NetPoint + GPM
CONFERENCE
May 13 & 14, 2021



Recalibrate Project Schedules & Support Owner's Strategic Decision-Making Process in Times of COVID-19

Presented by:
Angel Arvelo & Dennis Lucey

MEET THE PRESENTERS



Angel Arvelo PMP, LEED AP

Managing Director

Angel has extensive experience delivering large complex projects for clients in multiple industries. His experience includes work with oil and gas, pharmaceutical/GMP, life science, alternative energy, power generation & utilities, civil infrastructure, as well as commercial development projects.

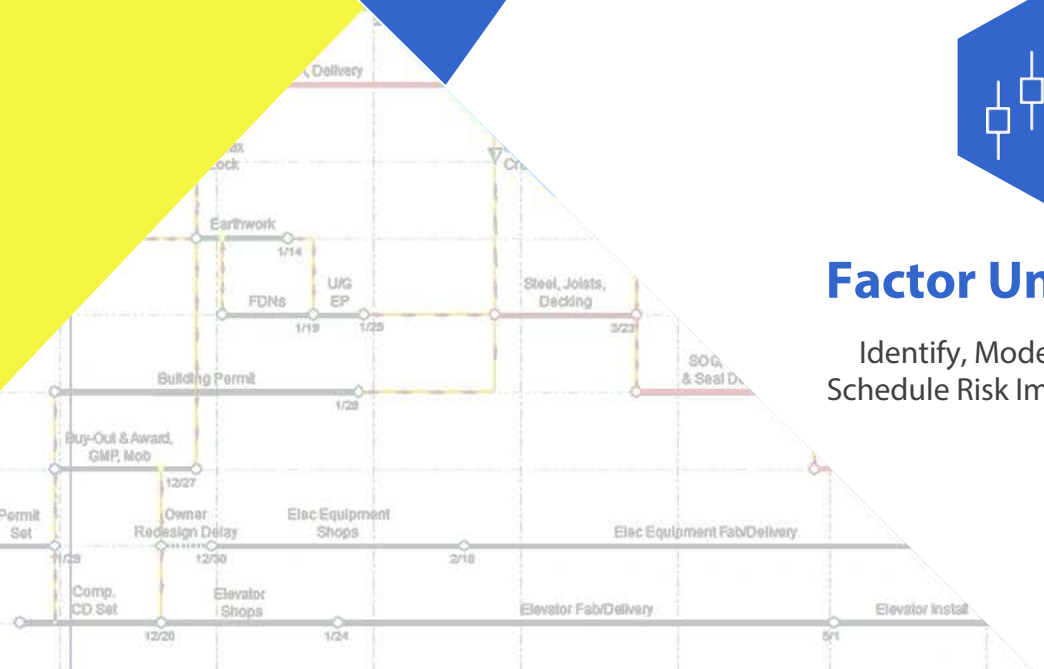


Dennis Lucey PMP, LEED AP, MCPPO

Managing Director

For over 20 years, Dennis has implemented, and managed project controls processes and systems that have delivered effective management tools and led to successful project outcomes. He has public and private sector experience in design, project management, and construction management.

AGENDA



A Little Background

Project details and Recap on the Events

Our Approach

Understand what happened, evaluate never-experienced conditions and define strategies to recalibrate execution strategy

Recalibrate the Plan

Update Project Schedule to reflect COVID related impacts, actual & expected, and additional changes to construction plan

Factor Uncertainty

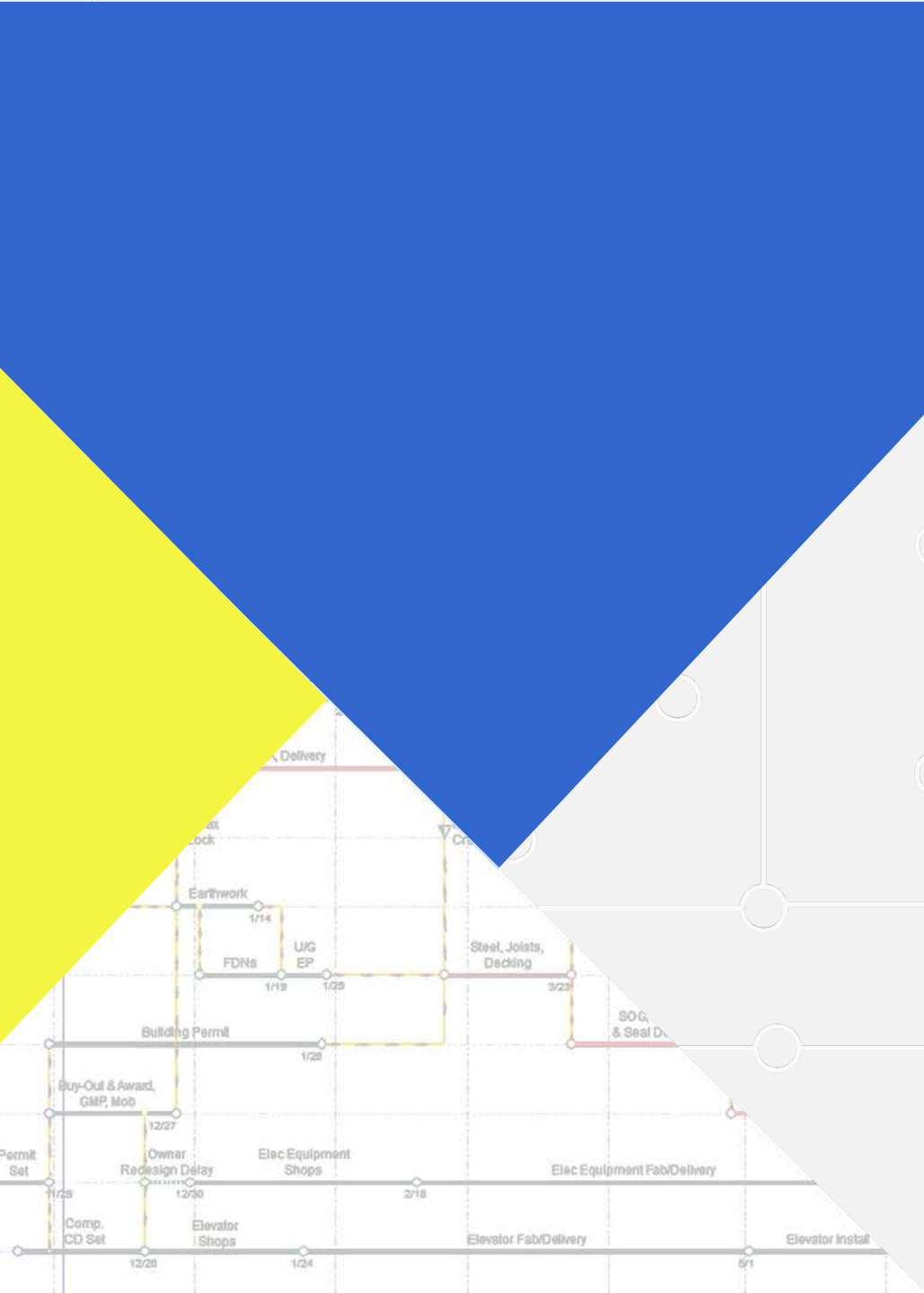
Identify, Model and Quantify Schedule Risk Impacts - Scenarios

Smart Decision Making

Evaluate Scenarios, Drive Smart Decisions Based on Data and Define New Execution Strategy

Conclusions

Final Thoughts, Lessons Learned, Q&A



A Little Background

Project details and Recap on the Events



PROJECT OVERVIEW

Boston Arts Academy School

Fast Paced Project

- Budget of $125M
- Compressed Project Schedule
- Minimize impact to students

Project in the Heart of the City of Boston

- Next door to Fenway Park
- Very tight site, No lay down/swing space
- Neighboring Projects

Scope Included:

- Demo of existing building
- Asbestos Abatement (DSC)
- Unique educational program and facilities

New 153,000 SF Facility, to include:

- 500 seat auditorium
- Expanded STEAM lab
- Roof terrace
- Dance, visual arts, theatre and fashion technology studios and workspaces

Highlight Project Goals

On Time Completion

Firm School Calendar relate occupancy date

Complete within Budget

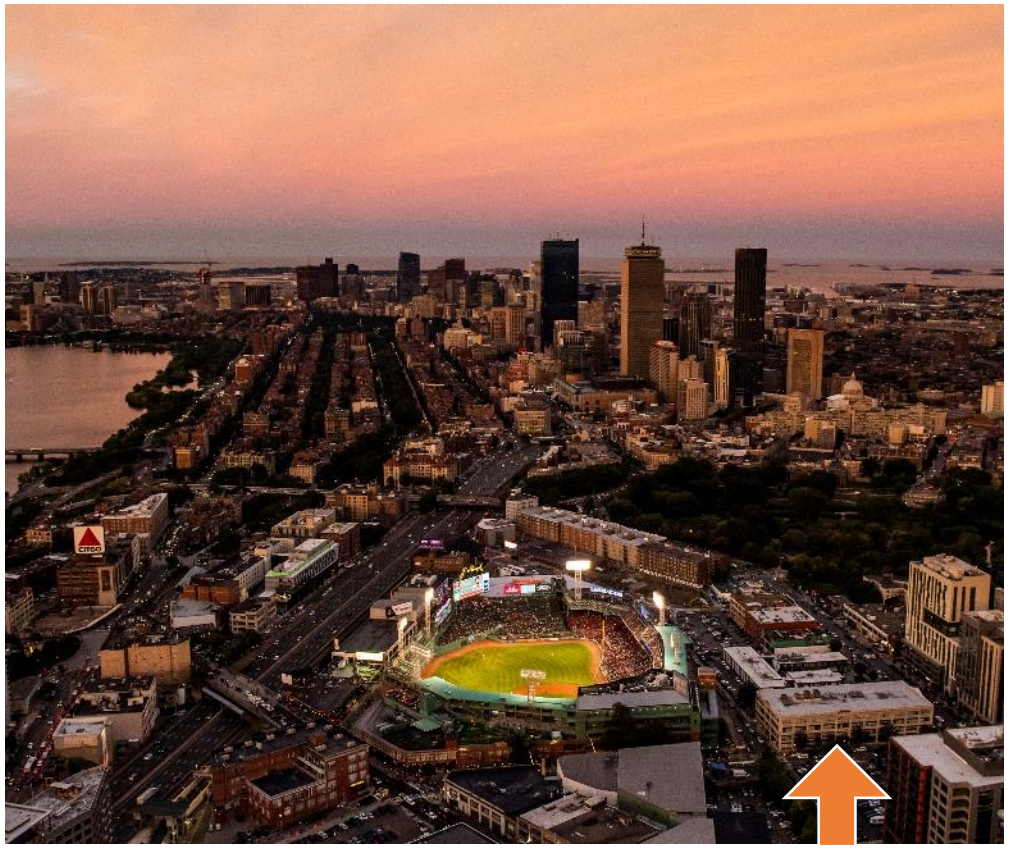
Public Project with Fixed Available Funding

Safety Protocols

Safe working environment for Construction & School Community

Transparency

Present Information to Stakeholders, Public, etc.



Project Site



SUMMARY OF EVENTS

Boston Arts Academy School Project

Dec. 2017

MSBA/City of Boston
Project Approval

Dec. 2018

Ground Break Ceremony
Start Demo Work

May 2019

Construction Documents

July 2019

GMP Pricing Finalized

Aug. 2019

Award Trade Packages

Oct. 2019

Building Permit

Mar. 2020

COVID Related Lock Down

May 2020

Resume Construction

May – June 2020

Schedule Risk Assessment

Fall 2021

Planned Substantial Completion (at time of SRA)

TBD

Reforecasted Substantial Completion

New Conditions

Unchartered Territory



New Safety Protocols

Temperature checks, screening, masks & enhanced PPE



Social Distancing

Limitations on the number of workers in certain areas, crew sizes



Schedule Changes

Weather sensitive work, re-mobilization, revised delivery dates



Limited Manpower

Reduced availably of manpower (short and long term)



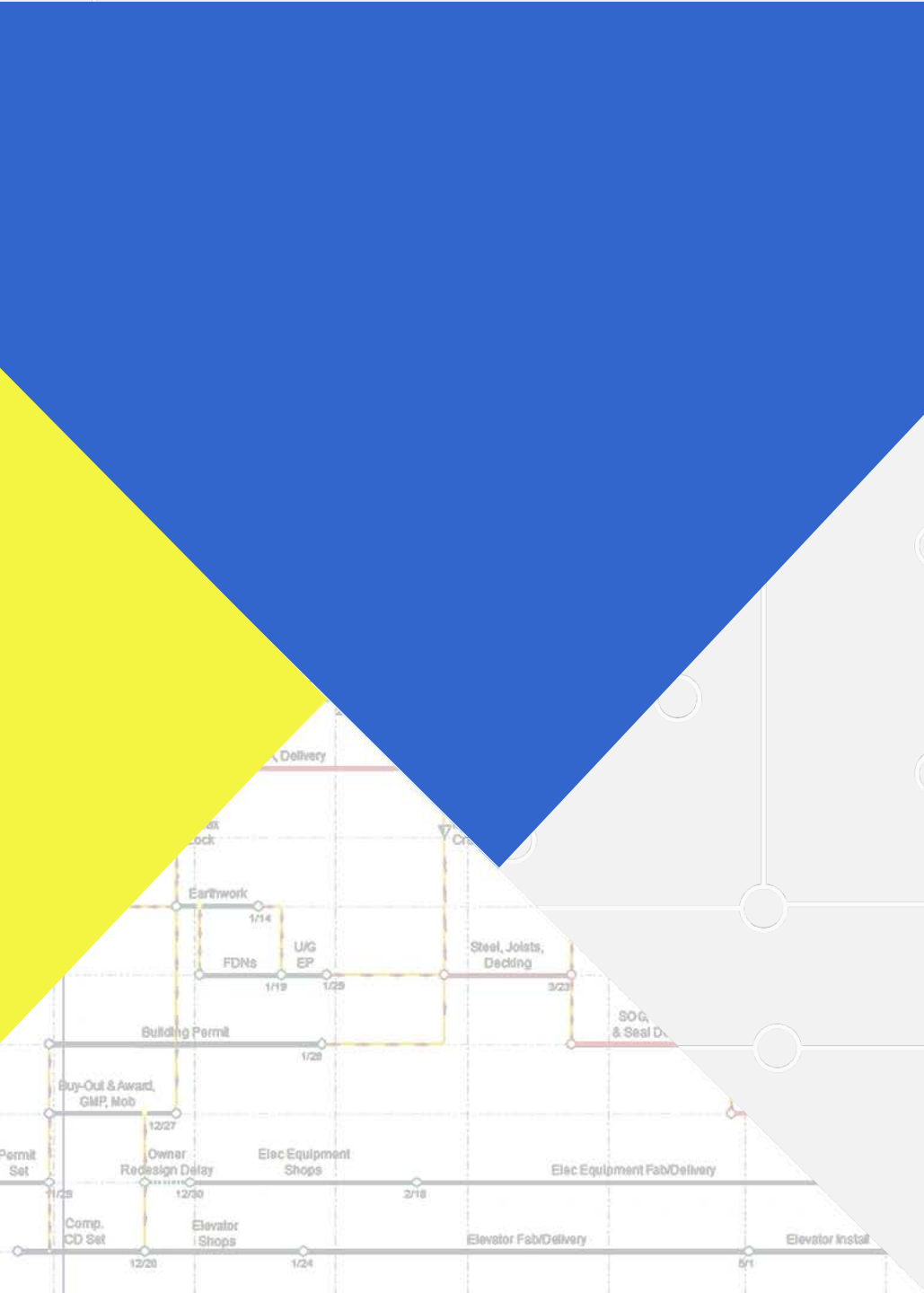
Productivity Impacts

Impacts in productivity due to new restrictions, social distancing crew sizes and enhance safety guidelines



Threat of Another Shutdown

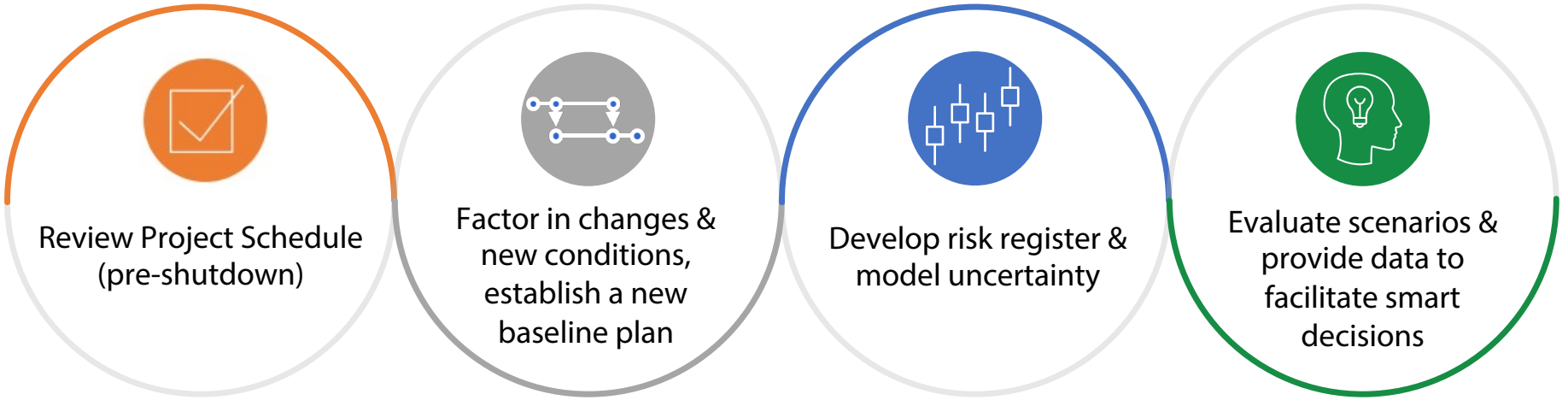
High likelihood that another surge in COVID cases would result in another site shutdown



Our Approach

Understand what happened, evaluate never-experienced conditions and define strategies to recalibrate execution strategy

Update the Plan & Factor Uncertainty



01 Project Schedule Review

02 Recalibrate Project Schedule

03 Qualitative & Quantitative Risk Assessments

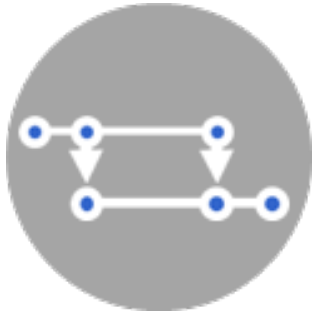
04 Support Owner's Decision-Making Process



Project Schedule Review

Understand the construction plan (original baseline and latest progress construction schedules) prior to the related COVID impacts

- Review latest approved baseline schedule for the work, as well as latest approved progress update to understand what was the plan before COVID related issues impacted the project.
- Understand Project Construction Schedule, approach, work sequences, LLE items, assumptions, constraints
- Use latest approved/agreed to construction plan as the foundation to develop the new revised schedule



Recalibrate Project Schedule

Update Project Schedule to reflect impacts, changes and new conditions, to be used as the basis moving forward (draft) and for risk assessment modeling purposed

- Collaborate with project team and stakeholder to understand short and long-term impacts to the project → ***New project team plan***
- Incorporate impacts experienced during the lockdown as well as changes in sequence and/or duration resulting from COVID related impacts
- Establish new project schedule for SRA modeling and simulation



Qualitative & Quantitative Schedule Risk Assessments

Identify project risks that could impact the schedule, define risk owners, mitigation actions, risk drivers, duration uncertainty and understand potential impact to project milestones

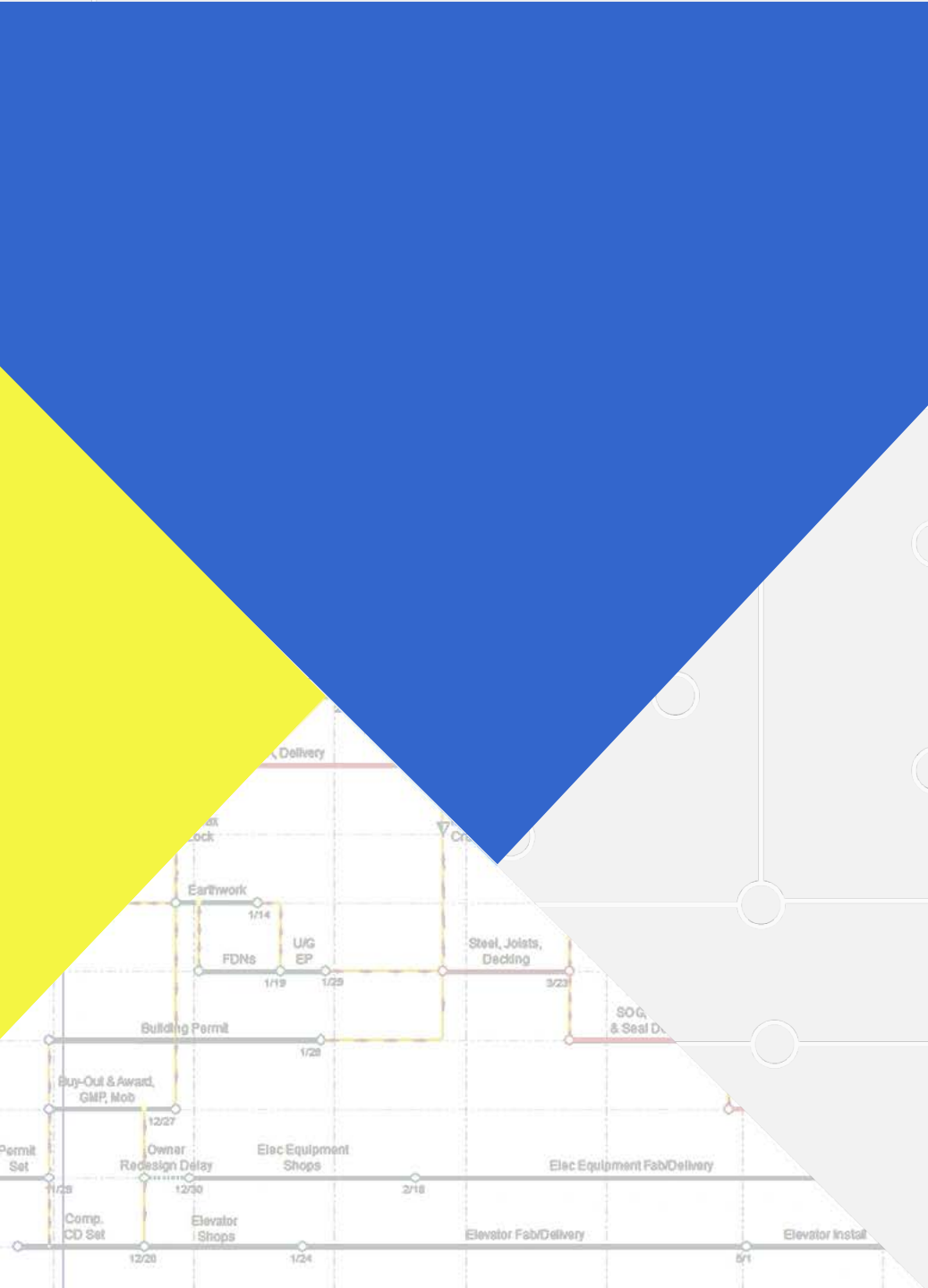
- Conduct risk identification work shops with project team and key stakeholders to identify, evaluate and manage potential threats and opportunities to the project schedule
- Identify risk drivers affecting the execution of the work, evaluate alternative scenarios that could potentially present, as well as factor in activity duration variability in the project schedule
- Simulate multiple scenarios and evaluate impacts to key project milestones/events.



Support Owner's Decision Making Process

Provide the Owner's team the right information to facilitate the decision making process, define new strategy and recalibrate execution plan based on data

- Understand major factors affecting the schedule (criticality, sensitivity and cruciality indexes)
- Evaluate likelihood of achieving target date and provide projections on most likely dates for key events (P50)
- Provide trusted advice to our client on potential mitigation/acceleration strategies



Recalibrate the Plan

Update Project Schedule to reflect COVID related impacts, actual & expected, and additional changes to construction plan

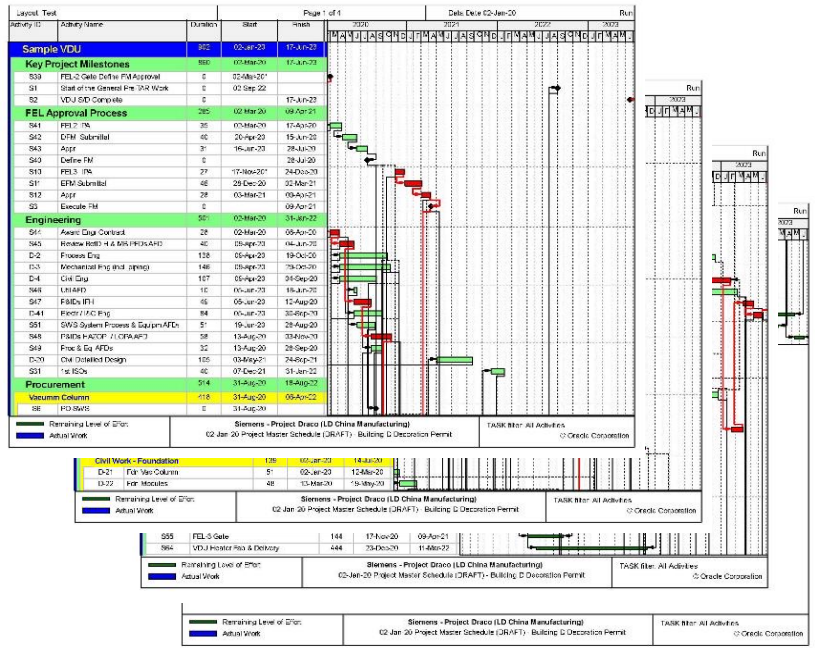
Understanding the Pre-Impacted Plan

Review detailed P6 construction schedule (3000+ activities)

- Latest construction schedule update was accepted ~2 weeks before shutdown

Understand Schedule assumptions / foundations

- Workflow through the building
- Work calendars → activity assignments
- Constraints / limitations
- Critical & Near Critical paths
- Key project milestones
- Available total float values: paths, areas, etc.



Update the Plan

Incorporate Impacts & Define Path Forward

Move to NetPoint

- Eliminate scheduling software barrier: P6 / MSP → Leverage NetPoint

Foster team collaboration and ownership of the updated schedule

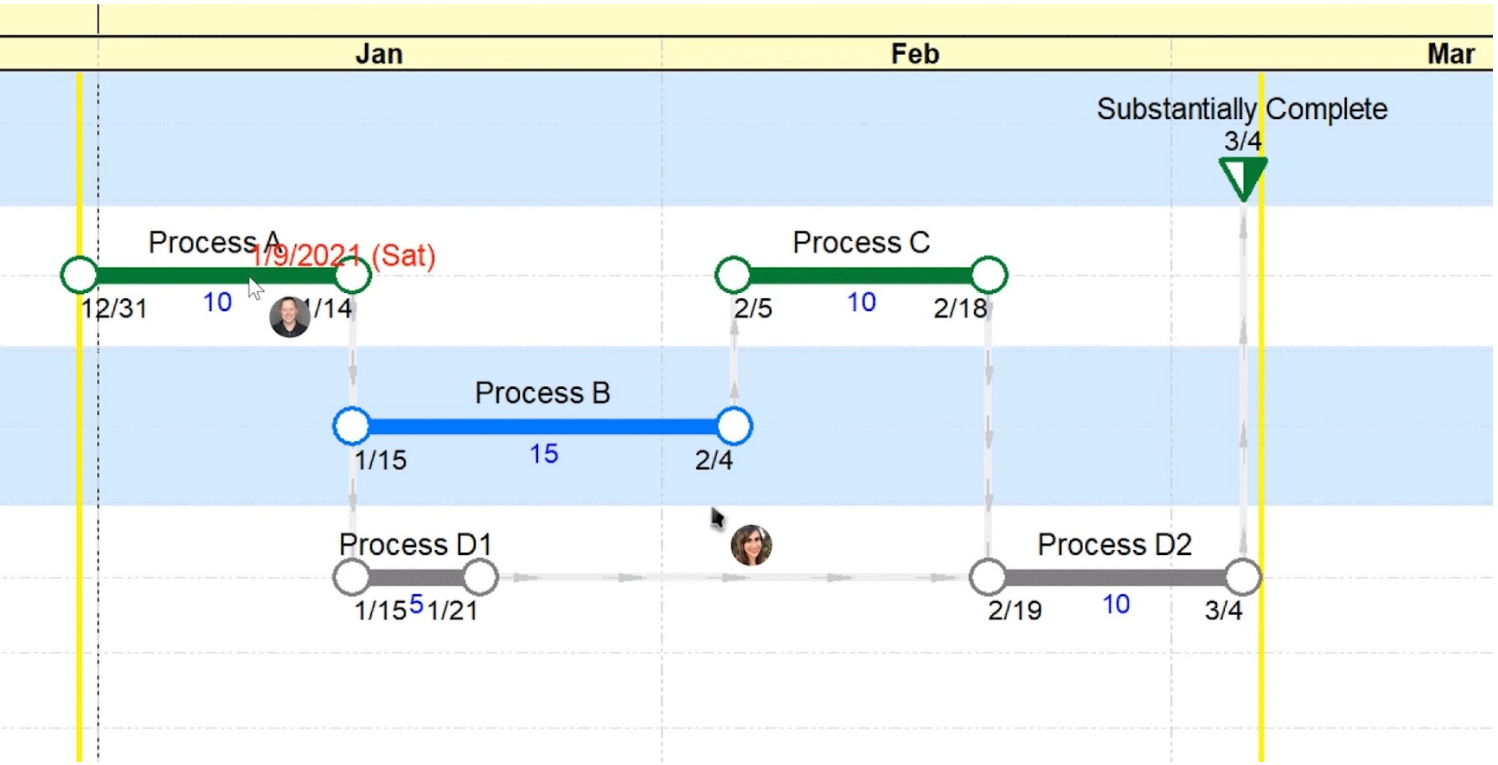
- Team needed to understand impacts and recalibrate
- Engage key project stakeholders (including non-schedulers) to recalibrate schedule moving forward

Accurate Model of Current State

- Accurate representation of impacts
- Plan for remobilization and ramp-up of operations
- Represent new working conditions (workers flow, density restrictions, site logistics, updated delivery times, etc.)
- Identify additional indirect impacts: new working periods, seasonal work, adjacent site coordination, etc.
- Starting point for SRA

Update the Plan

Incorporate Impacts & Define Path Forward

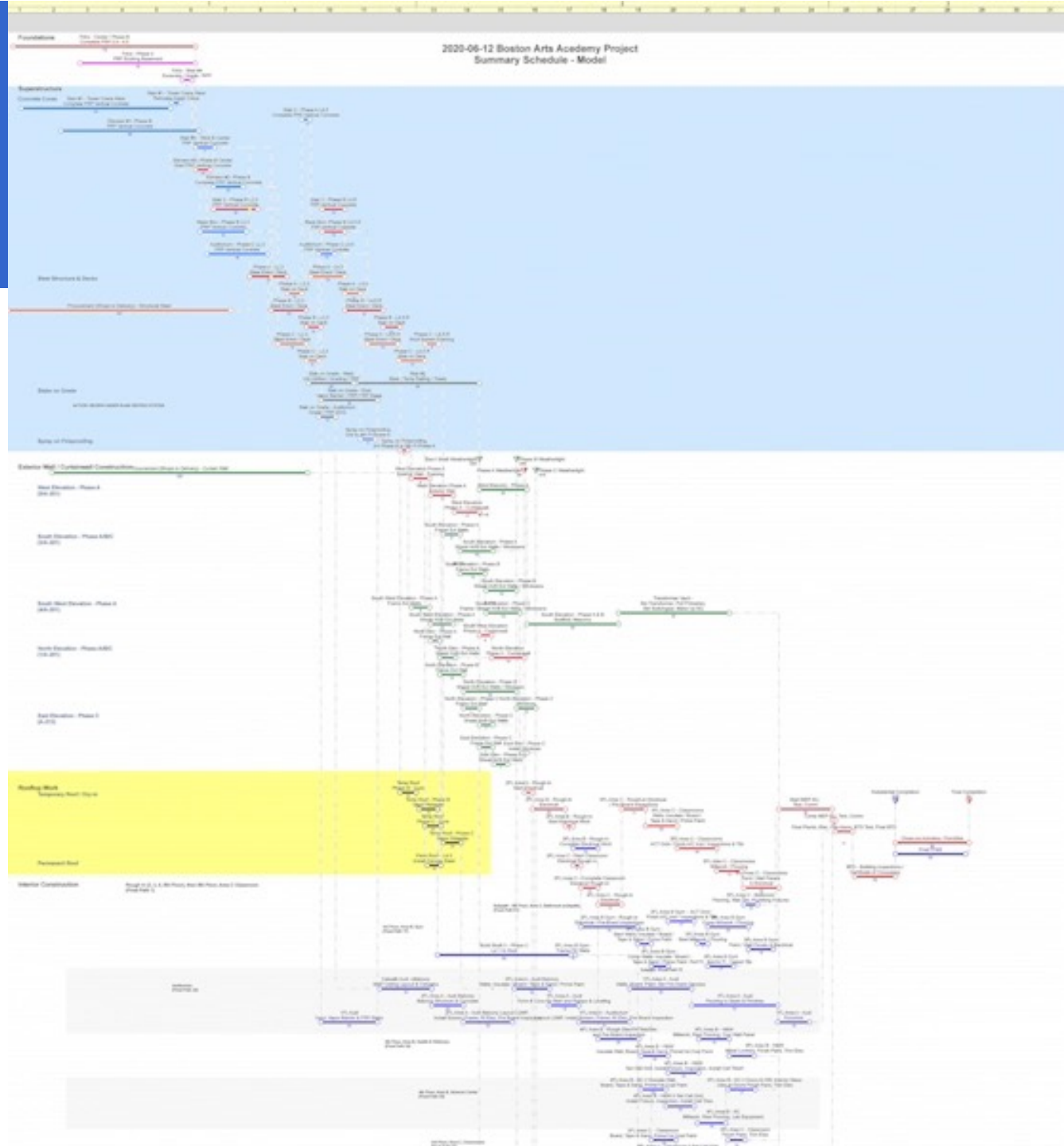


Virtual interactive planning sessions (IPS) with project team

- Leverage multiple-user feature in **Microsoft's Teams / NetPoint** for true interaction
- Increase team ownership of the plan
- Real-time calculations, quick what-if analyses, and facilitate quick decision making
- Generate better work product that reflects current status and accurate plan forward

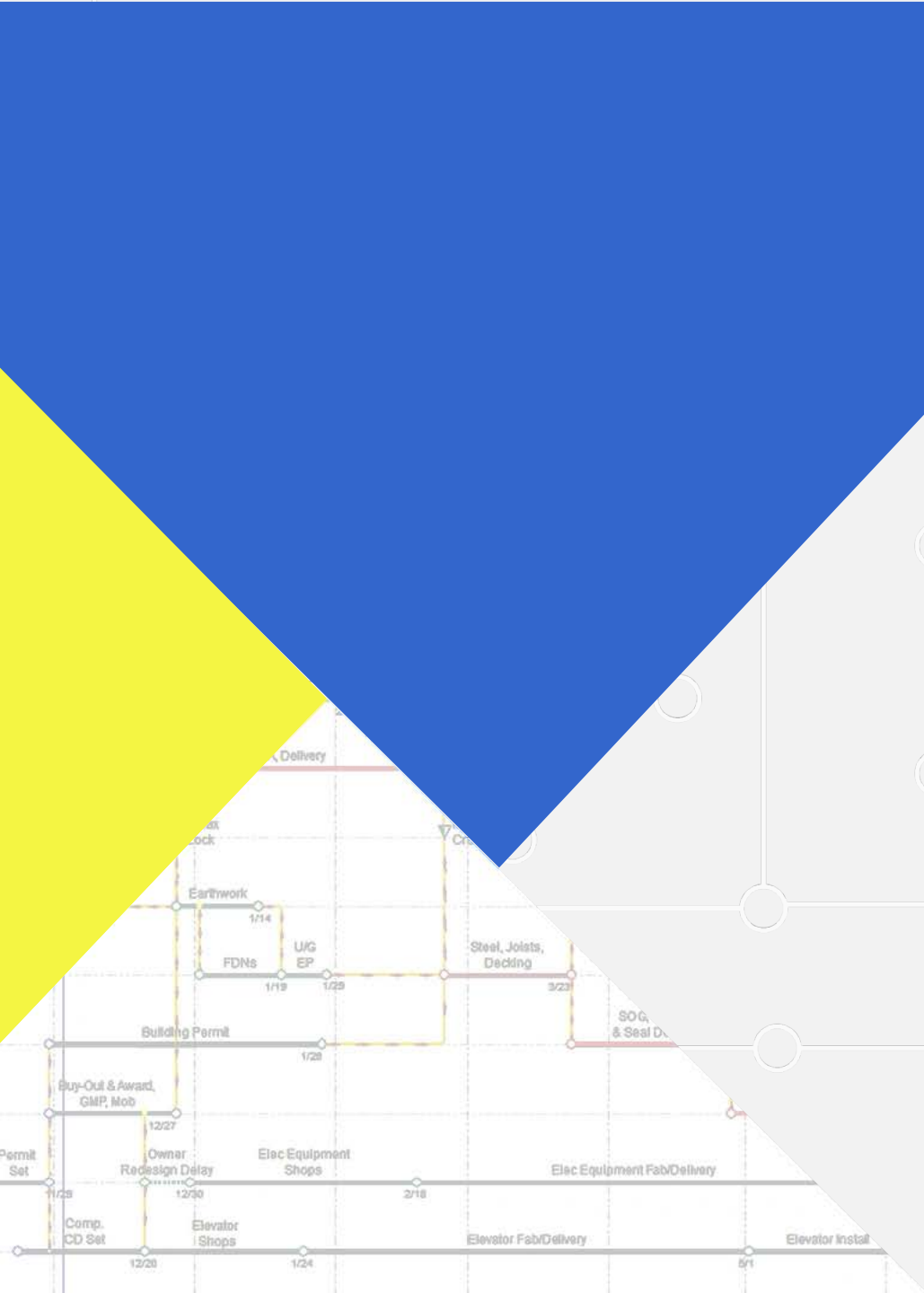
Update the Plan

Incorporate Impacts & Define Path Forward



Updated Plan

- ~150 activity NetPoint schedule summary
- Same behavior as detailed P6 schedule
- Same critical & near critical paths
- Accurate representation of impacted status
- Representing updated plan moving forward
  → recalibrated execution strategy
- Starting point for model and SRA



Factor Uncertainty

Identify, Model and Quantify Schedule Risk Impacts - Scenarios



New Updated Schedule in Place Now What?

Need to recalibrate the project execution plan

- What are the major risks affecting the project moving forward?
- What impact would they have to the project schedule?
- What is the probability of meeting the original target dates? Ranges?
- What can the team do to mitigate impacts and minimize risk exposures?
- What are the alternatives to potentially recover schedule? At what price? Is it worth?
- What should be the new project target dates? → Recalibrate expectations
- Define recalibrated project execution plan

New Updated Schedule in Place *Now What?*

Acknowledge New Conditions Affecting the Project → Factor Uncertainty



New Safety Protocols

Temperature checks, screening, masks & enhanced PPE



Social Distancing

Limitations on the amount of workers in certain areas, crew sizes



Schedule Changes

Weather sensitive work, re-mobilization, revised delivery dates



Limited Manpower

Reduced availably of manpower (short and long term)



Productivity Impacts

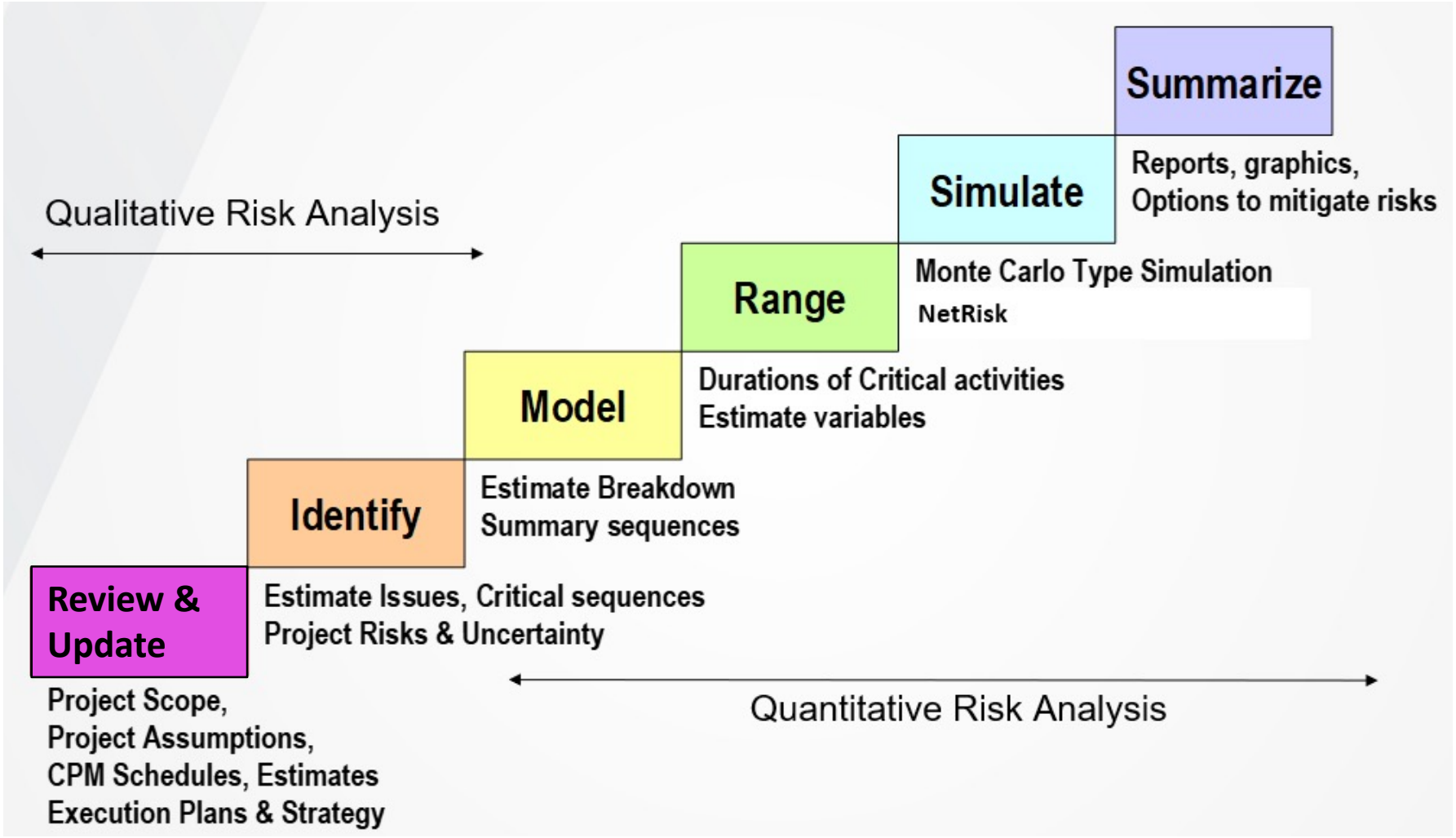
Impacts in productivity due to new restrictions, social distancing crew sizes and enhance safety guidelines



Threat of Another Shutdown

High likelihood that another surge in COVID cases would result in another site shutdown

SRA Analysis Process

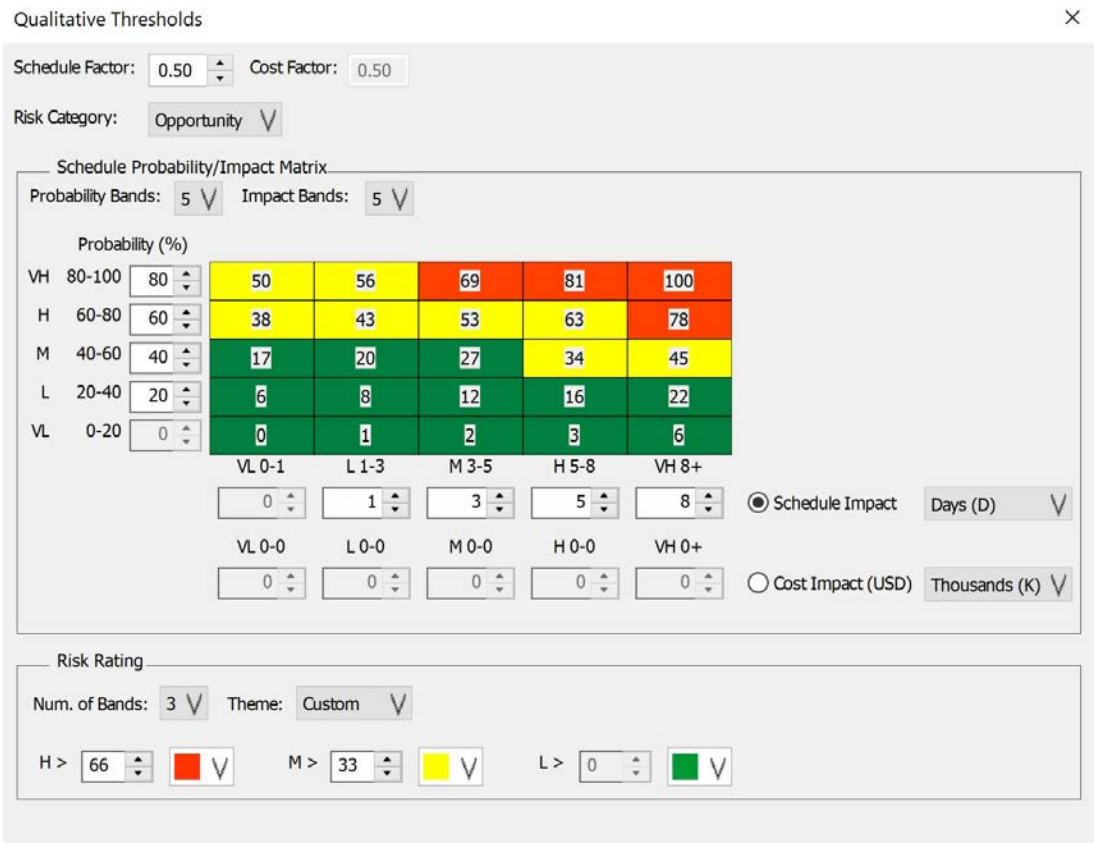


Qualitative Analysis

Identify risks / create register / evaluate potential impact

Engage key project stakeholders in the risk identification process & development of Risk Thresholds (heat map)

- ✓ **Held remote session via MS Teams with project team**
- ✓ **Follow up with owner's key stakeholders as needed**



Qualitative Analysis

Identify risks / create register / evaluate potential impact

Engage key project stakeholders in the risk identification process & development of Risk Thresholds (heat map)

Sent out Risk Identification Questionnaire – Anonymous feedback

- ✓ **Share questionnaire via email → top 5 threats and opportunities**
- ✓ **Collect feedback separately (Delphi Technique)**

Risk ID	Risk Description	Impact Type	Discipline	Probability of Occurrence	
				VH / H / M / L / VL	%
Opportunities					

Qualitative Analysis

Identify risks / create register / evaluate potential impact

Engage key project stakeholders in the risk identification process & development of Risk Thresholds (heat map)

Sent out Risk Identification Questionnaire – Anonymous feedback

Collect data, review with team and consolidate information

- ✓ **Brainstorm compiled risks with the group**
- ✓ **Rank groups depending on potential impact rating**
- ✓ **Define risk owners and discuss mitigation strategy**

Risk ID	Risk Description	Impact Type	Discipline	Probability of Occurrence	
				VH / H / M / L / VL	%
Opportunities					
O1	If the actual weather is better than the schedule weather calander	schedule	concrete, steel, roofing, CW, Sheathing, Wtrprf	M	70%
O2	Add CM staff to coordinate and supervise the expedited schedule	schedule	All	M	50%
O3	Re-sequence work activities around winter to lesson temp in costs	cost	exterior	M	30%
O4	If the City can establish an owners change order budget it will expedite getting extra work procssed and paid which in turn keep the subcontractors compliant	cost/schedule	All	L	10%
O5	Issue CCD's for all critical extra work to avoid comeback work and schedule delays and rework required because of late release of extra work	schedule	All	M	50%
Threats					
T1	6 day work calander does not obtain 100% effeciency	schedule	All	VH	100%
T2	COVID-19 work practices; less manpower and no stacking of trades	schedule/cost	All	VH	90%
T3	If the building isn't weather tight by 2020 winter it will cause delays in mep rough in and costs for temping in	schedule/cost	All	VH	90%
T4	Phasing plan in schedule of A,B,C might cause ineffeciances with work flow of trades installing horizontally cuasing lost time relocating to other parts of the building	schedule/cost	All	H	60%
T5	A lot of ductwork is lined, so need to confirm schedule reflects weather tight prior to ductwork install.	schedule	ductwork, MEP's	M	50%

Qualitative Analysis

Identify risks / create register / evaluate potential impact

Engage key project stakeholders in the risk identification process & development of Risk Thresholds (heat map)

Sent out Risk Identification Questionnaire – Anonymous feedback

Collect data, review with team and consolidate information

Define SRA Treatment for identified risks

- ✓ **Define risk drivers**
- ✓ **Incorporate in ranging**
- ✓ **What-if scenarios**

Risk ID	Risk Description	Impact Type	Discipline	Probability of Occurrence		SRA Treatment			
				VH / H / M / L / VL	%	Risk Driver	Duration Range	NWP / Weather	What-if
Opportunities									
O1	If the actual weather is better than the schedule weather calander	schedule	concrete, steel, roofing, CW, Sheathing, Wtrprf	M	70%	✓			
O2	Add CM staff to coordinate and supervise the expedited schedule	schedule	All	M	50%	✓			
O3	Re-sequence work activities around winter to lesson temp in costs	cost	exterior	M	30%				✓
O4	If the City can establish an owners change order budget it will expedite getting extra work procssed and paid which in turn keep the subcontractors compliant	cost/schedule	All	L	10%	✓			
O5	Issue CCD's for all critical extra work to avoid comeback work and schedule delays and rework required because of late release of extra work	schedule	All	M	50%	✓			
Threats									
T1	6 day work calander does not obtain 100% effeciency	schedule	All	VH	100%	✓			
T2	COVID-19 work practices; less manpower and no stacking of trades	schedule/cost	All	VH	90%	✓			
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T4	Phasing plan in schedule of A,B,C might cause ineffeciances with work flow of trades installing horizontally cuasing lost time relocating to other parts of the building	schedule/cost	All	H	60%	✓			
T5	A lot of ductwork is lined, so need to confirm schedule reflects weather tight prior to ductwork install.	schedule	ductwork, MEP's	M	50%		✓		

Qualitative Analysis

Identify risks / create register / evaluate potential impact

Engage key project stakeholders in the risk identification process & development of Risk Thresholds (heat map)

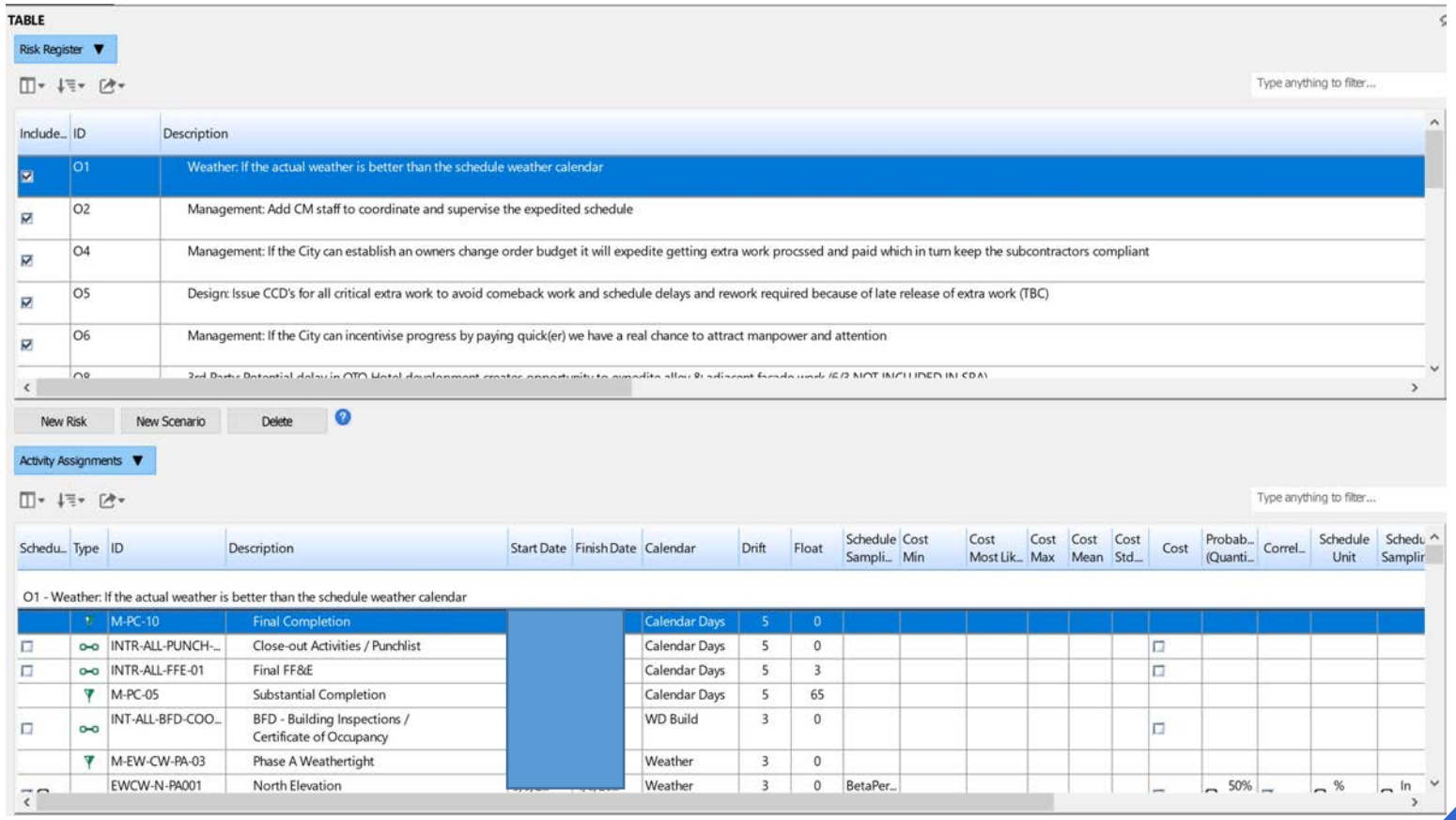
Sent out Risk Identification Questionnaire – Anonymous feedback

Collect data, review with team and consolidate information

Define SRA Treatment for identified risks

Establish Risk Register

- ***Risk Drivers***
- ***Probability***
- ***Impact***
- ***Qualitative Rating***



Quantitative Analysis

Range / Simulate / Analyze / What-if Scenarios

Team used NetRisk to run the SRA Quantitative Analysis

- ✓ Easy schedule model import from NetPoint
- ✓ Allows modeling of multiple risk driver scenarios
- ✓ Easy data entry: correlation, duration ranges
- ✓ Variability in either days or %
- ✓ Results are easily exported to excel
- ✓ Facilitates the comparison of what-if scenarios results

Quantitative Analysis

Range / Simulate / Analyze / What-if Scenarios

Team used NetRisk to run the SRA Quantitative Analysis

Probability and ranging of risk drivers and scenarios, activity assignment and correlations

TABLE

Risk Register

Includ...	ID	Description	Category	Probability...	Schedule Unit	Schedule Min	Schedule Most Lik...	Schedule Max
☑	O1	Weather: If the actual weather is better than the schedule w...	Opportunity	50%	% Variance	-7%	0%	7%
☑	O5	Design: Issue CCD's for all critical extra work to avoid come...	Threat	10%	% Variance	-2%	0%	3%
☑	O6	Management: If the City can incentivise progress by paying ...	Opportunity	50%	% Variance	-5%	0%	0%
☑	T2A	Covid-19 / Manpower availability (long term)	Threat	25%	% Variance	0%	1%	4%
☑	T8A	Covid-19 / Productivity Impacts: density, new guidelines, P...	Threat	75%	% Variance	0%	2%	4%
☐	T8A-M	Covid-19 / Productivity Impacts: density, new guidelines, ...	Threat	75%	% Variance	0%	6%	12%

Activity Assignments

Sched...	Type	ID	Description	Start Date	Finish Date	Calendar	Drift	Float	Schedule Sampling Val...	Proba... (Quant...	Correl...	Schedule Unit	Schedule Samplin...	Schedule Distribut...	Schedule Min	Schedule Most Lik...	Schedule Max
T2A - Covid-19 / Manpower availability (long term)																	
☑		EWCW-W-PA001	West Elevation Phase A Exterior Wall - Framing			Weather	3	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%
☑		STR-SOFP-PAPB0...	Spray on Fireproofing 3rd Phase B to 5th Fl Phase A			6D Wthr	4	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%
☑		STR-SSD-PB003	Phase B - L4,5,R Slab on Deck			6D Wthr	4	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%
☑		STR-SSD-PB001	Phase B - L4,5,R Steel Erect / Deck			6D Wthr	4	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%
☑		STR-CC-BB-PB01	Black Box- Phase B L4,5,R FRP Vertical Contrete			6D Wthr	4	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%
☑		STR-CC-STR3-PB01	Stair 3 - Phase B L4,R FRP Vertical Concrete			6D Wthr	4	0	BetaPert[0%,1...	25%	☑	% Varia...	In Parallel	Beta...	0%	1%	4%

Quantitative Analysis

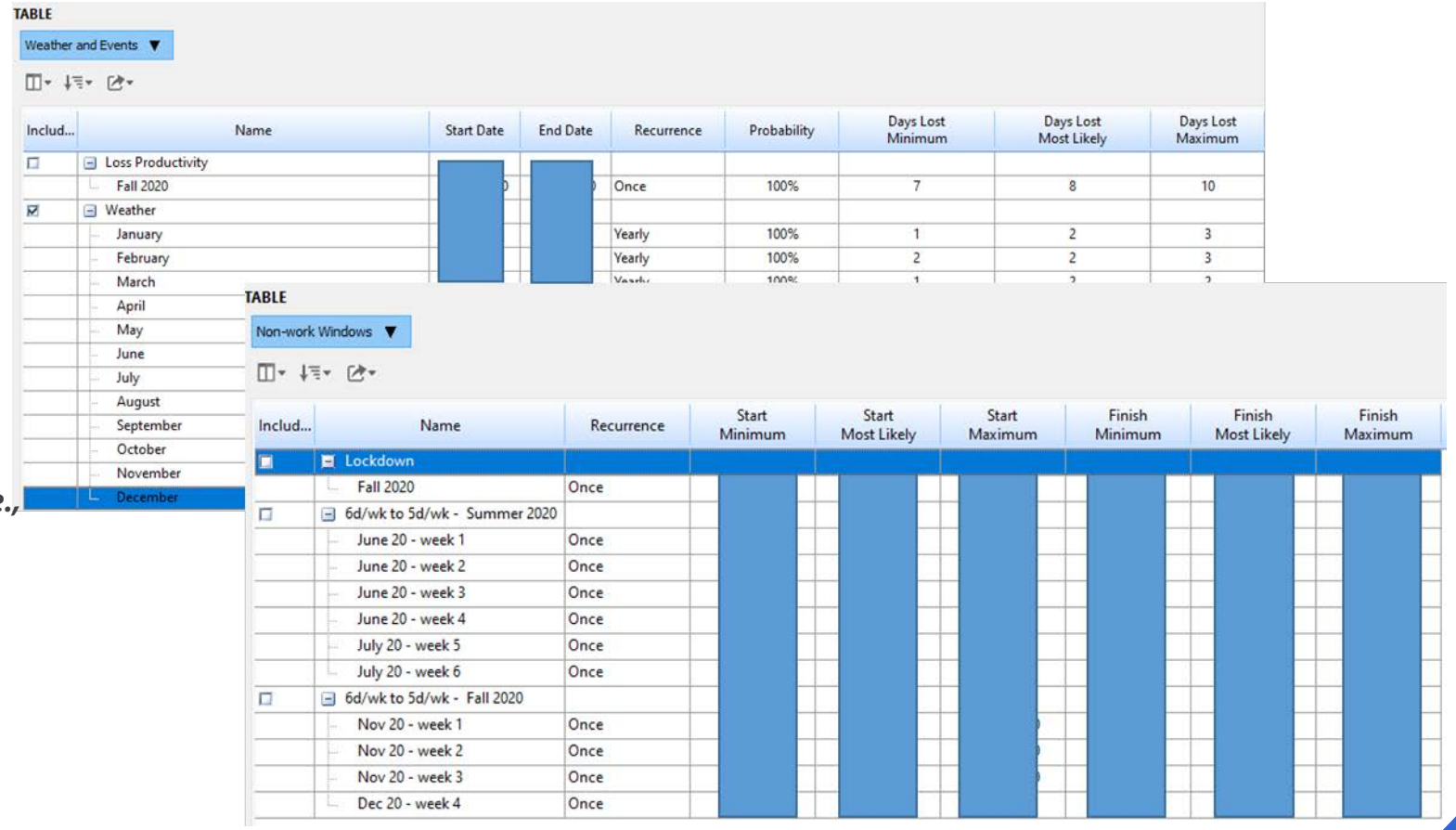
Range / Simulate / Analyze / What-if Scenarios

Team used NetRisk to run the SRA Quantitative Analysis

Probability and ranging of risk drivers and scenarios, activity assignment and correlations

Model weather and non-working periods

- ✓ *Factor Weather*
- ✓ *Effect of reduced working periods to accommodate new working conditions (i.e., cleaning, sanitization, area turn overs)*



Quantitative Analysis

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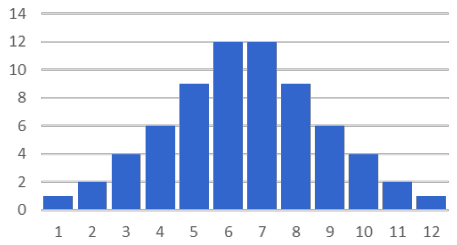
Ranging of activity durations

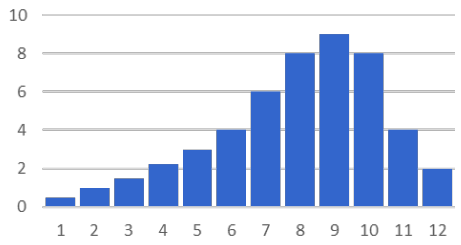
- ✓ Additional days
- ✓ Duration variability (%)

TABLE

Duration and Cost ▼

Durati...	Type	ID	Description	Calendar	Start Date	Finish Date	Existenc...	Duration Complet...	Duration Unit	Duration Distribut...	Duration Min	Duration Most Lik...	Duration Max
☑	⚯	INTR-FTP01-C-WAL-...	5FL Area C - Classrooms Paint / Wall Panels & Electrical	WD Build			100%	0	% Variance	BetaPert	-5%	0%	5%
☑	⚯	INT-FTP01-C-MLW-01	5FL Area C - Classrooms Millwork / Flooring	WD Build			100%	0	% Variance	BetaPert	-5%	0%	5%
☑	⚯	INT-FTP01-C-ACT-01	5FL Area C - Classrooms ACT Grid / Finish A/C Inst / Inspections & Tile	WD Build			100%	0	% Variance	BetaPert	-5%	0%	15%
☑	⚯	INT-FTP01-C-WALL-01	5FL Area C - Classrooms Walls: Insulate / Board / Tape & Sand / Prime Paint	WD Build			100%	0	% Variance	BetaPert	-5%	0%	10%
☑	⚯	INTR-FTP01-C-ELE-01	5FL Area C - Rough-in Electrical / Pre-Board Inspections	WD Build			100%	0	% Variance	BetaPert	-5%	0%	15%
☑	⚯	INTR-FTP01-C-ELE-04	4FL Area C - Rough-in Electrical	WD Build			100%	0	% Variance	BetaPert	-5%	0%	15%
☑	⚯	INTR-FTP01-C-ELE-02	3FL Area C - Start Classroom Electrical Rough-in	WD Build			100%	0	% Variance	BetaPert	-5%	0%	15%
☑	⚯	INTR-FTP01-C-ELE-03	3FL Area C - Complete Classroom Electrical Rough-in	WD Build			100%	0	% Variance	BetaPert	-5%	0%	15%
		INTR-FTP01-B-ELE-02	3FL Area B - Rough-In	WD Build			100%	0	%	BetaPert	-5%	0%	15%





Quantitative Analysis

Range / Simulate / Analyze / What-if Scenarios

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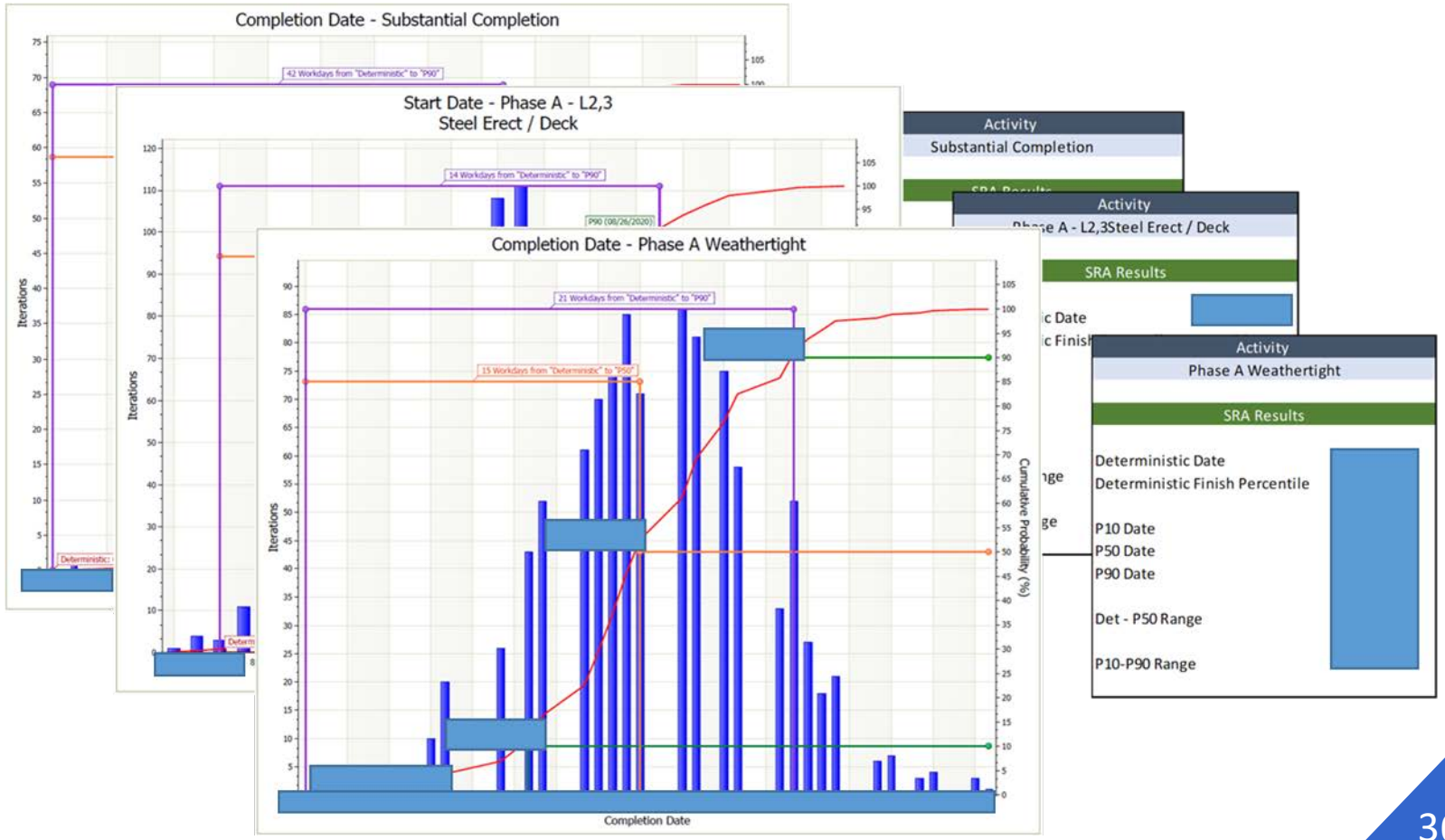
Probability and ranging of risk drivers and scenarios, activity assignment and correlations

Model weather and non-working periods

Ranging of activity durations

Run Monte-Carlo simulation & analyze results

- ✓ **1000 Iterations**
- ✓ **Probability distribution of key milestones start/finish dates**
- ✓ **Evaluate likelihood of deterministic dates**



Quantitative Analysis

Range / Simulate / Analyze / What-if Scenarios

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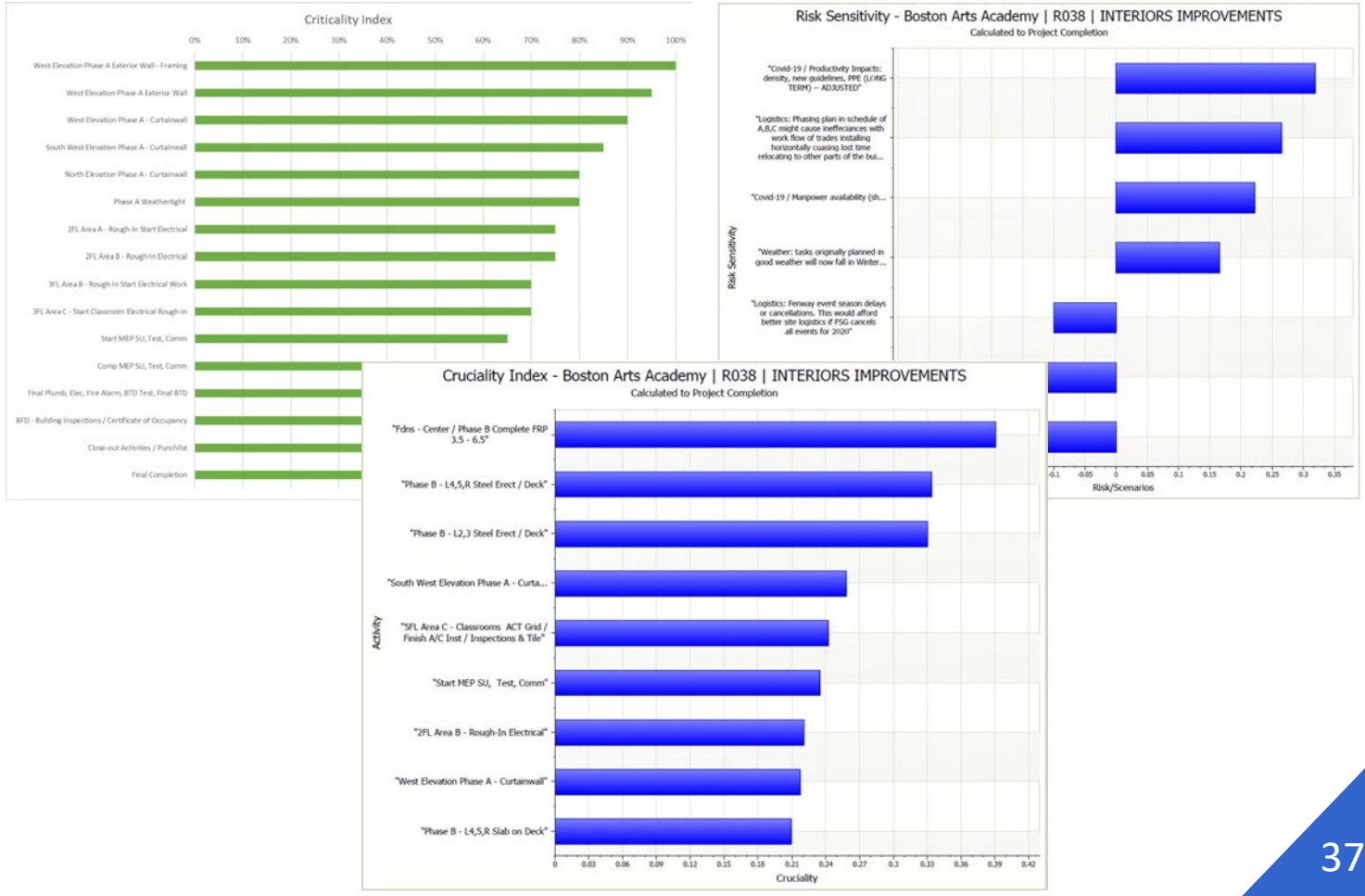
Probability and ranging of risk drivers and scenarios, activity assignment and correlations

Model weather and non-working periods

Ranging of activity durations

Run Monte-Carlo simulation & analyze results

- ✓ **Criticality Index**
- ✓ **Sensitivity Index**
- ✓ **Cruciality Index**



Quantitative Analysis

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Team used NetRisk to run the SRA Quantitative Analysis

Probability and ranging of risk drivers and scenarios, activity assignment and correlations

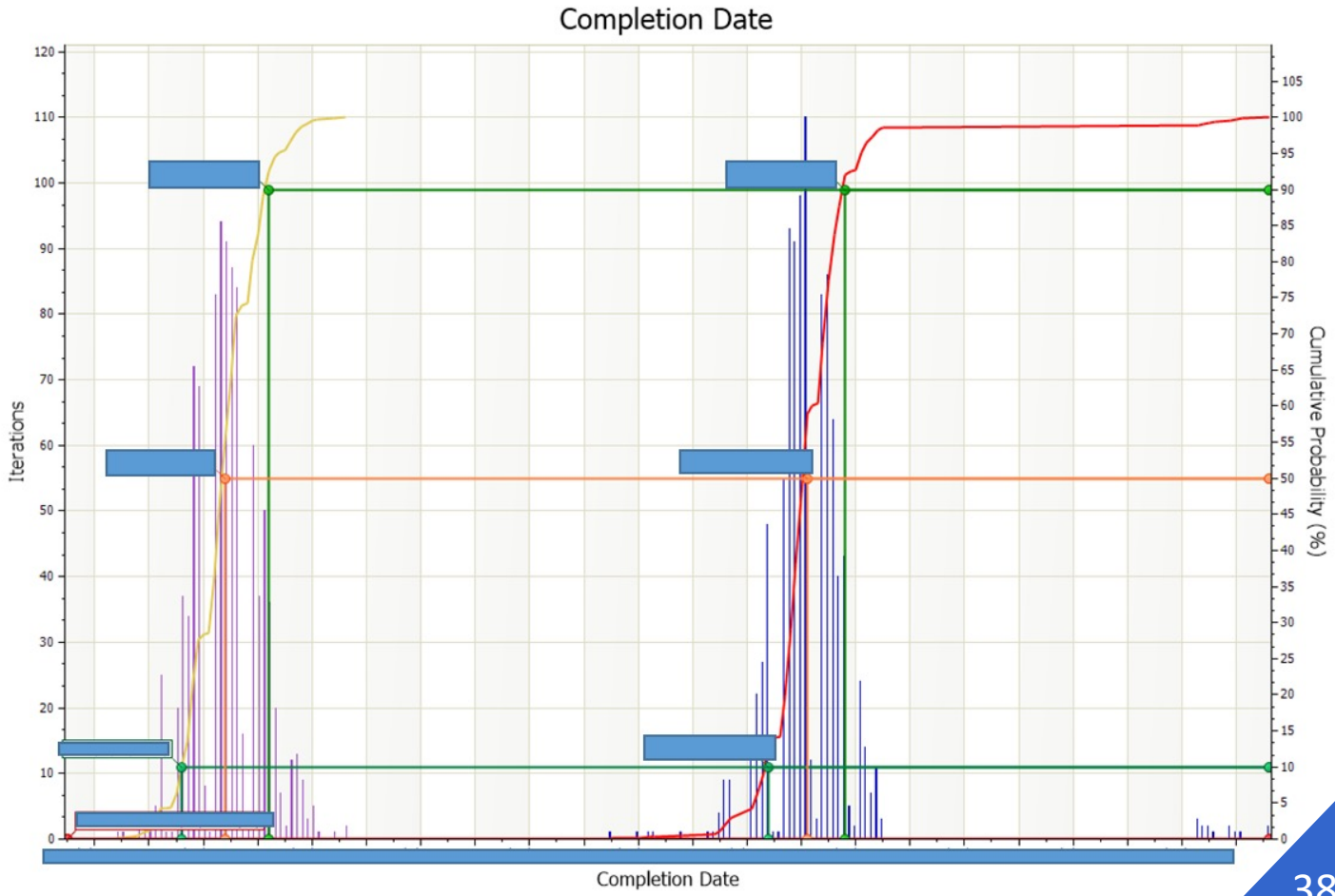
Model weather and non-working periods

Ranging of activity durations (days/%)

Run Monte-Carlo simulation & analyze results

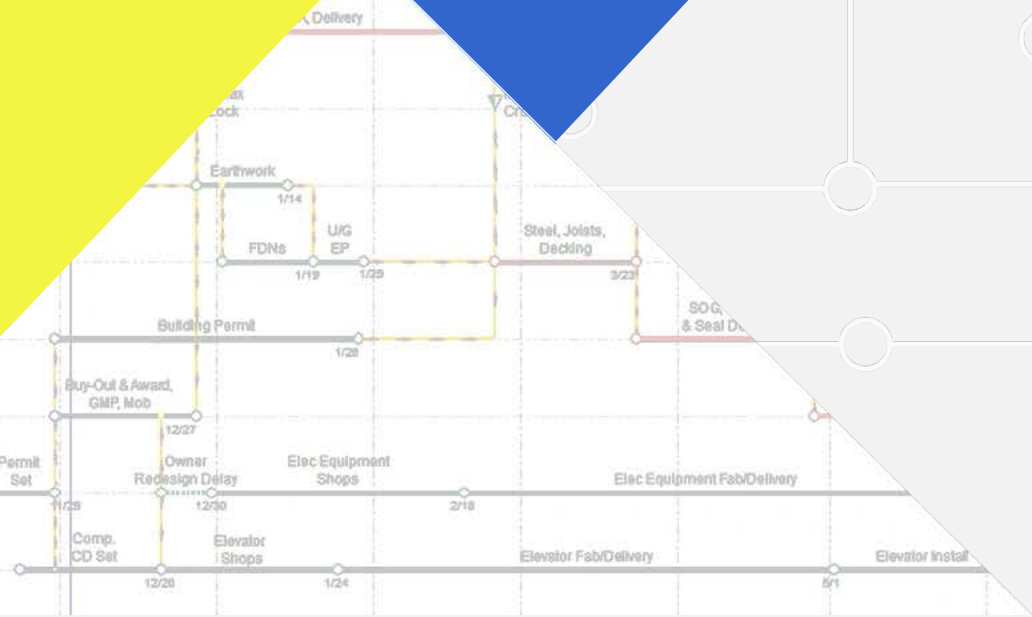
Compared What-if Scenarios

- ✓ **Model effects from another site lockdown**
- ✓ **Understand discrete impacts of risk drivers, NWP or act durations**
- ✓ **Effectiveness of mitigation actions**



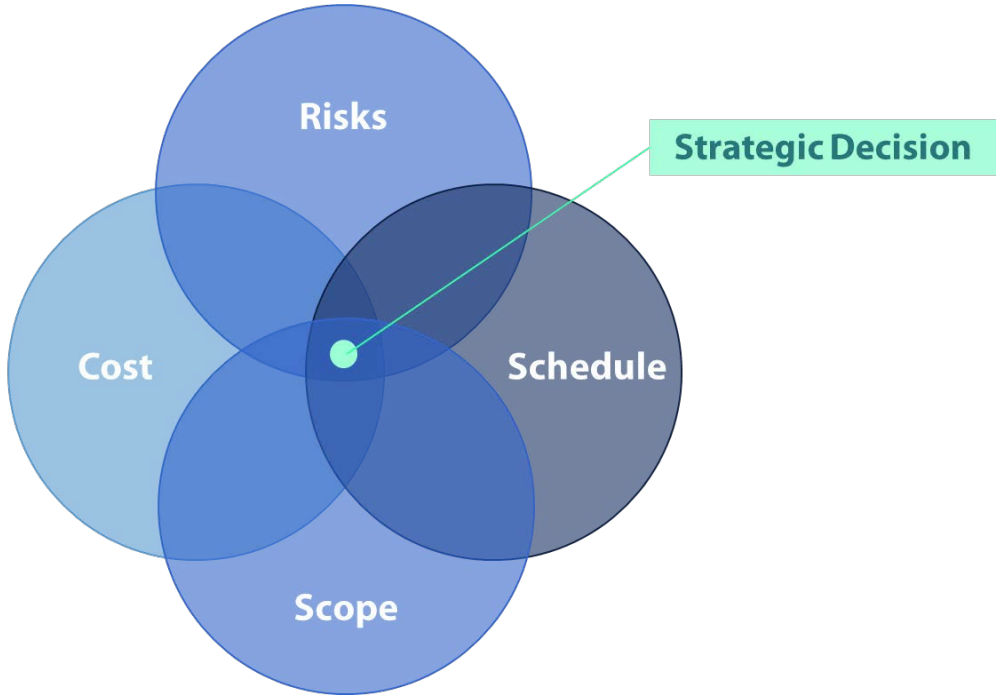
Smart Decision Making

Evaluate Scenarios, Drive Smart Decisions Based on Data and Define New Execution Strategy



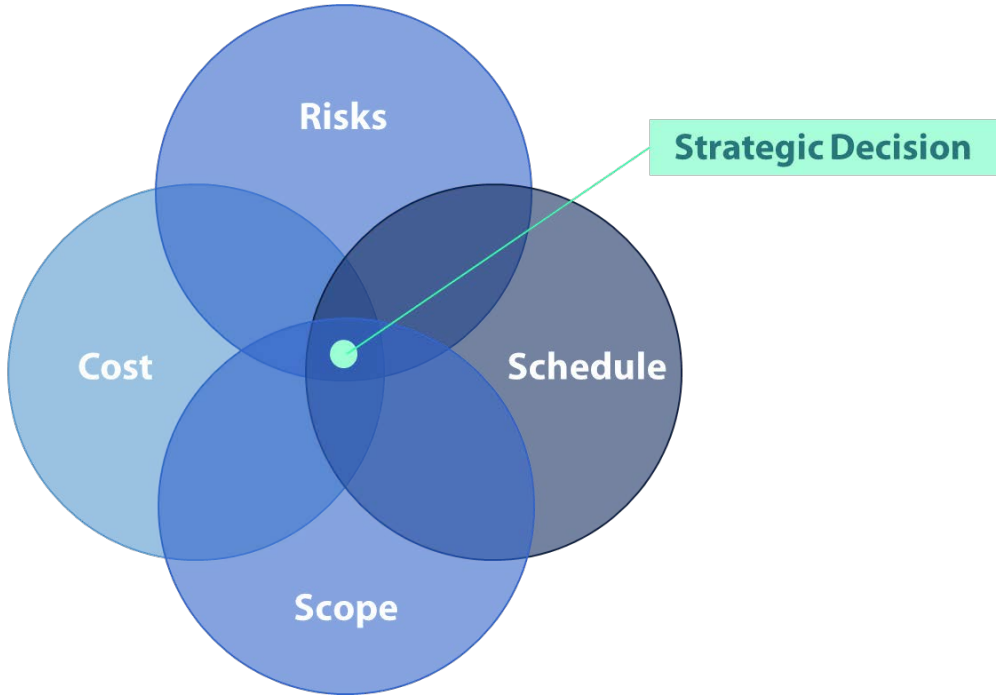
Support Smart Decision Making

- Assisted the Project Owner's Team answer key questions
  - The original target date to have the project completed by Fall 2021 had a probability of less than 5%
  - The alternatives evaluated by the project team to mitigate risks and recover time increased the probability by less than 5% → total <10%
  - Recommendation was that it was not worth paying a premium to try to recover the schedule, since the likelihood of meeting original schedule was very low
  - Plus the remaining uncertainty (i.e., another shutdown, which was an unknow at the time), would lapidate all chances



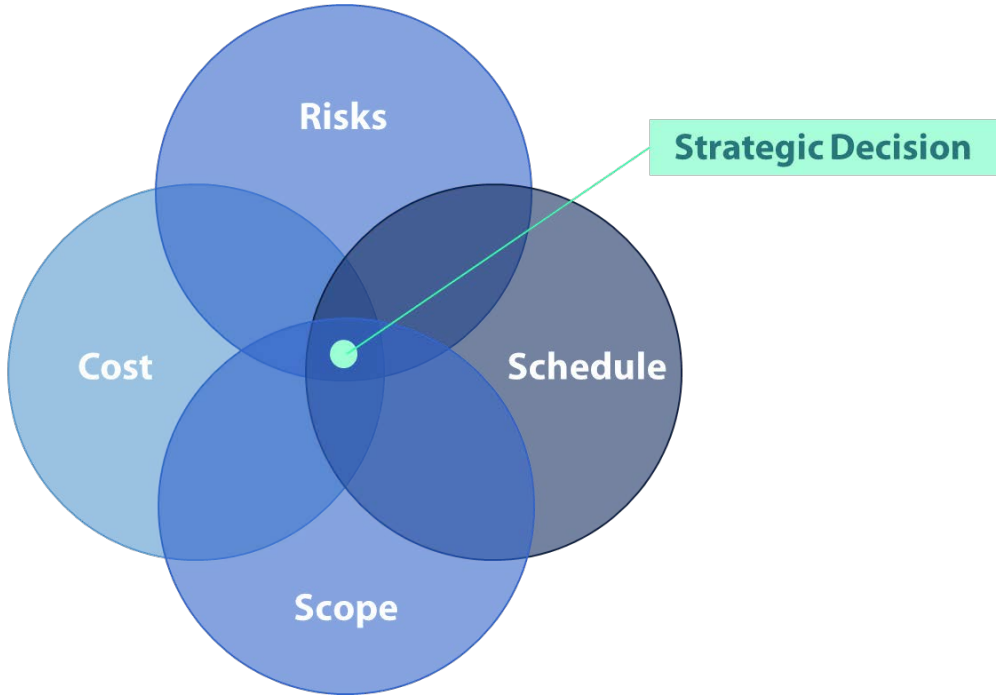
Support Smart Decision Making

- Assisted the Project Owner's Team answer key questions
- Recalibrate Execution Plan based on new conditions and uncertainty affecting the project



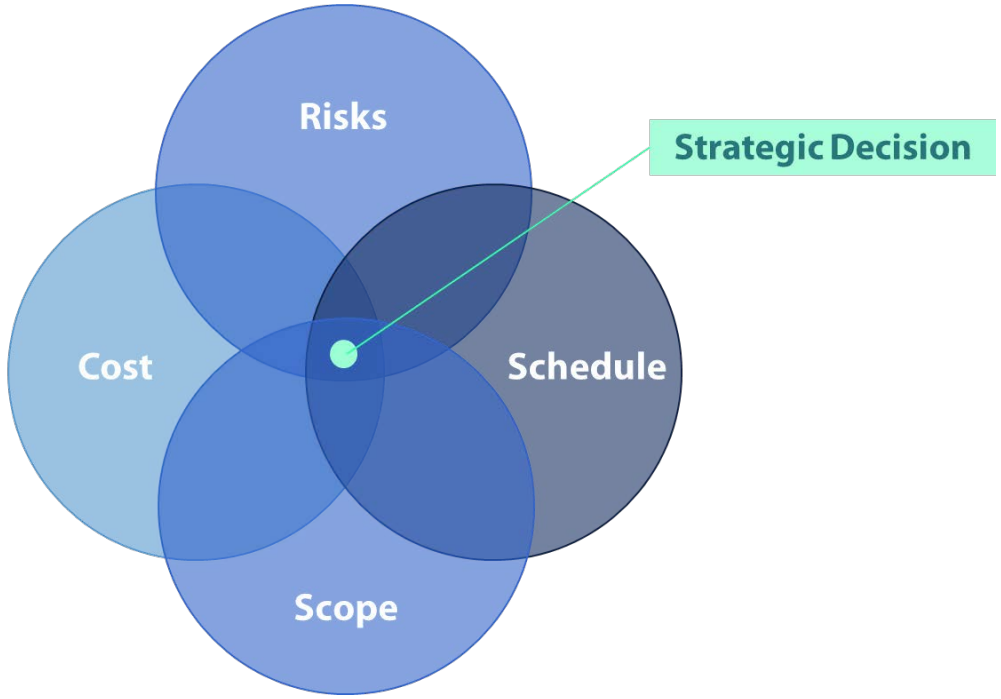
Support Smart Decision Making

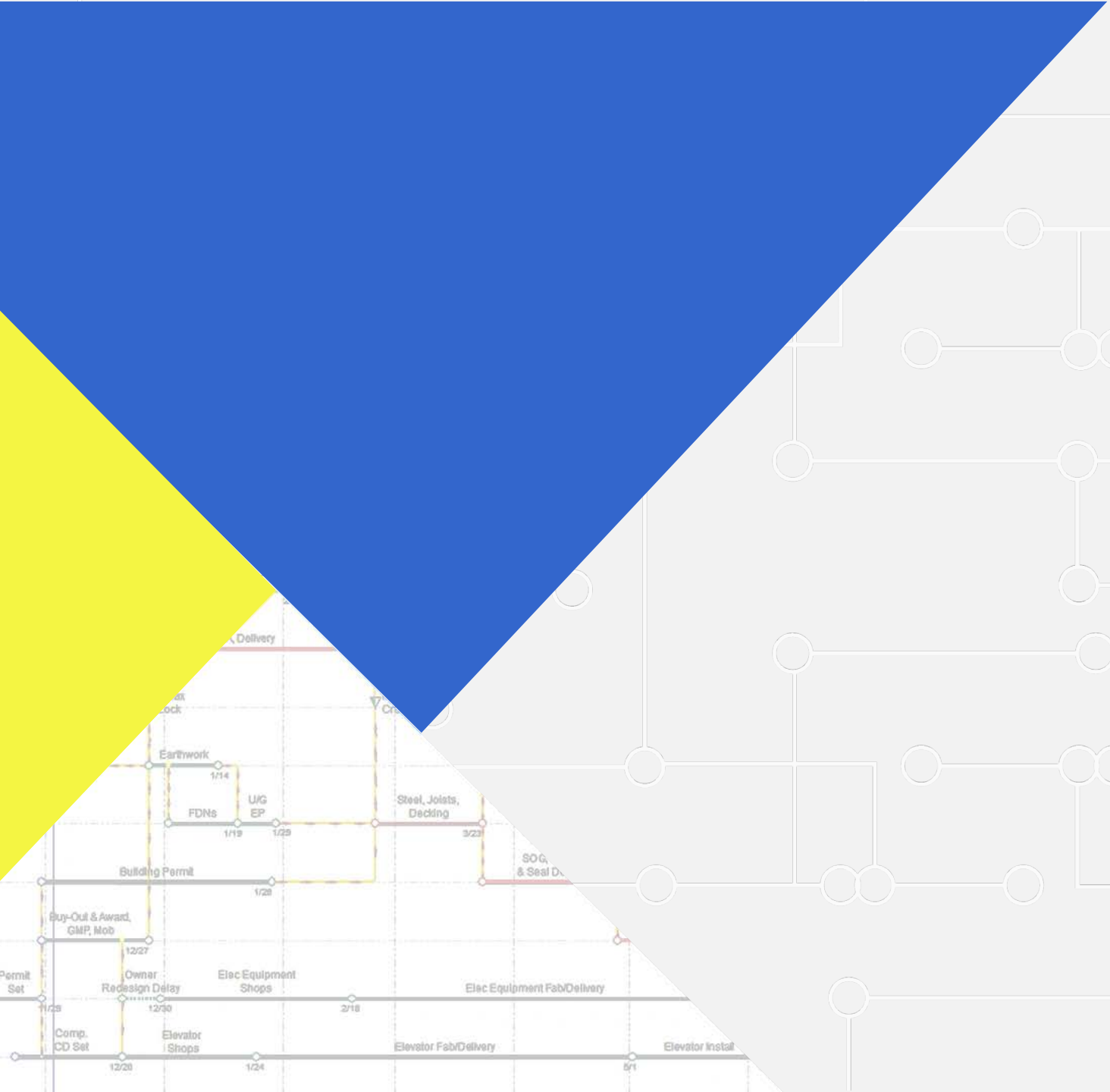
- Assisted the Project Owner's Team answer key questions
- Recalibrate Execution Plan based on new conditions and uncertainty affecting the project
- Align stakeholders to new project objectives



Support Smart Decision Making

- Assisted the Project Owner's Team answer key questions
- Recalibrate Execution Plan based on new conditions and uncertainty affecting the project
- Align stakeholders to new project objectives
- Manage project expectations: from the team, from the owners organization, from the public



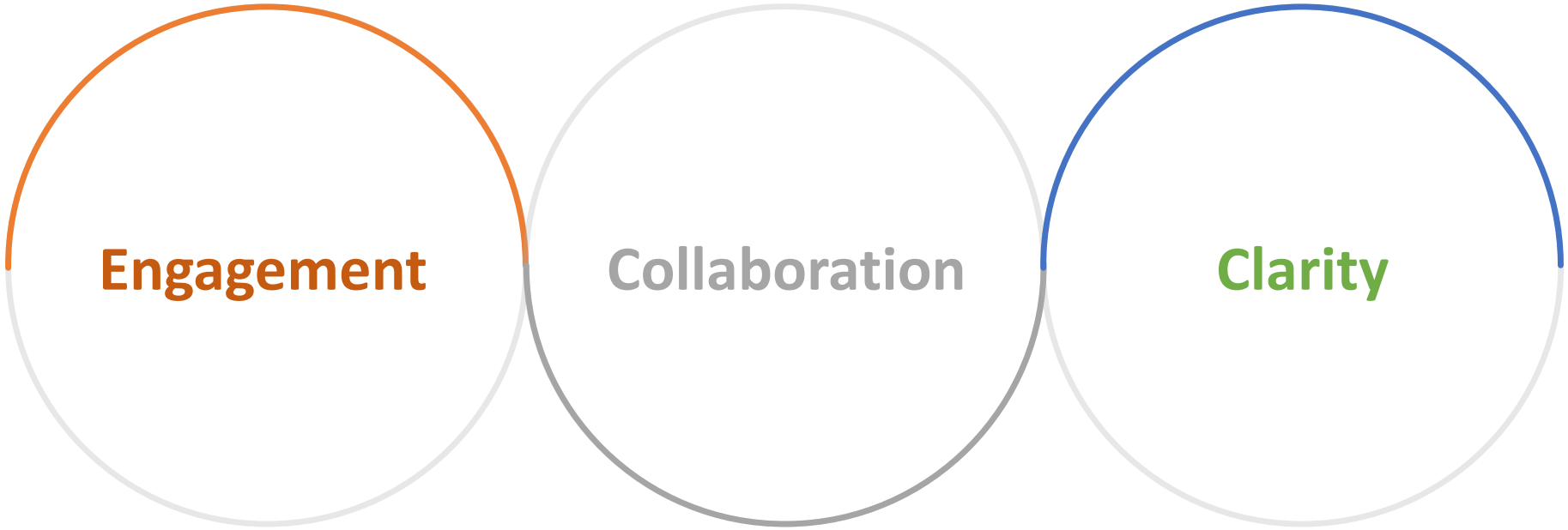


Conclusions

Final Thoughts, Lessons Learned, Q&A

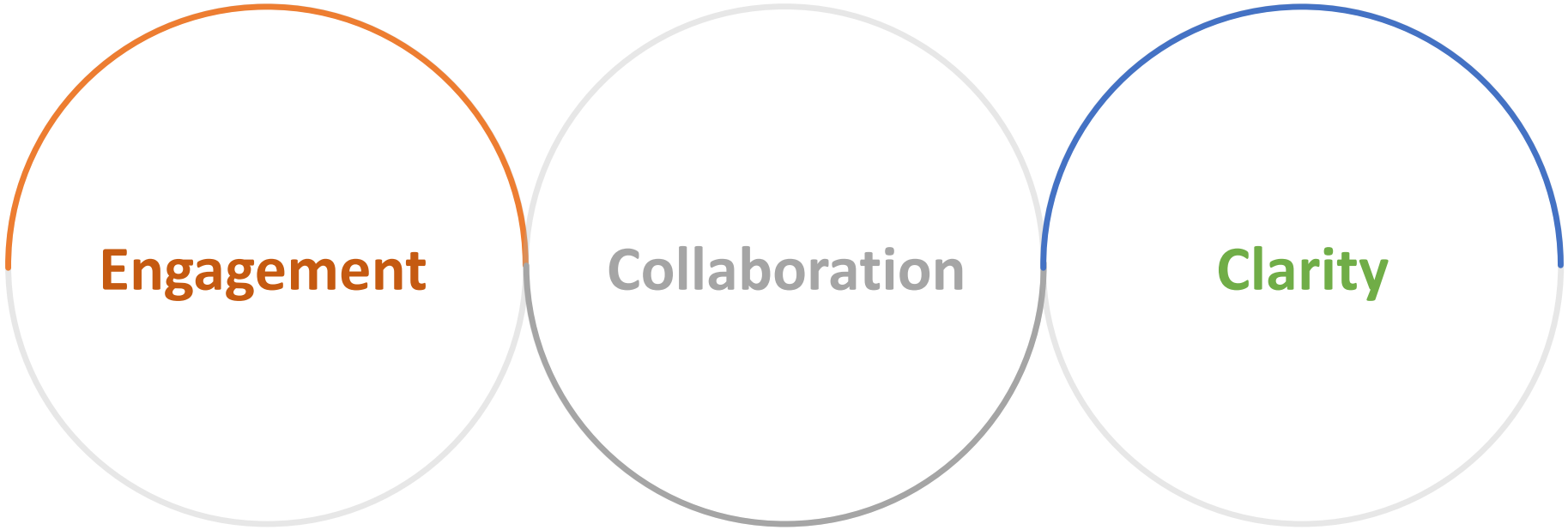
Conclusions

NetPoint is a tool used by the team to **create reliable execution plans**.



Conclusions

NetPoint is a tool to **communicate strategy and drive collaboration**



Q & A Time


Delivery
Earthwork
FDNs
U/G EP
Steel, Joists, Decking
Building Permit
Buy-Out & Award, GMP, Mob
Permit Set
Owner Redesign Delay
Elec Equipment Shops
Elec Equipment Fab/Delivery
Comp. CD Set
Elevator Shops
Elevator Fab/Delivery
Elevator Install

Thank You!





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