AUTOMATE THIS:

Solving the Weather Conundrum

PRESENTED BY:

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NetPoint + GPM CONFERENCE

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"These days, high-level tasks are increasingly being handled by algorithms that can do precise work not only with speed but also with nuance."

Dr. Gui unveils two new algorithmic solutions to the weather planning problem. The new methods rely on a *weather pass* that revises the early dates based on software-generated anticipated workday losses using NOAA data and user-defined thresholds for severe weather aka *weather profiles*. The methods are ideally suited when multiple combinations of weather conditions better model normal adverse weather. The *nonworking day* method preserves activity durations and relieves schedulers from having to create a burdensome number of weather calendars. The *weathered duration* method increases activity durations without introducing weather calendars thereby preserving total float continuity, a problem heretofore unresolved.

MEET THE PRESENTER



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MORE ABOUT THE PRESENTER

Dr. Gui is one of our nation's foremost planning and scheduling experts. He has served as investor's developer, construction manager, program manager, forensic scheduler, EPC contractor chief scheduler, and expert witness. Dr. Gui has pioneered innovations in project management throughout his career. He holds four US patents on his graphical path method (GPM) and has numerous applications pending with the US Patent and Trademark Office. He and a growing number of GPM planners believe that GPM has the potential to replace the critical path method (CPM) as the dominant planning/scheduling method.

AUTOMATE THIS: SOLVING THE WEATHER CONUNDRUM

01

The Weather Planning Void

Schedules that do not accurately factor *normal* adverse weather are not reliable predictors of progress or completion

02

Adverse Weather

Meteorological conditions that are sufficiently severe to interrupt or stop weather-sensitive outdoor work

03

Weather Planning Methods

Use a weather calendar or an activity to store weather days or increase duration estimates of weather-sensitive activities

04

The Weather Conundrum

Current methods rely on heuristics that generalize weather day losses without considering location or the weather record

05

Solving the Weather Conundrum

The schedule is adjusted in a *weather pass* for workday losses that can be statistically anticipated for *normal* adverse weather

06

A New Weather Planning Paradigm

Schedules that are nuanced for weather (location and historical weather) as well as what-if weather analyses become the norm

1

The Weather Planning Void

The weather planning void

Construction schedules that do not correctly account for *normal* adverse weather based on a statistical analysis of historical weather conditions at the site are not credible predictors of activity dates, progress, or completion

Determining weather impacts from a statistical analysis of historical weather is an exceedingly technical and resource-intense exercise; thus, not surprisingly, practitioners tend to rely on weather planning heuristics

The weather planning void *(cont'd)*

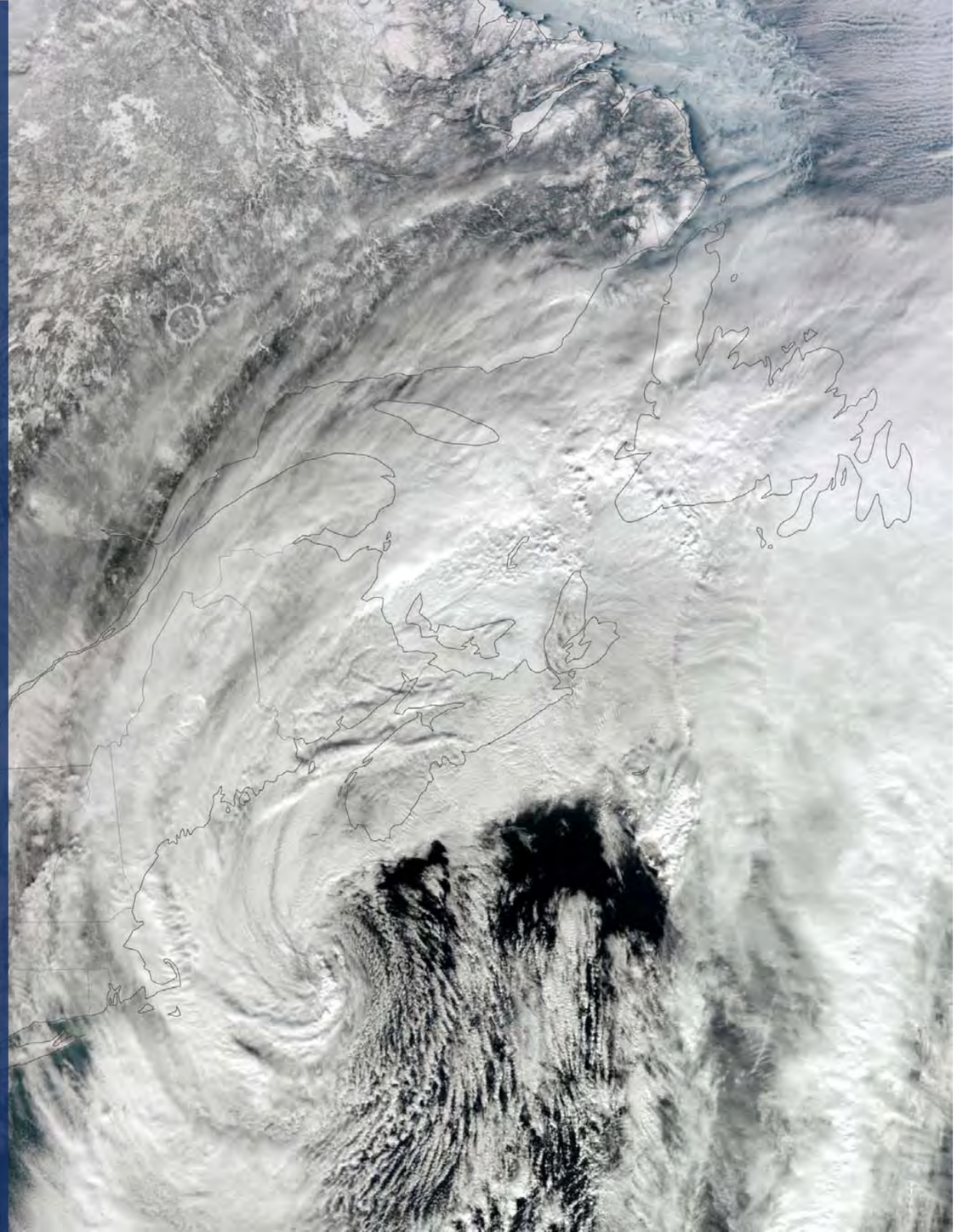
Standard nonworking day aka weather day monthly averages and other weather planning heuristics are nuanced neither for historical weather nor site location

In the absence of weather planning, otherwise foreseeable adverse weather conditions prevailing at the site remain unknown until a delay claim arises



2

Adverse Weather



Adverse Weather

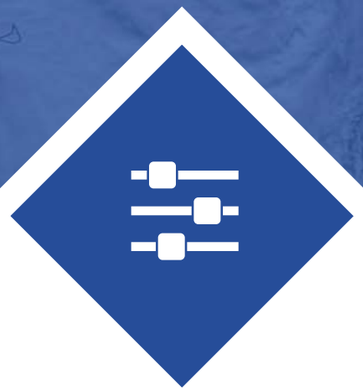
As it relates to outdoor work at the project site, precipitation, high winds, cold and hot temperatures, humidity, wind chill, and other meteorological conditions sufficiently severe to interrupt or stop work or slow production

ADVERSE WEATHER AT THE SITE



Precipitation

0.1 inch or more of precipitation (liquid equivalent) will typically interrupt or stop certain types of outdoor work; if over 1 inch, impact may extend to the following workday



Wind Speed

Wind speeds that stop work depend on work type and on means and methods; for instance, 30 mph-40 mph wind speeds are likely to stop certain crane-hoisting operations



Temperature

Temperatures ≤ 40°F and ≥ 95°F may prevent installation of certain materials; temperatures ≤ 10°F & 65% humidity and ≥ 100°F & 75% humidity may justify stopping work

3

Weather Planning Methods

WEATHER PLANNING METHODS

Commonly, one *all-weather* calendar, setting forth specified normal adverse weather days, is associated with the appropriate activities

2

Increasing weather-sensitive activity duration estimates (globally, if the software allows) to account for typical lost production based on prior experience

4



1

Weather days are modeled in a weather buffer that precedes an interim or the finish milestone; the duration is reduced monthly as the data date advances

3

The plan is to work on weekends as needed if progress falls behind schedule due to actual weather that is as or less severe than normal adverse weather



4

The Weather Conundrum

THE WEATHER CONUNDRUM

Using a weather calendar(s) further corrupts total floats along activity paths and overestimates weather losses if weather days are not assigned to weekends

2

Increasing duration estimates by a factor for weather is an imprecise method that requires laborious duration readjustments as the schedule is updated

4



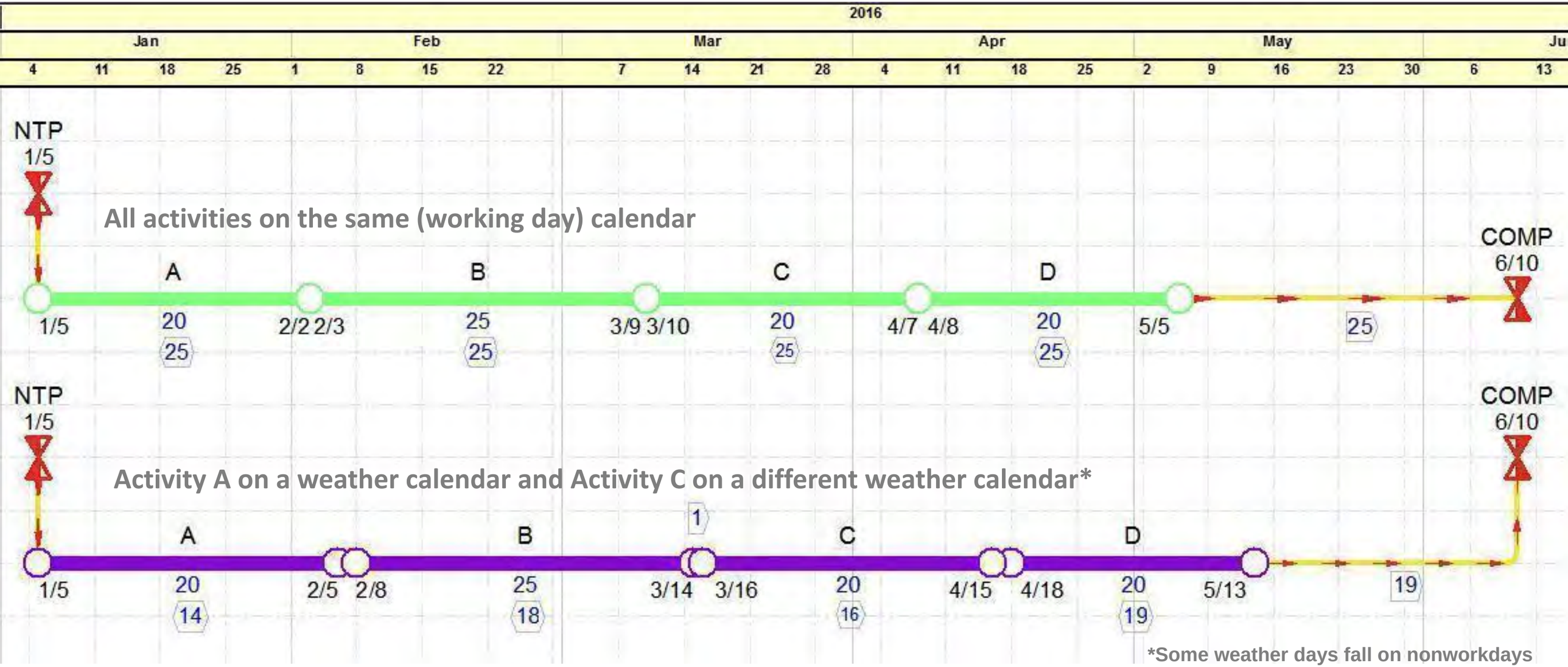
1

Using a weather buffer does not result in weather-impacted early dates and unnecessarily reduces total float on portions of the schedule not affected by weather

3

Assuming that durations factor weather may require a post-facto NOAA data analysis in any case as well as acceleration to recover excusable *normal* weather delay

Multiple-Calendar Adverse Effect on Total Float Continuity



IN THE ABSENCE OF WEATHER PLANNING...

The Delivery Dilemma

In the absence of a schedule that properly accounts for weather, project stakeholders are left to their own devices when having to synchronize deliveries requiring structural access and concomitant progress in the superstructure

Surrogate Weather Days

Because unusually severe weather is a force majeure event, weather planning often defaults to owners specifying weather days to be included in the contractor schedule for the purpose of negotiating weather-related time extensions

5

Solving the Weather Conundrum



Solving the Weather Conundrum

A ***base-case*** schedule is built and vetted for reliability; in the base case, the schedule completes early to allow for normal adverse weather and other contingencies

Weather profiles are created that delineate one or several severe weather condition thresholds along with the reduced resource utilization in a weather day

Solving the Weather Conundrum *(cont'd)*

Schedule IQ™ determines, for every weather profile, workday losses by month by accessing NOAA and creates calendars with randomly generated weather days

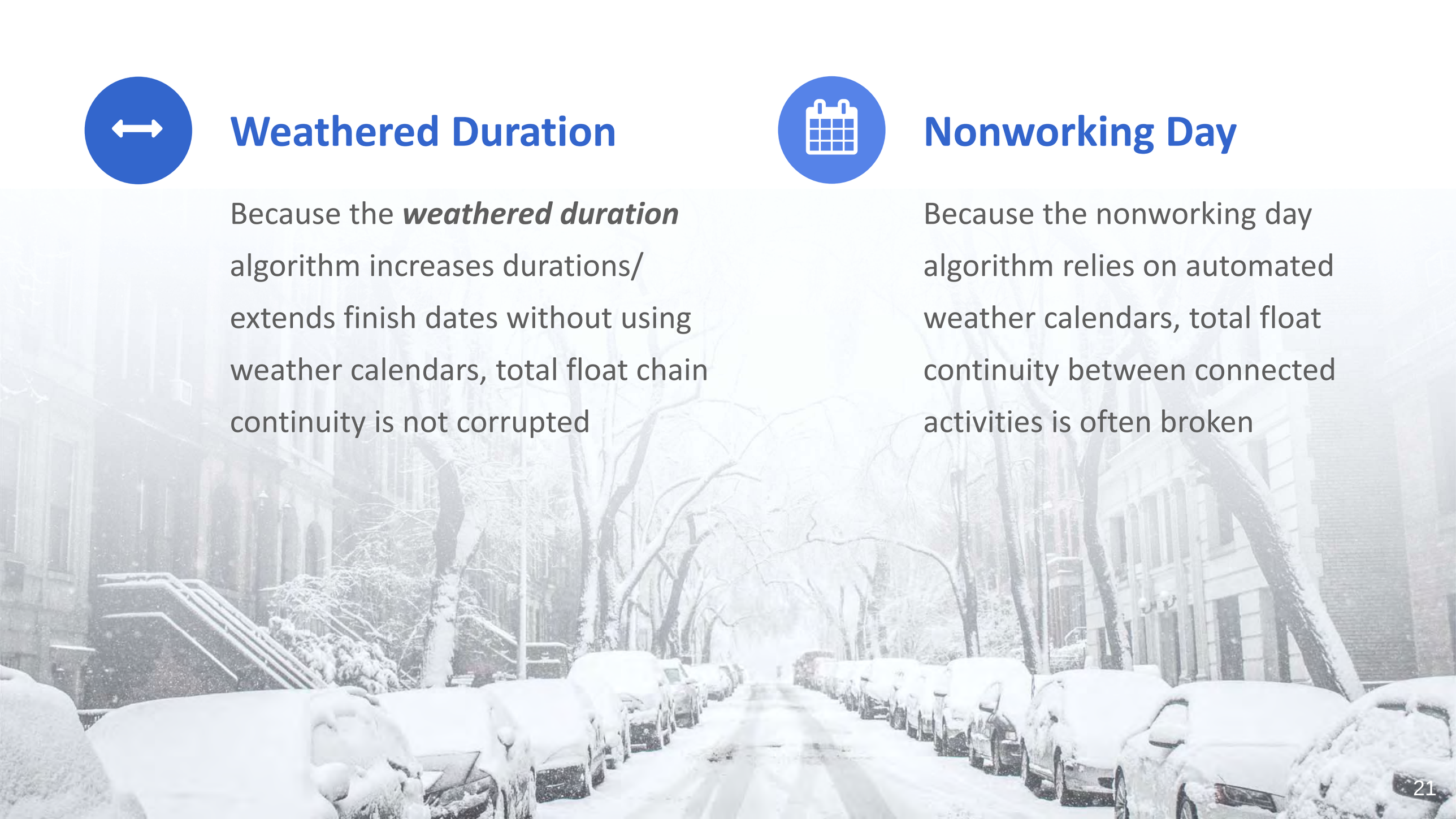
In NetPoint, a new option will allow selection of the weathered duration or nonworking day algorithm when the weather pass aka weather mode is selected

Weathered Duration

Because the ***weathered duration*** algorithm increases durations/ extends finish dates without using weather calendars, total float chain continuity is not corrupted

Nonworking Day

Because the nonworking day algorithm relies on automated weather calendars, total float continuity between connected activities is often broken



6

A New Weather Planning Paradigm

A NEW WEATHER PLANNING PARADIGM

Reliance on NetPoint's visual target underpins weather planning analysis; for starters, a target schedule is generated using the base-case schedule



The base-case schedule is revised and targeted should the *weathered* schedule finish late or not sufficiently early for other contingencies

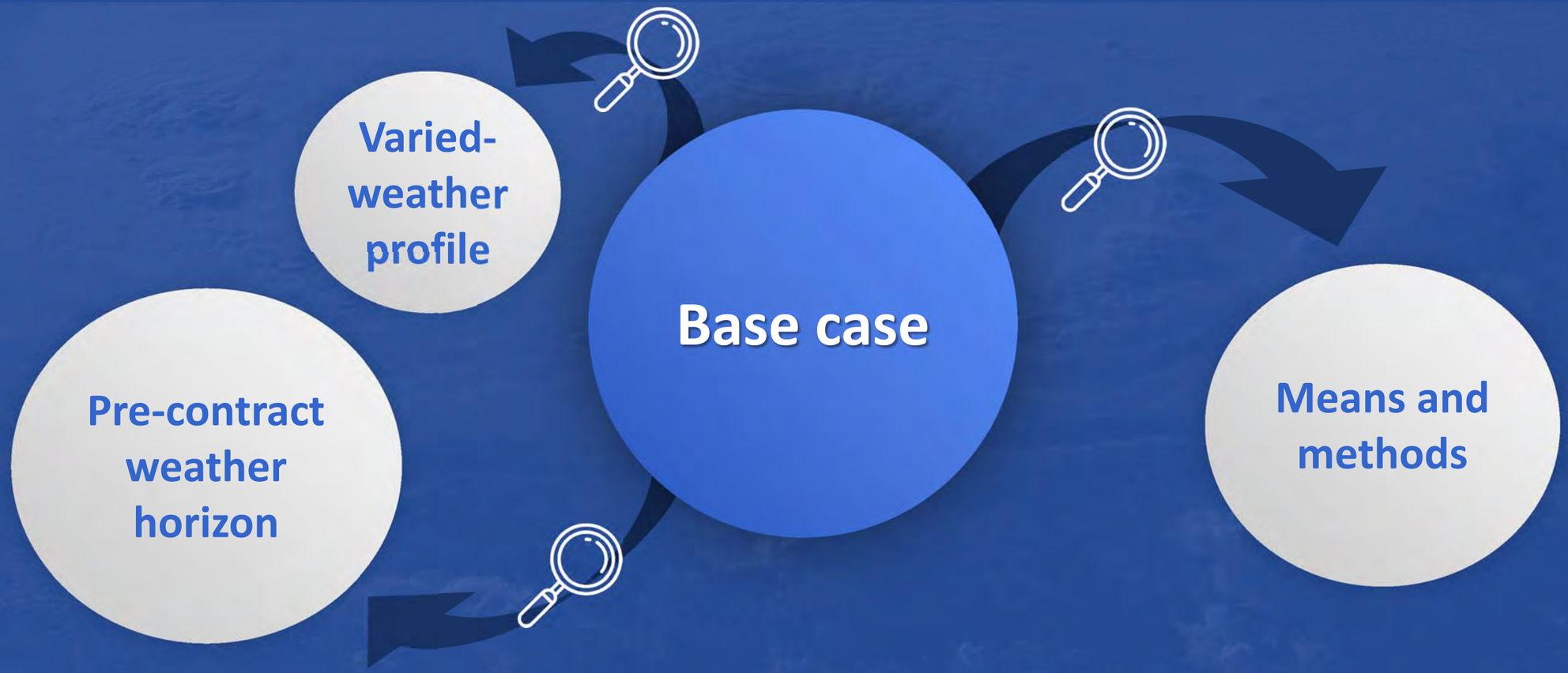
A NEW WEATHER PLANNING PARADIGM *(cont'd)*

The *weathered* and target base-case schedules are compared to assess impact on phases, deliveries requiring structural access, and other milestones



A NEW WEATHER PLANNING PARADIGM *(cont'd)*

The baseline is further vetted through what-if weather analyses by varying weather profiles, pre-contract weather horizon, and means and methods

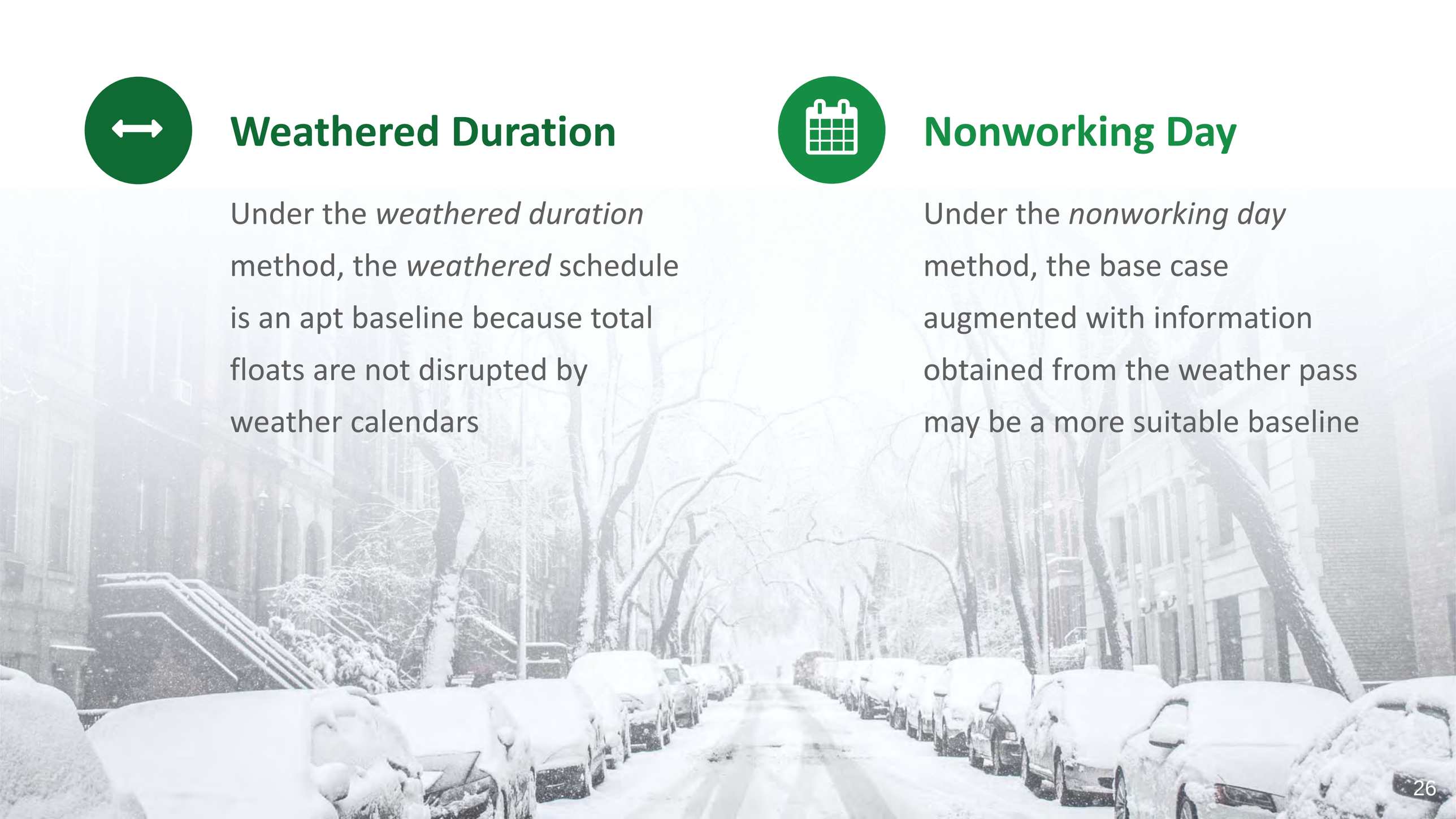


Weathered Duration

Under the *weathered duration* method, the *weathered* schedule is an apt baseline because total floats are not disrupted by weather calendars

Nonworking Day

Under the *nonworking day* method, the base case augmented with information obtained from the weather pass may be a more suitable baseline



BASE-CASE EARLY/LATE SCHEDULE IS THE BASELINE



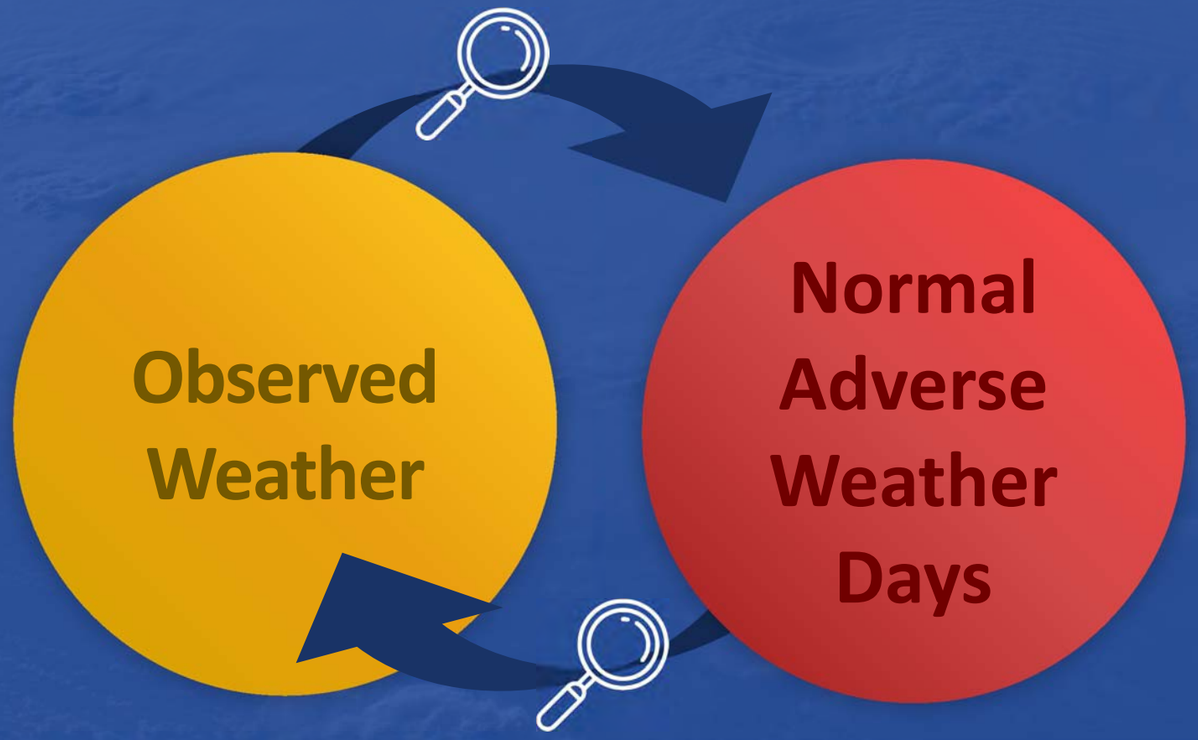
Step I—*Weather* the base-case schedule by expanding the activity early and late date convention to a new date trilogy: early, weathered, and late dates



Step II—*Weather* the base-case schedule by inserting a weather buffer(s) with appropriate durations gleaned from the weathered schedule

A NEW WEATHER PLANNING PARADIGM *(cont'd)*

The prior-month NOAA data is translated into *observed* weather days and compared to the corresponding normal adverse weather days



Schedule updates are carried out in the weather mode so that early dates right of the data date account for the shifting of activity time frames

A NEW WEATHER PLANNING PARADIGM *(cont'd)*

Once the update is complete, a target is generated and the updated schedule is run on CPM or GPM mode and compared to the updated schedule target

If *observed* weather is more or less severe than normal adverse weather, a notice of a pending time extension with appropriate support is processed



IN CONCLUSION

01 The Schedule IQ™ interface that instantly determines normal adverse weather obsoletes weather planning heuristics

02 The nonworking day method relieves users from the laborious task of manually creating multiple weather calendars

03 Activity weathered dates, intermediate of the conventional early and late dates, become a new schedule attribute

04 The weathered duration method extends durations vs. adding weather calendars, which preserves total float continuity

05 Powerful, nuanced weather algorithms make it feasible for schedules to be credible predictors of progress and completion

06 As these teachings evolve, innovations in weather risk management are likely to fundamentally alter scheduling practice



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Questions?

Thank you!

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