**The application of “Value Engineering” tools to risk assess the outputs of an NSI**

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**Abstract**

The ONS was faced with the problem that there was no basis to determine the relative strengths or weaknesses of the full range of statistical outputs which it produced. To remedy this situation, the continuous improvement team borrowed a measurement tool from “Value Engineering” to enable a structured self-assessment of all ONS outputs.

By applying the approach, the ONS was able to produce a broad picture of where the highest risks were in ONS statistical systems by allocating a Red/Amber/Green status to each statistical system/output. By applying a simple scoring mechanism, outputs were ranked for each of the seven dimensions measured (Data sources, Methods, Processes, Systems, European Quality dimensions, user feedback/reputational risk and People).

The risk assessment provides:

* a broad picture of where the highest risks to outputs are to assist in prioritising / directing resources for improvements
* a basis for the prioritisation of quality and methods reviews
* a top down approach to planning/bidding for any future systematic programme of improvements
* a strategic approach to identifying process improvement initiatives

Having carried out the risk assessment in November 2012, the exercise has been repeated, providing an opportunity to reassess priorities and identify progress made.

1. **Background**

From December 2008, the ONS embarked on a corporate initiative to bring IT systems into a sustainable state in a programme of work called “Red to Green”. The Information Management Directorate (IMD) developed a model which was capable of measuring the state of the IT estate. The model examined the components that made up the ONS business systems, and each component was given a Red, Amber or Green rating, according to the sustainability of the platforms and software that they rely upon. The model could be queried at the level of individual components, whole business systems or aggregated at the corporate level for the whole of ONS. The intention of the programme was to systematically address the vulnerabilities of the office infrastructure and systems to reduce risk to the office.

The ONS uses a number of methods for assessing the quality of statistical outputs. Further analysis is carried out where there are particular issues to be addressed. Risk assessment tools are also in place, but risk is not considered consistently for all statistical outputs.

The senior management team at ONS wanted to create a model, similar to the one created in the “Red to Green” programme which would address, in a consistent way, the risks associated with the outputs which ONS produces. The structured risk assessment would be carried out for the following reasons:

* ONS needs to have a broad picture of where the highest risks are in terms of its outputs to assist in prioritising / directing resources for improvements in methods, processes and systems
* to inform the prioritisation of quality and methods reviews
* to provide a top down approach to planning/bidding for any future systematic programme of improvements
* to provide a strategic approach to identifying process improvement initiatives.

Work commenced in August 2012 to create the model and analyse the results.

1. **The model**

The requirements of the model were that it should provide an overall score for the risk associated with each output, assessment should be made against a number of dimensions and the reasons for the score should also be provided.

Following consultation with Divisional Directors, the final list of dimensions was as follows:

* Quality of data sources (administrative and survey data)
* Methods (robustness/appropriateness)
* Systems (robustness and functionality)
* Processes (efficiency of data acquisition, results processing and analysis)
* Quality (six EU dimensions: relevance, accuracy, timeliness & punctuality, accessibility & clarity, comparability, coherence)
* User feedback and reputation (to include degree of challenge / trust in national media)
* People (sufficient skilled and trained resource working on the output)

Each of the dimensions was to be further split into sub-elements, each to be assessed and scored to allow a drill down capability from a high level score.

The Continuous Improvement Zone (CIZ) was asked to develop the required model, arrange for the data to be collected and analyse the results. This team has the responsibility for developing the Continuous Improvement (CI) capability of ONS and has experience of a number of CI methods. One of the team members, a Lean Six Sigma black belt had experience of using a model derived from Value Engineering in industry.

Value Engineering can be defined as “a systematic method to improve the ‘value’ of goods or products and services by using an examination of function” [[[1]](#footnote-1)].

In industry, such a model would look to identify how a function could be optimised to reduce cost but still provide the required “value” to the customer. The model, adapted for our purposes would provide a systematic assessment of risk and results would be analysed to identify how the risk could be mitigated.

In order that the “Red to Green” concept was adopted, red, amber and green statuses were defined and scores allocated (Table 1). The selected weightings were based on those commonly used in Quality Function Deployment, a lean six sigma tool for design.

**Table 1 – Definitions and ratings**

|  |  |  |
| --- | --- | --- |
| **Status** | **Definition** | **Score** |
| Red | In need of attention | 9 |
| Amber | Some improvements possible | 3 |
| Green | No issues or not applicable to the output | 0 |

The model also had to cope with the situation that some of the sub-elements would not apply to all outputs e.g. an output may use survey data, administrative data and census data to compile results. In many outputs, only one sub-element was applicable. In order that outputs could be compared equitably, the model took the highest scoring sub-element as the summary score for that dimension. Each of the dimensions could then be summed to provide a composite score for the output. Details of the sub-elements of each of the dimensions are set out in the Appendix.

Recognising that some outputs are more important than others to users, an additional weighting was applied to the composite score. The weighting reflects the relative importance of the output to users and the impact to ONS reputation if results were erroneous (1 – low; 2 – medium; 3 – high). The application of the weighting resulted in a weighted composite score.

1. **Data collection process**

The first task was to determine a list of all statistical outputs. A statistical output is defined as those for which a statistical release exists, as listed annually by the UK Statistics Authority for ONS, under the terms of the Statistics and Registration Services Act 2007. The entire GSBPM was considered in terms of sources/methods/systems and processes used to produce the outputs.

Having agreed the list of outputs with Divisional Directors, facilitated workshops were held for a sub-set of the outputs to ensure that the template could be understood. After fine tuning the content, blank templates were provided to Divisional Directors to be completed, with instructions that the assessment should be completed by the statistician responsible for the published output. The statisticians were asked to populate the template and provide reasons for the red or amber assessment to justify their choice. Once the template had been completed for all dimensions, the Divisional Director was then asked to check the data for their division for reasonableness and to allocate the importance weighting for each output.

The completed results for the whole of the office were shared with data collection, methodology and systems support areas to challenge anything they felt appeared incorrect. Once any differences were agreed, the full results were analysed. The first set of results was collected during November 2012.

1. **Analysis and presentation of results**

Once the data had been collected and validated, analysis was carried out to identify the risk profile of each statistical output. Data was sorted in descending order of weighted composite scores to identify the highest risk outputs. A simple percentage count of the red, amber and green scores in all dimensions provided a useful overview of risk (Table 2).

**Table 2 – Overall percentage scores**

|  |  |  |
| --- | --- | --- |
|  | **2012** | **2013** |
| **% red overall** | 21.4% | 18.7% |
| **% amber overall** | 46.8% | 48.1% |
| **% green overall** | 32.0% | 33.2% |

The ONS repeated the data collection exercise again in November 2013, providing the opportunity to identify the change in the risk profile as a result of improvements which had been been made since the first evaluation.

Boxplots were used to show the distribution of weighted composite scores in each division, allowing comparisions to be drawn between divisions and also comparisions between years for the same divisions (Figure 3).



**Figure 3**

Further analysis was carried out for the each of the dimensions assessed, showing the relative risk exposure of the 14 divisions which produce outputs for the ONS (Figure 4).

**Figure 4**



Comparisons could also be made between the two years of asessment for each of the dimensions for each division.

1. **How the tool is being used**

The tool and the resulting analysis have delivered to the objectives of the brief. The output allows a high level view of the risk exposure of our statistical outputs and drill down capability exists to understand the reasons for the risk exposure.

The overall percentage of “red” scores was adopted as a Key Performance Indicator for the office. The analysis is also used to prioritise the outputs selected for National Statisticians Quality Reviews (a structured assessment of the quality of a National Statistical output in the UK) and the information from the analysis is used for:

* input to survey action plans - identifying and prioritising key improvements required
* identifying local continuous improvement initiatives
* prioritising developments and influencing budget allocations
* sense checking where we are currently investing in developments
* deploying our skilled people to reduce risks in key areas
* improving communications on outputs
* highlighting where we need careful stakeholder handling

The tool will continue to be used to assess the risk of ONS outputs on an annual basis and will for an integral part of our risk management strategies.

1. **Lessons learned**

Self assessment can be subjective but we do what we can to minimise this through senior staff sense checking and other business areas challenging. It is likely to be sensitive to staff changes. The ONS has had a high degree of staff movement due to a large development agenda and risk averse staff are likely to score higher in areas less familiar to them. This knowledge of the circumstances needs to be considered when looking at the data.

It is encouraging that those outputs assessed as the highest risk in 2012 generally showed the largest improvements in 2013, demonstrating that the improvement work over the year focused on the higher risk areas.

The tool needs to be used alongside other measures of risk and quality but is a good broad assessment of risk on a consistent basis across the output portfolio.

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1. [] Definition from Wikipedia [↑](#footnote-ref-1)