves their products.

DIGITAL TECHNOLOGY AND DESIGN PROCESS

SOCKS AS DESIGN TOOLS

As a knowledge management system, SOCK serves as design tool, or a design library to enrich validity and accuracy of technical drawings and document which is developed during design process. As project's requirement is increasingly complex as a function of material specification, and new product, the need of library system which provides and complies with latest requirement is inevitable. The system accessed via web browser and directly can be loaded into the software being used is critically important (Khrisman, 2009). In example, the CAD library with search capability helps designer/ architect quickly load building elements when in need.

The Knowledge Management system is developing rapidly in the present era in the form of collection of data of knowledge information. The digital process helps the knowledge information to be shared with other people than internet/intranet (Krishman, 2009). In this context, SOCKS is a knowledge management in the digital form that is accessible to the personnel who are involved in the project.

Considering that SOCKS are collection of data and information for design, design management etc., it has to function as design tools for handling projects.

Moreover parties involved in the design works such as engineers, architects, CAD operators etc. have to coordinate and collaborate. Utilization of digital technology devices is efficient for coordination and collaboration purposes. Therefore SOCKS function both as digital devices as well as design tools to handles design projects.

DIGITAL TECHNOLOGY FOR STORING AND TRANSFERRING DATA

The data and information in the form of knowledge is to be stored by using digital technology '. It is intended for easy development of the material and accessibility as well as transfer to parties in needs. As suggested by Byornson and Dingsoir (2008), that knowledge management should be done by using digital technology 'and appear as a storehouse of information with a structured system which is part of the Floor information company. It obvious that the role of digital technologies described in the context of knowledge management is a means to distribute data or information. This is consistent with the statement of Ward & Aurum (2004), that one activity of the Knowledge Management that uses digital technologies is the distribution and organization of knowledge.

2.3. DIGITAL TECHNOLOGY AS ENGAGEMENT TOOLS

In the context of knowledge management digital technology is a system utilized to store and to deliver data and information. This implies that delivery of information and data to several parties involved, as well the verification and the discussion about the data and information et. Simultaneously using digital technology reflect an engagement process between the parties.

In the handling of design project in an engineering company the above process would take place, starting with coordination between engineers in the field, engineers of different fields, coordination with other sections, coordination with external experts, coordination with sub-consultants to be collaborated with, and coordination with related parties. These are all, as stated by Aurum Warda (2004) as; an engagement process is the organ of knowledge process and application of design project management in engineering company.

DIGITAL TECHNOLOGY AND DESIGN PROJECT EXECUTION

A project demonstrates collaboration of various divisions consisting of various areas of expertise to produce an architectural work (building). As a project with time consuming settlement a good system, this is done by applying technology systems that utilize digital technology. According to Ibrahin (2011), in the past few decades, project managers, engineers, architects, and researchers have been exploring and developing different digital technologies and processes aimed at addressing issues surrounding coordination and collaboration in the design and delivery of major building and infrastructure projects. Henderson (1991) emphasized the importance of the CAD models application in undergoing projects as "the basic components of communication" and a means to shape "the structure of the work, to manage parties participating in the work and the final products of the design engineering ". Bröchner (1990), added to it that the role of technologies in the construction industry has been discussed from various perspectives, with regards to their impact on the structure and construction, including architecture in it..

KNOWLEDGE MANAGEMENT SYSTEM IN ENGINEERING COMPANY

Engineering company is a knowledge-base company. A knowledge-base Company's would be definitely supported by trained and qualified experts, ranging from junior experts to senior experts with long track records and experiences. The effective functions of individual experts vary in accordance to the scope of services offered by the company. The more extensive the scope of the services to more diverse the expert workforce maintained.

An Engineering Company who offers service with special skills and expertise is referred as specialist. It involves architectural consultants, civil and structural engineering consultants, Mechanical and Electrical engineering consultants, etc.. The supporting experts would be relatively homogeneous. This is quite different from the engineering company with multidisciplinary scope of services, such as those that include Architectural Design, Civil, Structural, Mechanical and Electrical, and further service like interior and landscape. The supporting workforce, labor ad experts would relatively diverse and many.

The advantage of a specialist Engineering Company is its ability to offer high-quality single services with specific knowledge development to maintain its service and expert’s qualification. However this kind of engineering company can only offer singular engineering service and work, there is no options for alternative

scope of work. While the multi-disciplinary engineering company could offer various engineering service and engage in various optional works. The consequence is that the multi-disciplinary services would require development of diverse expertise and skills. Besides, the more experts required the more expertise workforce should be available and maintained.

With regards to the time of operation of an engineering company, the longer the professional operations of a company in executing their works and projects, the more the experiences it maintained. The sustainability of an engineering company correlate with the experienced accumulated. Similarly, for both specialist and multidisciplinary service company, the more aged the company the more experienced it turns out to be.

However the correlation between the lengths of operation of an engineering company to its quality of experience is not always as ideal as described above. Without transforming experience into knowledge the company will not be able to maintain its expertise, particularly in the case that the personnel-expert with certain kills or expertise no longer works with the company. When this happens, the lengthy experience of even a well-aged company could be useless. To prevent this incidence to occur at an engineering company a division is needed: Knowledge Management. Knowledge management is transformed into personnel' experience into explicit knowledge and later covert them into corporate knowledge. With this knowledge management division, a company is able to maintain the existing knowledge accumulated from its personnel, even in the case that the personnel's may resign or stop working for the company again..

SERVICE ORIENTED CUSTOMIZED KNOWLEDGE SYSTEM (SOCKS)

The 30 years and more of professional practice in handling design / engineering has made BITA advanced with exhaustive and various experiences. The experience, such as solving the design problem, design solution, design concept, detailed design, etc. as well as experiences related to how to manage the handling, and or the execution of design project, lays on chiefs of expert of BITA. The experiences or knowledge that is accumulated within the mind of chief experts and staffs of BITA which mostly appear as tacit knowledge is facilitated in a system which is called Customized Service Oriented Knowledge System (SOCKS).

Other than accumulating the tacit knowledge and the experiences and expertise of BITA's personnel the purpose of SOCKS is to provide design tools for next design project. Hence, SOCKS accommodate explicit knowledge of BITA, rule of thumbs, and technical standards for design drawings and details, etc. Considering that SOCKS is a tool for design and engagement with parties involved in the design works, with a broad scope of operations, a processing system based on Information Technology And Communication (ICT) is utilized.

The extensive scope of substances and knowledge require a Taxonomy for making the preparation and compilations simple. As BITA handle many International

projects the taxonomy utilized refer to those utilized in International Construction Organization which is Construction Specification Institute, based in Canada, and popularly called CSI Taxonomy 1995. Till date all preparation of the Technical Specification for Building Construction utilize the taxonomy for International projects.

TAXONOMY CSI 1955

Taxonomy CSI 1995 is also known as Master format CSI 1995. The Master format consist of 16 Division. To elaborate further see Tabel 1 below.

Tabel I Taxonomy CSI 1995

#	Division Number	Division	Total Sub Division
1	Division 1	General Requirement	8 Sub Division
2	Division 2	Site Work	9 Sub Division
3	Division 3	Concrete	8 Sub Division
4	Division 4	Masory	7 Sub Division
5	Division 5	Metals	9 Sub Division
6	Division 6	Wood and Plastics	6 Sub Division
7	Division 7	Thermal and Moisture Protection	9 Sub Division
8	Division 8	Door and Windows	9 Sub Division
9	Division 9	Finishes	9 Sub Division
10	Division 10	Specialties	9 Sub Division
11	Division 11	Equipment	8 Sub Division
12	Division 12	Finishings	8 Sub Division
13	Division 13	Special Construction	9 Sub Division
14	Division 14	Conveying Systems	9 Sub Division
15	Division 15	Mechanical	9 Sub Division
16	Division 16	Electrical	9 Sub Division
	Total		135 Sub Division

(Source : CSI, 1995)

The table shows that each division comprises of several sub division- at least 6 sub-division and most are 9 sub division. To clarify the idea of Division and Sub-Division, the Table II below is an outline example of Division with its sub Division:

Tabel II. Division 8 with its Sub Division

No	Division	Sub Division		
8	Division 8 Doors and Windows	08100	Metal Doors and Frame	
			08110	Steel Doors and Frames
			08120	Alumunium Doors and Frames

			08140	Brozer Door and Frames
		08200	Wood And Plastics Doors	
			08210	Wood Doors
			08220	Plastics Doors
			08250	Door Opening Assemblies
		08300	Special Doors	
			08310	Sliding Doors and Grilles
			08330	Coiling Doors and Grilles
			08350	Folding Door and Grilles
			08360	Sectional Overhead Doors
			08390	Storm Doors
		08400	Entrances And Storefronts	
			08410	Aluminium Entrances and Storefronts
			08420	Steel Entrances and Storefronts
			08440	Bronzer Entrances and Storefronts
			08450	All glass Entrance
			08470	Revolving Entrance Doors
			08480	Balanced Entrance Doors
			08490	Sliding Storefronts
		08500	Metal Windows	
			08510	Steel Windows
			08520	Alumunium Windows
			08540	Bronze Windows
		08600	Wood And Plastics Windows	
			08610	Wood Windows
			08630	Plastics Windows
			08650	Special Windows
			08655	Roof Windows
		08700	Hardware	
			08710	Door Hardware
			08760	Window Hardware
		08800	Glazing	
			08810	Glass

			08840	Plastics Glazing
		08900	Glazed Curtain Walls	
			08960	Sloped Glazing System
			08990	Structural Glass Curtain Wall

Tables I and II above illustrate the way knowledge is grouped according to Divisions and Sub Divisions. For example, the knowledge about Doors And Windows will be classified according to Division 8 or more specifically Sub Division Door and Windows. Knowledge about Wood Door for example, would be classified in 08200 Wooden and Plastic Doors, and Sub Folders 0821 Wooden Doors.

SOCKS CONTENT

After the compilation and classification in Sub Divisions and Divisions according to CSI 1995 Taxonomy system, next is replenishing the content of the Divisions and Sub Divisions. Sub Division is a vehicle or container of knowledge in question. The content of Sub Division is the content of the SOCKS which can be seen in the following table.

Tabel 3. Content of Sub Division

No	Chapter A	Content
	Chapter A	DESIGN CONCEPTS & GUIDELINES 1. Design Concept 2. Rule of Thumb/Formulas, etc.
	Chapter B	STANDARD DRAWING and DETAILS 1. Design Standard 2. Standard Drawing Standard 3. Detail Standard
	Chapter C	STANDARD SPESIFICATION 1. High End Specification 2. Low End Specification
	Chapter D	BILL OF QUANTITY AND UNIT PRICE
	Chapter E	KNOWLEDGE SOURCE 1. Project Sample (BITA Project, Other Project) 2. Reference (Text book, Journal, Articles, Webs 3. Network and Expert (Internal, External) 4. Lesson Learned (Internal project, external project)
	Chapter F	BENCHMARK 1. New Practice/State of the art 2. Green Building Related

		3. Etc.

Totally SOCKS is built by 16 Divisions wherein are 135 Sub Divisions. Each Sub Division contains Chapter A to Chapter F as shown in Table 3 above. With the broad numbers and scope, SOCKS should be utilized as instrument for design for handling project. How to utilize SOCKS will be discussed in the next chapter.

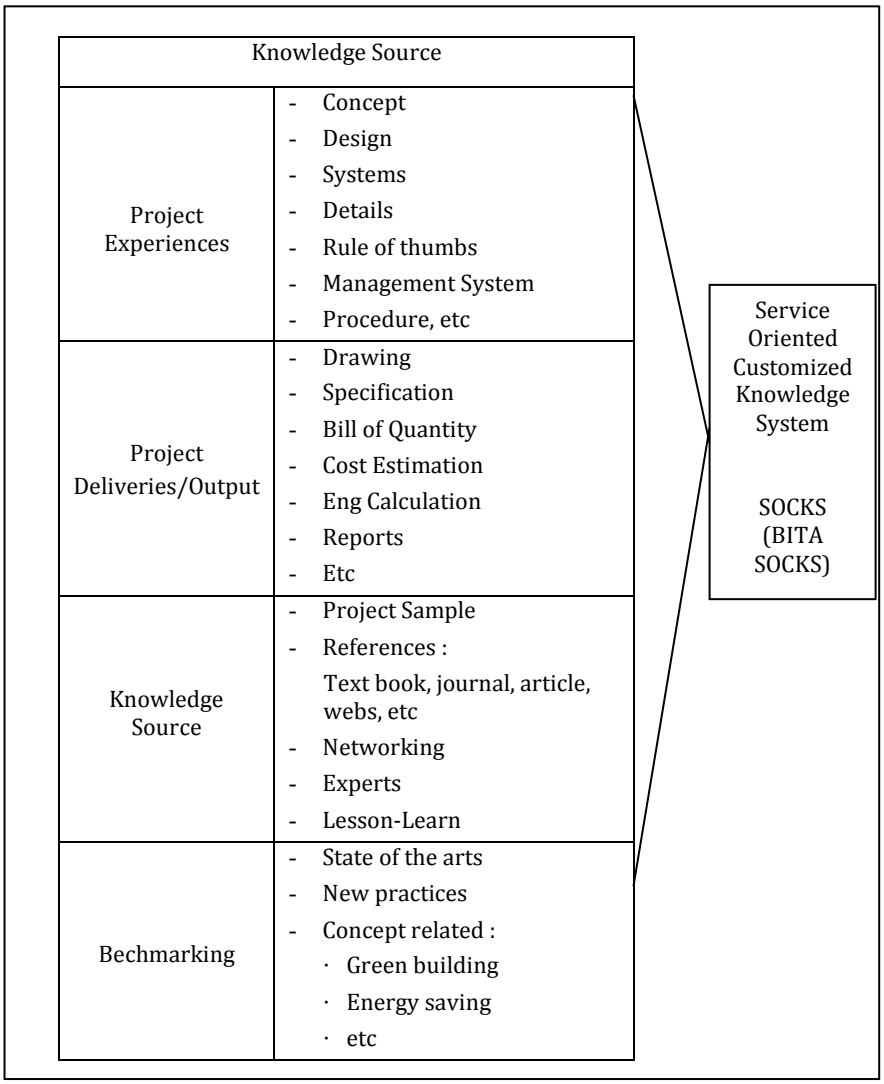

Figure 1. Knowledge source of SOCKS

INFORMATION SYSTEM FOR DESIGN PROJECT EXECUTION IN PT. BITA ENARCON ENGINEERING

THE SOCKS UTILIZATION

The overall preparation of SOCKS in BITA is approaching approximately 90% to completion, but the Division or Sub-Division which is not specific or special has been finalised. In the last two years all design projects of BITA have been handled using SOCKS as a design tools. Given the more than 30 years track of experience

of BITA, and various kinds and types of design work assigned ever since, the advantages of using SOCK is to avoid "reinventing the wheel" for any common professional situation. Its appropriation for new project means updating and enrichment of the already compiled previous projects, with regards to concept, system , design , details , specifications , etc. . Moreover, the content of the SOCKS BITA are references to "state of the art" design or most advanced design formulation, network of compiled list of experts to be contacted to handle some difficulties in the execution of project work . The next advantage is avoidance of repeating common mistakes done by personnel should the respective personnel be altered. This would mean a better quality of workmanship and faster process. When the job is completed faster the utilization of man hours of experts , engineers CAD operators, etc. would reduce and it means cost reduction for the project implementation.

Indeed, there has been no in-depth research yet in this course in BITA. But in general, within the last two (2) years there the significant increase of profit is obvious. Without doubt the use of SOCKS in BITA has been proved to make the work better, faster, and less costly (Figure 2).

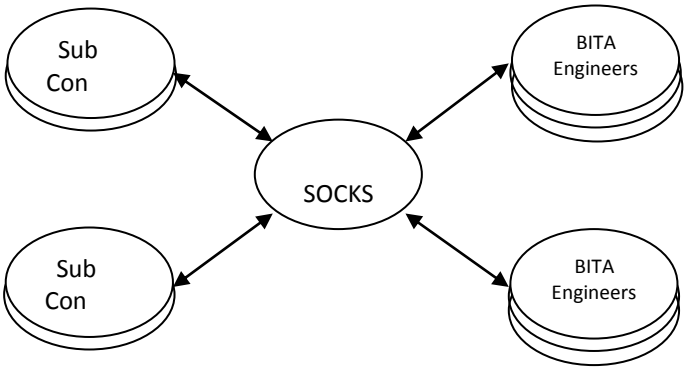

Figure 2. Implementation Diagram

INFORMATION SYSTEM APPLICATION FOR SOCKS

BITA SOCKS is designed according to taxonomy, therefore all filing and numbering system is arranged using digital system or specific information system. Moreover, because SOCKS is a source of data and information for handling project design a management system was created to access, update and deliver information in and with SOCKS, etc.

COLLABORATION SYSTEM DURING PROJECT EXECUTION

In the handling of each design project multiple expertise are always involved. The minimum experts or engineer involved are Architects, Civil Engineers, Structural Engineers Mechanical Engineers, CAD Operators Electrical Engineers, Engineers Specification, Cost Estimator, etc. At BITA Company all of those expertise are available.

In the handling of design project in BITA all above mentioned parties can coordinate with each other by using SOCKS as a means of engagement. Similarly, if there is a scope of design work that is very specific and require outsourcing effort that involve external sub-consultants, this external party can also coordinate with the in=house engineers and architects of BITA by means of SOCKS.

CONCLUSIONS

With the formulation of a knowledge management in BITA named BITA SOCKS all knowledge of the company that initially lay on the engineers and staff personnel's now can be made into an explicit knowledge and operational for the execution of projects. BITA SOCKS is developed and managed by a sophisticated digital information system considering the wide scope of knowledge which hence require simple modes of management, updating, and accessibility.

Other that design tools for handling and completion of the design work BITA SOCKS is as well used as medium of engagement for parties involved in the project. Information technology plays an important role for it. Engagement activity that is interesting to be mentioned here is the way experts within the company interact with each other, experts from outside the company collaborate with experts within the companies, etc. Here, SOCKS is therefore the engagement tool. The beneficial operation of SOCKS that is managed using a digital information system for handling project and design works is obvious through the more qualified, faster result and more cost-effective process.

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