



# NEWBITS

NEW Business models for Intelligent Transport Systems





## Developing successful business cases for ITS services

Webinar

21<sup>st</sup> February 2019 – 16:00 CET / 15:00 GMT / 10:00 EST



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 [newbits-project.eu](http://newbits-project.eu)  
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## Key objectives

**EU-Project**

**Background of the NEWBITS project and its goals**

**Cost Benefit Analysis**

**Find out how to use cost-benefit analysis to support decision-making for (C)-ITS services**

**Case Study**

**Get insights from a demonstration of an intelligent carpooling system at UAB**



NEWBITS NEW Business models for Intelligent Transport Systems

## Speakers



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NEWBITS

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## SPEAKER

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## Facts about NEWBITS

- **Funding** | Horizon 2020  
Smart, Green and Integrated Transport
  - **Duration** | 30 months (Oct 2016-Mar 2019)
  - **Partners** | 9 partners from 6 countries
  - **Coordinator** | Viara Bojkova, Ortelio
- 
- **Aim** | An improved understanding of the conditions affecting Intelligent Transport Systems (ITS) innovation deployment using an improved value network-based framework that
    - minimizes failures inherent to (C-)ITS innovation diffusion
    - evolves current business models
    - identifies effective incentives to accelerate (C-)ITS deployment



## NEWBITS Case studies

1



### University carpooling service in Spain

an example of the sharing economy collaborative consumption, where the platform matches users to vehicles to reduce unnecessary trips

2



### Urban traffic control solution in Italy

an example of the 'Internet of Things' (IoT) smart city's C-ITS platform to monitor drivers' behaviour and forecast

3



### Container tracking service in the NL

an example of how smart data analytics and real-time information can improve the logistic chain

4



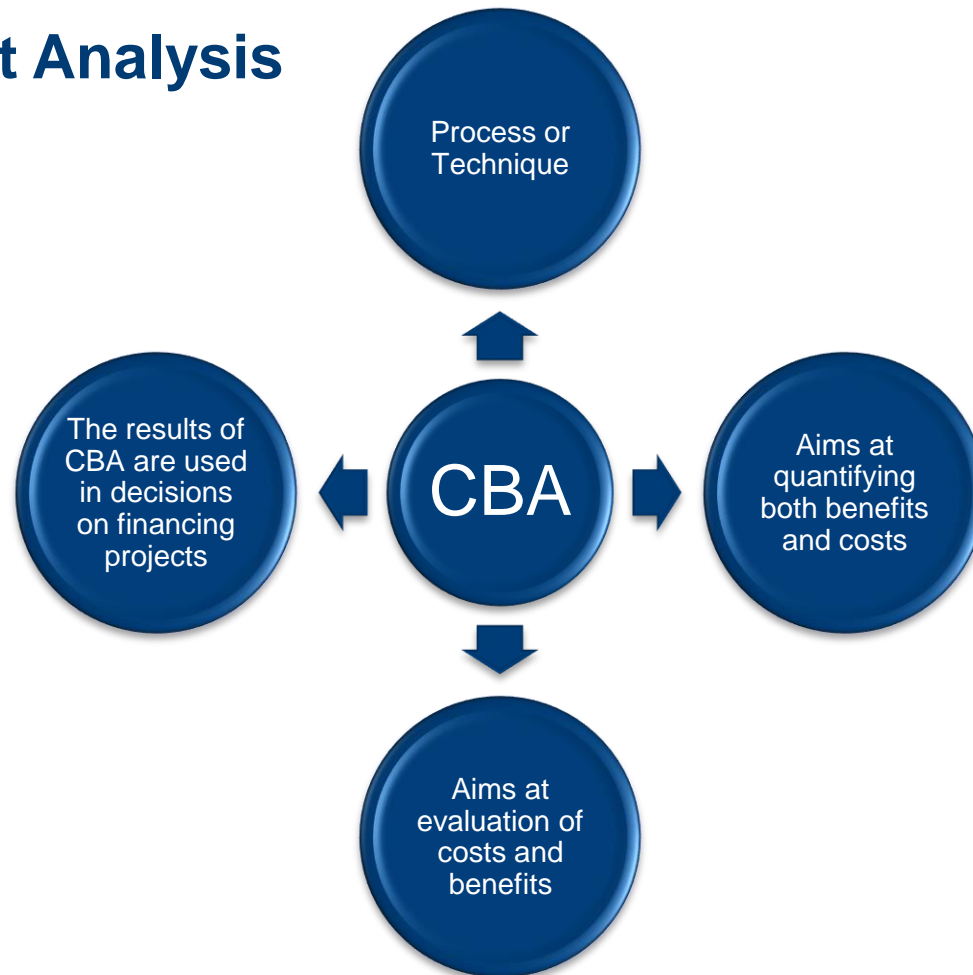
### Rail maintenance solution in the UK

an example of big data analytics and visualisation service of infrastructure assets to avoid unplanned repairs

## Introduction to Cost-Benefit Analysis

- ✓ Cost Benefit General Introduction
- ✓ Identification of Costs and Benefits
- ✓ General Methodology of CBA
- ✓ Indicators of CBA
- ✓ Limitations of CBA
- ✓ CBA: Case Study 1

# Cost-Benefit Analysis





## Definition of CBA

Although CBA aims to quantify all the measures in monetary terms to compare in a common unit, not all valuations are available to monetise.

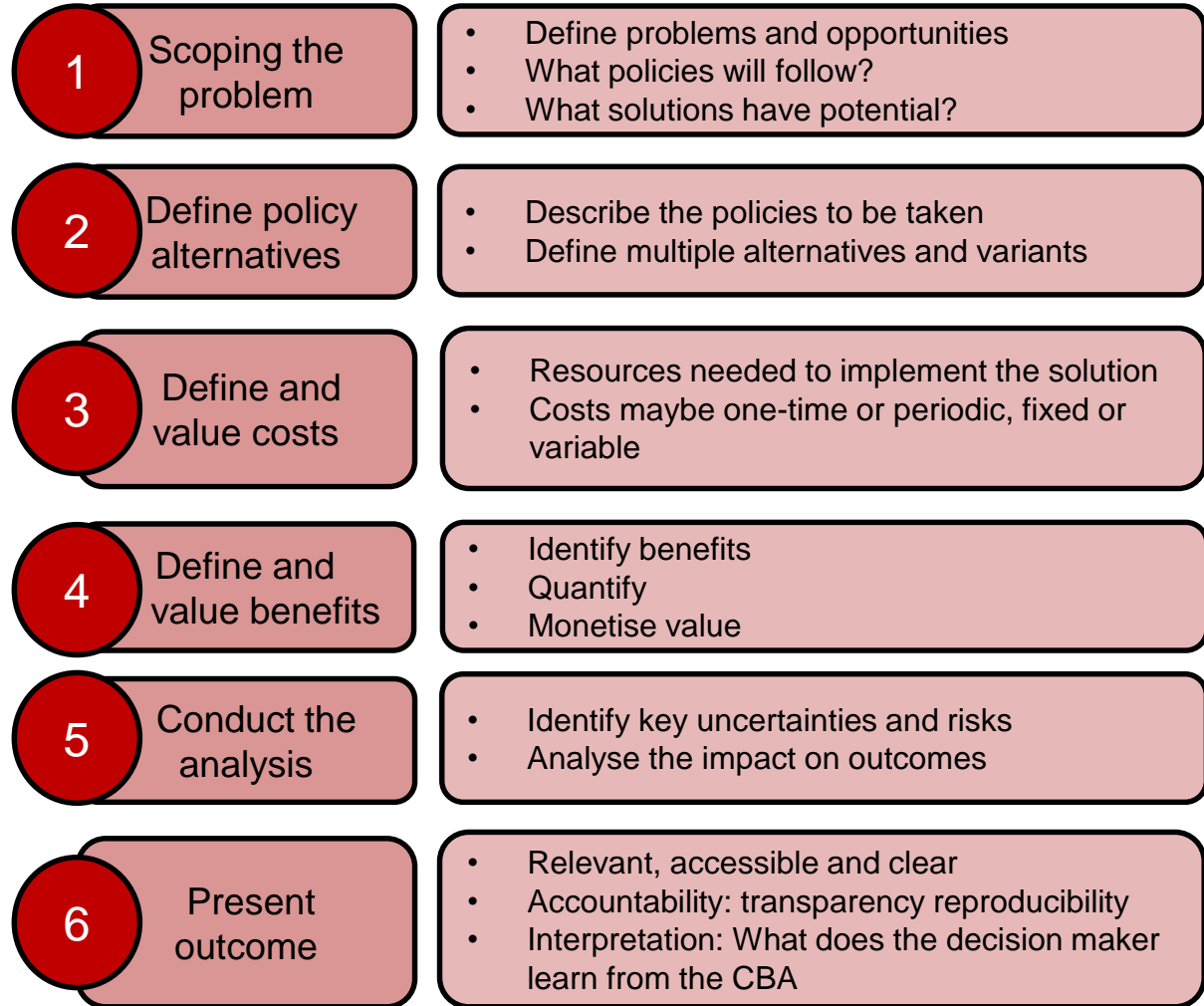
It is usually carried out to support decision making in investments

Benefit-Cost (also called Cost-Benefit) analysis, uses monetised (measured in monetary units) values to compare total incremental benefits with total incremental costs. The results can be presented as a ratio, with benefits divided by costs.

CBA is a useful tool that not only assists in deciding to proceed with a policy measure by assessing its benefits and costs, but can also be valuable in structuring the policy preparation itself.

CBA is 'a procedure aimed at quantifying and evaluating the costs and benefits of an investment project in order to determine its feasibility'.

# Methodology





## Costs

- Costs are defined as the **resources**, such as land, labour, and material, **expended on the project** by the entity providing it.
- These "costs" are often referred to as "agency costs" and **do not include any costs borne by the users** of the project or the public at large.
  - Initial costs
  - Continuing costs
  - Rehabilitation costs
  - End of project costs



## Benefits

- Benefits are defined as **all of the effects** of the project/ program **on its users or the society** at large, even those effects that are negative (sometimes referred to as disbenefits).
- Benefits and disbenefits are **measurable** and have **economic value**.
  - Travel time
  - Vehicle costs
  - Safety
  - Emissions
  - Reliability
  - Noise/Pollution
  - Economic effects
  - Community impact

## Discounting to present value

- The **present value of money or goods** is perceived to be higher than the expected value of returns in the future due to effects of inflation etc.
- Hence, the potential value of benefit or cost in the future may not be representative of the present actual value of cost or benefit. It is therefore **essential** when considering a long term of the project to **discount all future costs and benefits to a common present value**. This concept is termed as **discounting** and allows calculation of the **Net Present Value (NPV)** of a project.
- Using a **discount rate**, the current equivalent monetary value of a benefit or cost that occurs in the future is calculated. The formula used to calculate the NPV of a future benefit or cost is:

$$PV = \frac{F}{(1 + r)^n}$$

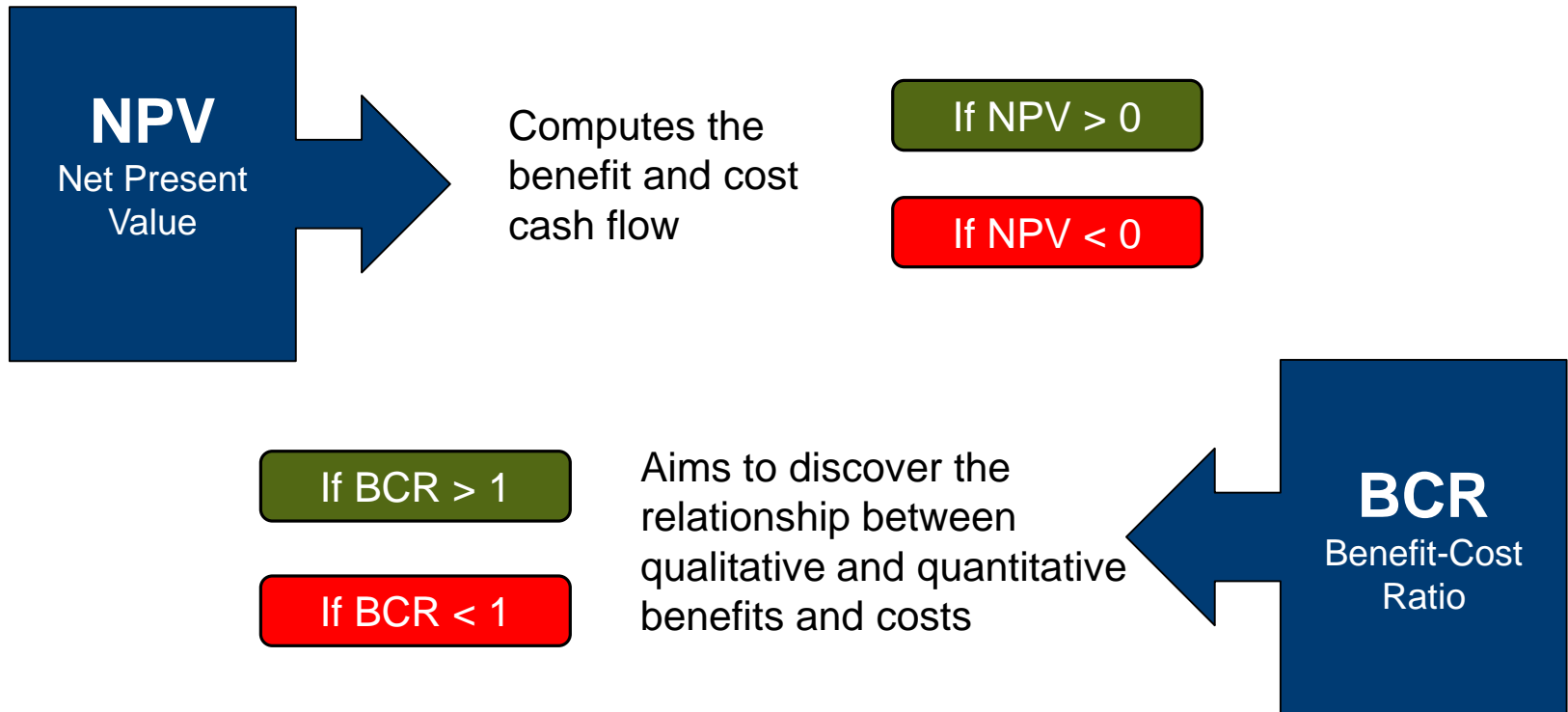
PV = Present value

F = Future value of the benefit or cost, in monetary terms

r = Rate of discount

n = Number of periods under consideration, for example number of years

## Indicators for CBA



## Net Present Value

- NPV provides the **difference** between the **present value of the benefits** and the present value of the **costs** and is expressed using the following equation:

$$NPV = \sum PV (B) - \sum PV (C)$$

NPV = net present value

PV (B) = present value of the benefits

PV (C) = present value of the costs

- This equation is also expressed as:

$$NPV = \sum \text{present value of total future benefits} - \sum \text{present value of total future costs}$$

- The NPV signifies that **for value of NPV>0, the project has the economic justification to proceed**, denoting that if the sum of the NPV of benefits is greater than the NPV of costs.

## Benefit Cost Ratio

- BCR provides the results of the CBA as a ratio. This is achieved by calculating the **sum of the NPV of benefits** and comparing them against the **sum of the NPV of costs**. BCR is expressed by the following equation:

$$BCR = \frac{\sum PV (B)}{\sum PV (C)}$$

BCR = benefit cost ratio

PV (B) = present value of the benefits

PV (C) = present value of the costs

- It is also commonly expressed as:

$$BCR = \frac{\sum \textit{present value of total future benefits}}{\sum \textit{present value of total future costs}}$$

- If the **BCR is below 1**, it is interpreted that the **costs outweigh the benefits** of the project and hence should not proceed. A **BCR above 1** suggests that the **benefits associated with the project are higher**.



## Limitations of CBA

Geographical area

Political context

Point of time consideration

Technology issue

Human factors

Discount rate

Uncertainty over costs

Quantifying benefits

Moral and ethical limitation of CBA

## Summary of CBA

CBA assesses the costs and the benefits attributable to an investment to evaluate the economic advantages or disadvantages

CBA has certain limitations

For decision-making in investments, an analytical information tool such as the Cost-Benefit Analysis (CBA) is used

Although typically a CBA is conducted before a project is initiated, it can also be carried out on completion of a project.

The higher the reliability of the CBA results, the higher the success for implementation of a project



**SPEAKER**

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# UAB

**Universitat Autònoma  
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## Case Study 1: Intelligent carpooling system at UAB

### Problem:

- 13.000 vehicles daily with a peak of 8,000 when exist 7,000 parking spaces at low occupation index: 1.2
- UAB: mobility problems, infrastructure maintenance, occupation of space (opportunity cost by more efficient or desired uses)
- Users: time, cost and quality of the trip to and from the university
- Society: unnecessary pollution, increase in congestion of the road network

### Carpooling system:

- if we can ensure that the vehicle is of high occupancy (tracking via app) you can park in reserved area

### Reference:

Newbits D5.1: <http://newbits-project.eu/publications/deliverables/>

## CS1-CBA: Costs

CS1 One-time costs	Amount (€)
Pilot software development and implementation	122,264.00
Convert prototype into definitive software	28,000.00
Servers	750.00
Cost of barriers and sensors for parking spaces	75,000.00
<b>TOTAL NON-RECURRING COSTS</b>	<b>234,571.00</b>

CS1 Periodic costs (Op. & Maint.)	Amount (€)	Periodicity
Hardware hosting	216	Per year
Software maintenance	7,500	Per Year
Infraestructure Maintenance	3,000	Per Year
Social Network Monitoring	5,220	Per year
Software Major Revision and Upgrade	30,000	4 <sup>th</sup> year only

## CS1-CBA: Benefits

### Incomes:

- Users do not pay → No monetary income → all benefits are intangible
- Most relevant quantifiable: Reduction in CO<sub>2</sub> emissions.
- CO<sub>2</sub> savings calculated using:
  - Reduction of 2.000 cars in 3 years (Project objectives)
  - Days per year to be considered (aligned with public transport usage)
  - Average trip in km (UAB Mobility plan)
  - Average CO<sub>2</sub> emissions by age per car (Eurostat)
  - Average age of cars in Catalonia (Mobility observatory Catalonia Government)

### Results:

- The investment is recovered at the beginning of year 3.



## CS1-CBA: Benefits

Other **intangible benefits** that we have not included in the CBA given its calculation complexity:

- **Reduction of stress** (increase of tranquillity, reduction of uncertainty) considering the security of finding an unoccupied car park without having to look for it
- **Reducing 15% the influx of vehicles** leads to a considerable reduction in traffic accidents
- **Time to find a parking space** close to zero, in peak hours could be more than 10 minutes
- **Data acquisition.** System will provide a big data on users' mobility habits
- **Reduction of vehicles parked inappropriately.** Improvement of internal mobility and safety in University campus
- **Promotion of interaction between users** of different centres.
- **Promotion of multidisciplinary groups and initiatives.** Aligned to the corporate objective of promoting multidisciplinary innovation initiatives on campus

## Conclusions

- CBA is an analytic tool that endeavours to express the most important effects in monetary values, which is not always possible.
- It measures efficiency, yet decision makers sometime will have other objectives that have nothing to do with efficiency.
- Regarding C-ITS services, these are more likely to be delivered when a number of organisations with different business cases and models are involved.
- However, it is a very difficult task to quantify and understand within a CBA all individual costs and benefits, which will vary with each link in the delivery chain, the consumer and society.
- This leads us to the conclusion that CBA provides, at the best regard, the first general overview of the potential of cooperative systems to address society needs.
- However, its support to build a business case for a specific implementation of cooperative system is very limited.





## NEWBITS Webinar Series

Recordings are available on [www.newbits-project.eu](http://www.newbits-project.eu)



### Unveiling the Potential of ITS Applications / Services in Europe

- how to identify elements of an ITS service that are **key for the potential user**
- **market insights** for four ITS services covering all ITS market segments



### Communities of Interest (Cols) for the advancement of new collaborative business models of C-ITS products and services

- how a Col - an **exchanging accumulation of different stakeholders**, can drive the development of new business models for ITS.
- **functionalities, tools and features** of the NEWBITS Network Platform (NNP)







### Developing innovative business models for ITS applications using a Value Network Approach

- how to use a value-network-based approach to **craft new business models** for ITS services.
- **role of intangible value flows** between stakeholders



# NEWBITS

## Join the NEWBITS Network Platform today !

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