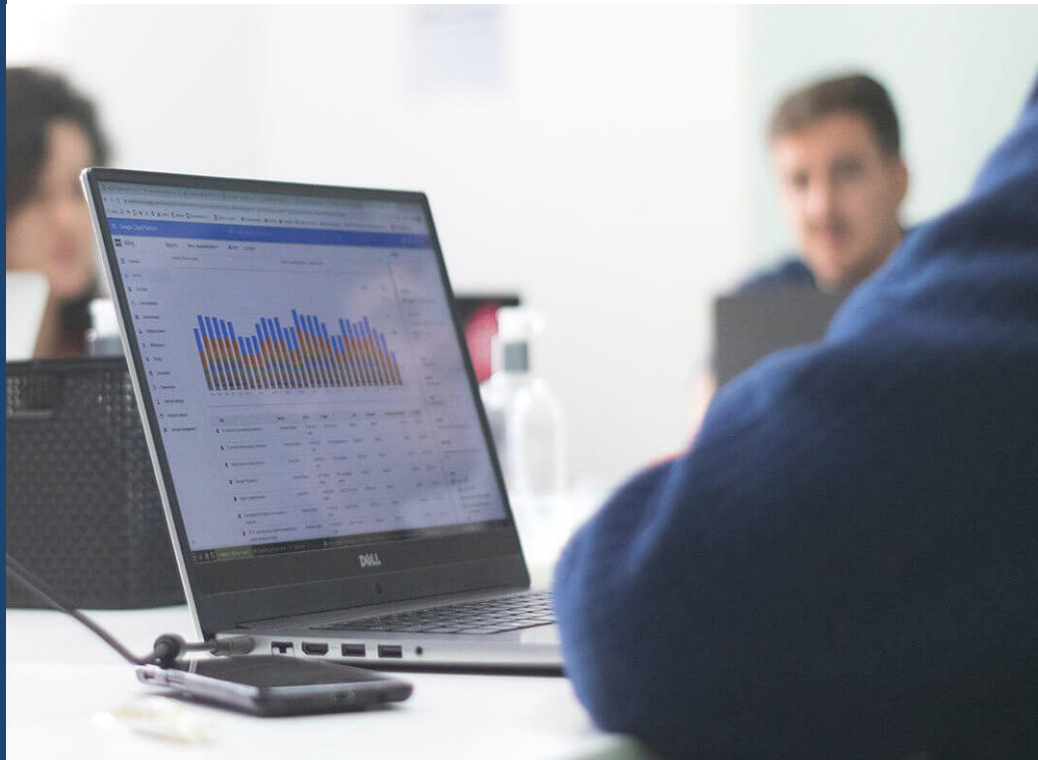


QUANTITATIVE SCHEDULE RISK ANALYSIS

Quantitative Risk Analysis (QRA) is a modelling technique that allows a project team to understand the risk that exists within a project and the impact this could have by predicting project schedule and cost outcomes. Our risk models consider both the impact of uncertainty that may exist in the project and the impact that potential risks may have on the outcome of the project.

At Blueprint, we offer a tailored risk modelling service with the capability to carry out both Quantitative Schedule Risk Analysis (QSRA) and Quantitative Cost Risk Analysis (QCRA).

We provide a fully flexible service whereby we can either be brought in to carry out a QRA on a specific package of work, or alternatively be available on a call-off basis to carry out the service as and when required (even at short notice).



WHAT ARE THE BENEFITS OF QUANTITATIVE RISK ANALYSIS?

Experience tells us that very few projects get delivered to their original base estimate as by their very nature, projects contain areas of uncertainty and things can happen that can significantly impact the outcome. In the past, projects have often used rudimentary uplifts to try to account for uncertainty and risk, but these often have little underpinning and do not reflect the intricacies of a specific project.

Carrying out the Risk Analysis, will allow the project team to gain a better understanding of the risk and uncertainty that may exist within a project. This has 2 key benefits; It allows more realistic schedules and cost estimates to be developed and also provides meaningful data that can be used to make better and more informed decisions.



PROCESS



SYSTEMS



PEOPLE



TRAINING



WHEN IS THE BEST TIME TO RUN A RISK MODEL?

There is no right or wrong answer for when the Risk Analysis can be carried out. However, it is usually recommended that they are carried out either at the start of a project, before a baseline is agreed or at key decision points during the delivery of a project.

In addition to the whole project, there may be a time-critical piece of work such as an outage, commissioning or blockade of existing infrastructure that needs to be delivered on time. We can carry out risk models on these to forecast the probability of delivering on time and where the project team should be focusing their attention to minimise the chances of an overrun.

HOW DO WE DELIVER THE SERVICE?

To carry out the Risk Analysis, specialist software is required that uses probabilistic sampling techniques such as Monte Carlo. This is used to model the project and its

interactions with uncertainty and risk in order to show their potential impact on project outcomes.

At Blueprint, following an extensive research exercise we have invested in Acumen Risk, a software product developed by Deltek for use in all of our QRA requirements. Acumen Risk is in our opinion the current market leader when it comes to a single product that can carry out both schedule and cost risk models. It also provides an output that can be easily understood by the whole project team.

"Blueprint has provided Cargill with bespoke, timely and effective support for both cost and schedule Quantitative Risk Analysis across multiple projects. The service is professional yet personal, and they have always been able to meet our short-notice and tight deadlines."

— EMEA Project Controls Leader – Cargill

WHAT OUTPUTS DO WE PROVIDE?

Through a combination of our experience and toolset, we are able to offer customisable outputs depending on a client's requirements that range from detailed reports to high-level summaries. We are able to provide the same high-quality outputs for both schedule and cost models.

THE OUTPUTS WE PROVIDE

1. RISK REGISTER

Acumen Risk has a simple and graphical Risk Register that as well as ensuring data entry is a relatively quick process, also provides a professional-looking output that some clients may wish to use to present their risk registers. To support this, we can offer additional services where we can assist you with the development of your risk register and even facilitate risk workshops where required.

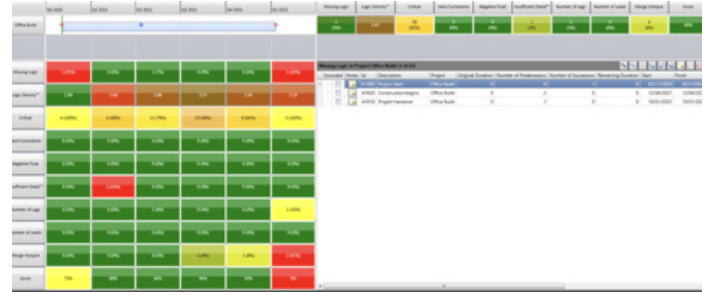
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<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R1	⚠	Adverse weather	Low	Low	Medium	Very Low	Very Low	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R2	⚠	Quality / damaged materials from Long Lead Suppliers	Very Low	Medium	Low	Negligible	Very Low	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R3	⚠	Poorly performing site labour and/or Subcontract	Low	Medium	High	Low	Medium	Medium	Medium	2
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R4	⚠	Error in material specification & ordering	Very Low	Medium	Medium	Medium	Medium	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R5	⚠	Careless site working	Very Low	Very Low	Medium	High	High	High	High	3
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R6	⚠	Environmental impact on equipment siting	Low	Very Low	Medium	Very High	Very High	Very High	Very High	4
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R7	⚠	Site Bath / Handwash	Low	Very Low	High	Very Low	Low	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R8	⚠	Lack of Resource availability	Medium	High	High	Medium	Very Low	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R9	⚠	Damage to Adjacent Properties	Very Low	Low	Very High	Very High	Very High	Very High	Very High	5
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R10	⚠	Fundamental Change to Design	Medium	High	High	Medium	Very Low	Very Low	Very Low	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R11	⚠	Unforeseen Ground Conditions/Findings	Very Low	Medium	High	Negligible	Negligible	Negligible	Negligible	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R12	⚠	Environmental/Contamination Event	Very Low	Low	Medium	High	High	High	High	3
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R13	⚠	Material price fluctuations, ie copper price	Medium	Negligible	High	Negligible	Negligible	Negligible	Negligible	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R14	⚠	Delays in Connecting to Main Supply (Water, electricity, gas)	Medium	High	Low	Low	Negligible	Negligible	Negligible	1
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	R15	⚠	Risk of Planning Permission being delayed	Medium	High	Very High	High	High	High	High	4

Risk Register

2. SCHEDULE QUALITY CHECKS

Before carrying out a Schedule Risk Analysis, we will carry out a detailed quality check of a schedule to ensure it is of sufficient quality to carry out a meaningful risk model. Acumen allows us to carry out detailed quality checks across multiple criteria that could invalidate the risk model such as; missing logic, hard constraints, and invalid actual or forecast dates. The results of these checks can then be fed back to clients.

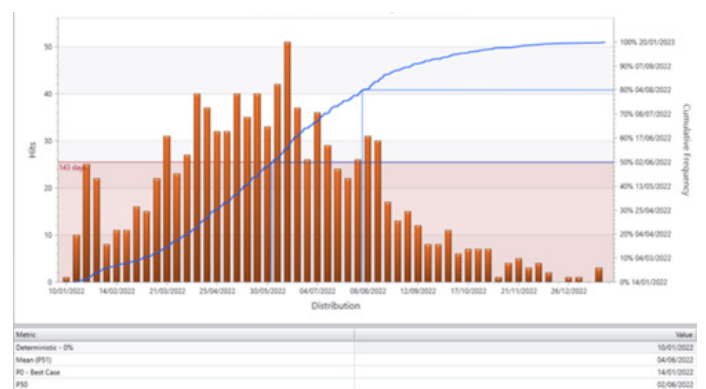
These quality checks can also be provided as a standalone service where clients are just looking to improve the quality of their schedules. We also have the ability to help develop and refine schedules ready for modelling utilising our in-house planning capability.



Acumen Fuse Schedule Quality Check Dashboard

3. SUMMARY RESULTS

As an initial output, we will always provide a simple Risk Exposure S Curve that graphically summarises the results. This will show confidence in delivering the base (deterministic) schedule when uncertainty and risk are factored in as well as providing a confidence level for any given date (or time). It should also be noted that as well as for the whole project this information can be extracted for any chosen activity or milestone within the schedule where multiple key deliverables may exist. This same Risk Exposure S Curve can also be produced for cost models and again can be presented for the whole project or for any chosen cost element.

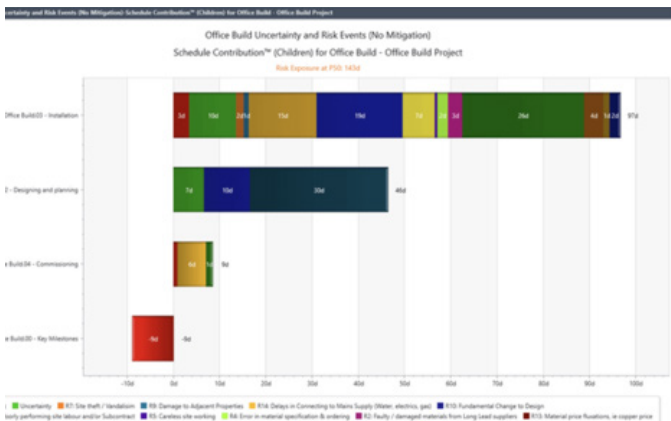


Risk Exposure S-Curve - provides confidence levels of achieving key dates or cost estimates

4. RISK DRIVERS

In our opinion, a standout feature of our risk models is the Risk Driver charts, also known as Tornado Charts. Most risk models produce outputs based on coefficients that mean nothing to many of the project team. We make it easier to understand by clearly showing the number of days or the cost that is being added to the project as a result of risk and uncertainty. The beauty of these outputs is that they are easy to understand and the information can be readily used by stakeholders at all levels to make proactive informed decisions.

For those who are interested in the detail such as project managers, it can be presented at an activity level that will help inform them of areas for attention or where existing durations appear insufficient.



Critical Schedule Drivers – shows the risk impacted critical and subcritical paths

5. RISK IMPACTED CRITICAL PATH

The introduction of uncertainty and risk is likely to impact a project's critical path, we are able to show multiple critical paths so that the project team can understand exactly which activities are driving the project end date.

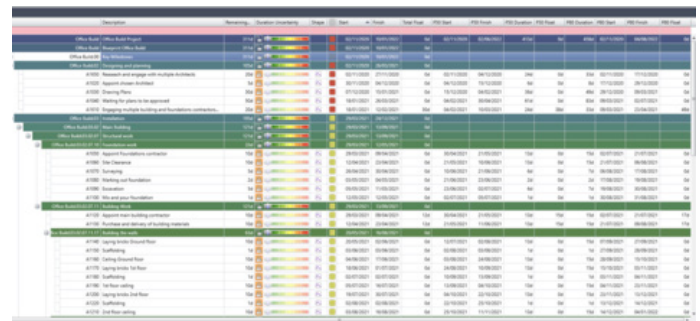


Detail Activity Output – shows the selected confidence level impacts for each activity on the schedule

6. APPLICATION OF THE OUTPUTS

Finally, we can also show any desired confidence level duration, start, and finish dates within the schedule so that the impact of any given activity is known. This can then be exported back to the native planning software to implement or record.

This feature is useful on time-critical pieces of work such as an outage, commissioning, or blockade of existing infrastructure where teams may be working different shift patterns. As well as showing the impact of risk and uncertainty it will also help understand the resultant impact of different shift patterns or calendars. We have found this especially helpful to project managers in providing justification to bring in additional teams to mitigate potential delays.



Detail Activity Output – shows the selected confidence level impacts for each activity on the schedule



Risk Analysis Report – an easy to understand report with all of the results is provided as part of our service

Once the client is happy with the outputs, we can assist with the implementation of the results into the base schedule or cost estimate. This may be via prolongation activities or even phased contingency pots by phase, we are flexible in our approach and will choose the option that best suits our client's processes and requirements. To supplement this, we will provide a comprehensive risk report detailing the QRA results and risk drivers to ensure that the client has the underpinning information and a supporting narrative.