Special Seminar: Assessing Emergent Business IT Using the Web of System Performance

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Abstract: Businesses must often decide whether to purchase emergent technology in various states of maturity. Purchasing immature technology can have serious consequences for a business, but equally not purchasing new technology can invoke intangible opportunity losses that are equally costly in the long term. Businesses that don't upgrade their IT can go out of business, but upgrading every time can be equally disastrous

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1. INTRODUCTION

The use of information technology (IT) has become a primary survival factor for business organizations in a global competitive environment. However just as IT can make money for business, it can also lose money, as IT has become a major corporate expenditure.……

WHY A NEW THEORY OFINFORMATION SYSTEMPERFORMANCE?

In the infancy of software development, designers held functionality (what the system does to the world) as the primary goal of software development. This is because at that time, software was just a tool, as say a hammer is a tool. As information systems developed however, they not only became more complex, but also less passive and more active systems in their own right. IS today works with the user not just *for* the user, and now enables a virtual online society that could span the globe. Hence functionality has become an insufficient indicator of information system performance. The main battle against functionality as the prime directive of system designers was carried out by the proponents of usability, human-factors and human-computer interaction, supported by theoretical frameworks such as the Technology Acceptance Model (TAM). These views presented ease of use as equal to usefulness in determining user acceptance of a system [1], e.g. if a web site performs well functionally, but users don't like it and click on to other sites, then it is a failure. Functional failure and usability failure it was noted have the same effect – the system does not run!

2. WHAT IS A SYSTEMS APPROACH?

Nearly forty years ago Bertalanffy noted that certain mathematical formulas repeated across many disciplines like chemistry, physics and biology [2], which used the same formulae to describe completely different things. Hence was borne the idea of studying a "system" without referencing what type of system it was.

Computer systems seem systems in a general sense [3], so a hardware computer system of chips and circuits is also a software system of information exchanges, and today also the human-computer combination [4], e.g. a plane is mechanical, its computer controls are informational, but the plane plus pilot is also a system – a human-computer system. Human-computer interaction (HCI) sees computers as more than just technology (hardware and software). Table 1 summarizes the four computer system levels, matching the idea of an information system (IS) as hardware, software, people, and business processes[5]. The levels are different views

of the same system not different systems, and match disciplines of Engineering, Computing, Psychology and Sociology, respectively.

Table 1. Information system levels

Level	Examples	Discipline
Social	Norms, culture, laws, zeitgeist, sanctions, roles	Sociology
Cognitive	Semantics, attitudes, beliefs, opinions, ideas, morals	Psychology
Information	Software programs, data, bandwidth, memory, processing	Computing
Mechanical	Hardware, computer, telephone, FAX, physical space	Engineering

3. WHAT DOES THE FIGURE REPRESENT? [10pt, capitalized, bold]

In the web of system performance (Figure1):

- Web area represents system performance in general, so a bigger the area means a greater system performance potential.
- Web shape represents the goal criterion weights, which vary with the environment, e.g. a threat environment may mean security has more weight.
- Web lines represent goal tensions, imagined as connecting rubber bands that can pull back one performance dimension as another increases.

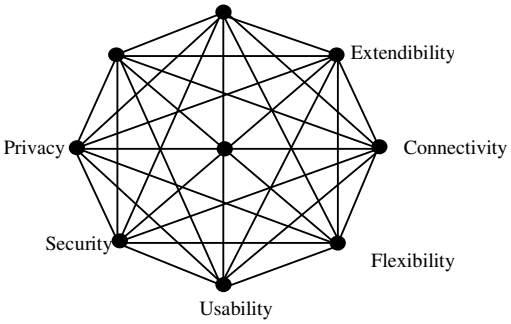

Figure 1. The web of system performance

4. HOW ARE THE DIMENSIONS EDFINED?

$$\text{Min } C = \sum_{i=1}^{N}\sum_{t=1}^{T}(h_i y_{it} + s_i \delta_{it}) \qquad (1)$$

Ideas seem similar to Alexander's synthesis of form.

Yes, this model merely applies Alexander's theory to IS. Over forty years ago Alexander noted the "tension" problems of physical world system design [5]. Since then, his architectural pattern theory has been applied to information systems (IS) and object orientated (OO) design. Design tensions arise when physical systems composed of parts have multiple contextual demands. For example, in a simple machine such as a vacuum cleaner, each part, like the engine, can be designed for its specific function by using the best materials. Specialized materials allow a powerful engine, with more suction, but this may also create more noise, heat and weight, making the vacuum harder to use. Part specialization may also mean more complex joints that fail easier, reducing reliability. Finally, customizing parts can increase manufacturing material diversity, raising costs.

Is WOSP useful for system evaluation as well as system design?

Yes, it can be used as a process-oriented design framework for system developers, or a product-oriented evaluation framework for system users/buyers. The common concept of system performance connects the two fields: generally designers want to produce high performance systems, and likewise users want to buy them.

Reason A

Design then, is the art of synthesizing "forms" to reconcile contradictory contextual demands, e.g. vacuums that are both lightweight and powerful. "Patterns" are generic solutions to design conflicts that repeat: "*Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that*

problem." [6]. If problems repeat, it makes sense to re-use successful solutions. The logic applies as well to IS design as it does to physical design.

5. CONCLUSIONS

Supply chain coordination has become the key strategic area that has direct impact over the success of any enterprise in today's highly competitive business environment.

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