Ci3 *India* – Consultants Round Table October 18, 2016

Action Item #3B – Study on Technology Adoption in Construction

Background & Objectives of Action Item #3B

- Action team #3B was formulated for this purpose
- Objectives of the action item
  - Discuss and understand the drivers of technology adoption
  - Identify issues in the current technology adoption process
  - Identify the root causes for the barriers in technology adoption
  - Develop strategies for improving the technology adoption process

Highlight of actions to date…

S.No	Meetings and Calls	Description of Actions
1	Concept paper	• A kick off note was circulated to the participants to set the context
2	Workshop on April 29th at IITM	• Discussions was divided into two topics – IT technologies and Equipment technologies • Discussion points elaborated (see following slides) • Identified need to first explore scheduling technologies in depth
3	Data Collection	• Three project schedules were collected and assessed
4	Validation of data	• The assessment results were discussed with the team members for their inputs and suggestions

Issues in Technology Adoption

Equipment Technology	IT Technology
• Cost of Technology • Lack of awareness • Return on Investment • Productivity (vs conventional) • Training Facilities • Local Maintenance Requirements • Local Repair Service availability • Limited Scope of repeated usage • Suitability for local conditions • Flexibility for varied requirements • Import regulations • Local Transport • Low Tech Culture • Limited Rental options • Contractual Requirements	• Cost of Technology • Lack of Awareness • Lack of ROI Models • Who pays Owner or Contractor • Data Security Cloud / On-premise • Interoperability of existing solutions • Data Availability • Training on technology usage • Local Support for customization • Lack of Specialists (IT + Construction) • Organization structure (BIM Coordinator) • Low Process maturity for IT adoption • Weak links in process partners • Rapid change in Technology • Policy requirements

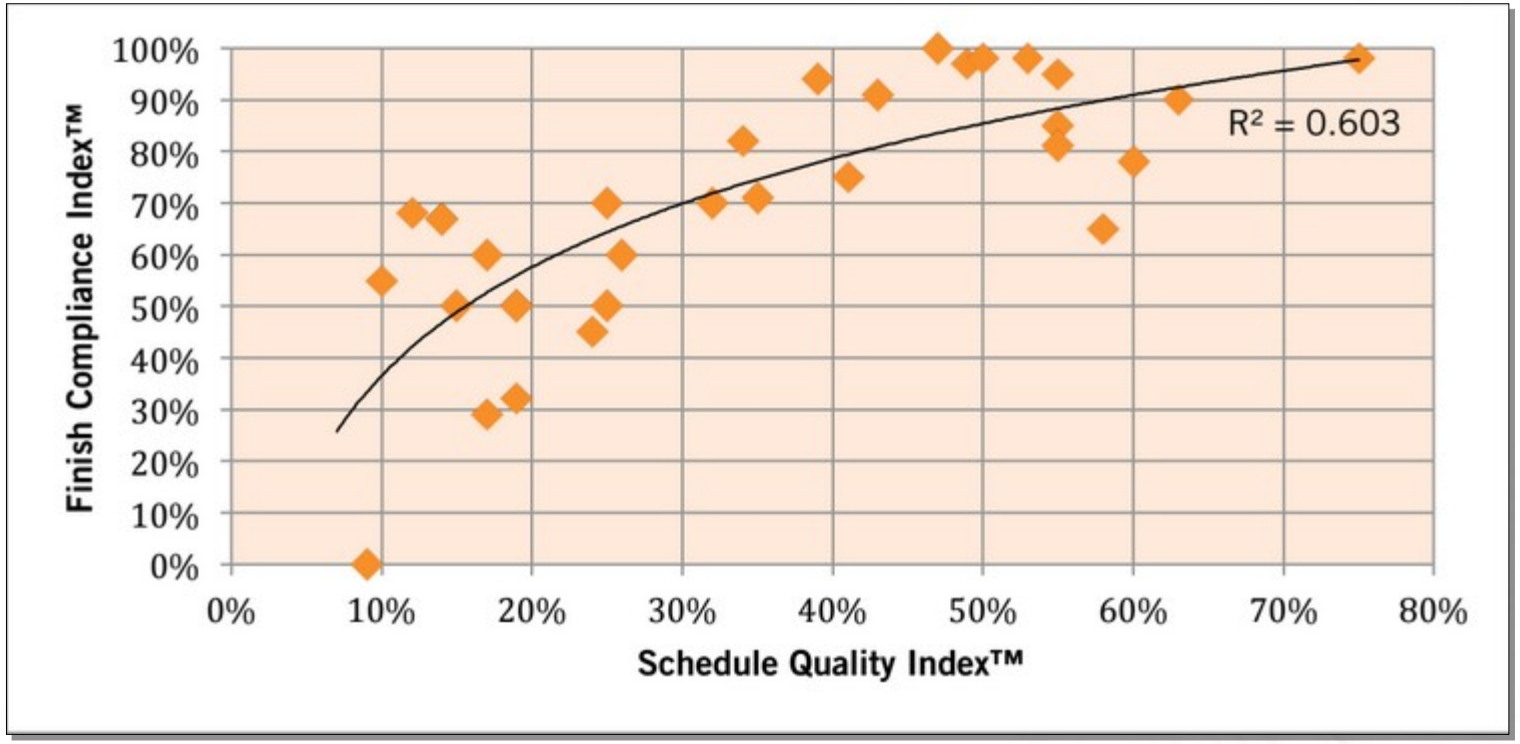
Deep dive into Scheduling
Process and Technologies

- Reason to pick Scheduling:
  - Ideally project plans and schedules should be the crucial driver of project progress (basic data)
  - Most of the projects today use primavera or MSP to schedule and monitor.
  - But their effectiveness is very much limited in projects.
- Understanding to date:
  - Lack of metrics to understand “quality” of plan (for monitoring)
  - Planning and Monitoring not fully understood as a control process for project performance

Why are schedules essential to in a project ?

- Provides a useful **'road map**' that can be used by the project manager and the project team.
- **A dynamic tool** reflects project personnel's vision of how the project will be performed and reacts appropriately to changes in progress, scope, etc.
- Allows to look at the performance of the project to date, and use that data to make more **accurate projections** of future.
- Implies the **consensus of all stakeholders** concerning the required **sequence of events, resource assignments, and acceptable dates for key deliverables.**
- Basis/ document for the administration of **construction disputes, change in project sequence, scope and extension of time order and claims**
- Used to **justify or deny time extensions and inefficiency losses,** which may have tremendous financial consequences

Should we have quality schedules ?



Schedule evaluation – Industry proven metrics and standards

- Until recently scheduling was a ‘black art’ with only subjective opinions as to what constituted a ‘good schedule’ and any debate over schedule quality tended to be confused with arguments over personal preferences in tools and/or networking techniques and is open to inconsistency (Weaver 2010).

- Today we have schedule assessment methods and metrics that have been developed to access the schedule for their quality.

- Both qualitative and quantitative methods are available.

- Several organizations (particularly in the US) have devised and implemented schedule assessment metrics and standards to evaluate a schedule.

Schedule evaluation standards

Organization	Publication/guideline title
Department of Defense (DOD)	Over target baseline and over target schedule guide
Department of Defense (DOD)	Integrated master plan and integrated master schedule preparation and use guide
Defense Contract Management Agency (DCMA)	Earned value management system (EVMS) program analysis pamphlet (PAP)
National Defense Industrial Association (NDIA)	Planning and scheduling excellence guide
Project Management Institute (PMI)	Practice standard for scheduling, chap. 6 project time management, fourth edition
University of Texas System Office of Facilities Planning and Construction (UT OFPC)	Project planning and scheduling, section 01 32 00, issuance: September 2007, revision: 3/1/2011 revision
United States Government Accountability Office (GAO)	Schedule assessment guide
National Aeronautics and Space Administration (NASA)	NASA schedule management handbook, NASA/SP-2010-3403
Defense Acquisition University (DAU)	Better schedule performance assessments derived from integrated master plan–referenced schedule metrics
Naval air (NAVAIR)	Integrated master schedule (IMS) guidebook, version 1.0
Center for Earned Value Management (CEVM)	Analysis toolkit

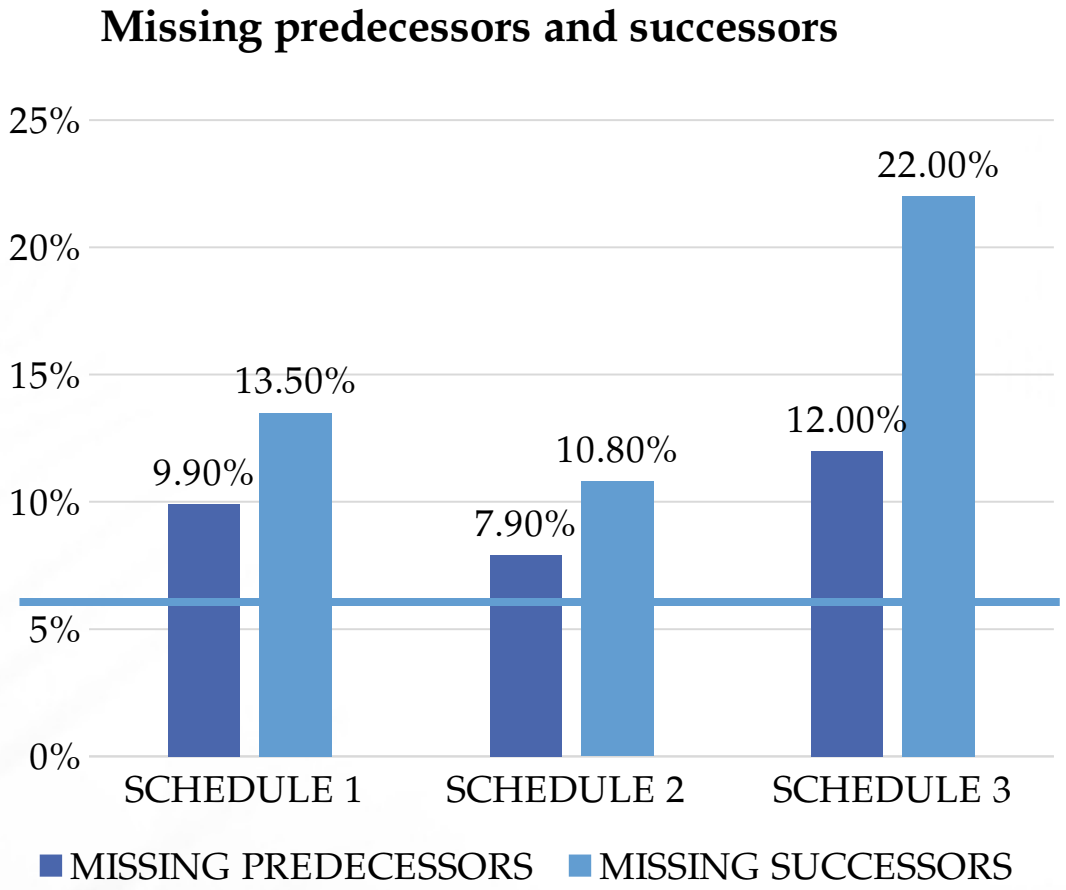
Schedule assessment – Defense contract management authority

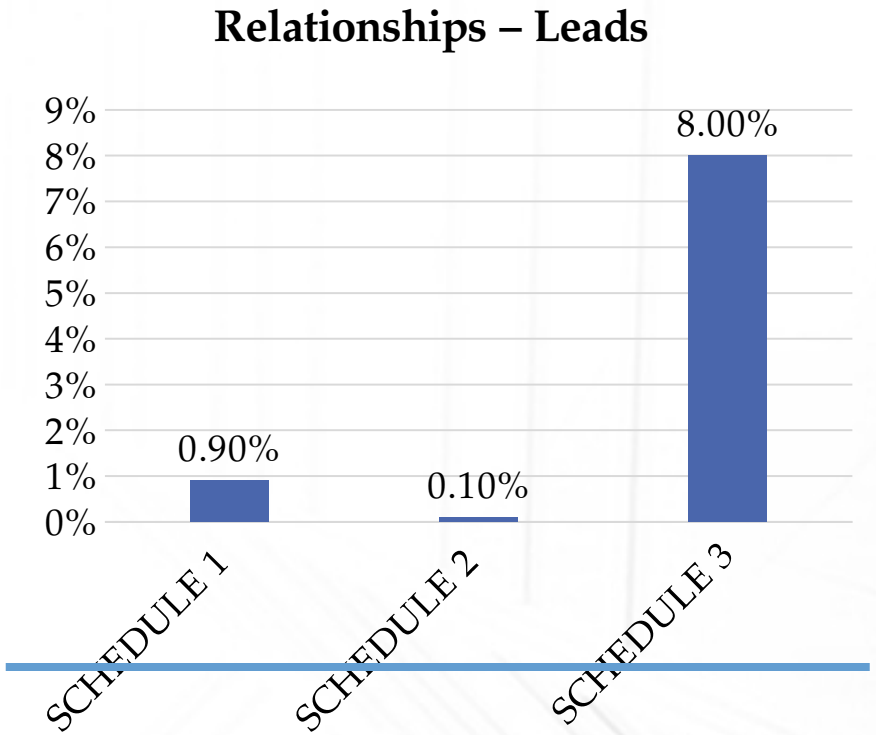
Metrics	DCMA recommendation
Schedule logic	The number of missing predecessors and successors in a schedule should be less than 5%
Usage of Leads and lags	There should be no leads in a network Total number of lags should be less than 5%
Usage of Floats	The exact definition of high float can be commonly arrived at by studying more schedules. For the purpose 44 days of float is considered (as per DCMA).
Use of Various Types of Precedence Relationships	At least 90% of relationships should be finish to start.
Use of Date (Hard) Constraints	Date constraints should be eliminated in a project schedule.
Resources loading schedules	Resource should be loaded in a schedule in order to realistically reflect the reality
Creating realistic project schedules	Project schedules should consider weather and other uncertainties when determining the dates (start and finish) for activities.

Pilot Assessment

Project	Schedule #1	Schedule #2	Schedule #3
Type	Mall	Residential	Commercial (IT Park)
Total number of activities	2069	1566	10342
Scheduled duration	Nov 2015 - Nov 2017	Oct 2015 - Dec 2017	Mar 2014 – Aug 2016

Some assessment…





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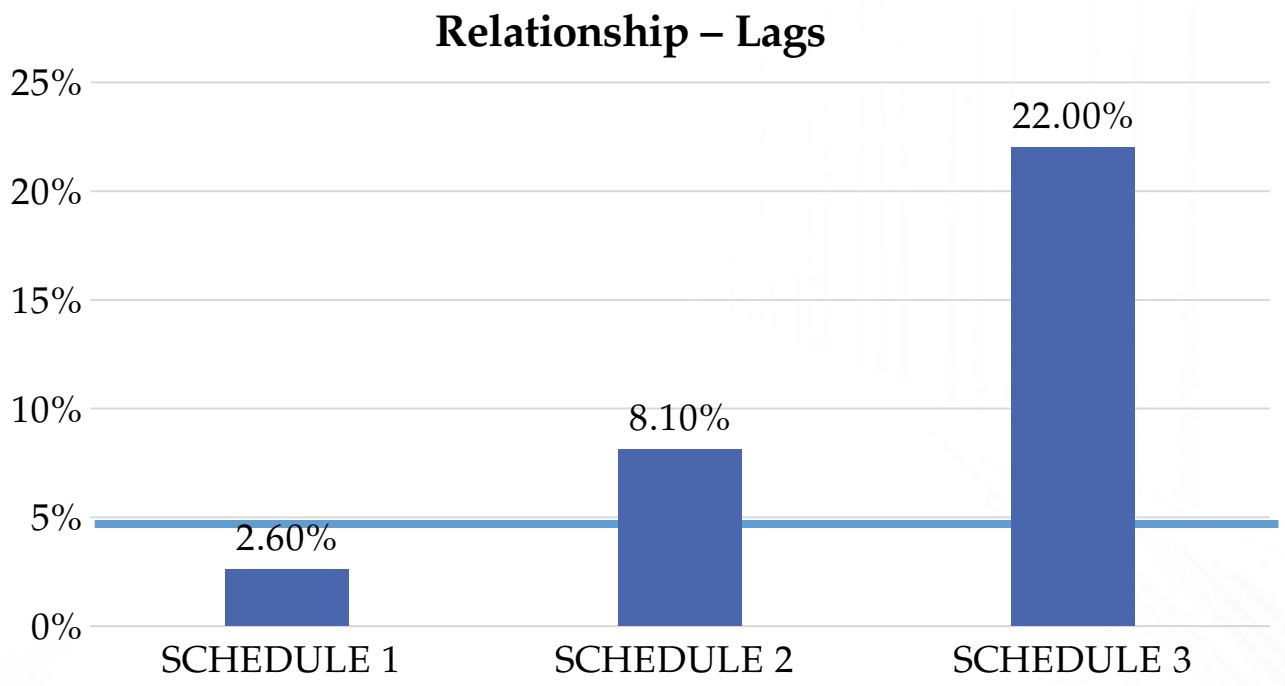

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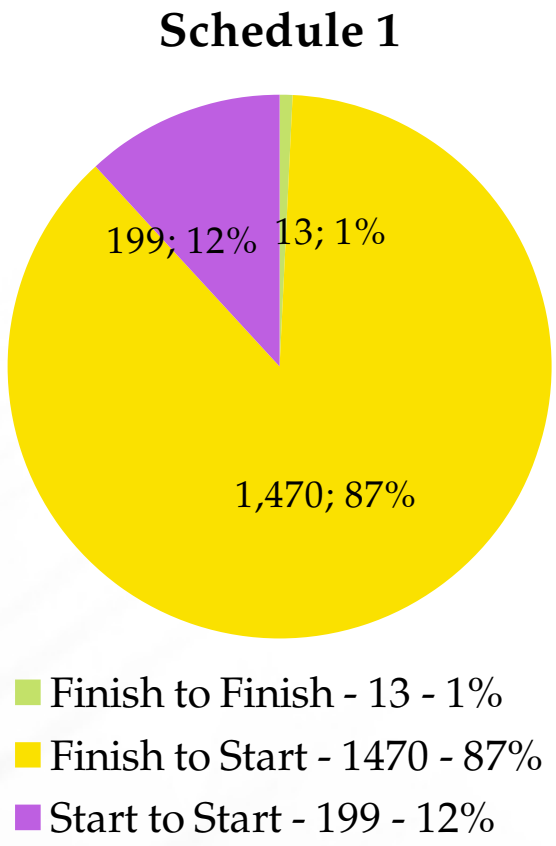

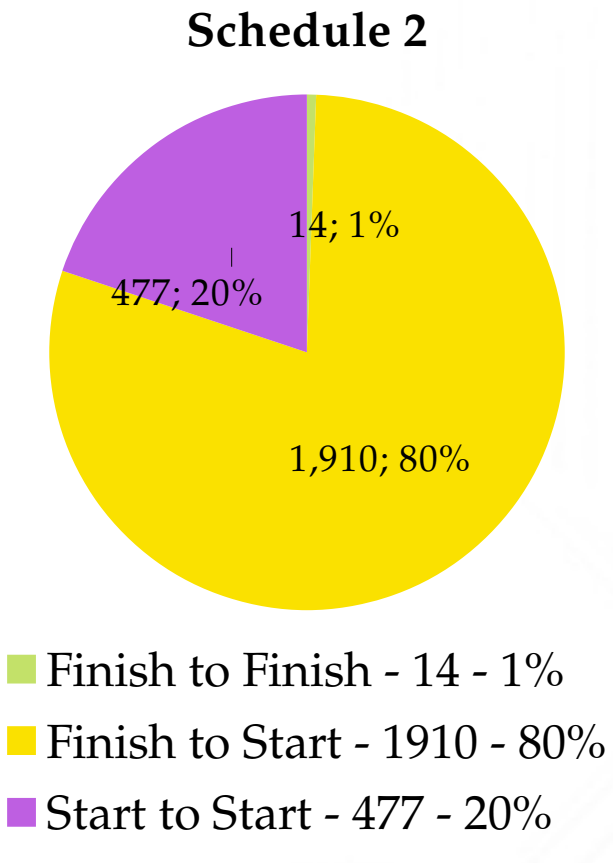

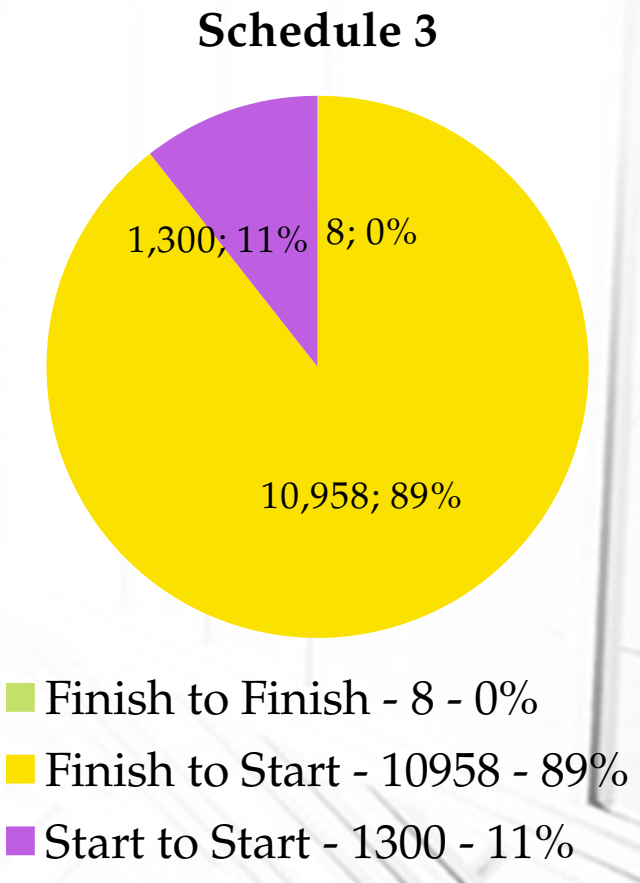

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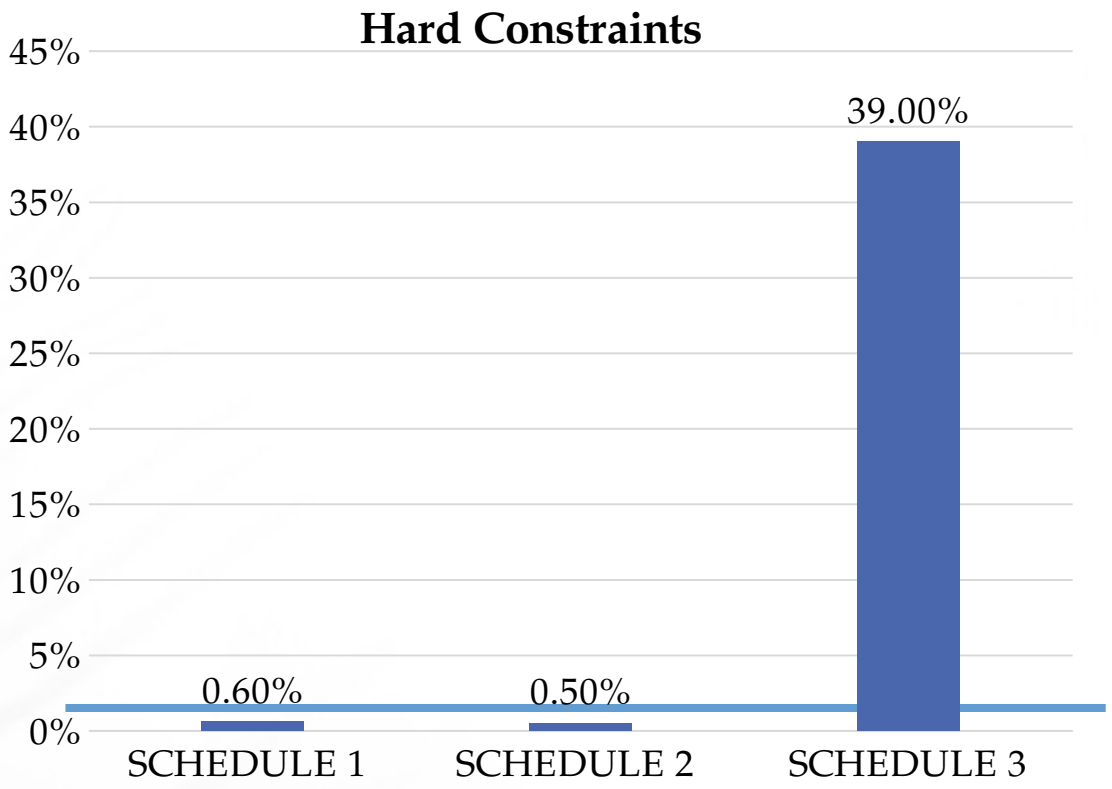

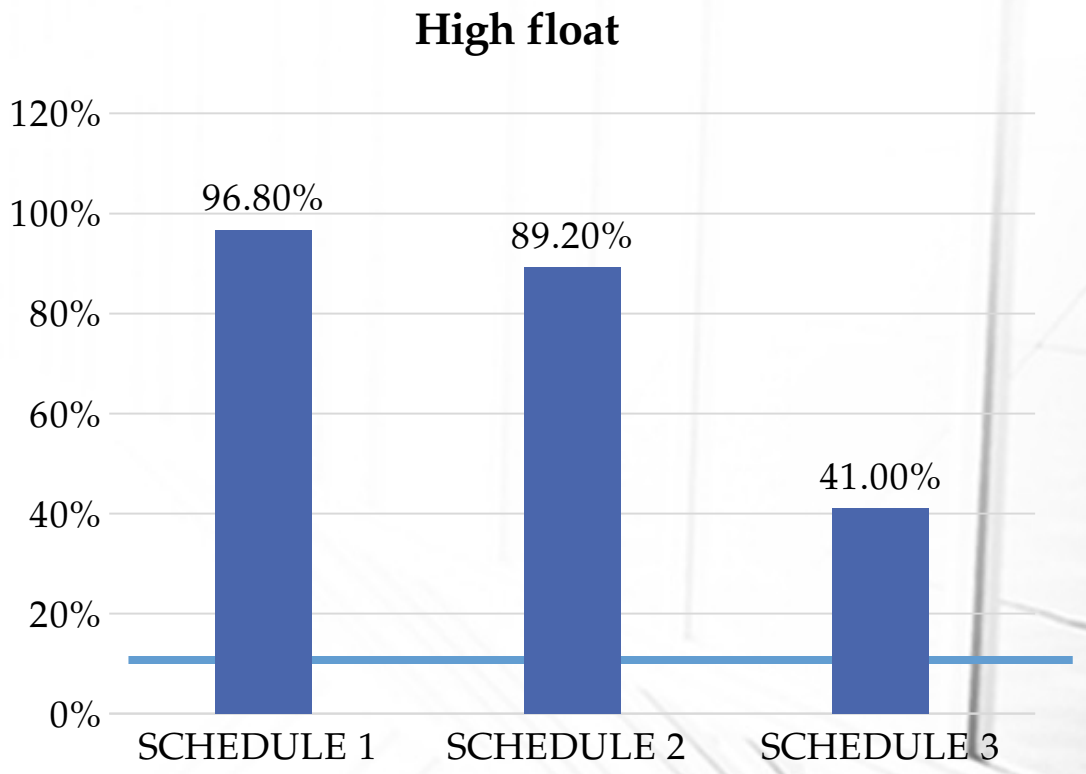

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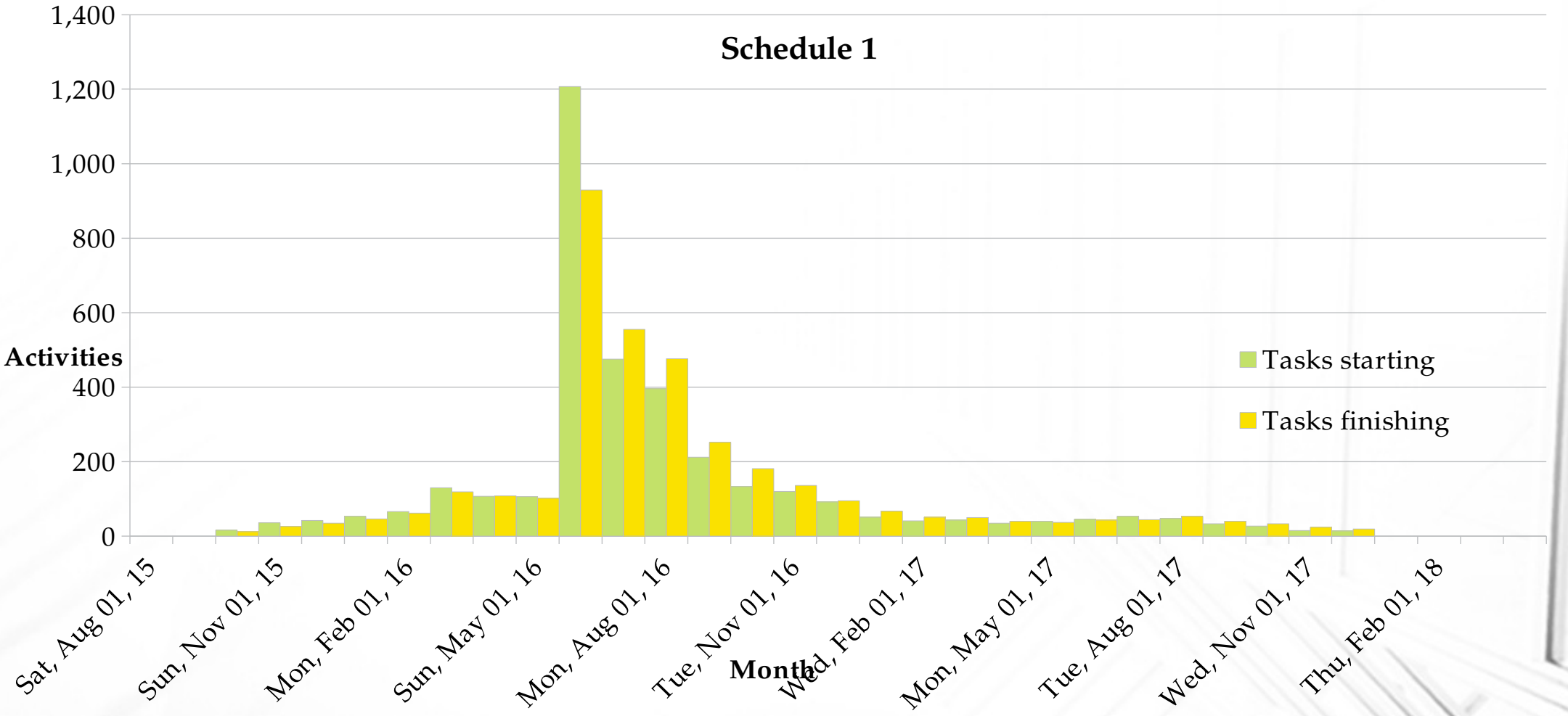

Next Steps

- On scheduling
  - Develop stage wise targets to improve schedule quality
  - Conduct a workshop for schedule improvement for Owner and project
  - Evaluate alternate strategies to improving schedule quality
- On overall technology adoption action point
  - Conduct survey on technology adoption (see work in progress)
  - Conduct survey not only with Owners, but also Consultants, Contractors, and others
  - Collect results and analyze data
  - Recommend strategies to improve technology adoption

Indicative Technology Adoption Survey

Discussion

- On Scheduling
  - What are the barriers to creating a “good” schedule?
  - What can be done to enforce the schedules effectively and use it for planning & monitoring?
- On Technology
  - What in your opinion on the state of technology?
  - What pain points do you think usage of effective technology can address?
  - What value addition do you think usage of effective technology can provide?

Thank You