

ICEAA SCAF – September 2024

C3 Basis Of Estimate (BoE)

“We gotta head for higher ground”

No Fancy slides
No classified material included

All background Information based on public domain information

Our Costing Responsibilities

- **To provide comprehensive and best possible Forecasts**
- **To keep abreast of new and emerging technology that may impact current Forecasts**
- **To constructively challenge the Customer(s)**
- **To offer Options of time and cost against alternative solutions**
- **To ensure all Deliverables are documented and include analyses of technical options and data including a view on Uncertainty and Risks associated with project progression**

You may, of course, agree or disagree depending on how your organisation makes use of Estimators, Forecasters and Assurance routines

“BoE GUIDANCE”

Treasury Green Book (Investment Appraisal)

Treasury ‘Rainbow’ books (Risk etc)

IPA Cost Estimating Guide

GAO Cost Estimating Guide

ICEAA CEBOOK

Software Estimating Guide

Parametric Cost Estimating Handbook

**The above “Guides” say WHAT should be included generally
but NOT exactly how to construct and deliver a
comprehensive Forecast/ Estimate**

BOE Background Information

- **A BOE is fundamental to every Estimating & Forecasting task and include:-**
 - **Who the customer is**
 - **What the Forecast is for**
 - **Timescale for delivery**
 - **Inclusions and Exclusions from the Forecast**
 - **Methods used to generate the numbers**
 - **Correlation(s) between Forecast cost elements**
 - **Skillsets/ knowledge required to undertake the task**
 - **How the presented results were generated**
 - **Any gaps/ future work to improve the Forecast**
- **A BOE is not a ‘get out of jail’ pass!**

BASIS OF ESTIMATE (BOE) contd

- In **all** tasks the BOE is:-
 - **more** important than the numbers themselves
 - often poorly constructed and
 - some even fail to allow a re-creation of the original estimate
- Specific BOE guidance documents, particularly for large complex projects and portfolios are noticeably **absent** although their importance is noted
- This presentation aims to set out the scope of BOE requirements and the complexity issues for an example of future Estimates & Forecasts

Before we start... Be Careful about Definitions

- **The UK uses the average sea level in the English Channel for almost all mapping activities**
 - **Measured at Newlyn, Cornwall**
 - **1915-1921 data collection (hopefully this has been updated!)**
 - **Calculated average of sea height for this period (sometimes known as Mean Sea Level (MSL))**
- **The rise and fall of the sea is **NOT** uniform and depends on many factors (Seabed contours, Sea currents, Lunar position, Coastal shape, Wind, Air pressure etc)**

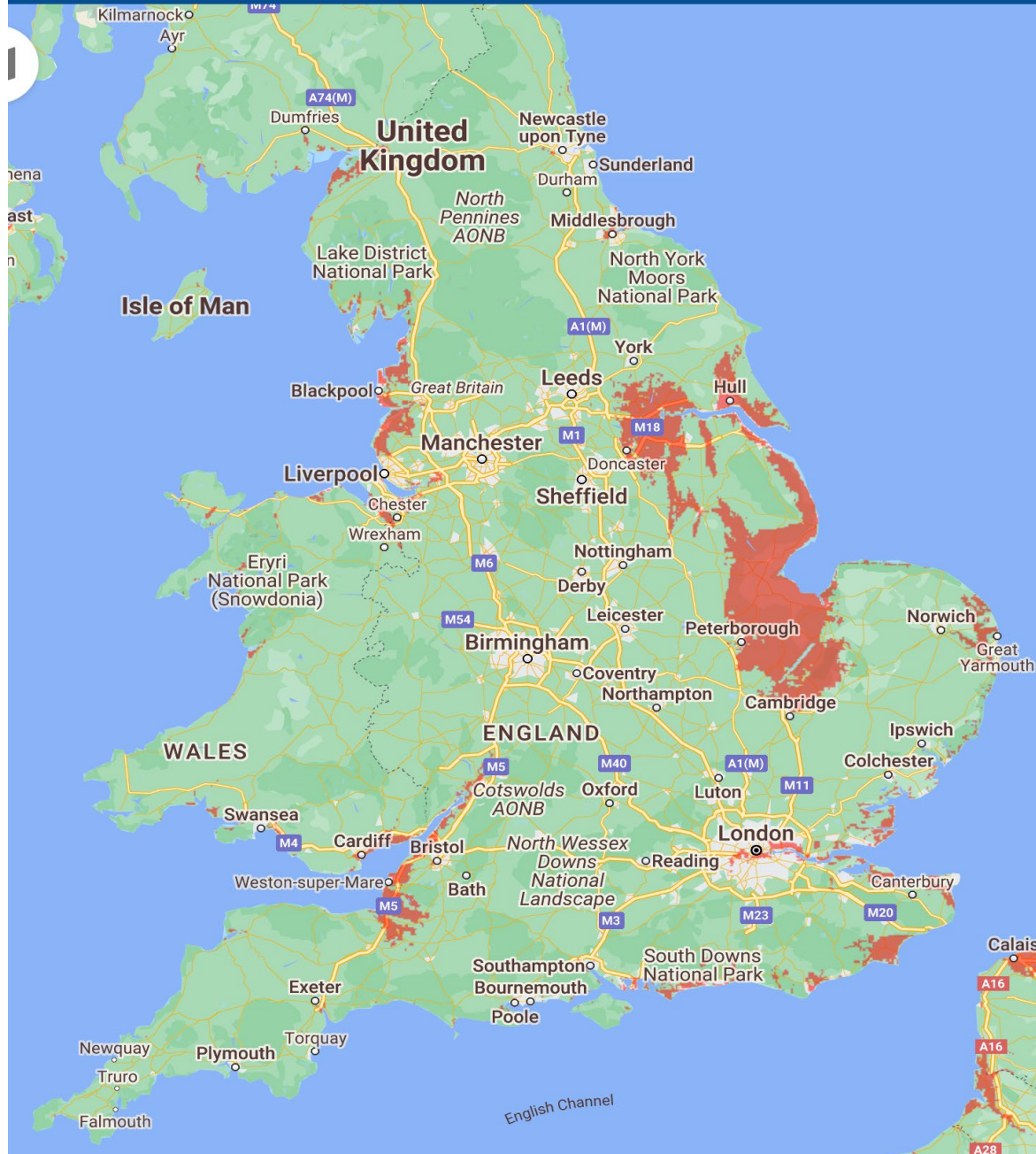
My Example for Today is “The Next 76 years”

- The UK uses the average sea level in the English Channel for almost all mapping depictions
- The MSL in Newlyn therefore may not be the same in Cromer

Selected Example 31/1/1953 70 Years ago (Storms/ Disasters are not new)

- **1607, 1623, 1638, 1665,**
- **1703, 1709, 1729, 1740,1755,**
- **1848,1852, 1859, 1864, 1871,**
- **1913, 1918, 1928, 1946, 1952, 1953, 1955, 1962, 1978,**
- **In 1953 the East Coast suffered the perfect storm:-**
 - **High Tide, Coastal shape, Wind, and a large Depression all combined to give a Storm surge of 5.6 metres (~18 feet) above mean sea level**
 - **Canvey Island in particular and other areas had severe floods, many drowned and homes were demolished**

The Future UK



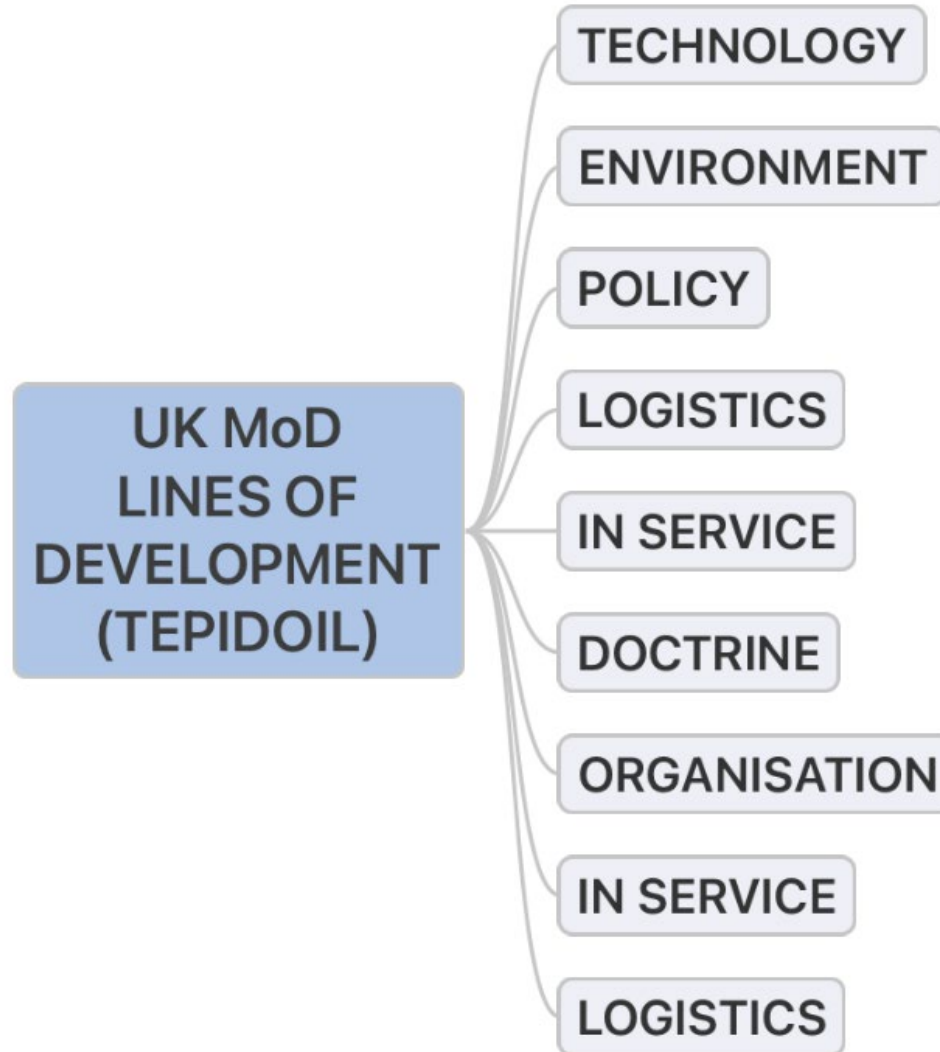
- Based on projected MSL rise
- Timescale ~75 years
- **NOT** 'net zero issue'
- Met Office and International observations are included in this graphic
- **This not the debate for today, red areas are NOT worst case!**

Sea Level rise is just one challenge – here's another Atlantic Meridional Overturning Current (AMOC)

- **In 2024 a Danish Report provided a troublesome prediction**
- **The impact of deep sea Antarctic meltwater entering the Southern Atlantic would:**
 - **Impact water circulation into the Northern Atlantic and eventually other oceans**
 - **The influx of deep sea cold water would act as a switch and turn OFF what we generally call the 'Gulf Stream' and severely affect North American and European climate (**cooler & wetter & stormier**)**
 - **Their prediction is that this would occur not long after 2050**
- **If their research is validated by other experts then this is the **closest** crocodile to our canoe**

2024 Peter & Susanne Ditlevsen "How soon might the Atlantic Ocean break?"

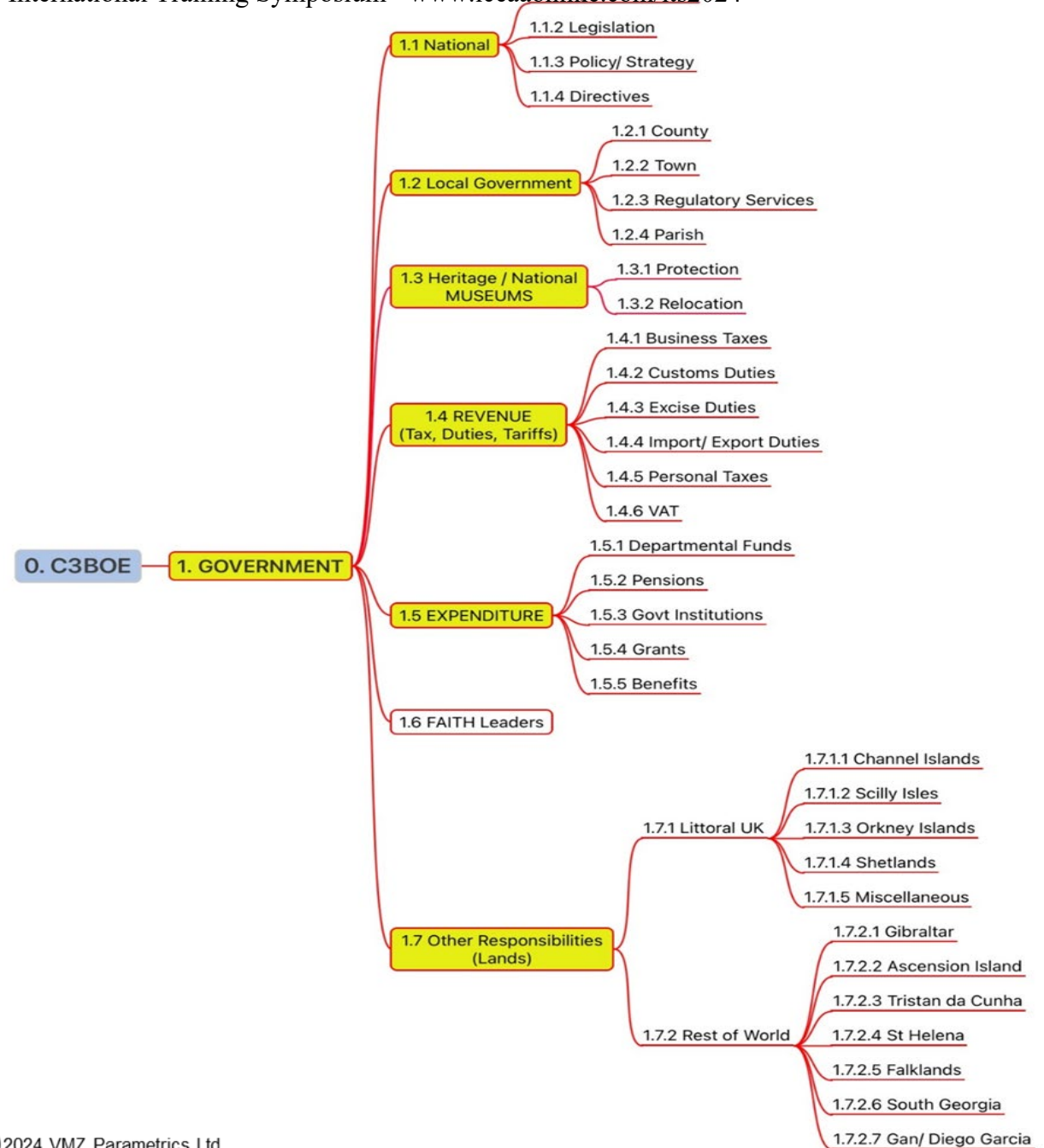
AN EXISTING BoE BASIS



C3BOE Level 0/1– SUGGESTED BoE Index



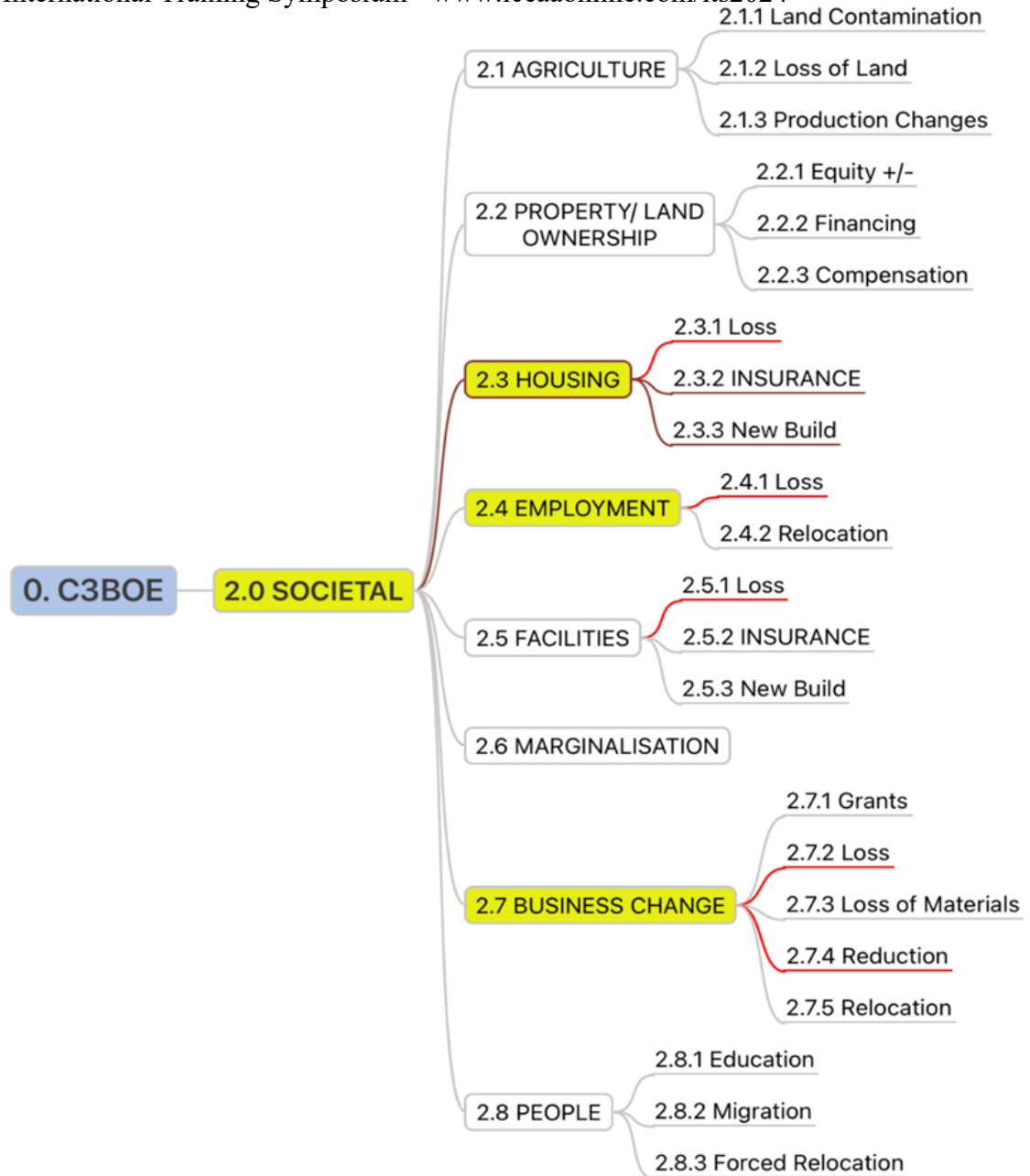
C3BOE LEVEL 1 EXPANSION 1.0 Government



C3 BOE

Level 2 Expansion

2.0 Societal



THE COMPLEX CHALLENGE TO COSTING

- **From my outline of BoE we may observe:-**
 - **The wide coverage of almost all aspects of Government and Society**
 - **No single defined BoE element operates in isolation**
 - **BoE interactions are **both** Cost and Schedule related**
 - **BoE interactions (correlation) are not properly understood in terms of magnitude, direction of effect or effect linearity**
 - **The data requirements are not fully understood**
 - **Data sources are not fully identified**
 - **The Costing/ Schedule & Forecasting skills required do not reside in a single or small number of experienced individuals**
- **IMHO the only way to progress is to develop the use of AI**

So where could AI feature 1?

- **Collection of Data:**
 - **BoE line item potential interactions/ correlation**
 - **Locations and costs of current planned sea defences**
 - **Locations at risk from known mapping data**
 - **Numbers of Houses, Businesses & People**
 - **Exchequer income from identified risk locations**
 - **Local Authorities involved**
 - **Local Authority incomes for identified locations**
 - **Identification & Plans for re-settlement/ construction**
 - **Contributions from identified locations impact on GDP**
 - **Non-Coastal flood risk impact areas (river courses & existing inland risk)**
- **Areas outside sea level rise at risk from increased flooding**
- **Identification of suitable re-location sites for construction**

So where could AI feature 2?

- **Collection of Data:**
 - **Volumetrics (Housing, Business, People, Schools etc)**
 - **Communications (Roads, Routes etc)**
 - **Heritage sites/ collections at risk**
- **Reduction of data:**
 - **Data interactions and Relationships**
 - **Necessary Legal Changes and challenge effects**
 - **Audit trail**
 - **Uncertainties/ Risk for inclusion in Forecasts**
- **Generation of Draft BoE**

What does AI need?

- **Apolitical long term Ownership of the challenge**
- **Guidance documents – Specifications, BoE, skills development**
- **Allocation of:-**
 - **Research funding – Academic and wider**
 - **Data requirements and standardisation of data descriptions**
 - **Successive Government plans deliverable over 70+ years**
 - **Legal Changes to permit the larger scale movement of population**
- **Ethical considerations –voluntary or mandatory powers**
- **Re-definition of “Defence of the Realm”?**

Next 8 Decades – Challenging

- **‘Net Zero’ – misplaced – immediate threat is increasing sea level rise and AMOC**
- **Climate change is NOT just carbon**
- **Planning is vital for a Healthy UK:-**
 - **Infrastructure**
 - **Services**
 - **Agriculture**
 - **Business**
 - **Population security (Housing & Employment)**

Note: Delft University study [s41598-023-48136y](#) published January 2024 referred climate change (sea level driven) impacts to GDP for many European countries

The Challenges are not limited to the UK

Just before this presentation was finalised:

- **The Pacific Island Nations held a Conference to discuss the challenges posed by rising sea levels – this prompted a statement by the UN – many of these will become non-viable or disappear by 2100**
- **Other areas with low lying coastal communities will also be in trouble**
- **The next slide illustrates what a rise in sea level may mean in the future for a continental land mass – here the population tends to be concentrated around the coastal regions.**

It is not just a UK problem!!



CONCLUSION - FUTURE NEEDS

PLANNING & COMPREHENSIVE COST ESTIMATES

INVESTMENT

RESEARCH

INFRASTRUCTURE PRIORITIES

DEFENCES & RELOCATION IMPLICATIONS

SACRED COW DEBATE (NIMBY)

Write/ Lobby your MP

Climate Change Committee needs better Funding & Tasking

The above are **not** party political tasks but are owned by all the UK

Cost Analysts & Estimators underpin our Future

Thank you for your attention

Questions?

Andy Nicholls

VMZ Parametrics Ltd

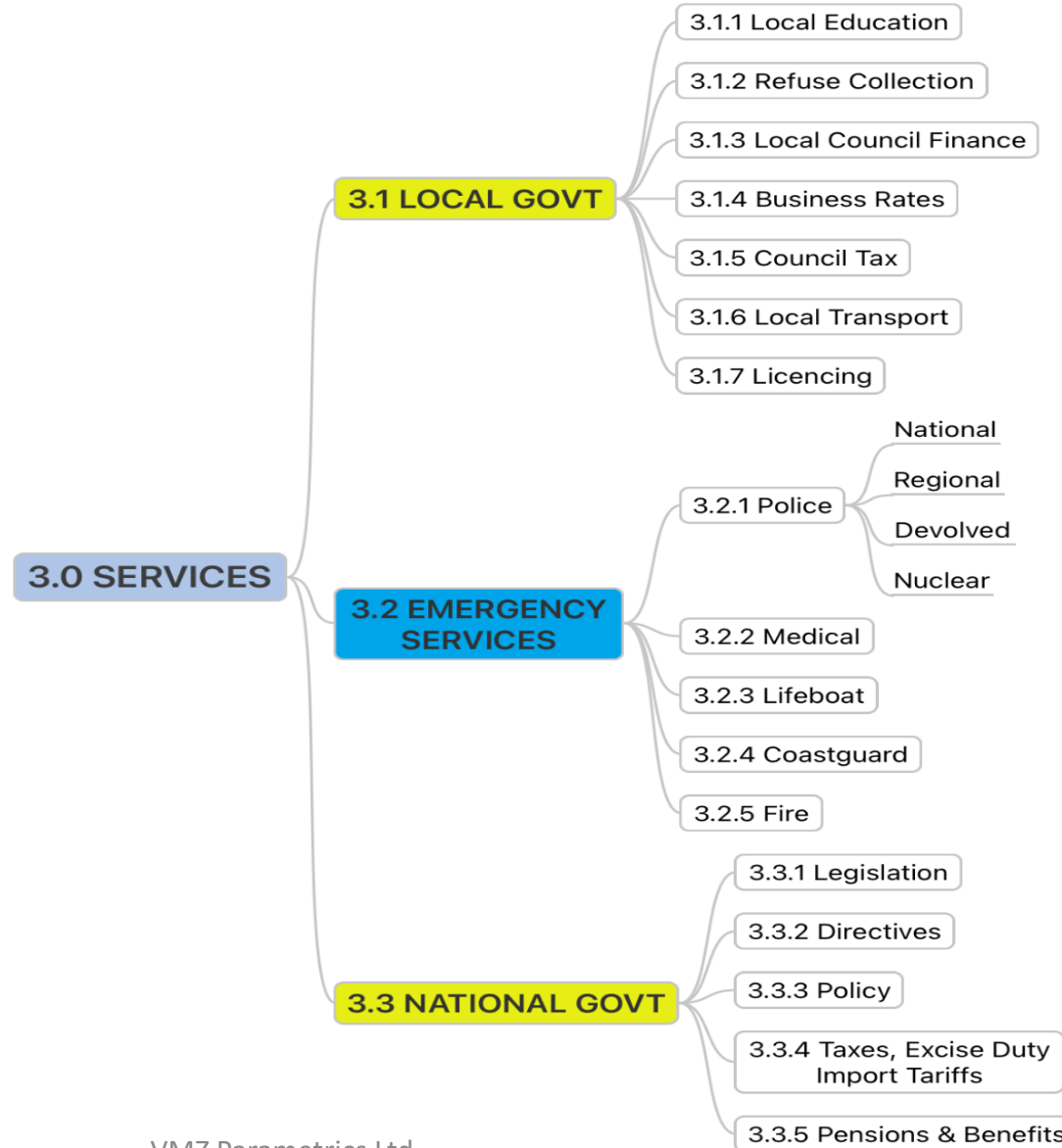
Email: andy.nicholls73@outlook.com

Backup Slides

C3BOE

Level 2 Expansion

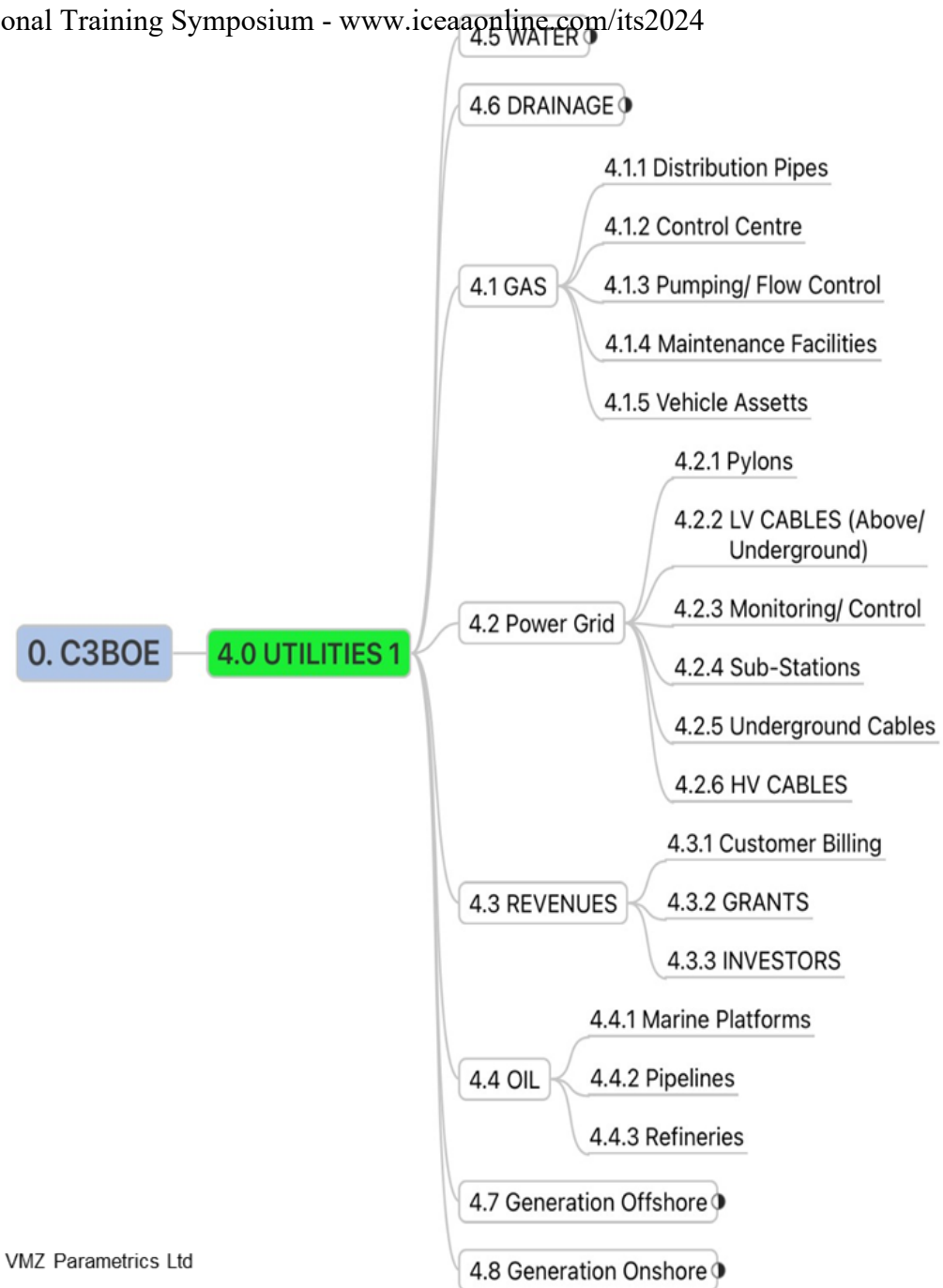
3.0 Services



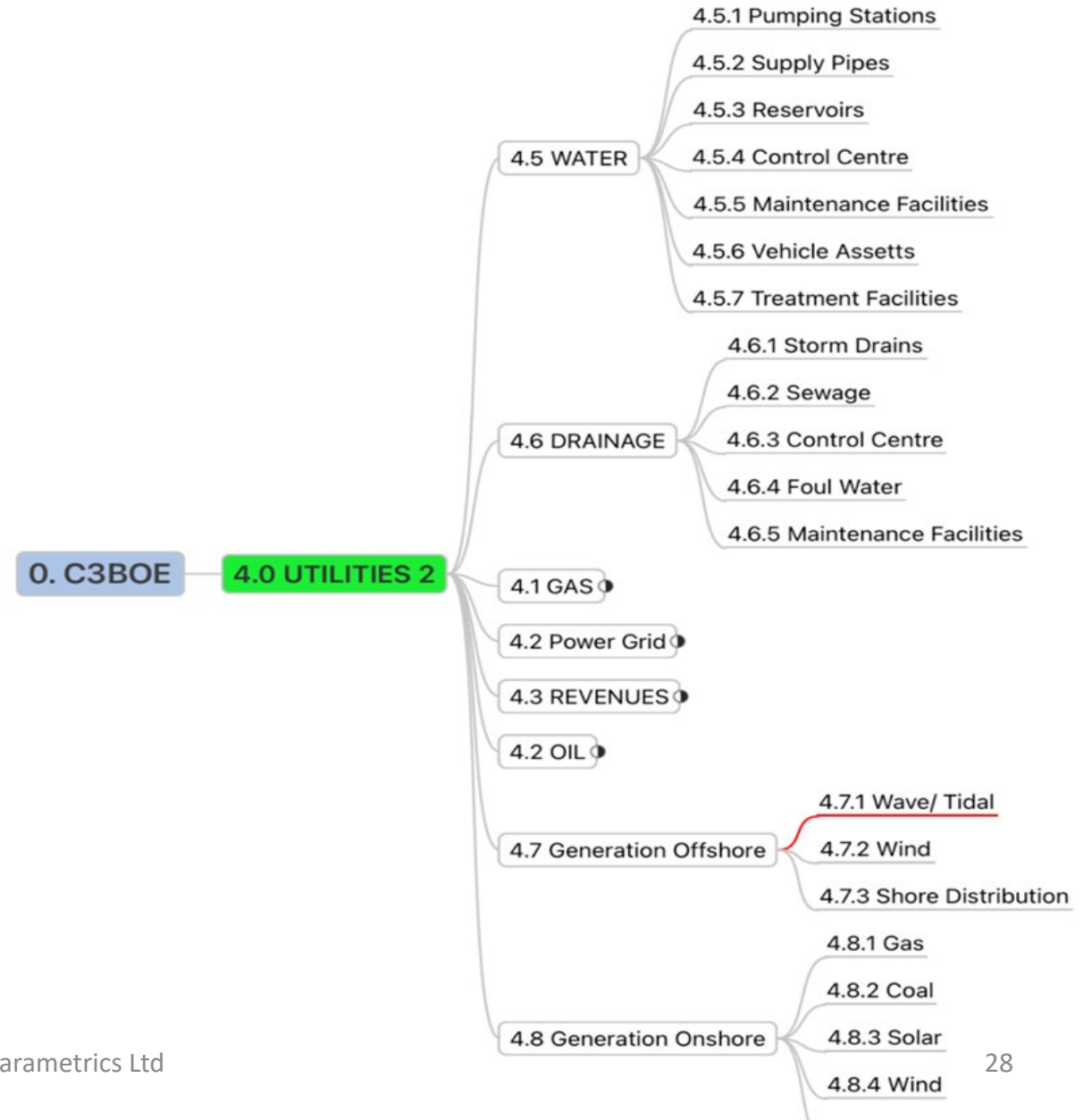
C3BOE

Level 2 Expansion

4.0 Utilities 1



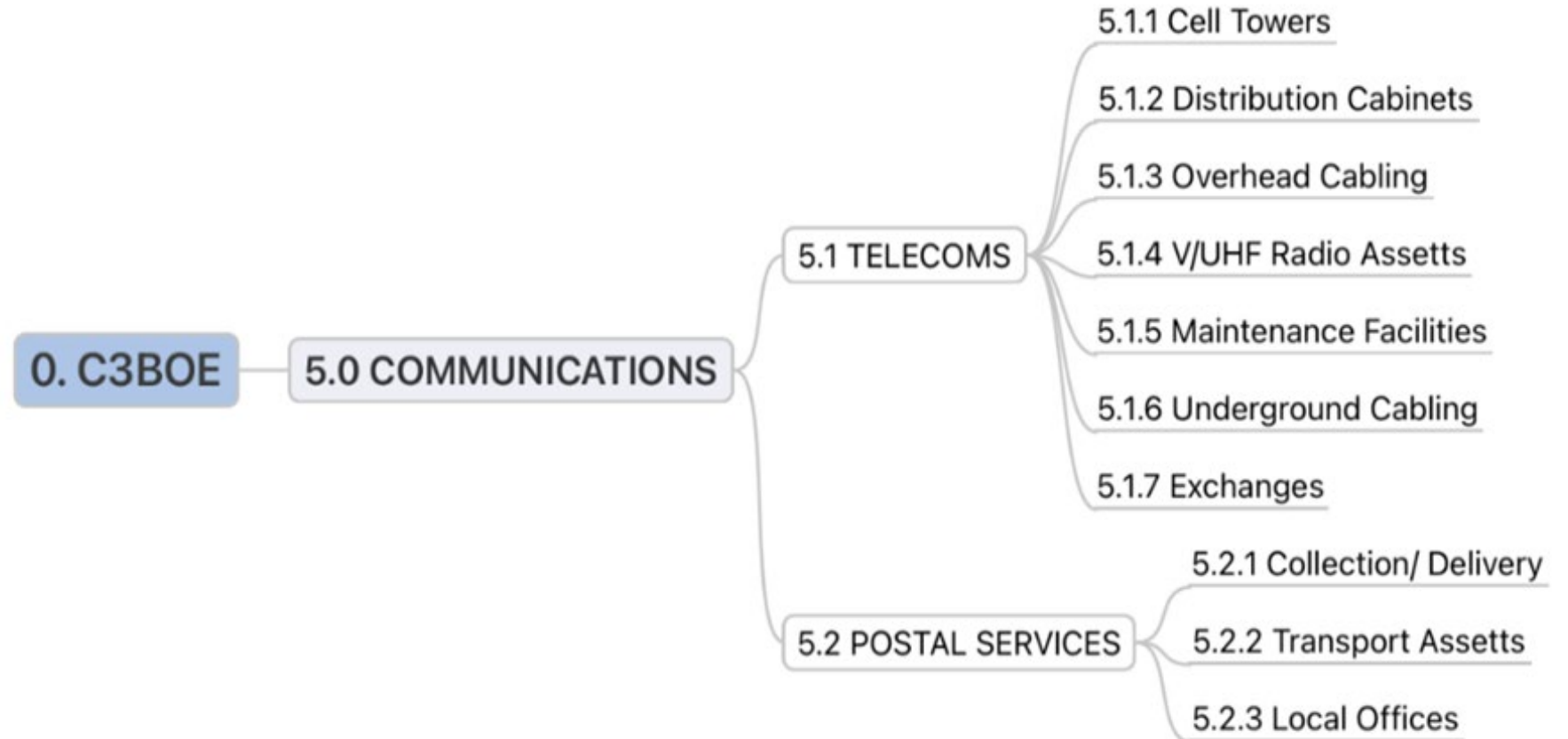
Level 2 Expansion 4.0 Utilities 2



C3BOE

Level Expansion

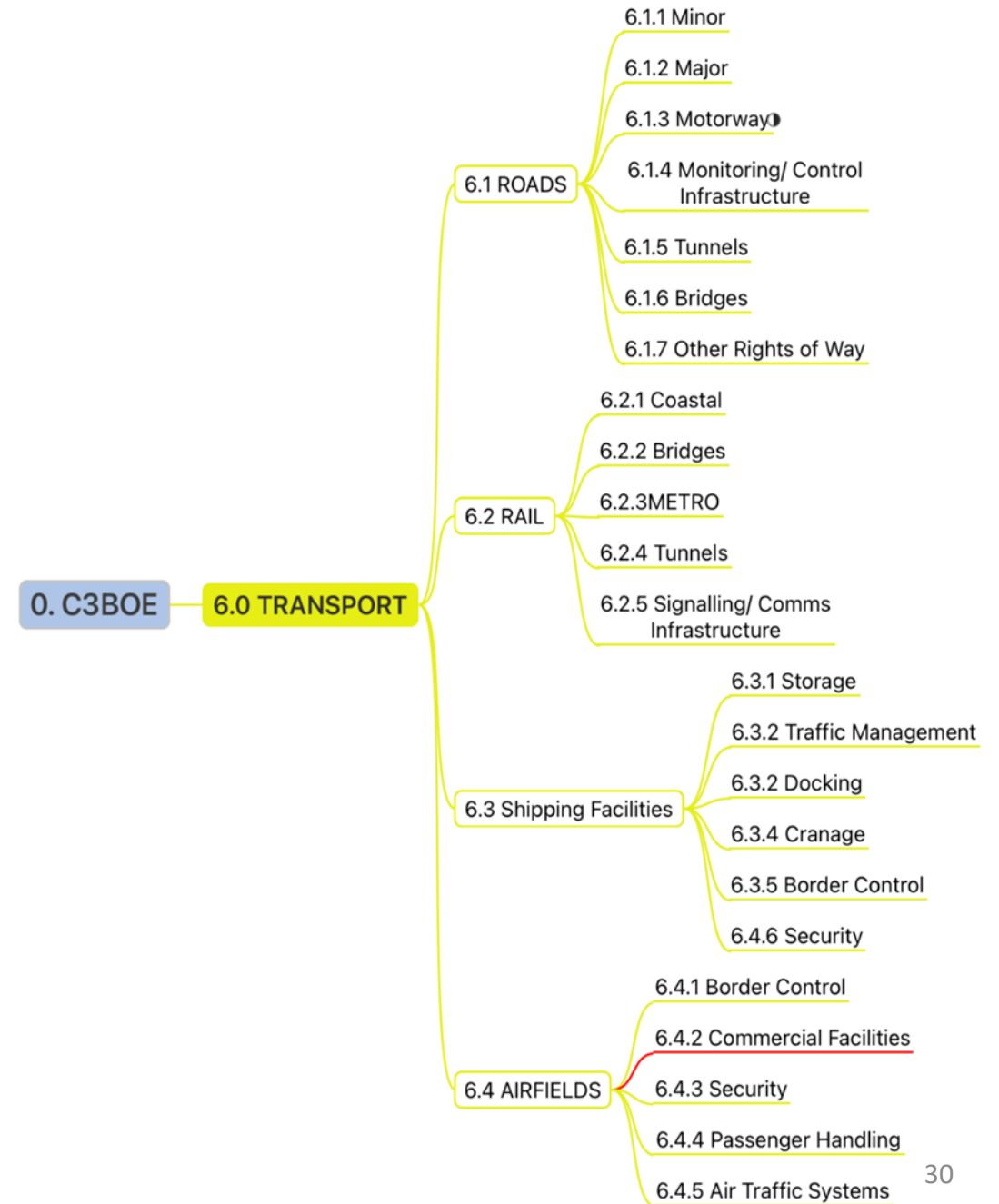
5.0 Communications



C3BOE

Level 2 Expansion

6.0 Transport



CONSIDER THE GRAPH BELOW

