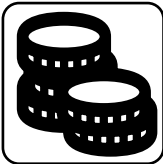


# Problem statement and value proposition

How do we undertake optimisation in an uncertain parameter space with competing definitions of 'success'?



Military bridging operations are complex, and the time for a convoy to complete a route depends on the gaps encountered, as well as the number, type, and location in the convoy of the available bridges.



Finite resources for investment, meaning there is a finite pool of assets. Different assets have different attributes and therefore different impacts on route completion time.



What is the 'best' mix of assets that the UK can invest in? Bearing in mind there may be competing definitions of best, most resilient on average, most resilient for a specific route, faster on average..., etc.



Frazer-Nash and Dstl have worked collaboratively to implement a software solution to improve decision making on asset investment and deployment by using software to encode complex logic to reduce simulation time from one run per day to hundreds per hour to enable meaningful 'what-if' calculations.

# Example of implementation

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Blend UX with scientific output to enable clear decision making

Intuitive setup

Tailored post-processing

Detailed tabular output

User friendly graphs

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Packet	Location	Time Seconds	Time	Action
Lead Vehicles	0m	0	0 days 0h: 0m: 0s	Start
Lead Vehicles	0m	0	0 days 0h: 0m: 0s	Departure
Lead Vehicles	1000m	240	0 days 0h: 3m: 59s	WaitingForBridge
Lead Vehicles	1000m	684	0 days 0h: 11m: 24s	CrossingBridge
Lead Vehicles	1010m	784	0 days 0h: 13m: 4s	Departure
Lead Vehicles	3010m	1264	0 days 0h: 21m: 4s	WaitingForBridge
Lead Vehicles	3010m	1906.00000012	0 days 0h: 31m: 46s	CrossingBridge
Lead Vehicles	3030m	2106.00000011999	0 days 0h: 35m: 6s	Departure

Packet	Arrival Time	Departure Time	Travel Time	Bridge Name	Section	Action	Source	Target
Lead Vehicles	0 days 0h: 57m: 16s	0 days 0h: 0m: 0s	0 days 0h: 57m: 16s	Asset 01	Gap 1	Emplaced	EF1/Deployable Assets	EF1/Depl
Deployable Assets	0 days 1h: 4m: 30s	0 days 0h: 0m: 24s	0 days 1h: 4m: 6s	Asset 01	Gap 1	RecoveringBridge	EF1/Deployable Assets	Deployat
Main Convoy	0 days 1h: 5m: 56s	0 days 0h: 1m: 0s	0 days 1h: 4m: 56s	Asset 01	Gap 2	Recombining	EF1/Deployable Assets	Deployat
Secondary Assets	0 days 1h: 7m: 48s	0 days 0h: 1m: 36s	0 days 1h: 6m: 12s	Asset 01	Gap 3	Emplaced	EF3/Deployable Assets	Deployat
Chase Vehicles	0 days 1h: 19m: 42s	0 days 0h: 2m: 12s	0 days 1h: 17m: 30s	Asset 02	Gap 1	Emplaced	EF1/Deployable Assets	EF1/Depl
Final Vehicles	0 days 1h: 43m: 49s	0 days 0h: 3m: 3s	0 days 1h: 40m: 46s	Asset 02	Gap 2	Recombining	EF1/Deployable Assets	Deployat

# Our solution

We provide desktop and cloud-based software systems that provide insight and value, enabling users to make decisions in an efficient manner to further the sustainability, energy, security and transport sectors.

Software service	Benefit	Case study detail
Requirements capture and an Agile development approach.	<b>Answer the right question, at the right time.</b>	Six-week cycles with Dstl analysts, deploying and responding to change.
Background in fast and efficient algorithms to be coded in many languages.	<b>Reduced turnaround time for simulations.</b>	Hundreds of runs per hour with the new tool, compared to one run a day previously.
Logging and auditing, including ISO9001 and TickIT <i>plus</i> .	<b>Repeatable and auditable.</b>	Encapsulate decisions as code and automatically write detailed log files.
Expertise in understanding Monte Carlo and its application across a range of sectors.	<b>Informs risk decisions.</b>	Option to set bounding cases and run different 'what if' scenarios automatically.
Bespoke software to link to other tools and resources, including pipeline integration.	<b>Informs investment decisions.</b>	Automatic aggregation of cost metrics for the impact of decisions.
Customisable output and visualisation.	<b>Share knowledge to internal and external stakeholders.</b>	Novel visualisation tools and deploying our systems thinking to highlight the key answers.