REFERENCES

The Stresses and Politics of Project Management: A Systems Analysis and Design Simulation

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ABSTRACT
This paper describes a systems analysis and design project that simulates the difficulties of project management within an information systems environment. This website construction project is typically implemented within the business core's management information systems class, although it could also be used within the IS major's information systems analysis and design course. The project requires the teams to play roles both as developers and as managers and uses an innovative class structure to simulate three levels of management. In addition to the project implementation, an unusual project grading schema is described, which alleviates many percent grading inequities that plague group projects. Students' class comments are also examined to determine the final effectiveness of the project in communicating the difficulties of management politics and ethics.

INTRODUCTION
Teaching the difficulties of project management has recently received much interest within business schools [1,2,3,4]. Ironically, while business schools have begun paying attention to the desirability of project management skills, the engineering disciplines can trace its use of project management techniques back to the Polaris submarine project in the early 1960s [5]. Why the new interest in project management in information systems? Poor past performance may be one reason. Over half of all information systems projects cost two to three times the original projected cost and take two to three times longer to implement than originally forecasted [6]. New emphases on such complex underpinnings as business process reengineering (BPR) and total quality management (TQM) have increased in companies as competition increases. In addition, managers are increasingly expected to do more with less [7]. These forces require managers to monitor their technological, human, and financial resources more carefully to achieve ever-increasing management expectations.

Given the traditional focus of the information systems discipline, the teaching of project management skills should not be surprising. In contrast with computer science, the information systems discipline differentiates itself by concentrating on solutions that involve changes in attitudes, management and organizational policy and behavior [8]. Knowledge of how such factors as upper management support, involvement of users, and project risk level could affect the success of a project is critical for all project managers. Emphasizing project management skills not only fits within an information systems course, it may very well enforce the core knowledge of the field that instructors wish to convey.

One concern often raised is that by teaching the “softer side” of project management within systems analysis and design, the students fail to learn important technical skills that they need. There are technical aspects of SAD, without a doubt, but I would argue that these tasks are routine compared to the difficulties of managing a project to its completion. In a recent article, one IS manager stated, “Technical skills are easy to obtain and fluid by definition because technology is changing so fast” [9]. Indeed, he advocates hiring individuals with the knowledge and savvy to manage projects, facilitate communication, and build consensus. Supporting a classroom simulation approach, Thamban [10] found that of the many different methods of teaching project management (e.g., literature reading, observation of other managers, professional conferences, seminars and workshops), the most popular was experimental learning.

The conclusion appears to be that while establishing a core set of technical skills is indeed important, so is teaching students the difficulties of managing a project to its completion. Moreover, students take business core courses to learn the important concepts specific to each business discipline. I would argue that development methodologies (e.g., prototyping) teach critical skills in the structuring and managing of projects, regardless of the student’s field of study [8]. The stresses of absent team members, the difficulties of changing project requirements, and the politics of consensus building are realities in the management world that can be simulated with an SAD project within the classroom environment.

Following that philosophy, this article describes the implementation of a systems analysis and design project. While the included project description could be implemented within the IS major’s systems analysis and design course, I implement the project within our business core’s management information systems course. Finally, while this article emphasizes the SAD project and the resulting website deliverable, is should be stated that the pr...
JECT integrates many aspects of my management information systems
tests course. I will discuss how the project affects the other parts
of the course in the conclusion of the paper.

TEAM FORMATION
My management information systems class typically consists of
forty students, and I divide the class into eight teams. I allow students
to choose their team members, although I use stereotypes to allow students
to meet and learn about each other. Five student teams are ideal
because the team is large enough to create tensions and communica-
tion difficulties without these difficulties becoming unmanageable.

Early in the semester and before the SAD project starts, I
have found that some initial team building improves a team’s chances
of working together effectively. The initial stages of team develop-
ment are incredibly important and set the tone for the remainder of
the semester. For this reason, the team’s initial assignment is to
“have as much fun together as possible.” The only requirements of
the assignments are that all team members attend and that the team meets off-campus. I believe this assignment is
critical to the team’s chances of success. Teams must go through
a period of development where they learn about each other. Each
member must decide what role he or she will play within the team.
This assignment allows students to learn about each other in a
relaxed environment. Since they must go to the trouble of meet-
ing off-campus, it is an additional buy-in by team members.

Teams are required to report back their adventures over email,
which familiarizes them with our campus email system early in
the semester. I then grade the assignment based on “the amount of fun
that they had.” In practice, all teams receive a grade of “A” for the
assignment, which is a small percentage of their final grade.

Approximately one week after the social event, the teams are
required to meet and discuss their class experience. One student
is responsible for all aspects of the team, a communications repre-
sentative, who facilitates intrateam and interteam communication;
and a technical leader, who oversees the projects website con-
struction. I have discovered that these roles assist students
in structuring their initial roles within the team. As the project pro-
gresses, however, the importance of the roles tends to diminish as
the team develops more comfortable working relationships.

After the team roles are established and to further encourage
team unity, the team is then required to create a team website.
The website must contain the team homepage and links to a homepage
for each team member. The team homepage reflects the students’
team’s name and history, as well as its area of expertise. The infor-
mation on the team homepage may be fictional, and I encourage students
to think about the unique selling points of their own
company reflecting their roles on the team. The individual
hompages are factual, however, and I use this opportunity to
learn more about the students early in the semester.

There are a number of benefits to having the students create
their website early in the semester. In addition to becoming fami-
lar with the idiosyncrasies of web bureaucrat development (e.g., upload-
ings profile, learning to the web editor), students have
time and the understanding to tweak and adapt during the
class concepts later in the semester (e.g., frames). In addition, at least
one student on each team usually has some web page construction

TEAM STRUCTURE
The primary purpose of the assignment is to stimulate the diff-
culties of team management and to teach the principles of web page
development. Since this is a design process, students are required to
build the actual pages as well as the visual aspects that combine to
create the overall impression of the website. The requirements include
a non-functional prototype that shows the basic structure of the
website and the navigation. Students are responsible for the design
of the website and the creation of the visual elements.

Each team plays both management and developer roles in
the SAD project. In its management role, the team supervises the
construction of a resource website by a development team. The web-
topic is an important issue in information systems (e.g., the
year 2000 problem or electronic commerce). The management team
acts as a consultant to the “experts” on the chosen topic, but in their roles
as managers—knowing nothing about the technology in the prototype—
their role in the project is to help both teams work together. In
the role each team assumes that is a website development team.
Within this role, the team is an independent contractor hired by
the management team to develop the website. I have divided these
tasks between teams in the past, and I have found that the team
managing the project is often better prepared to deal with the
very difficult problems that arise.

The ‘class’ team structure, therefore, is a circle, with Team
managing Teams 2, Team 2 managing Team 3, and so on with the
process continuing. Each team then develops a website for Team 4,
who develops the website for Team 5. To succeed in this role as a
management team, each team must hire and supervise a
development team. The teams then have ways to communicate and
solve problems. The idea is to encourage teamwork and mutual
understanding. To succeed in this role as development team, each team
must develop a website that satisfies the requirements of its boss, the
management team.

THE SAD PROJECT
The SAD project begins shortly after the completion of the ini-
tial team homework. In this assignment, I introduce students to the prototyping methodology. The stages of pro-
totyping are requirements definition, prototype development,
and the process of evaluating the final deliverable.

Students are asked to submit deliverables for each stage of
development. These deliverables are not graded until the end
of the project, and I am purposely vague on the contents of
the requirements document, because I want students to experience
the process of creating and using a requirements document. The de-
velopers must also consider interteam communication with
the exception of actual webpages, the management team must submit
anything to communicate its vision of the final website. In previ-
ous projects, students have constructed written mockups, Word
documents, and PowerPoint slides. After the requirements docu-
ment has been submitted to the development team, the develop-
ment team must create a working prototype (usually to reduce the scope
of the project). Once the development team and the management team reach a consensus,
I encourage the management team to get a signed contract to commit the
project.

Approach approximately one week later, the development team
is responsible for translating the written requirements document into a
functioning website. One of the challenges between the time period between the
completion of the requirements document and the prototype fairly
shortly after the prototype is not a completed website. The extent of the prototype, however, is determined by mutual
agreements between the teams.

The management team then submits the feedback document
to the development team. The feedback document is essentially
an exception report, detailing where the prototype needs to be
modified or enhanced to match the stated requirements. The man-
gagement team often realizes at this time that its sketchy require-
ments have resulted in an extensive feedback document. It is important to realize that all characteristics of the
development deliverables are open to negotiation between the teams. With the excep-
tion of the due date for the final deliverable (which has been dic-
ted by the Vice-President) the interim due dates can be
changed, given that the development team receives approval from the
management team.

The project is completed when the management team accepts
the final deliverables. For accuracy to occur, however, the de-
velopment team must transfer the final website to a management
department member’s server account and the management team then
make changes to the contents, visually, or other requirements. To complete the
project, the management team evaluates the performance of the
development team by completing a developer evaluation form. In
addition, each development team evaluates the performance of the
management team by completing a management evaluation form. These forms will be used in the calculation of the team’s final grade,
which will be described in the next section.

CLASS AND PROJECT GRADING

The first step in determining the SAD project grades is the
assessment of each team’s performance. To increase the validity
of performance assessment in the business world, companies
are moving away from the supervisor-centered concept of evalua-
tion to a multi-rater framework, commonly called “360-degree evalua-
tion.” In this spirit, SAD teams are evaluated by three different
per- spectives—management, developer, and customer. Each per-
pective counts one-third of the team’s final SAD grade.

The management and developer perspectives result from eval-
uation forms that are completed at the end of the project (see
Appendix 1). Each management team evaluates its developers,
and each development team evaluates its managers. Scoring are
entered on a seven-point Likert scale. Within each of the SAD
requirements also encourage interteam communication. With
the exception of actual webpages, the management team may submit

TABLE 1. Criteria Used to Evaluate the Team's Final Deliverables

<table>
<thead>
<tr>
<th>Technical Quality</th>
<th>Links and graphics work</th>
<th>Graphics load quickly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Appearance</td>
<td>Site is esthetically pleasing and easy to read</td>
<td>Site conforms to layout in requirements document</td>
</tr>
<tr>
<td>User interface</td>
<td>User allows site to be navigated easily</td>
<td>More</td>
</tr>
<tr>
<td>Sophistication</td>
<td>Frames</td>
<td>Image maps, forms, other advanced techniques</td>
</tr>
<tr>
<td>Content</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appropriate given the requirements</td>
<td></td>
<td>Text is grammatically correct</td>
</tr>
</tbody>
</table>


The custom grade is different than any other grade that stu-
dents receive. In the business world, a manager’s performance is
highly dependent on the performance of his or her employees.
Similarly, the student’s custom grade on this project results direct-
ly from the quality of the work performed by its development
team. In other words, the team’s custom grade is determined not
by the quality of the work that the team completes, but by the quality
of the work that is completed for the team. This mech-
nism reflects the importance of management team supervision;
management teams also realize it is in their own self-interest to
motivate their development teams.

We believe that, depending on the requirements and customer perspective,
equally. I then calculate the composite team grade. The final grade
is then assigned individual team members. Within a
group, feedback can be an effective mechanism to encourage team
performance and to motivate errant team members. The problem
that all faculty members face in grading team projects, however, is
grading each team member equitably. Giving everyone on the
same team grades that are equitable is impossible, since team
members rarely contribute equally. Moreover, awarding the same
grade to both strong and weak performers demotivates the true
performers. Another approach, anonymous student feedback
never completely satisfies me, because anonymous feedback lack
accountability. In recent semesters, therefore, I have adopted a
grading schema which accomplishes the difficult task of percep-
that, but not only, on my perceptions of the team’s fairness on my part.

Since only the team knows how its members performed, its
obvious answer is to let the members allocate the individual
grades. Each team multiplies its composite team grade by th
anything to communicate its vision of the final website. In previous semesters, students have constructed written mockups, Word documents, and PowerPoint slides. After the requirements document has been submitted to the development team, the development team has the option of accepting the requirements as written, or negotiating (usually to reduce the scope of the project). Once the development team and the management team reach a consensus, I encourage the management team to get a signed contract to commit the development team to the project.

Approximately one week later, the development team is responsible for translating the written requirements document into a functioning prototype. I keep the time period between the completion of the requirements document and the prototype fairly short, since the prototype should not be a completed website. The extent of the prototype, however, is determined by mutual agreement between the two teams.

The management team then submits the feedback document to the development team. The feedback document is essentially an exception report, detailing where the prototype needs to be improved or enhanced to reach the stated requirements. The management team often realizes at this time that its sketchy requirements have resulted in an extensive feedback document.

It is important to realize that all characteristics of the deliverables are open to negotiation between the teams. With the exception of the due date for the final deliverable (which has been dictated by the Vice-President), even the interim due dates can be changed, given that the development team receives approval from the management team.

The project is completed when the management team accepts the final deliverable. For acceptance to occur, however, the development team must transfer the final website to a management team member's server account and the management team must agree that the web site satisfies requirements. To complete the project, the management team evaluates the performance of the development team by completing a developer evaluation form. In addition, each development team evaluates the performance of its supervisors by completing a management evaluation form. These forms will be used in the calculation of the team's final grade, which will be described in the next section.

CLASS AND PROJECT GRADING

The first step in determining the SAD project grades is the assessment of each team's performance. To increase the validity of performance assessment in the business world, companies are moving away from the supervisor-centered concept of evaluation to a multi-rater framework, commonly called "360 degree evaluation." In that spirit, SAD teams are assessed from three different perspectives: management, developer, and customer. Each perspective counts one-third of the team's final SAD grade.

The management and developer perspectives result from evaluation forms that are completed at the end of the project (see Appendix 1). Each management team evaluates its developers, and each development team evaluates its managers. Scores are entered on a seven point Likert scale. Within each of the two roles, teams receive feedback on team organization, attitude, reliability, and communication, as well as the quality of the project deliverables. I collect these evaluations after the final deliverables are completed. For each category (e.g., attitude), the average scores are calculated for the team's performance both as managers and as developers. I then rescale the final averages into percentiles. While the scaling differs slightly each semester, average scores from six to seven typically result in As, scores from five to six result in Bs, and so on.

As the Vice-President, I determine the customer perspective by reviewing the final website for content completeness and visual impact. The criteria I use for the customer perspective are listed in Table 1.

<table>
<thead>
<tr>
<th>TABLE 1: Criteria Used to Evaluate the Team from a Customer Perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical Quality</strong></td>
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<td>• Text is grammatically correct</td>
</tr>
</tbody>
</table>

The customer grade is different than any other grade that students will receive. In the business world, a manager's performance is highly dependent on the performance of his or her employees. Similarly, the team's customer grade on this project results directly from the quality of the work performed by its development team; in other words, the team's customer grade is determined not by the quality of the work that the team completes, but by the quality of the work that is completed for the team. This mechanism increases the importance of management team supervision; management teams also realize it is in their own self-interest to motivate their development teams.

Weighing the developer, manager, and customer perspectives equally, I then calculate the composite team grade. The final step is to then assign grades to individual team members. Within a group, feedback can be an effective mechanism to encourage team performance and to motivate errant team members. The problem that all faculty members face in grading team projects, however, is grading each team member equitably. Giving everyone on the team the same number of points is rarely equitable, since team members rate contribute equally. Moreover, awarding the same grade both to strong and weak performers demotivates the true contributors. Another approach, anonymous student feedback never completely satisfies me, because anonymous feedback lacks accountability. In recent semesters, therefore, I have adopted a grading schema which accomplishes the difficult task of perceiving equity on the students' part and fairness on my part.

Since only the team knows how its members performed, the obvious answer is to let the members allocate the individual grades. Each team multiplies its composite team grade by th
number of team members. The team then discusses each individu-
ual's contribution, reaches a consensus, and divides the available
points. This zero-sum scenario forces students to base grades sole-
ly on the merits of their work; i.e., students cannot award them-
theselves without penalizing others. In addition, accountability
is achieved because all discussions are conducted openly with all
team members present.

CONCLUSION
The most obvious result of the SAD project is that students bet-
ter understand the process of systems analysis and design, office politics, and
project management. But the experiential nature of the simulation allows me
to integrate other aspects of the course. To reinforce the
team concept, I have moved away from classroom exams to team-
based take-home tests. Exams are largely short answer and essay,
and questions require discussion among team members. I ask stu-
dents to apply the concepts from the text to the project they have
just completed. Questions from previous semesters have included:
- Instead of developing your web site project using prototyping,
  consider end user computing. Discuss the benefits and prob-
  lems of applying end user computing to the development of a
  web site. Would you recommend prototyping or end user
  computing? Why?
- Compare and contrast the systems development life cycle with
  the prototyping methodology. When should each methodolo-
gy be used? Why did we use prototyping on the class project?
- Consider the various types of project conversion. Which conver-
  sion strategy do you recommend for the web site systems anal-
  ysis and design project? Discuss why your recommendation is
  superior by contrasting your choice with the alternative strategies.

The above questions require the teams to apply what they have
experienced in the SAD project to the theories covered in the text-
book. In addition, I believe requiring students to differ, discuss,
defend, and integrate concepts into a final answer increases learning.

As described earlier, team members allocate grades for all class
assignments. By requiring that process, students also experience
many of the difficulties of management. In a recent example, an
obviously upset student stopped by my office for advice. He had
worked hard on the final exam, and his team was meeting in a few
minutes to allocate the points. He was concerned about one team
member who had contributed little to the final product. The
dilemma he faced was that the slacking team member was also a
brother in a fraternity he was pledging. By weighing frater-
nity membership against personal pride, the student understood
more about the difficulties of company politics.

More informally, I have observed a number of positive effects not
mentioned directly by the students. Teams seem to be more cohе-
сус, with fewer hassles. This effect may be attributable to a number of
factors on the project. Team members not performing receive
almost immediate feedback on this lower performance through
lower grades on projects. In reviewing the individual grades, many
teammates grade each team member differently on the first few assign-
ments. By the end of the semester, however, almost all team mem-
bers are receiving equal grades on the projects. There is—in effect—
no way to lose without being penalized by your teammates.

While I have been pleased with the overall project, it should
be noted that this project can be highly stressful for both the stu-
dents and the instructor. Students are unaccustomed to evalu-
ing team members, especially with the team members present. Also,
since one-third of the students’ grade result from the work
performed by other students, they are often uncomfortable trust-
ing the performance of others. I have found it helpful to conduce
a class discussion on the relevant criteria for evaluating
The list usually results with such factors as organizational and
communication skills and reliability. Students often pick up
the fact that because managers are often delegate to complete the
required tasks, they are frequently evaluated not only on the way
they do, but the work that they supervise. These observation
segue nicely into the description of how their performance on
their projects is evaluated.

It should be noted that I did not mention formal project man-
gagement tools, such as Gantt charts and PERT/CPM or project
management software, such as Microsoft Project. Given the
amount of time within the core management information system
course and the available space for this article, I have decided to
omit the details of how these tools could be implemented within
the project. The project lends itself well to the use of these tools
however, and I would encourage faculty members to integrate the
use of these tools throughout the assignment.

Since I structure the course around the SAD project, I always
administer an open-ended student feedback form directed special-
ly at the project after all web pages have been completed. Stu-
dents seem to agree that the project simulates management expe-
riences in the business world. “We were able to look at different
aspects of the organization—management and development. We
were forced to learn both sides [which] allowed us to see difficulties
in both departments.” Another student commented, “I think this
project simulated real-world management situations because of
the difficulty of meeting with group members, reach-
ing consensus on ideas, and motivating the development team
to do effective work...it was more fun, interesting, and involved
than simply reading the text.” With regard to teamwork, one stu-
dent commented, “more than anything, [the project] taught us
to work with people and to compromise.” We learned a
lot about teamwork, and more importantly, learned how to be patient
and deal with conflict with the other group.” In summarizing my
feelings about the project, a student commented, “This was the
closest assignment to ‘the real-world’ that I’ve ever done.”
The general consensus is that students consider the project to be
rewarding—but stressful—experience. I consider the parallel
between those comments and today’s management careers to be
the projects strongest gauge of success.

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APPENDIX 1: Management and Developer Evaluation Criteria

ASSESSMENT OF ABILITIES
Organization Skills
The degree of organization within the management/development team was (1=Low; 7=High)
The amount of time that the management/development team gave us for incorporating changes was
(1=Unacceptable; 7=Acceptable)

Attitude
The attitude of the management/development team was (1=Belligerent; 7=Cooperative)
The management/development team was pleasant in its dealings with us (1=Never; 7=Always)

Reliability
Whenever the management/development team promised to have something completed, how often was it
completed on time (1=Never; 7=Always)
The management/development team completed tasks when it was supposed to have them completed.
(1=Never; 7=Always)

Communication
The amount of feedback we received from the management/development team on our development/man-
geriment team’s progress was (1=Low; 7=High)
The degree to which the management/development team involved me in this project was (1=Insufficient; 7=Sufficient)

Overall Evaluation of Performance
Would you work for this management/development team in the future (1=Never; 7=Gladly)
Overall, my rating for this management/development team is (1=Poor; 7=Excellent)

QUALITY OF THE DELIVERABLES
Extant Requirements Were Met (Evaluation of Management Team Only)
Consider the detail of the initial requirements document. Consider also the amount of latitude you team
desired in creating the team’s website. The amount of agreement between these two factors was (1=Very
Low; 7=Very High)

Feedback Document (Evaluation of Management Team Only)
The feedback document detailed exactly what needed to be accomplished to finish the final deliverable
(1=Absolutely Not; 7=Definitely)

Quality of the Initial Prototype (Evaluation of Development Team Only)
The amount of work completed on the prototype was (1=Very Low; 7=Very High)

Extant Requirements Were Met (Evaluation of Development Team Only)
The accuracy (what was delivered versus what was requested in the requirements of the final deliverable
was (1=Very Low; 7=Very High)
## APPENDIX 1: Management and Developer Evaluation Criteria

### ASSESSMENT OF ABILITIES

**Organization Skills**
- The degree of organization within the management/development team was (1=Low; 7=High)
- The amount of time that the management/development team gave us for incorporating changes was (1=Unacceptable; 7=Acceptable)

**Attitude**
- The attitude of the management/development team was (1=Belligerent; 7=Cooperative)
- The management/development team was pleasant in its dealings with us (1=Never; 7=Always)

**Reliability**
- Whenever the management/development team promised to have something completed, how often was it completed on time? (1=Never; 7=Always)
- The management/development team completed tasks when it was supposed to have them completed. (1=Never; 7=Always)

**Communication**
- The amount of feedback we received from the management/development team on our development/management team’s progress was (1=Low; 7=High)
- The degree to which the management/development team involved me in this project was (1=Insufficient; 7=Sufficient)

**Overall Evaluation of Performance**
- Would you work for this management/development team in the future (1=Never; 7=Gladly)
- Overall, my rating for this management/development team is (1=Poor; 7=Excellent)

### QUALITY OF THE DELIVERABLES

**Extent Requirements Were Met (Evaluation of Management Team Only)**
- Consider the detail of the initial requirements document. Consider also the amount of latitude you team desired in creating the team’s website. The amount of agreement between these two factors was (1=Very Low; 7=Very High)

**Feedback Document (Evaluation of Management Team Only)**
- The feedback document detailed exactly what needed to be accomplished to finish the final deliverable (1=Absolutely Not; 7=Definitely)

**Quality of the Initial Prototype (Evaluation of Development Team Only)**
- The amount of work completed on the prototype was (1=Very Low; 7=Very High)

**Extent Requirements Were Met (Evaluation of Development Team Only)**
- The accuracy (what was delivered versus what was requested in the requirements) of the final deliverable was (1=Very Low; 7=Very High)
STATEMENT OF PEER REVIEW INTEGRITY

All papers published in the Journal of Information Systems Education have undergone rigorous peer review. This includes an initial editor screening and double-blind refereeing by three or more expert referees.