**Term Project on Decision Analysis**

Each student is required to complete a term project to demonstrate proficiency in applying the project management methods and tools learned in this course. The case for this course is the [Custom Woodworking Company - Woody 2000 Project](http://www.maxwideman.com/papers/woody2000/intro.htm).  The work for this case substitutes for Modules 7 & 8.

The incidents described in this case study are typical of the types of things that happen in real-life projects. They reflect peoples' attitudes and the way they do things and the reality is that if project sponsors do not start out with an understanding of project management and its processes, the probability of these kinds of happenings are quite high!

While the focus of this case study centers on construction, the project has serves to bring to light many of Woody's management decision-making short-comings and the need for change. ***Can you spot the real source of the problems and what needs to be done to fix them?***

Assume you were brought in as a management consultant by the management team to make specific recommendations about this case.  You may develop whatever reasonable data you might need for estimates and to use statistical/project management tools.

Your role as a management consultant for the company is to assess how their project was handled, what worked and what could be improved, using the [Project Appraisal Questionnaire](http://www.maxwideman.com/papers/woody2000/questionnaire.htm). Then, recommend a feasible, effective and efficient course of action the company should follow going forward.

         *Feasible* - Your recommendations are reasonable and capable of being accomplished by the company.

         *Effective* - Your recommendations will have the intended or expected effect. The company will achieve the goals stated in your plan.

         *Efficient* - Your recommendations will help the company produce effectively with a minimum of waste, expense, or unnecessary effort.

 You need to be specific and support your recommendations with *qualitative and quantitative evidence*, avoid general and unsubstantiated opinions.  Evidence can be developed from the readings in your text or the suggested readings, doing research on the Internet and by applying the different methods and techniques that you will be learning in this course.

**Your task is to show how you would run this project properly from the beginning by addressing the questions listed in** [**Project Appraisal Questionnaire**](http://www.maxwideman.com/papers/woody2000/questionnaire.htm).  **See the website for the** [**Custom Woodworking Company - Woody 2000 Project**](http://www.maxwideman.com/papers/woody2000/intro.htm)**.** Also, you may use the **Project Planning Exercise (Doc Sharing)** as a template for your report.  
  
You will not find all the answers written into the case study. Most of the answers are matters of opinion and you will need to search the Custom Woodworking Company - Woody 2000 Project site for ways to approach many of them.  
   
**Schedule for Term Project:  
  
Please post each of these assignments in the discussion area for the weekly Modules; for example, Module 3 (M3:A2) for July 14th.**  
       ***July 14*** *– Analyze the Facts of the Case & Project Concept and Strategy*

       ***July 21*** *- Project Scope and Planning & Quality and Planning and Scheduling*

       ***July 28*** *- Cost Estimating and Contracting for Engineering and Construction Services & Communication and People Management*

       ***August 4*** *- Progress Monitoring and Control*

       ***August 11*** *-  Cost Control and Risk Identification and Management*

       ***August 18*** *- Final Report* *& Class Presentation*

**Analysis of the Woody 2000 Case**

Identify the key issues explicitly to fully define each of the problems and outline the changes that are necessary. Explain why they are problems, and outline the goals for each of these changes in measurable terms. You can do this in a bullet list with a brief explanation; this will help you cut down on the narrative.  There are no parameters for the length of your response; the important thing is to clearly define the problems and the goals for the project in measurable terms.

Some other important points:

* The additional readings for this course should be ***need-driven***, e.g., done in response for additional clarification about a topic, rather than for general information;
* The problem definition process is ***iterative***; it is normal to continue to define the problems, issues and goals until everything being investigated has been clearly defined and proper measures have been identified;

**Problem Analysis**

To be effective in problem solving and decision-making we need to "transform" raw data (qualitative and quantitative) into ***"meaningful information".*** This ***transformation process*** consists of the following steps:

        Defining the problem

        Listing the possible alternatives

        Listing the payoff or profit of each combination of alternatives and outcomes

        Selecting one of the decision theory models

        Acquiring data

        Developing a solution

        Testing the solution

 A ***problem*** can be defined as a “deviation from a standard”.  This definition implies that performance standards have been established to help identify deviations and determine the extent to which they affect achievement of economic, customer and productivity targets.  If standards do not exist, they must be established to be able to economic, customer and people “value-added”, monitor performance and proactively control behavior of key "variables" over time.  Examples of these performance metrics include:

        **Economic Value Added (EVA)** - an estimated annually recurring or one-time cost savings.

        **Customer Value Added (CVA)** - a process and/or procedure improvement (e.g., reduction in cycle time and/or defects) that results in a higher quality output delivered to internal or external customers.

        **People Value Added (PVA)** - a process and or procedure improvement (e.g., reduction in cycle time and/or defects) that results in increased satisfaction of process associates involved in producing the output.

To arrive at a “feasible” solution, i.e., one that is effective and efficient, you must consider both ***quantitative (e.g., historical data, marketing research)*** and ***qualitative (e.g., management practices***, ***performance of employees)*** factors.  Your job as a consultant is to:

        Drive a consistent approach to resolving issues and achieving business improvements.

        Simplify communications and issue management across processes/organizations.

        Create consistent time frames to assure timely issue resolution.

        Use quality gates to assure effective issue resolution management (i.e., review/approval of business needs/gaps, action plan implementation evidence and corrective action plans).

        Easily summarize and report key metrics including financial, customer and people benefits.



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|  | http://www.maxwideman.com/papers/woody2000/title.gif | |
| http://www.maxwideman.com/images/project.gif | http://www.maxwideman.com/images/curve.gif |  |

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Background

The Custom Woodworking Company is a small-to-medium sized custom furniture and cabinet making company, with head-office and a spacious plant site at Industrial Estates, Someplace, BC. Its Chairman and Chief Executive Officer is Ron Carpenter now in his late-sixties. His wife Mrs. Emelia Carpenter, being an aggressive business woman and somewhat younger than her husband, now effectively runs the company.

Ron Carpenter is affectionately known to all as "Woody" and so the company is generally known as "Woody's". Woody, after an apprenticeship as a cabinet maker, started his small furniture manufacturing business back in 1954 and he and his wife moved to their present location in 1959. The company quickly gained a reputation for attractively designed and well constructed furniture, using imported hardwoods and indigenous softwoods for its products. Woody's now produces custom furniture to order, several lines of furniture for wholesaler/retailers, and a number of variations of standard kitchen and bathroom cabinets, including units made to order.

Over the years the Carpenters continued to prosper and built up a loyal staff and work force. More recently their son, John Carpenter, has joined the company's management after having obtained a commerce degree at the local university. At John Carpenter's insistence, lured by longer production runs and higher and more consistent mark-ups, the company has moved into subcontract work supplying and installing counter-tops, cabinets and similar fixtures for new commercial construction. To date, Woody's has established a well-founded reputation for supplying millwork to the construction industry.

**Woody's Corporate Profile**

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| **Head Office:** | Someplace, BC |
| **Business:æ** | Furniture manufacturing, custom millwork, and hardwood importer; federal charter 1960; privately held; number of employees approx. 850. Major Shareholder: Emelia Holdings Ltd. At December 31, 199X, total assets were $181,000,000. In fiscal 199X, sales were $93,250,000 with net earnings of $6,540,000. |
| **Directors:** | |
| Chairman & CEOæ | Ron Carpenter |
| President | Mrs. Emelia Carpenter |
| Executive Vice President | Kim Qualey |
| Director | John Carpenter |
| **Key Personnel:** | |
| VP Production | Miles Faster |
| VP Finance and Administration | Spencer Moneysworth |
| VP Personnel | Molly Bussell |
| VP Sales and Estimating | Bruce Sharpe |
| Controller | Kim Cashman |

**Other Key Players in this Case Study:**

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| I. Leadbetter (Ian) | Woody's Project Manager |
| R. Schemers (Randy) | Principal, Schemers and Plotters (S&P), industrial design consultants |
| A. Fowler (Alfred) | Director, Expert Industrial Developers (EID), industrial property developers and contractors |
| I. Kontrak (Ivar) | EID's Project Manager |
| D. Rivett (Dave) | I. Beam Construction Ltd., steel fabricators and installers |
| B. Leakey (Bert) | Classic Cladding Co., cladding and roofing contractors |
| C. Droppe (Charlie) | I. C. Rain Ltd., water-proofing contractors |
| A. Dent (Amos) | Tinknockers Associates, mechanical contractors |
| O. Volta (Olaf) | Zapp Electric Co., electrical contractors |
| E. Forgot (Eddie) | Piecemeal Corporation, equipment suppliers |
| W. Easley (Win) | Project management consultants |

**The Opportunity**

In 1989 there was a mini-boom in commercial construction in south-western BC. With the possibility of a major airport expansion, and free-trade opportunities south of the border, Bruce Sharpe persuaded Woody's directors that they were well placed to expand their manufacturing business. Miles Faster, regularly complaining that the company's production efficiency was being thwarted by lack of manufacturing space, made a pitch to John Carpenter for moving to completely new and more modern facilities. John Carpenter, with a vision of growth based on computer controlled automation, talked over the idea with his father. Woody discussed it with his wife who in turn brought Kim Cashman and Spencer Moneysworth into the debate.

Cashman and Moneysworth felt strongly that they should remain where they were, since there was spare land on their property, even though not the most convenient for plant expansion. They argued that not only would this avoid the costs of buying and selling property, but more importantly avoid the interruption to production while relocating their existing equipment. Besides, the nearest potential location at an attractive price was at least fifteen miles further out from the residential area where most of them lived. Polarization of opinions rapidly became evident and so, in the spring of 1989, Woody called a meeting of the directors and key personnel to resolve the issue. After a visit to the factory floor and a prolonged and sometimes bitter argument lasting into the early hours, it was agreed that the company would stay put on its existing property.

**The Project Concept**

It was agreed at the meeting that additional production capacity would be added equivalent to 25% of the existing floor area. The opportunity would also be taken to install air-conditioning and a dust-free paint and finishing shop complete with additional compressor capacity. Equipment would include a semi-automatic woodworking production train, requiring the development and installation of software and hardware to run it. The President and Executive Vice Presidents' offices would also be renovated.

At the meeting, the total cost of the work, not including office renovation, was roughly estimated at $17 million. Woody agreed to commit the company to a budget of $17 million as an absolute maximum for ***all*** proposed work and the target date for production would be eighteen months from now. To give Woody's personnel a feeling of ownership, Molly Bussell proposed that the project should be called Woody 2000. Spencer Moneysworth would take responsibility for Project Woody 2000.

**Planning**

Moneysworth was keen to show his administrative abilities. He decided not to involve the production people as they were always too busy and, anyway, that would only delay progress. So, not one for wasting time (on planning) Moneysworth immediately invited Expert Industrial Developers (EID) to quote on the planned expansion. He reasoned that this contractor's prominence on the industrial estate and their knowledge of industrial work would result in a lower total project cost.

Meanwhile, Kim Cashman developed a monthly cash flow chart as follows. First he set aside one million for contingencies. Then he assumed that expenditure would be one million in each of the first and last months, with an intervening ten months at $1.4 million. He carefully locked the chart away in his drawer for future reference. All actual costs associated with the project would be recorded as part of the company's normal book-keeping.

Upon Moneysworth's insistence, EID submitted a fixed-price quotation. It amounted to $20 million and an eighteen month schedule. After Moneysworth recovered from the shock, he persuaded Woody's management that the price and schedule were excessive. (For their part, EID believed that Woody's would need considerable help with their project planning and allowed for a number of uncertainties). Further negotiations followed in which EID offered to undertake the work based on a fully reimbursable contract.

Moneysworth started inquiries elsewhere but EID countered with an offer to do their own work on cost plus but solicit fixed price quotations for all sub-trade work. Under this arrangement EID would be paid an hourly rate covering direct wages or salaries, payroll burden, head-office overhead and profit. This rate would extend to all engineering, procurement, construction and commissioning for which EID would employ Schemers and Plotters (S&P) for the building and industrial design work. Moneysworth felt that the proposed hourly rate was reasonable and that the hours could be monitored effectively. He persuaded Woody's directors to proceed accordingly.

**The Design**

A couple of months later as S&P commenced their preliminary designs and raised questions and issues for decision, Moneysworth found he needed assistance to cope with the paper work. John Carpenter suggested he use Ian Leadbetter, a bright young mechanical engineer who had specialized in programming semi-automatic manufacturing machinery. Moneysworth realized that this knowledge would be an asset to the project and gave Leadbetter responsibility for running the project. Ian was keen to demonstrate his software skills to his friend John Carpenter. So, while he lacked project management training and experience (especially any understanding of "project life-cycle" and "control concepts") he readily accepted the responsibility.

During the initial phases of the mechanical design, Ian Leadbetter made good progress on developing the necessary production line control software program. However, early in design EID suggested that Woody's should take over the procurement of the production train directly, since they were more knowledgeable of their requirements. Miles Faster jumped at the opportunity to get involved and decided to change the production train specification to increase capacity. Because of this, the software program had to be mostly rewritten, severely limiting Leadbetter's time for managing the project. It also resulted in errors requiring increased debugging at startup.

Neither Moneysworth nor Leadbetter was conscious of the need for any review and approval procedures for specifications and shop drawings submitted directly by either S&P or by Eddie Forgot of Piecemeal Corporation, the suppliers of the production train. In one two-week period, during which both Faster and Leadbetter were on vacation, the manufacturing drawings for this critical long-lead equipment sat in a junior clerk's in-tray awaiting approval. For this reason alone, the delivery schedule slipped two weeks, contributing to a later construction schedule conflict in tying-in the new services.

**Construction**

Site clearing was tackled early on with little difficulty. However, as the main construction got into full swing some eight months later, more significant problems began to appear. The change in production train specification made it necessary to add another five feet to the length of the new building. This was only discovered when holding-down bolts for the new train were laid out on site, long after the perimeter foundations had been poured. The catalogue descriptions and specifications for other equipment selected were similarly not received and reviewed until after the foundations had been poured.

Leadbetter was not entirely satisfied with the installation of the mechanical equipment for the dust-free paint shop. As a registered mechanical engineer, he knew that the specifications governed the quality of equipment, workmanship and performance. However, since these documents had still not been formally approved, he was loath to discuss the matter with Ivar Kontrak. Instead, he dealt directly with Amos Dent of Tinknockers Associates, the mechanical sub-contractor. This led to strained relations on the site.

Another difficulty arose with the paint shop because the local inspection authority insisted that the surplus paint disposal arrangements be upgraded to meet the latest environmental standards.

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**Startup**

Two years after the project was first launched, the time to get the plant into production rapidly approached. However, neither Moneysworth nor Leadbetter had prepared any meaningful planning for completion such as owner's inspection and acceptance of the building, or testing, dry-running and production start-up of the production train. They also failed to insist that EID obtain the building occupation certificate. Moreover, due to late delivery of the production train, the "tie-in" of power and other utility connections scheduled for the annual two-week maintenance shut-down could not in fact take place until two weeks later.

## These factors together resulted in a loss of several weeks of production. Customer delivery dates were missed and some general contractors cancelled their contracts and placed their orders for millwork elsewhere. Finished goods inventories were depleted to the point that other sales opportunities were also lost in the special products areas on which WoodyÍs reputation was ba**Control**

Costs arising from these and other changes, including the costs of delays in completion, were charged to Woody's account. Project overrun finally became reality when actual expenditures exceeded the budget and it was apparent to everyone that the project was at best only 85% complete. Cashman was forced to scramble for an additional line of credit in project financing at prime plus 2-1/2%, an excessive premium given Woody's credit rating. From then on, Woody's were in a fire fighting mode and their ability to control the project diminished rapidly. They found themselves throwing money at every problem in an effort to get the plant operational.

During WoodyÍs period of plant upgrading, construction activity in the region fell dramatically with general demand for WoodyÍs products falling similarly. Even though Sharpe launched an expensive marketing effort to try to regain customer loyalty, it had only a marginal effect.sed

**Post Project Appraisal**

The net result was that when the new equipment eventually did come on stream, it was seriously under utilized. Production morale ebbed. Some staff publicly voiced their view that the over-supply of commercial space could have been foreseen even before the project started, especially the oversupply of retail and hotel space, the prime source of Woody's contracts. John Carpenter, not a favorite with the older staff, was blamed for introducing these "new fangled and unnecessarily complicated ideas".

Because of this experience, Woody's President Emelia Carpenter retained project management consultant Win Easley of W. Easley Associates to conduct a post project appraisal. Easley had some difficulty in extracting solid information because relevant data was scattered amongst various staff, who were not keen to reveal their short-comings. Only a few formal notes of early project meetings could be traced. Most of the communication was on hand-written Speedy memos, many of which were undated. However, interviews with the key players elicited considerable information, as has been outlined above.