Study on improving the efficiency of the transport system in urban nodes of the TEN-T core network

The stepwise methodology for cost-efficient measures

Tina Laparidou, Panteia

Purpose of the methodology

- Urban nodes at the intersection of
  - TEN-T (mostly hard core infra measures with impact on urban policy objectives)
  - Urban measures (with impact on TEN-T objectives)

- Dedicated methodology to
  - Identifying related measures
  - Measuring/rating cost-effective measures
  - Assessing their impact on shaping the efficiency of the transport systems

Why?

- Variety of perspectives and stakeholders
- Bridging the gap:
  - TEN-T is "far away" for urban policy makers
  - urban context is "just a dot on the map" for TEN-T policy makers
- Variety of measures: from infrastructure to soft measures
- Existence of – sometimes conflicting – high level policy objectives (accessibility, safety, environment, perception/strategy/land-use, economy)

What does it involve?

- Core of the methodology
  - CBA alone does not take into account non-monetized effects properly
  - Combination of CBA and MCA

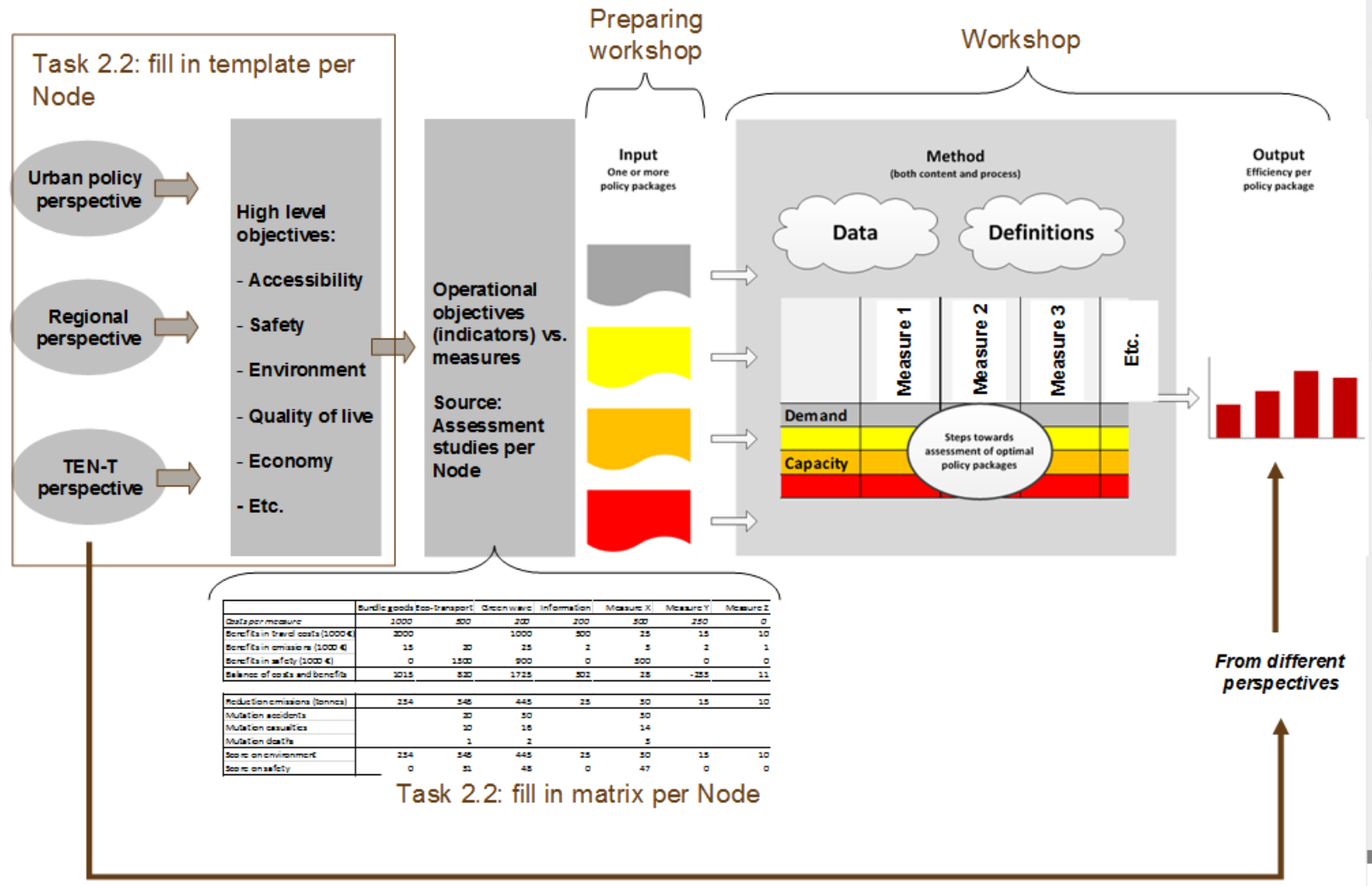
- Required to take all perspectives into account
  - Assessment needs variety of stakeholders → variety of objectives and perspectives needed

- Feedback on the methodology

Outcomes

- An applied methodology which is
  - tested,
  - understood and
  - embraced by different type of stakeholders
- Generation of cost-effective measures and packages

The methodological framework



	Bundle goods	Eco-transport	Green wave	Information	Measure X	Measure Y	Measure Z
Costs per measure	1000	500	200	200	500	250	0
Benefits in travel costs (1000 €)	2000		1000	500	25	15	10
Benefits in emissions (1000 €)	15	30	25	2	5	2	1
Benefits in safety (1000 €)	0	1500	900	0	500	0	0
Balance of costs and benefits	1015	830	1725	302	28	-233	11
Reduction emissions (tonnes)	234	346	445	25	30	15	10
Mutation accidents		20	30		30		
Mutation casualties		10	16		14		
Mutation deaths		1	2		3		
Score on environment	234	346	445	25	30	15	10
Score on safety	0	31	48	0	47	0	0

Objectives

4 Objectives based on TEN-T and Urban policy

- Accessibility
- Safety
- Environment
- Perception / strategy / land-use

Also included

- Interaction

Economy counts via costs (and scores reversely: low costs, low score)

Operationalisation of the objectives

Accessibility	Private vehicle Kilometres by road vehicles
	Accessibility to Public Transport Network
	Number of households within 400 meter of a public transport stop
Safety	Reduce fatal and serious accidents
Environment	Reduce air pollution
Perception / strategy / land-use	PT / walking and cycling mode share
	Image of the city
	Land-use
Economic	Costs

Definitions

Accessibility – refers to the ease of reaching destinations; time to get from one place to another. Different modalities: Car, PT, W&C
Safety – concerns material damage, injuries and even fatalities (avoided)
Environment – the way the urban environment is influenced by air pollution and/or noise
Perception/strategy/land-use – this is where the soft factors enter the analysis. Preferences for PT/W&C as such, but also measures that do well to the image of the city or land-use score points here.
Interaction – the way in which a measure relates to other measures. Does it have the potential to positively/negatively interact or is it standalone?

Methodology is a stepwise approach

- Input for the approach is a set of measures
- Descriptions of measures
- Then the **9 steps** follow:

The nine steps

1. Determine the interaction between measures in the package
2. Determine benefits and costs of measures
3. Determine the other quantifiable measures
4. Determine qualitative effects
5. Determine ranking of measures
6. Decide on weights of effects
7. Perform MCA
8. Perform sensitivity analysis
9. Discuss & optimize packages

Applying the methodology

Step 1: **Select the measures and Determine their interaction**

- Goal: select possible packages
  - Pre-selection process
- Criteria: impact on policy objectives
- Involved: Original set of measures provided by the consultants/ related authorities and processed by key stakeholders

STEP 1:
Interaction Matrix

		PT1	IM1	IM2	RN1	RN2
		Hoekse Lijn	Greenport	Rotterdam - the Hague Internation al Airport	A13 - A16	A15
PT1	Hoekse Lijn					
IM1	Greenport	0				
IM2	Rotterdam - the Hague International Airport	1	2			
RN1	A13 - A16	1	1	2		
RN2	A15	1	1	1	1	

Applying the methodology

Step 2: **Cost (and Benefits)**

- Goal: monetization of measures
- This step often requires the presence of a CBA or other economic assessment reports
- Involved: Consultants (data collection), Key stakeholders, Expers

➔ Cost information

➔ Data sources/ expert views / estimations

Applying the methodology

Step 3: **Other quantifiable effects**

- Goal: effects as much as possible to make objective comparison possible
- This step needs a thorough assessment of available studies
- Supplemented with interviews
- Involved: Consultants, Experts

Applying the methodology

Step 4 - **Qualitative aspects**

- Relative score of measures
- Ranking of measures with regards to an objective
- --, -, 0, ++, +
- Assign relative score in numbers
- Involved: Consultants (the outcomes of the analysis is assessed by related authorities)

➔Follows directly from the initial scoring

Applying the methodology

Step 5 - **Make score of measures on different objectives comparable (normalisation)**

- Involved: Consultants

➔Relative soring on a scale from 1 to 10
➔Per objective "1"is for the lowest, "10" is for the highest
➔Same scale for all objectives
➔Objectives can be compared

Applying the methodology

Step 6 - **Choose weights**

- Involved: Consultants, Key stakeholders

➔By applying weights, objectives can be integrated/added
➔Weights need to be agreed on between stakeholders
➔Per region and stakeholder, weights may differ per theme
➔Assessment model flexible
➔Weights always add up to 100 (%)

Applying the methodology

Step 7: **do the Multi Criteria Analysis**

- Involved: Consultants

➔This step automatically follows from the previous ones
➔Apply the weights
➔Assessment model flexible, allows for quick adjustments

Applying the methodology

Step 8: **Sensitivity analysis**
Involved: Consultants

➔ for different packages of measures the sensitivity is tested
➔What if different weights are chosen
➔What is different packages of measures can be combined
➔What if there is a cap on available budgets

Applying the methodology

Step 9: **discuss packages of measures**

- Involved: Consultants, related authorities, key stakeholders

➔Stakeholders discuss the various packages of measures

➔Discussion should lead to agreement on which package suits the stakeholders best

➔If agreement cannot be reached, then the process can be repeated

Thank you

Tina Laparidou (k.laparidou@panteia.nl)
Rob de Leeuw van Weenen (r.de.leeuw.van.weenen@panteia.nl)
Tianang Li (t.li@panteia.nl)
Raznan Belibov (r.belibov@panteia.nl)