IPRO 333: Fab Lab

Spring 2009

PROJECT PLAN

Instructor David Gatchell

Collaborators The Museum of Science and Industry
Steven Willis - Director, Fabrication Laboratory,
Brett Balogh – Instructor, IIT

IPRO Team:
Robert Boyer
Lawrence Chung
Michael Gajdorus
Keenan Gottschall
Rachel Hendricks
Joseph Luciani
Nicolle Mallinger
Paul Marks
Patricia Murman
Anne Nadler
Shunsuke Nakano
Leslie Obst
Treyson Ptak
Ivan Reyes
Adam Winterbauer

Illinois Institute of Technology

February 6, 2009

Abstract

Fabrication Laboratories, or Fab Labs, were started as a community outreach program by the Massachusetts Institute of Technology providing digital fabrication tools for rapid prototyping to the general public. The Museum of Science and Industry has partnered with IPRO to further develop the Fab Lab at their site. IPRO 333 has been rendered the task of working with the administration in the Fab lab of MSI to design methodologies for furthering the use of the laboratory and assisting in determining its end goals for both the museum and the community by working with the lab directors to broaden the possible uses of the lab, promoting membership at the Museum of Science and Industry in Chicago, and involving the community in science and technology programs at the museum.

In order to accomplish our tasks we have broken into three main teams, each of which will focus on a different aspect of the lab. The first team will be responsible for creating events specific to the museum members, creating proposals for low-cost, high-profit activities for the lab, and possibly creating a website where users of the lab may sign up for time in the lab, reserve or order materials, and rent storage space for long term projects they wish to work on. The second team is responsible for integrating the Fab Lab into the current working exhibits as well as future exhibitions. The third team will be responsible for designing and creating new programs for users of the Fab Lab, such as the students enrolled in the Science Achievers program or museum members.

Contents

I. Background

Currently there are thirty-four Fabrication Laboratories (Fab Labs) spread across nine countries. What began as a rapid prototyping platform developed by the *Center for Bits and Atoms* at the Massachusetts Institute of Technology (MIT) in August 2007 has quickly emerged as the future of small scale industry. As such, Fab Labs are meant to encourage local entrepreneurs to take their own ideas from the drawing board to prototypes to starting local micro businesses. More importantly, Fab Labs also teach users critical skills in computing, electronics, programming, and CAD/CAM fabrication techniques; which remain a set of internationally recognized skills. A lab typically contains groups of off-the-shelf, industrial-grade fabrication and electronics tools, wrapped in open source software and programs.

What IPRO 333 aims to do is take the knowledge, education, and fresh ideas of young engineers, architects, and scientists of IIT and pair that up with the resources of the Fab Lab at the Museum of Science and Industry in Chicago (MSI). This partnership hopes to utilize the current Fab Lab at MSI to its fullest potential by designing future projects for museum visitors. While past Fab Lab programs were primarily designed to solve critical issues within the local community, IPRO 333 will concentrate on the education of client groups such as; high-school science achievers, museum guests (children and adults), and members. We will also focus on creating a new advertising and marketing strategy for the lab as well as, possibly creating a robotics component within the lab, creating a website for the lab, proposing new ideas for members only events, and integrating the Fab Lab further into the MSI itself. In doing so, we will introduce people of all ages in the greater Chicago-land area to the MSI and its Fab Lab so that we may stimulate the minds of future generations of scientists, architects, and engineers.

II. Objectives

This semester the objectives of IPRO 333 are to:

- educate the Fab Lab employees on the capabilities of the lab by introducing local expertise in the form of IIT professors and advanced students
- define potential programs for the user groups of the lab to include:
    - pre-lab exercises to introduce users to the lab tools, software, and its safety measures
    - user tutorials to facilitate more independence among the users
    - quick reference cards that provide visual cues to guide a project
    - predefined projects to fit into a specific time frame which are age appropriate according to the standards of the National Science Foundation
- create and implement new marketing strategies for the Fab Lab
- propose ideas for members only events
- integrate the Fab Lab into the current working exhibits as well as future exhibitions
- record a catalogue of all ideas regarding the possibilities of the Fab Lab for future semesters of this IPRO to draw upon

In addition this IPRO aspires to:

- Create a safe workshop in which children can operate the machinery under the supervision of the museum staff.
- Coordinate a program with other Fab Labs that allows for the sharing of ideas, past experiences, successes, and failures.
- Develop a program that allows for the continuation of projects over numerous sessions. This would include museum storage and pertain mainly to museum members.

III. Methodology

A. The Problem

The problem presented to this IPRO is that the Fab Lab is underdeveloped and underutilized. We will be working with the MSI Fab Lab to develop plans to improve the lab and expand its usage. We started this semester by beginning to familiarize ourselves with the Fab Lab and its associated problems. Our first visit to the Fab Lab was conducted on January 29, this allowed the group to become familiar with the lab and to better define the scope of our projects for this semester. In this first visit, we determined that the staff of the Fab Lab could benefit from the expertise offered by the students and faculty of IIT as well as any other potential collaborators.

B. Plan of Action

- We will make weekly visits to the Fab Lab. In the first half of this semester these visits will allow us to meet with the Fab Lab staff and work with them in developing their goals as well as our own.
- During the first half of the semester, we will offer the staff of the Fab Lab the experience of this group to increase their understanding of the capabilities of the Fab Lab tools. We will also bring IIT professors, experienced in working with and teaching students about these tools, to the lab. As part of this process we will ensure that the tools are in proper working order.
- New marketing strategies and styles will be developed and implemented for the Fab Lab.
    - Web development (e.g. MSI Website, Wikipedia, Fab Lab network)
    - Mailing lists (e.g. Members, local schools)
    - Advertising (e.g. Newspapers, radio, member events)
- The programs previously developed will be user tested at the MSI Fab Lab. The success of the programs will be determined by surveys given to the users before and after their completion of the program. The surveys and observations from the testing will be analyzed, so the results may be implemented in writing future programs.
- The new programs will be completed and ready to be tested for their designated user groups, whether they are for third-grade students or adult museum members.
- The semester will close with a “launching” of the Fab Lab in the form of a members and MSI staff party during which the members will get an inside look at the lab and its possibilities.

C. Documentation

Throughout the semester, an engineering notebook will be used to record the results of our research. The materials produced for our programs (surveys, pre-lab worksheets, step-by-step instructions and photos of finished projects) will also be provided, as well as the results of our program testing. The team members will also contribute, in the notebook, to a compendium of ideas for possible implementation in the Fab Lab for future semesters of this IPRO to draw upon. Weekly status reports generated by each team will also contribute to our documentation.

IV. Budget

Item	Estimated Cost ($)
Transportation Reimbursement	$225.00 (3 vehicles, $75.00/vehicle)
Prototyping Materials	$450 .00 (e.g. 1' x2' acrylic piece = $15.00)
Public Relations (for food, meeting with representatives from M.S.I, etc)	$150.00
Miscellaneous	$50.00
Total	$875.00

V. Team Structure

A. Team Structure Chart

Name	Major	Skills/Interests	Experience	Cluster
Robert Boyer	Biomedical Engineering (3rd Year)	Possesses strong social, language, and task management skills. Proficient in MATLAB and Microsoft Office Suite.	Marketing and student organization leadership experience	2
Lawrence Chung	Biomedical Engineering (3rd Year)	Experienced project team member/leader. Proficient in Microsoft Office Suite, Visio, and MATLAB.	Prior IPRO experience as a presenter and team leader.	2
Michael Gajdorus	Architecture (4th Year)	Proficient in CorelDraw, Microsoft Office Suite, and Photoshop	Shop and digital fabrication experience	2

Keenan Gottschall	Political Science (3rd Year)	Proficient in AutoCAD, Microsoft Office Suite, and Quicken accounting software	Shop experience, laser-cutter certified, and student organization leadership, previous IPRO experience	2
Rachel Hendricks	Biochemistry (3rd Year)	Proficient in Microsoft Office, Sequencer. Time and organizational skills. First aid and CPR.	Safety training, administrative and leadership experience	2
Joseph Luciani	Architecture (4th Year)	Experienced in various software platforms used in design and digital fabrication. (Including: Digital Project, Sketch-up) Microsoft Office, Hand drafting and rendering, Free-hand sketching, Model-making, Field measuring, Digital Cameras, Welding, and Custom carpentry.	Design/Build, CAD development and Digital media, and conceptual design & fabrication experience. Intern for Heffernan Holland Morgan Architecture, growing interest in digital fabrication and design.	2
Nicolle Mallinger	Civil Engineering (4th Year)	Experienced in use of design software, strong organizational skills, time management, and inter-group relations.	Leadership experience in student organizations.	3
Paul Marks	Biology (3rd Year)	Solid communication skills, problem solving mindset, and adept at acquiring new skills quickly.	Electrical, landscaping, and mechanical construction experience.	3
Patricia Murman	Psychology Criminal Justice (3rd Year)	Mechanical skills: engines and wiring Basic wood working, Microsoft office, Excel; Photography, Painting.	Worked for a contractor in construction, painting and simple demolition. NJROTC: Leadership and skill development. Academic interest: Forensic Profiling, the technical aspects of a lab and educational methods.	1
Anne Nadler	Mechanical Engineering (4th Year)	Experienced in Pro-Engineering and AutoCAD software. Familiarity with Shape Deposition Manufacturing machine. Organization skills, time management skills	Leadership experience in student organizations.	1
Shunsuke Nakano	Architecture (5th Year)	Experienced in AutoCAD, rhinoceros, illustrator. Photoshop, 3dsmax, laser-cutter	Familiarity with digital fabrication.	3

Leslie Obst	Mechanical Engineering (4th Year)	Strong organizational skills	Previous IPRO experience	2
Treyson Patek	Architecture (5th Year)	Well versed in various shop and computer skills, photography, drawing, and music. Interested in light weight building technologies, architecture in general, and philosophy.	16 years of Job experience including military, and various cooperate duties, even as a professional stunt man.	1
Ivan Reyes	Architecture (5th Year)	Experienced in various software platforms used in design and digital fabrication. (including: Revit Architecture 2008, Pro-Steel 3D V16.3) Power Point, Microsoft Word and Excel	9 years of job experience in architecture / engineering, and drafting abilities. A Master's of Architecture in Landscape.	3
Adam Winterbauer	Biochemistry (3rd Year)	Organizational, problem solving, and time management. Proficient in Microsoft Office Suite.		2

- Group One: Marketing and developing strategies to promote the Fab Lab.
- Group Two: Integration of the Fab Lab into the current working exhibits as well as future exhibitions.
- Group Three: Refine and develop projects for museum members and students.

B. Team Tasks

The initial steps taken in dividing the team involved identifying the major themes requiring the most attention. In that, the classification of task subsets could be established. Ultimately, the first breakdown assessment resulted in following three clusters:

Cluster 1 (Project Development)

- Settings for machines/Tutorials
- Software Tutorials
- Projects Tutorials for K-12
- Procuring materials
- Working with exhibits
- 5 week workshop
- How to Build Anything

Cluster 2 (Communication)

- Web Development
- Advertising and marketing
- Working with other IPROs
- Event to showcase
- Working with other Fab Labs
- Steven's boss and her 57 Companies
- Networking with educational professionals

Cluster 3 (Shop Development)

- CNC running
- Enclosure
- Storage
- Inventory/ Comparing to center for Bits and Atoms
- Funding

C. Breakdown Logic

Group One:

As requested by the staff of the Museum of Science and Industry, our group is working to create events specialized to Museum members as well as creating proposals for low-cost, high-profit events; marketing and advertising strategies for the lab; and possibly creating a website where people may sign up for time in the lab, designate projects they would like to do, buy (or reserve) materials, rent storage space for long term projects, and view general information about the lab itself.

Patricia Murmon: Team Lead
Treyson Ptak
Anne Nadler
Keenan Gottschall

Group Two:

Considering there are dozens of planned or current exhibitions put on display at the Museum of Science and Industry, Team Two's goal will be to integrate the Fab Lab into the current working exhibits as well as future exhibitions. Our team will focus on the use of small projects that reinforce the interactive learning of both the Fab Lab as a learning tool and the museum as a experience. We hope to establish strong connections & responsibilities within the museum by coordinating with the different departments to present the Fab Lab as a resource for both members and the museum itself.

Joseph Luciani: Team Lead
Shunsuk Nakano
Leslie Obst
Rachel Hendricks
Adam Winterbauer
Robert Boyer

Group Three:

Group three's first goal will be to refine the four main Fab Lab projects purposed last semester. This will include troubleshooting the manuals and delivering a prototype to a test group to be evaluated by mid-semester. A finalized prototype for each project will be integrated into the Fab Lab program for use by members. Group three will also try to develop more projects for the Fab Lab. These new ideas will try to integrate other exhibits in the museum, be educational to different age levels, and be eventually prototyped.

Ivan Reyes: Team Lead
Paul Marks
Nicolle Malinger
Michael Gajdorus
Lawrence Chung

D. Project Monitoring Roles

- Minute Taker: Rachel Hendricks
- Agenda Makers: Treyson Ptak
- Deliverable Coordinator: Leslie Obst
- Weekly Time sheet Collector/Summarizer: Nicolle Malinger
- Master Schedule Maker: Anne Nadler
- iGroups Webmaster / Binder Organizer: Lawrence Chung

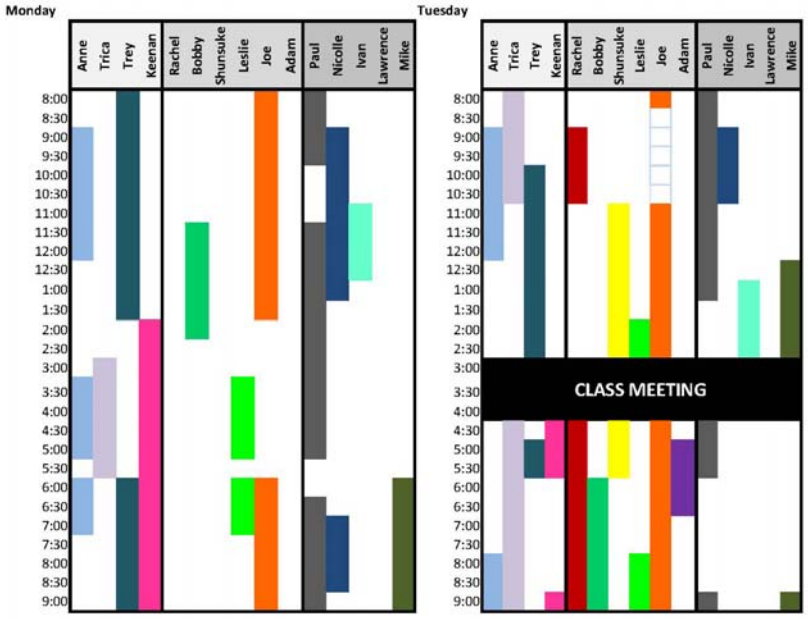
VI. Team Value Statement

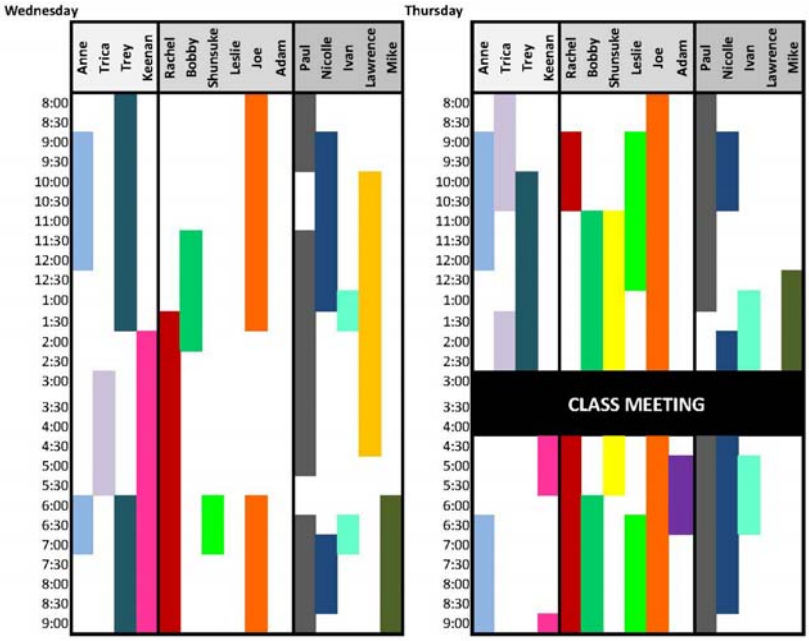
All group members participating in IPRO 333 acknowledge and agree to adhere to the following principles of professional, ethical conduct:

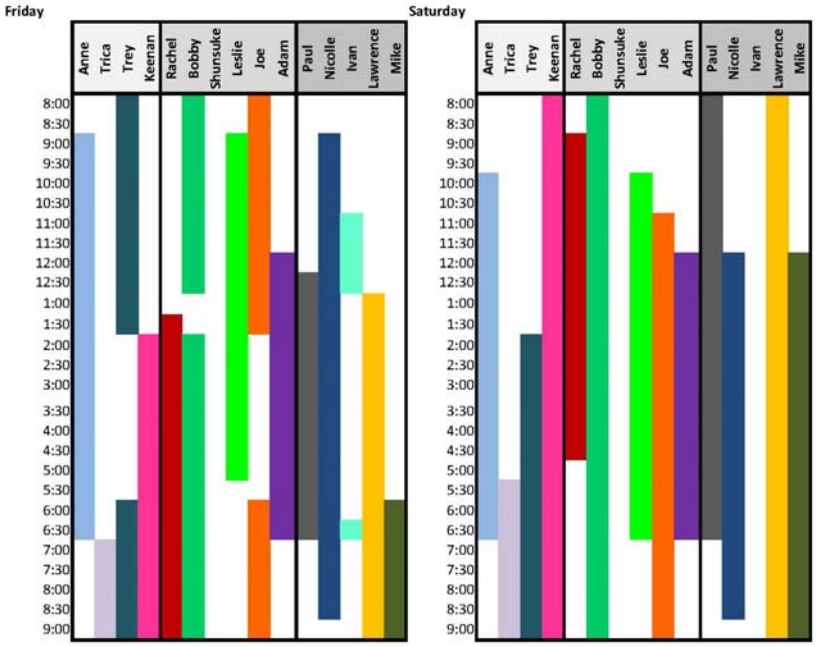
To complete their assigned tasks in a timely and earnest manner, and trust in their teammates to do likewise; to seek help and/or clarification when needed to understand what is required of them; to remain informed of all topics and important issues addressed by the group; to treat each of the group members with courtesy and respect as dictated by professional standards; to communicate clearly and effectively when sharing information with the group; to be present, attentive, and open-minded during group meetings so as to achieve maximal participation and comprehension; to resolve any grievances among group members quickly and peacefully, thereby maintaining focus on their primary objective; to provide/accept constructive criticism to/from other group members politely.

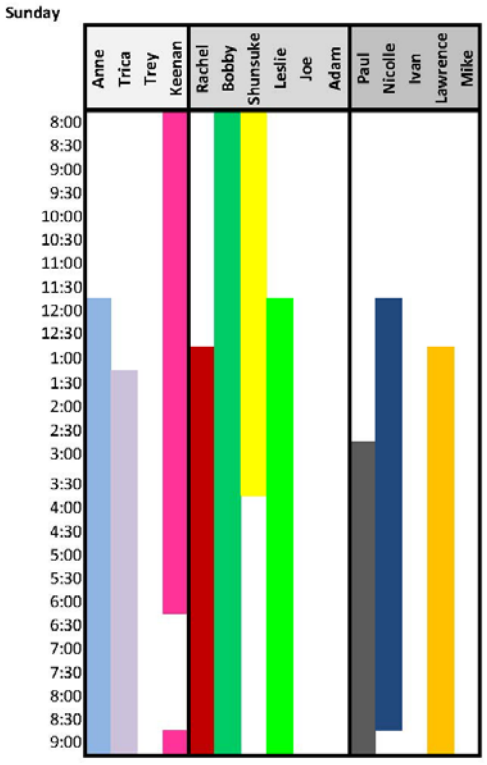
VII. Appendix

A: Team Schedule







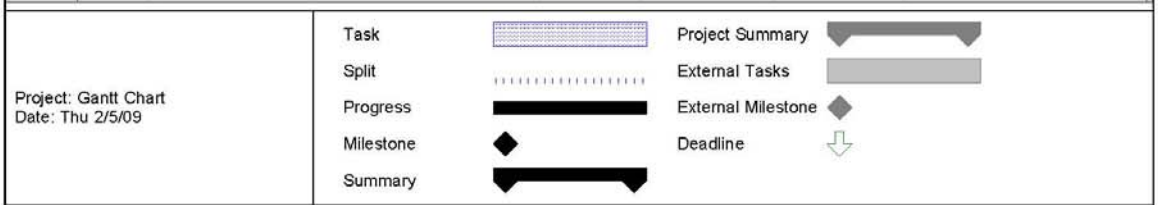


***Color is in accordance to time available**

Team 1	Anne	
	Tricia	
	Trey	
	Keenan	
Team 2	Rachel	
	Bobby	
	Shun	
	Leslie	
	Joe	
	Adam	
Team 3	Paul	
	Nicolle	
	Ivan	
	Lawrence	
	Mike	

B: Gantt Chart

ID	Task Name	Duration	Start	Finish	Resource Names
1	IPRO 333-Fabrication Lab Project Schedule	74 days	Tue 1/20/09	Fri 5/1/09	
2					
3	**Deliverables**	**69 days?**	**Tue 1/27/09**	**Fri 5/1/09**	**all team members**
4	Project Plan	9 days	Tue 1/27/09	Fri 2/6/09	all team members
5	First Draft	6 days?	Thu 1/29/09	Thu 2/5/09	Lawrence,Patricia,and Trey
6	First Admission Draft	2 days?	Thu 2/5/09	Fri 2/6/09	all team members
7	Midterm Review	9 days	Thu 2/19/09	Tue 3/3/09	all team members
8	Abstract	7 days	Thu 2/19/09	Fri 2/27/09	TBD
9	Posters	12 days	Thu 4/16/09	Fri 5/1/09	TBD
10	Presentation	13 days	Wed 4/15/09	Fri 5/1/09	TBD
11	Report	1 day?	Wed 2/4/09	Wed 2/4/09	TBD
12	Project CD	1 day?	Wed 2/4/09	Wed 2/4/09	TBD
13					
14	**Events/Seminars**	**63 days?**	**Wed 2/4/09**	**Fri 5/1/09**	
15	Team Building Seminar	1 day?	Wed 2/4/09	Wed 2/4/09	all team members
16	Communications Seminar	1 day?	Wed 2/4/09	Wed 2/4/09	TBD
17	IPRO Day Tips	1 day?	Wed 2/4/09	Wed 2/4/09	TBD
18	MIT FabLab Visit	1 day?	Wed 2/4/09	Wed 2/4/09	TBD
19	IPRO Day	1 day	Fri 5/1/09	Fri 5/1/09	all team members
20					
21	**Methodology**	**63 days?**	**Tue 1/27/09**	**Thu 4/23/09**	
22	FabLab Research Review	8 days?	Tue 1/27/09	Thu 2/5/09	all team members
23	IPRO Direction Brainstorming	3 days?	Tue 2/3/09	Thu 2/5/09	all team members
24	**FabLab Work**	**51 days**	**Thu 2/12/09**	**Thu 4/23/09**	**all team members**
36	**Equipment Training**	**16 days**	**Thu 2/5/09**	**Thu 2/26/09**	**all team members**
41	Project Scope Definition	3 days?	Tue 2/3/09	Thu 2/5/09	all team members
42	**Project Development**	**51 days?**	**Tue 2/10/09**	**Tue 4/21/09**	**all team members**
43	Project Proposals	8 days?	Tue 2/10/09	Thu 2/19/09	all team members
44	Design Development	16 days?	Tue 2/17/09	Tue 3/10/09	TBD
45	Prototype Development	18 days?	Tue 3/10/09	Thu 4/2/09	TBD
46	Prototype Testing (Old and New projects	9 days?	Thu 4/2/09	Tue 4/14/09	TBD
47	Project Finalizations	6 days?	Tue 4/14/09	Tue 4/21/09	TBD
48	**Tutorial Drafting**	**36 days?**	**Thu 2/26/09**	**Thu 4/16/09**	**TBD**
49	Software Tutorials	36 days?	Thu 2/26/09	Thu 4/16/09	TBD
50	Project Tutorials	36 days?	Thu 2/26/09	Thu 4/16/09	TBD
51	Equipment Tutorials	36 days?	Thu 2/26/09	Thu 4/16/09	TBD



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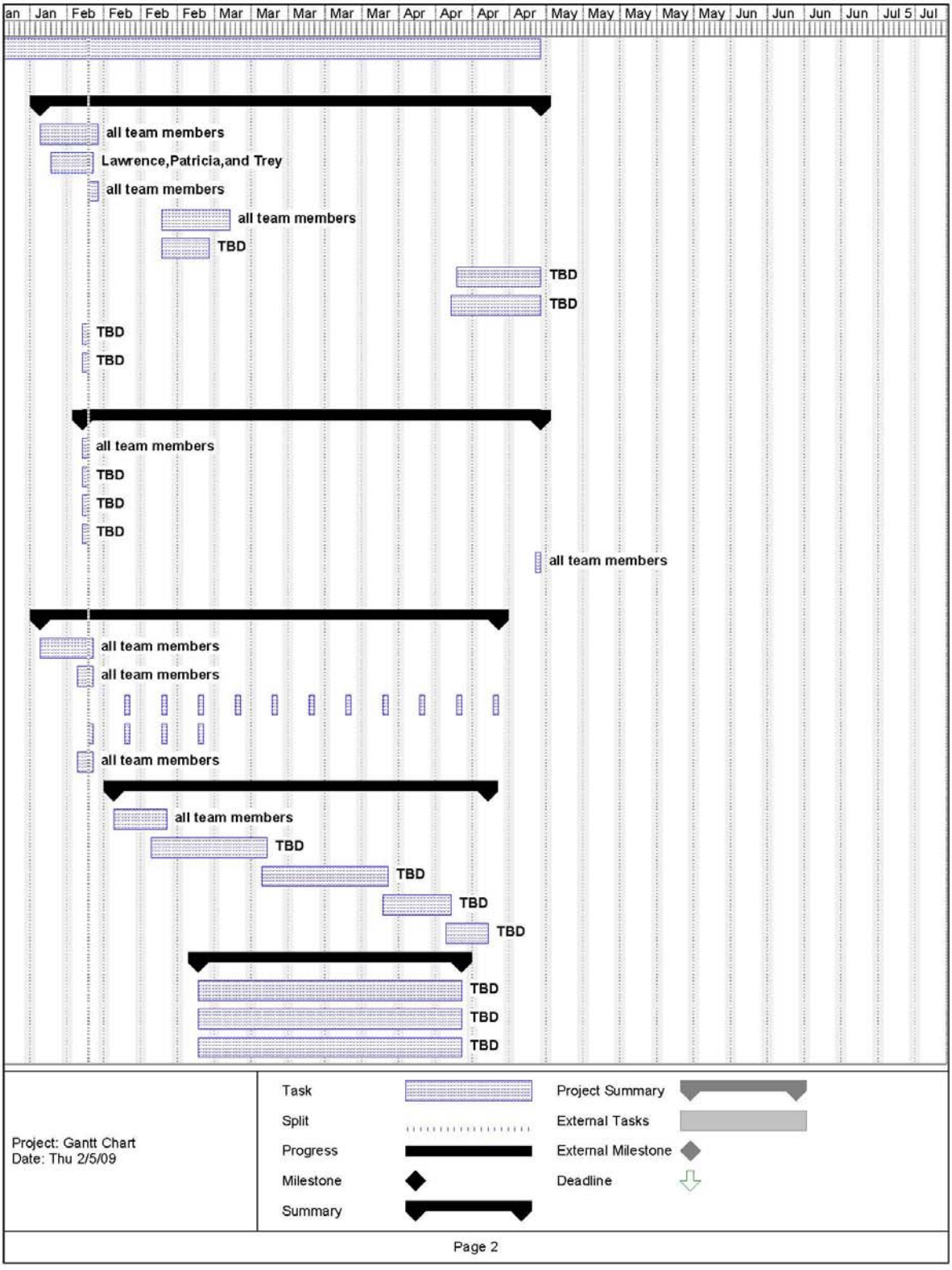
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