

EVALUATION AND ANALYSIS OF CLASS SCHEDULING SOFTWARE: AN INFORMATION MANAGEMENT CASE

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ABSTRACT

This paper provides a fictionalized case description of an information technology (IT) decision at a regional state university (SU). The IT decision of interest is the acquisition of classroom optimization software for making classroom assignments across the campus. The case describes the information that is available to senior IT managers at the university level and asks the student to characterize the information needed, to describe the alternatives available and to make recommendations.

Keywords: Information Technology Strategy Teaching Case

CASE INTRODUCTION TO THE STUDENT

Carefully read and study the information provided in this case. The case is based on a real-world decision at a regional state university with some alterations to provide anonymity. Please take the point of view of the Chief Information Officer of the university. Your responsibility is to analyze the information that is given and to develop a recommendation for the President's Executive Council comprised of the senior executives of the university. In this type of situation the President has asked that agenda items be accompanied with answers to the following questions.

1. What alternatives are available in this situation?
2. What criteria or metrics are appropriate measures for comparing the alternatives?
3. Compare and contrast the available alternatives using the metrics above.
4. Develop a recommendation for the President's Executive Council.
5. Describe the demonstrable benefits to the institution, along with likely obstacles to implementation of the recommendation.
6. What additional information is needed before making a final decision?

Report from Dr. Works regarding the SchedulePro Software

This evaluation is provided in response to a request from Thelma Oakes, Associate Planner at SU Facilities, Planning, Design and Construction Services. In a meeting attended by James Works, Associate Professor of Quantitative Analysis and Thelma Oakes, Ms. Oakes indicated an interest in having Professor Works evaluate the SchedulePro software to understand the potential benefits of campus-wide implementation, along with potential obstacles. A follow-up meeting was attended by James Works, Thelma Oakes, Stephanie Styles (Dean of the College of Business) and Brian Hill (Director of Facilities Services) to discuss the participation of Dr. Works in evaluating the SchedulePro classroom scheduling software. Subsequent to these meetings Dr. Works studied the software and evaluated the potential benefits and obstacles associated with implementation of the software at SU as detailed in his report that follows.

SchedulePro 6.0 is a general purpose scheduling program that can be used by educational institutions to allocate physical classroom resources, along with faculty and other supplementary resources to regular course sections, and also ad hoc campus events, mid-term and final exams and miscellaneous room requests. To some degree the functionality provided in SchedulePro overlaps features already available at SU provided by the campus-wide Enterprise Resource Planning program (ERP). SchedulePro was installed with the intent of more efficiently utilizing the campus physical infrastructure, particularly instructional classrooms. The following sections will detail the added functionality provided by SchedulePro as compared to ERP, the potential for campus-wide benefits available through SchedulePro implementation, as well as the possible organizational resistance to SchedulePro.

Executive Summary

This analysis and evaluation provides a look at the features and functionality of SchedulePro, an academic classroom scheduling product, giving consideration to workload and applicability to Facilities Services, The Registrar's Office and the Academic Departments. General features of the software include the ability to query current classroom utilization, to model hypothetical usage scenarios, to optimize the assignment of classrooms within day/time constraints and to provide detailed and summary classroom utilization reports.

This analysis concludes that SchedulePro would provide improved usability and transparency regarding classroom usage across the SU campus, but cautions that successful campus-wide implementation would likely require cultural, organizational and procedural changes. Due to the broad interest and dependence on physical space and access to physical space this issue is likely to generate intense interest from many constituents at SU.

Organizational Considerations

While primarily an evaluation of the SchedulePro software functionality this analysis will by necessity discuss organizational issues associated with campus-wide implementation. This discussion will use the department head as the position of focus, but other campus positions, departments and units will be discussed as appropriate. Perhaps no other topic is as far reaching and as inclusive regarding potential for interest and attention as the assignment of classrooms and the creation of the academic schedule. All major campus units including Academics, Administration and Finance, Student Affairs and Research and Creative Activity have a powerful vested interest and large vocal constituencies that are impacted by the academic schedule, consequently this issue is of great interest to a very broad audience.

College of Business

The College of Business will be used in this analysis as the example academic unit for the fall semester. All SchedulePro functionality regarding academic scheduling will be discussed and evaluated, however large segments of the SchedulePro functionality including event scheduling, resource scheduling, pricing, revenue management, accounting, invoice generation, accounts payable and messaging will not be evaluated. These features may be of potential benefit to SU, but are not directly associated with the academic schedule; consequently their potential application at SU would have to be evaluated by other relevant departments.

Note that the College of Business (COB) does not necessarily provide an adequate representation of all campus academic scheduling requirements since they do not have scientific, artistic, biological or medical labs or equipment, consequently it might be accurate to suggest that an evaluation within the

COB of the SchedulePro software will cover only the basics. Conclusions may not be generalizable to other campus academic units.

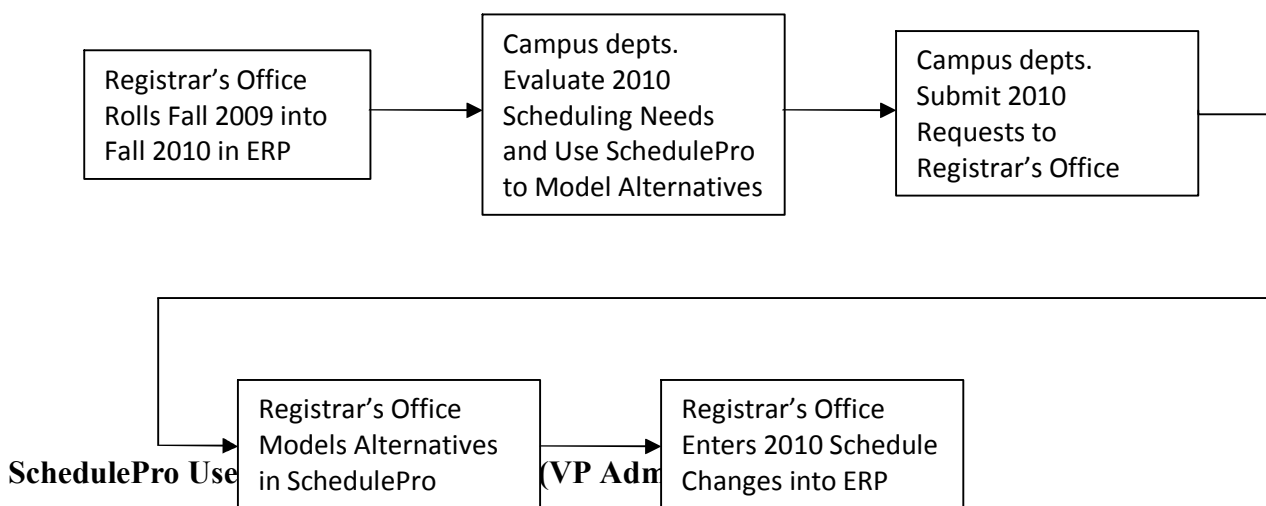
In the Fall semester COB will offer 144 sections across five rubrics, actg, bus, fin, mgmt and mktg taught by 24 tenure track, 1 visiting and 26 adjunct faculty. This scheduling example using the COB as the unit of analysis is robust enough to evaluate the core functionality of SchedulePro. Assumptions regarding section preferences, faculty preferences, room preferences, etc. will be made based on knowledge currently available. Potential information collection systems and processes will be described, and data used will be illustrative of actual data, however to prevent mass hysteria faculty will not be polled regarding their actual preferences.

Semester Academic Scheduling w/SchedulePro

The first step in using SchedulePro is the periodic upload of ERP data regarding classroom assignments to course sections. However, many months prior to this upload all academic departments submit draft schedule/classroom requests to the Registrar’s office. The Registrar’s schedule creation process starts by rolling the prior year ERP schedule forward into the planning year. Academic units then submit request for changes in the upcoming year by editing the past year’s schedule. Existing processes indicate that the Registrar’s office must have a primary role in a campus-wide SchedulePro implementation; however there is a chicken and egg problem regarding which comes first the SchedulePro schedule which is uploaded into ERP or the ERP schedule which is uploaded into SchedulePro. It will be assumed that ERP will continue to be the primary data and information planning/scheduling system, consequently SchedulePro functionality will only be evaluated as a complement or addition to ERP.

If SchedulePro were fully implemented across campus the Fall 2010 planning cycle would include SchedulePro use by the Registrar’s office, and by many other campus administrators and offices. The details of this potential use will be provided in the following sections. The flow chart below provides a graphical overview of the relationships between ERP and SchedulePro in the academic planning process.

Figure 1: Overview of SU Academic Scheduling Process



Before attempting to use SchedulePro to support academic scheduling, descriptive data regarding all campus rooms and resources must be entered. This data entry process has already been completed by SU Facilities Services; future edits/updates will be required, particularly as classroom characteristics are

improved. Campus rooms are individually entered as new records in the SchedulePro database with characteristics (fields) including among other things: photos, configurations, pricing, notifications, partitions, sharing, capacity, type, technology, other features, campus, blocking and availability. The SU implementation of SchedulePro was obtained under the auspices of Facilities Services to improve campus classroom utilization, installed by computer support personnel in Facilities Services, and is currently supported by their staff. If implemented as a campus-wide resource the current circumstance for funding, housing and support of SchedulePro should be reviewed and discussed by all affected campus units and departments.

A brief introduction to the SchedulePro features for room description will be provided. The first screen shot shown below in Figure 2. displays the drop-down of the configure menu including the building information, room type and room features options. Selection of the menu items for building information, room type and room features will open separate scrollable dialog boxes for adding and/or deleting buildings, room types and/or features as shown in Figure 3 which follows below.

Figure 2. SchedulePro Configure Menu including the Building Information, Room Feature and Room Type Options (Available with Full Paper From Author)

The initial entry of all campus buildings, room types and room features, along with other required data such as campuses and campus regions was provided by Facilities Services. Future update/edit of these data listings would be shared by both Facilities Services and the Registrar's office as SchedulePro administrators. Following the creation of lists of campus buildings, room types and room features, every individual room on campus was entered using the Room dialog as shown below in Figure 4. Rather than get mired in the details of the creation of a room suffice it to say that all campus rooms have been entered into SchedulePro. Entering the physical inventory of campus rooms provides the setting for application of SchedulePro to the creation of academic schedules which will be discussed in the following sections.

Figure 3. The SchedulePro Building Information, Room Type and Room Features Lists (Available with Full Paper From Author)

The creation and entry of buildings, room types, room features, campuses, campus regions, etc. populates the drop-down menus with campus specific information which is used to characterize all rooms in the room dialog box as shown in Figure 4.

Figure 4. Room Information Dialog Box (Available with Full Paper From Author)

Region information is used to group campus buildings for classroom assignment based on proximity. In collaboration with campus departments these regions would be created by giving consideration to buildings that are within reasonable walking distance for students and faculty. The College of Business example is shown below in Figure 5. Region preferences would be determined by the academic departments and listed by instructor and course as described in a section that follows.

Figure 5. College of Business Region (Available with Full Paper From Author)

SchedulePro Use by the Registrar's Office (VP Student Services)

If implemented fully SchedulePro would provide substantial benefits to the Registrar's Office. Full implementation would require that personnel from the Registrar's office have administrative privileges.

SchedulePro provides four powerful functions for planning and implementing academic schedules, which can be described as resource querying , scenario modeling, optimizing and reporting.

Resource querying allows the user to review current classroom commitments to quickly find available resources. For example, if the Registrar’s staff were looking for an available classroom with a certain minimum capacity, with a certain instructional technology configuration, within a certain region of the campus SchedulePro would provide a listing of all available classrooms satisfying the stated requirements. (This same feature will be described in greater detail in the academic department section that follows)

Scenario Modeling allows the user to consider possible scenarios such as a temporary building closure to understand/analyze the campus-wide impacts on classroom utilization and to ask questions such as what would be the impact of this possible situation on utilization of various types of classrooms such as labs, lecture halls, etc. or the impacts in various campus buildings such as Robin Hall or Trundle Hall. Scenarios can be saved for future discussion and analysis. Select campus users would develop the expertise to provide this functionality to campus decision makers as future building plans were developed.

Optimizing gives the user the ability to optimize the classroom assignments based on a set of campus objectives including average classroom utilization, course requirements, instructor preferences, etc. Note that SchedulePro does not default to any particular objective or priority; rather, it is up to the campus to structure the relative importance of potentially competing priorities. This type of objective structuring would hopefully be aligned with the SU mission and vision. With administrative privileges, select users would run possible scenarios based on departmental requests, then implement final optimal solutions by inserting the scenarios into the SchedulePro production data and making the required changes in ERP. Finally, SchedulePro provides both standardized and customized reports which are easy to use and can be flexibly developed to meet the needs of all campus users.

SchedulePro Use by Academic Departments (VP Academics)

The department head must be a registered SchedulePro user with access to model potential scheduling alternatives. After the Registrar’s office has created the planning schedule in ERP, SchedulePro would be a helpful tool for considering possible changes. Examples will be provided from the College of Business. Initially the Dept. Heads must enter subject and course requirements (preferences) along with instructor preferences. These options are shown in Figure 6 below in the SchedulePro Configure menu.

Figure 6. SchedulePro Configure Menu including the Course, Subject, Instructor and Meeting Preference Options (Available with Full Paper From Author)

Dept. Heads set preferences for courses by setting “weights” on a variety of factors including room type, room features, room capacity, campus region, building, room. Example weights are shown in the “w” column for room features, region, building and room number in the example shown in Figure 7. below. Preferences can be set at hierarchical levels for commonalities including the meeting type level (for the entire campus), at the subject level (by course subject abbreviation/rubric) at the course level (by course id) or at the section level (section by section). Over time all the preferences roll forward in the database except section level preferences. It makes sense to minimize the entry of section level preferences so that preference considerations will roll forward in time at the meeting type, subject and course levels.

Meeting type preferences would be set by the Registrar’s office as defaults, but would be supplemented by preferences set by dept. heads in greater detail at the subject or course level. Example subject and

course preferences for the College of Business are listed in Appendix A. The preferences for BUS 101 would be set as shown below (see Figure 7.)

Figure 7. Course Information and Preference Dialog Boxes

Initially the Dept. Head would enter course preferences for every course offered by the Department, and then over time would be responsible for entering preferences for new courses and for edits/updates of preferences for existing courses. Note that it would be unwise to enter preferences by section. While this feature is provided in SchedulePro, individual section preferences do not carry forward from semester to semester.

Dept. Heads would also be charged to enter instructor preferences. This process is similar to the course preferences entry process. An example listing is provided for the College of Business in Appendix B. In this example, business faculty were categorized based on scheduling availability for days per week and times of day.

Another feature that would be very useful to academic departments is the ability to view current schedules by room using the Weekly Room Grid. While ERP provides this functionality, the ERP interface is not user-friendly, nor is it intuitive. The SchedulePro interface on the other hand is very flexible and easy to use. An example is shown below for Robin 202. The user can select any building and any room on campus and see the current schedule for that room for any week of interest. In the display shown for Robin 202 it is easy to see that there is one hour open on 9/18/09 at 12:00 pm. This feature would be very useful for many users across campus who are looking for rooms for meetings, events and courses. To test this feature a Fall semester summary was created for Robin Hall for all rooms that are used by the College of Business; this summary, provided in Appendix C, gives a snapshot of all classroom usage in Robin Hall for Fall.

Figure 8. Weekly Room Grid for Robin 202 as of 9/3/09 (Available with Full Paper From Author)

Software Limitations

While providing useful and helpful features and functions, SchedulePro suffers from a number of weaknesses that restrict the potential utility of the software including

- no ability to list scheduling preferences by course and
- no ability to create logical relationships between various courses.

These limitations are associated with long standing scheduling practices at SU that are not likely to be changed.

Author's Note: A full version of this case is available from the author.