Action WP6I12:
A new Appraisal Framework and Decision Support Tool
Sustainable transport for North-West Europe’s periphery

Sintropher is a five-year €23m transnational cooperation project with the aim of enhancing local and regional transport provision to, from and withing five peripheral regions in North-West Europe.

INTERREG IVB

INTERREG IVB North-West Europe is a financial instrument of the European Union’s Cohesion Policy. It funds projects which support transnational cooperation.
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Introduction

This findings report summarises the development of a new appraisal framework and decision support tool for use in assessing public transport infrastructure projects, particularly for the development of innovative light rail and tram-based projects. The work was undertaken by UCL as part of the Sintropher transport project, funded by the EU’s North West Europe (NWE) transnational cooperation programme under INTERREG IVB.

The central objective of Sintropher has been to use innovative transport links to connect peripheral regions of NWE with the core European transport network of high-speed trains, via effective interchange hubs. Though the Sintropher investments are connecting these regions through their principal interchange hubs, the weaker regions are not receiving the investment because they cannot demonstrate adequate economic returns. This is partly because the current appraisal approaches do not adequately take account of wider potential regeneration and growth benefits – but also the cost-benefit assessment (CBA) process favours time savings, whereas public transport enhancements are often associated with other journey improvements, such as journey quality and comfort, or environmental or built environment impacts.

The secondary lines, which connect indirectly by ‘thin’ (infrequent) service to the hubs, perform poorly in comparison with more direct ‘thick’ (frequent) links. They constitute the outermost circles of their regional transport systems – ‘the peripheries of the peripheries’. It is in the weaker cities and regions of NWE that the case for transport investment is very important, alongside wider policy initiatives, for economic growth; yet perversely difficult to make through the current appraisal process as the ‘user benefits’ and ‘wider economic benefits’, as presently calculated, appear too low. The impact of transport infrastructure investment on development is indirect, hence difficult to include as a ‘benefit’ in the appraisal process. In regeneration areas, the developmental impact may be very uncertain – and the current CBAs are low relative to projects in more affluent urban areas. The process hence means that public transport investment is difficult to justify in regeneration areas – and projects only tend to be pursued in more affluent urban areas. The problem has been exacerbated in the difficult fiscal climate following the 2008 financial crisis, which has led to delays and cuts in public expenditure programmes.

The report is structured as follows: Part 1 provides the background and objectives for the work. Part 2 gives some context for the work, drawing on relevant literature on the use of CBA in transport infrastructure planning. Part 3 outlines the new Appraisal Framework and Decision Support Tool which has been developed for the study. Part 4 outlines the use of the tool in the South Fylde Line case study. Part 5 sets out the transnational relevance of the work and the tool in relation to knowledge transfer within the Sintropher project partnership, and with wider target audiences, and arrangements for wider access. The main audiences are governmental authorities and transport agencies at city, regional, national and EU levels; and transport professionals and practitioners who may be involved in planning and implementing new transport infrastructure links. Part 6 provides next steps, whilst Parts 7 and 8
provide further reading and summarises the overall Sintropher project, of which this work is a part, including the overall aims, objectives, partners and partner regions, and activities.
Part 1
Background and objectives

Developing appraisal methodologies appropriate to different contexts

During the Sintropher work on the feasibility of innovative light rail and tram-based projects, it has become apparent that there is a need to develop a new framework for project development and decision-making which can be tailored according to the particular requirements of the territorial development context. For example, in the UK context, the one-size-fits-all WebTAG approach, including use of CBA, is useful as a centralised decision-making process, allowing the comparison and prioritisation of investment between many schemes, but it means that peripheral regions with economic difficulties struggle to justify public transport investments. Alongside a greater devolvement of funding, perhaps the appraisal process can be tailored to better reflect local policy priorities, multi-actor views, and to support the territorial and area planning more effectively. A similar situation applies to other countries in NWE, where appraisal of transport schemes is likewise dominated by CBA.

Results from Sintropher WP2 (comparison of systems of transport project appraisal and investment decision-making in different EU countries) show that, in most NWE countries, the system of CBA (and decision-making on investment) has a narrow focus and fails to recognise the wider potential regeneration and growth benefits. Specifically, the application of CBA for transport schemes often does not adequately take account of the wider urban and regional economic benefits that the new transport links can help to generate – these potential benefits remain outside of the estimation of ‘benefit’ in the CBA.

Significant national differences exist in the role that CBA plays in appraising transport investment across NWE. In the UK, CBA and the wider multi-criteria assessment (MCA) used in WebTAG have been developed over the past 40 years and are very well established. Benefit-cost ratios (BCRs) have been a strong factor in prioritising transport investment. In contrast, French urban transit decision-making is relatively unconstrained by CBA; rather, the planning and regeneration imperative takes precedence – with transport infrastructure chosen to integrate best with the planning strategy – and is facilitated by other supporting factors such as devolved government and revenue raising powers. Germany is also similar, with a strongly devolved governance structure, and transport infrastructure prioritised to develop effective urban and regional transport systems. The concern for ‘economic efficiency’ in transport appraisal is not so central to the decision-making process.

This is now a major issue in NWE countries in the context of the economic growth agenda and EU2020. For example, in the UK the £42 billion (€51 billion) High Speed 2 railway connecting London, the Midlands and the North of England has been justified through a CBA process, largely based on time savings and capacity improvements. This has been widely criticised on the basis that time on train journeys can be productively used. Hence, from many angles, the conventional CBA
process is being questioned. There is now widespread acceptance that a major justification lies in the indirect benefits for potential development and regeneration in economically weaker cities and regions. However, this is not reflected adequately through CBA or WebTAG – and the MCA process needs to be strengthened to incorporate these issues.

The Green Book (HM Treasury, 2003, p.4) defines CBA as “analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value.” However, the process is necessarily partial, in that many issues cannot be quantified effectively (Hickman and Dean, 2016). MCA offers a way forward to assess project investments against multiple policy objectives, including economic, environmental and social criteria, and also territorial and planning objectives.

**Objectives**

This report develops a new framework and decision support tool which can help to prioritise transport investment relative to local and/or regional policy objectives. The aim is to develop an assessment framework which allows transport projects to be more effectively prioritised, and justified, where they support the territorial planning strategy.

For many of the Sintropher case study contexts, this means examining how investment in innovative transport links and interchange hubs can help ‘unlock’, or at least support, economic development and regeneration aspirations, including estimating the potential developmental and regeneration effects along the corridors served by the improved transport links.

The process includes multi-actor views, hence can also help to strengthen the participatory element of decision-making in transport.

For example, in the UK system, this type of process could potentially be used to strengthen the ‘strategic case’ multi-criteria assessment used in WebTAG, allowing different criteria to be chosen related to local and regional policy objectives and incorporating multi-actor views. The framework is not developed in order to replace the CBA and WebTAG process as used in the UK, but to help start a more critical debate on appraisal approaches. The framework is tested on the South Fylde Line case study and made available for use on other projects, including wider regional test case studies within Sintropher. The MCA process could be similarly adapted or incorporated to the appraisal and decision systems of other NWE countries.
Part 2
Relevant literature

Current appraisal approaches

Transport appraisal involves making choices between different projects and budget allocations – deciding which projects, and of what form, might be the best spend of funds. The decision-making process can be complex, including the estimation and trade-off between impacts across multiple, and sometimes competing, goals. In the UK, the Green Book (HM Treasury, 2003, p.1) sets the basis for project appraisal, seeking to: “to ensure that no policy, programme or project is adopted without having asked: are there better ways to achieve this objective and are there better uses for these resources?” These are, of course, quite difficult goals to satisfy – and the result often depends on the framing of the problem or issue to be resolved and the application of the appraisal framework. The range of potential investments in the transport sector is very large; and the impacts of investments can be difficult to isolate alongside wider issues, such as the performance of the economy, the shape of the built environment, or wider socio-economic characteristics, education and skill levels, individual attitudes and societal norms. Within the UK, at the national and local levels, CBA is used alongside an Appraisal Summary Table (AST), which draws on wider MCA to assess transport investment priorities. Very extensive guidance is given to practitioners in the Website for Transport Analysis Guidance (WebTAG) (Department for Transport, 2015). The appraisal is usually carried out ex-ante (before the fact), comparing the difference between the ‘without project’ and ‘with project’ cases.

For many practitioners, the UK is seen as being at the forefront of contemporary transport appraisal internationally (Worsley and Mackie, 2015). CBA is viewed as providing “much of the information needed when making decisions about whether to approve an investment and how it might rank when compared with other transport schemes competing for limited funds” (Worsley, 2014, p.17); it provides a “framework within which impacts are quantified on a consistent basis, forcing decision makers to face up to numbers” (Mackie et al., 2014, p.4); and, even, provides an example of “decision-making by democratic consent” (Mackie et al., 2014, p.3). The current transport appraisal process, including the dominant use of CBA, is put forward as rational, transparent and objective, providing a ‘solid analytical framework’ for decision-making (Worsley and Mackie, 2015). This is viewed as a major step forward from previous times, where decision-making was perceived as ‘unscientific’, overly political and vulnerable to influence.

More critical viewpoints

This is perhaps the mainstream discourse in transport appraisal practice – but there is some, perhaps increasing, dissatisfaction with the process. There are some devastating critiques of the use of CBA in wider public policy (Ackerman and Heinzerling, 2004, Ackerman, 2008) and some that extend to transport and infrastructure planning (Self, 1970, Adams, 1994, Næss, 2006, Van Wee, 2012,
Dimitriou et al., 2012, Næss, 2016). Other have considered how the MCA process envisaged through WebTAG can be usefully brought together, i.e. how different criteria impacts can be balanced (Sayers, 2003). A central argument from those who critique the use of CBA concerns the problem of quantification of issues that cannot easily be quantified. This includes the value of human life, impacts on the natural and urban environments and social equity. Often the alternative approaches to appraisal also suffer from these issues – social impact assessment (SIA), cost effective analysis (CEA), environmental impact assessment (EIA), and indeed MCA, can all suffer from quantification problems if there is a reliance on purely quantitative data.

Self (1970, p.255, p.260) encapsulated the problems: “Many of the judgements relative to the appraisal (and calculation of the likely impacts) of a transport infrastructure project can only be reasonably expressed and argued in fairly broad terms [...] they belong to the arena of public debate – and not to a world of endlessly hypothecated and quantified sums [...] ultimately, they can only be taken through a series of policy judgements, which should be as open and explicit as possible, and supported by relevant information which by itself can never be conclusive. Greater rationality in the final decision is not helped, but hindered, by the use of notional monetary figures which either conceal relevant policy judgements or involve unrealistic and artificial degrees of precision. Those who suppose otherwise are heading for a peculiarly dreary version of 1984.” Others take a more conspiratorial tone, questioning why the process is usually inaccessible to everyone but the economists in the field, suggesting that this allows transport economists, transport planners, and also the politicians, to hide their ‘vested interests behind a supposed technical debate’ (Ackerman and Heinzerling, 2004).

This report is written in the spirit of generating a greater critical debate on appraisal methods in transport, arguing that there should be less reliance on CBA. Instead, a strengthened application of MCA with quantitative and qualitative data can be applied, including a much stronger discussion on choice of policy criteria, weighting and impacts – hence incorporating multiple actors in the process (after Macharis et al., 2010). A more detailed literature review and explanation of the MCA participatory process can be found in two background papers (Hickman, 2016; Hickman and Dean, 2016, Chen et al., 2016).
Part 3
A new appraisal framework and decision support tool

Developing a new appraisal framework

Many of the problems of quantification found in CBA are still evident in MCA approaches, however MCA allows projects to be assessed against a wider set of policy criteria, including quantitative and qualitative data. A greater discursive approach means that different viewpoints can be considered. Returning to Self (1970) we can see that many of the judgements required can only be reasonably expressed in fairly broad terms, and that impacts should not always be traded against one another. The decision-making process can become less of a technocratic desktop exercise, but one of evidence gathering and public debate. Borrowing from the tradition of communicative rationality (Habermas, 1981, Dryzek, 1990), the discussion should be more open and transparent, free from domination (from the project promoters and others) and any form of strategising by the actors involved. A strengthened participatory MCA approach would help, facilitating the debate – improving the current strategic case analysis within WebTAG, which is usually carried out in very cursory manner, at the start of project appraisals.

The new participatory MCA framework was developed in six stages as part of the Sintropher project:

- A literature review was carried out on the use of CBA and MCA in different contexts, including in France, the Netherlands, Germany, Belgium and Denmark. A seminar series was also held at UCL, during 2015, with invited transnational experts, to help understand and discuss different approaches. Parallel work by the OMEGA centre was also considered (Dimitriou et al., 2012) which has included the development of policy-led MCA approaches.
- An MCA framework and process was developed which was suitable for the Sintropher case studies. Alongside, the partners in the 5 regional test cases (Action 29) developed corridor masterplans with a planning strategy and alternative transport schemes (infrastructure, technologies, route design, operation patterns, etc.). The territorial development plan hence seeks to integrate land use and transport planning.
- The MCA framework and process was discussed with transnational partners to help develop and detail the new process, including regional partners and transnational experts. Discussion was held at two Sintropher workshops, in Arnhem in November 2014 and Saarbrucken in May 2015.
- LP and partners in the 5 regional test cases (Action 29) applied, tested, and compared alternative transport projects against policy objectives, including wider economic benefits. This included a CBA of projects using existing national and regional appraisal methodologies. The South Fylde Line project options were also compared to results from the wider MCA framework,
recognising additional benefits (in terms of development/regeneration potential) that could potentially be gained. Recommendations were made on the supportive institutional structure and decision process to achieve the wider effects.

- The new MCA framework is revised based on discussion with the 5 regional test cases and is developed as a software package. This is made freely available to use online via the Sintropher website.

- Dissemination included various workshops, conferences and papers to discuss and refine the MCA tool. The process has also helped to develop a more critical discussion of appraisal processes used in transport planning, and to potentially initiate a change in thinking by government and transport agencies making investment decisions (see new Action 30).

The new MCA framework is designed, developed, tested, and revised into a final product with inputs from project partners in the 5 regional test cases in 5 different countries, plus discussed with international experts through the Transnational Expert Panel (see Action 28). The MCA tool is designed to have adaptability to the various territorial, legal, and administrative contexts in countries across NWE. The corridor masterplans in the 5 regional test cases (Action 29), developed in parallel with the technical/economic feasibility studies in these regions, potentially allow the MCA tool to be tested in wider case studies, and demonstrate how the business case for transport investment can be transformed when compared to the traditional CBA used in the respective countries. This will particularly be important in more peripheral regions with smaller population and economies than the large city regions.

A participatory MCA process

The transport appraisal works best, in terms of integrating with the planning strategy, if a masterplan is followed. This leads to an integrated urban plan and transport plan, giving individual transport projects strategic direction and integration with the territorial planning approach taken. The project options deemed useful within the masterplan are then tested through a participatory MCA process as below:

- Multiple policy objectives and criteria are developed to match local policy requirements.

- Criteria are weighted to prioritise important local policy objectives.

- Criteria indicators are developed to understand what evidence is required to help make the impact assessment.

- Impacts are assessed through the scoring of the different project options against multiple criteria. Individual assessment studies, covering economic, environmental and social issues, can help inform the impact assessment.

- A decision conference is held (after Leleur, 2012, Macharis et al., 2010), with the discussion covering different stakeholder views – different actors will have different views on criteria and impacts. The MCA process is hence used to facilitate a public policy debate on policy criteria, weighting and impacts. This will help to generate a greater understanding of the different actor views, and
potentially a consensus can be developed on the preferred funding option. The local authority will make the final decision on funding prioritisation, particularly where a consensus is not reached.

A continued role for CBA?

Alongside, there are two possible roles for CBA. The pragmatic approach is to reduce its importance, with the BCR considered as just one criterion within the MCA, or as additional evidence alongside the MCA. This would follow the German approach to transport funding at the State (Länder) level, where a much lower 1:1 BCR threshold is required (Gühnemann, 2013), and the CBA is viewed almost as an administrative hurdle to overcome. The more radical approach is to dispense with CBA completely, as too partial an exercise in transport, and to handle the decision-making process through MCA. In addition, criteria can be added into the MCA that support public transport schemes, with more estimation of the developmental impacts associated with public transport; and reflecting the integration of projects with planning objectives. If development value is raised then, potentially, this can be taken away from the cost of the scheme and/or added to the benefit. Equally, the contribution towards social goals and even the extent of public support can be given much greater weighting in the MCA where this is important to the context.

The participatory MCA tool

The participatory MCA tool developed in Sintropher uses web-based software and is interactive, enabling the user to generate options, use variations in criteria, weights and scores; and test sensitivity of results to variations in these. It is freely available on the project website:

http://www.sintropher.eu/

and via:

http://www.vbat.org/participatory_mca/

username: UCL
password: MCA
Screenshots, with commentary on application, are given below.

The participatory MCA welcome screen. It is envisaged that the participatory MCA tool would be used in a workshop setting with multiple actors – split into groups representing particular viewpoints, spatially and/or by topic.

In Stage 1, participants choose MCA criteria which relate to local policy criteria.

Potential criteria and indicators are given as a guide – derived from WebTAG and also the UK Sustainable Development Indicators. Workshop participants are advised to choose their own criteria, reflecting local policy objectives or their own views on policy objectives.
In Stage 2, participants give a weight to each criteria – deciding which are given most weight out of a total of 100 points. This is a simplistic criteria weighting exercise, but it is useful to keep this process simple in a workshop exercise – so participants can understand the process.

In Stage 3, participants give their impact score for the project or project option by each criteria. A semantic scale is used (+5 to -5). A weighted impact score is then calculated.

In the final Stage 4, group results are presented for each project option. These can be submitted to the workshop – and then results compared across groups, i.e. the environmental group can compare results against the economic group or local community group.

The MCA software was developed by the UCL team with specialist software programmers, TraceMedia. A similar tool, but more sophisticated in its approach to criteria weighting, has been developed in the INTERREG IVB NISTO project – this is also available for use at: www.nistotoolkit.eu.
Comment on application

There are many difficult issues concerning the application of a participatory MCA process: criteria choice and weighting can be subjective; and impact scores are based on the performance profile of an option, which in turn is based on the result of appraisal methodologies, perhaps including CBA. A process with a large number of stakeholders is not feasible for all projects and can be costly. Involving only a few groups may exacerbate power imbalances between stakeholders. In making the final decision, there will always be differences between weights and scores ascribed by different stakeholder groups, which are difficult to resolve through debate and dialogue. The mathematical average between the different scores and weights does not work because of the problem of trading between criteria. However, it is the multi-actor discursive process that can help in the discussion of some of these issues and, in particular, the quantification problem can be addressed – as quantitative and qualitative data can be given due consideration. Hence, despite some concerns, the participatory MCA process offers much promise.

Example: possible application in the UK appraisal system

A more prominent role for participatory MCA would much strengthen the ‘strategic case’ that is currently used in WebTAG – and, potentially, help with progress against sustainability goals. The policy criteria used within the MCA can also reflect local policy priorities. Alongside, transport funding would be more fully devolved to the regions, and the allocation of spending would be decided locally. The participatory process will mean that key stakeholders are consulted on the appraisal criteria, weighting and impacts. There are many stakeholders with interests in transport investments, and they often have very different perspectives on investment priorities relative to central or local government, or indeed consultants. The appraisal system could reflect this, and not attempt to act as if there is only one ‘technical’ answer to appraisal – the viewpoint of the project promoter. Depending on the scale of the transport project, the participatory process could be carried out as part of Local Transport Plan preparation, or at a regional or national level if the proposed project is larger in scale. A decision conference could be used to enable the discussion, with no restriction on participation, and actors supported if necessary to allow them to make a full representation – hence they would become ‘communicatively competent’ (Dryzek, 1990). A reference class approach might be used to help benchmark the assessment of impacts against each criteria – hence there is greater sharing and testing of information between projects. Such a process can help re-engage the public and other interest groups in decision-making in transport, moving on from the very weak public consultation process used in most transport projects. This process can encourage a greater awareness of transport and planning issues and, perhaps, ownership of the transport investments that follow. Similarly, this type of process can be applied in other NWE countries, indeed it reflects, to an extent, the decision-making process carried out in France and Germany.
Part 4
Use of the MCA tool in the South Fylde Line case study

MCA for different project options

The participatory MCA tool has been used in the South Fylde Line (SFL) case study, assessing options for the South Fylde Line upgrade. A workshop was held in Lancashire County Council in July 2015. The result of preferred options were compared using participatory MCA, relative to conventional CBA which was employed in a parallel connectivity study of SFL that was commissioned and co-funded by Lancashire County Council, also part of the Sintropher project (Jacobs, 2015). In total, there were 26 participants from six groups (each group consisting of 3-5 delegates), namely: local authority (district-level), Lancashire County Council (county-level), local communities, business group, environmental group and a transport expert group.

Alternative options

Three major alternative options (Figure 1) were evaluated:

- **Option 1:** Regional Rail, with two trains per hour (tph) on the South Fylde Line, instead of the current one train per hour, with the additional service extended to Manchester and Manchester Airport. This gives an extended catchment between home and jobs/education to Manchester (and Manchester Airport) and offers potential for economic and social benefits. However, no new stations will be added and the connection is not improved between regional rail and Blackpool tram.

- **Option 2:** Tram-train replaces the existing heavy rail between Blackpool South and Preston, with the service extended to Blackpool North via a new line along the former rail line (using the central corridor). Due to the efficiency of shorter interval operation, 10 more stations can be added. This increases the potential for development regeneration around key nodes in Blackpool town centre, Blackpool South, alongside more potential housing provision in Fylde. There will be no interchange for journeys through the south of Blackpool.

- **Option 3:** Regional Rail and tram, with a tram to Lytham from Blackpool North (via the central corridor) and half hourly regional rail service as in Option 1. Option 3 includes a section between Lytham St Anne’s and Saltcotes overlapped with tram and train services. 13 more stations can be added. Again, there is increased development/ regeneration potential around key nodes along the promenade, Blackpool South, and more potential housing provision in Fylde. However, two interchange nodes are created – there is still need for interchange between regional rail and tram, and poorer regional connectivity relative to the tram-train option.
Figure 1: SFL Project Options

Option 1

Option 2
MCA results

Two major findings resulted from the MCA process. Firstly, the preferred options generated with the participatory MCA are the opposite of those derived from the CBA. With the participatory MCA, Option 2 is preferred, followed by Option 3. Option 1 is the least preferred. This is confirmed with findings from two slightly different analytical classifications, i.e. the sum of scoring results against criteria for three options and the stakeholder groups’ preferred options. Firstly, Table 1 shows scoring results from the participatory MCA against each criterion made by each stakeholder group for the three options. Both unweighted and weighted scores are presented. The unweighted results show that Option 2 has received a score of 54, followed by Option 3 (52), and then Option 1 (38). Likewise, the weighted results similarly present the same order, i.e. Option 2 (8.13), Option 3 (7.35), and Option 1 (5.6). Moreover, when it comes to each stakeholder group’s choices, Option 2 is the most preferred one for three stakeholder groups (Group 1, 2, and 3), Option 3 are opted for by two groups (Group 5 and 6). Only Group 4 opts for Option 1. Summation of MCA scores is not advised, as this leads to trading between criteria, but this has been given below as it is often used to simplify the decision making in MCA.
Table 1: Results from the participatory MCA workshop against criteria for three options (un-weighted vs. weighted scores)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Un-Weighted Scores</th>
<th>Weighted Scores</th>
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<tbody>
<tr>
<td></td>
<td>Option 1</td>
<td>Option 2</td>
</tr>
<tr>
<td>A1 Increased non-car mode share</td>
<td>1</td>
<td>1</td>
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<tr>
<td>A2 Improved journey integration, comfort, and convenience</td>
<td>0</td>
<td>1</td>
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<td>2</td>
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<td>A3 Improved regeneration potential</td>
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<td>B1 Increased economic prosperity</td>
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<td>B2 Reduced unemployment</td>
<td>1*</td>
<td>1*</td>
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<td>B3 Reduced poverty</td>
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<td>B4 Increased diversity of local economies</td>
<td>1</td>
<td>2</td>
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<tr>
<td>B5 Cost-benefit analysis</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>C1 Reduced greenhouse gas emissions</td>
<td>1</td>
<td>2</td>
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<td>C2 Reduced noise, pollution, &amp; vibration</td>
<td>-1*</td>
<td>0*</td>
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<td>C3 Improved safety</td>
<td>1</td>
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<td>C4 Improved urban quality</td>
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<td>D1 Improved healthy life expectancy</td>
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<td>D2 Improved social and community facilities &amp; social capital</td>
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<td>D3 Improved social mobility</td>
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<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>D4 Improved housing provision</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Sum**

| 38 | 54 | 52 | 5.6 | 8.13 | 7.35 |

**Notes:** Due to the limited time, Group 1 did not complete their scoring against all criteria for Option 3. Although the results they completed for Option 1 and 2 are shown here, the incomplete scores with a mark * are not taken into account the sum of scoring results (both un-weighted and weighted).
The MCA results are in contrast to the results generated by the conventional CBA approach, including additional consideration of wider economic benefits (WEB). Table 2 presents the result of the parallel SFL study based on analyses of both CBA and CBA plus WEB. A reverse result is evident – in terms of economic efficiency, the cheapest Option 1 with highest BCR ratios stands out as the preferred option. Given its high costs, albeit high benefits, Option 2 is the least preferred option with the lowest BCR ratios.

Table 2: Results from conventional CBA and CBA with WEB

<table>
<thead>
<tr>
<th></th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Benefit Analysis (CBA)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVB</td>
<td>£281.5m</td>
<td>£277.1m</td>
<td>£329-462m</td>
</tr>
<tr>
<td>PVC</td>
<td>£77.1m</td>
<td>£399.7m</td>
<td>£223-240m</td>
</tr>
<tr>
<td>NPV</td>
<td>£204.5m</td>
<td>-£122.6m</td>
<td>£106-222m</td>
</tr>
<tr>
<td>BCR</td>
<td>3.7</td>
<td>0.7</td>
<td>1.5-1.9</td>
</tr>
<tr>
<td><strong>Wider economic Benefits (WEB)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agglomeration</td>
<td>£37m</td>
<td>£68m</td>
<td>£60m</td>
</tr>
<tr>
<td>Labour supply and productivity</td>
<td>£28m</td>
<td>£64m</td>
<td>£40m</td>
</tr>
<tr>
<td>Sub-total</td>
<td>£65m</td>
<td>£132m</td>
<td>£100m</td>
</tr>
<tr>
<td><strong>CBA+ WEB</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVB</td>
<td>£346.5m</td>
<td>£409.0m</td>
<td>£429-562m</td>
</tr>
<tr>
<td>PVC</td>
<td>£77.1m</td>
<td>£399.7m</td>
<td>£223-240m</td>
</tr>
<tr>
<td>NPV</td>
<td>£269.5m</td>
<td>£9.4m</td>
<td>£206-322m</td>
</tr>
<tr>
<td>BCR</td>
<td>4.5</td>
<td>1</td>
<td>1.9-2.3</td>
</tr>
</tbody>
</table>

(from Jacobs, 2015)

**Comment on Findings**

A greater discussion on the participatory MCA results are found in Chen et al. (2016), however it is of great interest that the appraisal methodology chosen can lead to very different conclusions. The CBA approach breaks down in certain contexts, including in areas where public transport investment is being considered and where there are large regeneration issues, such as in Blackpool. It is here that a participatory MCA approach is useful, strengthening the strategic case assessment within WebTAG.

The transport sector is an area where the deviation between policy goals and implementation seems particularly large (Naess, 2006, Flyvbjerg, 1998). Policy objectives such as regeneration, social inclusion and the environment are not captured in CBA, and the application of MCA is too weak. Hence it is perhaps not surprising that an over-reliance on CBA in transport appraisal is not delivering the projects we might like.
Part 5
Transnational relevance to Sintropher partners and wider audiences

The participatory MCA tool has been utilised within Sintropher by the Blackpool case study to help appraise the potential investment options in the upgrade of the South Fylde Line and corridor. It has been developed with Sintropher’s wider partners and is available for use for development of tram-based proposals and other projects within these regions and wider contexts. The process has a much wider transnational relevance to other cities and regions which may be seeking to implement new or extended tram-based links to enhance regional connectivity.

Relevance for Sintropher partners

Sintropher partners will use wider MCA approaches to follow up their work on technical and economic feasibility assessments for new or extended innovative tram-based systems in their region, as part of the ‘Sintropher Plus’ project:

- **Saar-Moselle**: the Sintropher feasibility studies examined options for extending the region’s existing tram-train route to cover: (1) a new link Saarbrucken-Forbach (estimated capital cost €132.7m–€170.4m); (2) a service connecting Alt-Saarbrucken and the ZF factory, an automobile subcontractor which has almost 10,000 German and French employees; (3) extension by creating a small regional loop from Forbach-Völklingen (estimated capital cost of €143.8m); and (4) a large regional loop from Forbach-Béning-Freyming-Merlebach-Creutzwald-Überherrn-Wadgassen-Völklingen-Sarreguemines (estimated capital cost €292.7m). Tram-train options were compared to bus rapid transit, and the feasibility of using methane gas power from Saar-Moselles’ new state-of-the-art EfW plant (Energy from Waste) was an option.

- **Flanders, Brugge-Zeebrugge corridor**: De Lijn’s feasibility studies include options for a single-track tram system (as in Valenciennes), a tram-train system (as in Kassel), and various options to extend existing conventional tram.

- **Fylde Coast, South Fylde Line**: the Sintropher funded corridor studies examined options to connect the existing Blackpool Tramway on to the SFL, linking to the regional/national rail station hub at Preston by either tram or tram-train (as discussed previously).

- **Arnhem-Nijmegen**: Stadsregio Arnhem-Nijmegen (now Province Gelderland) has assessed the feasibility of operating the region’s existing electric trains (heavy rail) on non-electrified lines on the regional network, using battery power. The same principle could apply to trams and trolleybus.

- **Kassel, Nordhessen**: the focus is on further development of the region’s existing innovative tram-train network.
Transnational relevance: Europe-wide

The debate on appraisal, and the new approaches that are being developed in MCA, including multi-actor and participatory dimensions, should be seen from the perspective of promoting knowledge transfer and learning across different NWE countries and regions. Most appraisal approaches are specific to the national and/or regional context, and there is a large difference in approaches internationally. The participatory appraisal tool can be used in many different contexts, as criteria and impacts can be chosen by the user. There is also much scope for using this or similar tools in cross-boundary comparative studies.

Potential low-cost tram solutions now need to be tested in different regional cases in EU member states, and the method of appraisal of these systems will be critical to the eventual funding. There are some distinct physical differences:

- rail systems in most Member States were built at lower cost than in the UK, with fewer over-bridges and more at-grade road/rail crossings, which may reduce the benefits of some technological alternatives (e.g. discontinuous electrification).
- many areas have historic towns where conservation considerations make overhead catenary undesirable, increasing the advantage of battery-based solutions.
- in many European countries, in contrast to the UK, many urban tram systems have been maintained, or even constructed in the last 20 years, making tram-train solutions more relevant.

Even though the various approaches and case examples are context-specific, their transnational relevance is strong:

- the debate on appropriate appraisal methodologies offer a stimulus and possibilities for wider thinking by cities and regions in other European countries.
- many the MCA-based approaches and tools might be potentially adaptable within the particular organizational, governance, technical and regulatory regimes of other countries. For example, the Governments’ UK tram-train trial in Sheffield, Network Rail’s UK trial with battery power for trains on a non-electrified heavy rail line in East Anglia, and (in Sintropher) Province Gelderland’s feasibility studies for battery power to enable electric trains to operate on non-electrified routes in their regional network.
Part 6
Next steps

Dissemination to wider target audiences

The MCA tool has open access in accordance with NWE Programme requirements and ERDF regulations. Particular target audiences are governmental authorities and transport agencies at city, regional, national and EU levels; and transport professionals and practitioners who may be involved in the initiation and implementation of new transport links.

Dissemination and utilisation is carried out via the Sintropher website page plus ongoing conference presentations and journal papers – both in academic journals and the technical press. The MCA tool and process is also used in teaching at UCL. A seminar series has been held on appraisal approaches at UCL (2015), with national and international academic presentations, and we hope that the critical debate on appraisal methodologies will continue and begin to influence practice. A series of presentations have been made by Sintropher team members on the practice of CBA and participatory appraisal, including:

- Hickman, R. 2016. Critiquing the application of CBA in transport appraisal. World Conference on Transport Research, Shanghai.

Participatory MCA tool access

The MCA participatory tool can be accessed at the following:

Sintropher project website

http://www.sintropher.eu/
Part 7
References and further information

References


Responsibility for the report

Thanks to UCL staff members who worked on this initiative: Chia-Lin Chen (Research Assistant, UCL) and Colin Osborne (Project Manager) who helped produce the content and led the Preston workshop. Gavin Baily (TraceMedia) developed the MCA tool with UCL.

Report written by:

Dr Robin Hickman
University College London
Part 8
What is Sintropher?

The Sintropher project (Sustainable Integrated Transport Options for Peripheral European Regions) is funded by the EU’s North West Europe transnational cooperation programme under INTERREG IVB.

The overall project aim is to develop sustainable, cost-effective solutions to improve connectivity to, from and within poorly connected regions in North-West Europe. There are four objectives:

- promote possible cost-effective technology-based solutions.
- assess the appraisal procedures used by different counties for investment in regional tram systems and improve the development process for a positive business case.
- promote high-quality, effective interchange between regional tram systems and regional rail and air hubs.
- promote and market the benefits of regional tram-based systems to users and stakeholders.

There has been a particular focus on tram-train systems which allow local trams to run on to national rail networks, pioneered in Germany, firstly in Karlsruhe and developed in Kassel, which allow urban tram systems to extend over national rail tracks to serve extensive city regions. The project has also looked at other innovative forms of tram systems such as single-track tramways as well as high-quality transport interchanges that link such systems to major national or transnational rail or air hubs.

The project began in late 2009, with fourteen partner agencies in five EU Member States, and lead partner University College London (UCL): Valenciennes (France); the Fylde Coast (UK); West Flanders (Belgium); North Hesse (Germany); and Arnhem-Nijmegen (Netherlands). Participants include public transport operators, local authorities, regional transport agencies, and universities.

They have worked together on a series of feasibility evaluations, pilot investments and demonstration projects, as well as comparative analyses of EU best practice. The total budget is more than €23m, with funding part-financed by the EU’s INTERREG IVB Programme.

A €1.5m project extension, in 2014, covers follow-on work to capitalise on results from the initial project, and added a fifth objective:

- to test technologies for low cost transport links in different territorial contexts, plus integrated territorial corridor plans that help these links unlock wider economic and regeneration benefits; and better recognise these in business cases (this also covered innovative funding approaches to investment in such schemes).
This includes two new partners (total now 16) and two extra demonstration regions (total now 7) in West Flanders Brugge-Zeebrugge (Belgium) and Saar-Moselle (a cross-border region France-Germany).

The project ends in European funding terms in October 2015, but work will continue by partners beyond this, to capitalise on results and generate impacts in terms of influencing transport and territorial development policies and investment programmes in their regions, and influencing respective national approaches to appraising and deciding investment in such links.

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Sintropher is coordinated by

In partnership with

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