Planning

1 Project Organization

What is intermodal transportation?
According to William De Witt and Jennifer Clinger, intermodal transportation is defined as, "the use of two or more modes to move a shipment from origin to destination. An intermodal movement involves the physical infrastructure, goods movement and transfer, and information drivers and capabilities under a single freight bill."[1] The modes of transportation can vary and include air, ocean, rail, road, etc., but this IPRO will focus primarily on rail and road systems. Intermodal transportation is made possible by containerization, which is the use of a standardized container that can be loaded, sealed, and then transferred between transportation media without involving the contents of the container itself. For example, to make a shipment from Los Angeles to London, the product would follow a path similar to this:

- Product packed into a container on the back of a truck
- Truck driven to an intermodal yard, where the entire container would be loaded onto a train
- Container would travel by train to New Jersey, where a crane would transfer it onto a ship
- Ship would arrive in London, where the container, in the same condition as when it was first packed in Los Angeles, would be further transported to its destination

Why is intermodal transportation important?
Intermodal transportation increases efficiency in moving products. Time is saved because individual products do not need to be transferred between transportation modes. This results in money saved, both because more products can be shipped in less time and because less labor is required at the transfer sites. As the containers remain intact throughout their journey, there is a lower probability of losing products or confusing cargo.

Intermodal transportation eliminates some of the logistical limitations of shipping cargo, allowing for innovation in other areas of business. "For example, a true intermodal hub would be the kind of place where it would be possible to deliver same-day turnaround on emergency orders—even if those orders came at the eleventh hour—because there are so many shipping alternatives. Such flexibility is especially important for medical device and equipment manufacturers, for whom a delay of a day in shipping an item such as a

[1] Clinger, Jennifer and DeWitt, William. *Intermodal Freight Transportation.* <http://onlinepubs.trb.org/onlinepubs/millennium/00061.pdf>

replacement part could mean, for instance, the loss of thousands of dollars in diagnostic services, not to mention valuable customer goodwill."[2]

What is the scope of this IPRO?

As previously mentioned, this IPRO will focus on the road and rail modes of transportation. Specifically, the team will investigate intermodal rail yards that specialize in transferring containers from trucks to trains, and vice versa. It will then put this knowledge to use by designing an actual intermodal rail yard for the Gary, Indiana area. **The objective of this IPRO is to produce a thorough site plan for the Gary rail yard, a computer program to communicate with truck drivers, and an encompassing business plan.** The site plan will include:

- An overall site schematic
- A design for a bridge on Clark Road
- A design for the yard's visitor's center

The location and layout of the site was already determined by IPRO 307 in Spring 2007. The IPRO team will need to document changes and integrate its work.

Clark Road is a two lane road that provides access to the lakefront, other industrial sites, and the rail yard itself, but crosses eleven railroad tracks at grade level. This presents safety concerns as trucks can get stuck in the middle of tracks and the angle of the road limits truck drivers' ability to see approaching trains. Furthermore, there is no pedestrian path, and the narrowness of the road would not be able to handle the volume of trucks necessary for an intermodal yard. As such, the team will investigate solutions involving a bridge that would be wider, would include a pedestrian path, and would improve the aesthetic of the rail yard.

A visitor's center is essential to appeal to the local community and to visitors, and to portray the rail yard as an attraction as opposed to a hindrance. The IPRO team will design a visitor's center that explains intermodal transportation, displays the history of industrial Gary and its rebirth as a green area, allows observation of the rail yard, and improves the aesthetic of its surroundings.

One challenge to intermodal transportation yards is the congestion of trucks coming to pick up cargo or leaving the yard with fresh cargo. In addition, scheduling conflicts, miscommunication, and delays can result in idle trucks and containers clogging flow lines around the yard. To combat this problem, the IPRO team will develop a web-based program that allows truck drivers to check the status of their containers from local rest stops, keeping them miles away from the yard while they wait. The skeleton of the program (called the Gary Wide Area Network, or GWAN) was developed by IPRO 307 in Spring 2007, but the Fall 2007 team will refine it and turn it into something deliverable.

[2] Dixon, Russ and Pettit, Bill. Medical Device & Diagnostic Industry magazine. 1999. <http://www.devicelink.com/mddi/archive/99/09/005.html>

Finally, the development of the yard will certainly be an expensive undertaking. The team will draft a business plan that takes into account expenditures and fundraising opportunities associated with this project.

The IPRO is sponsored by Mi-Jack Products, Inc., a company based in Hazel Crest, Illinois that specializes in cranes and lifting machines that are used especially for intermodal yards. According to the company website, "Mi-Jack Intermodal is the undisputed leader in providing equipment to the railroad and port intermodal industry."[3]

Mi-Jack equipment at an intermodal yard

[3] <http://www.mi-jack.com/History.htm>

2 Task Definition

2.1 Work Breakdown Schedule

Task_Name	Start_Date	Finish_Date
IPRO Deliverables	**9/6/2007**	**11/29/2007**
Project Plan	9/6/2007	9/28/2007
Midterm Report	10/9/2007	10/14/2007
Midterm Presentation	10/9/2007	10/14/2007
Website	10/23/2007	11/22/2007
IPRO Day Presentation	11/13/2007	11/29/2007
IPRO Day Poster	11/15/2007	11/22/2007
IPRO Day Model	11/1/2007	11/27/2007
Final Report	11/6/2007	11/22/2007
Site Plan	**9/4/2007**	**10/30/2007**
Package for developer	9/4/2007	9/6/2007
Research other sites	9/4/2007	9/20/2007
Generate report of site plan	10/4/2007	10/18/2007
Check site design against codes	10/23/2007	10/30/2007
Check bridge design against codes	10/16/2007	10/23/2007
Check visitor's center design against codes	10/15/2007	10/18/2007
Bridge Design	**9/4/2007**	**10/30/2007**
Research similar projects	9/13/2007	9/20/2007
Determine feasibility of widening road	9/27/2007	10/2/2007
Design concepts	9/4/2007	10/9/2007
Pick a design	10/15/2007	10/16/2007
Make deliverables	10/18/2007	10/30/2007
Visitor's Center Design	**9/4/2007**	**10/30/2007**
Design concepts	9/4/2007	10/2/2007
Pick a design	10/4/2007	10/9/2007
Make deliverables	10/30/2007	10/30/2007
Determine location	10/2/2007	10/4/2007
GWAN Development	**9/11/2007**	**10/30/2007**
Scalability study	9/20/2007	10/2/2007
Integrate new attributes	10/4/2007	10/11/2007
Truck stop design	9/11/2007	10/4/2007
Improve aesthetics	10/16/2007	10/30/2007
Business Plan	**10/2/2007**	**11/15/2007**
Research business plans	10/2/2007	10/11/2007
Cost Analysis	10/18/2007	10/25/2007
Formal writeup	10/30/2007	11/15/2007
Milestones		
Midterm report and presentation	10/15/2007	
Sub-project deliverables done	10/30/2007	
IPRO Day	11/30/2007	

2.2 Summary Tasks Defined

- Produce a site plan for the intermodal yard
- Design a bridge for Clark Road
- Design a visitor's center
- Refine GWAN
- Draft a business plan
- Submit IPRO deliverables

2.3 Individual Tasks Defined

Because the layout and location of the site has already been determined, this IPRO will need to include its additions to the site plan and check that it meets zoning and other codes. The team will need to:

- Create a package summarizing the state of the project at the beginning of the semester for the developer
- Research other intermodal yards to get ideas and better understand the subject matter
- Draw up a report of the site plan, including what the team plans to add
- Make sure the proposed solutions are in accordance with zoning and other applicable codes for:
  - Site plan
  - Bridge
  - Visitor's center

To produce a functional and aesthetically pleasing bridge, the team will:

- Research similar industrial-location projects to get ideas
- Determine the feasibility of widening the road to more than two lanes
- Brainstorm ideas and concepts for the bridge
- Determine which concept will be pursued
- Create drawings, reports, and other applicable deliverables

To produce a functional and aesthetically pleasing visitor's center, the team will:

- Determine the optimal location
- Brainstorm ideas and concepts for the building itself
- Determine which concept will be pursued
- Create drawings, reports, and other applicable deliverables

In order to submit a version of GWAN that will convey its potential advantages to the client, the team will:

- Study the scalability of the program and brainstorm possible expansions and improvements
- Integrate new ideas into program through coding
- Roughly conceptualize the truck stop, including integration of wifi for GWAN accessibility
- Improve the aesthetics and interface of the program

As this IPRO is cooperating with a sponsor and attacks a financially relevant real-world problem, the team will:

- Research business plans to gain knowledge in the field and prepare to create one
- Perform cost analysis on the proposed intermodal yard and determine fundraising opportunities
- Write a report featuring the business plan itself

The following IPRO Deliverables will be submitted:

- Syllabus
- Project Plan
- Midterm Report
- Midterm Presentation
- Website
- IPRO day presentation
- IPRO day poster
- IPRO day model of the yard
- CD_ROM
- Final Report
- Meeting Minutes

3 Start & End Dates / Duration

3.1 Start and End dates for tasks listed

See Work Breakdown Schedule, §2.1.

3.2 Hours Estimated for Tasks

Task_Name	Estimated Time Commitment (in hours)
IPRO Deliverables	**310**
Project Plan	25
Midterm Report	20
Midterm Presentation	10
Website	15
IPRO Day Presentation and rehearsal	100
IPRO Day Poster	10
IPRO Day Model	100
Final Report	30
Site Plan	**87**
Package for developer	2
Research other sites	10
Generate report of site plan	25
Check site design against codes	20
Check bridge design against codes	15
Check visitor's center design against codes	15
Bridge Design	**160**
Research similar projects	5
Determine feasibility of widening road	20
Design concepts	30
Pick a design	5
Make deliverables	100
Visitor's Center Design	**140**
Design concepts	30
Pick a design	5
Make deliverables	100
Determine location	5
GWAN Development	**70**
Scalability study	20
Integrate new attributes	25
Truck stop design	10
Improve aesthetics	15
Business Plan	**140**
Research business plans	40
Cost Analysis	50
Formal writeup	50

As can be seen, approximately 907 hours have been delegated. The team has 11 weeks to finish the project, and each of the 12 members is expected to work 8 hours outside of class per week. This yields 11*12*8 = 1056 hours total. The 149 hours not yet accounted for will be used for peer review, meetings, correspondence, field trips to sites, etc.

3.3 Tasks Assigned to Individuals

- The tasks associated with bridge and visitor's center design, site planning, GWAN development, and the business plan will all be assigned according to sub teams (see §5.1)
- IPRO deliverables will be assigned as follows, and will be organized and managed by the IPRO Deliverables Team:

    - Project Plan: Jack, Jim
    - Midterm Report: Jack, Christine, Sabine
    - IPRO Day Poster: Matt W, Peter, Marek
    - Final Report: Zack, Matt S, Jac, Arnold, Renee
    - Website and CD-ROM: Zack, Jim, Christine
    - The IPRO Day Presentation and model will be collaborative projects involving the entire team
    - The team rotates taking meeting minutes and running the subsequent meeting

3.4 Gantt Chart or Equivalent

Refer to Gantt chart at the end of the report or ProjectPlan307.mpp

Organizing

4 Team Members

Name	Major	Skills & Strengths	Roles & Tasks
Christine Atterberry attechr@iit.edu	Architecture 5th year	Computer drafting and rendering, webpage design, experience in architecture firm	Site Planning Team, IPRO Deliverables Team Leader, midterm report, website
Renee Bartosik rbartosi@iit.edu	Architecture 5th year	Skilled with Adobe Illustrator and Photoshop, AutoCAD, and 3D Max and Sketchup	Site Planning Team, final report
Peter Beran berapet@iit.edu	Architecture 5th year	Experience with construction documentation and permits	Site Planning Team, Built Environment Team Leader, poster
Zachary Borschuk borszac@iit.edu	Computer Science 3rd year	Programming experience with Geico, Intel, skilled with multiple programming languages and Photoshop	Business Team, final report, website and CD-ROM
Jack Dobbin dobbjac@iit.edu	Applied Mathematics 4th year	Interest in finance and business, experience in architecture firm	Business Team Leader, IPRO Deliverables Team, project plan
Arnold Ibardaloza ibararn@iit.edu	Architecture 5th year	Interest in architecture and urban planning	Site Planning Team Leader, Built Environment Team, final report
Sabine Kollwitz kollsac@iit.edu	Architecture 5th year	Experience in a structural engineering firm	Built Environment Team, midterm report
James Meyer jmeyer11@iit.edu	Electrical Engineering 3rd year		Built Environment Team, Business Team, project plan, website and CD-ROM
Matt Schulz schumat3@iit.edu	Civil Engineering 5th year	Real-world construction and cost estimation experience	Business Team, final report
Jac Selinsky selijac@iit.edu	Architecture 5th year	Skilled with AutoCAD, Adobe CS3, and making models	Built Environment Team, final report
Matt Walczuk walcmat@iit.edu	Architecture 5th year	Interest in urban planning and architecture, site strategy	Site Planning Team, Built Environment Team, poster
Marek Wisniewski wisnmar@iit.edu	Architecture 5th year	Skilled with CAD, software consultant, experience with design build/construction documentation	Built Environment Team, poster

Advisors	
Laurence Rohter rohter@iit.edu	Adjunct Professor for the Department of Civil and Architectural Engineering Illinois Institute of Technology
Peter Mirabella pmirabel@qsales.com	Mi-Jack representative

5 Accountability and Role Allocation

5.1 Sub Teams

(*denotes team leader)

- Site Planning Team
- Responsible for the site plan, zoning and code checking, and other tasks associated with the site plan (See §2)
    - Arnold*
    - Matt W
    - Christine
    - Renee
    - Peter

- Built Environment Team
- Responsible for bridge and visitor's center designs, deliverables, and associated tasks
    - Peter*
    - Sabine
    - Marek
    - Jac
    - Matt W
    - Arnold
    - Jim

- Business Team
- Responsible for business plan, GWAN development, and associated tasks
    - Jack*
    - Jim
    - Zack
    - Matt S

- IPRO Deliverables Team
- Responsible for organizing, delegating, and compiling IPRO deliverables
    - Christine*
    - Jack

Controlling

6 Expected Results

6.1 Deliverables Described

Master Plan deliverables:

- Multi-layered, interactive map of Gary (with 3D models), comparing:
  - What Gary believes zoning to be
  - Actual state of Gary zoning
  - Possible improvements to produce higher levels of traffic

Bridge Design deliverables:

- Schematic plans of all levels
- Schematic sections, transverse and longitudinal
- Physical model for master plan table
- 3D model and animation of design

Visitor's Center Design deliverables:

- All relevant plans (floor, roof, etc.)
- All relevant elevations
- Longitudinal and cross sections
- Interior and exterior perspective renderings
- Programmatic and/or functional diagrams

Business deliverables:

- Functioning version of GWAN
- Cost analysis for proposed plans
- Business plan

6.2 Key Milestones Identified

- Oct. 15 Midterm report and presentation completed
- Oct. 30 Sub-project deliverables completed
- Nov. 30 IPRO Day

6.3 Budget Provided

The team will need approximately $150 to construct the IPRO day model. Since the attributes of the model are not yet known, it is impossible to give a more specific breakdown of materials and prices at this time.

In terms of budgeting time, each member of the IPRO is expected to devote eight hours per week on the project.

6.4 Key Results Described

The results hoped to be achieved by this IPRO include the completion and manifestation of all objectives described in §2.

7 Performance Metrics Data Gathering & Documentation Tools/Processes

7.1 Recording Meeting Minutes Assigned

As mentioned in §3.3, each member of the IPRO team will be responsible for taking minutes and leading the subsequent meeting, and the team will rotate throughout the semester.

7.2 Filing and Organizing Weekly Timesheets Assigned

Weekly progress and reports will be documented in the meeting minutes.

7.3 Preparing Weekly Task List Assigned

Weekly task lists will also be included in the meeting minutes.

7.4 iGROUPS Coordination Assigned

It is the responsibility of all members of the IPRO to coordinate with and utilize iGROUPS.