tpgroup

BAE SYSTEMS

‘Efficiency’ in Defence

With quantifiable inputs and unquantifiable outputs, how do we manage what can’t be measured?

25th July 2019
Nick Rose (TP Group)
Fiona McCann (BAE Systems, CORDA)

Trying to Measure what Defence Does

Dstl Studies:

- Metrics for Military Capability
- Measuring Deterrence
- Energy Capability Metrics
- Maritime Energy Management Enablers

Applied:

- MOD Business Cases
- COEIAs

/ Maritime Energy Management Enablers

Project Purpose: Enhance RN ability to manage energy use via the following 3 areas:

Map **energy management** processes and responsibilities.

Develop metrics that can be used to **measure RN energy efficiency**/reductions against targets.

Assess and propose improvements to the current **energy forecasting process** to ensure that it is robust, consistent, and that limitations are understood.

MEME – Metrics Approach

Principles:

- Metrics should be explicitly linked to goals / outcomes delivered locally or globally.
- The objective of a metric should reflect the objective of the RN.
- Applying metrics to RN energy efficiency may come with unintended consequences to manage.

Identification:

- Review of metrics in use inside and outside of the MOD
- Bottom-up review of what each asset / site delivers
- Top-down review of the RN's outputs

Assessment:

- Data availability
- Data utility
- Practicality of application
- Ease of use
- Scope equivalence

MEME – Complexity of Metrics Approach

There are 3 key areas that make developing and assigning an energy efficiency metric complex:

- **The diversity of RNs outputs:** emerging requirements dictate ships taskings and this may not always be its original design role.

- **Deployment / operation outcomes** often cannot sensibly be quantified, because they deliver intangible benefits (such as “global presence”).

- **Training activities overlap** with operational tasks and so it is difficult to measure consumption by operational / non-operational activities.

Due to the incompatible complexities of defining efficiency and differences in energy measures, a single energy efficiency metric that is applicable to both asset and infrastructure could not be identified.

MEME – Metrics Found

Metric	Benefits	Unintended Consequences
m^3 / (nm × Hours Underway)	• Data readily available • Outputs simple to interpret • Incentivises operation at efficient speeds • Incentivises efficient allocation of ships to tasks by planners	• Ships staying at sea for longer unnecessarily to improve perceived performance • Focus on outcomes which require smaller / less capable assets
m^3 / Qualitative Judgement of Output	• Accounts for all drivers of energy consumption • Able to evaluate total sum of outputs delivered • Accounts for SME real-world knowledge and experience • Can be applied to any scenario	• Not a rigorous method; likely open to bias, influence, and managerial pressure. • It may not be appropriate for holding the RN to account
Energy Consumption/ Person Trained per Year	• Ability to compare energy efficiency of producing trained SQEP for each trade / branch • Incentivises stopping or reducing 'overhead' energy consumption, and maximising training output	• Weakened definition of "SQEP" • Focus on trades with lower energy-intensity training requirement

MEME - Outcomes

27 Metrics Suggested

- Recommended 4 to invest in for use in this application
- Drive energy efficiency behaviours within target audiences
- Avoid unintended consequences

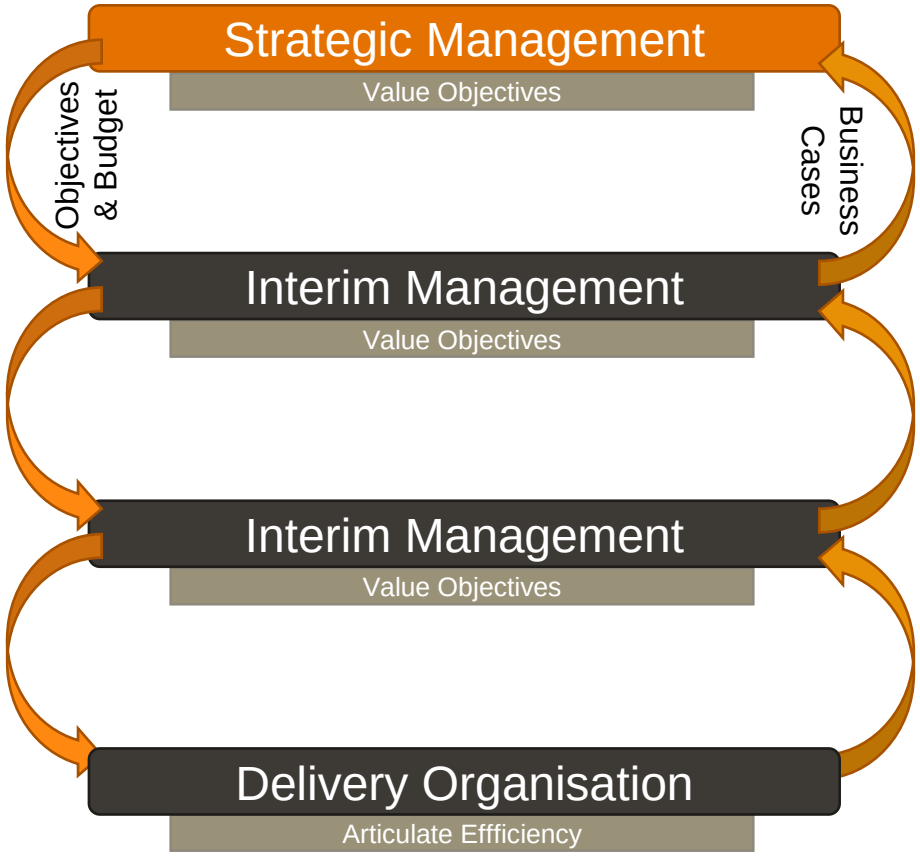
No one metric identified to cover all scenarios

- Continue current work and projects in other areas that can influence energy efficiency, e.g. incentivisation schemes
- Use metrics in conjunction with other influencers to improve energy efficiency

Lessons from MOD Financial Efficiency

MOD Financial Efficiency:

1. Define outputs and departmental budget
2. StratBOI identifies most important capabilities
3. Delegated FLC budgets
4. Business Cases demonstrate VfM to fill capability gaps



Lessons from MOD Financial Efficiency

tpgroup

BAE SYSTEMS

The Efficiency Optimisation Trap:

- A perfectly “efficient” structure is a fragile structure

High performance engineering: maximise product efficiency (size, weight, power, cost).

Also high performance engineering: use reserve factors, redundant pathways, and conservative load assumptions to mitigate risks.

More ‘narrowly’ efficient system = more problematic cascade failure.

/ Conclusion

tpgroup

BAE SYSTEMS

1. Efficiency cannot always be measured, but it can be managed
2. ‘One metric to rule them all’ may not exist
3. Different metrics may be useful to different roles
4. Useful vs. achievable vs. theoretically best
5. Consider adverse effects of metrics
6. Do not pursue efficiency too far

tpgroup

BAE SYSTEMS