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"Rational" Models and Values in Contentious Situations: A Case Study of a University Budgeting Process

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ABSTRACT

This paper describes the value-laden and contentious budgeting process in a large university system in the southeastern US. Budgets are computed using the "Flying Horse Model," based on historical enrollment in terms of semester credit hours, a "productivity factory" for faculty in each college and national average salary by college. The model is intended to make the process more "rational" and outcomes more equitable. A new version of this model is being developed following the knowledge management system design principles of Richardson, et al. (in press) which emphasize ethical issues. The model also illustrates new decision support software designed to enhance communication among stakeholders by better visualization of model results.

Keywords

Decision support, budgeting, financial planning, spreadsheets, accounting information systems

INTRODUCTION

The budgeting process in university systems is a value laden activity often steeped in negotiation, compromise and political processes. It affects many stakeholders as it determines the funds available for faculty salaries and other expenses and influences class sizes, laboratory facilities, and the quality of education that can be provided to students. These in turn affect the faculty, the students themselves, their families, employers and society in general.

This paper describes how one university has attempted to make the process more "rational" through the use of a rather simple model that is used by the provost to compute the number of faculty lines and the budget for colleges within the university. A new version of this model is being developed roughly following the guidelines for knowledge management system development described by Richardson, et al. (in press). Space limitations preclude a discussion of these guidelines, which are summarized in Table 1. We simply point out here that the guidelines integrate Churchman's (1971) Singerian inquiring system with Habermas's theory of communicative action (1984, 1985) and emphasize the need for open communication among various stakeholders in contentious processes such as university budget preparation.

We illustrate the model for the college of business administration (COBA). The dean of COBA uses a variation of the university model (the "Flying Horse Model") to allocate faculty lines and funds to the departments. The general model and the COBA model are described in the next section and a discussion of the budgeting process follows. Then we show how this model has been implemented with the Planners Lab©, a new software package that is intended to enhance communication among various stakeholders by improving visualization of model results and "what if" analyses. Finally, we discuss some lessons learned regarding the use of decision support and visualization tools in contentious environments such as this.

THE FLYING HORSE MODEL

The Flying Horse model is based on two simple calculations. The first calculation determines the number of faculty positions for the various colleges of the university. It is based on semester credit hours (SCH) for each college for the past year split out by lower division, upper division and graduate courses, and "productivity factors" for each of these course groups. The productivity factors are ratios of SCH to full time equivalent (FTE) faculty. For a college they are determined by benchmarking data for colleges in other universities in the state. For example, assume there are 3 other colleges of business in the state, and they generate, 850, 1000, and 1200 SCH per FTE in lower division business courses. Then the productivity factor in the model might be set at 1000, a "typical" number.

Faculty lines are determined by dividing SCH in each course group for each college by the corresponding productivity factor. Once the number of faculty lines has been determined, it is multiplied by the average salary nationwide for faculty in similar colleges. This gives the dollar figure that is allocated to the college for the academic year.

Definition. *A Churmanian-Habermasian knowledge management system (CHKMS) is a purposeful, ethical and adaptable information system that creates exoteric knowledge through communicative action and provides a link between knowledge and action in an organization or community of practice.*
Design Principle 1: The CHKMS designers, the design process and the CHKMS itself should adhere stringently to ethical and moral principles, for example, those espoused by professional organizations, such as the Association for Computing Machinery [3], in their codes of ethics and professional conduct.
Design Principle 2: A CHKMS should be a learning system itself and exhibit sustainability by being easily adaptable to changing environmental conditions.
Design Principle 3: CHKMS success measures should be developed for specific applications, based on information system and organizational memory success measures existing in the literature and in the organization.
Design Principle 4: The client of the CHKMS should include all salient stakeholders.
Design Principle 5: The decision maker should be expected to manage the system in such a way as to increase the measure of performance to the client.
Design Principle 6: The CHKMS should do minimal harm.
Design Principle 7: *The designer should seek a design that encourages the decision maker to use the system in a way that maximizes the value to the client, broadly defined.*
Design Principle 8: The designer must ensure that the CHKMS and the knowledge it handles, are used to enhance the dignity of humankind, and choose only those clients and decision makers who also abide by this imperative.
Design Principle 9: Design in a CHKMS environment is more than simply participatory, rather the client, the decision maker and relevant stakeholders are all swept into the design process along with the CHKMS design staff members themselves, who use the elements of the ideal speech situation and discourse ethics, to create a situation in which designers, clients and decision makers act as one.
Design principle 10: The theory of communicative action and discourse ethics should be employed in the design of CHKMS to create an environment in which goals of participants are mutually compatible.
Design Principle 11: Each system component should shaped in relation to the other components and to the system as a whole, so as to co-produce the measure of performance (that is, contribute to the creation of exoteric knowledge) and should not be constrained by organizational boundaries in doing so.
Design Principle 12: The CHKMS should include a mechanism for supporting Habermas' ideal speech situation and discourse ethics for guaranteeing the validity of the knowledge created in the CHKMS process.

Table 1: Churchmanian-Habermasian KMS definition and design principles

Mathematically, for college i this can be shown as:

$$Lines_i = \sum (LDSCH_i / LDPF_i) + (UDSCH_i / UDPF_i) + (GradSCH_i / GradPF_i)$$

$$Budget_i = Lines_i * AvgSal_i$$

where:

$Lines_i$ = Faculty lines for college i,

$LDSCH_i$ = Lower division semester credit hours for college i,

$UDSCH_i$ = Upper division semester credit hours for college i,

$GradSCH_i$ = Graduate semester credit hours for college i,

$LDPF_i$ = Lower division productivity factor for college i,

$UDPF_i$ = Upper division productivity factor for college i,

$GradPF_i$ = Graduate productivity factor for college i,

$Budget_i$ = Dollar amount of the budget for college i, and

$AvgSal_i$ = National average salary for faculty in colleges of type i.

After the budgets for the various colleges have been established, the deans allocate funds to their departments. We illustrate this process by showing how the dean of COBA computes allocations. The COBA dean uses essentially the same formula as that above to determine lines, except that departmental semester credit hours are substituted for college data. Since doctoral students are supported by the Dean's office and are expected to teach after their first two years, the lines for each department are reduced by 1/3 of its Ph.D. students. Finally, the budgeted dollar amount is 90% of the average salary for the department times lines. (The Dean's office keeps 10% for its administrative costs.) This gives the following for department i:

$$Lines_i = \sum (LDSCH_i / LDPF_i) + (UDSCH_i / UDPF_i) + (GradSCH_i / GradPF_i) - (0.33 * PhDi)$$

$$Budget_i = 0.9 * Lines_i * AvgSal_i$$

A PLANNER'S LAB APPLICATION

An application of this model has been developed in the Planner's Lab[1] (PL) software (GRW Studios, 2005). This software has excellent facilities for visualizing the results of financial planning models and spreadsheet models such as those of Excel©, which can be readily imported. (Wagner, et al., in press; Richardson, et al., 2005). A screen shot from a PL model with the equations for the business school is shown in Figure 1. Notice that the equations are written in algebraic form rather than in the row-column kind of references that are used in spreadsheets. It is easy to view and edit equations in this manner. Also, equations are arranged into hierarchical nodes. In Figure 1 we have nodes for the university, for colleges, and for departments in the business school). The Column Statement at the top of the screen defines columns for the years 2003 through 2008. Most of the data (fictitious) is in the input data node (contents not shown), but the business school's semester credit hours are included here for purposes of illustration. Lower division semester credit hours start at 100,000 in 2003 and increase by 7% per year (PREVIOUS * 1.07).

[1] The software is available to universities free of charge for educational and administrative use. For information, visit http://www.grwstudios.com.

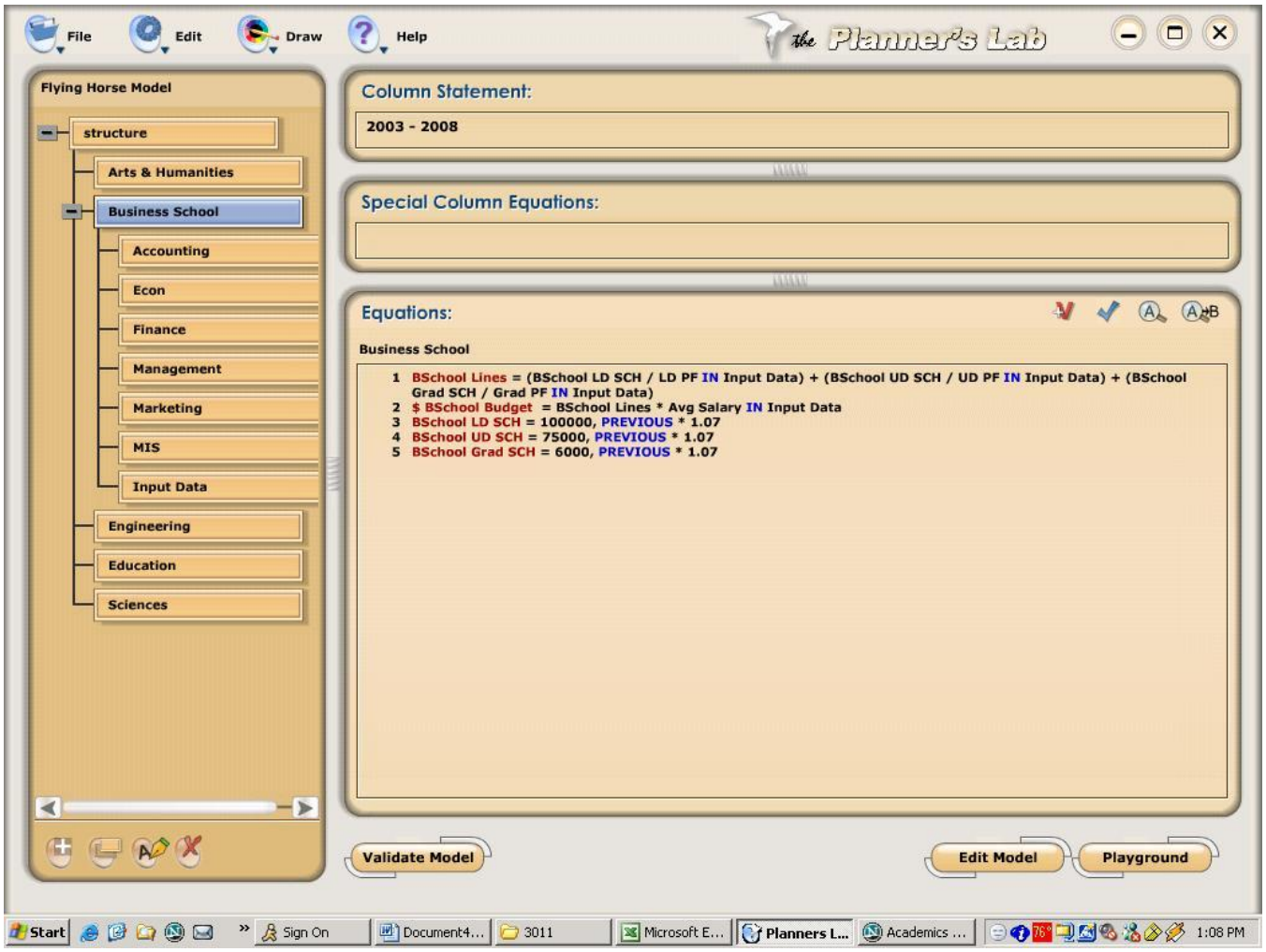
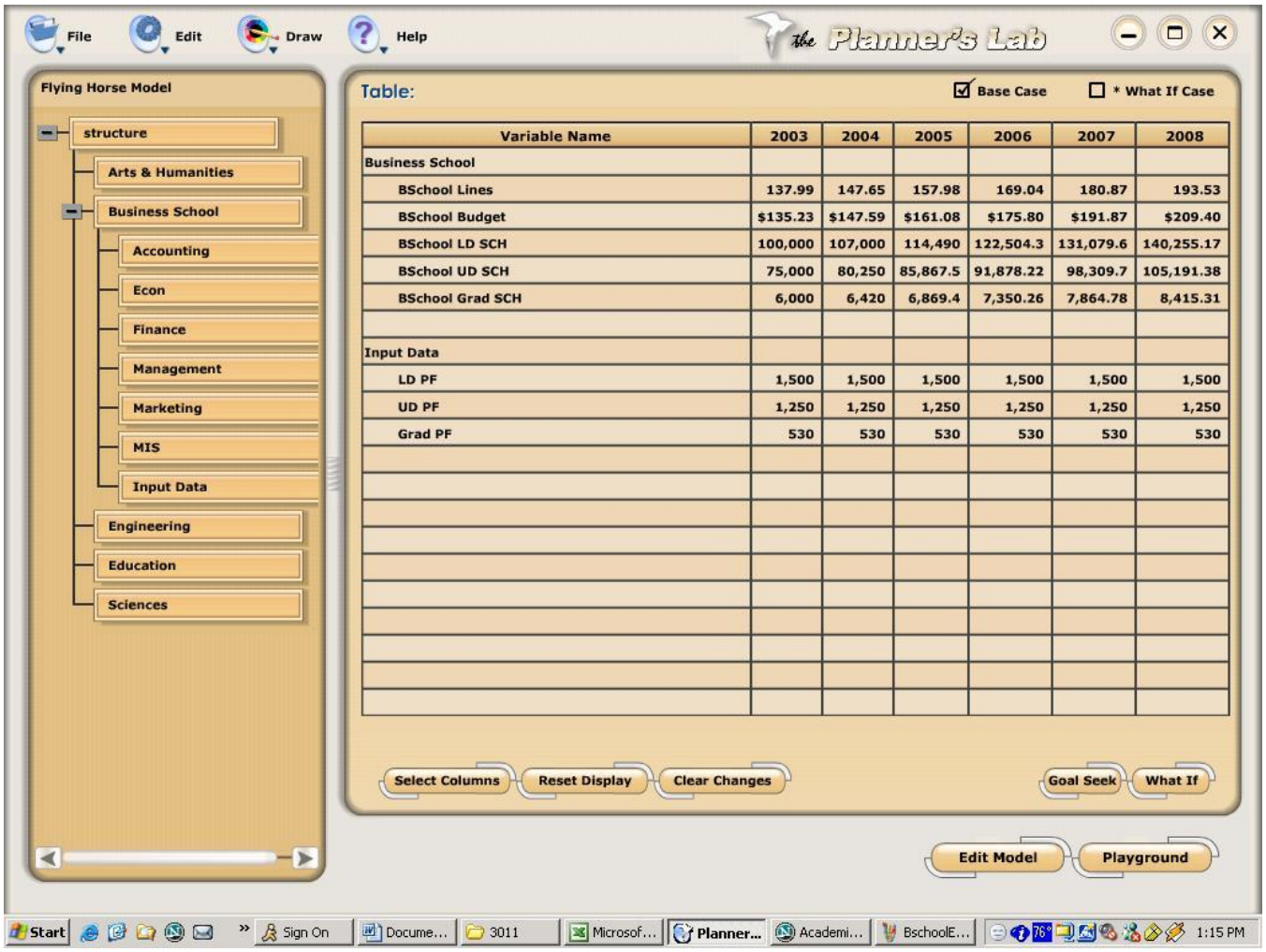


Figure 1. The Flying Horse Model Equations for COBA

Additional input data is shown in Figure 2, which is the tabular form of display for model results. This figure also shows the number of faculty lines, the budget (in $100,000) for the college for each of the 6 years, and the productivity factors for COBA.

WHAT IF ANALYSIS

In 2005, the provost's office indicated to the dean of COBA that the productivity factors for lower and upper division courses were being raised for the college, in effect inducing a budget cut and fewer faculty lines. Rather drastic increases were proposed, based on bringing the "efficiency" of COBA up to that of the largest school in the state. The COBA administration vigorously opposed the increases, arguing that COBA was one of the most efficient in the state in terms of dollars and that it couldn't achieve the economies of scale required with the current student population. The draconian increases were not imposed, but increases of approximately 20% in lower division classes and 10% in upper division classes were negotiated.



Variable Name	2003	2004	2005	2006	2007	2008
Business School						
BSchool Lines	137.99	147.65	157.98	169.04	180.87	193.53
BSchool Budget	$135.23	$147.59	$161.08	$175.80	$191.87	$209.40
BSchool LD SCH	100,000	107,000	114,490	122,504.3	131,079.6	140,255.17
BSchool UD SCH	75,000	80,250	85,867.5	91,878.22	98,309.7	105,191.38
BSchool Grad SCH	6,000	6,420	6,869.4	7,350.26	7,864.78	8,415.31
Input Data						
LD PF	1,500	1,500	1,500	1,500	1,500	1,500
UD PF	1,250	1,250	1,250	1,250	1,250	1,250
Grad PF	530	530	530	530	530	530

Figure 2. Tabular Display of Selected Inputs and Outputs

This was followed by a second meeting with the primary budget officer from the provost's office and COBA faculty in which the dean presented details of the Flying Horse model and its ramifications for the college. The dean suggested that some of the data in use by the provost's office might be flawed and that it failed to consider efficiency in terms of dollars.

The results of these changes are shown graphically in Figure 3. One of the outstanding features of the PL software is the capability of doing what if analysis by manipulating trend lines directly. You can grab an entire line or points on a line with the mouse and drag them up and down and the target lines will adjust accordingly. The dashed lines for goal and what if variables correspond to the old productivity factors. The solid lines correspond to the new ones. The drop in the budget and faculty positions from 2005 to 2006 is clear in these trend lines.

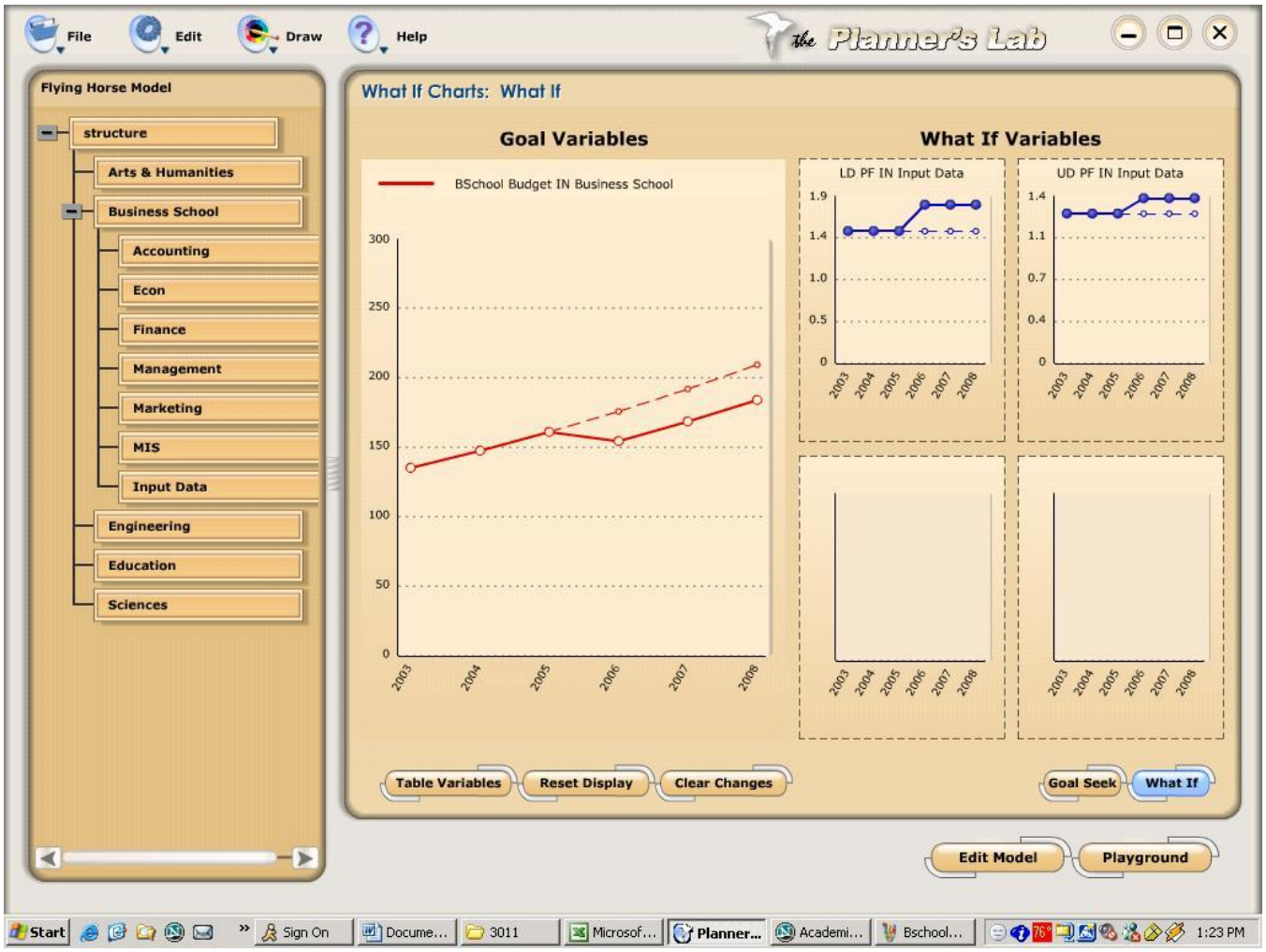


Figure 3. Trend Lines Showing The Effects Of Increased Productivity Factors.

The situation is even worse for the MIS Department. As has been the case with many other MIS programs, enrollment began to decline a few years ago.. The trend for the MIS Department's budget is shown in Figure 4. This reflects a decline of 12% per year since 2003. In fact, the department has lost faculty lines as a result and has not been allowed to fill positions as faculty attrite. Of course, this has had a very demoralizing affect on the faculty in the MIS department. Options such as merging the department with management or accounting were being discussed in the hallways. The dean of COBA met with the MIS faculty to reassure the department that if enrollments leveled off that the department would remain intact.

A variety of stakeholders have been involved thus far in the development of the Planner's Lab version of the Flying Horse model. To date, most of them have been administrators, faculty and students in the college of business. As the model is expanded input from people in other colleges and the provost's office will be sought.

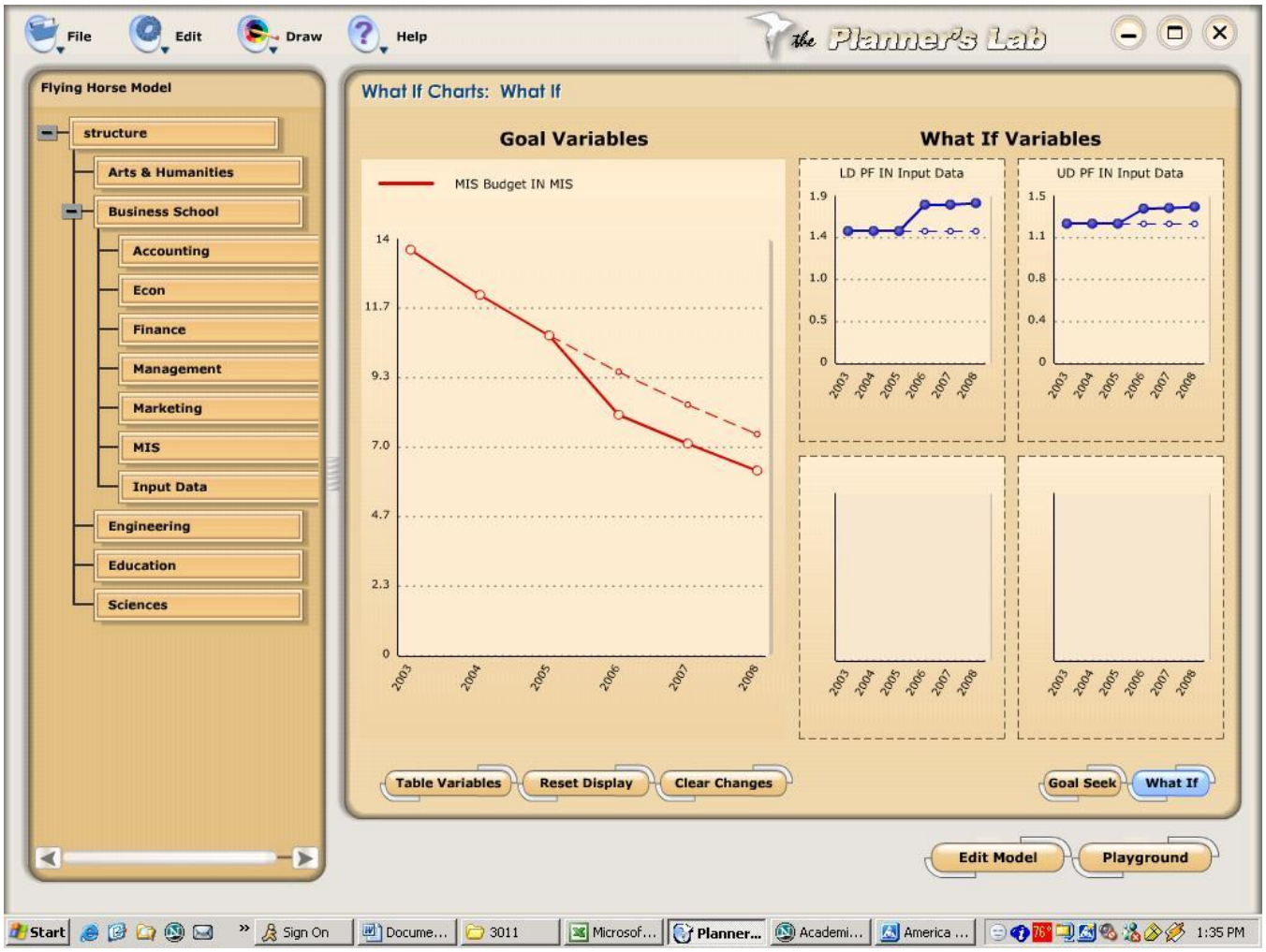


Figure 4. Budget Trend for the MIS Department

CONCLUSION

Budgeting can be a highly politicized process in any type of organization, but is problematic in universities because objective measures for university goals are not available. The Flying Horse model represents an attempt by one university to make the process at least appear to be more rational. The equations that form the basis of the model are simple and based on semester credit hours, productivity factors and national average salaries. Despite an air of rationality, there is still a great deal of bargaining, negotiation and politicizing going on. With the increase in the productivity factors, he current environment for the college of business in general, and the MIS department in particular is not good. The "rationality" of the budgeting process is being questioned. It is not clear whether a model such as this is improving the situation. That is difficult to know, since there is not an alternative to compare to.

The Planner's Lab is a convenient environment for implementing planning models such as the Flying Horse. Equations are entered in an algebraic style that is easy to edit, thereby reducing errors. What if analysis with trend lines is engaging and very simple to perform. This format also makes it easy to visualize changes as what if variables are manipulated. However, it is too early to tell if this form of the model helps stakeholders to visualize the effects of changes in things such as productivity factors on their situation. Nor is the effect on communications clear. We expect that clarity regarding these issues will increase as the project progresses.

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