

Investment planning in transport companies

A look into the crystal ball or can it be more precise?

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Railway undertakings' requirements for flexibility, security and performance are increasing. This impacts on the effective use of the available funds. On the other hand, in a well managed transport operation and service business there is a great deal of knowledge available in the form of process data. But until now, companies have been lacking a solution which combines this data and allows the user to generate planning variants based on a variety of scenarios. A new software-based solution creates planning scenarios for the next thirty years in an automated manner using different specifications and influential factors (fig.1). The forecast based on real data leads to detailed and well-founded budget planning, as a consequence of which the competitiveness of the company also increases.

Challenge in transport companies

“For the short, medium and long-term planning of our investment decisions we use Excel sheets with a certain computational logic. The groundwork of the data contained therein on several hundred infrastructure installations and vehicles is done by the individual divisions and this data is meticulously integrated by me into the Excel sheet. As a result of the different solutions (central maintenance

management, individual Excel sheets as groundwork) and the associated breaks in the data flow, information losses occur. Further, creating various planning variants is very difficult and complex. The real costs from the corrective maintenance history or the preventative maintenance planning are mostly not taken into account. The Excel assessment is the basis for investment decisions at our company.”

This or similar is how responsible controllers of many railway undertakings (RU) and railway infrastructure companies (RIC) describe their situation. Most of the basic information for the planning is available in Asset-Management-Systems (AMS) such as zedas@asset. “A consistent solution with the opportunity to plan various investment scenarios at medium or long-term level would be an enormous gain in time and accuracy,” say the controllers, in summary.

In addition to the aim of increasing the effectiveness of the work through digitalisation, transport companies also see themselves exposed to increasing cost pressure in the use of the vehicle fleet and the railway infrastructure. The companies must respond with even better and more pinpoint planning, such as for:

- new targets for the planned transport service,
- higher or lower current transport service,
- higher requirements for the availability of the vehicles and assets,

- the changed condition of the vehicles and assets due to such factors as material wear, faults and accidents,
- rising costs for material, personnel and operating supplies.

Therefore, their most important tasks include short (1-3 years), medium (4-5 years) and long-term planning (6-30 years) of the pending investments. The basis for successful investment planning is determining the technical, commercial and strategic requirements. Here, the planned period as well as the current and future stock of vehicles and assets are to be taken into account.

Project launch and implementation

Until now, statements were already made on investment decisions by means of complex but rigid reports based on the current software solution. However, with requirements constantly changing, the need for flexibility for individual input parameters and cost-determining influential factors is rising, which current market requirements confirm. For this reason, in mid-2017, ZEDAS GmbH decided to develop a new “Invest Manager” module for its product suite zedas@asset. It is being supported in the development by means of grants of the state of Brandenburg within the

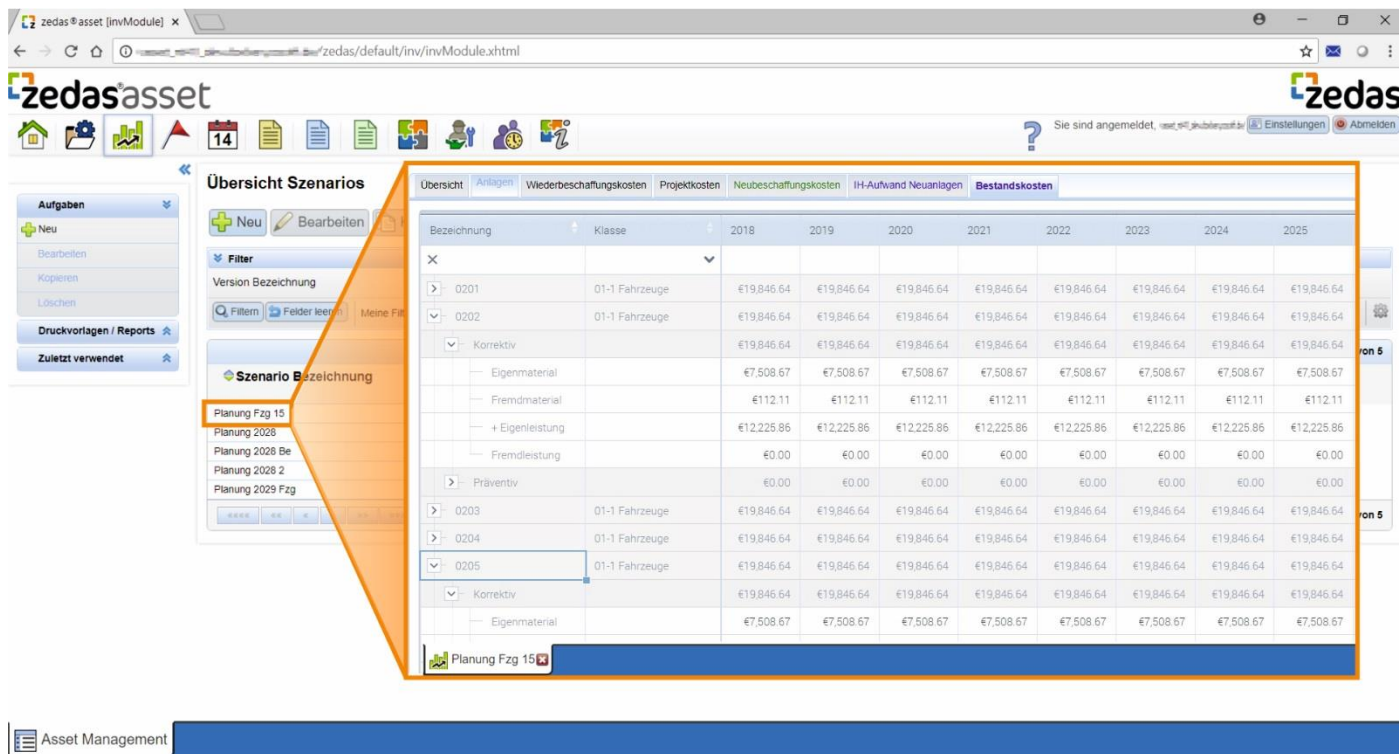


Fig. 1: Planning scenarios in the Invest Manager

framework of the support programme “BIG-FuE”.

The development project was launched at the start of 2018 and has a planned duration of one year. At the end of September, a prototype of the new module is already to be available for the test by selected users.

In addition to the experience from a large number of projects and the industry-specific expertise, market and user requirements – determined in part at a user meeting in April 2018 – are taken into account in such new developments at the beginning of the project. They form the basis for an exact description of the target functions.

Scenarios based on the corrective history and preventative planning

The new module uses the master, cost and condition data available in Asset-Management-Systems (AMS). Based on this data, cost and age scenarios are created for the assets and/or scenarios are

created for the HR requirements. The focuses of the requirements determination include the estimation:

- of the expenses for asset/vehicle maintenance (corrective and preventative maintenance expenses),
- of the funding requirements for future necessary asset/vehicle renovations,
- of the HR requirements for performing the maintenance and renovation tasks.

The module can process any data of the asset/vehicle infrastructure as well as vehicle data. To this end, the data is:

- used for asset/vehicle maintenance and for the planned renovations from the AMS and/or missing data is added manually,
- aggregated to the costs,
- proved with various influential factors, such as use intensity, use duration, price increases and times of execution,

- summarised separately according to success and investment plan,
- saved as scenarios.

Thus, various planning variants arise, which can be accessed and updated again at any time. The uniform and transparent reporting system of the Invest Manager works on the basis of the planning scenarios created in the module. The planning within the Invest Manager begins with the creation of a new scenario. This is followed by the definition of the asset portfolio for which the planning is carried out, e.g. the assets/vehicles of a company division or of the entire company. The definition of the planning period and the assumption of the data from the AMS - on existing and new assets/vehicles as well as on the already planned costs per year for the planning period - are the concluding steps.

The maintenance costs to be expected consist of preventative and corrective costs. While the corrective costs are ascertained

from the history of corrective costs of assets of the same type in the maintenance planning system, the preventative costs to be expected result from the constantly updating advance calculation of the time, load or condition-dependent maintenance measures (periods) with the associated maintenance plans. This pre-planning over several years or decades is also part of the standard functionality of the AMS.

If no preventative and/or corrective costs can be transferred from the AMS for the new assets/vehicles and/or if assumed values are to be modified, it is possible to enter or overwrite these amounts in the Invest Manager in just a few steps for a single asset or, using the "Multiple processing" function, for several or all assets/vehicles of an asset/vehicle class. The user is supported in this activity by comfort functions such as automated roll-out of values to several years or by multiple

processing of the fields of assets/vehicles of the same type.

Once the basic cost scenarios for the investment and success plan have been created, different factors can be applied to them. Factors related to the following impact on cost or time:

- price increase per year,
- change in maintenance expenses upon change of use intensity,
- change in maintenance workload upon change in asset/vehicle age,
- change in use duration (success and investment plan) upon change in use intensity.

As a result, a cost scenario regarding the planned investments as well as the maintenance expenses to be expected per year in the planning period arises for each asset, each vehicle and/or for individual projects.

The authorised user can access this scenario again, adapt it and save it under a new version number at any time. It is thus

possible to create various planning variants on the basis of real or assumed expenses as well as different cost-influencing factors (e.g. price increases, asset age or use intensity).

A sophisticated rights concept ensures that only authorised users can read, process or delete scenarios and/or execute certain functions in the module, such as the assignment or modification of cost factors.

The reporting is based on the saved scenarios; however, it can be adapted to the desired layout of a customer.

The possible evaluations in graphic or table form include, for example:

- 10-year planning - costs of the investment planning from projects, new assets and renovations per year and cost centre,
- 10-year planning - investment costs total per division and year (costs from projects, new assets and renovations),
- reinvestment ratio per year,
- 10-year planning - maintenance costs from corrective and preventative maintenance of planned new and current assets and/or vehicles,
- Total expenses from maintenance and investment for a division,
- quantity development for assets or vehicles,
- age development for assets or vehicles.

Of course, reports are also possible over other periods, e.g. 15, 20 or 30 years, provided the scenarios for these periods have been planned. Figure 2 describes the scenario within the zedas®asset system, which corresponds, in terms of structure, to a multi-tier application with a web-based client. Thus, the new module Invest Manager can be integrated seamlessly into this architecture.

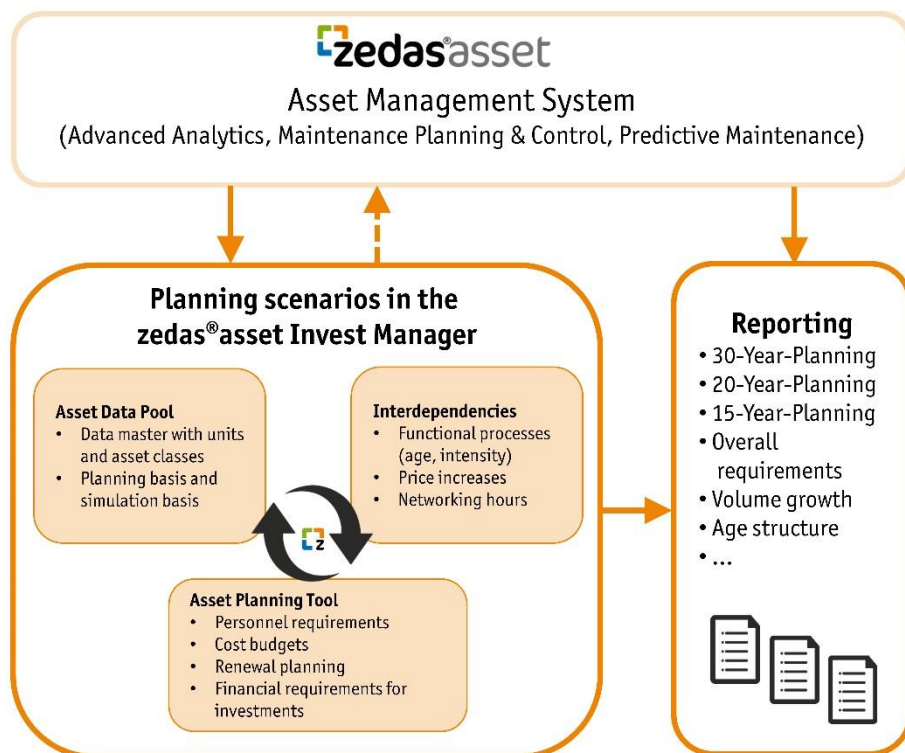


Fig. 2: Integration and function of the Invest Manager module

Conclusion: flexible planning and reliable forecasts

The planning of maintenance requirements and investments for the next 20 to 30 years is playing an increasingly important role in rail freight and railway infrastructure companies. For this purpose, ZEDAS GmbH is expanding the product suite for maintenance and asset management `zedas@asset` by adding the Invest Manager. A well presented, asset-based corrective maintenance history and preview of the preventative measures in the Asset-Management-System (AMS) form an outstanding starting basis for

determining requirements in the future. The user can add to, move or modify the data aggregated for each asset and divided onto annual tranches as he wishes. A range of comfort functions help him to save time in this detailed work. The effect of cost-influencing factors helps to model and forecast the future influences on the investments as objectively as possible. Comparative consideration and simplified decision-making can be realised through the generation of multiple planning scenarios. Comprehensive reporting helps the user to evaluate the results. Selected data from a finalised planning scenario, for example

data concerning planned modernisations and replacements, can be applied in the existing AMS planning of measures. The planning of future measures for system maintenance and procurement can now more easily be done effectively, with time savings and with a well-founded database. It is possible to react quickly and precisely to changes, e.g. new regulations for transport service or availability. Planning staff and controllers, as well as the companies' service units such as workshops, particularly benefit from the new functions.

Current assets/vehicles	New assets/vehicles	Projects
Renovation data <ul style="list-style-type: none"> • Date of commissioning • Date of planned renovation • Technical use duration • Replacement value <ul style="list-style-type: none"> ○ Material costs ○ External labour costs ○ Own labour costs or hours 	Purchasing data <ul style="list-style-type: none"> • Date of commissioning • Date of planned renovation • Technical use duration • Purchase value <ul style="list-style-type: none"> ○ Material costs ○ External labour costs ○ Own labour costs or hours 	Project data <ul style="list-style-type: none"> • Project start date • Project costs <ul style="list-style-type: none"> ○ Material costs ○ External labour costs ○ Own labour costs or hours
Existing maintenance data Σ costs/year <ul style="list-style-type: none"> • Material costs <ul style="list-style-type: none"> ○ Preventative ○ Corrective • External labour costs <ul style="list-style-type: none"> ○ Preventative ○ Corrective • Own labour costs or hours <ul style="list-style-type: none"> ○ Preventative ○ Corrective 	Planned maintenance data Σ costs/year <ul style="list-style-type: none"> • Material costs <ul style="list-style-type: none"> ○ Preventative ○ Corrective • External labour costs <ul style="list-style-type: none"> ○ Preventative ○ Corrective • Own labour costs or hours <ul style="list-style-type: none"> ○ Preventative ○ Corrective 	

Table 1: Basic data adopted from the AMS



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