Analysis of Future Fit

'Appraisal of Options '

a co-operative council

Telford & Wrekin COUNCIL

Overview

The Future Fit appraisal process considered 4 options:

- Option A – is the 'do nothing' option
- Option B, Option C1 & C2 are the 3 shortlisted competitive options. Each requires an 'affordable'[i] amount of capital investment to realise, and would contribute savings to the Trust's underlying Financial position (Option C2 has now been discounted).

These options were appraised by Future Fit using an Overall Economic analysis following separate financial and non-financial analyses.

Future Fit published a report of its 'Appraisal of Options' on 28 November 2016 (this followed an earlier version published on 30 September 2016). A detailed analysis of the processes and results of their original appraisal was undertaken by the Council in a paper published as an appendix to our letter to the Senior Responsible Officer on 10/11/2016**.**

In the recently-published appraisal document, the Future Fit Team has taken no account of the concerns and errors flagged by the Council.

Their Non-Financial Appraisal has ranked option C1 first by a margin of 21.1%.. Their Financial Appraisal has ranked option B first with an equivalent annual cost benefit of £3.4 million p.a. Overall, in considering these two broad findings, Future Fit concluded that Option C1 should be the preferred option.

In correspondence with the Senior Responsible Officer for Future Fit, the Council has detailed its concerns that the process followed to date has not been sufficiently objective and robust and that there are fundamental errors that have been made in the financial and non-financial appraisals and in the way that these two exercises have been brought together to establish a preferred option. The conclusion reached through the process, in our view, is therefore flawed. The Council's concerns have included:

- Insufficient weight has been given to the financial arguments – Future Fit agreed to a 50:50 weighting for non- financial: financial scores as part of the appraisal. The Council's analysis shows that the weighting used is actually 98:2 in favour of the non-financial appraisal. This was clearly not the intended model and this is a major error by the Future Fit Team.

- The 'Cost per Benefit Point' Economic Appraisal Method that Future Fit has also used has been shown to be meaningless and therefore has no valid basis for assessing options.

- There are serious flaws in the way the non-financial appraisal panel was undertaken e.g. no set definition for scoring 1-7 points and no training for participants before assessing and scoring the options. Future Fit Team place huge reliance on measuring the difference between scores but there was no guidance on how to score e.g. one person may score a particular criteria a 3, another person a 4 – this in itself represents a c.14% difference!

- It is not clear what assumptions have been built into the costings

- Insufficient account has been taken of the needs of different vulnerable groups such as children, older people, BME groups and people from deprived backgrounds.

- It has been shown that the Panel Member's scores are being distorted during their transfer in to the 50:50 Economic Model.

As mentioned, in our letter dated 10/11/2016, we set out our detailed analysis of the 'Appraisal of Options' process that Future Fit had used which clearly showed that the conclusions reached were unsound, at best, due to the way the Future Fit team had undertaken the process. There were very clearly fundamental flaws and misunderstandings which the Future Fit Team have failed to engage with or seek to rectify.

Because of this, the Council has undertaken a further piece of work which looks to utilise the same information that Future Fit possesses but to identify a correct methodology which enables a robust and valid comparison of the financial and non-financial appraisal by using a methodology that delivers a 50:50 weighting – which is what the Future Fit team were tasked with doing, but have failed to do so (their model mistakenly delivers a 98:2 weighting).

The Council has now undertaken and completed a detailed technical exercise that adheres closely to the national Treasury Green Book guidelines to produce a methodology which provides a genuine 50:50 weighting. The result of this exercise is:

With the correct score calibrations the 50:50 weighted scores are:

Combined (50:50) = financial + non-financial

Option B = 50.0 + 31.1 = 81.1 out of 100

Option C1 = 31.0 + 39.4 = 70.4 out of 100

As such, the information and evidence actually held by the Future Fit team, when used correctly, indicates **that Option B should be the preferred option that is considered by the Joint committee of the two CCGs**.

CONTENTS

Background

The Future Fit appraisal process considered 4 options:

- Option A – is the 'do nothing' reference option
- Option B, Option C1 & C2 are the 3 shortlisted competitive options. Each requires an 'affordable'[ii] amount of capital investment to realise, and would contribute savings to the Trust's underlying Financial position.

These options were appraised by Future Fit using an Overall Economic analysis following separate financial and non-financial analyses. The non-financial analysis was completed in September 2016 and a full report of the Appraisal of options was made available to the Future Fit partners at the end of September 2016. This was 'Appraisal of Options - version 2'.

On 28th November 2016 a later version of this document was circulated to Future Fit Partners 'Appraisal of Options - version 5'. The principle differences were in the financial analysis, with modified financial estimates, in particular less favourable figures now used for option B.

This report provides a thorough and detailed analysis of the Future Fit Options Appraisal process. In particular it considers whether the Appraisal Team :

1. have used and correctly achieved the process they state they intend to use ?
2. have followed the Treasury and NHS Capital Guidelines they state they are adhering to?
3. have used reasonable and sufficient judgement that would be expected by the public and other stakeholders when considering a capital investment of over £300 million of public funds?
4. have not mislead or poorly informed the non-financial Panel, Programme Board, and other stakeholders
5. will not mislead and poorly inform the public when the 'Appraisal of Options' is published as part of the public consultation.

Executive Summary

Future Fit published version 5 of its 'Appraisal of Options' report on 28th November 2016. An analysis of the processes and results of their appraisal have been analysed in this paper.

The 50:50 Economic Appraisal Method is actually delivering a 98:2 weighting in favour of the Non-Financial Appraisal. This must be withdrawn or is corrected using the calibration in this document to achieve the correct weighting.

The 'Cost per Benefit Point' Economic Appraisal Method has been shown to be meaningless and lacking in judgement. This must be withdrawn from the Appraisal.

The Non-Financial Appraisal has ranked option C1 first with an average score of 5.5 out of 7. It has been shown that the Panel Member's scores are not being transferred into the 50:50 Economic Model using Future Fit's stated process. This must be corrected using the linear-scale method in this document.

The Financial Appraisal has ranked option B first with a net present value (NPV) advantage of £72 million.

1. Overall Economic Appraisal

Prior to the final Overall Economic Appraisal, two separate pieces of analysis have been completed by the future fit team to appraise the 4 shortlisted options :

- the financial analysis, and
- the non-financial analysis

The financial analysis ranked option B first with C1 second. The non-financial analysis ranked option C1 first with B second. So which option should be chosen?

The non-financial analysis is not expressed in monetary terms, and therefore cannot be simply combined with the financial analysis, and vice-versa. At this point the Treasury Green Book advises appraisers that '*judgement is then required to compare the results of weighting and scoring with the cost benefit or cost effectiveness analysis*' [iii]. As non-financial benefits are in consideration, it also instructs appraiser that the quantification of the non-financial benefits must be both '*possible and meaningful*' [iv]. The Future Fit appraisal team are therefore required to use their judgement to select a comparative methodology for choosing the most favourable option, in which the non-financial quantities used are meaningful.

The appraisal team have chosen to combine the outputs of non-financial and financial appraisals into an Overall Economic Model using two separate methods:

- 50:50 Weighting
- Cost per Benefit Point

1.1 What Appraisal Methods Do The Guidelines Suggest:

The NHS and Treasury guidelines do not suggest the use of either of these methods during the final appraisal stage of 'selecting the preferred option'.

However, the Treasury Green book gives an excellent example in its chapter 6 which shows how to handle the situation of selection between two competing options, which is exactly the position of Future Fit [v].

' Box 21 Example – Selecting The Best Option

Two lead options are being considered, with net present costs of £1 million and £3 million respectively, after taking into account valued benefits. To select the £3 million option, a decision maker would need to judge that the unvalued benefits of the project must be worth at least £2 million.

He or she needs to judge whether this is reasonable. Several considerations could help inform this judgment. Are there any measures of the unvalued benefits that could be used to derive unit values, which could help assess whether the £2 million is in fact worthwhile? Have values for this kind of benefit been estimated in other studies? Or are there better opportunities elsewhere for using the £2 million? What do the stakeholders think? And importantly, what do the stakeholders representing the opportunity of using the £2 million elsewhere think? '

The questions to ask are quite clear. In particular, the question '*Or are there better opportunities elsewhere for using the £2 million?* ' is very relevant to the Future Fit position. The equivalent question is:

> Future Fit has to decide if the £72 million of additional net present cost (NPC) being made available for better opportunities is valued more than the 1.1 point difference in non-financial average scores.

Nowhere in this example, or elsewhere in the Guidelines, are appraisers guided to use either:

- the weighted score combination of financial cost and the unvalued benefits, or
- a mathematical cost benefit quotient of the financial cost divided by the unvalued benefit scores.

1.2 Analysis Of The Two Selected Overall Economic Appraisal Methods

Despite the relevant example in section, the Future Fit Appraisers have chosen to use two numerical methods to assist them in their selection of the 'preferred option'. Neither method is explicitly recommended in the Guidelines. The two methods are:

- 50:50 Weighting
- Cost per Benefit Point

In sections 2 and 3 below, each method is explained and analysed for its suitability and integrity, in particular considering if there has been appropriate and thorough judgement and meaning used to compare the results of the financial and non-financial appraisals. A conclusion of the analysis is given in section 5.

2. 50:50 Weighting Method

The appraisal team have chosen to combine the outputs of non-financial and financial appraisals by giving each a 50:50 weighting. This seems a very reasonable and fair process.

The appraisal team have chosen to assign each option a score from 0 to 50 for each of the financial & non-financial analyses respectively. These are then summed to achieve an overall score out of 100 for each option.

It is crucial that the algorithms used to generate the scores correctly maintain the intended 50:50 weighting. Let's test this.

2.1 Financial Analysis

Looking at the rough-cut financials in Table 1, option B is the clear winner. It provides equivalent revenue savings of £46 million p.a. (13%) to option C1, but with £62 million (25%) less investment.

Rough Cut Financials	£ million			Table 1
	A	B	C1	
Investment		249	311	
		-25%		*B has 25% less investment than C1*
Revenue Cost p.a. (yr 4)	343	297	297	
		-13%	*-13%*	*B & C1 have equivalent revenue savings*
EAC (p.a.)	351.4	321.4	324.1	
			+0.84%	*C1 has0.84% more EAC than B*

After discounting the financials to their Present Value, the Total Equivalent Annual Costs (EAC) of B & C1 differ by 0.84%. The appraisal team have decided to 'value' this benefit of 0.84% into 0.4 points out of 50. This is tiny and clearly is not representing the strength of the financial advantage of option B. Even option A, the reference 'do nothing' option, with no investment, only has a difference of 4.3 points out of 50, when it should have an extreme score. Why?

It has been decided to measure the overall economic analysis in points. The non-financial analysis is already available in points. However, the financial analysis has to be converted in to points on a scale of 0 to 50. Remember, the mathematical method selected to do this conversion **must** provide for the 50:50 weighting required by the overall economic analysis. **The chosen method does not do this** – it is achieving a 98 : 2 weighting (non-financial : financial).

This is because the realistic variation in magnitude of the differences in the total EAC is significantly less than the variation of differences possible in the non-financial panel's scoring. To explain this further, consider 1.2 & 1.3 below (and the diagrams in Appendix 1) :

2.2 Non-Financial Score Variation:

All options were scored by the Non-Financial Assessment Panel using scores 0 up to 7[1]. Thus the possible range of average score per option is clearly between 0 and 7. The economic assessment team have chosen to score the winning option 50 points; the remainder are given a lower score at the rate of 0.5 points per 1%.

Non-Financial Analysis

% difference possible — Table 2

average winning difference	**average winning score**						
	7	**6**	**5**	**4**	**3**	**2**	**1**
1	14%	17%	20%	25%	33%	50%	100%
2	29%	33%	40%	50%	67%	100%	
4	57%	67%	80%	100%			
6	86%	100%					

[1] Clause 3.6, b), viii) of Report on Appraisal of Options states that the values 0 & 7 were used by panel members

Table 2 shows the % differences that are possible for combinations of winning scores and winning differences. It shows that the range of differences possible is large, with up to 100% being possible at the extreme. This means that at a rate of 0.5 points per 1%, the non-final scores can range from 50 down to zero, the full-scale.

2.3 Financial Score Variation:

The Financial score of 0 to 50 is generated from the EAC % differences. As with the non-financial analysis, the scores which are assigned differ by 0.5 points per 1%, the winner scoring 50. But is this difference meaningful, and will it provide the 50:50 weighting required?

2.3.1 Total Costs

The Financial analysis team have chosen to assess each option on a 'total cost basis'. Therefore, the Net Present Cost (NPC) and the resulting EAC are the costs for providing the whole service. They are not the marginal costs and benefits of each project option. In the economic model, the points range of 0 to 50 is applied to the full range of total costs down to zero. Therefore, the full 50 points range is equal to the running cost of a whole hospital. The scale of measurement is massive !

An improvement of 2% in the total annual costs of a hospital would be highly prized achievement. Despite being a very significant amount, it is only valued at 1 point out of a possible 50. An improvement of 10% in the total annual costs of a hospital would be unprecedented, but it is only valued at 5 points out of 50. It is clear that considerable care and judgement is required in valuing such large financial benefits when transferred to a non-financial scale, especially when it will be used to assess the financial differences between project options of circa £300million of public investment. The scoring chosen is inappropriate and meaningless.

2.3.2 Absorbed Differences in Project Options

This scoring system's inappropriateness is further compounded by the following :

As the options are all large investment projects, each will contain the latest 'industry' know-how of what equipment to provide and what buildings are required to get the best revenue savings. Therefore, during the generation of each of the options, ideas used by one option will be absorbed in to the business case of the other options, if possible. In this way, all considered options are iterated and refined over time before the final shortlisted project options are reached. Therefore, if say option C1 was spending its extra £62 million of capital on achieving a further £10 million of revenue savings, it is likely that the same new know-how would be absorbed into options B & C2. If it's not possible, then it is due to other constraints, as equivalent financial capital would be made available to all options at the consideration stage. In this way, the % spread of final total cost differences in the financial case of options is always limited. That is why projects that DO display healthy % differences at the total cost(NPC) level are to be highly prized.

2.3.3 Calibrating the Financial Analysis Scoring

The range of EAC differences between the final first ranked options (B & C1) are 0% to 0.84%. This gives rise to scores of 50 and 49.6 respectively. To achieve scores close to 0, the differences in EAC would have to be close to 100%. This is clearly impossible as it is equal to the annual cost of a

hospital or more in some cases. So to complete a well reasoned transfer of financials into scores it is crucial to establish what is actually possible in the extreme:

To establish what maximum variation in EAC/NPC is possible in project options, two extreme examples have been considered:

1. Capital differences of 100%
2. Revenue savings differing by 25%

Beyond these extremes, any favourable variations in capital and revenue differences would be adopted by and absorbed in to the other competing options during their evolution as explained in 2.3.2 above. Therefore, they represent the 'boundary of probability'. (See diagram in Appendix 1)

Applying these extremes to the final options B and C1

1. Project B is delivered for 1/2 of C1's capital spend whilst retaining the same revenue benefit of £46million p.a. :

   The EAC of B_{new} will fall to £317.1 million p.a. , 2.2% better than C1

OR

2. Project C1 is delivered with a further 25% marginal revenue saving of £10 million p.a. but with the same capital spend:

   The EAC of $C1_{new}$ will fall to £315.5 million p.a., 1.9% better than B

The largest winning variation is 2.2%. This suggests that the boundary of EAC differences is 0 to 2.2% in the extreme. Values outside this range have zero probability of occurring. (See Appendix 1)

So the possible and well reasoned calibration of the conversion of the financial analysis to 'points scored' is:

The full-scale scoring range = 0 to 50.

The full scale variation in the % difference between the EAC's of competing options = 0% to 2.2% in the extreme.

Therefore, the appropriate calibration to reflect both full-scales is :

1% of EAC difference = 50 ÷ 2.2 points = 22.7 points

This is the calibration necessary to give equal weight (50:50) to the financial and non-financial appraisal in the overall economic model.

2.3.4 What Weighting Is the Future Fit Economic Appraisal Calibration ACTUALLY Delivering?

Having now established the 'boundary of probability' of the financial analysis in 2.3.3, we can now establish the actual weighting delivered by the Future Fit Economic Analysis:

- Financial Analysis Conversion into points of 0 to 50:

    - The full scale variation in the % difference between the EAC's of competing options = 0% to 2.2% in the extreme
    - The Overall Economic Analysis actually used assigns 0.5 points per 1% of EAC difference
    - So the maximum points difference possible for the financial analysis = 0.5 points x 2.2% = 1.1 points in the extreme
- Non-Financial Analysis Conversion into Points of 0 to 50:
    - The full scale variation in the % difference between the scores of competing options = 0% to 100% in the extreme (see 2.2)
    - The Overall Economic Analysis actually used assigns 0.5 points per 1% of winning non-financial score difference
    - So the maximum points difference possible for the non-financial analysis = 0.5 points x 100% = 50 points in the extreme
- Therefore, the weighting provided by the Overall Economic Analysis 97.8 : 2.2, or 98 : 2 in round numbers, in favour of the non-financial case.

The Appraisal team have stated that they would use a 50:50 weighting of the non-financial and the financial analyses, but instead they have actually used a 98:2 weighting. This has occurred because the Appraisers have used poor judgement and understanding when transferring financial values into Economic Model scores - they have applied a scoring range of which 98% is impossible to achieve in the REAL world. Remember that the transfer of financial units to non-financial units must be *meaningful* [iv] (section A), and this calibration adopted is meaningless and therefore not allowable.

2.4. Sensitivity Analysis of 50:50 Weighted Economic Model

To better understand the effects of the 50:50 Weighted Economic Model, consider the following sensitivity test. It will value the point at which the non-financial case is matched by the financial case, the 'switchover point':

> Option C1 is ranked first in the non-financial analysis with 275.8 points (5.5 average score). Option B is second with 217.6 points (4.4 average score), a difference of 21%.
>
> Option C1 is ranked second in the financial analysis with an EAC of £324.1 million p.a.. Option B is ranked first with an EAC of £321.4. What value must the financial case of B have to reach to overturn the above result of the non-financial analysis?
>
> The point at which it is overturned is when the EAC of B is 21% less than C1 when measured in proportion to B. This value is £267.3 million p.a.. This is an improvement of £56.4 million p.a. compared with C1.

Over 67 years, this **switchover point is a project which has a Net Present Value (NPV) of £1507 million over C1.** (See Appendix 2)

A project capable of delivering this NPV would have Option B's capital expenditure with a total annual revenue saving of 108 million (234% higher than Option C1) – this is a third of the cost of a hospital and impossible.

To put this sensitivity test into word :

Future Fit will chose Option C1 and reject all other options which have a Net Present Benefit over C1 of up to £1.5 billion in order to retain the additional benefit (1.1 points average) as given by the scoring Panel.

i.e. each 1.1 point average of non-financial score has an implicit value to Future Fit of **£1.5 billion** (or £ 56 million each year every year for 67 years).

These are unimaginable amounts, and it is not unreasonable to conclude that there are fundamental issues with the design of the weighted Economic Model actually used.

2.5 Conclusion of the 50:50 Weighted Method

The stated intention of the Appraisers is to use a 50:50 weighted Economic Model. They have used a 98:2 Model contrary to their intention. This has the effect of ignoring the financial case. The whole 50:50 Model must be corrected or withdrawn as an Overall Economic Appraisal Tool.

Additionally, the stated conclusion of the Appraisers that option C1 is the preferred option of the 50:50 Economic Model is **incorrect** and **misleading** and **must** be removed.

3. Cost per Benefit Point Method

The appraisal team have chosen to combine the outputs of non-financial and financial appraisals by dividing the Equivalent Annual Cost (EAC) by the non-financial benefit score. In doing so, they attempt to value the financial cost to provide each point of benefit for each option.

$$\text{Cost per benefit point}_{\text{option}} = \text{EAC}_{\text{option}} \div \text{total benefit score}_{\text{option}}$$

The option with the lowest cost per benefit point is the most favourable.

However, this method should play no part in the Overall Economic appraisal as it :

1. Uses a mathematical quotient that has no meaning
2. Is nowhere recognised in the Green Book Guidelines or NHS Capital Guidance

The reason for each of these is explained in section 3.1 & 3.2 below:

3.1. The 'Cost per Benefit Point' Quotient Is Meaningless

Consider the meaning of each part of the quotient:

Numerator = the Total Equivalent Annual Cost of Providing Hospital Services in Shropshire & Telford & Wrekin for the next 67 years

Denominator = the sum of the weighted scores of a Panel of 50, declaring their valuation of the four criteria of Accessibility, Quality, Workforce and Deliverability, for each option.

Consider what meaning is achieved by dividing one by the other. Change in the denominator is independent of any change in the Numerator, and vice-versa. Any variation that each has is due to other factors and constraints, not to each other. So dividing the two numbers creates a third number that has no meaning.

Next, consider the extent to which values used in the quotient can vary:

- The numerator is a Total Cost and varies very little in proportion to itself (2.2% in the extreme).
- The denominator is a 'marginal' value, capable of varying in full (100%) proportion to itself.
- Therefore variation in the quotient of the two will be solely due to the variation of the denominator i.e. it varies solely with the non-financial weighted score.

Therefore, the 'cost per benefit point' is just an alternative measure of the non-financial score. (In this case it's the reciprocal of the non-financial score). It is not affected by the financial case. Therefore the **financial case is ignored**. (See Appendix 3)

3.2. A 'Cost per Benefit Point' Quotient Is Not A Recognised Technique For Appraising Options

When at the point of selecting the best project option both the Treasury and the NHS offer guidelines to use:

3.2.1 The Treasury Green Book Guidelines

The final stage of overall project appraisal is covered in Section 6 of The Treasury Green Book under the heading **'Selecting The Best Option'** [vi]:

> ***6.3*** *If a full cost benefit analysis has been undertaken, the best option is likely to be the one with the highest risk adjusted net present value. To the extent that all costs, benefits and risks have been robustly valued, this guideline can be applied with more certainty. In cost effectiveness analysis,* ***the option with the lowest net present cost should be the best****, again assuming that the cost estimates are as accurate as possible.*
>
> ***6.6*** *in practice, other factors will also affect the selection of the best option, in particular the consideration of unvalued costs and benefits. Weighting and scoring techniques are useful in comparing different options in terms of the same criteria.* ***However, as scores are not expressed in monetary terms, judgment is then required to compare the results of weighting and scoring with the cost benefit or cost effectiveness analysis. The two analyses should complement each other****, and may indicate that further analysis is required before a decision can be reached. Annex2 provides further information on how weighting and scoring can be brought into the decision making process. Fully involving stakeholders is very important in making judgments between monetised and non-monetised effects.*

The full text is shown to demonstrate that at no point does this guidance explicitly state making a mathematical quotient of the NPC and the weighted scores to determine the preferred option.

3.2.2 The NHS Capital Investment Guidelines (1994)

In the Business Case Guide Section of this guidance, the NHS offer advice on selecting the preferred option under the heading '**Selecting the Preferred Option'** [vii]**:**

> ***2.64.1*** *The steps involved in making a choice are to rank the options in order of the benefits (Step 4), and then to set the net present costs of each option (from Step 5) alongside the benefits. It may*

be possible immediately to identify an option which is clearly the best solution (maximum benefits at lower cost with an acceptable degree of risk), or to rule out options which are clearly inferior (fewer benefits at higher costs).

2.64.2 *However, a clearly superior choice may not be immediately evident;* ***often the choice will be between an option offering lower costs but fewer benefits and one at a higher cost but with better benefits. Determining the preferred option will be a matter of judging the value of the additional benefits of an option against the additional costs that would be incurred if the option were selected.*** *The preferred option will be the one that affords the greatest ratio of benefits to costs. In these situations, a fine assessment of the risks and uncertainties (Step 6) and an appreciation of purchasers' views can help with decision-making.*

Again, the full text is shown to demonstrate that at no point does this guidance explicitly state making a mathematical quotient of the NPC and the weighted scores to determine the preferred option.

3.2.3 Guidelines Conclusion

These Treasury and NHS guidelines are giving broadly the same advice to appraisers selecting the preferred option. In particular, when making the choice between options where non-financial scores are involved, **judgement** is required when using and comparing the results of financial and non-financial analyses. Whilst the NHS guidance uses the word 'ratio' (in 2.64.2), its meaning is clearly as emphasis of the human judgement process required to balance the two analyses. It is not an explicit instruction to mathematically divide the two analyses. This is supported by the Treasury Guidance.

3.3. Sensitivity Analysis of Future Fit's 'Cost per Benefit Point' Economic Model

To better understand the design and use of the 'cost per benefit point' Economic Model, consider the following sensitivity test. It will value the point at which the non-financial case is matched by the financial case, the 'switchover point':

> Option C1 is ranked first in the non-financial analysis with 275.8 points (5.5 average points). Option B is second with 217.6 points (4.4 average points), a difference of 21%.
>
> Option C1 is ranked second in the financial analysis with an EAC of £324.5 million p.a.. Option B is ranked first with an EAC of £321.4. What value must the financial case of B have to reach to overturn the above result of the non-financial analysis?
>
> The point at which it is overturned is when the EAC of B is 79% of the EAC of C1. This value is £256.3 million p.a.. This is an improvement of £68 million p.a. compared with C1.

Over 67 years, this **switchover point is a project which has a Net Present Value (NPV) of £1815 million over C1.**

A project capable of delivering this NPV would have Option B's capital expenditure with a total annual revenue saving of 122 million (265% higher than Option C1) – this is over one-third of the cost of a hospital and is impossible.

To put this sensitivity test into words :

Future Fit will chose Option C1 and reject all other options which have a Net Present Benefit over C1 of up to £1.8 billion in order to retain the additional benefit (1.1 points average) as given by the scoring Panel.

i.e. each 1.1 point average of non-financial score has an implicit value to Future Fit of £1.8 billion (or £68 million each year every year for 67 years)

These are unimaginable amounts, and it is not unreasonable to conclude that there fundamental issues with the design and use of the chosen 'cost per benefit' Model as an Overall Economic Appraisal Tool.

3.4 Conclusion of Cost per Benefit Point Method

The 'Cost per Benefit Point' quotient is used by Future Fit in its Overall Economic Appraisal.

However, it has been demonstrated above that :

- It is not recommended anywhere in the NHS or Treasury Guidance for selecting the preferred project option
- It produces a number which has no relevant meaning
- It varies greatly with the non-financial case and ignores the financial case

The use of this quotient as a project appraisal tool shows poor understanding and sensitivity to the inherent information content and meaning of the financial values and scores available to the Appraisers. It certainly does not demonstrate an acceptable level of *judgement* as is required by the public, stakeholders or the Guidelines. Therefore, the Cost per Benefit Point Quotient must be withdrawn as an Overall Economic Appraisal Tool.

Additionally, the stated conclusion of the Appraisers that option C1 is the preferred option of the Cost Benefit Economic Model is **incorrect** and **must** be removed.

4. Option A - The 'Do Minimum' Option

The Green book is clear that a 'do minimum' option is included in a project appraisal, and not eliminated during the short listing of competing options which have larger financial benefits. However, they are also clear on why this is the case :

> *'The 'do minimum' option should always be carried forward in the shortlist, to act as a **check** against more interventionist action*.' [viii]

Therefore, Option A is only retained as a **check**, a reference point with from which the present value benefits (NPVs) of the competing project options are compared. Therefore Option A is **not** a competing option. In particular, it has not been thorough the process of option generation, iteration and refinement of the final competing options, and has zero probability of selection.

The 'do minimum' option is not used in the Green Book's Guidance on the '*Selection of the Best Option*'[ix] or in the NHS Guidance for 'Selection of the Preferred Option' [vii]. Likewise Option A is not necessary in the final Overall Economic Model for the selection of Future Fit's 'preferred option'.

5. Overall Economic Analysis Conclusion.

Both the Economic Models chosen by Future Fit to assist in the selection of a preferred option are not recommended in the Treasury or the NHS Capital Guidelines

The 50:50 weighted Economic Model is actually delivering a 98:2 weighting contrary to Future Fit's intention. It must, therefore be withdrawn from the appraisal or corrected. Any conclusions reached from its use must be withdrawn or corrected.

The Cost per Benefit Point Economic Model has been shown to be a meaningless value, varying solely with the non-financial case. It must be withdrawn from the Economic Model and the Appraisal. Any conclusions reached from its use must also be withdrawn.

A sensitivity test of the Models has demonstrated that Future Fit would continue to recommend option C1 ahead of option B even if it saved £1.5 billion more than C1. In this, the Appraisal Team have demonstrated that they do not sufficiently understand the numbers they are analysing and their true value and meaning. Without this they will be unable to make the judgements that are the crucial part of the Preferred Option Selection when using public funds.

The Guidelines do not expect that the 'do minimum' option, Future Fit's option A, is included in the final appraisal stage of 'selecting the best option'.

6: Non-Financial Analysis

6.1 Guidelines

The Treasury Green Book is clear in its attempts to encourage appraisers to value benefits in financial terms. Even for variables or benefits that are not normally expressed financially, such as health benefits, it challenges appraisers to use a variety of economic processes or commission studies to obtain valuations of the cost of a benefit. In this way they can be directly included in the overall financial cost-benefit appraisal. The Future Fit Appraisers have not attempted to commission studies or use techniques, familiar in economics, to assign a financial valuation to their four non-financial criteria of accessibility, quality, workforce and deliverability.

If this financial valuation of benefits is not attempted or possible, the Green book still encourages their consideration:

'5.76 *Costs and benefits that have not been valued should also be appraised; they should not be ignored simply because they cannot easily be valued. All costs and benefits must therefore be clearly described in an appraisal, and should be quantified where this is possible and meaningful*' [iv]

It also suggests the most common technique:

'5.78 *The most common technique used to compare both unvalued costs and benefits is weighting and scoring (sometimes called multi-criteria analysis).The basic approach to weighting and scoring involves assigning weights to criteria, and then scoring options in terms of how well they perform*

against those weighted criteria. The weighted scores are then summed, and these sums used to rank options.'[x]

This 'multi-criteria analysis' (MCA) is the method that the Future Fit appraisers have used to value their non-financial benefits.

6.2 MCA Design and Use

The Green Book publishes a separate guidance document for the use of Multi-Criteria Analysis.[xi] This states that the MCA is ' *an alternative to defining monetary values.. when this is impractical*' and benefits from its *'openness '* and *'transparency '* [xii].

MCA Panel Members have all the information they require on the options being assessed. Likewise they have the information packs on the four criteria being valued. They also know the relevant weighting of each criterion before values are summed into an overall score. They also know the scale on which to value each criterion. Each panel member will use all the information to record their valuations after processing this vast array of competing information, criteria, options and weightings before them. Even where panel members have giving an equal scores to a criteria, they may have done so having gone through completely different processes and valued each part of the information before them differently. There are infinite permutations and combinations of valuation processes and reasons. The benefit of MCA is that it transforms this complexity into a score that can help a project appraisal process. **However, the translation of millions of thought processes into one score demands that the score be treated with respect – they contain an almost infinite amount of information.**

Therefore, for MCA to succeed,

- **all** information must be available and accurate at the time of panel valuation.
- **no** post-processing or variation of the scored values after the panel scoring can occur

To do so would destroy the openness and transparency that the Guidelines expect, and hide from the panel a piece of weighting information that could influence them, or simply distort the actual meaning of the value they chose.

6.3 Future Fit MCA

The Future Fit MCA process can be summarised:

- The 3 competing options B, C1 & C2 were assessed together with the 'do-nothing' reference option A
- Four criteria were chosen to score : Accessibility; Quality; Workforce & Deliverability
- Weighting of each criteria were agreed after the combination of public telephone survey and assessment panel views : 25.1% ; 31.2% ; 27.3% and 16.3% respectively
- Information packs were supplied for all options and criteria prior to scoring
- A Panel Members scored each criteria and each option on a scale of 0 - 7[2]

[2] Clause 3.5, b), viii) of Report on Appraisal of Options states that the values 0 & 7 were used by panel members

A panel of 50 members met and assessed the information, completing the MCA with the results shown in Table 3:

Total Weighted Scores of MCA Table 3

	C2	B	C1	
Total Score	120.8	217.6	275.8	*Total possible = 350*
Average Score	2.4	4.4	5.5	*Average of 50 members*
Ranking		2	1	*C1 ranked first*

The Future Fit MCA has ranked C1 first and B second. However, how can we use the MCA to assist decisions in the Overall Economic Appraisal?

6.4 Transfer Of Non-Financial Result To The Weighted Economic Model

Future Fit describes the method they will use to bring these MCA scores in to their Weighted Economic Model in the 2016 Evidence Pack presented to the panel.

> "*A non-financial score for each option is derived from the weighted total of the score for each non-financial criterion, giving a maximum 100 'benefit points"*.[xiii]

The same intention is also stated in the 'Appraisal of Options' Report as the guidance that the Appraisers will follow.

6.5 Actual Method Used To Transfer the Non-Financial Values

The stated transfer process of non-financial scores into Economic Model Points has not been used.

Instead the process actually used transfers the proportional differences between the weighted scores of each option and the first ranked option.

This proportional difference transfer method must not be used for several reasons:

1. It is not the method the MCA Panel agreed to use,
2. It is not the method the Future Fit Appraisers' agreed to use
3. It transfers score differences and not scores. The MCA Panel gave meaning to scores not differences. Therefore the values transferred into the economic model lose their meaning.
4. It transfers proportional score differences. This has the additional effect of amplifying the values taken into the economic model. Even worse, the lower the scores, the higher the amplification. (see Appendix 5)
5. Its use is not recommended anywhere in the Treasury or NHS Guidelines.

6.6 The Correct Method to Transfer Non-Financial Values Into the Weighted Economic Model

The correct process that Future Fit stated they would use is a simple linear scale adjustment [iii]. This process will overcome the issues raised in section 6.5 above.

The 50:50 Overall Economic Model uses a linear scale of 0 – 50 points. The MCA has also produced its Non-Financial scores on a linear scale, in this case 0 – 350. It is possible to simply change this 0 – 350 linear MCA scale to a 0-50 linear scale. This can be done without affecting the meaning of the MCA, as it respects all the original values recorded by the MCA Panel. Table 4 shows the scores to transfer to the 50:50 weighted model in row 2. (See Appendix 6).

Total Weighted Scores of MCA Table 4

	C2	**B**	**C1**	
0 – 350 Score	120.8	217.6	275.8	*Total possible = 350*
0 - 50 Score	17.3	31.1	39.4	*Total possible = 50*

6.7 Non-Financial Conclusion

The outcome of the Non-Financial MCA has ranked option C1 first and option B second.

Following this, the transfer of the non-financial scores into points in the 50:50 Economic Model has been completed incorrectly. In doing so the Appraisers have:

- Mislead the MCA Panel, invalidating the scores they have produced
- Distorted and changed the meaning of the scores during their transfer into points, making them meaningless
- Not followed the process Future Fit stated it would use
- Not followed the requirement of the Guidelines in the use of MCA scores.

Therefore, the transfer process used **must** be withdrawn and removed from the appraisal. If it is decided to proceed with the use of the 50:50 Economic Model, the intended stated transfer process must be used in place of the incorrect process (see 6.6).

7.0 Financial Analysis

7.1 The Future Fit Project Financial Methods Used

Future Fit has used Present Value discounted cash-flow financial project appraisal approach, in line with the Treasury and NHS Capital Guidelines.

7.1.1 The Net Present Cost (NPC)

Each option has a full discounted financial analysis completed at a Total Cost Level, with a Net Present Cost (NPC) totalled at the end of the project life. The use of NPC is a recognised tool in both Guidelines.

The challenge with the use of NPC in project appraisal is to remember how little it can vary in proportion to itself because it is an absolute measure. For example, in Future Fit the NPC is the **total cost** (capital & revenue) **of a hospital for 60 operational years**. Its small variation with hard won improvements must be understood, and not allowed to be dwarfed by crude and poorly judged

assumptions or estimates elsewhere in an options appraisal. This poor judgement has been demonstrated to have occurred in the use of the NPC in the Overall Economic Appraisal in Sections 2 and 3 above.

7.1.2 The Equivalent Annual Cost (EAC)

The stated operational life of the project after investment is 60 year. However, some projects take longer to consume their capital than others, resulting in different project lengths to achieve this 60 year operation life. It is not possible to directly compare the NPCs of options with different project lengths.

In such cases, an Equivalent Annual Cost (EAC) can be calculated from each NPC for each option. It is possible to directly compare the EACs of the competing projects. This has been done by Future Fit to compare project options. The EAC is not mentioned or advocated in the Treasury or NHS Guidelines. However, it is a known technique in present value annuity calculations, and does have meaning. However, it is important to understand that meaning, and why it is called an **equivalent**.

The EAC is an **average annual cost** calculated using present value mathematics. Its use requires the clear understanding that:

- The actual value of project cost differences is made to look very small, misleading those that do not understand present value mathematics
- It is a 'one-value' **estimate** of **actual** financial activity in each project year, and in many of the years of a discounted cash-flow, it **will** be massively in error.
- It is being used as a proxy for the NPC, which is the value used in the Guidelines , and should not replace it

In 7.3 and 7.3.3 below, the misunderstanding of this has led to poorly judged conclusions.

7.1.3 Equivalent NPC Is Preferable

To overcome the disadvantages, and attenuating effects of the EAC, an alternative method is to use Equivalent Net Present Costs. These are calculated for those projects with a different project life to the most frequent project life amongst the options. They can be compared directly with the NPCs for the other project options having the frequent project life.

For Future Fit the Equivalent NPC for option B can be calculated for a 67 years project life. It can then be compared to the actual NPCs of options C1 & C2 which already have a 67 year project life. In doing so, the NPC differences between the options can be calculated and displayed. This gives a clear project difference between options, uses NPC as the Guidelines require, and does not attenuate the project differences as EAC does.

7.1.4 Financial Summary

Table 5 shows a summary of all these significant values for projects B & C1. It shows that the difference in EAC between B & C1 is £2.7 million p.a. This can seem small to non-accountants. After 67 years it will add up to a NPC difference of £72 million between the projects, with B being the cheaper project. This is a very significant financial benefit that Project B has over C1, especially when considering precious public money.

As this extra difference of £72 million is available to Project C1, the Appraisal team or other stakeholders may take the very reasonable view that Project B is chosen and £72 million is made available for other significant beneficial health projects. For example, there may be the need for investment projects in Community Fit, the sister programme to Future Fit.

The key question for the overall economic appraisal, and the public is, if there are additional non-financial benefits of option C1, are they worth £ 72 million.

Financial Case	£ million			Table 5
	A (reference)	B	C1	
Investment		249	311	
		-25%		*B has 25% less investment than C1*
Revenue Cost p.a. (yr 4)	343	297	297	
		-13%	*-13%*	*B & C1 have equivalent revenue savings*
EAC (p.a.)		321.4	324.1	
			+0.84%	*C1 has 0.84% more EAC than B*
NPC 67 years		8588	8659	*Projects both run for 67 years calculated from the EAC*
NPC Difference 67 y		72		*B has £ 72 million smaller NPC*

7.2 Changes from 'Appraisal of Options' version 2 to version 5

The finances have been revised between vn2 and this latest vn5 of the 'Appraisal of Options' reports. The main differences are :

1. A change to the phasing of the capital spend at the start of all competing project options, with all options completing their capital spends in project year 5. Previously they completed in year 6 for B, and year 7 for C1 & C2.
2. An increase in the capital spend for option B of £12miilion (5%). This appears to be a large increase at this late stage of the Options Appraisal process, occurring in the 6-weeks between each report

The following considers what has become incorrect during the transition between the two versions:

7.2.1 Appraisal Period

Option B, C1 & C2 complete their investment in project year 5. Each has completed the significant part of its investment, 85% or more, in project year 3. This means that the options will commence their full operational life in year 6

The Financial Analysis states that the project evaluations have been calculated for an operational life of 60 years. Therefore, each option commencing its operational life in year 6, will end its project life in year 65.

However, option B is actually 66 years of project life, and option C1 & C2 are 67 years. This is incorrect and contrary to the stated intention of the Appraisers.

This appears to be an oversight in the change to the Project cashflows calculations between version 2 and 5 of the Options Appraisal. Version 2 correctly provided just the stated 60 year operational life, commencing the project year after the full capital spend was completed. Version 5 states 60 years of operational life, as in version 2, but gives longer in differing amounts to different projects.

7.2.2 Lifecycle Capital

Similar to 7.2.1, there has been no stated change to the intention with lifecycle capital between versions 2 and 5. The lifecycle capital is stated to occur on 5 - 15 year cycles in both versions. However, the timings of these spends has not been adjusted from version 2 to 5 as it should be. In vn2 the lifecycle capital started 5 years after the commencement of operational life for all options. Now it commences after 6 years for B and 7 years for C1 & C2. This is incorrect. It also takes the lifecycle capital spend beyond the operational 60 year life. As no explanation of this change is given it must be an error and incorrect.

7.2.3 Project Life of 65 Years For All Options

Correcting the errors in 7.2.1 and 7.2.2 above, all three competing projects have the equivalent project lives of 65 years. Table 6 shows the new financials for the corrected present value cashflows over 65 years:

Corrected Financials	£ million			Table 6
	A (reference)	B	C1	
Investment		249	311	
		-25%		*B has 25% less investment than C1*
Revenue Cost p.a. (yr 4)	343	297	297	
		-13%	*-13%*	*B & C1 have equivalent revenue savings*
NPC 65 years		8527	8604	*Projects both run for 65years*
			+0.91%	*C1 has 0.9% more NPC than B*
NPC Difference 65 y		77		*B has £ 77 million smaller NPC*

The Financial Analysis is showing a total project benefit of option B over option C1 of £77 million of benefit over a 60 year operational life.

Now the projects have equivalent project lives of 65 years, the use of the EAC is unnecessary for comparison of project financials. This is advantageous as it's hard to consider the correct meaning from estimated annual financials, as shown in 7.1.2 above. Now the NPC, the measure used in the Guidelines, can be the correct project valuation to use in the public consultation.

7.3 Future Fit's Financial Direction

In the Financial Analysis Conclusion, the Future Fit Appraisers offer their readers some guidance on how to interpret the respective financial cases of the competing options B & C1.[xiv]

The Value for Money margin between all the development options is relatively close with the exception of option A. This is the case even though there are substantial differences in the initial capital requirements of each of the change options. Once viewed from the perspective of whole life costs (as required by the guidance), however, these differences become minimal. For example, although Option B has a capital requirement of £250m and Option C1 of £312m (c. 25% more), the final difference in terms of equivalent annual cost is just £2.7m (0.8%)

This statement is made by the Appraisers and is directing its readers (the Future Fit board and programme team, other stakeholders and the public) how to interpret the financial values. The direction and advice given is misleading and no professional project appraiser should make a selection of a preferred option with this thinking and understanding. This is because:

1. It is contrary to the Treasury and NHS Guidance
2. It states that the 'substantial' capital saving of 25% or £62 million is a 'minimal' difference - so do they know where it went ?
3. It displays insufficient understanding of the meaning of the EAC and its limitations
4. It demonstrates insufficient understanding of the discounted cash-flows in their Appendices, and the timings of cash-flows during the 'whole project life'
5. It will mislead the public and misrepresent the truth contained in a better informed assessment of the financial analysis

These are explained in the following :

7.3.1 The Guidelines

The Treasury Green Book in Its 'decision guidelines' state '*In cost effectiveness analysis the option with the lowest net present cost should be the best*'.[xv]

The NHS Capital Investment Manual states ' *the preferred option would be the one that achieved a set of objectives with the lowest cost i.e. the option with the lowest net present cost'*.[xvi]

Both sets of Guidance are clear in their message that there is value and importance in the option with the lowest NPC. It displays poor judgement by the Appraisers to attempt to discount the importance of the Option with the lowest NPC, and is misleading the readers who may not be familiar with the detail in the Guidelines.

7.3.2 Capital Savings are Substantial

The Appraisers state that there are significant differences in the initial capital of the options. Option B has an initial capital requirement of £62million (25%) less than C1. The Appraisers are right to say that this is a substantial difference, especially as the capital spent will produce exactly the same result in option B as it does in the £62m more expensive option C1 i.e. a new hospital service for the next 65 years.

The Appraisers then state that, once viewed from perspective of whole life costs, the differences become minimal. If this is the case where did the capital difference disappear to? The short answer is nowhere, there is still a substantial saving.

In Table 7 the Initial capital spend on B and C1 is shown. It shows a real cash saving of 25% for option B, a 'substantial' saving. When this is valued using present value project life considerations it still remains a substantial saving of 24%, with a NPV of £55million.

After the initial capital is spent to realise the new hospital services, there are additional lifecycle capital spends every 5-15 years to maintain and refresh the original investment. These costs have also been added to Table 7 . It shows a real cash saving of £131 million (29%) for option B. When this is valued using present value project life considerations it still remains a substantial saving of 24%, with a NPV of £30million.

Therefore, both types of capital investments are a substantial saving for option B of c. 25% over option C1.

Capital Spend £ million Table 7

	B	C1	C1 - Extra Spend	C1 - % Extra Spend
Initial Capital (real cash cost)	249	311	62	25%
Initial Capital (whole project cost)	230	285	55	24%
Life Cycle Capital (real cash cost)	454	585	131	29%
Life Cyclel Capital (whole project cost)	120	150	30	25%

7.3.3 Understanding The EAC

In section 7.1.2 the importance of understanding the limitations of the use of the EAC are highlighted. In writing this financial conclusion the Appraisers have demonstrated a poor understanding of the meaning of EAC and its limitations.

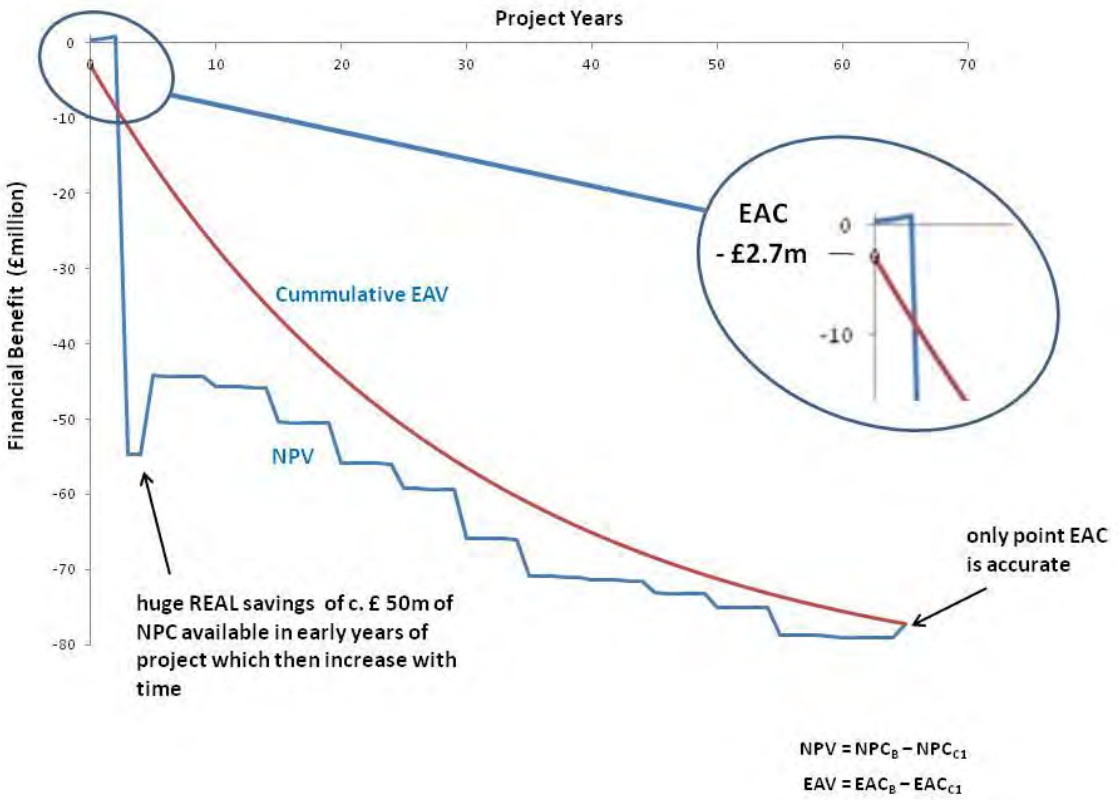
To explain the mistake the Appraisers consider figure 1 below which shows the savings made by option B over option C1. It shows the project assessment years along the top (x–axis) and the savings in millions on the y-axis. On the graph are two lines:

1. The Actual Net Present Value (NPV) of the Project savings – in blue
2. The project savings (EAV) when estimated using the EAC – in red

The first thing to notice is that the estimate is only accurate at one point – the last project year. Early in the project the estimate is in error by over 1000%. The error decreases as the project continues,

but only comes under 10% in year 44. The conclusion is that the EAC, and the EAV calculated from it, is not a reliable estimate of the Actual project present value cash-flow savings.

Figure 1 - The Real NPV and the Estimated EAV of B vs C1



Secondly, the significant part of the Real NPV savings is achieved in the first few years of the project. Beyond that the savings continue over the project life to reach the overall NPV. The EAV, however, just ignores all the real fluctuations with time, and follows its smooth annuity curve. This results in the substantial **real** savings available early in the project being smoothed out and spread across the 67 years of project life. This makes the **estimated** EAV a very inaccurate and unusable estimate for the real NPV.

This use of the EAV to smooth important real effects over the whole length of a project solves the question of 'where did the substantial capital saving of £62 million disappear to'? It is averaged out using and unreal measure of EAV - it never really disappeared !

All project Appraisers, and indeed the sponsors, need to understand the real timing of cash-flows of the projects being considered. The EAV therefore has no place in thoroughly Appraising project options. It is no surprise then, that the Guidelines do not support the use of EAV or EAC, or

recommend smoothing out and averaging cash-flows when calculating NPC and NPVs over a project life.

From the above we now know that the statement here is **not** true :

'Once viewed from the perspective of whole life costs (as required by the guidance), however, these differences become minimal.'

- The Guidance requires the use of the **real** NPC or NPV, not EAC or EAV as used
- At **real** NPV level, the differences are not minimal, they remain substantial
- Most importantly the differences are available very early in the project

7.3.4 What The Discounted Cash Flows Show

The timing and magnitude of the financial benefits of project B and C1, clearly shown in 7.3.3, are obvious from a simple look at the discounted Cash-Flows tables in the Appraisal of options. If this had taken place and been understood, it would be clear that the statement was untrue.

7.3.5 Mislead Stakeholders and Public.

If this statement is actually published in the public consultation it will mislead the public. It is clear that the public value the financial case ahead of the non-financial case in this Future Fit Process (see Section 8). A public and stakeholders unable or unwilling to dive into the real financials will be satisfied to take direction from the Future Fit Professionals. However, the advice is untrue and **will mislead** them.

7.4 Other Errors In the Financial Analysis

7.4.1 The Discount Rate Applied

The Green Book guidelines recommend that for costs and benefits accruing over more than 30 years into the future that discount rates are varied. [xvii]

It requires that:

- years 0 – 30 are discounted at 3.5% and
- years 31 - 75 are discounted at 3.0%

The Future Fit Appraisal has not followed this recommendation and used 3.5% for all years.

In the 2015 Appraisal of Options it was correctly used. However, the 2016 Appraisal of Options has not.

Most of the differences between the competing options occur in the first 10 years. Therefore, correcting this error will not affect the Appraisal outcome. However, the decision not to use it in 2016 should have been communicated, especially when considering the progression of NPCs between 2015 and 2016 (they would have been higher in 2015 with the multi-discount rate).

7.4.2 Risk Analysis

The Green Book guidelines recommend that '*Appraisers should calculate an expected value of all risks for each option*' [xviii] . This has **not** been undertaken.

It has been made clear by Future Fit that they have chosen not to do this.

7.5 Financial Appraisal Conclusion

The Financial Analysis is showing a total benefit of option B over option C1 of £72 million of benefit over a project period of 67 years.

The financial analysis has been shown to contain errors. When these are corrected, option B has a total benefit over option C1 of £77 million.

The Appraisers have introduced a new Financial Analysis conclusion in a new paragraph in version 5 of the report. This has been demonstrated to be erroneous and misleading and must be withdrawn from the report or rewritten with the appropriate accuracy and meaning.

8. What Weighting Is Favoured by the Public

A stratified public telephone survey was completed for Future Fit in April 2016. Its results are summarised in the 2016 Evidence Pack.[xix] In this survey the Public were asked to rate their view of the 'importance of cost compared to the four non-financial criteria' on a scale of 1 to 10, where 10 is very important. The results of this question, taken from the Evidence Pack, are summarised in Table 8 below.[xx]

Rating the Importance of Cost vs non-financial criteria Table 8

	% scoring 1- 4	% scoring 5-6	% scoring 7-10
% Public vote	21.6	26.9	51.3

Table 8 shows that 26.9% of the public felt that the costs & non-financial criteria have equal value. Of the remaining 73.1% of the public, two-thirds (51.3%) rated the costs as more important than the non-financial criteria.

Therefore, the public value the importance of the financial case more than the non-financial case. Considering all the public's votes, the public assign a **65 : 35 financial : non financial weighting.**

Future Fit Appraisers **should** use this public opinion when selecting the best option.

8.1 Using the Correct Weighting In The Overall Economic Model

Future Fit's chose to use a 50:50 weighting in their current overall economic model. However this only represents the views of **26.9%** of the public. To represent 100% of the population they should use a **65: 35 weighted ratio** (financial : non- financial)**.**

8.2 Incorrect Information In the MCA Panel Evaluation Pack

The Evaluation Pack supplied to the 50 MCA Panel Members contained a detail presentation of the results of the stratified public telephone survey. This was very helpful for the Panel and formed an important part of the information supplied to them prior to their scoring assessment.

However, there is a crucial mistake in the information. It informs Members, in a highlight bubble, that the public vote favoured the non-financial case ahead of the financial case. This is clearly incorrect. (see Appendix 8).

This may seem an innocent mistake. However, as section 6.2 highlighted, the Guidelines require that everything is known prior to the MCA scoring in an 'open and transparent' way. To do otherwise could mislead Members prior to the complex evaluation and scoring before them.

9: Overall Conclusion

The analysis of each of the Appraisal methods has shown that significant changes and adjustments are required to ensure that the selection of a preferred option has the required levels of accuracy, judgement and meaning.

9.1: The Economic Model

Both the Economic Models chosen by Future Fit to assist in the selection of a preferred option are not recommended in the Treasury or the NHS Capital Guidelines

The 50:50 weighted Economic Model is actually delivering a 98:2 weighting contrary to Future Fit's intention. It must, therefore be withdrawn from the appraisal or corrected. Any conclusions reached from its use must be withdrawn or corrected.

The Cost per Benefit Point Economic Model has been shown to be a meaningless value, varying solely with the non-financial case. It must be withdrawn from the Economic Model and the Appraisal. Any conclusions reached from its use must also be withdrawn.

9.2: The Non-Financial Appraisal

The non-financial analysis has been undertaken by 50 Panel Members. Its conclusion ranks option C1 first and B second with respective average scores of 5.5 and 4.4 out of 7 (a difference of 1.1).

Following this, the transfer of the non-financial scores into points in the 50:50 Economic Model has been completed incorrectly. In doing so the Appraisers have:

- Mislead the MCA Panel, invalidating the scores they have produced
- Distorted and changed the meaning of the scores during their transfer into points, making them meaningless
- Not followed the process Future Fit stated it would use
- Not followed the requirement of the Guidelines in the use of MCA scores.

Therefore, the transfer process used **must** be withdrawn and removed from the appraisal.

If it is decided to correct and use the 50:50 Economic Model, then the intended and stated transfer process must be used in place of this incorrect process (see 6.7).

9.3: The Financial Appraisal

The financial analysis ranks option B first with option C1 second by a difference (NPV) of £72 million. This increases to £77 million if errors in the financial analysis are corrected.

A new Financial Analysis conclusion paragraph has been added to *version 5.* This has been demonstrated to be erroneous and misleading and must be withdrawn from the report or rewritten with the appropriate accuracy and meaning.

10: Corrected 50:50 Weighted Economic Model

The 50:50 Economic Appraisal Method used can be corrected to obtain an actual 50:50 weighting. The corrections made are solely confined to correctly achieving the stated processes of Future Fit in the 50:50 Model. All other errors noted in this report are not included. Therefore the financial values and the non-financial scores remain as reported by Future Fit, and are:

Non-Financial Scores : B = 217.6 C1 = 275.8

Financial EAC(£m) : B= £321.38 C1 = £324.07

With the correct score calibrations the 50:50 overall weighted scores, calculated in 2.3.3 are:

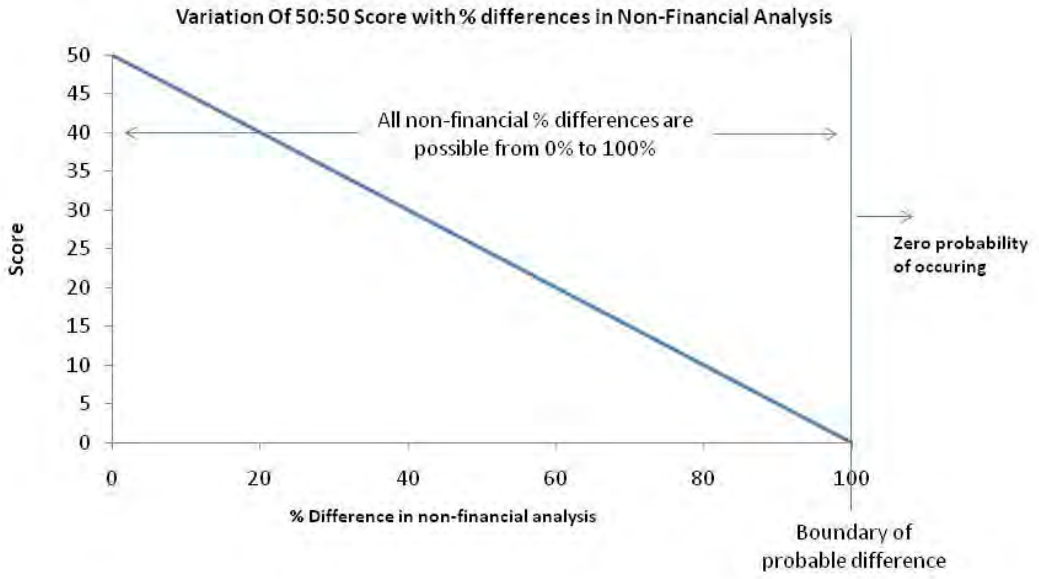
Combined (50:50) = financial + non-financial

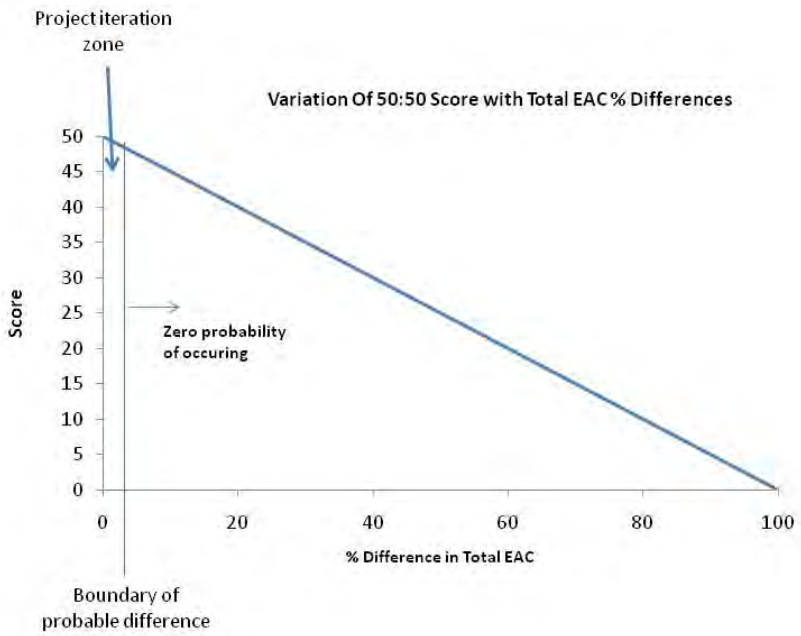
Option B = 50.0 + 31.1 = 81.1 out of 100

Option C1 = 31.0 + 39.4 = 70.4 out of 100

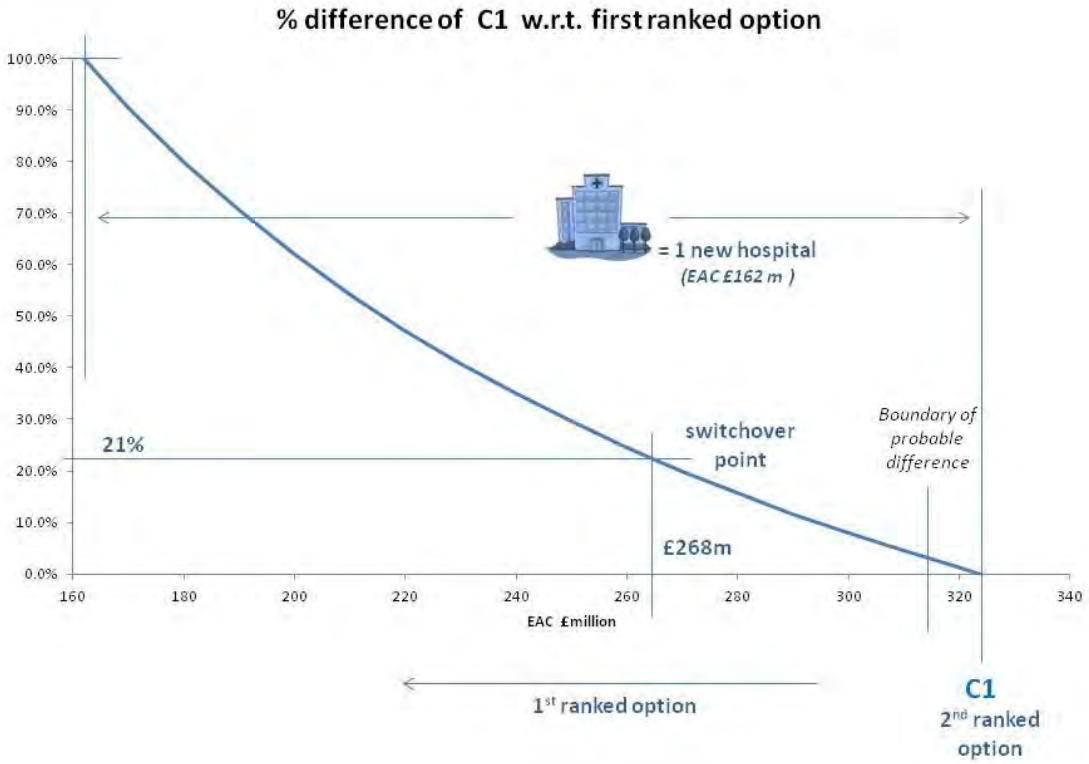
This demonstrates that a well judged and meaningful treatment of the financial and non-financial appraisals, produces an auditable conclusion when combined in the Overall Economic Model.

Appendix 1 – Scoring range and Calibration of Overall Economic 50:50 Method





Appendix 2 – Switchover Point Of Non-Financial and Financial Cases



Appendix 3: Explanation of Variation In the Cost per Benefit Point Quotient Elements

Non-Financial Analysis

% effect on 'cost benefit' quotient

Table A1

average winning difference	average winning score 7	6	5	4	3	2	1
1	17%	20%	25%	33%	50%	100%	infinite
2	40%	50%	67%	100%	200%	infinite	
4	133%	200%	400%	Infinite			
6	600%	Infinite					

Denominator Variation: When the MCA Assessment Panel meet the probable outcomes are that each option will receive an average score from 0 to 7. This score is used as the denominator in the cost per benefit point quotient. Table A1 demonstrates by how much the quotient will vary when the winning options score, along the top, is compared with other options which have a lower score of the amount in column 1.

For example: Option X has the winning score = 5 points. The second ranked is Option Y with a score of 3 points. X has a winning score of 2 points. If each option has an equivalent Total Costs, the 'cost per benefit point' quotient of option Y will be 67% higher than option X as circled in the table.

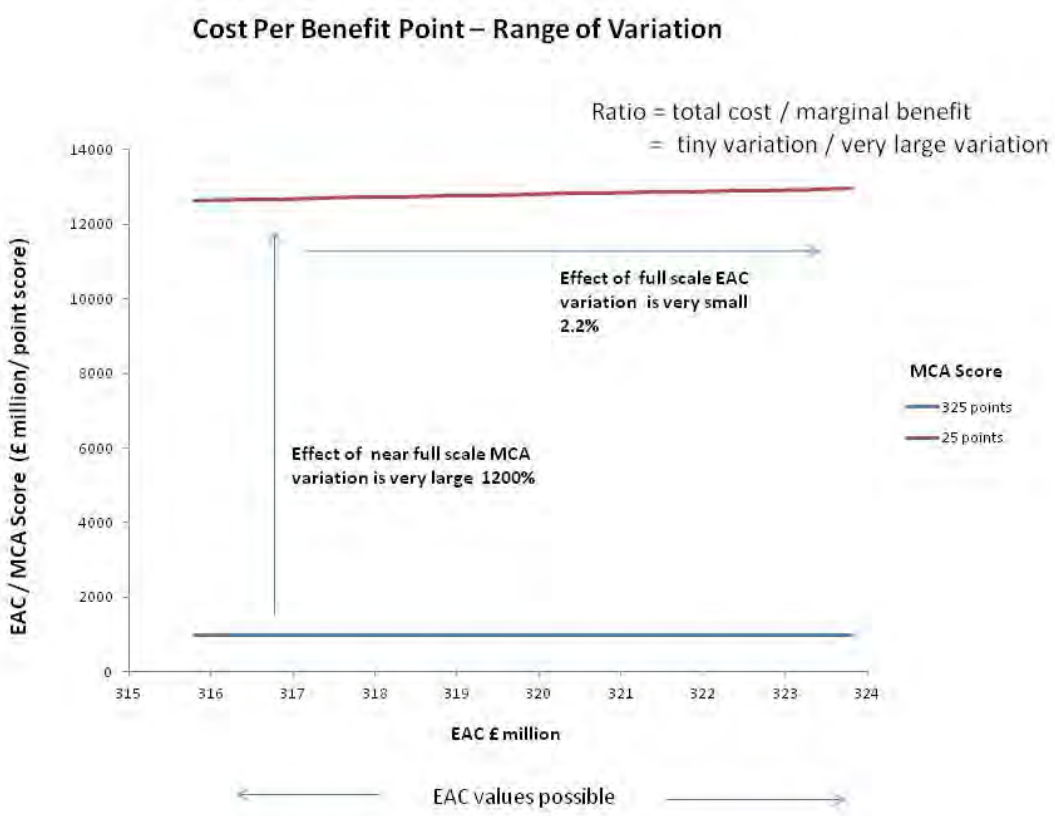
Consider a second example: If option P scores 6 points and option Q scores 5 points, then option Q, the losing option, will have a 'cost per benefit point' quotient 20% higher than the winning option P.

As all values are possible from the assessment panel, then all the % differences in table A1 are possible.

Numerator Variation: The numerator in the cost per benefit quotient is the total Equivalent Annual Cost (EAC) of each option. It has a maximum variation of 2.1%. Its effect on the 'cost per benefit point' quotient is therefore a maximum of 2.1%.

The numerator represents the Financial Analysis case. The denominator represents the Non-Financial case. Each case has different amounts of variation on the scales chosen. The scales are not compatible. The decision to divide the two shows poor judgement and a lack of understanding of the meaningless of the quotient.

Appendix 4: Variation in the Cost per Benefit Point Quotient



Appendix 5 – Amplification and Distortion of Non-Financial Scores

The Future Fit Appraisers have chosen not to use the simple scale adjustment they stated they would use (see section 6.4). Instead they calculate the proportional difference of options with respect to the winning score. However, to do this has no meaning. This is because panel members were not asked to give a value to the proportional differences between options. If they had been, it would have been transparent at the time of the MCA scoring panel, and properly reflected in proportional scores. Basically, the MCA process would have to ask ' if option Z is ranked first what proportional percentage value would you give to how poorer options W, X & Y are because we want to transfer these values to an overall economic model ?' . This question is then repeated for all the permutations and combinations of winners and losers, for each criterion and option. This would be a very unusual, unfamiliar and unnecessary MCA process.

This actual Future Fit transfer process is not recommended anywhere in the Guidelines. However, as we are working with non-financial scores we are reminded by the Green Book that their use must be *' .. meaningful'*. [iii]

The MCA scores only have meaning on the linear scale on which they were generated by the panel. The above 'proportional difference' step introduces a new variable weighting factor to the original MCA scores before they are used in the overall economic model. In doing so, the Non-Financial MCA loses its original meaning.

Table A2 shows the variable weighting that is applied to the MCA scores as they are put through this 'proportional difference' process. It shows clearly that only when the winning average score is at its maximum of 7 is no weighting applied. Otherwise a non-linear and variable weighting factor is applied to the transfer of the MCA in to the weighted Economic Model. This is because the process is working on the transfer of differences in proportion to the first ranked option.

Further analysis of Table A2 shows that the variable weighting factors are all greater than 1. Put into words, this means that :

> ' a variable amplification of difference and scores will take place during the transfer of scores into the weighted Economic Model '.

Even worse, Table A2 shows that this amplification increases as the winning score becomes lower. Again, putting this into words :

> ' if the panel find less value in all the options, then the differences between the ranked options will be amplified even more and higher scores transferred to the Overall Economic Model '.

This is counter intuitive and meaningless.

Look once more at Table A2. Note that size of these additional variable weightings can range from 1% to over 200%. This is an enormous hidden weighting. It dwarfs the carefully precise weightings of the MCA criteria, valued to the nearest 0.1%.

It is unlikely that this additional weighting was the intention of the Future Fit Appraisers. However, before the MCA Panel met there was no knowledge of any MCA scores. Therefore, any combination

of a winning score and score difference was possible. This means that the breadth of any of the weighting factors in Table A2 being applied as a hidden multiplier was probable.

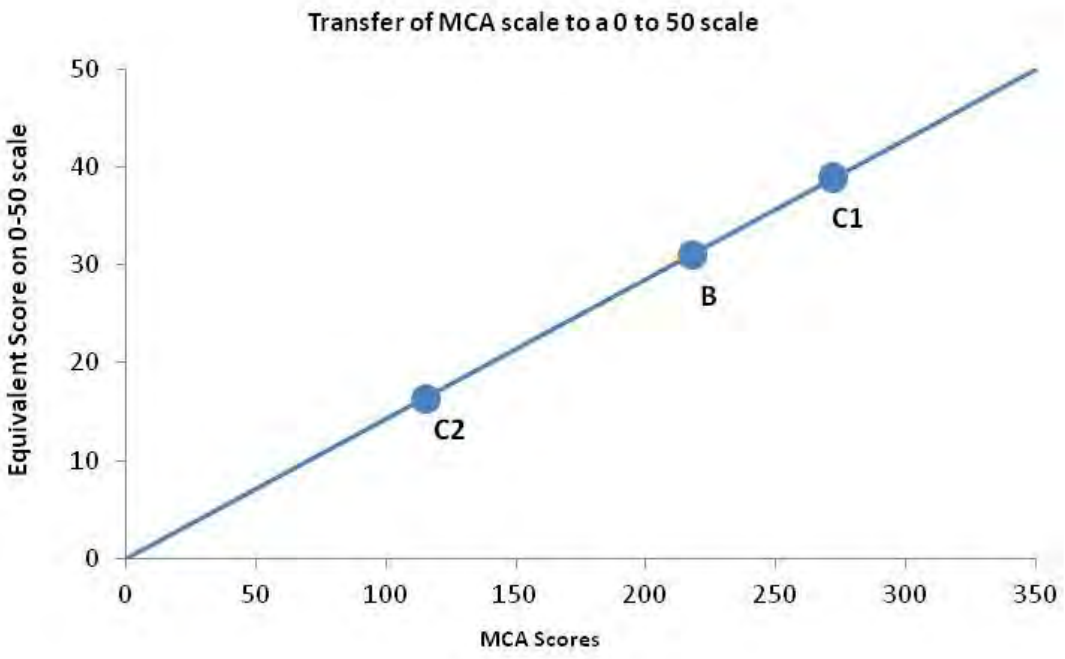
It is clear that this actual process used by Future Fit Appraisers to bring the Non-Financial MCA in to the Overall Economic Model is inappropriate as it does not retain the meaning of the MCA scores. Firstly, It transfers differences and not MCA scores. Secondly, It then distorts the differences with a variable a variable weighting factor. Neither step of post-processing was made clear to the MCA Panel before scoring.

Additional Weighting Applied Table A2

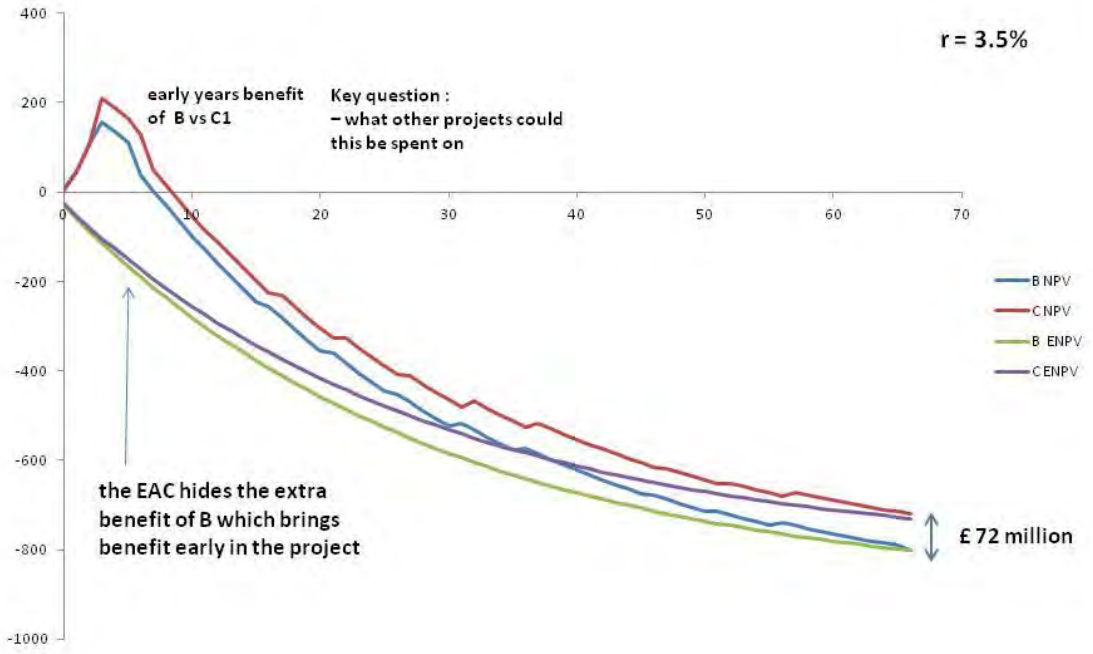
	winning average score						
winning difference	**7**	**6**	**5**	**4**	**3**	**2**	**1**
0.5	1.00	1.01	1.03	1.06	1.11	1.24	1.86
1	1.00	1.03	1.07	1.14	1.29	1.71	
2	1.00	1.07	1.19	1.43	2.14		
3	1.00	1.14	1.43	2.29			
4	1.00	1.29	2.14				
5	1.00	1.71					

The smaller the winning score, the larger the additional weighting applied to the winning differences.

Appendix 6 – Linear Scale Transfer for Non-Financial MCA Scores



Appendix 7 – Progression of NPC vs estimated EAC



Appendix 8 – Public Survey Results for the Importance of Cost Question

Non financial appraisal briefing pack part 2 of 2

MIDLANDS AND LANCASHIRE COMMISSIONING SUPPORT UNIT

NHS

Cost compared to the other criteria was most highly rated by Oswestry respondents

The importance of cost compared to the other four criteria,

	1 %	2 %	3 %	4 %	5 %	6 %	7 %	8 %	9 %	10 %
Bridgnorth	6.7	3.3	4.6	5.4	19.6	4.6	4.2	17.9	5.8	27.9
North Shropshire	12.1	3.3	5.9	2.2	21.6	2.9	10.6	13.9	4.4	23.1
Oswestry	8.4	2.2	1.8	5.7	24.2	3.5	9.7	11.0	4.8	28.6
Shrewsbury	7.1	5.3	3.6	5.0	22.1	6.4	11.7	11.7	6.8	20.3
South Shropshire	10.4	5.4	7.6	5.0	27.0	5.4	6.5	11.5	3.6	17.6
Hadley Castle	11.1	5.0	4.4	4.0	20.1	5.0	11.1	13.4	3.7	22.1
Lakeside South	7.7	3.9	4.2	4.6	23.6	4.6	8.9	12.7	6.6	23.2
The Wrekin	7.4	4.5	4.8	4.8	19.4	9.0	10.6	15.5	6.5	17.4
Powys	9.6	1.2	4.8	2.4	16.7	4.4	12.0	17.5	5.6	25.9
Area	9.0	3.9	4.7	4.3	21.6	5.2	9.6	13.9	5.3	22.6

1 is not at all important and 10 is very important

Results suggest a 43.5/56.5 balance between financial and non-financial scores

Your **success** is our **success**

References

[i] Section 2.2 b) Future Fit – Report on the Appraisal of Options version2 7/11/2016
[ii] Section 2.2 b) Future Fit – Report on the Appraisal of Options version2 7/11/2016
[iii] Section 6.6 of Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[iv] Section 5.76 of Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[v] Box 21 in Chapter 6 of Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[vi] Chapter 6 of Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf
[vii] Step 7, page 43
The NHS Capital Investment Manual 1994 – Business Case Guide
[viii] Section 2.8
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[ix] Chapter 6 ; first section The Treasury Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf
[x] Section 5.78 of Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf
[xi] Communities and Local Government : Multi-criteria analysis: a manual
[xii] Paragraphs 2.1, 4.2 & 4.3.1 Communities and Local Government : Multi-criteria analysis: a manual

[xiii] Section 3a) page 7
'Future Fit Non-Financial Appraisal Panel – Evidence Pack September 2016'
[xiv] Section 4.4 Future Fit – Report on the Appraisal of Options version2 7/11/2016
[xv] Paragraph 6.3 The Treasury Green Book
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/220541/green_book_complete.pdf

[xvi] 2.48.3 The NHS Capital Investment Manual 1994 – Business Case Guide
[xvii] Appendix 6, clause 12 The Treasury Green Book
[xviii] Paragraph 5.58 The Treasury Green Book
[xix] Appendix H
'Future Fit Non-Financial Appraisal Panel – Evidence Pack September 2016'
[xx] Page 159
'Future Fit Non-Financial Appraisal Panel – Evidence Pack September 2016'