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# Modelling to de-risk your project



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# Introduction

## Agenda

1. Why model?
2. Tools everyone owns
  - Example: Pen & Paper for single value result(s)
3. Developing tools in-house
4. Specialised software tools
  - *KLOC*: Sensitivity analysis
  - *KWOTA*: Optimisation
5. Grant Funding
6. Summary

## Tools

- Tools everyone owns
- In-house tools
- Specialised software

## Techniques

- Single value
- Sensitivity analysis
- Optimisation



# Why model?

- Discard poor options early on in the process (Agile methodology "Fail fast")
- Find threshold points through sensitivity analysis
- Account for uncertainty through sensitivity analysis (KDOTS)
- Finding optimal designs or operating points
- Challenge existing industry beliefs (reducing cable length is not the only consideration)
- Explore many scenarios quickly and safely
- Save time
- Save money



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# Tools you already own

## **Examples:**

pen and paper, MS Excel

## **Advantages:**

low cost

bespoke to your needs

## **Disadvantages:**

limited use or accuracy, depending on complexity of application



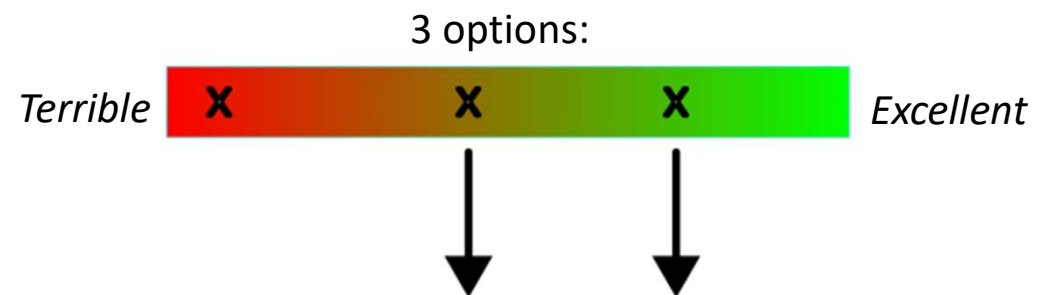
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# Example: Pen and Paper

## Single value results

*Back of an envelope calculation*

- Ballpark values from experience
- Crude assumptions and use intuition
- Results have a high degree of uncertainty
- Allows for discarding of poor options
- Trade-off accuracy with effort



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# Developing tools in-house

## **Advantages:**

very bespoke to your needs

## **Disadvantages:**

long time/high cost to develop

cost to maintain

loss of knowledge/maintenance if staff move on



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# Specialised software tools

## Examples:

KLOC, KWOTA, KDOTS (Kinewell), OrcaFlex, JBA ForeCoast® Marine

## Advantages:

refined to address a specific set of problems

better accuracy

easier to use

speed

maintained externally

## Disadvantages:

relatively high ownership cost (depends on the value it brings)



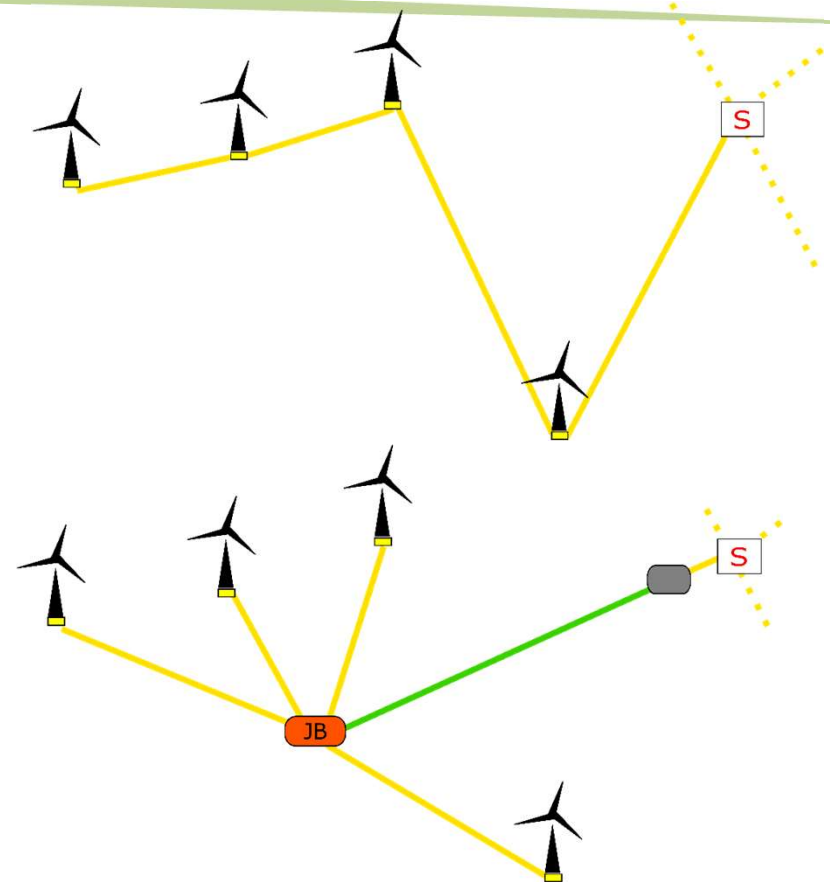
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# Example: Sensitivity Analysis KLOC Software

## Sensitivity Analysis

Value of sub-sea Junction Boxes?  
(for floating offshore wind)

- Varying parameters
  - Cost of JB
  - Water depth
- Number of studies can get large
- Use software to iterate



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# Example: Optimisation KWOTA Software

## Optimisation

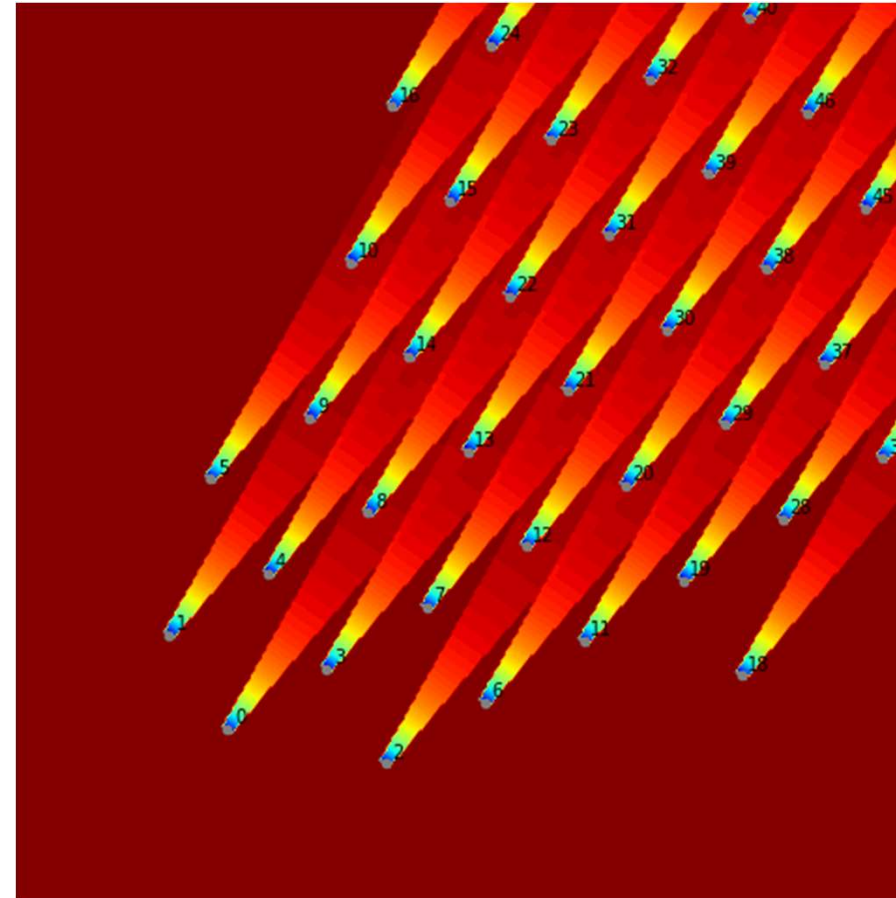
### Where to place wind turbines

*KWOTA balances minimising wake losses with reducing additional costs :*

- Needs a very high number of calculations and automation to find the most valuable solution
- Can only be achieved with software
- Software must be fast/efficient to achieve the calculations in a reasonable time



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# Grant Funding

Grant funding can de-risk projects, particularly where there is an innovation element

Kinewell has leveraged funding from the **TIGGOR** programme and **Innovate UK**.

Example: development of the KWOTA product

- KWOTA concept had unknown commercial value
- Development could not have happened without funding from the TIGGOR programme



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# Summary

## Tools

- Tools you already own
- In-house tools
- Specialised software

## Techniques

- Single value
- Sensitivity analysis
- Optimisation

- Balance effort against accuracy to make 'discard' or 'continue' decisions early on
- The numbers aren't the whole story
- Software can save time/improve accuracy
- Software allows for exploration and asking 'what if' questions
- Software allows for iteration (depending on the package)



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# Questions



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