

Time is of the essence

Fugro recognises time as a key business driver in infrastructure development and wants to highlight the value of early intervention and time-saving solutions as part of its Geo-Risk Management Framework.

Geo-data and subsurface risk specialist Fugro's Geo-Risk Management Framework (GRMF) is founded on an understanding that uncertainty must be reduced in order to manage ground-related risks. By reducing uncertainty, risk is automatically better managed, and value is added.

"Large and complex infrastructure projects tend to overrun on time by years and on budget by up to 70% to 80%," notes Fugro solutions director for land site characterisation Rod Eddies.

"You only have to look at the market analyses of global management consultancies such as McKinsey and the published work of economic geographers such as Oxford University's Bent Flyvbjerg. On average, there have been no strong indicators of improvement in the delivery of capital works projects over more than half a century; large and complex projects generally overrun."

The factors that underpin historical underperformance fall into several different categories, political, social, economic and some technical, including geo-risks that for many large infrastructure projects mean ground risk.

"Obviously we have to accept that early estimations of project time and cost can be very vague, and sometimes politically driven, whereas the outturn schedule and cost is generally known to a much higher accuracy. So, there's a

big difference between what happens at the beginning of a project and at the delivery of that project. But we do feel that the ground has a role to play in this underperformance; in other words, there is value to be unlocked in the ground that could be added to the project," says Eddies.

"The question for an organisation like ours is: What does this value look like and what value adding role can we play?"

Indeed, some of this cost and schedule overrun could be avoided by managing ground risk more effectively.

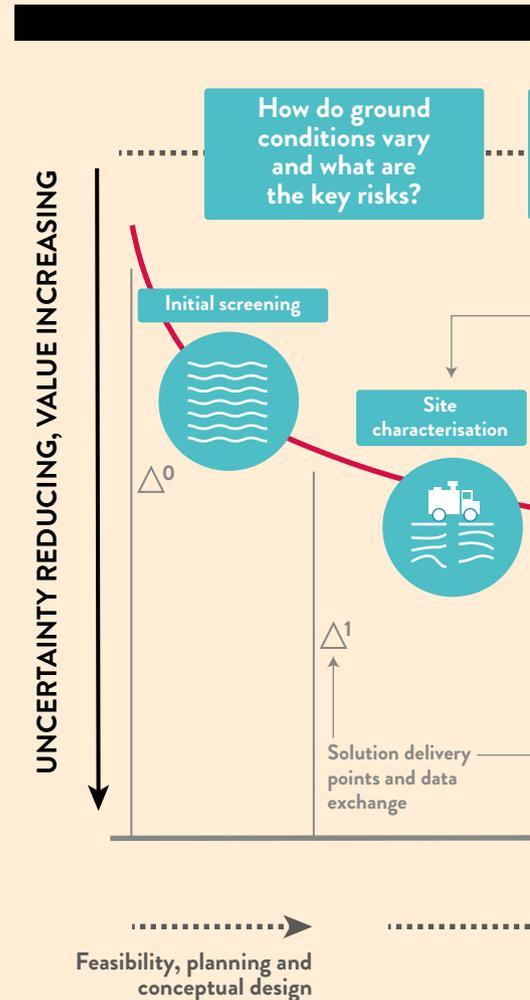
"It is well known that the greatest opportunity to impact positively sits at the beginning of a project where the cost of change is small, so it makes sense that we start to look at those elements that will benefit from early intervention," Eddies adds.

WITHIN THE FRAMEWORK

Fugro's GRMF provides a starting point to look at how value can be added to infrastructure projects from planning and feasibility through to operations. The GRMF forms the risk environment that Fugro shares with its clients and key stakeholders, and for whom the framework is tailored on a project by project basis.

"There are a number of reasons why we need a framework," Eddies explains.

"Firstly, we need to identify the key stakeholders and their endgames. Understanding endgames, or key engineering business objectives,



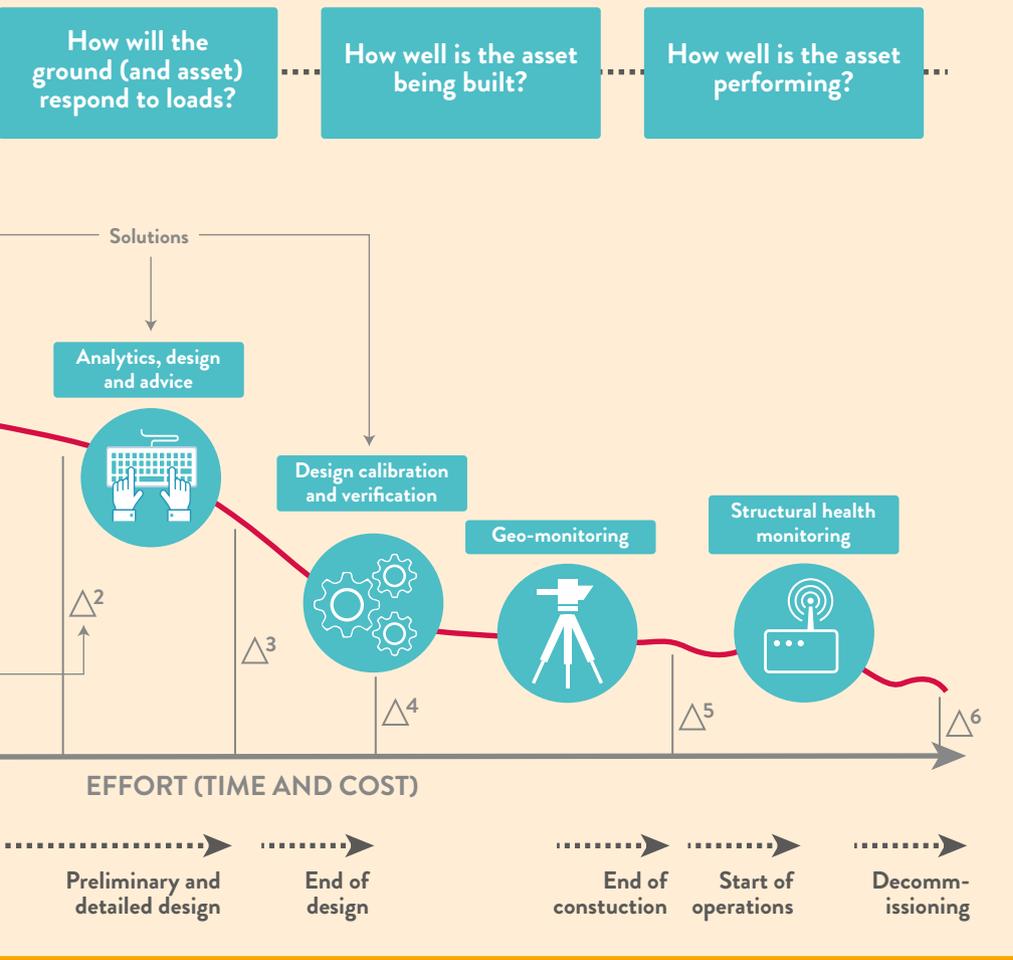
drives our solution-based approach. And each of those stakeholders will no doubt have points of pain and frustration.

"When we look at how these stakeholders are linked to each other, and understand how information might need to flow through the cycle, one of the questions we ask ourselves is: can we do something better?"

"With project owners we recognise their endgame is to develop an asset and get the earliest possible return. Other stakeholders have different objectives. We then need to understand the connections between stakeholders and that inevitably involves the flow of data and information and sometimes the management and transfer of risk.

"Subsurface risk cannot be ignored, and if not effectively managed, can

GEO RISK MANAGEMENT FRAMEWORK (GRMF)



impact a number of stakeholders through the [asset] cycle – of course it is critical for foundation design and construction, but it can also impact the activities of planners, investors, insurers, architects and so on. It's very important for us, first of all, to identify those connected stakeholders. We don't just look at the element of work that we might be interested in for a particular project; we have to look at all the stakeholders and really understand how they connect together."

Eddie notes that this is partly about identifying technology gaps and areas that can be improved through development and innovation.

"Identifying technology gaps is a key facet of the GRMF. This brings digitalisation into the discussion," he continues, "and how we can speed

things up from largely conventional, analogue activities – like drilling, probing and laboratory testing – how we effectively link these activities such that information flows effortlessly through the project.

"This falls into building linked solutions. So, because we're looking at the asset cycle more holistically, we start to see how different solutions applied to the asset cycle, linked to each other digitally, can produce a better outcome – we are now starting to see a convergence for example between geophysics as part of a screening solution and geotechnical parameters required for early design.

"As a result, by understanding data flow and connectivity and making sure the value added at the beginning of the project isn't lost, the GRMF can deliver better and faster outcomes.

"What we'd like to do is try to challenge the traditional trade-off between value for money and certainty of outcome. Maybe there are better ways of reducing uncertainty that, at the very least, are not more expensive, provide equivalent quality and accelerate time to delivery."

COMBATTING TIME STRESS

Many infrastructure projects are also under increasing time stress, both in the short and long term.

"In the short term, for example, we're only just coming out of Covid; it's impacted the supply chain. Just that in itself has caused time stress on project delivery. If we look at some of the geopolitical situations right now, Ukraine being the most obvious example, that's putting time stress on infrastructure projects related to energy security and supply.

"At the moment, high inflation in many economies means that investors with money locked into projects will have a lower value of return, where inflation is eroding the value of that money with time. So, we've got financial pressures leading to time stress as well," Eddie says.

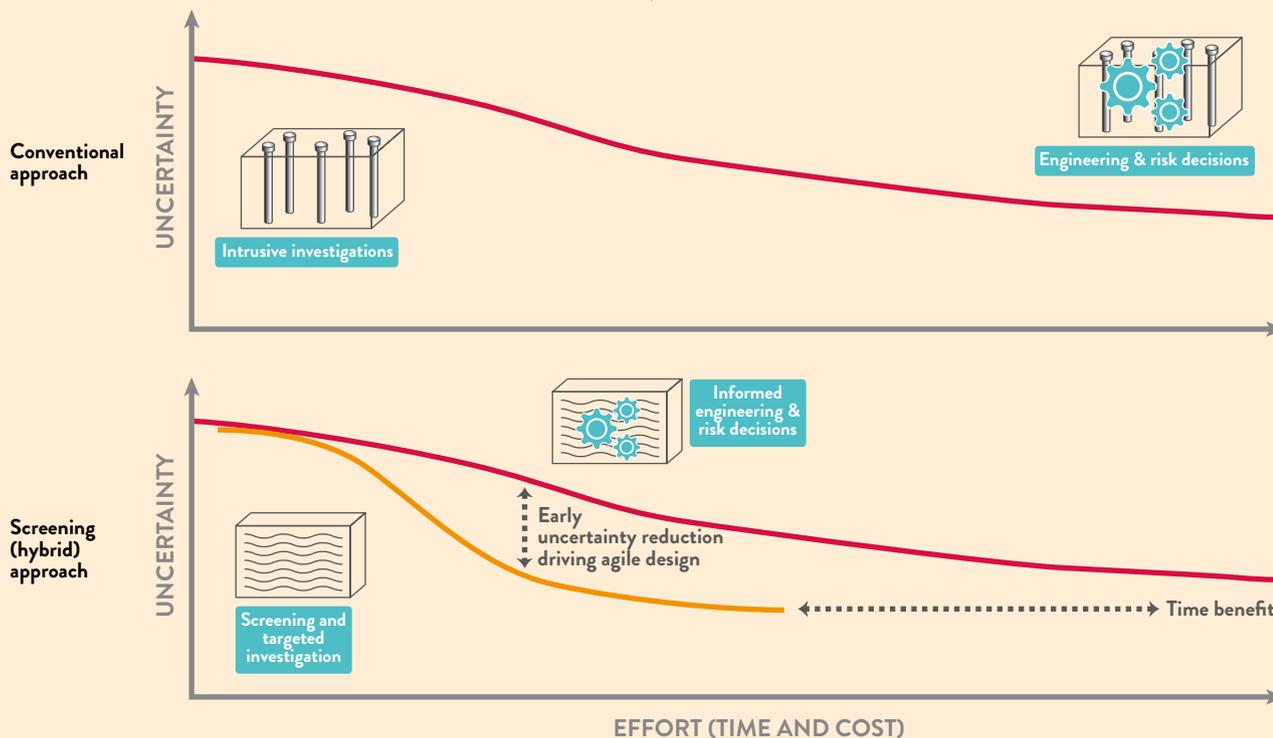
"And as we go more to the medium to long term, we've got the global megatrends imparting time stress, including population growth, climate change, the energy transition and the digital revolution."

Fugro has thus seen time becoming a very important factor for its clients. Speed is important to the success of its client activities, because longer timelines bring increased uncertainty and risk and greater resource consumption. So as part of its framework, the company is looking at how it can deliver value that really addresses time as an important business value driver for clients.

In the broader context of time, Fugro wants to address key questions such as:

- Can we impact the economic outcome of a project for a client, say in a net present value sense?
- Can we improve the investability of a project or the ability to insure or underwrite a project?
- Can we avoid foreseeable events that negatively impact design and construction schedules?

USING INITIAL SCREENING TO BUY TIME



- Can we contribute to safety and sustainability ambitions?
- Ultimately, can we buy time for our clients meaning shorter design schedules and earlier construction and operations?

EARLY SCREENING

As part of the GRMF, early discussions around time are key for organisations like Fugro to be able to improve performance in the asset cycle. If the early screening is done effectively, it can accelerate and optimise the processes that follow from it downstream.

“The earlier that specialist organisations like ours are involved in the project cycle, the better, when engineering business objectives drive key decisions such as at feasibility by owner organisations, at FEED [front end engineering design] and during early contract phases for design and build organisations seeking to manage their below ground risks and generate business value from a functional specification. Early involvement means a dialogue driven by engineering business objectives and the potential to build project-specific, value-adding solutions. Relatively late involvement can mean an interaction driven by procurement compliance focusing on

narrow solution components with fewer options for exploring alternative and potentially better approaches.

“The design phase of infrastructure development really has been dominated by fairly conventional geotechnical investigation for decades,” Eddies explains.

“It’s largely intrusive, with some localised remote sensing and testing around the borehole. And it has served the industry very well, supported by standards and design codes that have evolved over decades.”

However, through the identification of technology gaps in the GRMF, Fugro has discovered significant potential at the screening stage to improve project outcomes.

“And it’s come at a time when we’re becoming much more curious about geophysics, for example, as one component of a screening solution that delivers insights into engineering properties and not just to identify spatial changes or anomalies,” he adds.

“Looking to other sectors screening technology in the medical sector such as MRI has led to significant improvements in medical outcomes since the 1980s.”

Fugro is thus looking at how effective screening could involve existing and newly developed

technologies in geophysics, remote sensing, data science and digital modelling.

On a recent project, Fugro says that an effective 3D screening solution reduced the time to delivery of the key geotechnical parameters by 50% at conceptual design stage.

“That was brought about through a hybrid approach meaning a smart application of screening of the subsurface and then an optimised, reduced conventional programme of [geotechnical investigation],” Eddies says.

“This highlights the potential importance of an effective screening solution, because of its particular place early in the cycle where some of the biggest decisions are made. A lot of capital expenditure (capex) can be committed very early on in the project. So why not have those early discussions around time as a business value driver that could impact that capex performance through the project?”

“If that discussion does take place early, then possibly we can look to shorter timelines and sufficiency of effort. This means reduced uncertainty, ground risk that is better managed and improved outcomes for stakeholders in large and complex projects”.