



SOCIO-ECONOMIC IMPACT ASSESSMENT

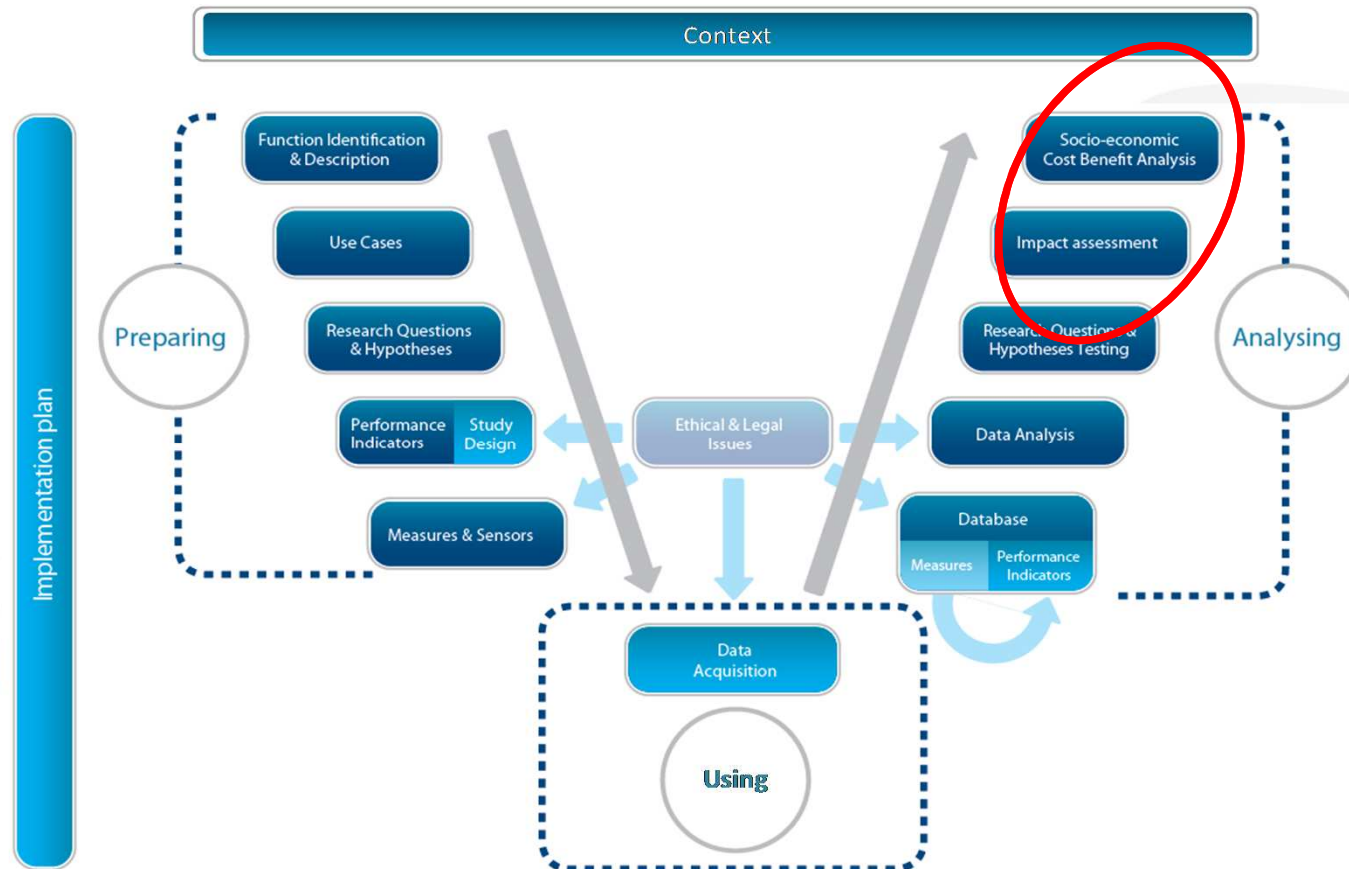
From analysed FOT data to costs and benefits

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FOT-Net is a support action co-funded by the European Commission to network FOT activities at European, national and international level.

WHERE ARE WE IN THE FESTA-V?



CONTENT

- Introduction: the client's perspective
- Impact assessment
- Scaling up
- Cost benefit analysis
- Discussion and questions

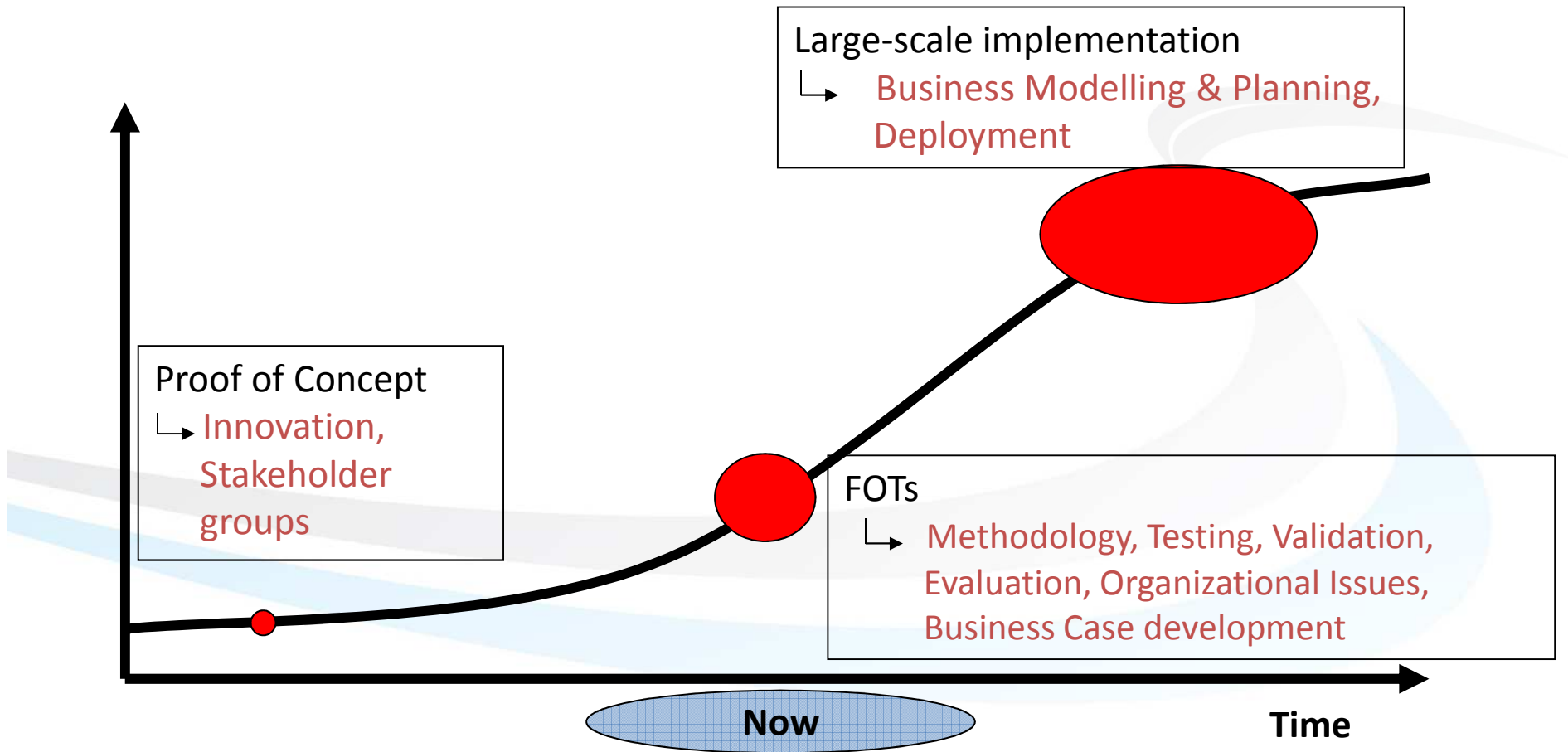


THE CLIENT'S PERSPECTIVE



WHY DOING A FOT?

PUTTING THE FOT INTO PERSPECTIVE



WHY DOING A FOT?

- Important step in decision making process towards deployment
- Link theory / experiments and practice
- See whether predicted benefits actually arise in practice
- Raising awareness
- Benefits first!

IT'S LIKE BUYING A CAR...

- The brochure promises you a lot (literature research and simulation studies)
- Make a test drive, does the car live up to the described potential? (FOT)
- Weigh the benefits against the costs
- Buy it (deployment)

CLIENT'S BACKGROUND

- Who is usually the client?
 - EU commission / public parties
- Why does the client pay for a FOT?
 - Deployment is expensive, seeing is believing (before you buy a car, make a test drive)
- What is the goal for the client?
 - Validate potential benefits, raise awareness
- What does the client expect (outcomes)?
 - Quantitative results, if you invest this, your benefits are that

MATCH CLIENT & CONTRACTOR



STEPS TO TAKE

- From analysed data and tested hypotheses to calculation of costs and benefits:
 - Impact Assessment
 - Scaling up
 - Cost Benefit Analysis (CBA)

IMPACT ASSESSMENT



GOAL IMPACT ASSESSMENT

- Draw conclusions about what the effect of the tested system is on
 - **Safety**
 - **Traffic efficiency**
 - **Environment**
 - User acceptance
 - Personal Mobility
 - Policy
 - Business models
 - Etc.

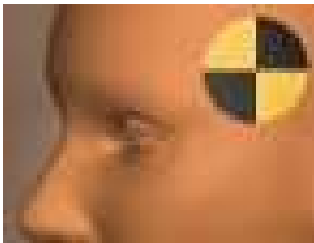
DETERMINING EFFECTS

- Starting point
 - FOT data available
 - Hypotheses tested
 - Research questions answered
- CBA needs **quantitative** data, specified as follows...

IMPACTS NEEDED FOR CBA



- Traffic efficiency
 - Changes in travel times



- Safety
 - Changes in no. of accidents (with fatalities, injuries, property damage only)

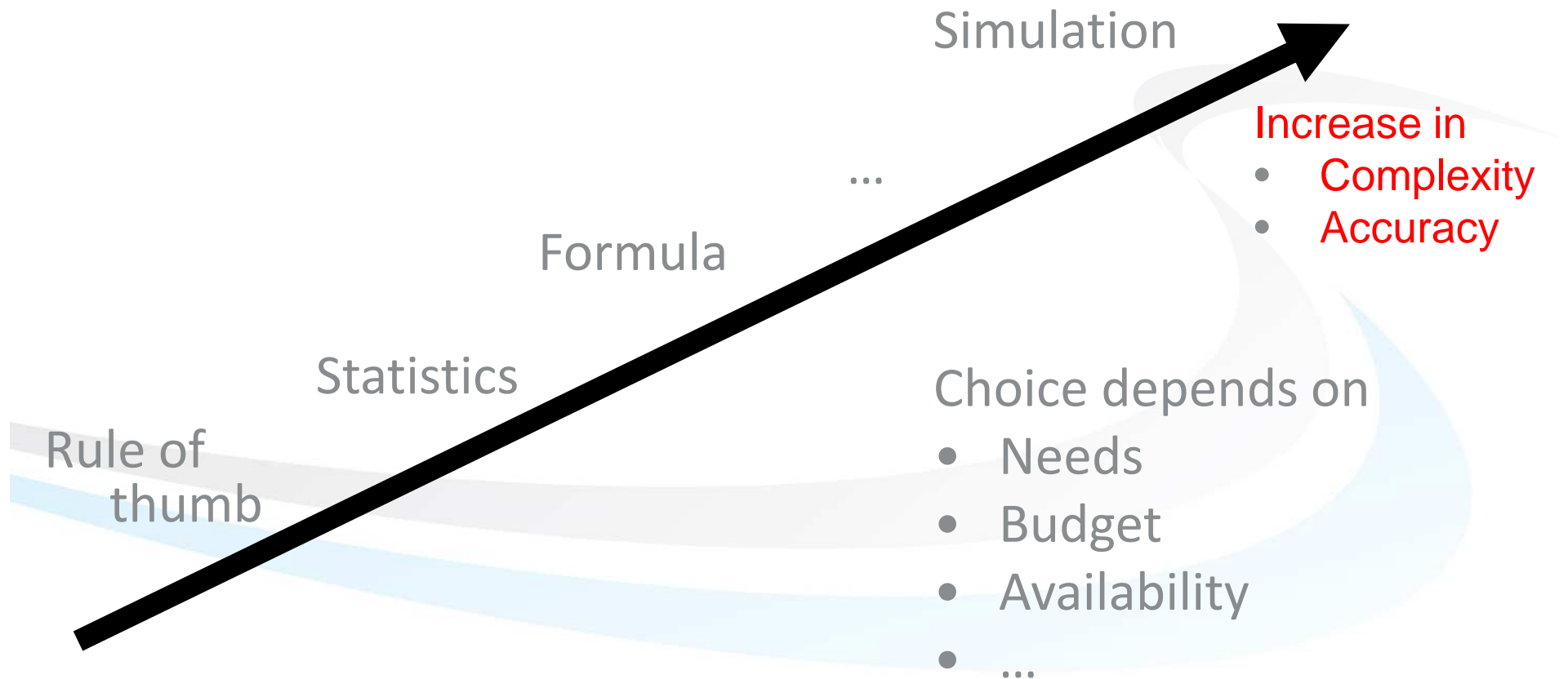


- Environment
 - Changes in emissions of NO_x, PM₁₀, CO₂ (and other pollutants), noise, change in fuel consumption

NOT A STRAIGHTFORWARD STEP...

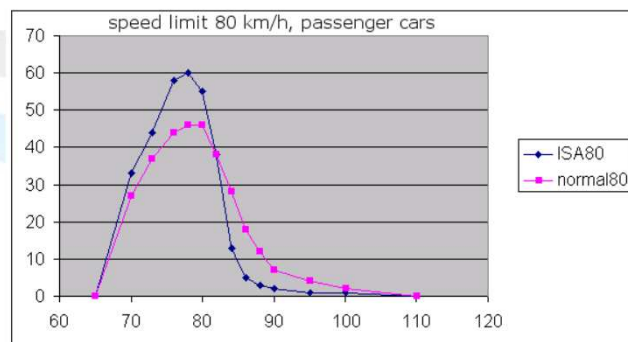
- Usually the FOT does not directly provide the right data
 - Indicators could not be measured directly (accidents, emissions)
 - Data was not logged or lost
 - A translation needs to be made
- For the calculation of the impacts data can be complemented with simulation, models, data enrichment, ...

HELP IN DETERMINING EFFECTS



EXAMPLE: TRAFFIC EFFICIENCY

- Available data
 - Speeds, time headways, lane change behaviour, etc.
- Needed
 - Change in travel times / delays / capacity
- Translation distribution of desired speed into impact on travel times at network level
 - With traffic micro simulation tool



EXAMPLE: SAFETY

- Available data: surrogate safety measures
 - Speed, speed variation, time headways, time to collision
- Needed: change in no. of ***fatalities*** and injuries

- Outcome FOT

- Change in average speed: -2% (100 km/h → 98 km/h)

- Nilsson formula

$$F_2 = F_1 \cdot \left(\frac{v_2}{v_1} \right)^4$$

- F_1 = no. of fatal accidents without system, F_2 with system
 - v_1 = average speed without system, v_2 with system

- Result

- Decrease of fatal accidents: -8%

EXAMPLE: ENVIRONMENT

- Available data: speed profiles (speed vs. time)
- Needed: change in CO₂ emissions

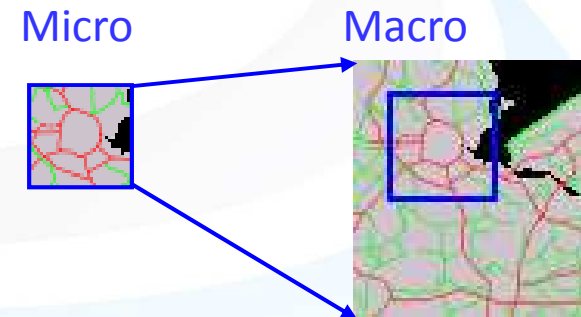
- Translation
 - With emission model

SCALING UP



WHAT IS SCALING UP?

- Translation of small scale effects into large scale effects on society level
 - Geographical scale
 - From Pisa to Europe
 - Time scale
 - From one week to one year
 - Time period (future)
 - From 2012 to 2020



WHAT IS DIFFICULT ABOUT SCALING UP?

No cookbook / cut-and-dried formulas:

- Interaction between users and non-users
- Nonlinear in penetration rate (early adopters, cooperative systems)
- Different geography
- Different time scale
- Different time period (future)
- Modelling of driver behaviour
- Frequency of conditions needs to be matched (traffic situations, weather, road types, ...)
- Cultural differences
- Etc.

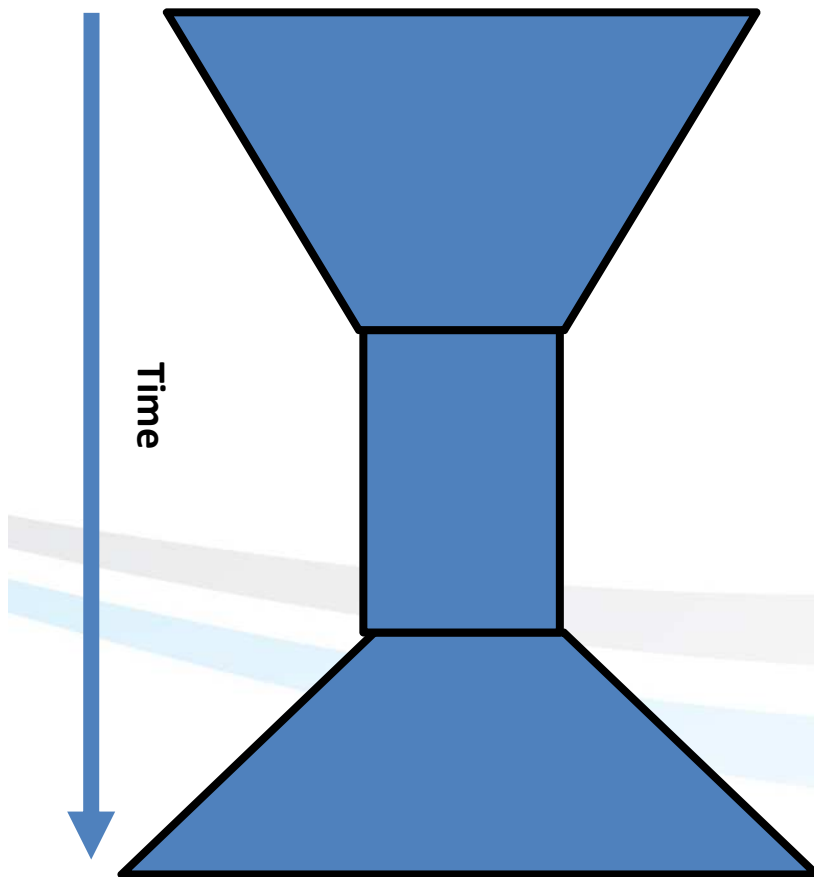
SCALING UP A REGION – HOW?

- Direct method: using statistical characteristics
 - E.g., scale up delay times per road type in the micro network by number of road km of that type in the larger region
- + Works well for local effects
- + Requires little effort
- + Easy to do
- Inaccurate if network structure has influence
- Data collection

COST BENEFIT ANALYSIS



CBA IN THE FOT



- Initial phase
 - Define scope of CBA
 - Specify components, address CBA issues and discuss CBA design
- On watch phase
 - Particularly useful for exploring cost side
- Results phase
 - Monetisation of impacts (benefits)
 - Result: benefit cost ratio
 - Plausibility checks and sensitivity tests

COMPONENTS

- Benefits
 - Efficiency (travel times)
 - Safety (change in no. of accidents)
 - Environment (change in emissions)
 - ...
- Costs
 - In-vehicle equipment
 - Infrastructure equipment
 - Operation
 - Maintenance
 - ...

ISSUES TO CONSIDER

- Geographical scope (regional, national, EU)
- Assessment of stand-alone functions or bundles of applications
- Lifecycle versus snapshot CBA
 - Effects over entire assessment period
 - Assessment for one or several preselected target years
- Selection of the reference year

CALCULATING COSTS

- Cost components
 - In-vehicle equipment
 - Infrastructure equipment
 - Operation
 - Maintenance
- Obtain information from
 - Publicly available information
 - Project partners
 - Other companies
 - Business and service models
- Make initial estimation of costs and refine this with partners

TRANSLATING IMPACTS INTO €

- Cost unit rates for each impact
 - Safety impact (€ per fatality, injury)
 - Mobility impact (€ per h, € per l)
 - Environmental impact (€ per t CO₂, NO_x-eq.)
- Issues and choices
 - European average versus country specific values
 - Appraisal offers some room for shaping the results

RESULTS

Example: Speed Alert – Scenario 2020 low

	Valued effects (in Mill. Euro per year)	
Benefits	Safety Impact	2,897.2
	Indirect Traffic Impact	66.0
	Direct Traffic Impact	48.0
	Total	3,011.2
Costs	System Costs	1,619.8
	Total	1,619.8
Benefit-Cost Ratio		1.9

RESULTS: DISCUSSION

- Only a results table does not say much
- Work is not over when the results are ready
- Series of checks necessary
 - Acceptability to policy and stakeholders
 - More disaggregated information needed
- Particular aspects
 - Composition of impacts
 - Sensitivity tests
 - Broader stakeholder analysis

BACK TO THE CLIENT...



CHALLENGES

- Scaling up
- Value of societal benefits (political perspective)
- Human factors
 - (Unexpected) side effects
 - 2nd order effects
 - Interaction effects

FOLLOW UP CLIENT

- To the Minister! (for the 2nd time)
- Benefits could be safety related, but focus has shifted towards environment or throughput...
- Political issues
- 26,27 June, Brussels
- http://www.eurofot-ip.eu/en/final_event/

DISCUSSION AND QUESTIONS

