Assessing mission-oriented R&D programs:

Combining foresight and assessment

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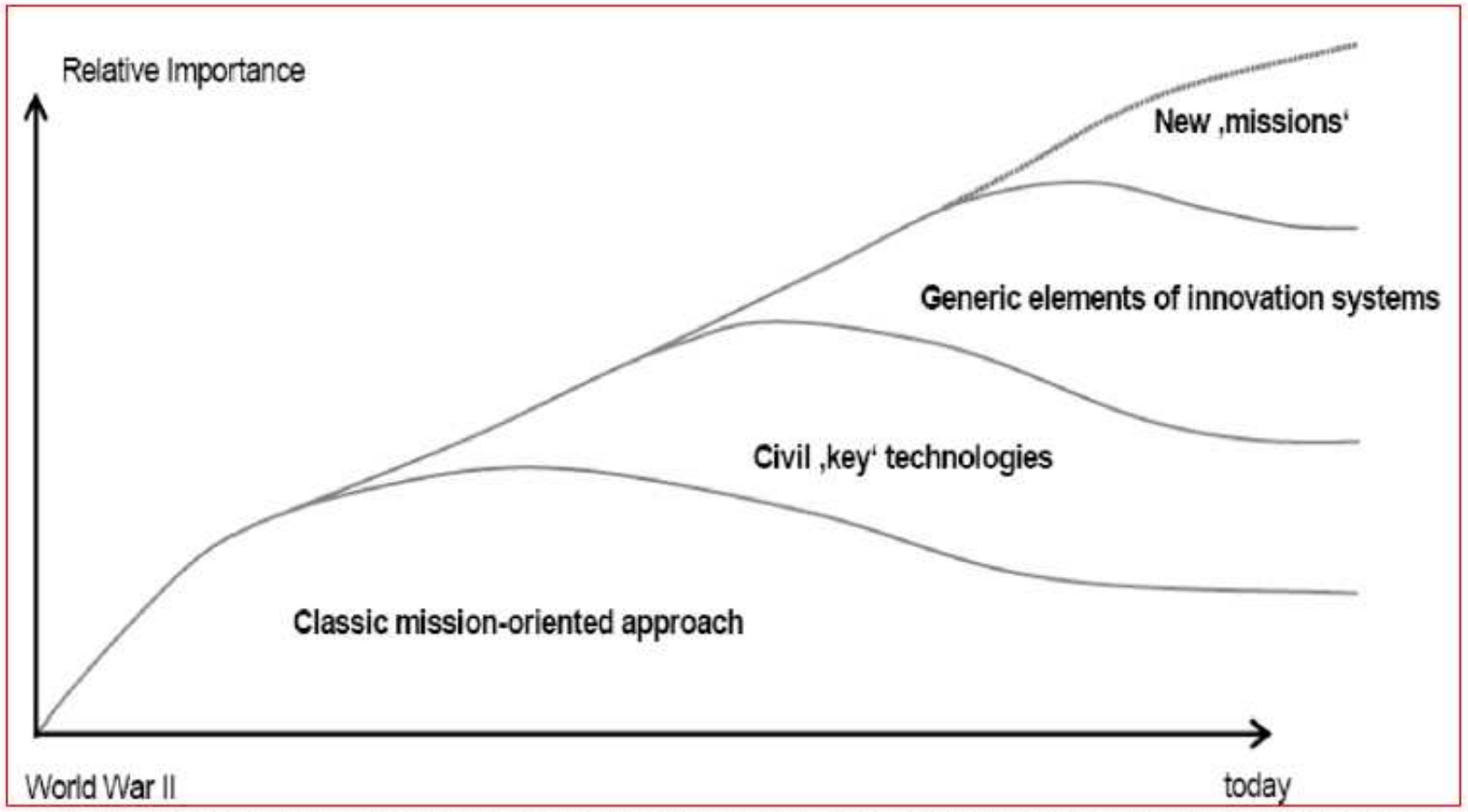
Structure of the presentation

- Trends in Policy: increased emphasis on „new“ mission-oriented RTI programmes
- Current trends in assessment and evaluation of RTI policy
- Challenges for the assessment and evaluation of mission-oriented RTI programmes
- A process model: methodological implications
- Future perspectives

New emphasis on mission-oriented RTD programmes



Source: Gassler/Polt/Rammer 2008

New emphasis on mission-oriented RTD programmes (2)

- Grand Challenges as today‘s missions: societal, economic, technological
  - Soete/Arundel 1993 „Maastricht Memorandum“ – New Missions
  - Reference to US debates of 80ies/90ies– Grand Challenges
  - ERA Rationales Expert Group 2008 – Grand Challenges

- Mission-oriented RTD programmes (since middle of last decade)
  - High ambition: High-level policy goals to which R&I is supposed to contribute
  - Legitimation: Makes public spending on R&I more appealing to societal stakeholders
  - Complexity: Introduces multi-actor, multi-level, multi-instrument programming architectures with a long time horizon
  - Relevance: Increasingly shaping RTI policy (H2020, JPIs, EIPs, national programmes and rhetorics)

Specificities of RTI policies addressing ‚grand societal challenges‘

- Target **‚wider impacts‘ as primary target**, outputs and outcomes as means
- Necessarily involve **social** as well as technological **innovations**
- Often span **from basic research to** implementation of **socio-technical solutions**
- They are ‚**Multi**‘: Disciplinary / Domain / Actor / Level … and hence ask for „whole-of-government“ approach
- Often involve a ‚long-term transformative orientation‘ **(‚systems innovation‘)**
- When addressing global challenges, **international collaboration** is needed

Current trends in assessment and evaluation of RTI policy

- **Growing demands**, in particular since Court of Auditors position on FP 6 in 2007 and NPM approaches in most governments
  - Calls for improved quantitative impact assessment

- Growing emphasis on **ex ante impact assessment** as compared to ex post evaluations

- Against the background of **growing complexity**:
  - Multi-level, multi-actor, multi-instruments ('policy-mixes'), but chasing ever-growing complexity and requirements

- **Evaluations have not lived up to that task** (see results of INNO-APPRAISAL)

Mission goals and programme goals

- "New Missions" often expressed in terms of
  - social, economic and / or environmental targets (and not just competitiveness and economic performance), and
  - with a transformative intention (beyond 'behavioural additionality')

- "Mission goals" to be clearly distinguished from the more specific RTI policy instrument/programme goals
  - Major gap between mission goals and "achievable" programme goals
  - Level of specification of mission and programme goals is critical !

Challenges for mission-oriented RTI programme evaluations

- Typical challenges of evaluation and impact assessment are reinforced in the case of new missions:
  - Diffusion problem
  - Time horizon problem
  - Attribution problem
  - Multi-policy problem
  - Multi-level problem

- Evaluation strategy - How to assess the contribution of the different outputs of research – from basic research to implementation - to the mission?
  - Broadest possible coverage of potential impacts vs. selective focus on expected impacts on mission goals
  - Ex-ante: Focus on primary mission-related goals!
  - Ex-post: Broad spectrum of observable impact chains/pathways (including unexpected ones !)

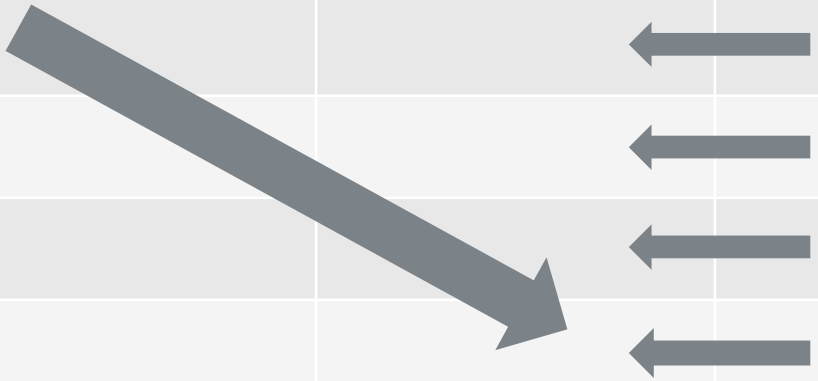
Implications for RTI policy instruments and their evaluation

- The impact of RTI policy instruments on a mission has to pass through four different stages
  - **(Oriented basic) research**: impacts difficult to anticipate, feasible only ex-post
  - **Innovation**: comparatively clear impacts on innovation system and its functions (that's what R&I policy instruments are for)
  - **Diffusion**: impact on mission is mediated through diffusion process in time and space
  - **Transformation**: innovation is processed in the target system in the course of its diffusion: interaction and embedding in context, changing patterns of use, institutional changes, etc.,

- Only after diffusion and/or transformation an impact on new mission goals occurs

Levels and pathways of impact

	MICRO/NICHE	MESO /REGIME	MACRO/LANDSCAPE as CONTEXT
(ORIENTED BASIC) RESEARCH			
INNOVATION			
DIFFUSION			
TRANSFORMATION			



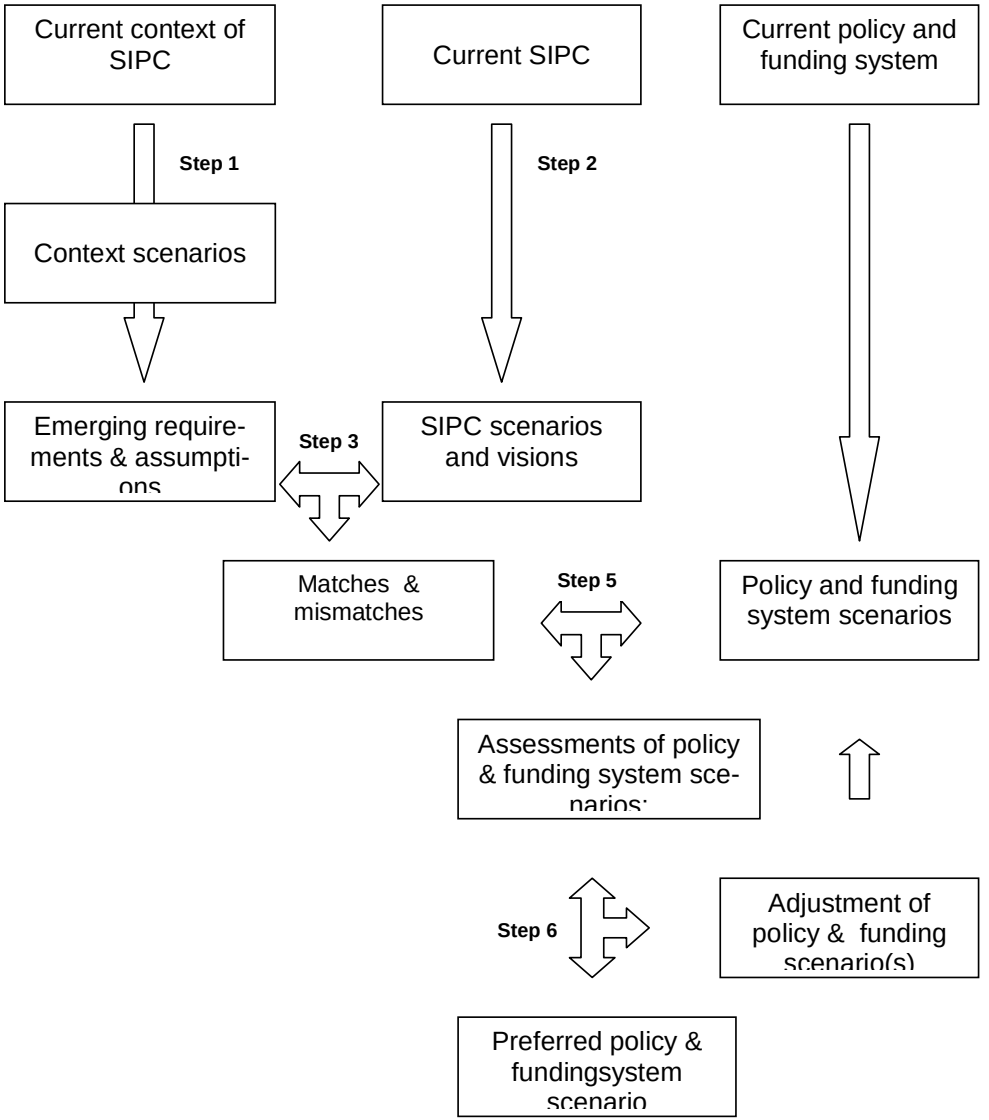
- Traditional R&I evaluations focus mainly on the upper left matrix elements
- Influencing mission goals implies transformative impacts, in micro, and meso terms, embedded in macro context
- Focus on “Systems of innovation, production and consumption” (Weber/ Rohracher 2012) rather than innovation systems as the frame of reference
- Variety of impact pathways, involving feedback, rebounds, etc.,

Methodological implications – ex ante

- Forward-looking approach required – context scenarios to cope with broader contingencies
- *Context scenarios* to cope with broader contingencies/assumptions and frame bundles of potential impact pathways
- *System scenarios* based on impact pathways: must be made explicit, using
  - theoretical insights,
  - extrapolation of current observable trends, but also
  - unexpected developments and wildcards → creativity required
- *Policy and funding scenarios:* Different packages or even roadmaps of R&I and sectoral policies to be assessed in a comparative way
- "Social Cost-Benefit Analysis" w.r.t. mission goals to anticipate and assess impacts in the target system → limits to modelling
- Depending on complexity of impact pathways, only upper and lower bounds of impacts on mission goals can be assessed

Process model

- Distinction between three types of scenarios
  - Context
  - Systems of Innovation, Production and Consumption (SIPC)
  - Policy and funding
- Impact assessment embedded in context and SIPC scenarios
- Ideally, comparison of different policy & funding scenarios
- Iterative process over longer periods of time



Source: adapted from Weber & Johnston (2009)

Methodological implications – from ex ante to ex post

- Major difference between ex ante and ex post
  - Not only intended core impacts on mission goals, but also non-intended and side-effects of relevance to the mission
- The emphasis in the evaluation of mission-oriented policy has to be
  - on ex-ante social cost-benefit assessment
  - on the process of joint vision and policy forming (which is formative in nature!)
- Ex-post evaluation of the contribution of the involved RTI policies is likely to fail because of
  - attribution problems
  - multitude of instruments and actors.
- Ex-post evaluation to highlight some side-effects which can be captured by traditional ex-post evaluation techniques (e.g. highlighting impulses for basic research from mission-oriented research)

Mission-oriented impact assessment in practice

- Screening has shown first steps in particular in:
  - Denmark
  - Finland
  - Germany
  - Sweden
  - UK
  - Austria
- No „good practices“ available yet, new approaches are currently being tested

Future perspectives of IA/evaluation of mission-oriented programmes

- Ex ante impact assessment: Social Cost-Benefit-Analysise based on scenario approach and potential impact pathways, with a focus on mission goals
- Iterative-formative assessment process: adjustment of objectives and instruments over longer periods of time to take account of
  - New technological possibilities
  - Better understanding of technological and economic potentials and limitations
- Ex post evaluation: comprehensive coverage of potential impacts, including unexpected and non-intended ones
- Frame of reference broadened beyond RTDI, to cover also sectoral policies (e.g. transport, energy, health, …) in SIPC

Future perspectives of IA/evaluation of mission-oriented programmes

- The PESCA Principle „Prospective & Adaptive Societal Challenges Assessment“ for ex-ante assessment, which
  - Focuses primarily on establishing sound relations between instruments and mission-goals upfront
  - Builds on a scenario-based approach for context, system and policy exploration
  - which is periodically adapted as technological options, market conditions and societal demands change (e.g.in the field of primary energy sources)