

# Creating a Real-World Capstone Experience for I.T. Management Students: Putting Theory into Practice

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## ABSTRACT

The increasingly dynamic demands of the information technology (IT) management workplace require graduating students to have demonstrated mastery of analytical skills and theoretical frameworks. Students are also expected to have demonstrated they can apply creative problem-solving skills, think critically, and learn from their efforts. IT management educators have often used capstone courses in the final year of a program to enable students to synthesize concepts from previous courses and apply them to a final project. In this paper, we argue that the capstone courses should not only focus on synthesis and application of concepts, but should also pay explicit attention to developing the action learning skills of critical analysis and critical reflection. Furthermore, the use of a real-world experiential project rather than a textbook case can help students develop "soft skills" such as dealing with ambiguity, adding value, communicating effectively, and managing relationships with clients and team members. We describe the capstone experiential learning project for undergraduate IT management students at Ryerson University. This is an integrated 8-month problem-based learning experience involving classroom-presented theory, small-group tutoring and the execution of two major projects for a student-recruited real client organization. Over the last eight years, more than 300 organizations have supported student teams. Teams, each of 5-6 students, carry out a strategic assessment of the client organization. They identify a business system or business process needing improvement. They carry out a requirements-and-design study, obtain proposals from vendors, and make recommendations for the selection and implementation of the best solution, the capstone project links theory presented in the class with actual work done by the students. The paper concludes with a reflection on the capstone experience and some lessons learned as well as proposed research to evaluate the experience.

**Keywords:** capstone, action learning, problem-based learning, outcomes-based learning, critical analysis, critical reflection, information systems management, pedagogy

## 1. INTRODUCTION

The increasingly dynamic demands of the information technology (IT) management workplace require graduating students to have demonstrated mastery of analytical skills and theoretical frameworks. Students are also expected to have demonstrated they can apply creative problem-solving

skills, think critically, and learn from their efforts.

IT management educators have advocated the use of capstone courses in the final year of a program to enable students to synthesize concepts from previous courses and apply them to a final project (Janicki et al., 2006; McGann and Cahill, 2005). In this paper, we describe the capstone experiential learning project for undergraduate IT man-

agement students at Ryerson University. This is an integrated problem-based learning experience involving classroom-presented theory, small-group tutoring and the execution of two major projects for a real client organization. Teams of six students carry out the work over an eight-month period, each working with a client organization recruited by the student team. Over the last eight years, more than 300 organizations have supported student teams.

Student teams are required to carry out a strategic assessment of the client organization and to identify a business system or business process needing improvement. They then carry out a requirements and design study, including the solicitation of proposals from suitable vendors, and make recommendations for the selection and implementation of the proposed solution. In addition to giving the students valuable practical experience, the capstone project links theory presented in the class with actual work done. It also allows the integration of subject matter from many other courses, both business and IT, covered during the prior three years of program.

In the following sections, we describe the evolution of the program and the capstone course. The paper concludes with a reflection on the capstone experience and some lessons learned as well as proposed research to evaluate the experience in a more formal manner.

## **2. THE RYERSON B.COM. DEGREE**

The Ted Rogers School of Information Technology Management at Ryerson University in Toronto is Canada's largest IT-focused business school, with some 1,200 full-time and several hundred part-time students enrolled in its Bachelor of Commerce degree (BCom). Part of an urban university, located in the heart of Toronto's central business and shopping district, its large scale and location present both opportunities and challenges.

Students in the four-year degree, take 39 credit hours in business courses, 63 credit hours in IT-related courses and 18 credit hours of liberal studies. (Note: The course curriculum meets the requirements of both the IS2002 curriculum (Gorgone et al, 2002)

and the ABET certification process.) In addition, about 20% of the full-time students take part in a cooperative option, which gives them an additional 20 months of work experience as part of the degree.

## **3. THE CAPSTONE COURSES AND PROJECT**

As Brown & Benson (2005) suggest "Research shows that the addition of a capstone course to the final period of undergraduate study is a means to help assess students readiness to make the transition from undergraduate to graduate school or work."

All students in the Ryerson ITM BCom degree program are required to take a final year integrated theoretical and practical activity that combines classroom coursework and credit with a real-life consulting project. The key learning objectives of the activity are summarized in Exhibit 1.

The Capstone Experience covers two semesters and, administratively, represents two half-credit courses or six credit hours of the program (though the level of effort expected would likely be viewed as equivalent to at least nine credit hours).

The overall structure of the experience is shown in Exhibit 2 and includes some 16 three-hour lecture/tutorials and the production of two major reports, several interim deliverables and a final presentation. In addition individual student assessment is done using two formal examinations and three individually submitted case studies.

## **4. FORMING THE PROJECT TEAM AND RECRUITING THE CLIENT**

### **Initial Team Formation**

The whole experience is based around a real client and students are expected to take the lead in managing this relationship. First, they form groups of six students -- either ahead of starting the experience or at the first class. They must then recruit a client organization that will allow them to study their business over a seven to eight-month period.

**Understand and apply theory:**

- Use the Michael Porter (e.g. Porter, 1996) market-positioning competitive model to analyze industry dynamic in a selected industry;
- Describe and apply the competitive analysis process to a real company;
- Explain the strategic role of information systems in supporting organizational objectives and apply this knowledge in specific cases;
- Discuss the need to align IT strategies with business strategies and describe specific techniques to implement and manage IT assets to support these strategies;
- Identify strategic information technology opportunities and weaknesses in an organization and develop possible solutions to meet these needs;
- Describe and apply the methodologies and tools used to develop and implement business information systems (e.g. systems development methodologies, business process design, change management, vendor selection, and project management).

**Gain "real-life" work experience:**

- Conduct applied fieldwork by integrating key concepts from management and information technology theory in a "real-life" project
- Prepare complex reports;
- Make formal business presentations
- Deal with group dynamics in a pressured environment
- Handle client relations and expectations

**Exhibit 1: The Capstone Experience Learning Objectives****First Semester Topics**

Industry Analysis  
 Business Strategy  
 IT-enabled Strategy  
 Business/IT Strategy Alignment  
 IT Investment Management

**First Semester Client Work****Strategic Assessment Report:**

- Client Industry Analysis
- Client Business Analysis
- IT Assessment
- Recommendations for Improvement

**Second Semester Topics**

Business Systems Analysis  
 Systems & Business Process Design  
 IT Procurement Processes  
 Business Case Analysis  
 Implementation Planning  
 Project Management

**Second Semester Client Work**

Project Plan  
 User Requirements Report  
 Request for Information Report  
 Feasibility Study Report:  
 - Current Situation Analysis  
 - Proposed New System/Process  
 - Vendor Proposal Analysis  
 - Recommendations for Implementation

**Exhibit 2: Capstone Course Topics & Client Deliverables**

Team formation is completely the responsibility of the students. Information on the Capstone Project Activity is always accessible from the home page of the student website. This includes a list of all organizations studied in the last three years. In addition, full information on the first course and the team formation activities is made available to all students taking the course about two weeks prior to the beginning of the semester through the Blackboard course management system.

The rules for team formation are simple:

- To be eligible for the Capstone courses, students must have completed all required courses in the first three years of the program. (This rule is strictly enforced, even if will cause a delay in graduation for the student.)
- Teams can be made up of five or six students (four or seven person teams are not allowed).
- A broad mix of skills and experience is encouraged, but not required.

- Students must commit to work together for eight months, withdrawal from a team is allowed only under the very exceptional conditions.
- Teams, should they so desire, can enter into an agreement that marks allocated for the project work will be based, in part, on an agreed peer assessment process.
- Students who fail the examination set in each of the two courses must withdraw from the course and the team, and take the withdrawn course again in the next semester.

The advice to students on team formation is summed up in the project description as follows:

*Each team should have a range of skills. Make sure you have at least one person who is good at each of: project management; accounting; technical knowledge; library/Internet research including organizing vast amounts of data, writing, and editing; and leadership. Do not team up with your friends just because you like them – friendships have been destroyed that way. Team up with people who can form an effective and efficient work team.*

Typically a large proportion of the full-time students have formed complete or partial teams prior to the first class, while a much smaller proportion of part time students do so. Pre-registration of teams is possible but seldom done -- normally no more than three or four teams do so each year.

All students starting the experience in a given semester attend a common first class (this can be as large as 250 students in the Fall semester). All professors attend this class. Following a formal lecture that describes the overall experience, explains the methods of team formation and provides the first theoretical content of the first course (an introduction to strategic thinking) the students are then asked to form, or to complete forming, their teams. For the last few years this lecture has taken place in the University gym, where, in addition to temporary seating provided for the lecture, there is lots of space for small groups to gather and for students to move easily through the room.

In many ways this formation is rather like a "speed-dating" activity. Students who need teams circulate and talk and begin to coalesce into groups; students with partial groups look to make up their full teams. The course professors also circulate in the background and intervene when asked to provide information and guidance. Within 10 minutes or so, many groups are formed or nearly so, with only a few students still having difficulty.

Typically, out of more than 200 students, there will be fewer than 10 or so who do not have groups -- more often than not, these will be partial groups who have only 2-4 members. At that point, the professor leading the activity gathers these together and facilitates the sorting out of the last couple of teams. (Note there are also a very few students who do not attend this session and in week 2 of the course these are incorporated into a new team or added to existing teams with only five members).

### **Recruiting the Client**

Finding a client is the responsibility of the team. The School and the course professor take no part in this. The criteria for clients are clearly laid out and teams must rely on their own networking connections to do so. They are given some help, however. Class lectures in weeks 1 and 2 provide guidance on client identification and selection. Helpful hints for finding a client are posted on the course website and a small brochure is also provided to the students for use with prospective clients, describing the Capstone experience, the student team's role and objectives and the expectations from the client organization.

Very occasionally, an organization contacts the School and asks to be part of a study and, when this happens, the client will be offered to a student group that has not yet found a client.

To be eligible to participate, a client organization must:

- Have its headquarters located in Canada. If it is a subsidiary of an international firm, it must have the equivalent of a Canadian corporate staff. It can be

- a strategic business unit (SBU) within a larger business.
- Have the key elements of:
  - a. A discrete definable market.
  - b. Its own financial statements (or these can be created).
  - c. Management team that has the freedom to make "strategic" decisions.
  - d. Managing and making decisions about its own IT services.
- Have at least 30 employees (full-time and/or part-time/volunteer).
- Be willing to commit to working with the student team for the next eight months.
- Be willing to share confidential information with the team and give it access to the right people, subject to a confidentiality agreement can be signed by all team members and the client.
- Be open to using information technology to improve its operations.
- Not have been studied by a student team from the program in the past three years.

So where do clients come from? Anecdotal discussion with students suggests three main sources:

- Organizations with which a student has work experience, either in coop work-terms or as summer, part-time or full-time work.
- Organizations where a student has contact with an employee (usually at the mid-management level) either as a personal friend, or relative, or friend of a friend.
- Cold calling, where the student identifies a number of organizations that they feel comfortable in making a contact and, if given the chance, a sales pitch.

And what kind of organization supports such a study? In short, almost any! Exhibit 4 shows a simple categorization of the 192 clients worked with in the last 3 years.

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**Types of Organization  
Number Studied**

Publicly Quoted Corporations	54
Private Corporations	101
Not-for-Profit Institutions (e.g. Hospitals. Schools. Professional associations)	20

Not-for-Profit Charities	17
Total:	<u>192</u>

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**Exhibit 4: Types of Organization Studied  
From 2004-2007**

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A wide variety of industries have been covered, including telecom, entertainment, real estate and property management, light and heavy manufacturing, professional services firms such as lawyers and engineers, and many types of retail. Not for profit organizations have included hospitals, colleges and school boards, charities, community-centred groups and more. A significant number are major entities and household names. The largest have revenues in the billions of dollars, the smallest in the hundreds of thousands.

Once a client has agreed to participate, the client and the student team sign a non-disclosure agreement. The University's legal position is that this contract is between the students and the client, and does not involve the University. The professor may voluntarily sign the agreement but need not do so.

A draft agreement is available for use by student teams. This was developed some years ago by an enterprising team and is now shared with all. Almost all the teams use a version of this agreement. On occasion a client may ask for their own agreement to be used and student teams may chose to do so, however the University will not be a party and if the client insists, the project cannot continue with that client.

The primary reason for the University's position is to emphasize to the client that the primary purpose of the project is to give the students field work experience and that, in the spirit of that purpose, a somewhat informal approach to the arrangement is best. Obviously there is also the practical implication that, if the University was to be party to each agreement then a significant cost might be incurred and the projects delayed.

One other "legal" point is that the School considers the work being done with the client to be a practical field project not a research activity and thus the project does not

require review by the University's Research Ethics Committee.

### **Organizing and Running the Classes**

Each year some 300 students take part in the capstone, with some 50-60 groups being formed. The majority do so in a daytime class in the full-time program in the fall and winter semesters (September to April), however, to meet the needs of part-time students (and full-time students who cannot take the courses in the normal cycle) a night class version is started every semester (i.e. September to April, January to August and May to December)

Typically between six and nine groups are combined into a single "class" and assigned to a professor who will be lecturer, tutor and project advisor for that class for the two semesters. Each professor is provided with a teaching assistant, whose main role is the marking of case submissions.

As an administrative convenience, the (normally small number of) groups with five members (i.e. with potential vacancies) and all "stray" students are assigned to one professor to facilitate the final assignment of all students, which is usually completed in Week 2 of the course.

## **5. COURSE CONTENT AND DELIVERY**

### **First Semester: Strategic Assessment**

In the first semester, students take 11 three-hour classes, in which the first two hours or so cover theory and the last hour or so has tutorial work related to the Capstone Project. Each team has at least three formal meetings with their professor to review project deliverables. The fieldwork is directly related to, and slightly lags, the theory being taught in class. Appendix A shows the relationship between the course topics and the project deliverables in the First Semester. The last lecture is used to start the project carried out in the 2<sup>nd</sup> semester.

The course starts with a discussion on the meaning of strategy and the concept of competitive advantage. The primary perspective used is that of Porter (1987) and concentrates on market positioning and sustainable competitive advantage. While stu-

dents are told that other perspectives exist (the "value disciplines" of Treacy & Wiersema (1993) the "resource-based view" of Grant (1991) and some work by Mintzberg (2005) are also presented briefly), the market positioning view has been chosen for its (relative) ease of presentation and its usefulness for field study in the projects. Many examples and guides to its use exist and students with very limited work experience can apply the related analytic tools (Five Forces Analysis, Value Chain, Generic Strategies).

The first five weeks of the course are spent on this work. In week 4, students are asked to prepare an individual case submission on a strategic case, usually involving industry analysis and market positioning. While the case submission is individual and forms part of the student's personal assessment, students are encouraged to discuss the case within their team prior to submission. This is then discussed in class and related to the theory presented. Meanwhile, in the project, they carry out a preliminary literature review on the chosen client and that client's industry. This review is submitted to the professor for critical comment and further suggestions. They then move into a more detailed analysis of the client's industry, including an assessment of the importance of IT to that industry. A more detailed analysis of the client's business follows.

In Week 6 the theory moves on to the use of Information Technology to gain strategic advantage, discussing both past practice and current challenges using the work of Henderson & Venkatraman (1993) and then, in subsequent weeks, the concepts of alignment maturity (Luftman et al, 2004) and IT portfolio investment (Weill & Broadbent, 1998) are presented. Finally students are introduced to critical views of the IT strategic advantage concept (e.g. Carr, 2003).

Individual cases covering the strategic use of IT and the management of an IT function are also submitted and discussed in class.

### **Second Semester: Solution Development**

In the second semester, students take just five lecture-based classes, which are largely review of material covered in the earlier

courses in the program, focusing on their applicability to the fieldwork. The review topics include systems and business process analysis, systems and process design and implementation. Two new topics are also discussed -- the preparation and facilitation of a "Request for Information" (RFI) process and the use of evaluation frameworks to select a solution for implementation. The table in Appendix B shows the direct relationship between the course topics and the project deliverables in the Second Semester. The fieldwork requires the identification of a system or process requiring improvement and the development of a solution that meets the requirement identified. The client project can address a user application system, a business process or a technology implementation or upgrade, and it must include a business benefits based justification. Some examples of recent projects are shown in Appendix C.

The majority of the class time is spent in individual team meetings, allowing student teams to present draft deliverables for review and discussion with their professor. During this semester, the students begin by presenting their Project Plan, following this with a User Requirements Report and a draft Request for Information (RFI) to send to selected vendors -- after review with the professor and client they issue the RFI. In parallel with reviewing and analyzing the RFI responses, the team refines the proposed new system or process design.

The work carried out is then consolidated in the final report, which: describes the present system or process; describes the proposed new system or process; presents and evaluates the alternatives proposed by the vendors; and makes a final recommendation for implementation, based on a formal evaluation of the vendor submissions and the related financial and non-financial benefits.

The project concludes with a formal presentation of analysis and final recommendations to the professor. Given the confidential nature of the subject matter, this is a private presentation.

Student teams are then encouraged, following feedback from their professor, to make the presentation to their client sponsor,

however this second presentation is neither required nor graded.

### **Ensuring Consistent Delivery**

The course topics and content are reviewed from time to time by the faculty teaching the courses and the course material -- readings, cases assigned, presentations given -- are common to all of the classes taught each semester.

Indeed, these "presentation decks" are jointly developed and updated by the teaching faculty. While faculty retain flexibility in classroom delivery, the core content must be delivered to all students and all students sit a common exam and are marked to a consistent marking scheme.

Students also have access to a wide range of helpful material. This is maintained in a standard course management template (using the Blackboard system). In addition, in a pilot activity started this year, students also have access to a process guide -- a Web-based description of each stage in the project, along with helpful hints on how to carry out the work and access to examples of key deliverables.

### **6. LESSONS LEARNED**

In many ways, this paper can be considered to be the output of a seven year "action learning" project for the primary author, who came from industry to the University and has been teaching the Capstone experience for 8 years, and has acted as the academic coordinator for the last three years. The commentary comes from the primary author's experience, along with anecdotal content from six other professors who also teach the experience.

Positive aspects of the capstone experience include:

**The business community is very willing to support student teams:** Faculty are continually impressed by the ability of student teams to find willing clients. In all the years in which the experience has been in operation, only one team has failed to find and retain a client. Organizations, both large and small, are willing to support the student teams,

in some cases allowing them to work on important projects for which the organization lacks resources. In others they allow the students to carry out a project, which would not otherwise have been done. Thus, in some cases, the organizations actually implement the condition, while in others they simply take the satisfaction of having supported the student effort.

**The students see this as a "rite of passage" from university to the workplace:** the capstone experience has become a major part of the "culture" of the degree program. Students look forward to the experience with both excitement and trepidation, and respond well to the challenges. Hours spent on the project go well beyond those expected for two half-credit courses, with many teams producing highly professional reports that gain high praise from their clients. For many of the students, the final presentation is their last activity in the program prior to graduation and, for students in earlier years, the sight of small clusters of their fellow students in business dress waiting to make their final presentations is a signal of the eventual end to their efforts.

**Most students respond well to the challenge of high expectations:** The demands and expectations placed on students are high. The teams are expected to self-manage their activities, handle internal conflicts and client relationship problems. They must meet tight deadlines and bring together complex project deliverables.

**For the better teams, there are some specific rewards:** When teams produce credible work, this can be of significant advantage as the students are looking for their first job. It gives some specific experience to discuss during interview in addition to being a source of anecdotes that can respond to specific interview questions. With the client's permission, students can even show the reports they produce during the interview process as a demonstration of the work they are capable of doing. The very best teams from each class are nominated for an academic award -- the most prestigious

in the school. The Barb Kelsey Award is named in honour and memory of the professor who acted as an early course coordinator. A winner and two runner-ups are chosen by a faculty committee each year to recognize the best set of reports produced in each calendar year. Students receive both academic recognition and a financial award. Representatives of client organizations are also invited to the annual awards ceremony.

**The experience contributes to formal assessment of learning outcomes:** The school is in the middle of an accreditation process (with AACSB) and is also committed to increasing the role of active learning in its professional classes. The project reports produced by the student groups provide an excellent assessment of learning outcomes, both for the specific capstone experience and for the integration of course material from throughout the program.

The experience also highlights some challenges:

**Putting theory into practice is a challenge for final-year undergraduate students:** While, in the end, most student teams put together creditable work, the observation of students trying to put into practice the theory they had been taught in class can be a sobering one for the professor. This applies not only to the theory presented with in the capstone program but also to the content from predecessor courses in such areas as accounting, finance and economics.

In addition students find the execution of IT-related activities to be a frequent challenge, when they are asked to assess the performance of real-life IT in businesses and to execute complex systems analysis and design activities. The actual creation of two complex reports (each typically 40-60 pages in length, excluding appendices) also stretches their writing and presentation abilities to the extreme.

**The method of team formation does produce some weak teams:** Since students are expected to form their own



teams, this produces a wide range of team capabilities. Well organized, academically sound students tend to cluster together, often beginning the planning of their teams up to a year in advance and, frequently, these students arrive at the capstone experience with a well-formed team and their client recruited.

At the other extreme, some students who lack experience, networking and social skills and, perhaps, have lesser abilities, form teams at the last minute and may have more difficulty in client recruitment.

Faculty have, from time to time, wrestled with the pros and cons of this approach. While other methods of team formation have been considered, in the end, given the intensity of the experience it is felt that student-led formation is by far "the best of all the evils". This allows teams that want to excel to do, so while others can balance their efforts to do sufficient to pass, without the extra effort needed to overachieve. In addition, the method of peer assessment, allows teams to give extra credit to those who contribute more to the project, sometimes even agreeing to do so in advance.

**There is a need for continuous improvement:** As with every activity, there are areas that need improvement. Finding better ways of integrating the classroom experience and tutorials to help execute theory in practice is a constant challenge. In addition, the very scale of the activity, along with changes to the way in which IT solutions are selected and implemented raises some challenges.

Sometimes, a vendor can be contacted by more than one student team and asked to submit a response to a Request for Information. In addition, as vendors move away from the direct sales model and many technology solutions become off-the-shelf or commodity items, the vendors may be unwilling to provide formal responses to the student teams.

In addition, an increasing number of projects address business process red-

esign -- in which case, instead of reviewing external vendor responses, the team must compare alternative design solutions.

Finally, a critical element of action learning or problem-based learning is that of "reflection", and a more formal reflective process would be a useful addition to the experience.

## 7. IMPLICATIONS FOR FUTURE WORK

This paper has described the Capstone experience currently offered in the Bachelor of Commerce in Information Technology Management program at Ryerson University. In preparing it, the primary author has reflected on seven years teaching in the experience, on discussions held with students prior to, during, and after completion of, the experience (including some students several years after graduation). The reflection has also included input from other professors who have taught in the experience and discussions with a small number of the client organizations.

The School intends to carry out a more formal evaluation of experiences from the perspective of both student and client. In the first stage of this work, students and clients who took part in the experience over the last 12 months will be asked to complete a survey which will address both anticipated and realized benefits for the student and for the client organization. This feedback will be used to refine and further develop the experience, incorporating a wider initiative within the school to use action learning as a primary method of instruction in its advanced courses.

In future stages, graduates will be requested to look back on the experience after two to three years in the workforce and to provide further feedback on the experience and make suggestions as to how it might be improved.

## 8. CONCLUSIONS

IT management educators have called for the use of capstone courses in the final year of a program to enable students to synthesize concepts from previous courses and apply them to a final project (Janicki et al.,

2006; McGann and Cahill, 2005). In this paper, we argue that the capstone courses should not only focus on synthesis and application of concepts, but should also pay explicit attention to developing the action learning skills of critical analysis and critical reflection. Furthermore, the use of a real-world experiential project rather than a textbook case can help students develop "soft skills" such as dealing with ambiguity, determining how to add value, communicating effectively, and managing relationships with clients and team members.

This paper has described a highly successful capstone experience, where students examine real world organizations and problems to demonstrate the theory and skills they have gained during their four-year degree. Acting as a rite-of-passage for all students and providing a rich source of experience on which to draw following graduation -- both in the interview and then at work -- graduating students look back on this with a combination of pride and recognition of the transition they have made from university to the workplace.

The program does, however, face challenges. The extremely large scale of the program can have an impact on the outside marketplace. In addition, as sources of IT solutions and methods of implementation change, some of the current techniques used may no longer be applicable in every case and need redesign. Further, although anecdotal evidence suggests that the program is highly successful both in meeting its learning objectives and in providing the students with an appropriate experience, a more formal examination all these factors would be worthwhile and is intended to be completed over the next year.

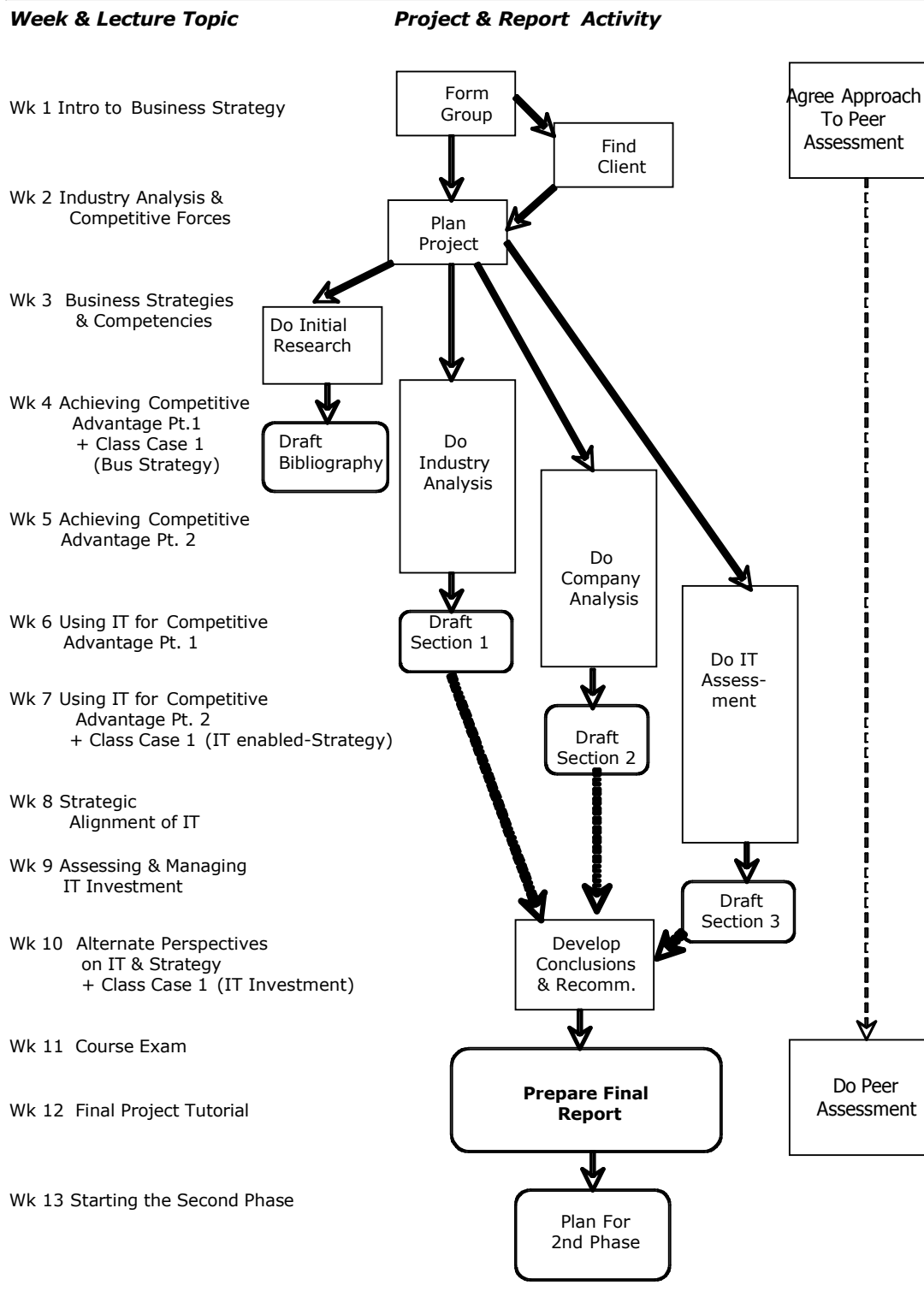
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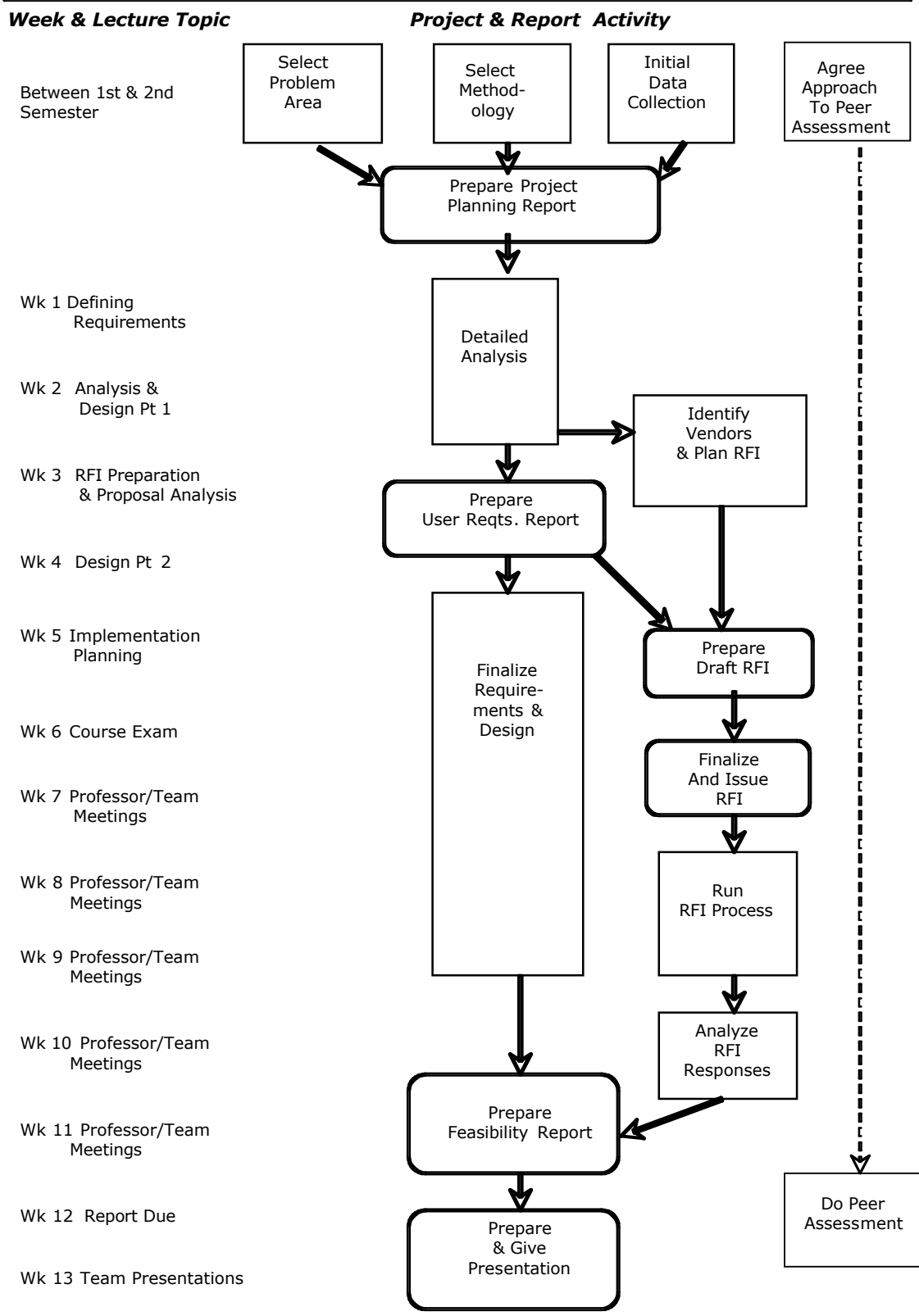
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**Appendix A: Capstone Activities in First Semester**



**Appendix B: Capstone Activities in Second Semester**



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**APPENDIX C: EXAMPLE CLIENT ORGANIZATIONS AND TEAM PROJECTS**

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*A Major Financial Institution:* Planning an integrated client relationship management system for all lines of business, to significantly increase per client profitability.

*A Children's Charity:* Providing on-line counseling to children in crisis, meeting an identified service gap to help young children in dangerous situations.

*A National Forestry Company:* Improving communications to field camps in remote locations, to improve operating performance and reduce costs.

*A Global Drug Company:* Implementing a sales force support tool to increase their sales productivity.

*A Large Law Firm:* Establishing a secure wireless network in their new office, with access for staff and visitors.

*An Electrical Retailer:* Replacing a dated inventory management system to improve inventory turns and increase sales.

*A Leading Fashion Retailer:* Re-engineering the garment alterations process to improve both service efficiency and customer satisfaction.

*A Community-based Volunteer-run Radio Station:* Managing volunteer rosters and tracking playlists to meet regulatory requirements and improve operating efficiency.

*A World-Leading Computer Accessories Manufacturer:* Developing a new product design and engineering process to help meet changing consumer and competitive demands in one of the worlds fastest changing markets.

*A Firm of Consulting Engineers:* Improving the firm's time reporting and management and client billing systems to improve professional utilization and increase revenue

*A National Cinema Theatre Chain:* Designing a new approach to ticketing and crowd control for major new releases

*A Major Mobile Phone Company:* Planning the sales conversion of 600,000 customers from Analogue to digital cellular technology.

*A University Print Shop:* Improving the business processes for order entry and billing

*A Large Property Management Company:* Choosing a new system for property management activities in several large rental buildings.

*A Real Estate Agent:* Implementing a new website to improve customer relationships and sales support

*A Large Elderly Care Institution:* Improving resident safety by the selection of patient safety technology to detect falls and "wandering" patients and trigger alarms.

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