Exploring the Application of GPM and NetPoint for Level 3 Project Schedules

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PROJECT TEAM

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PMA has been the consultant responsible for leading the construction team in CEE 402 (Senior Capstone Design) for nearly 10 years.

PMA is a founding member of UM Construction Industry Alliance Partners.

Construction Professional Practice: PMA teamed with U of M students on this research through UMCIAP.
CONSTRUCTION PROFESSIONAL PRACTICE

Project based learning course in association with UM Construction Industry Alliance Partners (UMCIAP)

Embedded Learning Experience for Students
Under faculty guidance, student teams investigate construction technologies and work with industry mentors as volunteer consultants to address industry, organization, and project challenges. Teams prepare and present written and oral reports to clients.

CEE 530 – UM and PMA
PMA is a founding member of UMCIAP and has been a valuable partner over the years, mentoring a student team nearly every year since the program’s inception.

PMA’s Project for Winter 2016
The student team for Winter 2016 was chosen based on their expertise in the field of construction planning and scheduling.

Team Recommendations
The team successfully conducted their research and provided their recommendations for PMA to consider incorporating into future versions of NetPoint.
Having the old bullet 2 makes much more sense here to maintain the continuity of the slide. The Bullet 2 can be elaborated after this slide.
The University of Michigan Research Project:

Exploring the Application of GPM and NetPoint for Level 3 Project Schedules

The team shares its findings on building and managing a detailed level 3 NetPoint schedule, including the team’s recommendation to implement a tabular interface to allow changes in a dashboard to instantly update the schedule, and to maintain the benefits of real-time planning while also streamlining the entry and editing of bulk data.

It is the team’s belief that if NetPoint were to provide the level 3 tabular dashboard, it would easily become the industry standard for construction scheduling software.

This effort was supported by access to NetPoint and hands-on training by PMA. Interviews were conducted with NetPoint clients and PMA employees to gain understanding from a broader base of experienced users.
WHAT WE KNEW...

What is NetPoint®

- Planning and scheduling software developed by PMA Technologies in 2008
- Uses a patented algorithm of the Graphical Path Method

Inspiration of NetPoint®

- The need for a computer-aided scheduling program over a computerized scheduling program
- The ability to use the intuitive capabilities of the human mind and the ease of real-time updating (Ponce de Leon, 2009)
THE PROJECT

Research

- GPM and NetPoint – Commonly used for Levels 1, 2, 4 and 5 scheduling
- Level 3 schedule – commercial CPM software is the standard

Challenge

Reluctance to move away from P6 / Microsoft Project (MSP)
Whole new user interface of NetPoint as compared to P6 / MSP

Final Goal

Test feasibility of NetPoint and suggest solutions to make it the software of choice for Level 3 scheduling
First meeting with PMA
Brief introduction to NetPoint. Discussion of PMA's expectations of the CEE530 team.

Hands-on NetPoint Training
Conducted several training sessions at PMA Consultants-Ann Arbor office

Technical Resources
Access to online user guide, training slides, quick start guides
ROAD MAP TO EXECUTION

**Selection of Project**
Access to multiple project files executed by PMA in past to choose which is best suited to execute NetPoint

**Execution of Project**
Working on the selected project in NetPoint by ironing out the issues and developing the new schedule and its layout

**Leveraged User Feedback**
Developing a user review questionnaire and reaching out to NetPoint users to get their feedback on some key features of NetPoint
METHODOLOGY

Work on Level 3 schedule in NetPoint – building and documenting personal experiences

**TASK 01**

Interact with NetPoint users and document their reviews based on 3 aspects:
1. Existing features for/against Level 3
2. Utilization of NetPoint as a Level 3 scheduling tool
3. Possible new features required for better Level 3 scheduling

**TASK 02**

Analyze the results of Task 1 & 2 to determine the common advantages and shortcomings of GPM and NetPoint for Level 3 schedules

**Concluding Task**

Recommendations for subsequent versions of NetPoint to make it the software of choice for Level 3 schedulers

**Discussion & Conclusion**
GPM allows project managers, superintendents, key subcontractors and other stakeholders to collaboratively network a project by graphically positioning activities on a time scale. Combining the best of both precedence and arrow networks into a new diagramming paradigm, it emphasizes the planning process for stakeholders who are charged with delivering the project but are not professional schedulers.

THE GPM LEARNING EXPERIENCE

- Hands-on, planning-dominated process
- Simple and intuitive logic ties to connect activities
- Look-ahead and real-time scheduling
- Dates and floats formed as plan evolves
This project primarily focuses on the implementation and usage of NetPoint on Level 3 Schedules.

NetPoint is widely accepted and utilized for these schedules.

NetPoint utilization has seen consistent growth for these levels.
TASK 1 CHALLENGES – BUILD THE SCHEDULE

The project built was originally executed in P3. We divided it into 5 phases to facilitate importing to NetPoint in batches from Excel.

PROJECT USED

Academic Building • 644 Activities • 3 Construction Phases
PROCESS

Create WBS
To replicate the 3 schedule levels based on location and tradecraft.

Import to NetPoint
Scheduled on NetPoint by batch-wise imports according to WBS from Excel

Export to Excel
P6 schedule studied in detail and exported to Excel after creation of WBS according to the visible levels

Resource Loading
Used the Excel link files to allocate resources to each tradecraft (based on resource assignment in P6)
FINDINGS

Links & Gaps
- GPM focuses on links between activities
- Gap: link attribute of flexible duration

Features contributing to Level 3 experience
- Real-time scheduling
- Planned dates
- Pull planning
- No negative lags

Recommended for better Level 3 experience
- Excel-linked files for faster resource allocation
- Faster Excel imports
- Tabular interface for activity inputs

Engine?
- CPM Engine: forward and backward pass; links are data attributes to activities (data entries)
- GPM: non-engine-based algorithm. All the objects are calculated despite their type (activity/link) or status (yet to start/completed/ongoing). This gives ability to use planned dates, real-time compiling and forensic floats
Features augmenting the ability of a scheduler to create Level 3 schedules in NetPoint:
- Simple and intuitive
- Quick resource allocation in Excel

Features that may hinder the experience of Level 3 scheduling:
- Drawing Time Scale Logic Diagram (TSLD)
- Setting up and planning
- Small canvas size
- Need for data management tool

Recommended features to improve the Level 3 scheduling abilities of NetPoint:
- Tabular interface
- Having Work Breakdown Structure (WBS)
- Vertically integrated swim lanes
- Time unit levels
No. of Users

Tabular interface: 6
- Against: 1
- Neutral: 1
- For: 4

Having WBS: 4
- Against: 2

Vertically integrated swim lanes: 4
- Against: 1
- Neutral: 1
- For: 2

Multi-dimensional time units: 5
- Against: 1
- Neutral: 1
- For: 3

Time unit levels: 2
- Against: 1
- Neutral: 1
- For: 0
DISCUSSION

Synthesizing the findings from author experiences and the feedback from the interviews

Prioritizing links in NetPoint is the main advantage to follow logic

Massive Level 3 schedules – difficult to handle in graphical interface

NetPoint framework can be optimized to run on dedicated GPUs to perform better
CONCLUSION

THE WAY FORWARD

1. Separate software package or interface module required. Too dependent on Excel

2. Primary recommendation – tabular interface – switch back and forth

3. Vertically integrating swimlanes such that hammocks perform as Level of Effort (LOE) activities to facilitate top-down scheduling

Resource Allocation

Real Time Updating

Tabular Interface

https://www.youtube.com/watch?v=RANxO6Tx_Yk
Now available!

- WBS is built into the code manager
  - Import WBS from xml
  - Import resource definitions from generic Excel spreadsheet

Work in the tabular interface of IQ while interacting with the objects in the plan simultaneously

Can now use metrics manager to filter, select and pan to objects to update or edit, and even report filtered lists

When importing from Excel, logic loops originating from P6 caused import to fail; they now can be identified for removal via the standalone metrics manager application
I would like to add a few more items here
Renee Woolley, 2/15/2017

you can edit this slide however you want
Vishal Shah, 2/20/2017
PMA TRAINING ADVISORS

Dr. Gui

Renee Woolley

John Zann
RW39  Who
  Renee Woodley, 2/17/2017

VS11  please change Gui's Pic - Poor resolution
  Vishal Shah, 2/18/2017
AND THANKS TO ALL PMA CONTRIBUTORS
seve, sergio, vivek
Renee Woodley. 2/17/2017

dax, tim, mike brown
Renee Woodley. 2/17/2017

Not sure how we want to do this - seems busy - we can work this out however you see fit
Renee Woodley. 2/17/2017

This looks great. We missed Angel Arvelo and Joseph Puzon
Vishal Shah. 2/18/2017
Questions?

Thank you!
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