



ITU / BDT workshop

Warsaw, Poland,

6-10 October 2003

Network Planning

Lecture NP- 5.1

Supporting Network Planning Tools

October 6-10

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Lecture NP - 5.1- slide 1



BDT workshop on Network Planning

Module 1: Introduction and Experiences in the Region

Module 2
Role of Network Planning in the current Telecom scenario

Module 3
Integrated Planning Process

Module 4
Specific Network Planning per Layer

Module 5
Supporting Network Planning Tools

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Content Chapter 5.1 Network Planning Tools

- Objectives and classification for the different tool types
 - Overall techno-economical evaluation
 - Network design and optimization
 - Network evaluation and simulation
 - Tool mapping per class

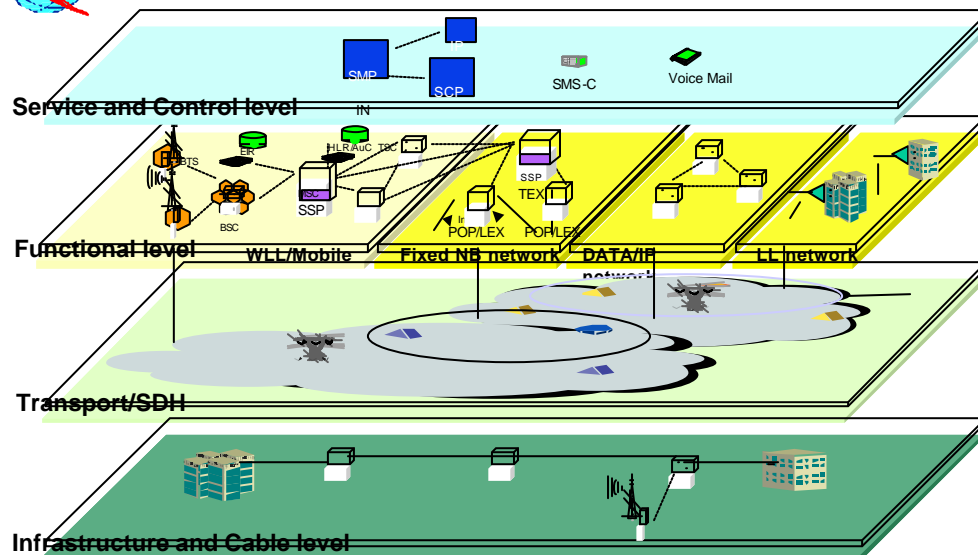
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Network Planning Strategic view: Network Layer Modeling



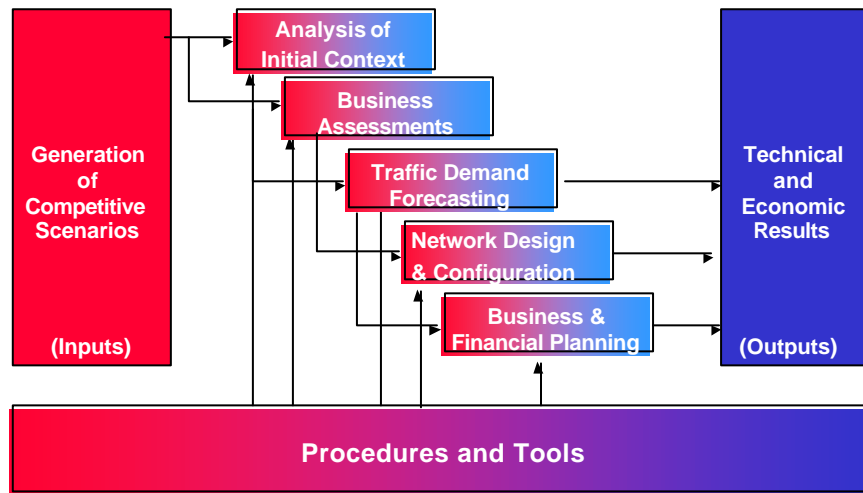
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Planning Methodology: Integrated Iterative Planning Process



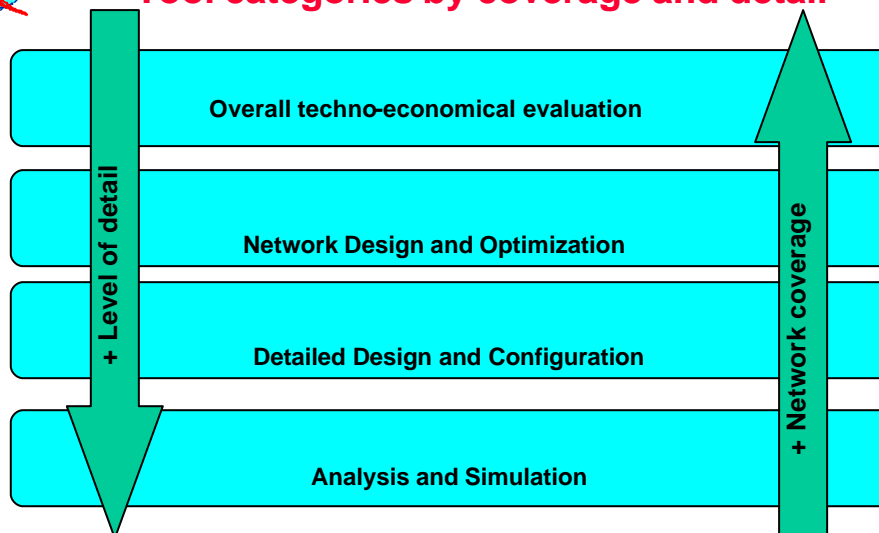
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Network Planning Tools: Tool categories by coverage and detail



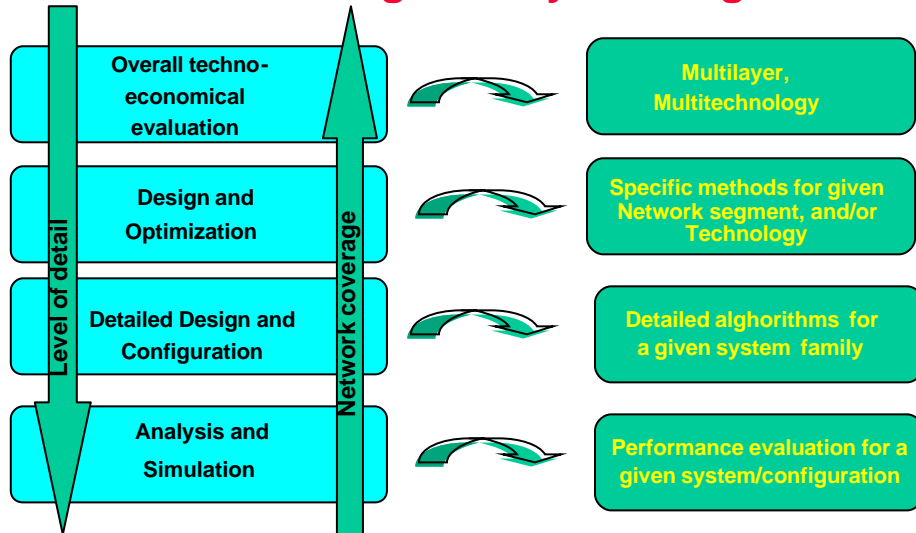
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Network Planning Tools: Tool categories by coverage



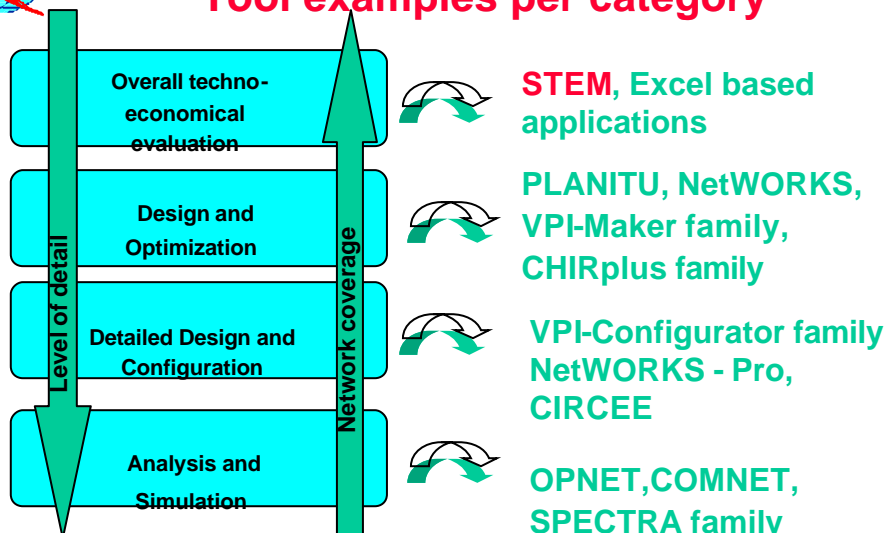
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Network Planning Tools: Tool examples per category



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Network Planning Tools : STEM

Analysys

Business
Planning



Objective : STEM by “Analysys” (in Cambridge) is a business decision making support tool that enables the analysis of business models and cost assignment for Telecommunication Networks and services over a period of time.

The Analysys STEM network investment modelling tool is a product of Analysys Consulting Ltd, Cambridge, UK

see: www.analysys.com



Business Planning Tools : STEM

Analysys

- Coverage

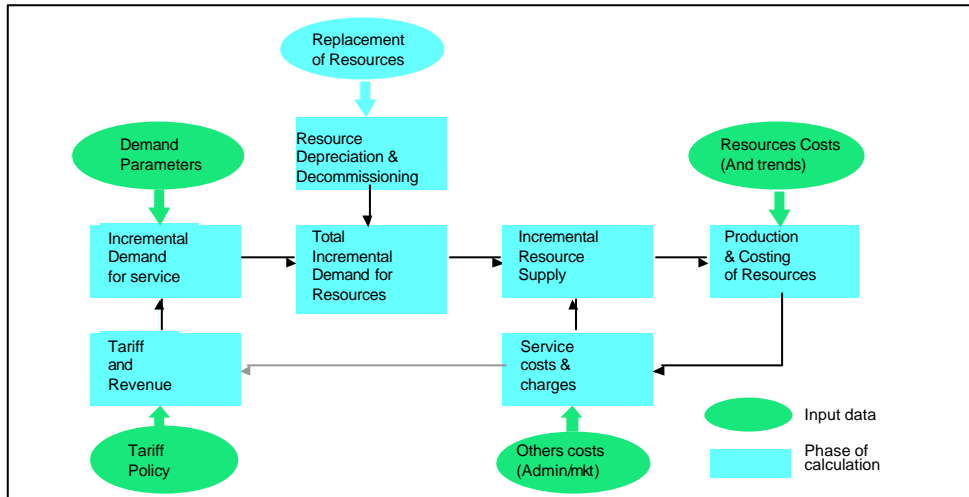
- Service Demand Projection
- Evaluation of network resources and associated investment (CAPEX)
- Evaluation of revenues for given tariffs and installation rate
- Modeling multiple resource lifetimes
- Modeling multiple time periods
- Modeling of demand elasticity
- Interrelation between network growth and operational cost (OPEX)
- Cost assignment as a function of utilization rates
- Produces automatically the standard financial results like Cash Flow, Profit & Loss, Balance Sheet and many others
- Interfacing to other MS Windows applications like Excel, Word,....



Business Planning Tools: STEM

Analysys

Activity Flow:



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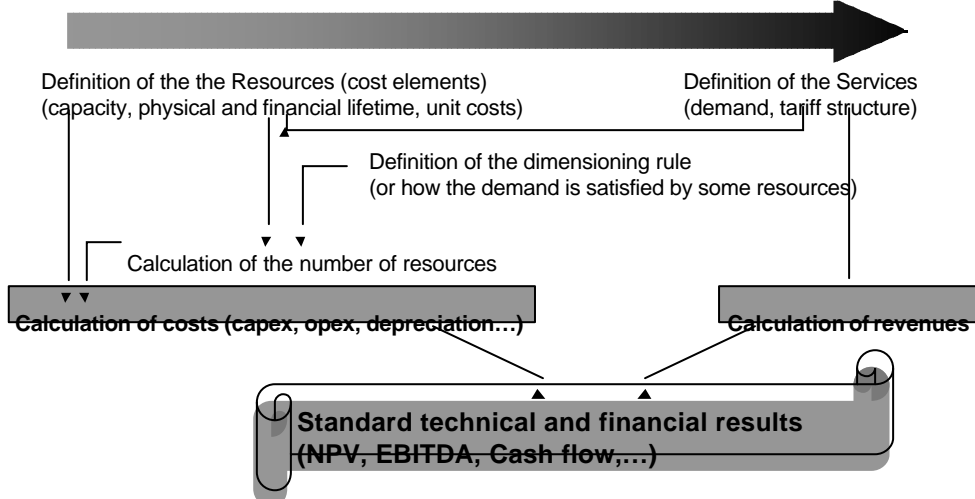
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How the STEM engine works

Analysys

Time period



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Business Planning Tools: STEM Analysis

Resources

- physical lifetime
- traffic-carrying capacity
 - depreciation period
 - economies of scale
 - capital expenditure
 - operating expenditure

Services

- subscribers
- service rates
- annual and busy-hour traffic
 - Erlang or BW demand
- resources required

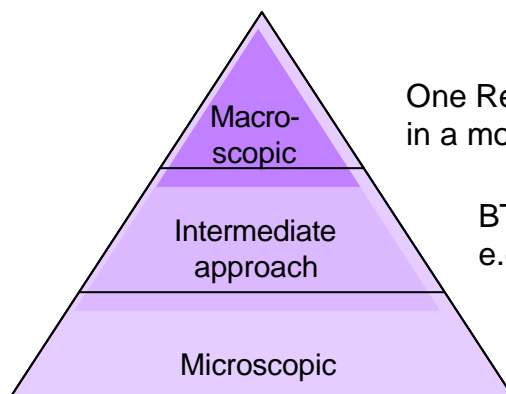
STEM*

↑
Time

- cost-related tariffs and demand elasticity
 - age-based cost profiling
 - non-linear resourcing



STEM allows both a macroscopic and microscopic approach to modelling Analysis



Examples:

One Resource used to model all BTSs in a mobile network

BTSs grouped by area type, e.g. urban/suburban/rural/highways

BTSs modelled one by one



The user must choose the level of detail to be modelled Analysis

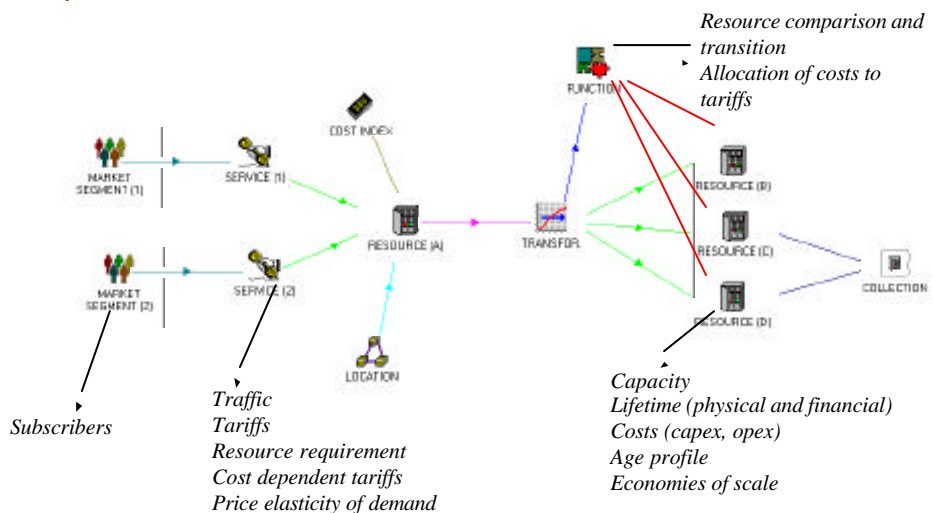
The user decides the best level of granularity, which involves a trade-off between...

The complexity of modelling and the large volume of input required when geographical factors are considered in great detail

Inaccuracies involved in averaging out over sites when using the intermediate approach (e.g. urban/suburban/rural/highways)



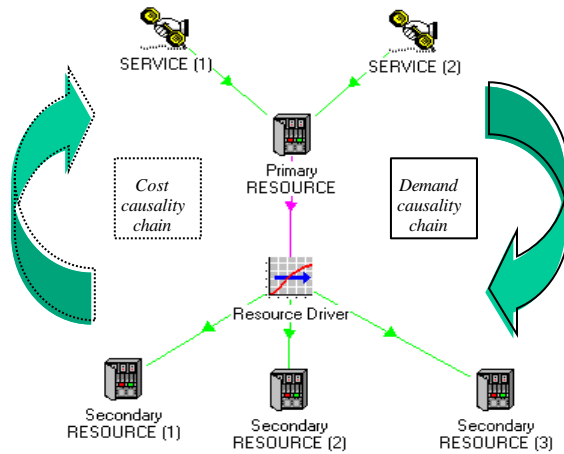
STEM focuses on telecoms objects Analysis





STEM is demand driven and allocates costs to demand

Analysys



- Demand driven
- The STEM Editor emphasises the demand causality chain between services and resources
- The cost causality chain flows in the opposite direction

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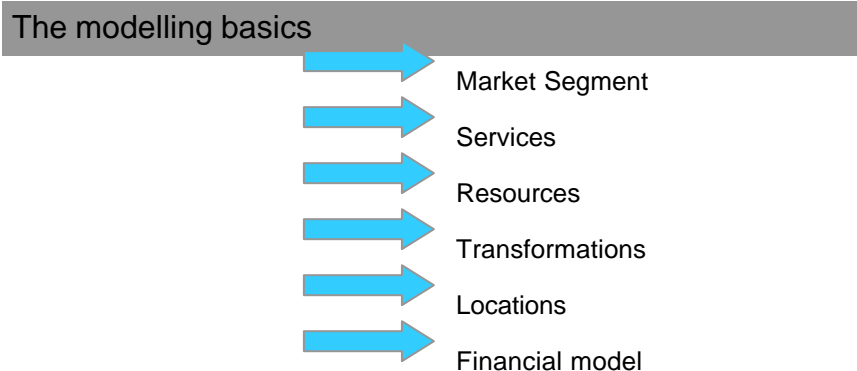
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Business Planning Tools: STEM Modeling Elements

Analysys



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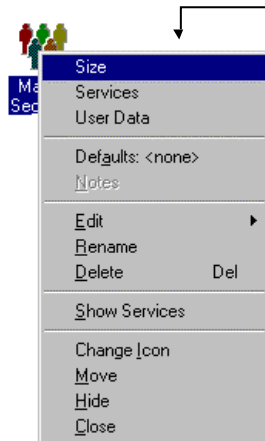
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Market Segment

Analysis



1. Choose the Size of the Market

2. Select the Service(s) to which this Market Segment is associated

3. You can define a set of inputs which can be referenced in formulae, and also in the definitions of derived results

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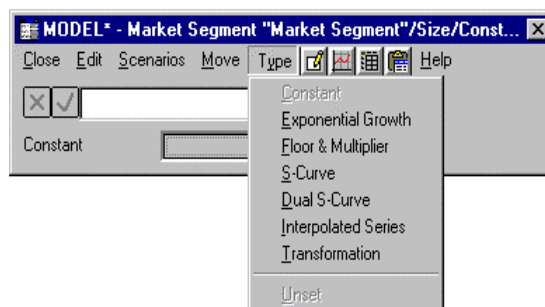
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Understanding the Type menu

Analysis

- The Type menu is a commonly-used menu for inputting data:
 - Constant
 - Exponential Growth
 - Floor & Multiplier
 - S-Curve
 - Dual S-Curve
 - Interpolated Series
 - Transformation



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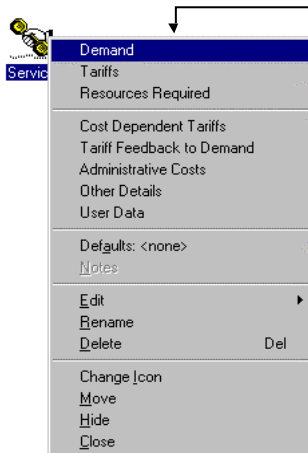
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Services

Analysis

A Service is anything you can draw a revenue from, such as mobile telephony, X.25, house rentals...



1. Define the Demand for this service (customer base, traffic unit, penetration rate...)
2. Define the Tariff of this service (connection, rental usage tariff)
3. Select the Resources the operator must install to provide that service

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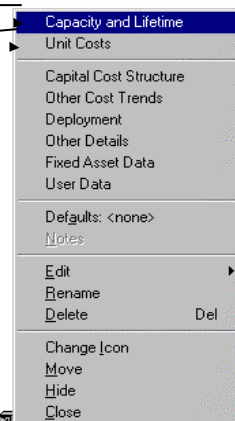


Resources

Analysis

A Resource is anything that will cost you something, such as switches, leased lines, staff, a licence...

1. Define the capacity and the lifetime (physical, financial) of the Resource
2. Define the cost (capital cost, maintenance and operation costs...) of the Resource



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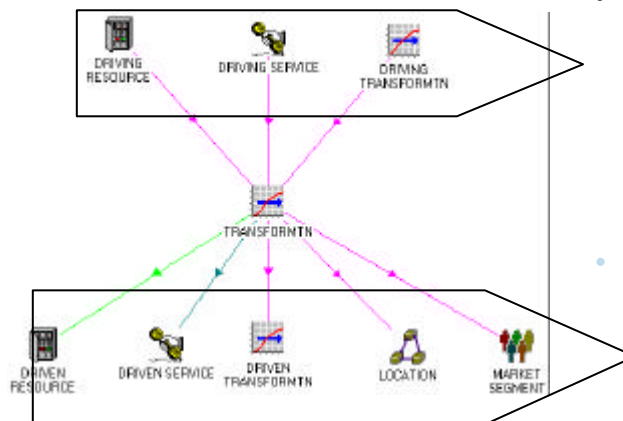
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Transformations can use a variety of inputs and can drive several elements

Analysis



- DRIVERS can be:
 - Resources
 - Services
 - Transformations

- DRIVEN elements can be:
 - Resources
 - Services
 - Transformations
 - Locations
 - Market Segments

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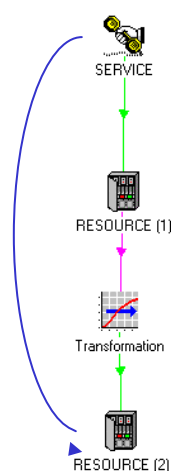
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Transformations allow Resources to be driven by other Resources rather than by Services

Analysis



- This is particularly useful when:
 - there is a natural relationship between two Resources
 - e.g. towers are driven by base stations
 - Resources are distant from end customers and Services
 - e.g. in backbone networks
- However, all Resources in a STEM model are ultimately driven by Service demand

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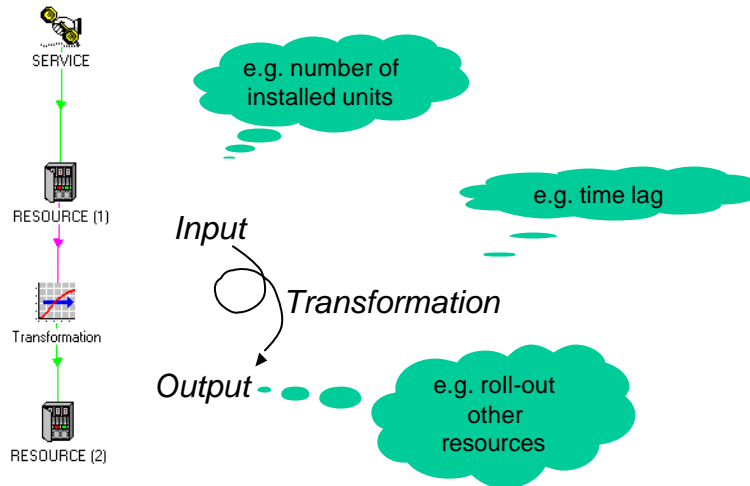
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The rationale for Transformations is to act as secondary sources of demand

Analysis



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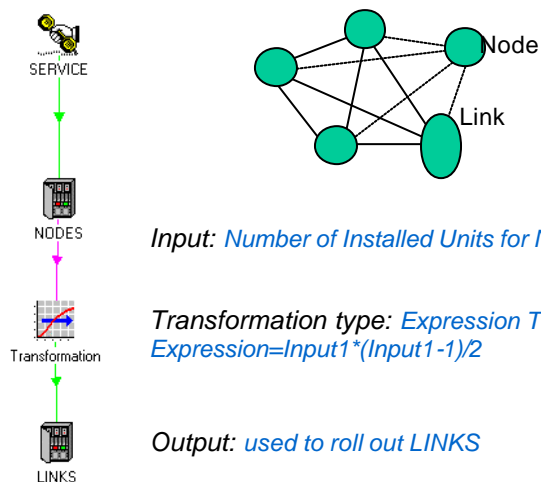
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Transformation: an example

Analysis



Input: Number of Installed Units for NODES

Transformation type: Expression Transformation
*Expression = $Input1 * (Input1 - 1) / 2$*

Output: used to roll out LINKS

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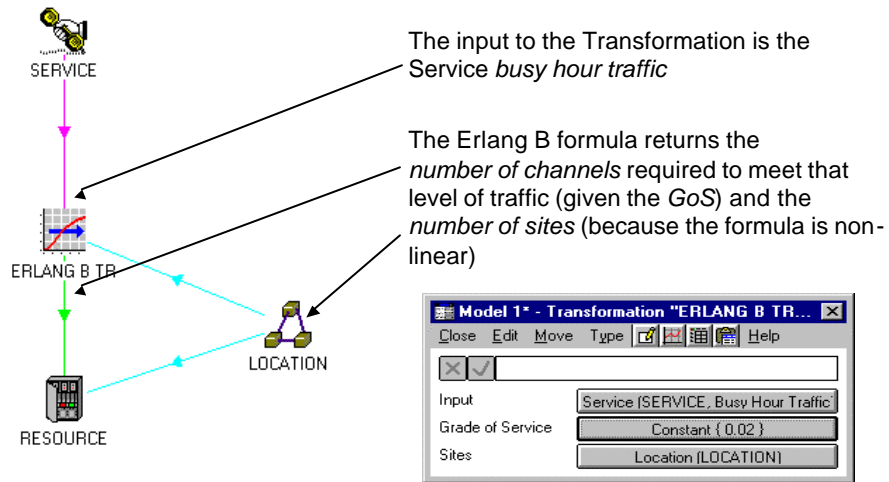
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Erlang B Transformations can be used to convert Erlangs into channels

Analysis



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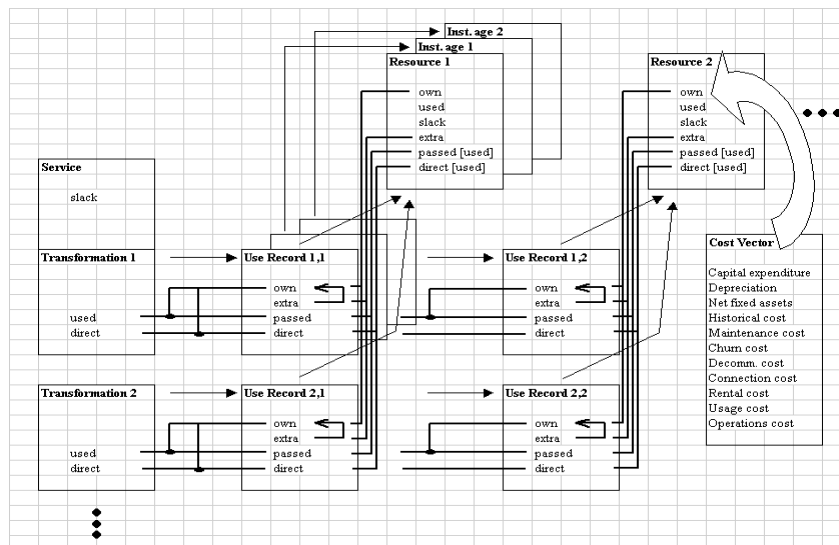
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Allocating multiple cost streams, ages and classifications

Analysis



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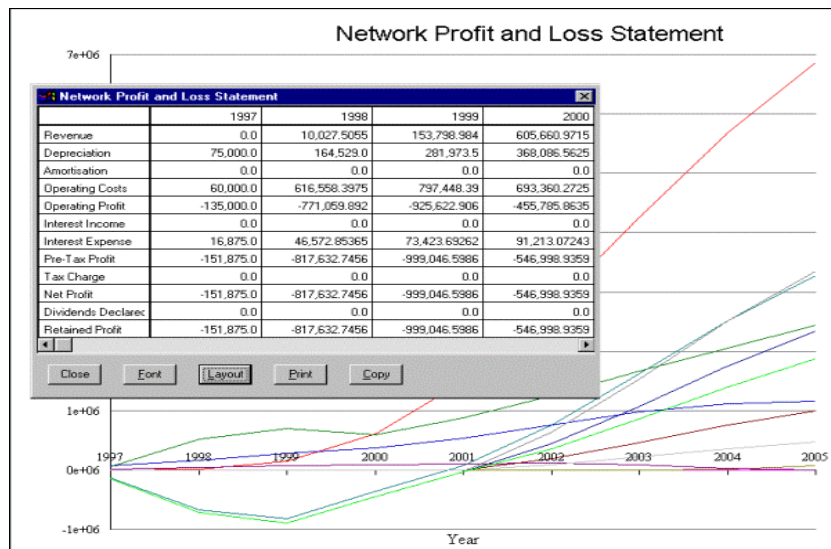
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Business Planning Tools: STEM

Example of results for business analysis

Analysis



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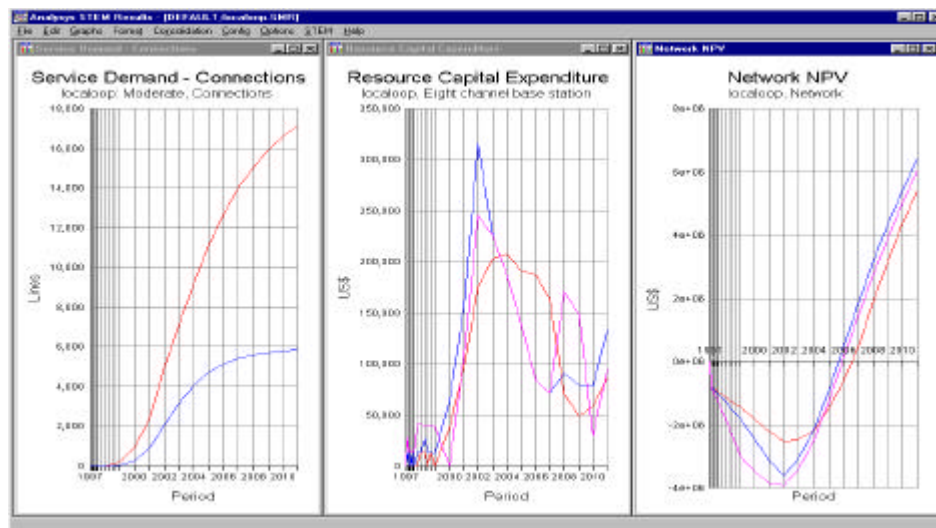
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Business Planning Tools: STEM

Example of results for business analysis

Analysis



* Under licence of Analysis

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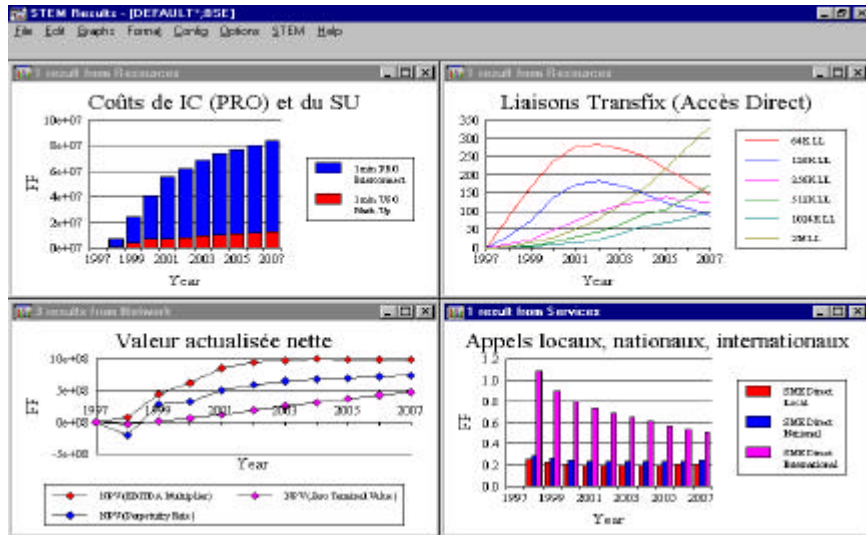
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Business Planning Tools : STEM

Example of results for business analysis

Analysis



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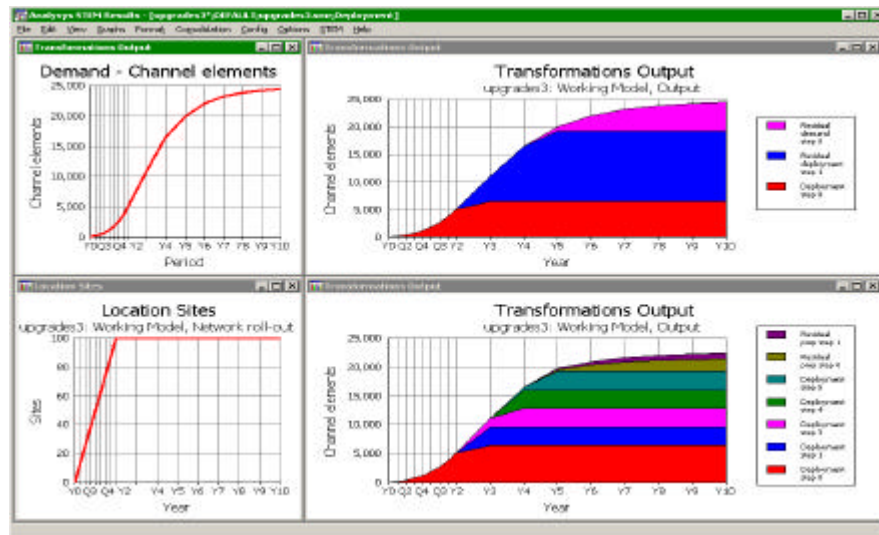
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Business Planning Tools : STEM

Example of results for business analysis

Analysis



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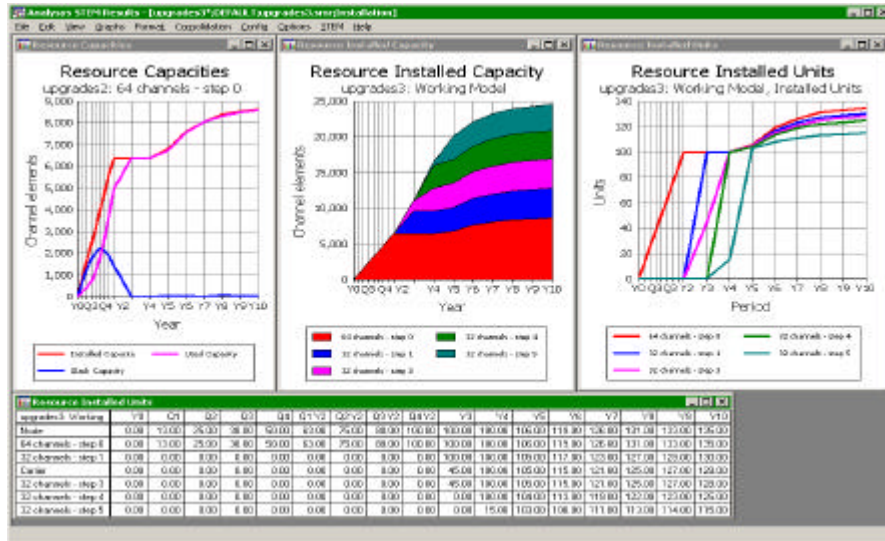
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Business Planning Tools : STEM

Example of results for business analysis

Analysys



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Business Planning Tools : STEM

Analysys

Tool usage in a PC with a hardlock protection key per user
Under license of Analysys Consulting Ltd

Current version: 6.2

Contact for further details

Robin Bailey at:

robin.bailey@analysys.com

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