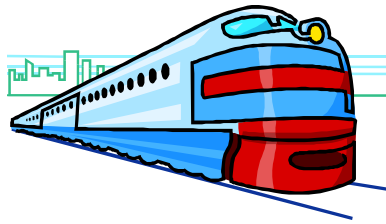


# **Information material for the REPID workshop in June 2003**

## **REPID application - REPID methodology**



## Introduction

This information material is aimed to facilitate the understanding and use of the REPID application. It has been made by Industrial Environmental Informatics (IMI) at Chalmers University of Technology.

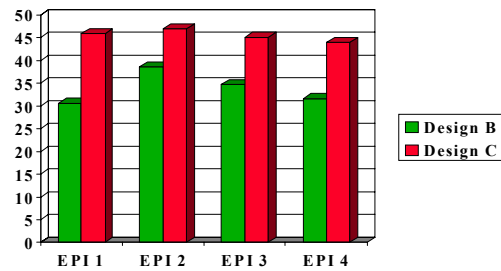
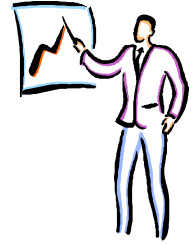
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## Usefulness of the REPID methodology

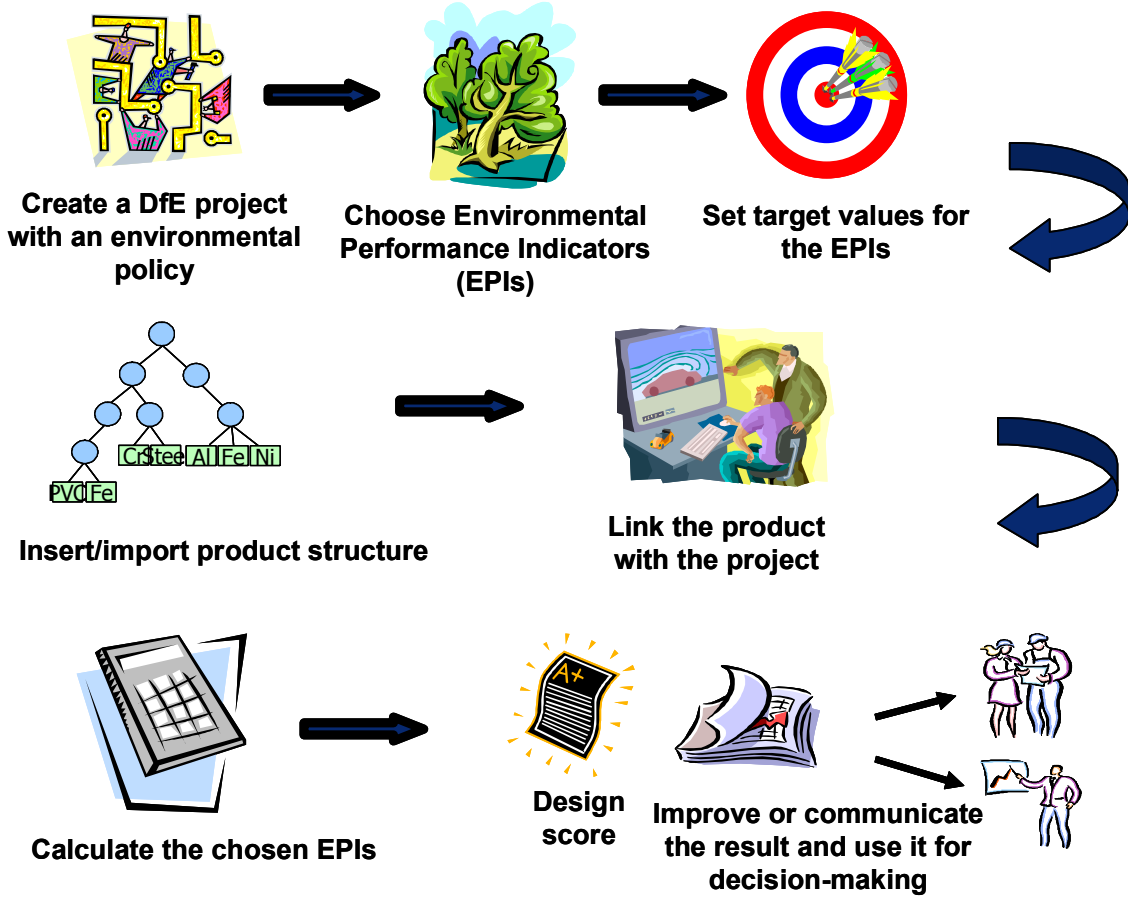
- The REPID tool is a Design for Environment (DfE) tool aiming to improve eco-efficiency for rail vehicles
- The REPID tool enables communication of environmental performance within the industry
- The REPID tool measures environmental performance in the design phase



# How to use the REPID application

The REPID application is based on a methodology developed in the RAVEL (Rail Vehicle eco-efficiency design) project, which has been further developed within the REPID project.

Below is a summary of the most important steps in the REPID application.



## **Create a DfE project with an environmental policy**

First, a project is created, that has the task to design a specific part, for example a train. A Design for Environment (DfE) project manages fulfilment to the Eco-efficiency targets. DfE projects often relate to design projects in the organisations.



The REPID information platform complies with a structured management of design projects. Targets, designs and users are associated with projects, and projects are used to keep data about these entities together. A project can be organizationally broken down into smaller pieces.

## **Chose Environmental Performance Indicators (EPIs)**

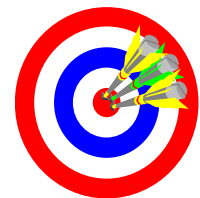
- The chosen indicators (EPIs) should be in line with the company's environmental policy or in line with specific user requirement or legal requirements.
- There are 21 EPIs to choose from. The set of indicators covers the following areas: noise, energy, exhaust emissions, materials and recycling, electromagnetic fields and manufacturing. The whole life cycle of the train is included: Production, Operation and End-of-life. Not all 21 are implemented in the first version of the REPID tool presented in June 2003.
- The EPIs have been designed and defined to follow state-of-the-art of scientific knowledge, environmental impact of rail vehicles, legal requirements and company policies.
- The REPID EPIs should be used when setting environmental targets, when measuring the environmental performance, when calculating an environmental baseline and when evaluating environmental performance.
- To calculate EPIs is to measure the eco-efficiency performance of a design.



- There are material related EPIs and non material related EPIs. A material related EPI needs basic data (material properties) from the materials in a component in order to be calculated, e.g. the EPI Amount of prohibited materials needs to know which materials are prohibited in order to be calculated. Non material related EPIs are calculated based on component properties, e.g. system mass.
- For more information about each indicator read the short definitions available in the REPID application.

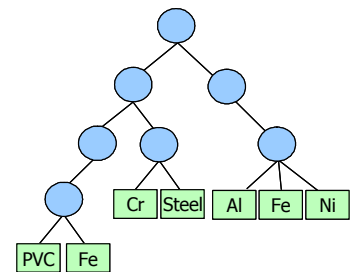
### ***Set target values for the EPIs***

Setting and breaking down targets are important. Target values for the chosen indicators should be set according to requirement within or outside the company. The unit of the indicators should also be set here since target values and EPI values must have the same unit to be comparable.



### ***Insert product structure***

Create product structure including components and materials or import product structure from an other file. You will select materials from a list of commonly used construction materials. It is important to note that these types of lists never are complete. If you, in your product, have a material not present on the list you must either exclude the material or do a best approximation by selecting a similar material. As a first choice you should always try to find an as similar material as possible. You must however then be aware of and consider these approximations when you interpret and communicate the result.



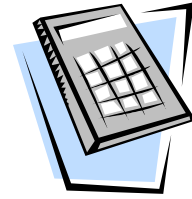
### ***Link the product with a project***

One or several products are linked to a project to make it possible to compare alternative designs and to confirm that the target is reached.



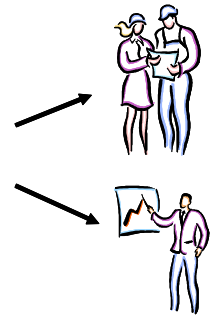
## ***Calculate Environmental Performance Indicators***

Use the tool to calculate the indicators for your product. Each indicator has been defined in a structured way including a description of the function, an algorithm and a description of the input and output needed. The calculations are based on the REPID material list and material properties connected to these materials. For information about how the calculations are performed read the description in “How the calculations are performed”, page 8.

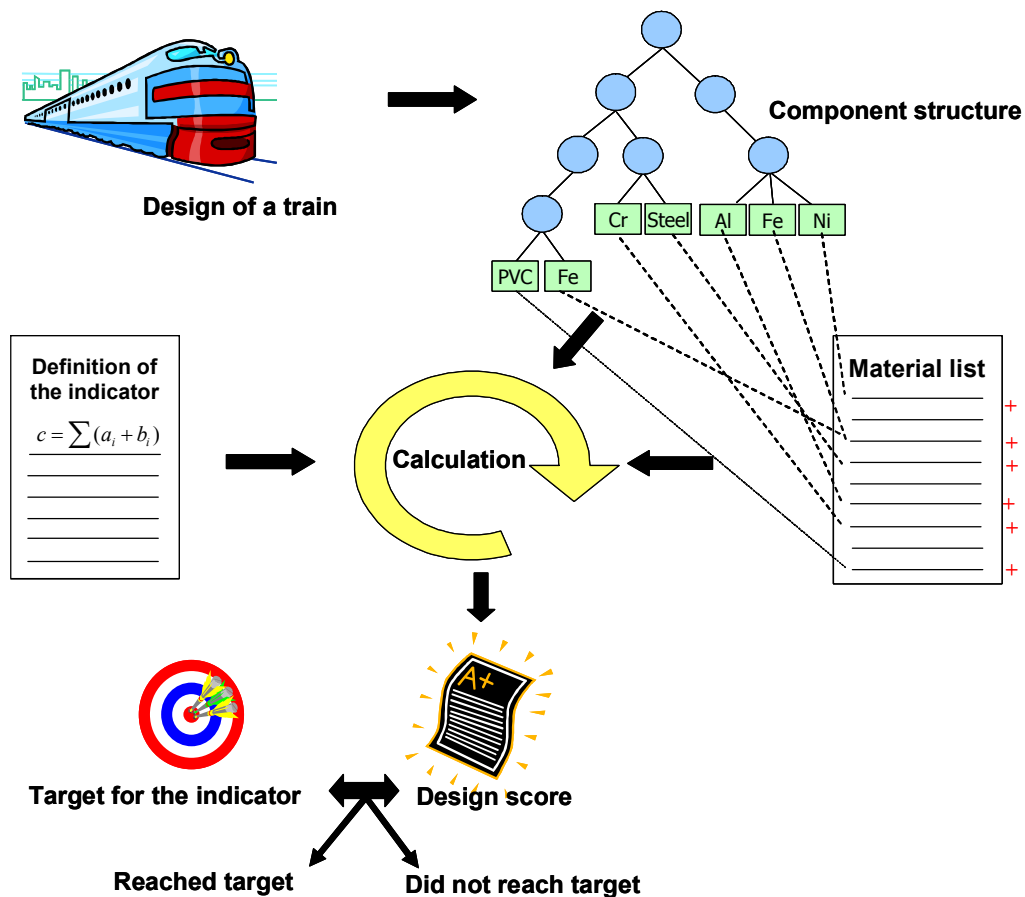


## ***Improve or communicate the result and use it for decision-making***

- Receive reports with information about indicators results, definitions of the indicators and also reports on how the calculations were performed.
- Compare the result with set target values for the EPIs.
- Compare the result for different alternative designs.

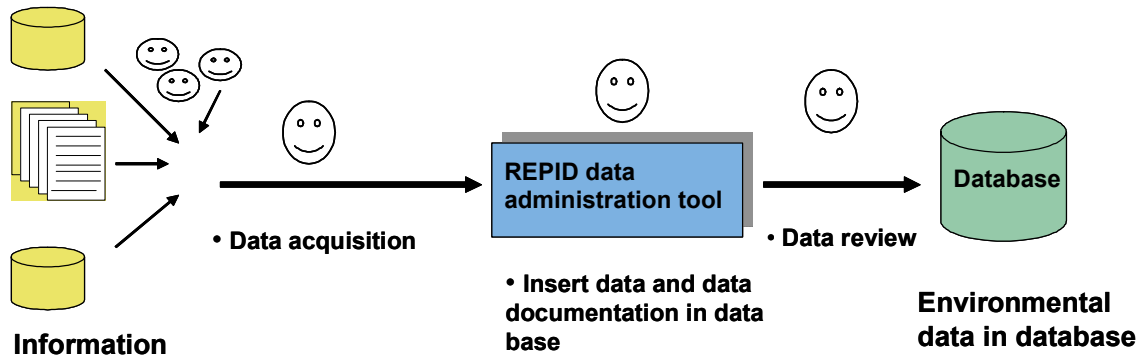


## How the calculations are performed



- The design describes how the train is composed of different parts in a component structure.
- Each component is broken down into smaller pieces until materials in the REPID material list are reached.
- The calculations of the indicators are being based on properties of the materials in the REPID material list.
- By using algorithms described in the definition of each indicator, the properties for the materials in the analysed component are aggregated and a score for the indicator in the component is reached.
- The evaluated score for a specific design can be compared to a target value for the design. An indicator can be calculated for any part in the component structure.

## REPID Environmental database



- There are material related EPIs and non material related EPIs. A material related EPI needs basic data - Material properties - from the materials in a component in order to be calculated. This data can be found in the REPID environmental database.
- Data acquisition is performed through a structured procedure. Data has been gathered for example from literature study, personal communication and other databases.
- Industrial environmental informatics (IMI) at Chalmers University of Technology is responsible for the development and maintenance of the REPID environmental database.
- Data is inserted into the REPID database through the REPID data administration tool by IMI.
- IMI performs review of data to ensure that data is fulfilling documentation and data quality criteria.

### For further information please contact:

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