# PATTERN

Planning Assistance Through Technical Evaluation of Relevance Numbers

# PATTERN



- Normative forecasting
- Relevance tree method
- Goal-oriented forecasting method where one establishes a future need and recedes backwards to the present and to the technologies needed to achieve the objective of the future.



#### Basic form of relevance tree



# Characteristics for forming the relevance tree:



- There is hierarchy in the relevance tree
- Branches represent goals and subgoals
- All relevant subgoals for each goal have to be identified
- Each branch must be well defined so that there are no overlaps

# PATTERN



 PATTERN has been used by the Honeywell Corporation for military, space and medical purposes.

# **PATTERN** is based on:

- Goal identification
- Recognizing the relevance of set goals in relation to criteria (means ranking, e.g. setting goals priority)
- Recognizing technological alternatives necessary for achieving the goal

# **Steps for PATTERN**



- Model description, recognizing the goals and hierarchy of the relevance tree
- Recognize criteria
- Determine relevance numbers with participation of experts; selected exploratory, intuitive methods can be used
- Data processing and final results calculating relevance numbers, goals priority, ranking of technological alternatives

## **Basic terms**

- Goals A, B,C...j...N
- Criteria α, β, ..., x, ..., *v*.
- Levels 1, 2, 3...i...n
- Criteria weights

Wα, Wβ, ..., Wx, ..., W*v*.

 Contribution marks of the goal j to criteria x element weights

 Based on the relevance tree primary matrix has to be made for each expert



# **Primary matrix**

Criteria	α	β	••••	Х	••••	V
Weights	W <sub>α</sub>	$W_{\beta}$	••••	W <sub>x</sub>	• • • •	W <sub>v</sub>
Goals	Contribution marks of goals to criteria – Element weights					
А	$S_A^{\ \alpha}$	$S_A^{\ \beta}$	••••	$S_A^x$	••••	$S_A^{v}$
В	$S_B^{\ \alpha}$	$S_B^{\ \beta}$	••••	S <sub>B</sub> <sup>x</sup>	••••	$S_B^{v}$
С	$S_C^{\alpha}$	$S_C^{\ \beta}$		S <sub>C</sub> <sup>x</sup>	••••	S <sub>C</sub> <sup>v</sup>
		• • • •	••••	••••	••••	••••
j	$S_j^{\alpha}$	$S_j^{\ \beta}$	••••	$S_j^x$	• • • •	$S_j^v$
	••••	••••	••••		••••	••••
N	$S_N^{\alpha}$	$S_N^{\ \beta}$	••••	S <sub>N</sub> <sup>x</sup>	••••	S <sub>N</sub> <sup>v</sup>

### **Basic terms**



- Based on the primary matrix the final primary matrix has to be calculated
- The elements of final primary matrix are average values of responding elements in primary matrixes

## **Basic terms**



- A panel of experts can be asked to weight the importance of each criterium in relation to the others
- The panel could be asked to weight the contribution of each element/goal to criteria – element weights



# **Conditions for primary and final primary matrix**

• Sum of criteria weights is 1

$$\sum_{x=\alpha}^{\nu} W_x = 1$$

 Sum of contribution marks of goals to each criterium is 1

$$\sum_{j=A}^{N} S_{j}^{x} = 1$$



 Partial relevance numbers (relevance of goal j for criterium x)

$$PRN_j^x = W_x \cdot S_j^x$$

$$r_i^j = \sum_{x=\alpha}^{\nu} W_x S_j^x$$



 Condition – Sum of local relevance numbers at one level has to be 1

$$\sum_{j=A}^{N} r_i^{j} = 1$$



 Cumulative direct relevance number – Relevance of goal j for main goal, whole relevance tree





- Criteria:
  - $\boldsymbol{\alpha}$  lower costs
  - $\beta$  higher security
  - $\gamma$  higher efficiency
  - $\delta$  better comfort