# Improving Economic Evidence in Crime and Justice Evaluations

Matthew Manning and Gabriel Wong

# Common economic analysis techniques

| Type of analysis | Measure of cost / inputs | Measure of outcomes | Strengths | Weaknesses | Analytical questions |
|---|---|---|---|---|---|
| Cost-feasibility | Monetary value of resources | N/A | Permits alternatives that are not feasible to be immediately ruled out before evaluating outcomes | Cannot judge overall worth of a project because it does not incorporate outcome measures | Can a single alternative be carried out within budget? |
| Cost-effectiveness | Monetary value of resources used during implementation | Units of effectiveness (e.g. crimes prevented or treatments delivered) | Easy to incorporate standard evaluations of effectiveness.<br>Good for comparing the cost of delivery per unit of treatment across interventions<br>Good for alternatives with a small number of objectives | Hard to interpret if there are multiple measures of effectiveness.<br>Only useful for comparing two or more alternatives | Which alternative yields a given level of effectiveness for the lowest cost (or highest level of effectiveness for a given cost)? |

# Common economic analysis techniques

| Type of analysis | Measure of cost / inputs | Measure of outcomes | Strengths | Weaknesses | Analytical questions |
|---|---|---|---|---|---|
| Cost-savings | Monetary value of resources used during implementation | Monetary savings resulting from impact of intervention | Good for assessing the savings generated to stakeholders | Difficult to place monetary values on salient life benefits | What are the estimated savings generated from the intervention? |
| Cost-benefit | Monetary value of resources used during implementation | Monetary value of benefits | Can judge absolute worth of a project<br>Can compare CB results across a variety of projects | Difficult to place monetary values on salient life benefits | Which alternative yields a given level of benefits for the lowest cost (or the highest level of benefits for a given cost)?<br>Are the net benefits greater than the net costs? |

# The CBA?

Forcing people to explicitly and systematically consider the various factors which should influence strategic choice.

↓

Should government/business undertake the activity?

↓

What is its proposer size or scope?

# Decision rule for CBA

Net present value (NPV) or net benefits criterion

Accept if NPV > 0
Reject if NPV < 0
Consider if NPV = 0

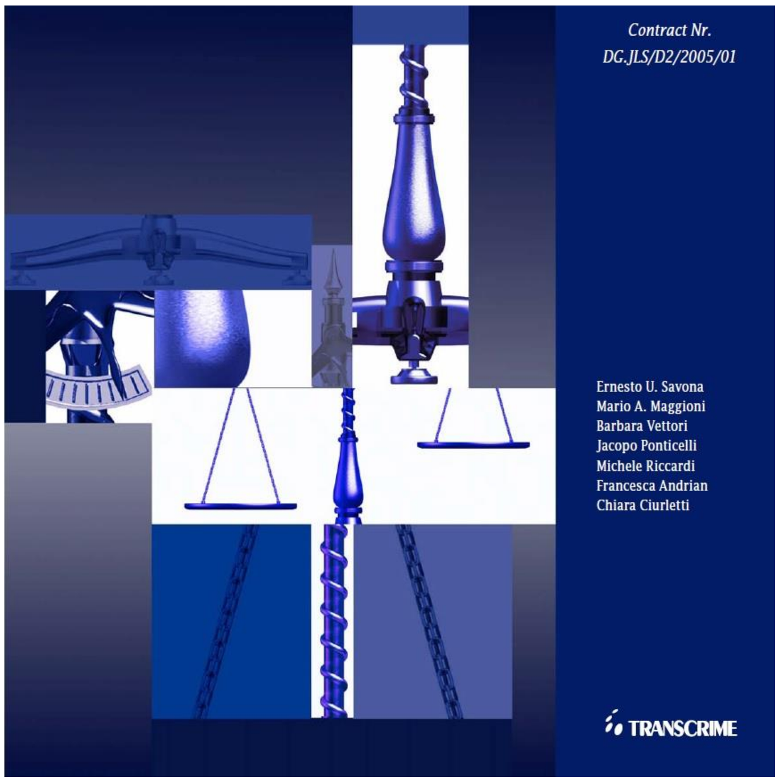
CBA ratio (cost divided by benefits) or BCA ratio (benefits divided by costs)

CBA – If < 1 – benefits outweigh costs
BCA – If > 1 – benefits outweigh costs

Results represents return on investment per dollar spent in the form of a ratio

CBA 1/7 = BCA 7/1 = $7 returned for each dollar invested

# CBA of transparency requirements in the company/corporate field and banking sector relevant for the fight against money laundering and other financial crime




Study that examined the costs and benefits associated with new transparency requirements in the company/corporate field and banking sector relevant for the fight against money laundering and other financial crime.

Report prepared by Transcrime - Joint research center of the Università Cattolica del Sacro Cuore, the Alma Mater Studiorum Università di Bologna and the Università degli Studi di Perugia. It was funded by the European Commission, DG JLS.

# Benefits

## of transparency requirements in the company/corporate filed and banking sector relevant for the fight against money laundering and other financial crime

- Asset recovery
- Time saved in searching for beneficial owner information
- Banks clientele info benefits – Financial stabilisation
- Banks clientele info benefits – Service quality
- Deterring intermediary connivance
- Banks clientele info benefits – Financial stabilisation
- Banks clientele gain benefits
- Accountants clientele information benefits
- Banks reputational benefits
- Accountants reputational benefits
- Accountants clientele gain benefits
- Reduction in unfair competition
- Improvement in market efficiency
- Market transparency benefits
- Capital inflows from extra EU countries
- Increase % in persons prosecuted for money laundering
- Benefits in terms of sharing liabilities against company

# Direct Costs

## Government

- Costs for persons convicted of money laundering
- Costs for prosecution and sentencing
- Costs of asset recovery

## LEA

- STR Analysis cost
- FIU Other costs
- FIU Training costs
- LEA Investigation costs
- Increase in FIU staff personnel costs


## Intermediaries

- BO Identification costs
- BO Data updating costs
- Banks' training costs
- Banks' internal controls costs
- Banks' ICT costs
- Banks' lobbying costs

## Individuals

- Fewer opportunities to hide BO identity

LEA –Law enforcement agencies; FIU – Financial intelligence units; STR – Suspicious transaction reports; ICT – Information and communication technology; BO – Beneficial owner

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# Indirect Costs

## Government

- Decrease in tax revenues

## LEA

- Increase in FIU staff personnel costs

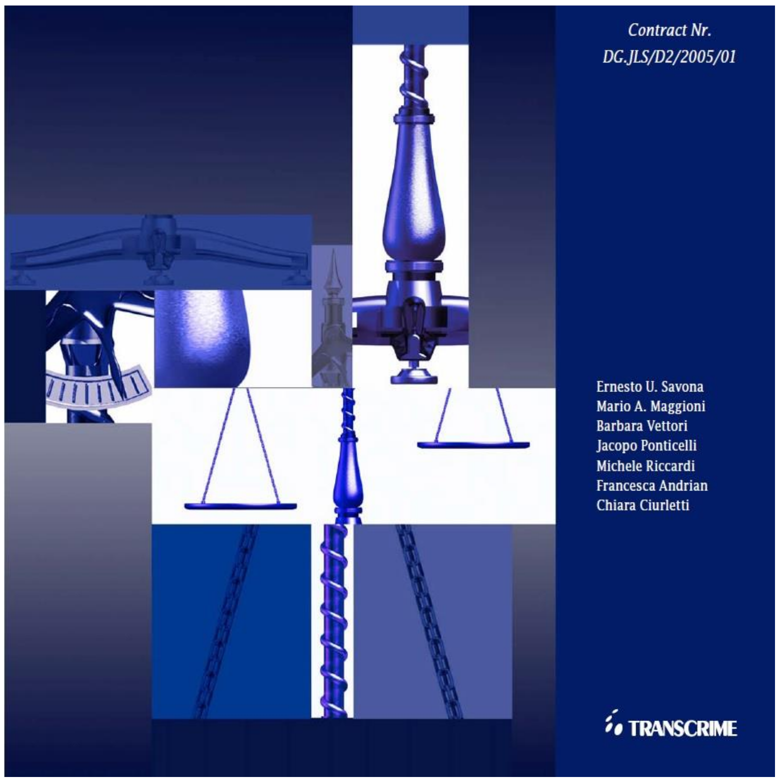

## Intermediaries

- BO identification duplication costs
- BO data updating duplication costs
- BO record keeping duplication costs
- Banks' clientele loss costs
- Accountants' clientele loss costs

## Business

- Business fiscal costs
- Access to credit unfair costs

# Results of BCA




**Model 0:** Intermediary based system of disclosure envisaged by the third directive

NPV: Benefits – Costs = €2,501,659,164 – €19,418,496,443 = - €16,916,837,279

BC Ratio: 0.13 (costs exceed benefits)

**Model 1:** The new upfront and ongoing disclosure system

NPV: Benefits – Costs = €2,508,156,650 – €13,804,900,100 = - €11,296,743,450
BC Ratio: 0.18

**Comparison:** Model 1 preferred – although both models may be considered economically inefficient

# Closing Off Opportunities for Crime: An Economic Evaluation of Alley-gating

This study evaluated the economic feasibility of  of a situational crime prevention measure (i.e. alley-gating) for reducing burglary in the City of Liverpool U.K.

Bowers, K. J., Johnson, S. D., & Hirschfield, A. F. (2004). Closing off opportunities for crime: An evaluation of alley-gating. *European Journal on Criminal Policy and Research*, *10*(4), 285-308.

# Results of Analysis

| | Burglaries prevented | Number of gates | Cost of gates | Value of burglaries saved | Cost benefit ratio |
|---|---|---|---|---|---|
| All areas | 875 | 3174 | £2,094,302 | £2,013,967 | 0.96 |
| 6 Months | 852 | 2943 | £1,939,437 | £1,960,252 | 1.01 |
| 12 Months | 727 | 1363 | £898,217 | £1,671,041 | 1.86 |

Value of burglaries saved represents the avoided costs associated with the crime. This is calculated based on the number of burglaries prevented multiplied by the estimated unit cost of burglary.

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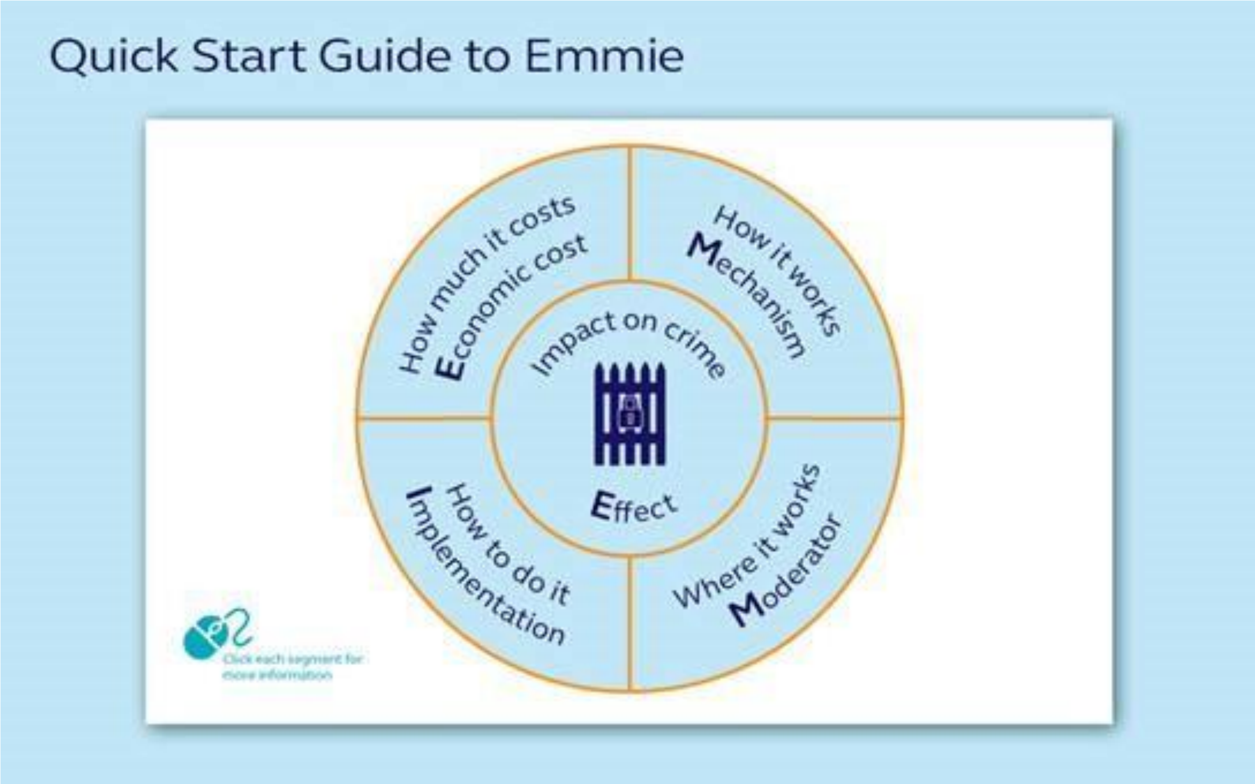
# EMMIE




Source: http://whatworks.college.police.uk/toolkit/About-the-Crime-Reduction-Toolkit/Pages/About.aspx

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# Crime Reduction Toolkit

Share this page:

Search the toolkit

| Intervention | Impact on crime (Effect) | How it works (Mechanism) | Where it works (Moderator) | How to do it (Implementation) | What it costs (Economic cost) |
|---|---|---|---|---|---|
| After school clubs | | | | | |
| Alcohol pricing | | | | | |
| Alley gating | | | | | |
| Boot camps | | | | | |
| NEW Brief interventions for alcohol use disorders within criminal justice settings | | | | | |
| Car breathalyser lock | | | | | |
| CCTV | | | | | |
| Cognitive Behavioural Therapy (CBT) | | | | | |
| Cognitive Behavioural Therapy (CBT) for Domestic Violence | | | | | |
| Couples therapy | | | | | |
| Domestic abuse sanctions | | | | | |
| Drink drive stops | | | | | |

Source: http://whatworks.college.police.uk/toolkit/Pages/Toolkit.aspx

# Current problems with CBA tools

- Requires a level of expertise
- Time consuming and expensive
- Users need to input, manually, a considerable amount of point-in-time data
- Often relies on subjective expert opinion (e.g. estimating costs of implementation in another jurisdiction)
- introduces the potential for data-input error
- The individual nature of CBAs (each time a new CBA is conducted- little to no history of previous CBA data)
- No central repository for CBA conducted in this area
- No ability to easily incorporate other data (e.g. open source data)
- We cannot learn from previous CBAs to facilitate value imputation (e.g. missing), identification of contextual variation and outlier detection.

# Smart Manning Cost-Benefit Tool

MCBT
Manning Cost Benefit Tool


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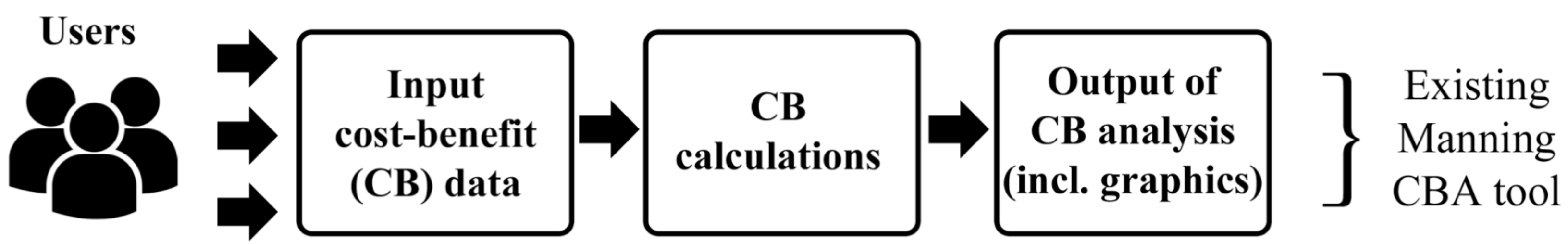
# Data flow MCBT



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# MCBT Input cost-benefit data

MCBT

Manning Cost-Benefit Tool

Welcome matthew. Log out

- Home
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  - Economic Assumptions
  - Bearer List
  - Costs
  - Attributable Fraction
  - Savings of Avoided Crimes
  - Overall Savings and Benefits
- Outputs

**RESOURCES**

- Data
- Confidence Grade

## Costs

| Cost Item | Total Costs | Predicted Cost Notes / Assumptions | Who Bears the Costs? | Optimism Bias Correction (%) | Adjusted Costs (Including optimism Bias Correction) | % Costs Yr 1 | % Costs Yr 2 | % Costs Yr 3 | Total % (sum should be 100%) | Costs Yr 1 | Costs Yr 2 | Costs Yr 3 | Annual Costs | E ma |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direct Cost | | | | | | | | | | | | | | |
| Capital Cost | | | | | | | | | | | | | | |
| Plants and equipments | | | | | | | | | | | | | | |
| Purchase plant and equipments | | | | | | | | | | | | | | |
| gates | £ 54741 | | cjs | 0 % | £ 54741 | 73 % | 26 % | 1 % | 100 % | £ 39961 | £ 14233 | £ 547 | £ 18247 | £ |
| Setup expenses | | | | | | | | | | | | | | |
| setup | £ 15072 | | council | 0 % | £ 15072 | 70 % | 29 % | 1 % | 100 % | £ 10550 | £ 4371 | £ 151 | £ 5024 | £ |
| Operating Cost | | | | | | | | | | | | | | |
| Intervention related staffing expenses | | | | | | | | | | | | | | |
| Wages for exising employees | | | | | | | | | | | | | | |
| constable | £ 114000 | | cjs | 0 % | £ 114000 | 38 % | 34 % | 28 % | 100 % | £ 43320 | £ 38760 | £ 31920 | £ 38000 | £ |
| sergeant | £ 129000 | | cjs | 0 % | £ 129000 | 40 % | 26 % | 34 % | 100 % | £ 51600 | £ 33540 | £ 43860 | £ 43000 | £ |
| inspector | £ 165000 | | cjs | 0 % | £ 165000 | 36 % | 33 % | 31 % | 100 % | £ 59400 | £ 54450 | £ 51150 | £ 55000 | £ |
| Other staffing expenses (not directly intervention related) | | | | | | | | | | | | | | |

Update Project Reset Values

**Instructions**:

The yellow boxes in the Cost Item column are where you enter cost data for each identified cost item. For a detailed example refer to Ch 7 of "A Guide to Economic Analysis and Efficiency". The percentage cost, for each cost item, on each year should sum to 100% over the entire length of analysis. If the total is less than 100% the cell will be highlighted in red.

Where the best-case estimate is a negative number, the best-case estimate is assigned a value of zero.
**Optimism bias correction**: The optimism bias correction method used here allows for the adjustment of costs according to the various degrees of confidence in each data source. Please refer to the tab "Confidence Grade" in the Resource section.

**Margin of error**: This costing tool includes the traditional method and an adaptation of the optimism bias correction method (HM Treasury, 2014a). The tool provides both worst-case (i.e. the intervention costs more money – 1+margin of error) and best-case (i.e. the intervention costs less money – 1-margin of error) scenarios according to an assumption of margin of error in cost item. The upper and lower bounds of the confidence interval are calculated by adding and subtracting the margin of error from the mean, which refers to the average annual cost of an item.

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# Cost-Benefit calculations

MCBT

Manning Cost-Benefit Tool

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  - Costs with Economics
  - Total Costs
  - Cost to Bearers
  - Cost Effectiveness
  - Benefits with Economics
  - Savings and Benefits to Bearers
  - Cost Benefit

**RESOURCES**

- Data
- Confidence Grade

## Costs Benefit

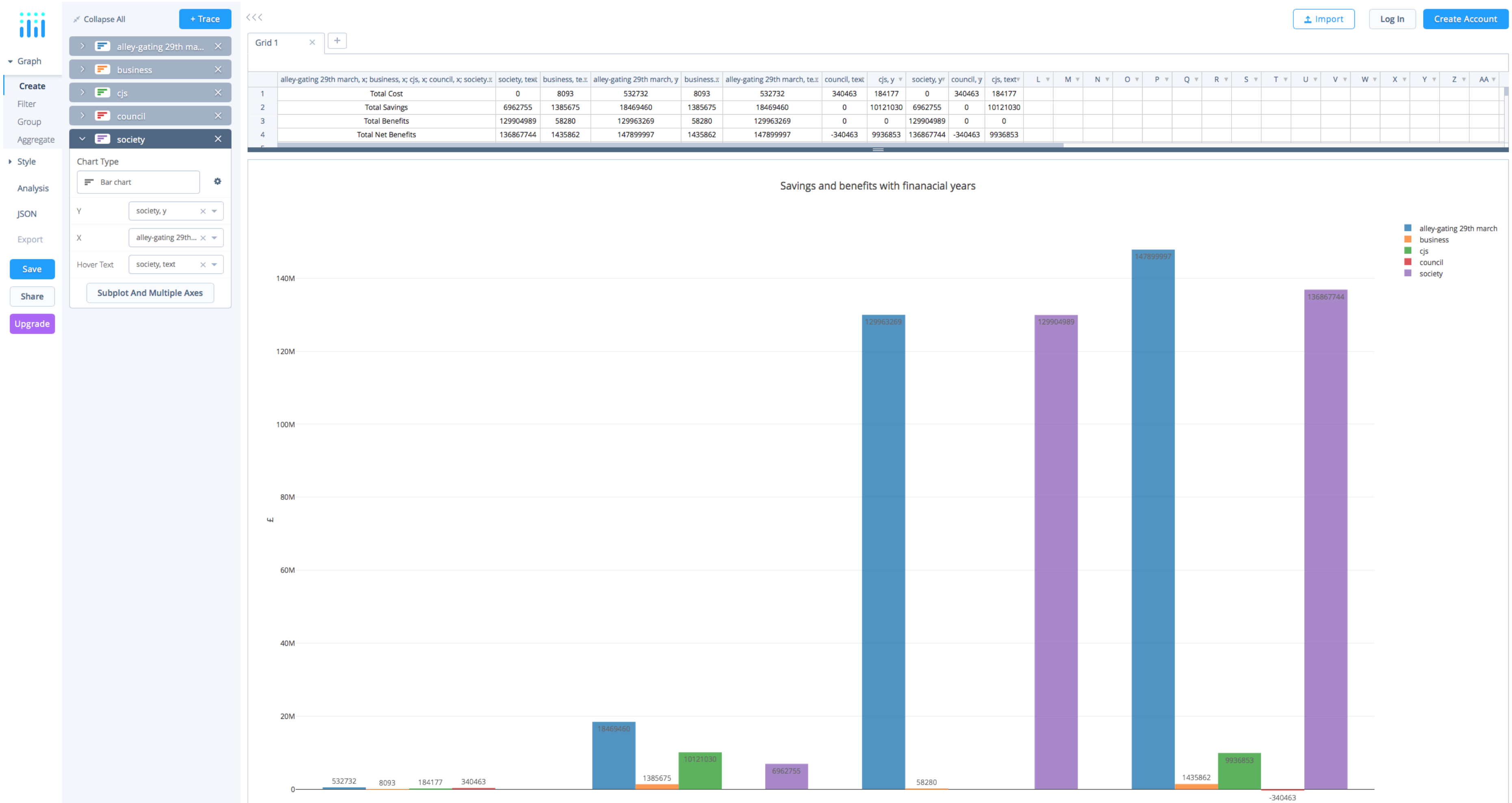
| | Total costs (corrected by optimism bias) | Annual total costs (corrected by optimism bias) | Total savings | Annual savings | Total benefits | Annual benefits | Sum of all savings and benefits (corrected by optimism bias) | Average annual savings and benefits (corrected by optimism bias) | Cost-benefit ratio | Total net benefits | Annual total net benefits |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **alley-gating_29th march** | £ 532732 | £ 177577 | £ 18469460 | £ 6156487 | £ 129963269 | £ 43321090 | £ 148432729 | £ 49477576 | 278.63 | £ 147899997 | £ 49299999 |
| **business** | £ 8093 | £ 2698 | £ 1385675 | £ 461892 | £ 58280 | £ 19427 | £ 1443955 | £ 481318 | 178.40 | £ 1435862 | £ 478621 |
| **cjs** | £ 184177 | £ 61392 | £ 10121030 | £ 3373677 | £ 0 | £ 0 | £ 10121030 | £ 3373677 | 54.95 | £ 9936853 | £ 3312284 |
| **council** | £ 340463 | £ 113488 | £ 0 | £ 0 | £ 0 | £ 0 | £ 0 | £ 0 | 0.00 | £ -340463 | £ -113488 |
| **society** | £ 0 | £ 0 | £ 6962755 | £ 2320918 | £ 129904989 | £ 43301663 | £ 136867744 | £ 45622581 | Infinity | £ 136867744 | £ 45622581 |

**View Cost benefit plot**

**Note**: Costs/savings/benefits to the bearer should add up to the total costs/savings/benefits.
If it does not add up to the total costs/savings/benefits, please go to previous tabs and confirm that all cost items have been assigned correctly to a bearer.

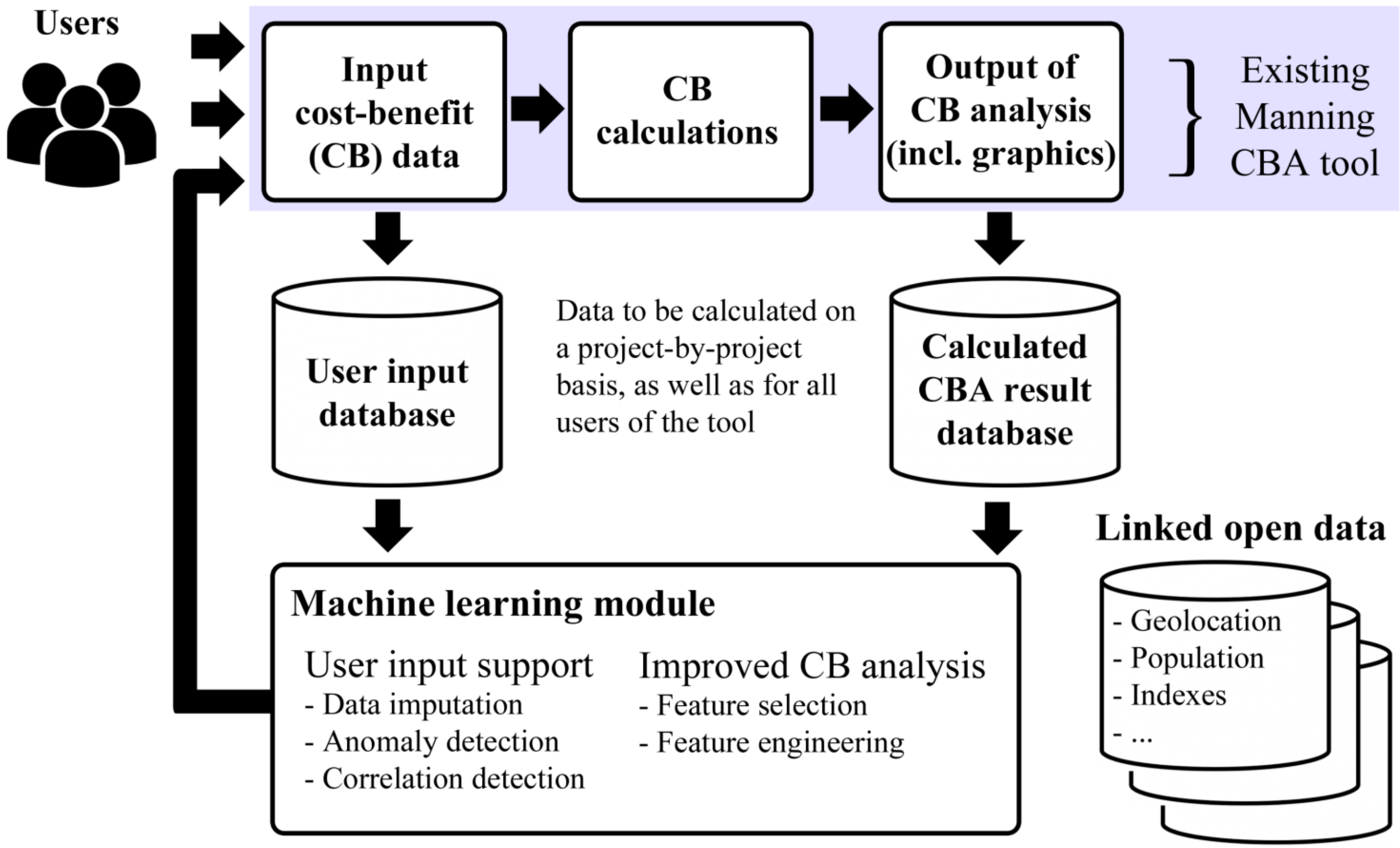
Updated: **25 May 2017** / Responsible Officer: **Development Team** / Page Contact: **Webmaster**

# Output MCBT




| | alley-gating 29th march, x; business, x; cjs, x; council, x; society, x | society, text | business, te... | alley-gating 29th march, y | business... | alley-gating 29th march, te... | council, text | cjs, y | society, y | council, y | cjs, text |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Total Cost | 0 | 8093 | 532732 | 8093 | 532732 | 340463 | 184177 | 0 | 340463 | 184177 |
| 2 | Total Savings | 6962755 | 1385675 | 18469460 | 1385675 | 18469460 | 0 | 10121030 | 6962755 | 0 | 10121030 |
| 3 | Total Benefits | 129904989 | 58280 | 129963269 | 58280 | 129963269 | 0 | 0 | 129904989 | 0 | 0 |
| 4 | Total Net Benefits | 136867744 | 1435862 | 147899997 | 1435862 | 147899997 | -340463 | 9936853 | 136867744 | -340463 | 9936853 |

# Smart MCBT


Users
Input cost-benefit (CB) data
CB calculations
Output of CB analysis (incl. graphics)
Existing Manning CBA tool
User input database
Data to be calculated on a project-by-project basis, as well as for all users of the tool
Calculated CBA result database
Linked open data
- Geolocation
- Population
- Indexes
- ...
Machine learning module
User input support
- Data imputation
- Anomaly detection
- Correlation detection
Improved CB analysis
- Feature selection
- Feature engineering