Valuing the health benefits of transport schemes

Guidance for London
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Introduction

What is this guide for?
This guide will help you to monetise the health benefits of schemes that increase active travel using two tools:

- The World Health Organization (WHO) Health Economic Assessment Tool for walking and cycling (HEAT)
- The Sickness Absence Reduction Tool (SART)

The guide includes details on:

- What the tools are
- When to use the tools
- How to use the tools
- Examples of the tools in action
- Rules of thumb for selecting your input data
- Defending the results that arise from the tools
- How the tools work

Who should use this guide?
This guide is aimed at anyone involved in the planning, advocacy or assessment of transport schemes – Transport for London (TfL) staff and contractors, local authority officers, elected members or voluntary organisations. It should be useful for both health and transport planners.

Context

Why is it important to monetise health benefits?
Road and public realm schemes are increasingly focused on improving access and quality of life. However, transport business cases have traditionally focused on the movement of motor vehicles, with most benefits arising from journey time savings.

Business cases can be strengthened by capturing the wider benefits of schemes. The monetised health benefits of some public transport and public realm schemes can be substantial and can make a significant contribution to a positive benefit to cost ratio. This guide aims to support practitioners in London to achieve this.

How is transport linked to health?
Building activity into people’s everyday lives is one of the biggest impacts of transport on health.

Lack of physical activity is currently one of the biggest threats to the health of Londoners. Being physically active helps prevent a range of illnesses including heart disease and strokes, depression, type 2 diabetes, and breast and colon cancer. Most Londoners are currently not active enough to stay healthy. It is estimated that in the Capital, 42 per cent of adults are not achieving minimum levels of physical activity. Adults are recommended to spend a minimum of 150 minutes a week doing moderate physical activity to keep healthy. This is equivalent to just three 10-minute walks five days a week. Even more worrying is that a third of adults are not even achieving 30 minutes activity per week.

Active travel is the main way in which Londoners get their physical activity and it has the biggest potential for increasing physical activity. It is estimated that 60,000 years of healthy life could be gained every year if Londoners swap motorised travel for active travel on short journeys.

The TfL health action plan Improving the health of Londoners clearly outlines the importance of physically active transport to health in the Capital. The document also sets out other links between transport and health, including air quality, road traffic collisions and accessibility.
Valuing the health benefits of transport schemes

Which health outcomes can be monetised?
In theory, it would be possible to monetise any of the health impacts arising from the links between transport and health (physical activity, air quality, road traffic collisions, poor access, noise). Outcomes that could be monetised might include risk of death, illness costs, healthcare costs and productivity.

However, currently only four tools exist to monetise the health benefits of transport schemes. Two of these monetise the health benefits from increasing physical activity levels and the other two look at the benefits of reducing road traffic injuries.

All are included in the Department for Transport’s (DfT’s) Transport analysis guidance (WebTAG) and the TfL Business Case Development Manual (BCDM).

This guide explains how to use the two tools related to physical activity – HEAT and SART.

What tools monetise the health benefits from increased physical activity?
Currently, two tools exist to monetise the impact of transport on physical activity. Both tools are recommended in DfT’s Transport analysis guidance (WebTAG) and the TfL Business Case Development Manual (BCDM). They are the most developed and evidence-based tools available for estimating the economic value of the health benefits of active travel. The outputs are important because they help to show decision-makers the value of money spent.

These tools are:

- WHO Health Economic Assessment Tool for walking and cycling (HEAT)
- Sickness Absence Reduction Tool (SART)

What other tools are in development?
Tools to monetise the impact of increased physical activity on illness and healthcare costs are in development.

Can we still include the other health benefits in business cases even if no tool exists to monetise them?
Even when health benefits cannot be given an economic value they should still be described in business cases to help make a comprehensive case for investment.

For example, you might consider including narrative on:

- Improvements in long-term conditions and mental health related to active travel
- Reductions in the damaging effects of noise, air pollution and greenhouse gas emissions from motorised traffic
- Reducing social isolation and stress through better connectivity

The TfL health action plan Improving the health of Londoners includes summaries of relevant health evidence for you to include in business cases.

How to increase active travel in a population

The following evidence-based approaches are taken from the National Institute for Health and Care Excellence (NICE) guidelines – the gold standard national guidelines on health and healthcare best practice:

- Ensure pedestrians and cyclists are given the highest priority when developing or maintaining streets and roads: reallocate road space to support active travel and restrict motorised transport access and speed
- Plan and provide a comprehensive network of routes for walking and cycling. These routes should offer everyone convenient, safe and attractive access to workplaces, homes, schools and other public facilities
## HEAT and SART at a glance

<table>
<thead>
<tr>
<th>What outcome does the tool monetise?</th>
<th>HEAT</th>
<th>SART</th>
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</thead>
<tbody>
<tr>
<td>Deaths prevented in the population as a result of increases in physical activity.</td>
<td>Lower levels of sickness absence from work as a result of increases in physical activity.</td>
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</tbody>
</table>

| Does the DfT or TfL endorse the tool? | YES – both tools are recommended in the DfT’s Transport analysis guidance (WebTAG) and the TfL Business Case Development Manual (BCDM). |

| How good is the underlying evidence? | The tools are the most developed and evidence-based available for estimating the economic value of the health benefits of active travel. |

| Who developed the tools? | WHO | TfL |

<table>
<thead>
<tr>
<th>Are there any limitations on when I can use the tool?</th>
<th>Cannot be used for:</th>
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<tr>
<td>• One-off events</td>
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<tr>
<td>• Calculating health benefits to individuals</td>
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<tr>
<td>• Schemes that only affect children</td>
<td></td>
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<tr>
<td>• Schemes that only affect people who are already very fit</td>
<td></td>
</tr>
<tr>
<td>Cannot be used for:</td>
<td></td>
</tr>
<tr>
<td>• Schemes that only affect people who are not in paid employment</td>
<td></td>
</tr>
<tr>
<td>• Schemes that only affect children</td>
<td></td>
</tr>
</tbody>
</table>

| Can I use it for walking and cycling? | YES – you just have to run the tool twice. | YES |

| Is the tool computerised? | YES – available through the WHO website. | NO – the tool is so simple; you can do it yourself with a calculator. |

| Can I use the same input data for HEAT and SART? | YES – The input data for HEAT and SART is available from exactly the same data collection methods (eg roadside counts, surveys, modelling). This is a benefit of using both tools at the same time. |

| Can the outputs of HEAT and SART be combined? | YES – HEAT and SART value different health benefits resulting from walking and cycling. The two tools can be used together with no risk of double counting the benefits. |

### In which situations can I use the tools?

You can use HEAT and SART in a variety of scenarios:

1. **Retrospectively** – to value the health benefits of increased walking or cycling after a project (e.g., benefits realisation after completion of a project)

2. **Benefits right now** – to value the health benefits of all walking or cycling in an area right now

3. **Prospectively** – to value predicted health benefits of planned projects (e.g., options appraisal for business case)

### How do I use the output from the tools?

The outcomes of these two tools may be added to the benefit cost ratio (BCR) of a scheme, which is the amount of benefit expected to be produced compared to the cost of implementing the scheme.

\[
\text{BCR} = \frac{\text{Total monetised benefit}}{\text{Total cost of scheme}}
\]

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**Valuing the health benefits of transport schemes**

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**Improving the health of Londoners**

**Transport action plan**

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**Improving the health of Londoners: Transport action plan**

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**Transport for London**

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**TfL**

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**WHO**

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**HEAT and SART**

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**DfT**
Health Economic Assessment Tool (HEAT)

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# HEAT at a glance

## What is HEAT?
HEAT is a tool developed by WHO to value the deaths prevented as a result of increased levels of cycling or walking. HEAT stands for Health Economic Assessment Tool.

To use the tool and read a user guide, go to heatwalkingcycling.org

## Why do we use HEAT?
We use HEAT because:
- HEAT has been approved by the DfT and TfL. It is included in the DfT’s Transport analysis guidance (WebTAG) and the TfL Business Case Development Manual (BCDM)
- There is a strong evidence base for the effects of cycling and walking on health. This ensures HEAT output figures are reliable and robust
- Output figures from HEAT are often large. This means they can make a significant positive contribution to a BCR for a scheme
- HEAT is very straightforward and simple to use

## What input data is needed?
There is a data template to help you gather all the necessary input data before you access the HEAT website. See HEAT input data template section.

In summary, HEAT asks for:

**Data about your scheme (you supply this):**
- Type of scheme (ie before/after or single point in time)
- Real or projected data for changes in walking and cycling for your scheme:
  - Number of people walking and cycling
  - Average amount of time spent walking and cycling
- Some assumptions about your data

**Standard statistical data (you select these from drop-down menus to make the calculation relevant to a UK context):**
- UK mortality rate
- Value of statistical life
- Discounting rate

See HEAT input data section for more detail on how to ensure high-quality input data.

## What is the output?
HEAT calculates:
- The number of deaths per year prevented as a result of a scheme
- The monetised value of this change
When should HEAT not be used?

It is not always appropriate to use the HEAT tool. The tool cannot be used for:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Example</th>
<th>Why can't you use HEAT?</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-off events</td>
<td>Monetising the health benefits from the London Sky Ride</td>
<td>HEAT measures the benefits of regular physical activity over a prolonged period. The tool cannot be applied to a one-off event because you cannot assume that all of the people who take part in the event will continue to walk/cycle regularly afterwards.</td>
</tr>
<tr>
<td>Individuals</td>
<td>Monetising the health benefit that someone would get from walking/cycling to work every day</td>
<td>HEAT is based on evidence from studies that gathered data from thousands of people. The reduction in risk of death from regular physical activity varies from person to person. HEAT uses the average number of deaths prevented across the large study population. So the output from a HEAT calculation will not be accurate for just one individual. Generally speaking, the larger the population that you use for your calculation, the more accurate the results will be.</td>
</tr>
<tr>
<td>Children</td>
<td>Monetising the health benefits to children from a walk to school project</td>
<td>The evidence for the effects of physical activity on risk of death in children is currently insufficient as most studies have been conducted in adults. We also know that fewer deaths occur in children, meaning the risk of death figures used in HEAT do not apply to them. If your scheme targets children but might also have impacts on adults (e.g., taking children to school), you can run the HEAT tool for the impacts on adults only. Describe the benefits to children in your accompanying narrative.</td>
</tr>
<tr>
<td>People who do a lot of exercise</td>
<td>Monetising the health benefits from a scheme that targets professional cyclists</td>
<td>HEAT uses data from studies of populations with a range of physical activity levels. People doing little exercise gain the largest health benefits from even small increases in activity. Conversely, people who are very active already gain much smaller health benefits from increasing physical activity levels. HEAT is not appropriate for schemes that target people already doing more than two hours of walking/cycling each day. We know that physical activity levels in London are low so this is unlikely to be a problem if you are applying the tool to schemes for the general population.</td>
</tr>
</tbody>
</table>
Using the HEAT tool

How do I find the tool online?
• The tool is located on the WHO website. Go to heatwalkingcycling.org

The website is very easy to use, particularly if you gather all your input data together before you start. Use the HEAT input data template section to gather all your input data in one place before starting online.

How long will it take to run the tool?
The tool is easy to use and takes about 10 minutes to run if you have gathered all your input data before you start.

It is good practice to run the tool several times in order to test your assumptions (sensitivity testing) and see how small changes in your input data can affect the outputs. This will make it easier to defend your results.

Tips for using the HEAT website
Useful links within the website
On the left side of the homepage, there is a menu bar with links to:
• Free online training
• A user guide
• How to select whether to run the tool for cycling or walking

Run the tool for either cycling or walking
• Heat monetises the benefits from both walking and cycling, however it cannot calculate walking and cycling benefits at the same time. If your scheme affects both walking and cycling, run the tool twice and add your monetised benefits together afterwards

Top tips
• HEAT gives you tips as you go along. Look in the box on the right side of the screen

What are the stages of the HEAT tool?
On the website, you are guided through a series of questions, each asking for your input data or asking you to select from drop-down menus. To help you know what to expect, we have divided the process here into three basic stages.

The three stages of the HEAT tool:

1. Enter data for your scheme
• Before/after or a single point in time
• Select the type of data you collected
• Add some assumptions about your data

2. Select the standard statistical data to use in the calculation
• UK mortality rate
• Value of statistical life
• Discounting rate

3. Results
• Deaths per year prevented as a result of the scheme
• Monetised value of this change in mortality
HEAT input data for stage 1

HEAT asks for data about your scheme as well as asking you to select the appropriate standard statistical data to make the calculation relevant to a UK context.

What data about my scheme does HEAT require?

HEAT needs two key pieces of results data from your scheme for its calculation:

- The number of people walking or cycling
- The average amount of time spent cycling/ walking per person

HEAT also asks for some assumptions about your data. What these are depends on what data collection method you used. For example it might ask:

- Do you know the number of people who take cycling trips, or do you wish to estimate the number of cyclists based on the proportion of return journeys of all trips observed?
- What proportion of trips are return journeys?
- How many days per year do people cycle?
- How many people benefit?
- What is the average trip duration or distance?
- What is the time needed to reach the full level of cycling?
- What is the time period over which benefits are calculated?
- What proportion of cycling data is attributable to your intervention?

For tips on how to answer these questions see HEAT – step-by-step section.

What are the most common ways to obtain input data for HEAT?

Counts

- Pedestrian or cycle counts measure the number of people using a particular route. These can be automatic counts using roadside sensors or manual counts (which tend to be more accurate but cost more).

Route user surveys

These surveys can provide information on:

- The average amount of walking or cycling done by users of a particular route
- The average distance walked/cycled
- The proportion of trips that are part of a return journey
- The age range of users
- Previous levels of active travel and physical activity

Mode shift

- If you want to monetise future health benefits from a planned investment, you will need to estimate the expected uplift in the number of people walking or cycling that might result.

Population surveys

These could be based on a representative sample of the population or a census of the whole population. TfL’s London Travel Demand Survey (LTDS) is a good example.

Modeled estimates

If you need to estimate uplift based on changes to walking/cycling levels in previous schemes that are similar.

How confident should I be of my input data?

Counts

You will be very confident about some of your input data (e.g. trip count figures) but HEAT will also ask you to make some assumptions about various aspects of it. Where possible, we have provided rules of thumb for these estimates based on TfL data. You may also be able to base your assumptions on similar schemes.

It is important to record how you came to any assumptions so you can justify your results in the final business case or report.
HEAT input data for stage 2

What standard statistical data does HEAT use?

HEAT asks you to select UK values for three standard statistical input data from drop-down menus. This allows HEAT to make its calculation based on a UK context.

Crude mortality rate
Crude mortality rate is also called the death rate. This is the number of deaths that are expected to occur in a given population within one year.

HEAT uses age-specific crude death rates taken from the WHO database. The rate is ‘age-specific’ because the tool does not include children or older people. HEAT uses different age cut-offs for walking and cycling because the tool assumes that people are more likely to continue to walk at older ages than to cycle:

- For walking, HEAT uses 20 to 74-year-olds (ie crude UK mortality rate = 434 deaths/100,000 people)
- For cycling, HEAT uses 20 to 64-year-olds (ie crude UK mortality rate = 249 deaths/100,000 people)

Use the UK crude mortality rate which is easily selected from a drop-down menu. HEAT automatically adjusts the age range depending on whether you are running the tool for walking or cycling.

Value of statistical life (VSL)
The value of statistical life (VSL) is the monetary value given to a death by statisticians. This allows us to value the deaths we prevent in monetary terms. HEAT uses a VSL figure for the UK of £3,229,114.

VSL has been used over many years by transport planners. It is calculated based on studies that ask what people would be willing to pay for small reductions in the risk of death in a population each year.

The HEAT figure for VSL is different to the figure used in road traffic injury calculations. However, this value is endorsed both by the DfT and TfL for HEAT calculations. The HEAT value comes from a large evidence review by the Organisation for Economic Co-operation and Development (OECD). The review included studies from around the world and derives country-specific figures for VSL based on income levels.

Discounting rate
Discounting is an adjustment made by economists to account for the fact that people generally value benefits received at the present time higher than they value the same benefits received in the future.

Any future costs or benefits related to a scheme or project need to be reduced to reflect this. The discounting rate is the annual percentage reduction in value that applies to future costs and benefits for each year that passes.

In 2003 the UK Treasury set a new discount rate to be applied to the public sector of 3.5 per cent. This figure continues to be recommended in the TfL Business Case Development Manual. This value can be entered manually into your HEAT calculation.

If you are using TfL’s Business Case Assistant (BCA) tool, enter a discount rate of zero. The BCA tool applies a discounting rate to your whole business case so you will want to avoid discounting health benefits twice.

Tips for getting the most out of HEAT

Look for multiple impacts of a single scheme
Always consider if your scheme has an impact on both walking and cycling levels. Schemes that target cycling can also have an impact on walking levels by improving the attractiveness of a street, reducing traffic flow etc.

You can increase the health benefits monetised by running the tool twice to capture benefits from increased walking as well as cycling.

Conduct sensitivity testing
Many inputs used for HEAT rely on assumptions and estimates. Try running the tool with your least and most optimistic estimates of your input data to see how they affect your outputs. This will allow you to make better informed decisions.

Explain what you have done in your business case or report to help justify your results.

Consider other impacts on cycling/walking
Remember that cycling and walking levels are influenced by the time of year and by the weather on a particular day. Ideally, counts should be taken over a period of several weeks and only compared against the same time of year.

Validate your count data
Automatic counters are good for collecting data on walking or cycling over a long period of time but they may not be 100 per cent reliable. A short period of manual counting to compare for accuracy add weight to your data.
HEAT – step-by-step

Stage 1 – enter data for your scheme

Flow chart of HEAT questions in Stage 1 – enter data for your scheme

Within the first stage of HEAT, you enter data on your scheme and are asked to make assumptions about it. This section of the guide goes through each question asked, giving rules of thumb to help you make robust assumptions about your data.

This flow chart sets out the questions that you will be asked by HEAT, depending on whether your data is from a single point in time or before/after. You will notice that the questions asked about your data are exactly the same for both approaches; you are just asked twice if choosing before/after.
HEAT – step-by-step

Initial questions

Is your data from a single point in time or before/after?
HEAT starts by asking you whether your data is from a single point in time or before/after. This determines whether you then need to enter one or two sets of walking/cycling data.

1. Single point in time: if you are just assessing the health benefits currently being delivered by a given level of walking in London, then you click ‘single point in time’. You will only need to enter one set of walking/cycling data.

2. Before/after: if you are evaluating the result of an intervention, or are trying to estimate the impact of a proposed scheme, you will have ‘before’ and ‘after’ data. You will need to enter two sets of walking and cycling data.

What type of data did you collect?
This question will be asked separately for both pre and post-intervention data. You will be given the option to select from:

1. Duration (most likely to be available from survey data)
2. Distance (most likely to be available from survey data)
3. Trips (most likely to be available from cycle or pedestrian count data)

HEAT will ask different questions after this point depending on the type of data you select.

What are all these questions about?
HEAT is trying to find out from you how many minutes are spent being physically active by how many people. This is the information needed to calculate the health benefit.

If you can estimate these two numbers and input this information directly into HEAT, you will take the most direct route through the tool and be asked fewer questions.

If you do not have the numbers, HEAT will ask you several questions to try to make an estimate from the data that you do have, taking you on a longer route through the tool.

Entering your data
You are now asked to enter your data. The questions will vary depending on whether you selected duration, distance or trips in the preceding question.

Trips: average number of trips per person, or total number of trips?
You will be given the option to select from:

1. Average per adult
2. Total number of trips observed

You may know the average number of trips per person from survey data. If you only have a trips count, you must choose ‘total number of trips observed’.

Total number of trips?
Enter a total number of trips by adding up northbound and southbound trip counts.

What proportion of these are walking/cycling trips?
Enter a percentage. This will always be 100 per cent if you have used pure pedestrian or pure cycle counts.

Do you know the number of people who take walking/cycling trips, or do you wish to estimate the number of cyclists/walkers based on the proportion of return journeys out of all trips observed?

How could you obtain the number of walkers/cyclists?

• Route user survey – ask how often cyclists use the route
• Population survey (eg LTDS)
• Estimate the number of return journeys and apply this to your cycle counts

Stage 1 – enter data for your scheme

Stage 2 – select the standard statistical data to use in your calculation

Stage 3 – results

You will be given the option to select from:

• Enter the number of individuals walking/cycling
• Estimate this based on return journeys

HEAT asks this question because it wants to know how many people are walking and cycling. When a higher proportion of your trip counts are return journeys, this represents fewer people walking/cycling and will reduce the overall size of the health benefit.

You may be able to obtain the approximate number of walkers/cyclists by conducting a route user survey or by using data from population surveys such as the London Travel Demand Survey (LTDS). Without survey data, you can estimate the number of walkers/cyclists by estimating the proportion of return journeys and applying this to your trip counts.
HEAT – step-by-step

Stage 1 – enter data for your scheme

What proportion of trips are return journeys?
Enter a percentage here. If you have not completed a route user survey you can make a judgement using the accompanying data tables.

How many days per year do people cycle or walk?
Enter a number of days per year that people cycle or walk (maximum 365). You will have to make a judgement.

Estimating the number of days per year that people walk/cycle
• Think about your target population. If you look at the accompanying data tables it shows how frequency of walking and cycling varies between groups
• HEAT recommends a conservative estimate that people cycle 124 days per year (based on an example from Sweden)

How many people benefit?
Enter the number of individuals doing the amount of cycling or walking that you entered in previous questions.

If you are estimating the number of people based on return trips, this is where you adjust your trip counts according to the proportion of return journeys.

How to calculate the number of people walking/cycling based on return journeys
• Calculate the number of return walkers/cyclists
  
  \[ \text{number of return walkers/cyclists} = \frac{\text{total trips} \times \text{proportion of return journeys}}{2} \]
• Calculate the number of one-way walkers/cyclists
  
  \[ \text{number of one-way walkers/cyclists} = \text{total trips} - \text{number of return walkers/cyclists calculated above} \]
• Add them together to get a total number of walkers/cyclists

Stage 2 – select the standard statistical data to use in your calculation

What is the average trip duration or distance?
You will be given the option to select from:
• Duration
• Distance

You may have the duration from survey data. Otherwise, you can estimate the distance. Remember – the tool is interested in the amount of time people are spending exercising. If you enter distance data the tool will convert this into duration to make its calculation so if you can, calculate duration.

Estimating trip distance
• A very conservative estimate would be to use the length of the street that we know they cycled/walked along. This is easy to do using Google maps but it is not very realistic
• For a more realistic estimate, work out the average trip distance you can look at the accompanying data table or make some assumptions about where people are travelling from and to, using:
  – Route user surveys
  – The likely start and finish destinations (e.g. a business park and a train station)

Stage 3 – results
HEAT – step-by-step

Extra questions for post-intervention data

Most of the questions on your post-intervention data are identical to the pre-intervention questions above. Detailed below are the additional questions that you will be asked for before/after studies.

Time needed to reach the full level of cycling/walking?
Select a time [in years] from a drop-down menu. This question is asking you to estimate how long it will take for your scheme to reach full capacity. You will have to make an informed guess.

Estimating how long it will take until your scheme reaches the full level of walking/cycling

- Base your estimate on data from similar schemes
- Think about:
  - The profile of the scheme. High-profile schemes tend to have shorter times until full use of the infrastructure, eg Cycle Superhighways
  - The type of person targeted by the scheme. Is the target population well informed? Will it take a lot of persuasion and information to get them to participate?
  - The type of scheme. An area where walking and cycling levels are already high will have faster uptake than where there is little existing active travel
- You may not know what the ‘full level’ will be in the long-term. Pick a certain level you are expecting by a certain point in time and base your responses on that level. You can always add to your narrative that this level could be exceeded and deliver even bigger health benefits

Time period over which benefits are calculated?
Select a time [in years] from the drop-down menu. The time period should not be longer than you believe the entered amount of walking/cycling will be sustained. The maximum value that HEAT allows is 50 years. The time period over which savings should be examined is often standardised; use the standard for your organisation.

HEAT calculates the total value of deaths prevented over the time period that you enter here. The longer the time period, the greater the total monetised benefit calculated. It is worth noting that the HEAT results page also gives the average annual benefit from your scheme (averaging total benefits over the number of years that you enter for this question).

Estimating the time period over which benefits are calculated

- Base your estimate on data from similar schemes
- Think about how long the infrastructure will last (providing cycling/walking levels are sustained for this time)
- Use the standard value for your organisation, if available
HEAT – step-by-step

Stage 1 – enter data for your scheme

Total number of trips?
This is easy to answer if you have pre and post-intervention data. However, if you are running HEAT prospectively to calculate benefits in the future, you will need to estimate the expected uplift in walking/cycling as a result of your scheme.

Estimating the expected uplift in walking for a prospective scheme
• We have developed a rule of thumb from looking at previous schemes. Uplift in pedestrian counts can be estimated to be low (five per cent), medium (15 per cent) or high (25 per cent), based on the type of changes that have been made as part of the scheme.

Our review of projects that have reported baseline and follow-up pedestrian counts found that:

5% Schemes with one or two features (excluding the introduction of a new route that didn’t previously exist) deliver low uplift (five per cent)

15% Schemes delivering more than two features (but still not including the introduction of a new route that didn’t previously exist) deliver medium uplift (15 per cent)

25% Schemes that consist of any number of elements including the introduction a new route that didn’t previously exist, deliver high uplift (25 per cent) regardless of other additional features.

• This is the full list of features from these schemes:
  - Improvements to visual appeal of the street (eg trees, planters, coloured paving)
  - Increased space designated for walking (eg widened pavements but not a new route)
  - Improved security of the route (eg better lighting, CCTV)
  - Upgraded route signage (eg Legible London or local route signs)
  - Improved surfaces for walking (eg repaving, installing dropped curbs)
  - Removing street clutter for pedestrians
  - Traffic calming or restrictions (eg pedestrianising a street, reducing speed limits, installing speed bumps, chicane)
  - The introduction of a new route that previously didn’t exist (eg a new bridge, subway)

Proportion of cycling/walking data attributable to your intervention?
Enter a percentage. This is where you adjust for route shift and mode shift. Route and mode shift are only relevant to before/after HEAT calculations.

Route shift: this is when people who are already walking/cycling switch to your route because it is more attractive. Since they are already active you will not want to include them in your calculations as an additional health benefit of your scheme, unless they are spending a greater amount of time being active.

Mode shift: this is when people switch from one transport mode to another. HEAT is interested in shift from sedentary modes (eg car/bus/taxi) to active modes (eg walking/cycling). You do not get a health benefit from people shifting from one active mode to another unless they spend more time being active.

Stage 2 – select the standard statistical data to use in your calculation

Stage 3 – results

Estimating the proportion of cycling/walking data attributable to your intervention
• Sensitivity analysis is critical to test the impact of different estimates on your results. The value you enter here has a large impact on the size of your results.

• Base your estimate on data from similar schemes

• Estimate route shift by assessing other alternative routes

• Estimate route shift or mode shift using route user surveys (ask users directly whether they have changed mode or route)
HEAT – step-by-step

Stage 2 – select the standard statistical data to use in your calculation

In the second stage of the HEAT tool, you will be asked to select standard input data from drop-down menus or to enter standard TfL values. This allows HEAT to make its calculation based on a UK context.

The three standard statistical data items are:

- Crude mortality rate
- Value of statistical life (VSL)
- Discounting rate

These statistical data are explained in more detail in the HEAT input data section. See below for tips on what to expect when using the website itself.

Mortality rate – please choose for which age range you wish to carry out your calculation
You will be given the option to select from:

- Average population (about 20 to 64 years old)
- Younger average population (about 20 to 44 years old)
- Older average population (about 45 to 64 years old)

You should almost always select the first option (average population) unless your scheme was targeted at an older or younger group of adults.

Mortality rate – please enter a figure for mortality data either by selecting the value from the WHO mortality database, or by entering your own value
You will be given the option to:

- Select from a drop-down menu of country-specific mortality rates
- Enter your own value manually

Always select ‘United Kingdom’.

Value of statistical life – select the country for which you want to carry out your assessment, and choose the currency
First, you will be asked to select a country from a drop-down menu. Always select ‘United Kingdom’.

Next, you will be asked to select a currency from a drop-down menu. Always select ‘British pound (GBP)’.

This automatically populates a box with the value of statistical life (£3,229,114 for the UK).

Discounting rate to apply for future benefits – please enter the rate by which you wish to discount future financial savings
You will be asked to enter a discounting rate manually.

If you are running HEAT to generate a value to put into TfL’s Business Case Assistant (BCA) tool, enter a discounting rate of zero. The BCA tool applies a discounting rate to your whole business case. Otherwise, enter a discounting rate of 3.5 per cent. This figure is recommended by the Treasury and the TfL Business Case Development Manual.
HEAT – step-by-step

Stage 3 – result

The final stage of the online HEAT calculation is the results page. At first glance, this webpage can be confusing as there is a lot of text. The key points to notice from the results page are detailed below.

You get a summary of your input data and assumptions
A summary of the key input data is found at the top of the page. A summary of your assumptions is found at the bottom of the page (in a grey box).

Recording these values is important. You can defend a large monetised benefit and strengthen your business case if you are able to justify the inputs and assumptions underpinning your HEAT result. It is good practice to take a screen shot of the results page for your records. This is particularly important when you run the tool several times using different input data (sensitivity testing).

The main results to look for are:

The number of deaths per year that are prevented
This is the number of deaths per year prevented by your scheme. This is generally a small number, although it generates a large monetary benefit because we put a high value on life.

The current value of the total benefits accumulated over X years
This is the total monetised value of deaths prevented over the number of years you entered for the ‘time period over which benefits are calculated’. HEAT has discounted this value at the rate you entered earlier.

Average annual benefit
HEAT averages the total benefits (i.e. ‘current value of the total benefits accumulated’) over the number of years that you entered for the ‘time period over which benefits are calculated’. If you are using the HEAT results as input into the TfL Business Case Assistant (BCA), you need to use this average annual benefit because the BCA asks for annual costs and benefits.

The increase in the number of individuals walking/cycling between your pre and post-intervention data
These values show whether your health benefits arose more from an increase in the number of people being active or from an increase in the amount of time each person spent being active. You will see the greatest health benefits from schemes that generate large increases in the number of people being active, even if they are only active for a small amount of time.

These apply only to before/after projects.
Reporting HEAT outputs

Write a short report on your HEAT project. This will:

- Enable you to re-run your calculations easily if you need to
- Help decision-makers see exactly what the final values are based on
- Allow others to learn from your work
- Allows people to compare HEAT outputs from different schemes

We recommend you include:

**An introduction**
- The aims and objectives of the HEAT calculation
- A clear description of the project (e.g., details of the intervention to be assessed)

**Inputs**
Use the HEAT input data template as a basis for this section.

- A full list of all input data (including data source) and justification of your assumptions
- Details on methods of data collection, e.g., based on counts, surveys, estimates, or modelling
- A list of all the values used for the standard statistical data (value for statistical life, mortality rate, discounting rate)

**Outputs**
- The number of people walking and cycling (or the change in the number as a result of your scheme)
- The amount of walking or cycling per person
- The number of deaths prevented
- The total monetised benefit over a stated timeframe and/or the average annual monetised benefit
- The BCR (benefit cost ratio) if calculated for a business case or evaluation

**Outcomes**
- If possible, include a summary of any impact achieved such as a business case being accepted, publicity achieved or the inclusion of the outputs in any major policy
- If HEAT figures were challenged by decision-makers, it would also be useful to include a summary of this and how it was dealt with
How does HEAT work?

The basic function of the HEAT calculation is to work out how many deaths can be prevented per year by an increase in walking/cycling. Each death prevented has a monetary value. HEAT adds up the total monetary value from all deaths prevented by your scheme.

The number of deaths prevented is related to the amount of walking/cycling done — more time exercising per person means a bigger reduction in the risk of death. This is why you need to enter data on the amount of exercise that people are doing (time, distance or duration) and not just the number of people.

How does HEAT give a monetary value to the number of deaths prevented?

HEAT simply multiplies the number of deaths prevented (calculated above) by the value of statistical life (VSL). VSL is the monetary value given to each death prevented. For more information on VSL see HEAT input data section.

How does HEAT estimate the number of deaths prevented?

HEAT does this in three stages:

1. HEAT works out how many deaths would be expected in your observed walkers/cyclists within one year, assuming they are similar to an average population

   The tool multiplies the crude mortality rate (expected annual death rate in an average population) by the number of people you have observed walking/cycling

2. HEAT then works out how many deaths you would expect in these walkers/cyclists, given that we know that they have been physically active

   We know that physical activity reduces the risk of death. HEAT is based on studies that have shown that for every minute of walking/cycling that people do, there is a reduction in their risk of death. HEAT estimates the number of minutes spent walking/cycling based on your input data. It can therefore apply the appropriate ‘relative risk reduction’ to the crude mortality rate based on the time that your observed walkers/cyclists have been active. This produces an expected annual number of deaths in the observed walkers/cyclists. For more information on relative risk, see below.

3. HEAT calculates the number of deaths prevented owing to walking/cycling

   This step is very simple: HEAT simply subtracts the number of deaths in Step 2 from Step 1

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   1. HEAT works out how many deaths would be expected in your observed walkers/cyclists within one year, assuming they are similar to an average population

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   3. HEAT calculates the number of deaths prevented owing to walking/cycling

      This step is very simple: HEAT simply subtracts the number of deaths in Step 2 from Step 1

What is relative risk?

Relative risk is a common and simple measure used in medicine and public health to compare the risk that a specified outcome will occur in one group of people compared with another group.

HEAT compares the relative risk of dying from any cause in people who cycle or walk compared with people who do not cycle or walk.

A real example of relative risk

Studies have shown that the risk of death (from all possible causes) in regular cyclists is nine deaths in 10,000 people per year. The risk of death in non-cyclists is 10 deaths in 10,000 people per year.

So people who cycle regularly are less likely to die in any given year than people who don’t cycle.

Relative risk is the ratio of the likelihood that a specific event will occur in one group compared with another group.

The relative risk (ratio of the two risks) is:

\[
\frac{9}{10,000} \div \frac{10}{10,000} = 0.9 = 90\%
\]

You can describe this ratio in words:

“The relative risk of death is 10 per cent lower in cyclists compared with non-cyclists.”
HEAT is based on high-quality evidence from cohort studies that followed up large numbers of people (a cohort) over time. The original evidence for HEAT came from a Copenhagen-based cohort study that followed up participants for 14.5 years. The study collected data on physical activity habits as well as many other lifestyle factors. Subsequent studies have found similar relationships between physical exercise and risk of death. HEAT uses the combined results from all the highest quality studies:

- **Cycling**: evidence shows that there is a 10 per cent reduction in risk of death in people who regularly cycle 100 minutes/week compared with non-cyclists
- **Walking**: evidence shows that there is an 11 per cent reduction in risk of death in people who regularly walk for 168 minutes/week compared with non-walkers

Both the figures for walking and cycling were agreed by an international advisory group based on a systematic review of all published studies.

HEAT increases or decreases the risk percentages proportionally depending on the average time spent cycling/walking that you put into the tool.

HEAT caps the health benefits at 450 minutes per week for cycling and 300 minutes per week for walking. This is because you do not get an infinite reduction in risk of death from infinite physical activity.

**What if people are cycling more or less than 100 minutes per week?**

The studies which HEAT was based on collected data on a large number of demographic and lifestyle factors (eg detailed dietary history, smoking, age, gender, education level etc.). We can be confident that the relative risk values related to walking and cycling used in HEAT are independent of any other factors.
HEAT calculation example

Imagine a scheme that creates 2,000 new cyclists each spending 100 minutes cycling per week. We know that people who regularly cycle for 100 minutes in a week are 10 per cent less likely to die per year from any cause compared with non-cyclists.

1. Calculate the expected deaths in the observed cyclists within one year, assuming they are similar to an average population

   Crude UK mortality rate in 20 to 64-year-olds = 249 deaths/100,000

   So in 2,000 average adults you would expect five deaths
   \[ \frac{249}{100,000} \times 2,000 = 5 \text{ deaths} \]

2. Calculate how many deaths you would expect in these cyclists, given that we actually know that they have been physically active

   Risk of death in cyclists is 10 per cent lower than non-cyclists

   So in 2,000 cyclists you would expect 4.5 deaths
   \[ 0.9 \times \frac{249}{100,000} \times 2,000 = 4.5 \text{ deaths} \]

3. Calculate the number of deaths prevented that were due to cycling

   \[ 5 - 4.5 = 0.5 \text{ deaths prevented in one year} \]

4. Give a monetary value to the number of deaths prevented

   The value of each death prevented is £3,229,000

   So the total value of the scheme = £3,229,000 \times 0.5 = £1.6m in one year

HEAT also calculates benefits over longer periods of time

This calculation was based on deaths prevented in one year. HEAT is able to calculate the number of deaths prevented and resulting monetary benefit over a longer period of time (the time period over which you think the benefits will be realised). Here, HEAT is multiplying the annual benefit above by the number of years in your time period. HEAT also adjusts for the time it will take for your scheme to reach full capacity.

HEAT also applies a discounting rate to future benefits

HEAT gives you the option to discount future benefits. For more information on discounting, see HEAT input data section.
HEAT in practice  
– Royal College Street

Key details about the scheme

Royal College Street in Camden was a cycle infrastructure project that aimed to improve the public realm and increase the safety of cyclists.

Before the scheme, there was a bi-directional segregated cycle track running on one side of the street. This had resulted in several collisions where cars turning into the road had not noticed cyclists coming from their left.

The infrastructure changes included:

- Using planters as lane markers
- Resurfacing the carriageway
- Planting street trees
- Repaving pavements

Cycling data was obtained from manual and automatic trip counts before and after the intervention (2012 and 2015).

The cost of the scheme was £475,000.

Royal College Street

Photographs: Christopher Martin, Urban Movement

Input data

This section has been written using the format of the HEAT input data template.

<table>
<thead>
<tr>
<th>Data about your scheme</th>
<th>Type of scheme</th>
<th>What type of data did you collect?</th>
<th>Baseline data</th>
<th>Post-intervention data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Trips</td>
<td>Number of walking/cycling trips</td>
<td>Number of walking/cycling trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>824 per day</td>
<td>1,700 per day</td>
</tr>
<tr>
<td>Average trip duration or distance</td>
<td>0.9 miles (a conservative estimate based on the length of the street)</td>
<td>453 = number of people cycling based on 90 per cent being return trips:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many people benefit?</td>
<td>Return cyclists: = (824 x 0.9)/2</td>
<td>= 742/2 = 371</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>One-way cyclists = 824 – 742</td>
<td>= 82</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total people = 371 + 82 = 453</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

935 = number of people cycling based on 90 per cent being return trips:

- Return cyclists = (1,700 x 0.9)/2
- One-way cyclists = 1,700 – 1,530
- Total people = 765 + 170 = 935
### Key assumptions about your data

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Description</th>
<th>Estimate Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline data</strong></td>
<td>Do you know the number of people who take cycling trips, or do you wish to estimate the number of cyclists based on return journeys?</td>
<td>Estimate based on return journeys</td>
</tr>
<tr>
<td>What proportion of your trips will be a return journey?</td>
<td>90% Reason: it is a commuter route therefore a high proportion are return journeys</td>
<td></td>
</tr>
<tr>
<td>How many days per year do people cycle?</td>
<td>100 Reason: this is a conservative estimate based on the Swedish example from the HEAT website</td>
<td></td>
</tr>
<tr>
<td><strong>Post-intervention data</strong></td>
<td>Do you know the number of people who take cycling trips, or do you wish to estimate the number of cyclists based on return journeys?</td>
<td>Estimate based on return journeys</td>
</tr>
<tr>
<td>What proportion of your trips will be a return journey?</td>
<td>90% Reason: it is a commuter route therefore a high proportion are return journeys</td>
<td></td>
</tr>
<tr>
<td>How many days per year do people cycle?</td>
<td>100 Reason: this is a conservative estimate based on the Swedish example from the HEAT website</td>
<td></td>
</tr>
<tr>
<td>Time needed to reach full level of cycling?</td>
<td>2 years Reason: this is based on other schemes</td>
<td></td>
</tr>
<tr>
<td>Time period over which benefits are calculated?</td>
<td>10 years Reason: this is based on other schemes</td>
<td></td>
</tr>
<tr>
<td>Proportion of cycling data attributable to your intervention?</td>
<td>75% Reason: this is based on other schemes. Different values were tested here (sensitivity testing)</td>
<td></td>
</tr>
</tbody>
</table>

### Standard statistical data

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Description</th>
<th>Estimate Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK mortality rate</td>
<td>Choose an age range from a drop-down menu</td>
<td>Average population</td>
</tr>
<tr>
<td>Select the UK from a drop-down menu of country-specific mortality rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of statistical life</td>
<td>Select the UK from a drop-down menu</td>
<td>HEAT standard UK value is £3,229,114</td>
</tr>
<tr>
<td>Discounting rate</td>
<td>If you are running HEAT to generate inputs for TfL’s Business Case Assistant (BCA) tool, enter a discount rate of zero. The BCA discounts all figures put into it and would end up discounting health benefits twice.</td>
<td>3.5%</td>
</tr>
<tr>
<td>For all other projects, enter a discount rate of 3.5 per cent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HEAT results

- There are now 482 individuals regularly cycling as a result of the scheme
- The average amount of cycling per person has not changed
- The number of deaths per year prevented by the scheme is 0.02
- The current value of the total benefits accumulated over 10 years is £347,000
- The average annual benefit, averaged over 10 years, is £44,000

### Calculating a benefit cost ratio (BCR)

\[
\text{BCR} = \frac{\text{monetary benefits}}{\text{project costs}}
\]

\[
\text{BCR} = \frac{\£347,000}{\£475,000} = 0.73:1
\]

Even without adding any other benefits, this BCR has almost broken even. You could improve the ratio further by running the HEAT tool again for walking and adding the two benefit results together. You could estimate the likely origins and destinations of the cyclists to improve your trip distance data. You could also add in the results of a SART calculation (monetising benefits from reduced sickness absence – see the next section of this guide).
Sickness Absence Reduction Tool (SART)

50 SART at a glance
52 When should SART not be used?
54 How does SART work?
56 Using the SART tool
58 SART input data
62 Reporting SART results
64 SART in practice – Royal College Street
# SART at a glance

## What is SART?
SART is the Sickness Absence Reduction Tool. It calculates the number of sick days prevented as a result of people shifting from being inactive to being active because of your scheme. The tool calculates the monetary value of this change.

## Why do we use SART?
We use SART because:

- SART has been approved by the DfT and TfL. It is included in the DfT’s Transport analysis guidance (WebTAG) and the TfL Business Case Development Manual (BCDM)
- It increases the scope of health benefits included in a benefit cost ratio (BCR)
- The savings calculated are a direct benefit to businesses. This can be attractive to decision-makers
- There is good evidence on the effects of cycling and walking on reducing absence levels
- SART is very straightforward and simple to use

## What input data is needed?
SART is so simple that you can calculate the result at your desk using a calculator. The tool requires:

- **Data about your scheme (supplied by you)**
  - The number of people cycling or walking 30 minutes per week as a result of your scheme who were previously not walking or cycling this journey. See SART input data for tips on how to derive this value from your data
- **Standard statistical data (supplied by this guide)**
  - The proportion of people in your target population who are employed
  - The number of sick days per year prevented by being physically active
  - The average cost of a sick day

## What is the output?
SART calculates:

- The number of sick days prevented per year as a result of your scheme
- The monetary value of sick days prevented
When should SART not be used?

It is not always appropriate to use SART. The tool cannot be used for:

<table>
<thead>
<tr>
<th>Situation</th>
<th>Example</th>
<th>Why can’t you use SART?</th>
</tr>
</thead>
<tbody>
<tr>
<td>People not in paid employment</td>
<td>Monetising the number of sick days prevented by a scheme that supports retired people to cycle more.</td>
<td>The figures used in the tool are based on the average UK adult population, which includes both employed and unemployed people. The tool would not be applicable to schemes that target people who are not in paid employment.</td>
</tr>
<tr>
<td>Children</td>
<td>Monetising the number of school sick days prevented.</td>
<td>The tool is based on studies looking at adults only. The figures used in the tool are based on adult employment rates and wages.</td>
</tr>
</tbody>
</table>
How does SART work?

On average, employees who are physically active take 25 per cent fewer sick days than inactive employees. SART aims to capture the economic benefits to businesses from staff being more physically active and taking less time off work sick.

SART calculates the number of people who shifted from being inactive to active by your scheme

The sickness absence calculation is simpler than HEAT. Unlike HEAT, SART does not account for the exact amount of physical activity being done by individuals. Instead, SART is concerned with whether a scheme is providing significant additional activity.

SART assumes a fixed reduction in sickness absence for each newly active person

SART simply assumes a consistent 25 per cent reduction in sickness absence in anyone who shifts from being inactive to active through your scheme. People are classified as active if they engage in 30 minutes or more moderate physical activity per week. People who engage in fewer than 30 minutes are classed as inactive.

SART gives an economic value to each sick day prevented

SART uses standard input data to give a fixed monetary value to each sick day prevented.

How do SART results compare with HEAT results?

The monetised benefits from reduced sickness absence are much smaller than the benefits from prevented death. Economic evaluation of the London-based Connect2 project by Sustrans shows that the value of the benefits from reduced absenteeism (SART outputs) are usually much smaller than those from prevented death (HEAT outputs) for the same levels of cycling or walking. In these projects, the value of sickness absence reduction was around five per cent of the values from HEAT.

SART outputs can still make a valuable addition to the benefit cost ratio.
Using the SART tool

How long will it take to run the tool?

The tool is so simple that you can calculate the result at your desk using a calculator. It takes just a few minutes.

What are the stages of the SART tool?

SART essentially has four steps:

1. Calculate the number of newly active people on your route*
2. Estimate the proportion of these people who are employed **
3. Multiply the number of sick days prevented by physical activity by each person**
4. Apply the average cost of a sick day to an employer**

* The first stage can be broken down into further steps if you do not have survey data that gives this number directly

** Stages 2-4 are based on standard input data
SART input data

What data about my scheme does SART require?

SART needs just one key piece of results data from your scheme:

<table>
<thead>
<tr>
<th>Key result data</th>
<th>How do I collect this data?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of people who shifted from being ‘inactive’ to ‘active’ as a result of your scheme</td>
<td>To use this tool you will need to decide how many people have shifted – or will shift – from being inactive (less than 30 minutes of physical activity per week) to active (regularly achieving at least 30 minutes of active travel per week).</td>
</tr>
</tbody>
</table>

In effect, this is the number of people cycling or walking 30 minutes per week as a result of your scheme who were not previously walking or cycling this journey.

This is available from:
- Roadside counts
- Population surveys
- Modelling/estimates

NB SART input data is available from exactly the same data collection methods as for the HEAT tool. This is a benefit of using both tools at the same time. See section HEAT input data section for more detail on data collection methods.

How confident should I be of my input data?

You may know the exact number of people who have shifted from ‘inactive’ to ‘active’ based on survey data. In most cases, however, you will have to estimate this shift from trip counts or modelling data.

See below for detail on how to estimate this value. Where possible, we have provided rules of thumb for these estimates based on TfL data. You may also be able to base your assumptions on similar schemes.

It is important to record how you came to any assumptions so you can justify your results in the final business case or report.

How do I work out how many people shifted from being inactive to active?

You can estimate this shift by breaking down the question into three stages:

1. Calculate the uplift in the number of people cycling or walking on your route

You can get this data directly from route user surveys or modelling.

Or you can calculate uplift from trip counts

   a. Calculate uplift \( = \text{after trip count} - \text{before trip count} \)

b. Estimate the number of walkers/cyclists based on the proportion of return journeys out of all trips observed. The method used is exactly the same as for the HEAT tool (see HEAT – step-by-step section)

2. Calculate the proportion who are new active travellers

   If you have the data from route user surveys

   • Include as new active travellers anyone now walking/cycling on your route who was previously using a car, motorcycle, taxi/minicab or bus

   If you need to estimate from trip counts

   You can use the following rules of thumb which are based on TfL cycling data:

   a. Only include people who shifted mode: this automatically excludes the existing walkers/cyclists who have re-routed to your scheme. TfL cycling data shows that 45-50 per cent of uplift in cycling was due to mode shift

b. Of these, only include people who were previously using ‘inactive’ modes (car, motorcycle, taxi/minicab, bus). TfL data shows that 40-45 per cent of current cyclists in London have shifted from a sedentary mode to cycling

   These data are for cycling. Currently, TfL does not have the same data for walking. To calculate SART for walking consider people shifting to public transport from ‘inactive modes’.

3. Calculate the proportion of these new active travellers who are cycling or walking for at least 30 minutes per week

Not all the newly active people identified above will be doing 30 minutes of physical activity per week. You need to exclude those who are still not reaching 30 minutes per week.

Work out who to exclude using the following rules of thumb

   • If your scheme delivers an average trip taking less than 10 minutes to walk/cycle, only include regular commuters (as they do the trip regularly enough to reach 30 minutes/week)

   • If your scheme delivers an average trip of 10 minutes or more, include all new active travellers
Breakdown of the uplift in cycling to identify newly active travellers

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cyclists on this route before the intervention</td>
<td>Number of cyclists on this route after the intervention</td>
</tr>
<tr>
<td>Uplift in cycling</td>
<td></td>
</tr>
</tbody>
</table>

New cyclists who shifted from another mode

- 40-45%
- 45-50%
- 50-55%

Existing cyclists who shifted route

- 55-60%

Previously bus/car/taxi (sedentary modes)

Previously walking/Tube/train (active modes)

Active for more than 30 minutes/week

Active for less than 30 minutes/week

New journeys on this route but we are unsure what these people were doing before

How do we know whether a transport mode should be classed as sedentary or active?

Many people make short walk stages as part of longer trips on public transport. To set a common and meaningful benchmark, TfL defines a ‘substantial’ walk stage as being greater than five minutes in duration.

Data from Travel in London 6 shows that walk stages of more than five minutes are more likely to be made as part of a main mode public transport trip, rather than as part of a trip by private motor vehicle.

- Active modes: Most trips made using rail, Underground or DLR services included a walk stage of more than 5 minutes (83 per cent).
- Sedentary modes: Car, taxi or bus journeys are classed as sedentary modes because a much smaller proportion of travellers are observed to walk for more than five minutes as part of their journey. 57 per cent of bus trips involved walk stage of more than 5 minutes. Only five per cent of car journeys involved a walk stage of more than 5 minutes.

What standard statistical data does SART use?

The SART calculation uses three standard input figures. All are approved by TfL. They are based on recent UK and London-specific data.

- Percentage of walkers/cyclists who are employed
  - SART uses a standard employment rate of 65 per cent.
  - This is an estimate based on data from the London Travel Demand Survey.

- Reduction in sick days per year for each newly active person
  - SART uses a standard figure of 1.3 sick days prevented per newly active person per year.
  - This is an estimate based on:
    - A 25 per cent reduction in sickness absence resulting from a shift from inactive to active
    - The current average number of sick days taken by adults in the UK (5.3 days)
  - This data comes from the National Institute for Health and Care Excellence and various other sources

- Monetary value for each sick day prevented
  - SART uses a standard value of £133.68 per sick day prevented
  - This is an estimate based on median daily pay in London (Office for National Statistics)
Reporting SART results

Just like for HEAT, it is recommended that you write up and share a short report on your SART project. This can be used within the organisation for help with future projects and included in a business case that has used HEAT.

We recommend you include:

An introduction
- The aims and objectives of the SART calculation
- A clear description of the project (e.g., details of the intervention to be assessed)

Inputs
- A full list of all input data (including data source) and justification of your assumptions
- Details on methods of data collection, e.g., based on counts, surveys, estimates, or modelling
- A list all the values used for the standard statistical data

Outputs
- The number of sick days prevented
- The annual savings to businesses from prevented sick days (you might also discount this value and total it over a longer time frame)
- The BCR (benefit cost ratio) if calculated for a business case or evaluation

Outcomes
- If possible, include a summary of any impact achieved such as a business case being accepted, publicity achieved or the inclusion of the outputs in any major policy etc
- If SART figures were challenged by decision-makers, it would also be useful to include a summary of this and how it was dealt with
Key details about the scheme

Royal College Street in Camden was a cycle infrastructure project that aimed to improve the public realm and increase the safety of cyclists.

Before the scheme, there was a bi-directional segregated cycle track running on one side of the street. This had resulted in several collisions where cars turning into the road had not noticed cyclists coming from their left.

The infrastructure changes included:

- Putting cycle track on both sides of the road
- Installing armadillos to separate the cycle track from the road
- Using planters as lane markers
- Resurfacing the road
- Planting street trees
- Repaving pavements

Cycling data was obtained from manual and automatic trip counts before and after the intervention (2012 and 2015).

The calculation

1. Calculate the number of newly active people on your route

\[
\text{Uplift in cycling} = 1,000 - 499 = 501 \text{ people}
\]

2. Estimate the proportion of these walkers/cyclists who are employed

\[
\text{Number of employed people} = 90 \text{ people} \times 65\% = 59 \text{ people}
\]

3. Multiply by the number of sick days prevented by physical activity per person

\[
\text{Number of sick days} = 59 \text{ people} \times 1.3 \text{ days} = 76 \text{ days}
\]

4. Apply to the average cost of a sick day to an employer

\[
\text{Annual savings} = 76 \text{ days} \times £133.68 = £10,187
\]

You can discount this value and total it over 10 years:

\[
\text{Annual savings discounted} = £10,187 \times (1 - 0.035)^{10} = £93,932
\]

You can add it to the HEAT output within the BCR:

\[
\frac{£347,000 + £93,932}{£475,000} = 0.93:1
\]
Frequently asked questions

68 Using HEAT
71 Using SART
72 Using the outputs of HEAT and SART
74 More useful information
Using HEAT

What happens if I have not collected my results as an average amount of time spent walking/cycling per person (which is what HEAT uses)?

This is not a problem. HEAT is able to calculate time spent cycling and walking using either trip counts (providing you enter a distance for the trip) or average distance cycled (generally from survey data).

HEAT assumes an average speed of 14km/hour for cycling and 4.8km/hour for walking. The tool applies this speed to your trip count and distance data to get an average time spent walking/cycling.

I only collected the number of cycling and walking trips for my project. HEAT needs the number of people walking/cycling. What do I do?

We recommend collecting information on the number of people impacted wherever possible via surveys. However, this is not always possible. You can estimate the number of people walking/cycling from trip counts, based on the proportion of trips that were return journeys. See HEAT – step-by-step section.

Does the physical activity need to be of a minimum trip duration or length to have an impact and be included in HEAT?

No. Any amount of walking or cycling that results from your scheme will bring a benefit recognised by HEAT. HEAT is based on:

- The number of people walking and cycling
- The average time spent per person walking and cycling

My project is targeted at children. Can I still use HEAT?

HEAT cannot be used for monetising health benefits in children because the evidence base in children is not currently strong enough. However, HEAT is still useful for schemes targeting children because you can run the tool to monetise the benefits to adults walking as a result of the intervention (e.g., adults walking with children to school/teachers walking to school).

You should capture the health benefits to children in the narrative section of your business case.

Automatic counts might include children. Would that artificially inflate the HEAT and SART outcomes?

The counting of children by automatic sensors is unlikely to be a problem for cycle counts as we know that only a small proportion of cyclists on London roads are under 16 years.

If a route user survey is available, this will give information on the proportion of walkers or cyclists who are children. Overall counts can be reduced accordingly.

HEAT caps the health benefits of cycling and walking at 450 and 460 minutes respectively. How do we know if our trip counts are including lots of people that are already doing that much activity through other means (e.g., sports/exercise classes)?

HEAT should not be used for populations with very high physical activity levels as it is known that they get only limited additional health benefit from any increase in exercise. However, this is not a problem for any scheme targeting the general population in London. Average physical activity levels in London are low and only a small proportion of people in the general public will be doing more than 450 minutes cycling or 460 minutes of walking per week.

My scheme is only going to increase cycling among existing cyclists. Can I still use HEAT in my business case?

Yes. There will be a health benefit as long as the target population is not already doing more than 450 minutes of cycling on average across the whole population (it doesn’t matter if some individuals are doing more than 450 minutes).

Whether or not existing cyclists will get a monetised benefit, you will also want to consider the potential for new cyclists to benefit in future. If you think this might happen, you can add this benefit to the narrative section of your business case.

Can I use HEAT even though I don’t know whether those who increase their active travel aren’t just reducing other types of activity?

Yes. Any other physical activity that people are doing, or not doing, is irrelevant. HEAT is based on long-term studies using very large populations. Some people in these populations would have been taking exercise already and some would not have; some would have taken up new activity and some would have stopped existing activity. HEAT is based on the average reduced risk of death from cycling/walking regardless of all other activity carried out by people in the population.

How do we know that it is the cycling and walking that is making people healthier? What if the reduced risk of death is just because the cyclists and walkers are already healthy (e.g., eating healthily, not smoking)?

HEAT is based on studies which collected data on a large number of demographic and lifestyle factors (e.g., detailed dietary history, smoking, age, gender, education level etc.). Statisticians adjusted for all these other ‘confounding factors’ in their statistical analysis. We can be confident that the reduction in risk of death related to walking and cycling used by HEAT is independent of any other factors.

Does HEAT account for the intensity of walking and cycling? For example, can HEAT capture if a new cycle trip was an intense 10 minutes while an old journey included a slow 10-minute walk?

HEAT does not account for intensity of physical activity. However, we would expect differences in the intensity of walking/cycling to average out over the whole population of cyclists/walkers.

This is why it is important to run HEAT on a population level and not for very small groups or individuals.
Using SART

Do people really achieve health benefits from only 30 minutes per week of physical activity?

Evidence shows that moving people from being inactive (less than 30 minutes exercise per week) to active (more than 30 minutes per week) brings the biggest health benefit.

Getting people to go from doing nothing to cycling/walking for 30 minutes each week can be a big achievement for them and likely to enable them to move to much healthier lifestyles.

Are there any other costs associated with sick leave other than just wages? If so, can we add these into our SART calculation?

Yes. Other costs could include:

- Pension contributions
- National Insurance Contributions
- The costs of covering for the absent staff member
- Lost productivity (fewer goods sold/service standards decline)

You can try and estimate these and add them into the cost of a sick day but you would need to find a reliable evidence source to justify your costings. Experience has shown that these values tend to be much smaller than the impact of salary. It may not be worth adding them in.
How can I convince people to believe the figure that comes out of the HEAT calculation? It seems far too big.

• Assure them that HEAT is endorsed by the DfT and TfL
• Conduct sensitivity testing using very conservative assumptions to see how the results vary and to build your confidence in the result
• Choose very conservative assumptions to produce a figure that is plausible to your audience
• Look at HEAT at a glance section for detail on the source of the tool and its legitimacy

Will I be double counting health benefits if I use HEAT and SART together?

No. As HEAT and SART value different health benefits of walking and cycling the two tools can be used together with no potential for double counting of benefits.

Who will receive the benefits that are valued by HEAT? Is it just the health sector?

HEAT produces a monetary value for deaths prevented, but this is not real saved money that goes to any one sector. Instead, it is the value that people put on the deaths that did not happen as a result of your scheme.

It is important to value the deaths prevented by active travel because:

• Business cases should demonstrate the global benefits delivered by a scheme – it does not matter who the benefits go to
• Health is a TfL priority and we need evidence to show that we are working to improve it
• Local authorities have statutory responsibilities for improving public health and must demonstrate what they are doing to improve it

HEAT and SART only value prevented death and prevented sickness absence. What about the other health benefits from physical activity?

There are other benefits of increasing physical activity which can be monetised such as the reduced risk of illness and the reduced costs of healthcare. Currently we do not have tools for calculating these monetary benefits but you can describe them in your narrative.

In business cases it is also important to set out the wider health benefits beyond those included in the benefit cost ration. All the information you need to do this is in the TfL health action plan Improving the health of Londoners.

Don’t the harms of air pollution and accidents outweigh the physical activity benefits?

No. The health benefits of physical activity far outweigh the risk of road traffic injury and air pollution (by 63 to 1). See page 27 of the TfL health action plan Improving the health of Londoners and the Greater London Authority report Transport and health in London.

HEAT measures the health benefits achieved after accounting for other risks. The relative risk of death by any cause already includes the impacts of road traffic collisions and air pollution.

Improving health is not a specific objective for my project so should I assume there is no point in capturing health benefits in the business case?

No. Business cases should not only reflect the objectives of the project, but should also capture the global benefits the project is expected to deliver.

You can use these health benefit calculations in a number of ways:

• To demonstrate the wider benefits of what your project can deliver
• To improve the BCR of your business case
• To demonstrate how TfL has made progress against its priority to improve the health of Londoners
## HEAT input data template

<table>
<thead>
<tr>
<th>Data about your scheme</th>
<th>Key assumptions about your data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of scheme</td>
<td>Baseline data</td>
</tr>
<tr>
<td></td>
<td>Only complete this section if your input data uses trip counts</td>
</tr>
<tr>
<td></td>
<td>Do you know the number of people who take walking/cycling trips, or do you wish to estimate the number based on return journeys?</td>
</tr>
<tr>
<td></td>
<td>What proportion of your trips will be a return journey?</td>
</tr>
<tr>
<td></td>
<td>How many days per year do people cycle?</td>
</tr>
<tr>
<td>What type of data did you collect?</td>
<td>Post – intervention data</td>
</tr>
<tr>
<td></td>
<td>Only complete this section if your input data uses trip counts</td>
</tr>
<tr>
<td></td>
<td>Do you know the number of people who take walking/cycling trips, or do you wish to estimate the number based on return journeys?</td>
</tr>
<tr>
<td></td>
<td>What proportion of your trips will be a return journey?</td>
</tr>
<tr>
<td></td>
<td>How many days per year do people walk/cycle?</td>
</tr>
<tr>
<td></td>
<td>Time needed to reach full level of walking/cycling?</td>
</tr>
<tr>
<td></td>
<td>Time period over which benefits are calculated?</td>
</tr>
<tr>
<td>Baseline data</td>
<td>Post – intervention data</td>
</tr>
<tr>
<td>* you only need to complete one of these sections (duration/ distance/ trips)</td>
<td>Only complete this section if your input data uses trip counts</td>
</tr>
<tr>
<td></td>
<td>Do you know the number of people who take walking/cycling trips, or do you wish to estimate the number based on return journeys?</td>
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<td>Time needed to reach full level of walking/cycling?</td>
</tr>
<tr>
<td></td>
<td>Time period over which benefits are calculated?</td>
</tr>
<tr>
<td></td>
<td>Proportion of walking/cycling data attributable to your intervention?</td>
</tr>
</tbody>
</table>

Baseline data
- Duration: Number of walking/cycling trips, Average trip duration or distance, Distance: Number of walking/cycling trips, Average trip duration or distance, Trips: Number of walking/cycling trips, Average trip duration or distance, How many people benefit? (Complete this based on your assumptions detailed on the next page).

Post–intervention data
- Duration: Number of walking/cycling trips, Average trip duration or distance, Distance: Number of walking/cycling trips, Average trip duration or distance, Trips: Number of walking/cycling trips, Average trip duration or distance, How many people benefit? (Complete this based on your assumptions detailed on the next page).
## Standard statistical data

<table>
<thead>
<tr>
<th></th>
<th>Choose an age range from the dropdown menu</th>
<th>Average population</th>
<th>Younger average population</th>
<th>Older average population</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK mortality rate</td>
<td>Select the UK from the dropdown menu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of statistical life</td>
<td>Select the UK from the dropdown menu</td>
<td>HEAT standard UK value is £3,229,114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discounting rate</td>
<td>If you are running HEAT to generate inputs for TfL’s Business Case Assistant (BCA) tool, enter a discount rate of zero. The BCA discounts all figures put into it and would end up discounting health benefits twice</td>
<td>For all other projects, enter a discount rate of 3.5 per cent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Documents

- **HEAT methodology and user guide (2014 update)**
- **Improving the health of Londoners: Transport action plan**
- **Travel in London reports**
- **NICE guidelines: Physical activity and the environment**
- **Cycling is good for health and the economy, Glasgow Centre for Population Health3**

## Websites

- **HEAT website**
  heatwalkingcycling.org
- **Department for Transport WebTAG**
  www.gov.uk/guidance/transport-analysis-guidance-webtag
- **Sustrans, national charity enabling people to travel by foot, bike or public transport**
  www.sustrans.org.uk/
- **Living Streets, the UK charity for everyday walking**
  www.livingstreets.org.uk/
- **Transport for London**
  tfl.gov.uk

### If I get really stuck using these tools, what should I do?

- Read the WHO manual on the HEAT website
- Sign up to a WHO online training session
- Contact Lucy Saunders (lucysaunders@tfl.gov.uk)