

A User-based design process for web database: case study melaka k-economy incubator database

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Abstract

The paper proposes a novel concept in designing a data integrated web database which incorporates three kernels which point towards database cells related to the development of Melaka K-Economy Incubator catalysed by Cottage Industries, Investors' Trend and Intellectual Properties resulting from the research work from local universities and research institutes.

The study takes into consideration many factors which facilitate improvement on human computer interaction (HCI) with regards to efficiency and QOS as perceived by the user. Research by V.A.J. Maller¹ has indicated that failure of systems analyst and designer is a dominant factor in deciding efficiency and QOS of any data integrated web database. In this study certain features have been added to design of the database to ensure that the negative effects of systems analyst and designer failure is minimised.

The user-based design process is an extension of the work of Eillen G. Abel et al² who designed the web interface and whose idea is currently further developed to design a web database where design decisions emanates from the user rather than from the designer view point throughout the process.

1.0 Introduction and literature review

The importance of considering users in the developing computer systems in general has been recognised since the 1970s. A lack of coordination among the interested professional groups and a failure of one group to build on what can be learned from others are characteristic behaviour. Software engineers and interface designers, for example, seem to be unaware of studies user needs and information seeking behaviour by information specialists (e.g. Hewins, 1991; Shaw,1991).

Recently software engineers have begun to work more closely with researchers in human computer interaction to enhance identifying and defining user requirements , using task analysis and inferring information requirements (Johnson and Jones, 1997). Actual user involvement, however has been relegated primary to usability testing conducted during the evaluation stage, after a system has been designed. User requirements solely on the basis of existing tasks does not always result in broad-based, effective user-oriented systems.

An exception to this narrow approach is participatory design. Participatory design was introduced for designing software products jointly by the user as subject expert and the system designer. This approach extends the user's role beyond testing an already designed system or prototype (Floyed et al,1989; trigg and Anderson,1996). Muller(1996) discuss the importance of considering the multicultural constituencies using the Internet. Focusing on Web site design, Shneiderman (1996) notes that , as in any user interface design process, the initial questions facing Web site designers relate to identifying the users and users' tasks.

The web is one of the most revolutionary technologies that changes the business environment and has a dramatic impact on the future of electronic business. The future of electronic business will lead to fundamental changes in the way companies relate to their customers and compete with one another (Slywotzky, 2000).

Rapid proliferation of new information media, particularly multimedia information such as images, video and sound in mainstream computing is providing numerous benefits to different types of users. Multimedia database provides the database capabilities of sharing, accessing and

querying large collections of multimedia data. With these properties, multimedia database have the potential to serve a host of multimedia tools and applications and to provide robust repositories on a network.(S Khoshafian, A.B Baker, 1996)

K-Economy Incubator Melaka incorporation of **Melaka K-Economy Incubator Complex** (PIKE) at Melaka International Trade Center , **Intermediate K-Economy Incubator Operational Centres** (PIP) incubator at Higher Learning Institution and (POP) **Rural K-Economy Incubator Operational Centres** at rural area in the total system .

There are several function of K-Economy Incubator Melaka :

1. To develop commercial creative activities such as IT products and cottage industry such as craft, batik, ceramic, glass, woods craft and iron as well as natural material like pandan .
2. To develop research work from local universities and research institutes for cottage industry – corridor knowledge supply chain for industry.
3. Physical and Virtual Mall for export of products from industry (Melaka International Trade Centre)

The purpose of the study is to determine the HCI characteristic of the Model Incubator Melaka Web Database prototype. This prototype will be using user-based design method, evaluate and tested for the feasibility and usability to enhance 3 items above.

2. The HCI characteristic of the model

The study of human computer interaction (HCI) has central concern of the efficiency and quality of computer-based systems as perceived by the people who use them whether from necessity or enjoyment. The failure of systems analysts and designer to make systems easily and comfortably usable by laymen is the most significant inhibiting factor in the future of the IT industry. (V A J Maller, Editorial, Computing, June 1987)

The discipline of HCI draws its inspiration and technique from a broad range of subjects- psychology, Ergonomics, cognitive science, computer

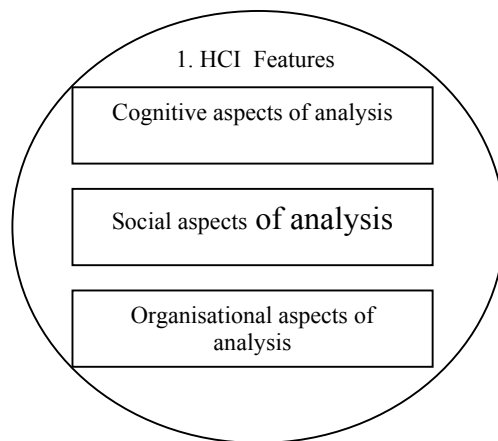
science and software engineering. It is evidently more than a concern for the interface itself. The lessons learned from different domains can contribute to HCI understanding and enhance HCI and also Incubator Melaka Web-Database model.

2.1 Dominant factor in deciding efficiency and QOS

Preece, Jenny (1994) has said that most of the research has until now focused on the cognitive aspects of HCI based on the needs of a single user interacting with a single interfaces. Recent development in system and software design, however have begun to provide much more scope for supporting group working and multitasking.

In the development of Model Incubator Melaka Web Database prototype, the dominant factor in deciding efficiency and QOS of the model is by widened the research to cover another two aspects of HCI by looking at social and organization of human behaviour.

Figure 2.1 : HCI Feature For The Web Database System



Cognitive aspects of HCI can help to upgrade the design of the system by:

- Providing knowledge about what users can and cannot be expected to do,
- Identifying and explaining the nature and causes of the problems users encounter,

- supplying modelling tools and methods to help build interfaces that are easier to use,

Social aspects of HCI can help to upgrade the design of the system by:

- Providing knowledge about the context of use,
- Identifying and explaining how people work together and what sorts of computer systems are needed to support collaborative working,
- Supplying frameworks of social interaction and conversation that can form the basis of HCI frameworks,

Organisational aspects of HCI can help to upgrade the design of the system by:

- Providing models of the processes and structure of organisations,
- Identifying 'trouble spots' in organisations that are preventing computer systems from being used optimally and people from obtaining satisfaction from their work,
- Supplying organisation methods for the design and evaluation of new technologies that are being introduced into work settings.

3.0 A Scenario of user - based design.

In the user-based design, users' task-related information input is solicited at several times during the process:

- Early in the research project to determine the evaluative criteria users apply to the web database they use.
- After a preliminary design of web database to elicit feedback and comments and/or to evaluate certain aspects of the database;
- When the web database is operational to elicit continual feedback and suggestions for addition and/or modifications to the database.

This user based design method which is ‘user centered’ rather than ‘data driven’ will be apply to design two different types element of the system. The two elements are web based interface and web database model as refer to figure 3.0

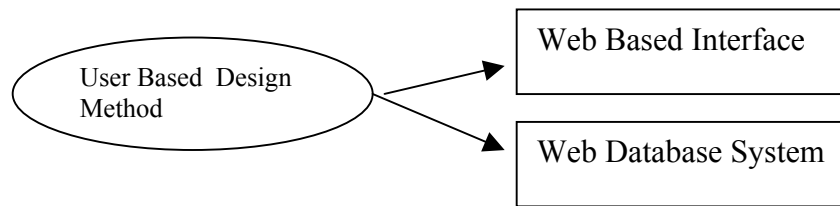


Figure 3.0 : The two different types element of the system apply the user-based method.

3.1 Users' task-related information seeking techniques

Users' task-related information seeking techniques or tools of Thanasankit et al ³ have been employed in the user-based design process for Melaka K-Economy Incubator web-database . In this technique the following information seeking drivers are employed in table 1:

Table 3.1 : Information Seeking Techniques

Information Seeking Techniques / Tools	Purpose
• Interviewing	Acquire in depth details about requirements from

	client. The techniques for constructing interviews are varied, depend on answers, which are looking for. The techniques for interviewing included : questionnaire interview, structured interview, and focus and application interview.
<ul style="list-style-type: none"> • Organisation objectives and goals analysis. 	For understand the purpose of new or updated information systems. These techniques will be employed to understand why the organisation needs new information systems. Objectives and goals analysis to set up and understand the scope and boundary of the new information systems
<ul style="list-style-type: none"> • Scenario-based requirements acquiring. 	This technique is based on listening and understanding the stories, which are told by clients to understand the problem domain and requirements for new information systems. By using for more than one scenario will gain more understanding about interaction between clients and the systems. This technique also encourages clients participation.
<ul style="list-style-type: none"> • Form analysis 	This techniques disregards clients as its prime sources for system requirements. Form are useful for gathering requirements as they are well construct and less ambiguous than narrative descriptions from clients.

3.2 User based design method for the web based interface

The data can be gather through information seeking technique above and determine the criteria the client applies in judging the best practice of the web based interface. Involvement of the client (user) in a continuous way in a stages of decisions making to be considered for web base K-Economy Incubator Melaka interface design .

Eileen G. Abels, Marilyn(1998) were rank and clustered into six major criteria areas in order of important : use, content, linkage, structure, special features, and appearances. These criteria based on feasibility will be translate into web based interface design features and design a preliminary version web based K-Economy Incubator Melaka.

The Function of end-user response will be measure related to function of the six major criteria based on equation bellow:

$$\text{Function \{end-user response\}} = \text{function \{use, content, linkage, structure, search capability, appearance\}}$$

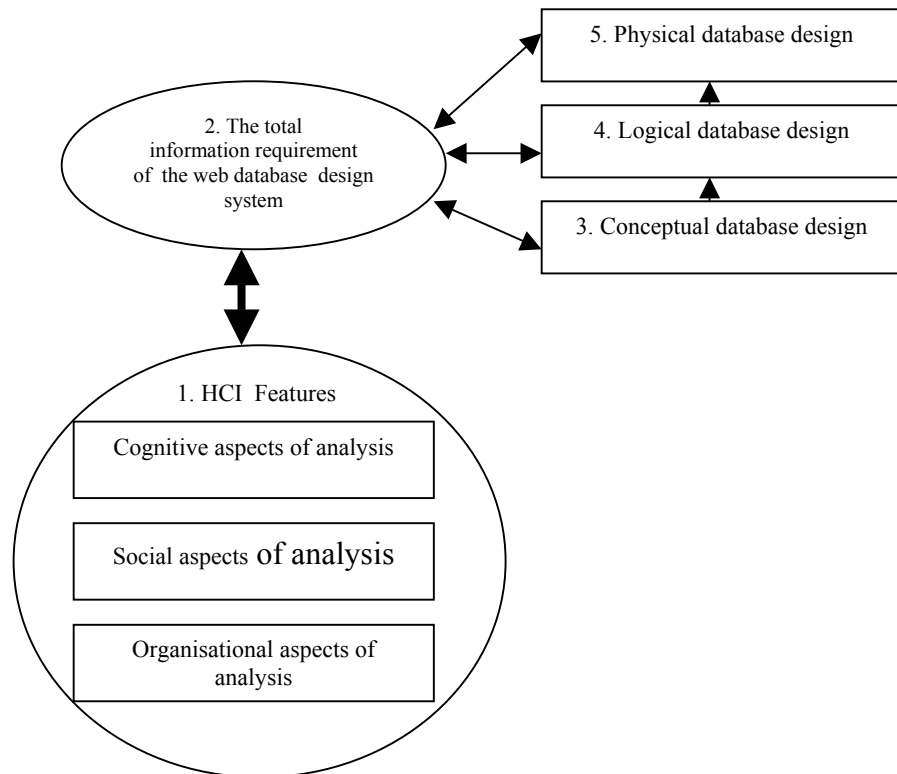
Table 3.2 : Operational definition of user criteria Eileen G. Abels, Marilyn(1998)

Criteria	Definition
Use	The site is easy to use. An overview of the site and appropriate navigation structures are available. Users do not get lost easily.
Content	Useful information. Current information. Concise non-repetitive information. Information not easily or readily found in library collections. Absence of the following: superficial and repetitious information, uninformative content, advertisements, boring text, lack of currency.
Structure	The site displays an intelligible, straightforward organising scheme. Text is broken into appropriate, well-labelled subsections. Large blocks of text are minimised.
Linkage	Pages provide links that integrate relevant information at the site and at other sites. Links provide access to related topics allowing serendipitous discovery of information. All links function; broken and under construction links are avoided.
Search	Search support for the page and site searching are provided. Searching produces a precise list of helpful sites or pages with a minimum of processing time.
Appearance	The site is visually attractive on-screen. Any given page contains few graphics and these are appropriate to page content. Graphics are not essential to site use; if graphics are turned off or a text-only client is used, the site remains fully functional. Pages result in attractive printouts without large dark areas.

3.3 User based design method for web database model

The database design stage of the database application lifecycle for relational database will be applied after analysis of the total information requirement of the web database design system from the HCI feature. The HCI feature from the end user is ongoing, interactive process, responding to changes in the total information requirement of web database design seeking for relational database design stage lifecycle.

Figure 3.3: The User based design method for the Model K-Economy Incubator Melaka Web Database System.



Thomas Connolly, Carolyn Begg (2002) described that the aim of each phase database design stage lifecycle for relational database as bellow:

Conceptual database design –to build the conceptual representation of the database, which includes identification of the important entities, relationships and attributes.

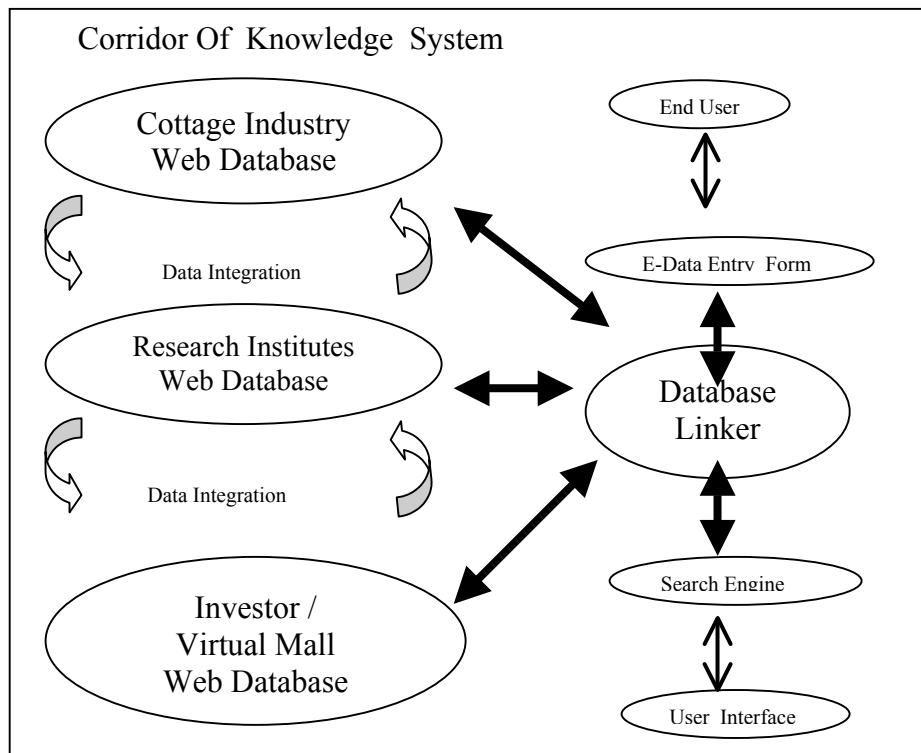
Logical database design- to translate the conceptual representation to the logical structure of the database, which includes designing the relations.

Physical database design- to decide how the logical structure is to be physically implemented(as relations) in the target Database Management System (DBMS).

4.0 The Proposed framework of the Model K-Economy Incubator Melaka Web Database System.

The framework of the model K-Economy Incubator Melaka Web Database System encompasses a few issue such as corridor of knowledge system, Data integration web database, Database linker , The contents development at the end –user.

Figure 4.2 : The Proposed framework of the Model K-Economy Incubator Melaka Web Database System.



a. The Corridor of knowledge system

The Corridor of knowledge systems consists of Cottage Industry Web Database from rural area, Research Institutes Web Database from Institution Higher Learning and Investor / Virtual Mall Web Database at Melaka International Trade Centre. The corridor of knowledge system will receive and distribute knowledge supply chain for cottage industry strategic planning and development.

b. Data integration

K-Economy Incubator Melaka Web Database Resources System will be have data integration and centralised between all web database system to provide end-user with all information needed through database linker.

c. Database linker

The function of Database Linker will be act as the gateway of the data entry using E-Data Entry Form. It's also will allow all the process of data query from cottage industry web database, research institutes web database and investor/ virtual mall web database through the search engine. A method will be needed to provide support to individuals who are interested in seeking information report. Additionally, it was clear that many information report required are common and resolved repeatedly. There will be a need to capture the resolution to the common requirement of the report and make them available online to the end-user. These integrated web database system will improve customer service compare to the traditional manual information provider by human resources..

d. The contents development at the end-user.

Model K-Economy Incubator Melaka Web Database System will be support information resources are regularly updated and maintained. The Web Database System will be designed for the end-user to develop, update and maintain the content resources. These will be increase the cost-effectiveness to update and maintain K-Economy Incubator Melaka Web Database System.

5.0 Conclusion

The paper proposes preliminary discussion of the Model K-Economy Incubator Melaka Web Database System .The concept of the model is designing a data integrated web database which incorporates three kernels which point towards database cells related to the development of Melaka K-Economy Incubator catalysed by Cottage Industries, Investors' Trend and Intellectual Properties resulting from the research work from local universities and research institutes.

The study takes into consideration many factors, which facilitate improvement on human computer interaction (HCI) with regards to efficiency and QOS as perceived by the user.

The user-based design process is an extension of the work of Eillen G. Abel et al ² who designed the web interface. The idea is currently further developed to design a web database where design decisions emanates from the user rather than from the designer view point throughout the process.

The next paper will be discuss more detail on the method of the analysis HCI feature such as social and organization of human behaviour for the model information requirement and translate the HCI features to the relational database design stage lifecycle.

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