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Abstract

This paper argues that the complementary perspectives of systems-rationalism and segmented-institutionalism (Kling, 1980) can be used to inform requirements analysis for information technology (IT). This paper addresses the issue of informing requirements analysis by using these complementary perspectives to examine expectation failures of a recent attempt to provide technology-mediated post-secondary education, the Western Governors University (WGU). These expectation failures provide an opportunity to explore why the factors contributing to these failures were overlooked in the process of requirements analysis for WGU.

Introduction

While there is no universally agreed-upon framework with which to analyze computing requirements, there is widespread agreement that requirements analysis is best served by a complementary view of the technical as well as the contextual aspects of these computing requirements. In light of this, we argue that a taxonomy originally developed for empirical analyses of computing can be adapted for use in requirements analysis. The original taxonomy is the outcome of a literature survey focused on empirical studies of computing spanning thirty years (1950-1979). This literature survey resulted in the distillation of two broad perspectives: systems-rationalism and segmented-institutionalism (Kling, 1980).

It is important to note that these are not mutually exclusive perspectives. Together these complementary perspectives provide a more complete view of the factors influencing the development of computing.

Briefly, the systems-rationalist perspective can be characterized by an emphasis on the more positive aspects of the potential and possibilities of information technology especially with respect to economic or organizational efficiency. In addition, this perspective focuses on the computer user while placing less emphasis on broader issues of context. The segmented-institutionalist perspective can be characterized by a more critical view of information technology while emphasizing values such as social equity. In addition, this perspective favors a more detailed view of social behaviors while broadening the context of information technology use and influence (Kling, 1980).

The expectation failures

This paper will focus on findings about the following three expectation failures which highlight two predominate themes of the virtual university, namely, providing greater access and decreasing costs.

a) *Low enrollments:* Officials at Western Governors University (WGU) anticipated an overwhelmingly positive response to greater access afforded by temporally and geographically independent classes. Students from all over the world and especially those residing in WGU coalition's area were expected to quickly fill the classes made available via multiple delivery modes. WGU anticipated a 5000-student enrollment when its 'virtual doors' opened in September, 1998. Instead, only 10 people enrolled and a total of 75 people made inquires (Noble, 1998). This paucity of enrollment occurred despite high-profile national and regional publicity both in print and online.

b) *High costs:* Another expectation is that the use of information technologies will reduce the costs of developing courses. According to a high-ranking university administrator at a traditional university, it costs four to five times more to develop an online course than its equivalent print-based course. For example, development costs for a print-based course are typically $5,000 while development costs for an equivalent online course are $20,000 to $30,000. Economies of scale occur when there is an average enrollment of thirty to forty students. Enrollment for online courses is often less than ten students and more often, zero. (Field Interview, 1998).

c) *Low revenues:* There is also the expectation that the WGU (and virtual universities, in general) will provide a sustainable source of revenues to compensate for the diminishing funds available for post-secondary education. (For example, many states are diverting funds to build

more prisons.) Online courses are touted as a means of generating additional revenues for higher education. The reality is that with some notable exceptions such as the University of Phoenix, almost no virtual university has realized a sustainable source of revenue.

Complementary perspectives

The systems-rationalist perspective of tradeoffs highlights arguments such as efficiency, productivity, 'better management,' and economic substitution, i.e. 'meeting a need' (Kling, 1980).

The segmented-institutionalist perspective of tradeoffs highlights issues such as social worlds, roles, legitimacy, power, social conflict, social meanings of dominant actors (Kling, 1980).

These two perspectives represent a type of figure/ground problem: While back grounding the social issues, the systems-rationalist perspective foregrounds issues with social consequences. And while the segmented-institutionalist perspective foregrounds issues dealing with social aspects, it backgrounds economic issues.

From a systems-rationalist perspective, the expectation failures can be interpreted as the product of failed tradeoffs analysis in determining the broad requirements for WGU. And while it is possible to attribute these expectation failures to startup conditions, this provides only a partial explanation. The planners for WGU no doubt performed a tradeoffs analysis focusing on systems-rationalist issues. This is understandable in light of the powerful economic incentives created by the following conditions: the anticipated surge in the numbers of post-secondary students, commonly known among the higher education community as 'Tidal Wave II'; the astronomical construction costs for more campuses to accommodate these students; and the lure of increased efficiency resulting from the economies of scale seen in corporate arenas as well as the administrative side of post-secondary education.

Based on a systems-rationalist analysis of tradeoffs, increasing revenues through cost reduction seems viable. The University of Phoenix (UoP) is an example of this type of alternative. WGU bears a striking resemblance to the University of Phoenix (UoP) which increases revenues by avoiding overhead usually associated with traditional campuses. For example:

- neither constructs campuses and therefore have none of the associated overhead of building or maintenance;

- neither have a faculty and therefore none of the associated overhead of providing benefits, support staff, or office space;

- neither have a library per se and therefore none of the associated costs of building, maintaining, and housing collections;

- and both focus on a narrow range of popular programs such as business or computing and thus avoid the cost of supporting less popular offerings such as Greek Classics.

However, the enrollment figures demonstrate that even the careful analysis done by WGU planners under-emphasized crucial issues. The segmented-institutionalist perspective enables us to broaden the scope of the meaning of 'cost' from the more narrow view of costs in terms of dollars. It also enables us to raise questions like: costs in what form? costs to whom? is this a zero-sum game where benefits to one mean losses to another? who benefits? who loses? When we begin to address these questions, the possibility of low enrollment is neither surprising nor unlikely.

Based on a segmented-institutionalist analysis, WGU's cost reduction plan actually increases the costs not readily measurable in dollars for its students. These costs, broadly categorized as coordination costs, make WGU less attractive to prospective students. The potential WGU student bears the brunt of these higher coordination costs in terms of time and effort required to deal with support structures that are currently transparent to the students enrolled at a traditional post-secondary campus. Examples of these structures include the registrar, articulation agreements, and student computing services.

a) Registrar When a student at a traditional post-secondary campus needs a copy of an official transcript, she simply contacts the campus registrar. Since her classes are offered by a single provider (her campus), she can use this single point of contact to obtain a transcript for all of the classes she has taken. It is the registrar rather than the student who bears the coordination costs of obtaining information from individual classes and creating a single document. In contrast, WGU courses are offered by multiple providers. Therefore, when a student needs an official transcript, he is required to contact as many registrars as the number of different individual provider(s) he has used. It is now the student who bears the coordination costs of collecting official transcripts for all the classes he has taken.

b) Articulation: WGU offers its students the option of competency-based evaluation. If a student wants to transfer credit for WGU competency-based courses to a post-secondary campus that uses the more traditional

methods of evaluation based on letter grades, translating competencies into grades is another type of coordination cost. (Recall, at one time, University of California, Santa Cruz, (UCSC) chose not to provide letter grades for students. When these students wanted to transfer to other institutions, they faced considerable articulation challenges. It is illustrative to note that UCSC now provides letter grades for its students.)

c) Student computing services: If something goes awry with a WGU student's computing environment, the onus of technical support falls to the individual student. There is no transparent computing support just an email message away, no possibility of moving work to another machine and continuing work on the project at hand. In addition, the individual student is responsible for obtaining (and more importantly, maintaining) the appropriate hardware, software, internet service provider required for each course. The student is responsible for making the necessary phone calls or trips to a nearby retail outlet to resolve the problem. Anyone who has spent hours trying to determine what is often an elusive incompatibility between hardware and software has an appreciation for the technical support costs.

In light of the additional coordination costs as illustrated by the transcripts, articulation, and student computing services, it is not surprising that students are carefully considering their alternatives.

The type of analysis made possible by complementary perspectives helps provide a richer explanation for these expectation failures and demonstrate the value of a prospective as well as a retrospective application of complementary perspectives.

Conclusion

The set of 'perfect' requirements does not exist and will never exist. The best that we can obtain is a suboptimal set of requirements based on incomplete information. However, using the complementary systems-rationalist and segmented-institutionalist perspectives to highlight important and often hidden problems can inform requirements analysis and diminish the likelihood of overlooking critical factors. The discussion of several expectation failures of WGU illustrates the utility of applying these perspectives in tandem.

References

Field Interview, conducted by the author, 1998.

Kling, Rob, "Social Analyses of Computing: Theoretical Perspectives in Recent Empirical Research," *Computing Surveys* (12:1), March 1980, pp. 61-110.

Noble, David, "Digital Diploma Mills, Part III, The Bloom Is Off the Rose," Nov. 1998, http://commons.somewhere.com/rre/1998/RRE.Digital.Diploma.Mill.html

Western Governors University, http://www.wgu.edu