IPRO 319

Logistics Outsourcing Tool

Midterm Report

Instructor: Herb Shields, in consultation with Keith McKee, and David Pistrui

Sponsor: Warehouse Education and Research Council and the Kern Family Foundation

Team:
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Illinois Institute of Technology

October 17, 2006

1 Objectives

The IPRO 319 team's objective for this semester is to create a model of a distribution operation which will aid companies seeking to outsource logistics operations. However, the team's main objective is to create a web based application for efficient and cost-effective analysis allowing companies to determine the effectiveness of outsourcing any aspect of a warehouse. This team will also attempt to establish a strong team-working environment based on the knowledge and capabilities of each individual given their different fields of study for the successful completion of the goals presented for the IPRO group, as well as gaining useful experience and knowledge for every member.

During the fall semester, the team has set forth the following objectives:

- Analyze logistic processes (Shipping, Manufacturing, Transportation, etc.)
- Define crucial resources used in these processes and structure them
- Research costs associated with logistic processes
- Develop a model that represents these costs associated with logistic process
- Develop a web based Logistics Outsourcing Tool

2 Results to date

2.1 Project plan

The team prepared the project plan as submitted on September 22, 2006. The team consists of a project manager (Tito Rodriguez), assistant project manager (Amol Gunale) and secretary (Alexandra Romanova-Smith) led by professor Herb Shields, in consultation with Keith McGee and David Pistrui.

2.2 Meeting with project sponsors

Warehousing Education and Research Council (WERC) is a non-profit organization engaged in research of various warehousing activities and education of professionals in the field. The team had the opportunity to meet senior officials from WERC in our IIT classroom on September 7, 2006. Robert L. Shaunnessey is the executive director and Rita M. Coleman is the deputy executive director of WERC. They briefed us about the work done by WERC to help the warehousing industry. We got to know about the client's expectations for our tool and various parameters that should be incorporated in the tool.

WERC officials presented us with the WERC WATCH newsletter and WERC Sheet. These two documents gave us information regarding industry (warehouse) trends, conferences, seminars and other useful information regarding warehousing activity.

After the meeting with WERC the team discussed various parameters that we needed to have to prepare the Logistics Outsourcing Tool.

2.3 Warehouse visit

We decided to visit a warehouse so as to get first hand experience of warehousing activities. Herb Shields arranged a visit to a warehouse owned by the Strive Group.

Before visiting the warehouse, the team prepared a set of questions and forwarded those questions to the warehouse officials. This was done so that officials knew what type of information the team needed to get from the tour. The questions addressed various warehouse costs, operations and activities, etc.

The visit to the Strive Group warehouse occurred on September 22, 2006.The Strive Group provides warehouse services and secondary packaging operations to the personal care product and food industries.

The warehouse officials provided us with some financial documents. The documents described various parameters they record in order to keep track of costs and to determine efficiency of day to day work. For example, line managers record the hours of labor, the number of employees per line, and the output which is used to calculate the production cost.

A warehouse tour report was prepared by the Nickolay Schwarz and Alexandra Romanova-Smith to summarize what the team has learned from the tour.

2.4 Interviews with warehousing professionals

A PowerPoint presentation was prepared by Kerstin Hammer to describe the IPRO system in general and our particular project. The presentation was prepared for guest interviewees, Mr. Mark Wozniak and Mr. Bob Horwath who came to our class to share their warehouse experience with us.

On October 3, 2006, Mark Wozniak of Liquid Packaging, LLC and formerly with Helene Curtis and Unilever, answered the team's questions with regards to warehouse operations. Kabir Mehta briefed Mr. Mark Wozniak on the project using the PowerPoint presentation.

On October 5, 2006, the team had a meeting with Bob Horwath from Keystone Aniline Corporation on the aspects of financial analysis that is used in the industry to track warehouse costs. Kerstin Hammer briefed Mr. Bob Horwath on the project using the PowerPoint presentation.

2.5 Summary of accomplishments

Based on our visit to warehouse, journal research, and meetings with Mark Wozniak and Bob Horwath, the team made a list of parameters that would be included in our model. For example, important variables are costs such as equipment cost, labor cost, facility (building) cost, electricity cost, administrative cost, taxes, insurance cost, etc. The model would also include parameters such as total square feet area and usable square feet area, actual number of pallets stored and the capacity of warehouse to store the pallets. The important parameter in warehouses is number of pallets stored per square feet.

The team will prepare a web based application where the user can input all the costs mentioned earlier along with the square feet area available for the storage of material. The tool will present a comprehensive view of all these costs to user at a glance and will also calculate the cost per pallet stored in the warehouse. The tool will also show the percentage values of these various costs so the user can easily identify the processes which require more expenditure.

WERC will be able use the data put into this model for their analysis purposes and benchmarking since the team will provide a backend database where this data will be stored.

The team has decided on the tools needed to develop a web based application. The tools such as ASP.NET with C# code backend and SQL Server 2005 database backend will be used to develop the web based application.

There have been changes in group organization – the team is now divided into four main sub-teams. These are the model team, the tool development team, the quality assurance team, and the marketing team. The mathematical model team will develop the basic structure of the model in MS Excel . The tool development team will develop actual tool using computer applications described earlier. Quality assurance team will test the tool and will provide essential feedback to development team in order to make any changes, if any. The marketing team will prepare the various presentations for final IPRO day. For more information, please refer to section *4 Updated Task Assignments and Designation of Roles*.

The team secretary Alexandra Romanova-Smith has been posting meeting minutes on iGroups after every meeting.

3 Revised Task / Event Schedule

The team is currently following the schedule originally proposed in the project plan. There have been no changes to important project tasks pertaining to the problem solution or project design. The timeline has not changed in a significant way.

Please refer to the network diagram for summary tasks or sub-tasks pertaining to IPRO deliverables. Refer to the Gantt chart for all associated due dates, a revised estimate of hours needed and number of team members needed to complete each sub task.

The research phase of the project has been completed and the division into four sub-teams has occurred for further development. The division was based on the fact that the team will deliver several types of deliverables:

- Mathematical MS Excel model
- Web-based model
- Verbal sections for the model, *Suggestions* and *FAQ*
- IPRO deliverables, such as the poster and PowerPoint presentation

Sub-team members were selected in accordance to everyone's interests, previous experiences and abilities. The following is a list of the members, roles, and majors at IIT. See section *4 Updated Task Assignments and Designation of Roles* for sub-team assignments.

Name	**Role**	**Major**	**Other**
Bae, Juhan		Computer Engineering	
Cho, HyoungTae		Computer Science	
Christopherson, Sean R.		Manufacturing Technologies and Management	
Gunale, Amol Venkat	Team leader (assistant)	Master of Industrial Technology and	Warehouse experience

		Operations	
Hacker, Maxime		Computer Science	
Hammer, Kerstin		Computer Science	Interest in information systems
Mehta, Kabir		Computer Engineering	IPRO-experience
Rodriguez, Tito	Team leader; Weekly Timesheet Collector/Summarizer; Agenda Maker; Master Schedule Maker	Business	
Romanova Smith, Alexandra	Secretary; Minute Taker; Time Keeper	Architecture	
Schwarz, Nickolay		Computer Science	
Shields, Herb	Professor	Professor	

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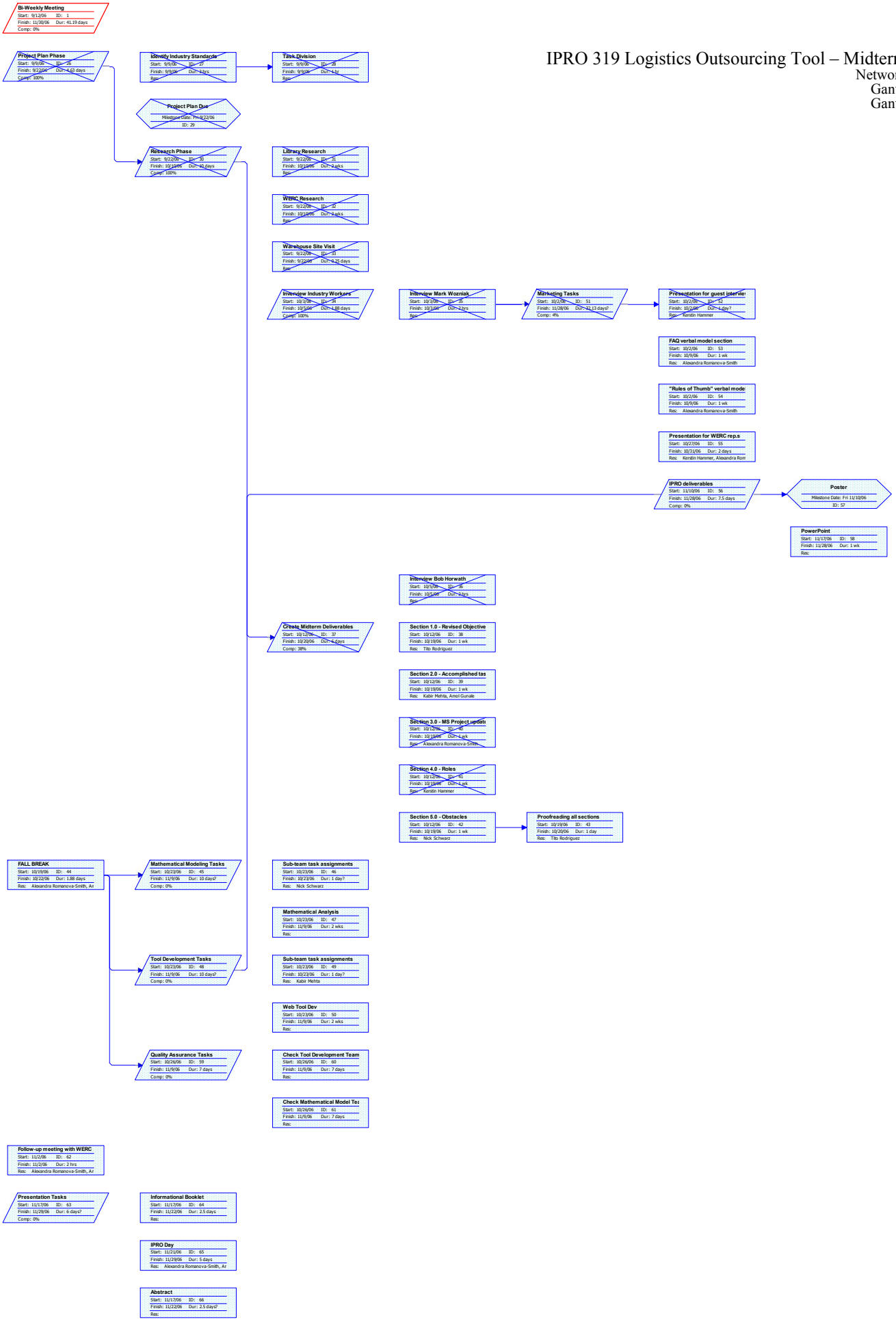
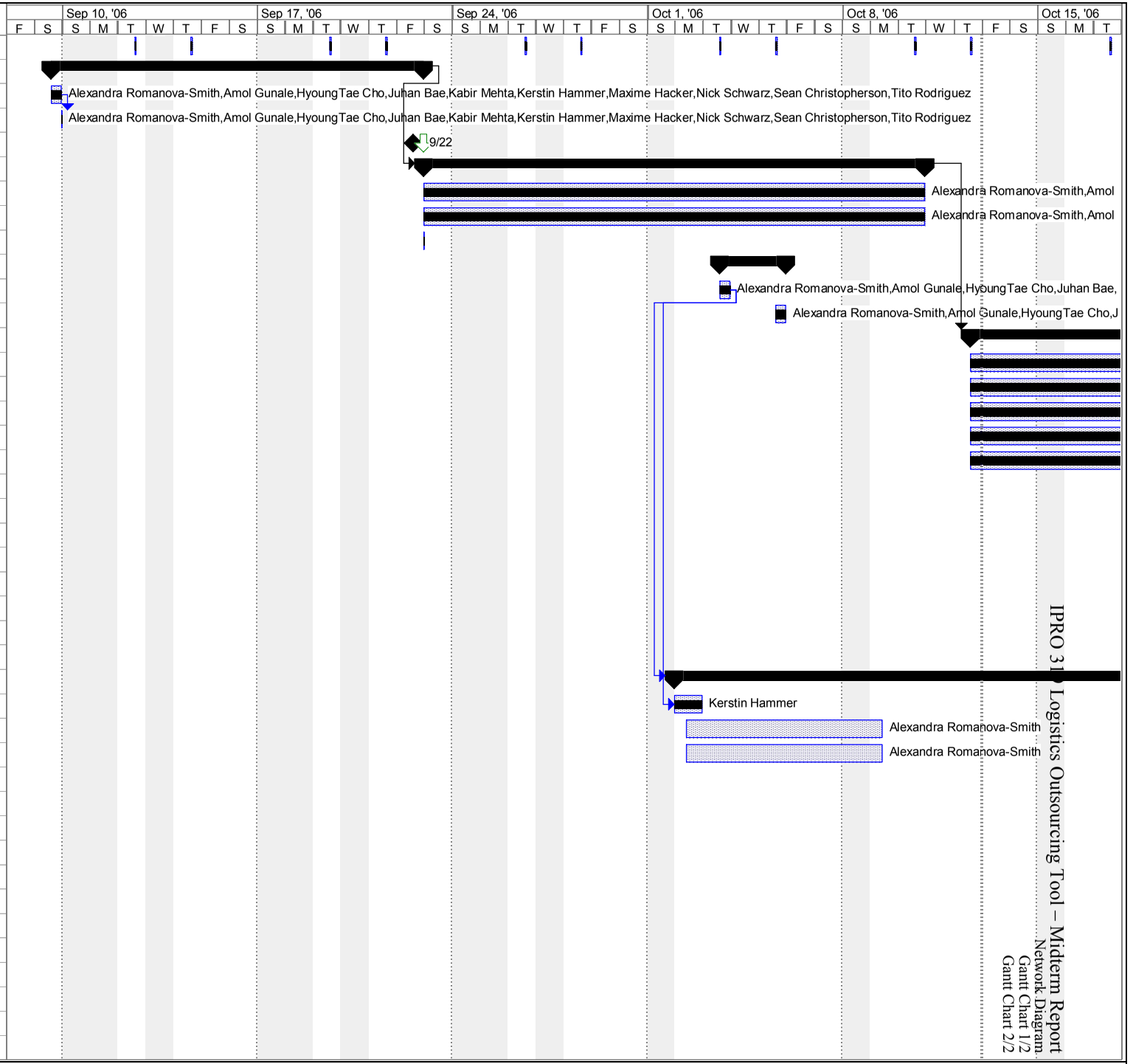
Network Diagram
Gantt Chart 1/2
Gantt Chart 2/2

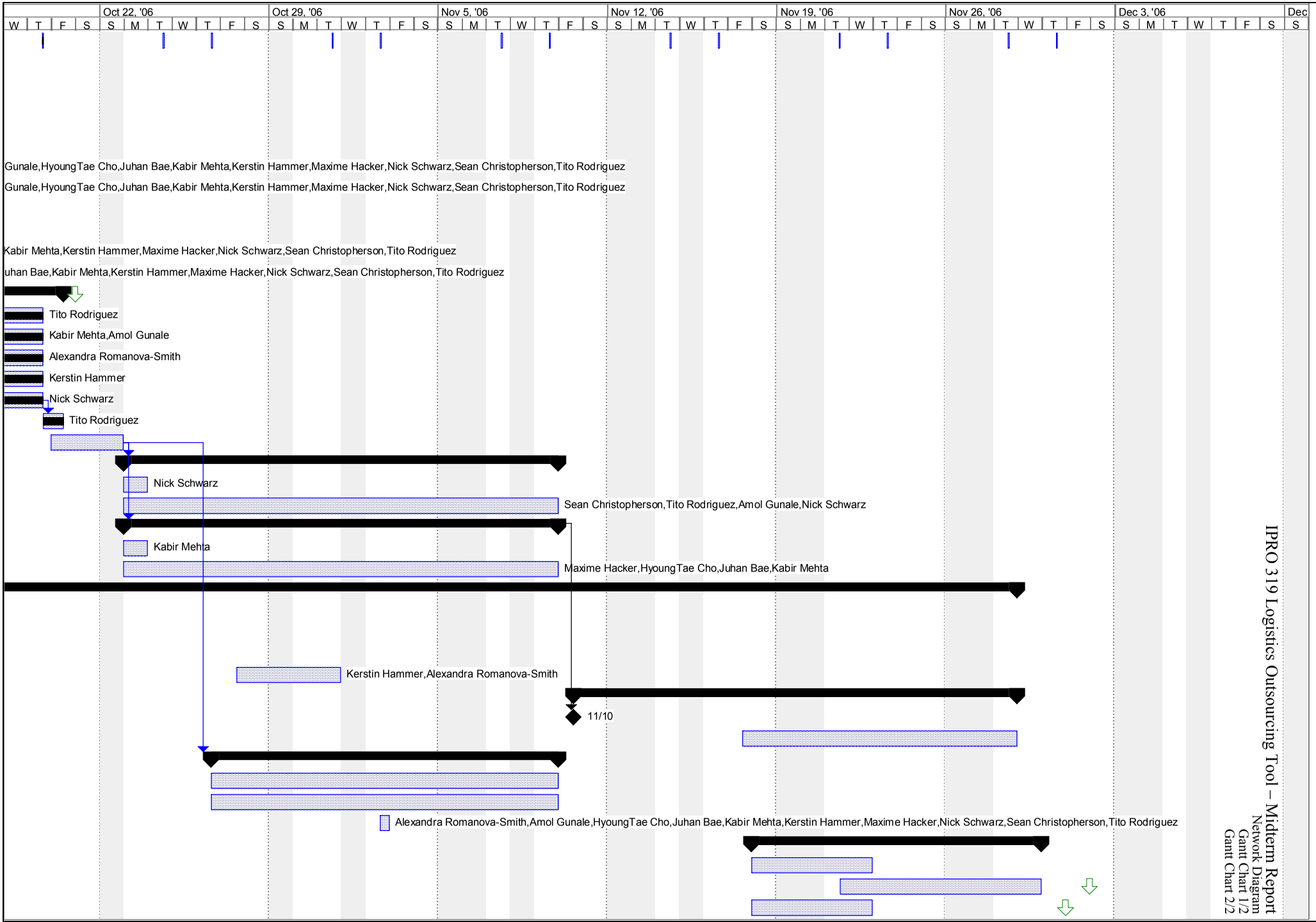


ID	Task Name
1	**Bi-Weekly Meeting**
26	**Project Plan Phase**
27	Identify Industry Standards
28	Task Division
29	Project Plan Due
30	**Research Phase**
31	Library Research
32	WERC Research
33	Warehouse Site Visit
34	**Inverview Industry Workers**
35	Interview Mark Wozniak
36	Interview Bob Horwath
37	**Create Midterm Deliverables**
38	Section 1.0 - Revised Objectives
39	Section 2.0 - Accomplished tasks
40	Section 3.0 - MS Project update
41	Section 4.0 - Roles
42	Section 5.0 - Obstacles
43	Proofreading all sections
44	FALL BREAK
45	**Mathematical Modeling Tasks**
46	Sub-team task assignments
47	Mathematical Analysis
48	**Tool Development Tasks**
49	Sub-team task assignments
50	Web Tool Dev
51	**Marketing Tasks**
52	Presentation for guest interviewees
53	FAQ verbal model section
54	"Rules of Thumb" verbal model section
55	Presentation for WERC rep.s
56	**IPRO deliverables**
57	Poster
58	PowerPoint
59	**Quality Assurance Tasks**
60	Check Tool Development Team's progress
61	Check Mathematical Model Team's progress
62	Follow-up meeting with WERC
63	**Presentation Tasks**
64	Informational Booklet
65	IPRO Day
66	Abstract



Project: ipro319
Date: Fri 10/13/06

Task	Summary	Rolled Up Progress	Project Summary		
Progress	Rolled Up Task	Split	Group By Summary		
Milestone	Rolled Up Milestone	External Tasks	Deadline		



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Date: Fri 10/13/06

Task	Summary	Rolled Up Progress	Project Summary		
Progress	Rolled Up Task	Split	Group By Summary		
Milestone	Rolled Up Milestone	External Tasks	Deadline		

4 Updated Task Assignments and Designation of Roles

Our current team organization is similar to the one we planned and recorded in the project plan. We concretized the tasks as we split up the work.

4.1 Designation of Roles

Team Leader: Tito Rodriguez

Assistant Team Leader: Amol Gunale

Minute Taker: Alexandra Romanova-Smith is in charge of recording decisions made during meetings including task assignments or changes under consideration.

Agenda Creator: Tito Rodriguez is responsible for creating an agenda for each team meeting. This provides structure to the meetings and offers a productive environment.

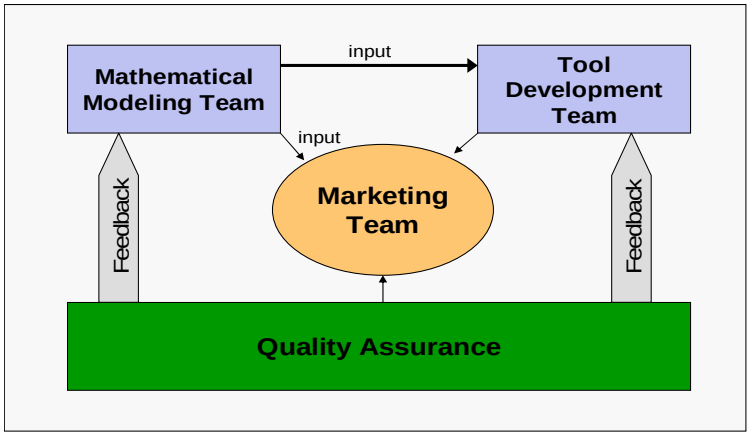
Time Keeper: Alexandra Romanova-Smith will be responsible for making sure meetings go according to agendas.

Weekly Timesheet Collector/Summarizer: Tito Rodriguez is responsible for collecting weekly timesheets from each member of the team and updating everyone with a summary report.

Master Schedule Maker: Tito Rodriguez is responsible for collecting schedules from all the team members and developing a master schedule, which tells the team when members are available and how to contact them.

4.2 Sub-teams: members and responsibilities

There are four sub-teams which closely interact with each other. The relationship between sub-teams is illustrated on the diagram below.



Mathematical Modeling Team

The team will develop and build the mathematical model on which the web tool is based. To build the model the team will use the software MS Excel.

At the beginning the whole IPRO-team discussed the variables used as input for the model and the desired output-data. Afterwards this team of four members is responsible for the overall mathematical model. During the development they work closely together with the development team which designs the web tool.

Name	Role	Responsibilities
Schwarz, Nickolay	Sub-team leader	Mathematical Model: Input and Output, Business Data
Gunale, Amol Venkat		Mathematical Model: Input and Output, Business Data
Rodriguez, Tito		Mathematical Model: Input and Output, Business Data
Christopherson, Sean R.		Mathematical Model: Input and Output, Business Data

Tool-Development Team

The team will develop the logistic outsourcing tool based on web technology. It will get input from the mathematical modeling team.

In general there are three different tasks which are important for the development of the online tool:

1. media and design of the model to build an usable and appealing graphical user interface (GUI) (front-end development)
2. development of the web-tool: programming and logic (backend development)
3. quality assurance (QA) by testing the model with all possible input

As the first two tasks are computer-science specific the QA will be done by everyone (see next sub team).

Name	Role	Responsibilities
Mehta, Kabir	Sub-team leader	Development
Hacker, Maxime		Media, Development
Bae, Juhan		Development
Cho, HyoungTae		Development

Quality Assurance (QA) Team

It is important that our logistic outsourcing tool works without producing any errors. Therefore we created a quality assurance team. Everybody in the IPRO team is part of this team.

The task is to make sure that the model works properly, detect every bug and make sure that it will be fixed. This will be done by testing the model with any possible input data, documenting the results (both correct and wrong output) and giving feedback to the other teams.

Even though the most work will for the quality assurance will be in the end, the testing should start early to detect bugs (both in the mathematical model as well as in the web tool) soon.

Name	Role	Responsibilities
Gunale, Amol Venkat	Sub-team leader	QA
Mehta, Kabir		QA
Hacker, Maxime		QA
Bae, Juhan		QA
Cho, HyoungTae		QA
Schwarz, Nickolay		QA
Rodriguez, Tito		QA
Christopherson, Sean R.		QA
Romanova Smith, Alexandra		QA
Hammer, Kerstin		QA
Shields, Herb		QA

Marketing Team

The marketing team is mainly responsible for all marketing material used throughout the project and at IPRO day, and at organizing the presentations for interview-guests and the IPRO day. It will also be involved in the design of the graphical user interface for the logistic outsourcing tool and will create the verbal sections for the model.

All the other teams will report to the marketing team with their results.

Name	Role	Responsibilities
Romanova Smith, Alexandra	Sub-team leader	Material for IPRO day, Presentations, Design and text for web tool
Hammer, Kerstin		Material for IPRO day, Presentations, Design and text for web tool

5 Barriers and Obstacles

As we began the project, IPRO team 319 encountered barriers and obstacles that slowed us down and raised certain questions of dealing with identified barriers. The main obstacle for the development of the model is the unpredictability and complexity of real world businesses. It is impossible to model every real warehouse due to the extreme differences among them and the number of values that has to be figured out, predicted and evaluated. This obstacle is a really important issue but of course there is a way to overcome it by simplifying. As a team, we decided to select a general, most-common and typical warehouse as the starting point. We had to leave out some functions of the more complex warehouses, otherwise this model could never be completed in one semester. Also, a very complex model would require a great amount of resources to analyze. As a result, the following costs were removed from the model: transportation cost, cost of outside activities, assembly lines, display operations and others. This simplification made it possible to create a general and understandable model.

One of the other obstacles we have met was the understanding of important variables we have to consider along with the cost per pallet variable (our basic output variable). We have faced this issue early on and resolved it by having great interviews with expects in warehouse/distribution business. All team discussion along with brainstorming and information from experts allowed us to select the variables that will help consumers of our product in their decision-making process. Fortunately for the team we have not encountered problems within the team and since 3rd week we have working together with a lot of effort from each member. Our knowledge of ethics, team cooperation, management and individual skills and abilities allows us to advance through the project quickly and effectively. We do realize that there is a possibility of barriers or obstacles that can appear during later work. Some of them could be lack of time, difficulty of modeling the warehouse, unrealistic program results, loss of interest of the members and others. However, we are ready to face them and solve them both independently and as a team.