Strategy 2020

Research, Technology and Innovation for Austria

Analyses, Proposals and Recommendations of the Austrian Council for Research and Technology Development

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RAT FÜR FORSCHUNG UND TECHNOLOGIEENTWICKLUNG

Alpbach, August 2009

www.rat-fte.at

Vision 2020

Austria is an Innovation Leader (Top 3)

- Excellent research and radical innovations are the basis
- Education, research, technology and innovation policy are key policy areas
- Focus on people at the heart of a dynamic knowledge-based society in global competition
- The goal is sustainable social and economic progress

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The Objectives of Strategy 2020

- Position Austria amongst the leading EU states in the field of RTI (Innovation Leader, Frontrunner)
- Strengthen the competitiveness and dynamism of the Austrian economy
- Further improve conditions for research (university reform, competitive award of research funding)
- Launch a (tertiary) education offensive
- Strengthen links and cooperation between science and industry
- Make structures more flexible

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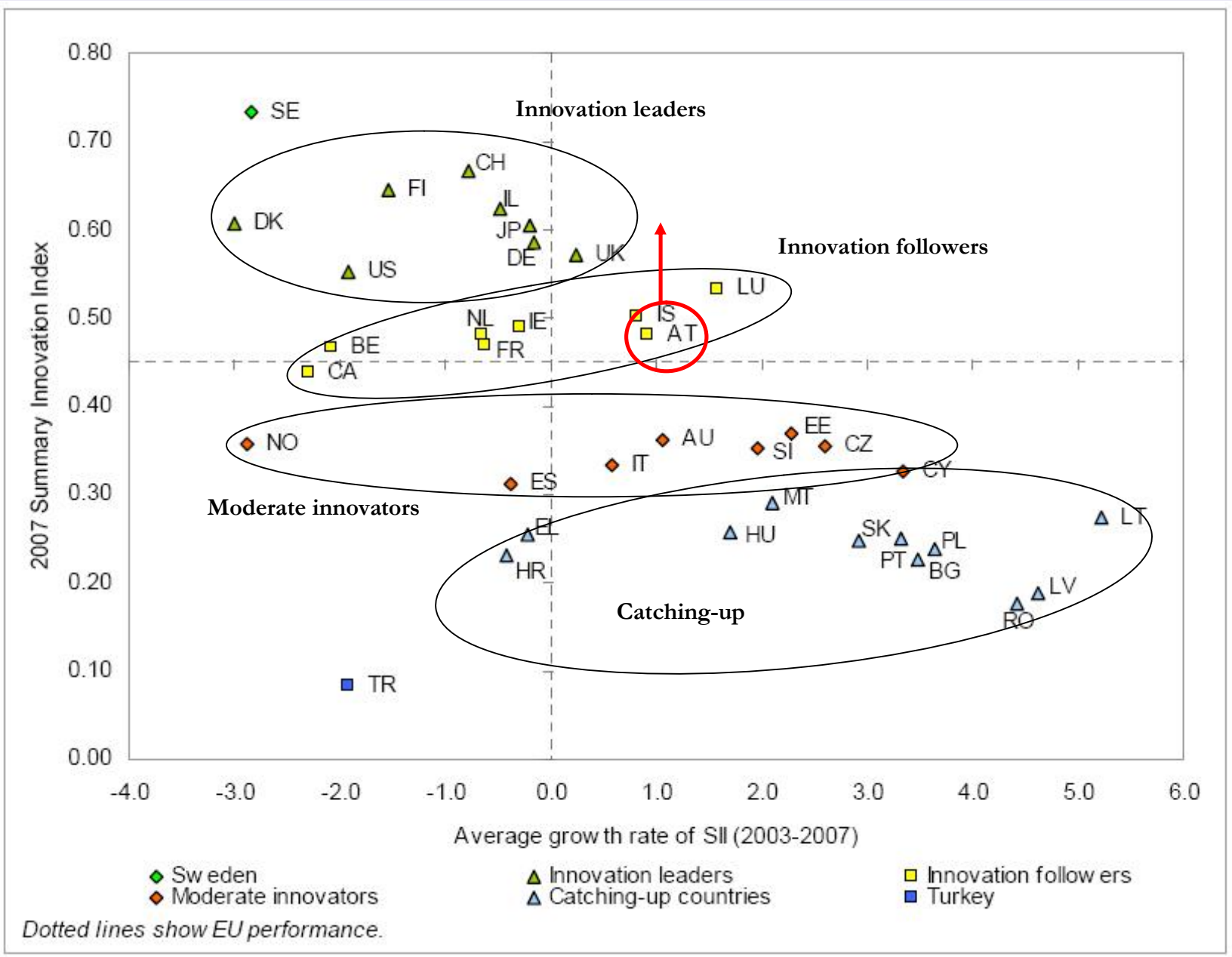
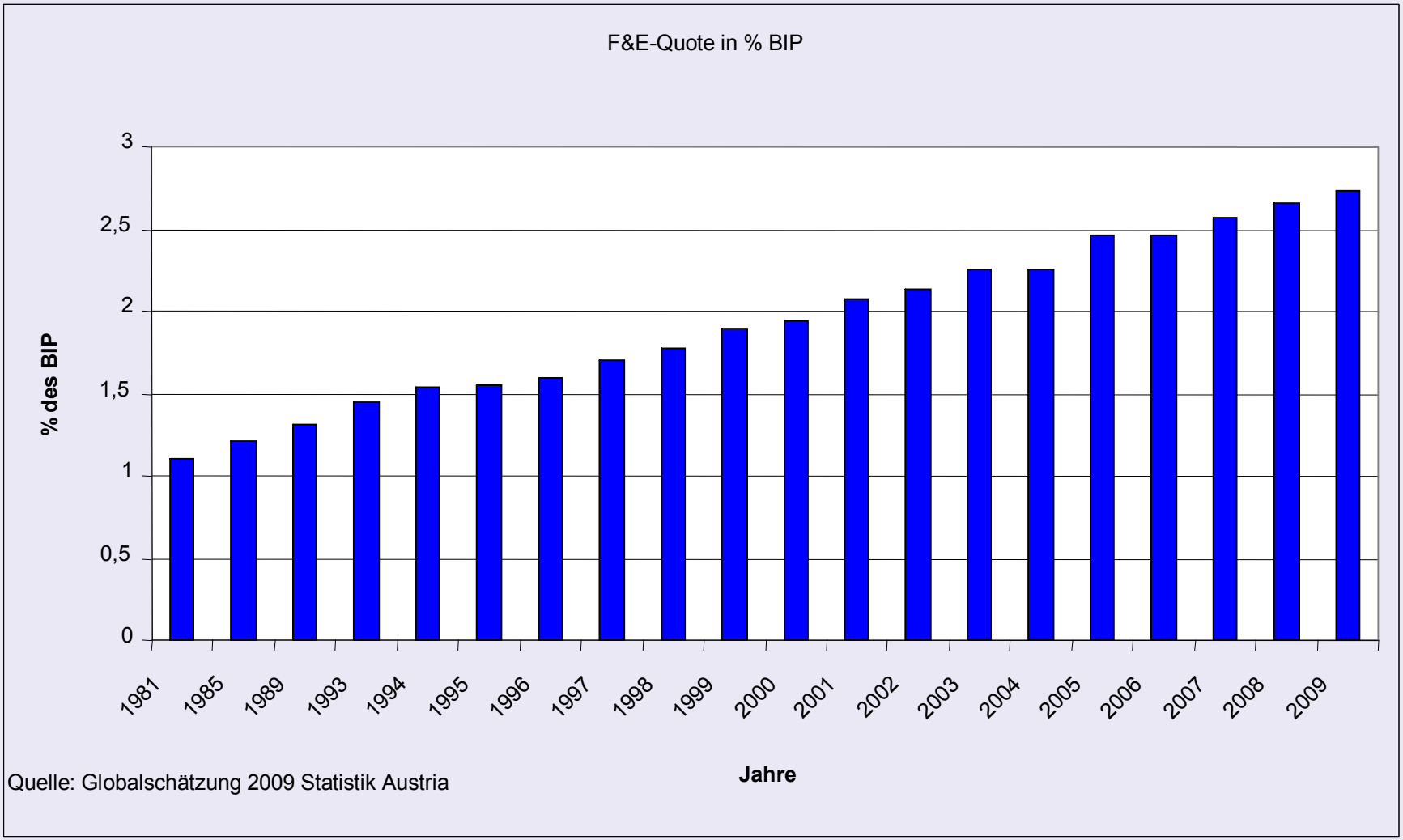
Austria 2008: Innovation Follower



Dynamics of the Austrian Innovation Development

(R&D Quota as a % of GDP)



Quelle: Globalschätzung 2009 Statistik Austria

Strategy Process and Work Stages

- **Analysis Stage**
  - **Research Dialogue, CREST Report**
  - **System Evaluation**
  - **Austrian Council Studies and Analyses**
- **Discussion Stage**
  - **Discussion of the draft strategy document**
  - **Incorporation of the results and coordination with those in positions of political responsibility**
  - **Formulation of a strategy document (Strategy 2020) by the Austrian Council**
- **Implementation Stage**
  - **Formulation of a national strategy for RTI on the basis of Research Dialogue, System Evaluation and Strategy 2020**
  - **Implementation of the strategic goals in the political agenda**

Guiding Principles (Selection)

- Sustainability and social relevance should become motifs of great importance for R&D
- Well educated and skilled people are the nucleus and key asset of a knowledge based society: Measures to enhance the educational system should be prioritised.
- Public money should increasingly be allocated on a competitive basis.
- Encourage a focus on strengths; poorly developing fields should be evaluated and thoroughly scrutinised.
- New structures and new themes should only be set up if in the medium term there are realistic chances to reach a leading position in specific scientific areas, to open up new markets or to satisfy societal demands.
- Especially in the context of governance, flexible structures have to be established in order to facilitate efficient reactions to future demands.
- Globalisation needs to be tackled by nationally defined strategies for internationalisation
- Transparency and participation, reflecting responsibility against the society, should become principles of tomorrow's policy

Strategy Elements

- People
- Society
- Input / Output
- Key Areas
- Infrastructure
- Instruments
- Governance
- Internationalisation

PEOPLE - Objective & Background

- Objective: Strategic planning of human resources development
- An innovative knowledge-based society and well educated people are a key element for ensuring Austria‘s competitiveness
- Jobs with an academic background are posting higher than average growth rates
- The forecast growth for scientists over the next 18 years is five times higher than growth in employment as a whole
- Percentage of graduates 2006: 18% (OECD average: 27%) new students 2006: 40% (OECD average: 56%)
- Science & industry are having massive difficulty recruiting technology graduates in the areas of mechanical engineering and electrical engineering

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PEOPLE - Analysis 1

- Segmented education system: In an OECD comparison earlier than average separation of "high achievers" from "low achievers" within the school system at the age of 10
- Selective education system: In an OECD comparison a child's educational career depends to a greater than average extent on the education of the parents
- Lack of scientific career options: No structured career models, instead freelance contracts, consecutive fixed-term contracts; 80% of doctoral students hold jobs; women leave university once they have obtained their doctorate
- Austria is not positioned as a high-tech country: No effective location marketing and lack of recruitment of highly-qualified researchers from abroad

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PEOPLE - Analysis 2

- In Austria only approx. 37% of the population start a university degree course, the OECD average is 54%.
- High drop-out rates lead to an actual percentage of graduates of 19.6%, the percentage of graduates in the international best performers is more than twice as high.

	Percentage of population with high school leaving certificate (or comparable training)	Percentage of the population starting tertiary education (degree course)	Percentage of the population completing tertiary education (degree course)
Austria 2005	40 %	37 %	19.6 %
OECD average	59 %	54 %	34.8 %
Best Performers	Finland 95 % Ireland 89 % Poland 85 % Sweden 77%	Australia 81% New Zealand 79% Poland, Sweden Norway 78 %	Iceland 50.0 % New Zealand 48.4 % Finland 47.8 % Australia 46.4 %
Austria 2025	47 %	43 %	22.1 %

Source: ÖAW 2006; Quantitative Entwicklungstrends derösterreichischen Universitäten und Fachhochschulen 1975-2025; OECD 2007; Education at a Glance

PEOPLE - Recommendations

- **Improve access to education** (start education earlier, later segmentation and modular structure)
- **Improve attractiveness of tertiary education** (better teaching conditions, attractive curricula - particularly in the technical-science branches)
- **Position science as a career** (additional funding for enhanced doctoral training schemes, improved conditions of employment to match international standards, new career models for women)
- **Use and promote immigration**, (implement Austria-wide recognition of qualifications acquired abroad, facilitate immigration of top researchers, start an awareness campaign)

SOCIETY - Objective & Background

- Objective: Improve the dialogue between research, technology, innovation and society in Austria
- A "democratic knowledge-based society" (EU goal) requires the involvement and participation of the general public
- Since the end of "Innovatives Österreich II" there has been no centralised coordination, cross-linking or promotion of measures in the field of RTI communication or vision or strategy in this regard in Austria
- Surveys show that the public feels that it is poorly informed about developments and results in science and research

SOCIETY - Analysis 1

- Lack of a differentiated landscape of programmes and players (e.g. private foundations) in the field of RTI communication
- Undifferentiated awareness measures address the "general public" and negate social differences as well as the fact that there are a host of "publics"
- The emphasis is upon "selling science" instead of upon a genuine "dialogue" between RTI and society
- The relationship between RTI and society cannot be reduced to the adequate communication of information; it is a matter of values and norms and questions of participation, representation and legitimacy

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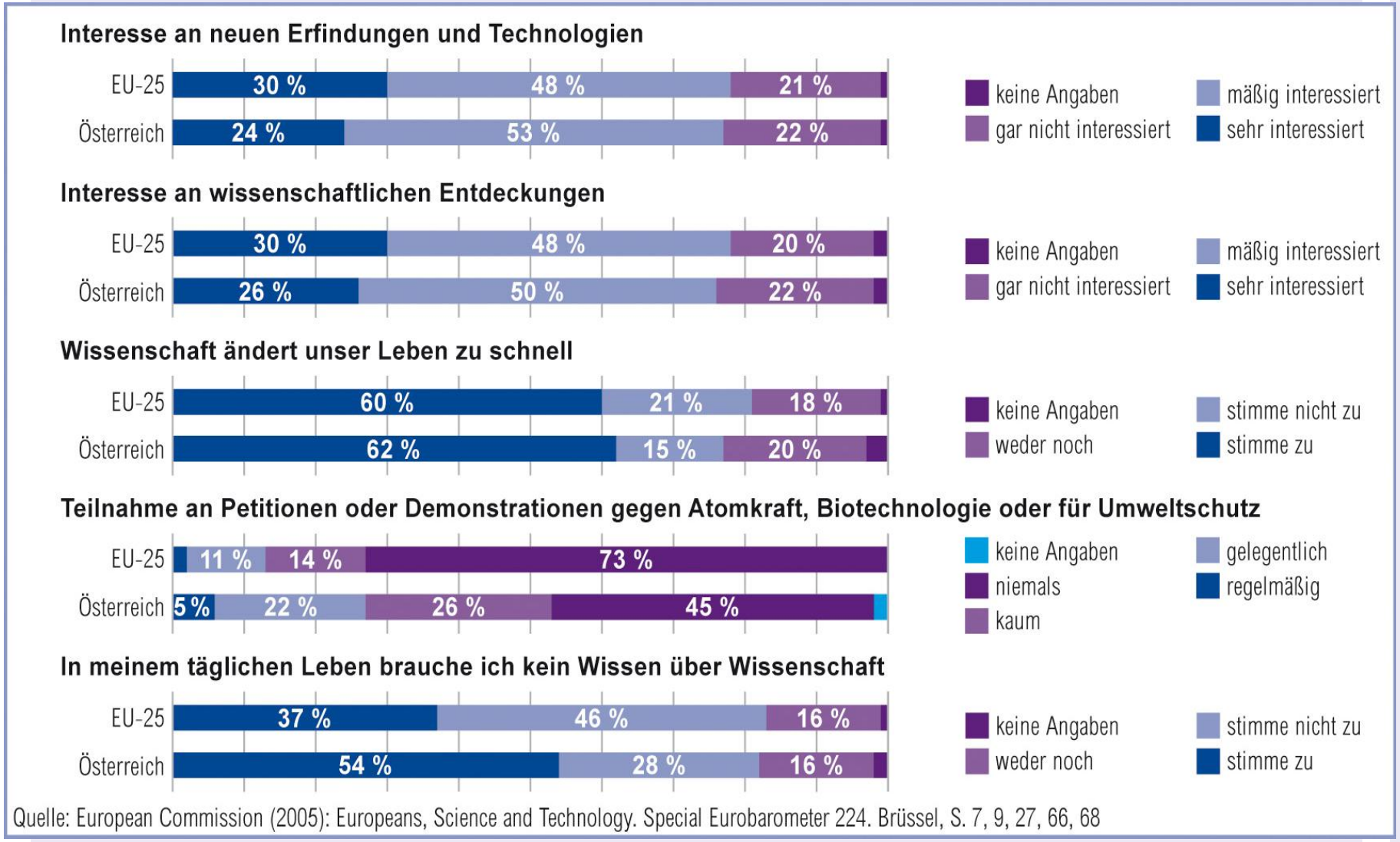
SOCIETY - Analysis 2



Quelle: European Commission (2005): Europeans, Science and Technology. Special Eurobarometer 224. Brüssel, S. 7, 9, 27, 66, 68

SOCIETY - Recommendations

- **Development of a strategy to design and implement a science-society dialogue**
- **Institutionalisation of this dialogue** (ideally in the form of an independent institution)
- **Periodical, ideally annual, realisation of the "Lange Nacht der Forschung" ("Long Night of Research")**
- **Development of an incentive system for scientists/ researchers to participate in the science-society dialog**
- **Expansion of the Parliamentary Research Service to obtain and edit impartial expertise**
- **Ethics discourses at universities, Fachhochschulen (universities of applied sciences) and research facilities**

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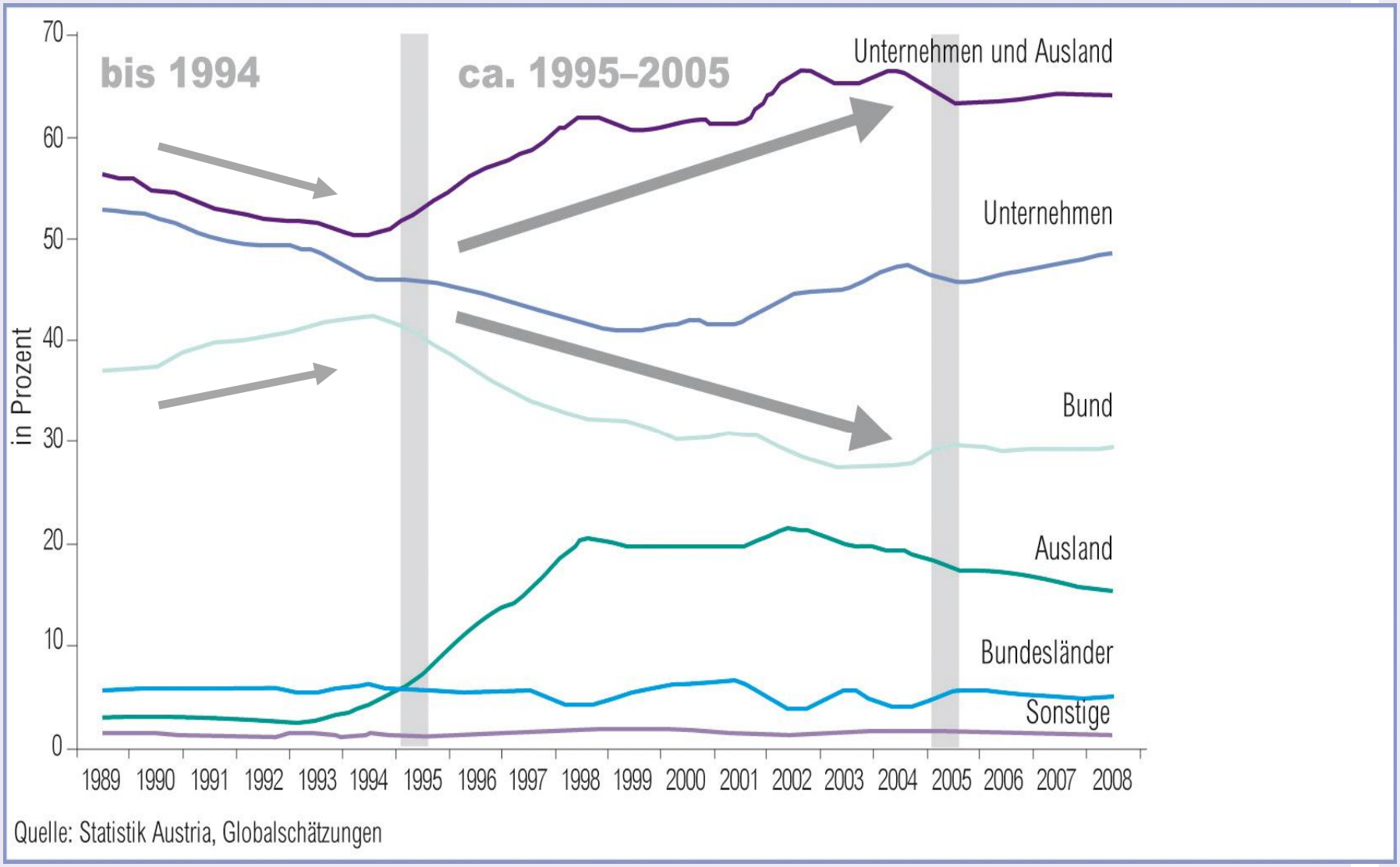
INPUT / OUTPUT – Objective & Background

- Objective: To collect, increase the availability/accessibility a nd analysis of R&D data for strategy development, assess the impacts of R&D investments upon employment, productivity and economic growth
- Strong need to move from resource input to result output has been recognised
- Better understanding of the RTI system is needed (in quantitative terms and with regard to internal linkages)
- 3% target of the Lisbon Strategy as an interim goal: a new goal is necessary to achieve steady growth in R&D financing and position Austria among European innovation leaders

INPUT / OUTPUT - Analysis 1

- Current status: Collection and analysis of statistical R&D data according to branches of industry and science (in keeping with international standards requirements of EU and OECD)
- Additional data for strategy and policy development is missing (e.g. resources allocated for key thematic areas); a coordinated , regular process of data collection is required
- More information is needed concerning the output generated by investments in R&D
- Methods for data analysis and impact assessment must be developed further

INPUT / OUTPUT - Analysis 2



INPUT / OUTPUT - Recommendations

- **3% research quota as an interim goal; a new long-term goal for 2020 has to be developed in the light of recent economic developments**
- **Current structure of R&D funding has to be enhanced with a focus on output**
- **Funding of basic research has to be in balance with the other sectors (applied research, experimental development)**
- **Improved support for the transfer of technology**
- **Improved collection and analysis of policy-relevant R&D data in cooperation with Statistik Austria, ministries and agencies**
- **Development of new methods and tools to analyse the output of research**

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KEY AREAS – Objective & Background

- Objective: To obtain an overview of and define RTI subject areas with a long-term importance for the state, science, the economy and society
- Importance of the mission-orientation and thematic-orientation in RTI policy programmes is increasing worldwide
- Analysis of the trends in the international RTI landscape on the basis of existing foresight processes and technology forecasts
- System evaluation and Research dialogue draw upon concepts to improve mission-orientation and the definition of key thematic areas in Austrian practice

KEY AREAS - Analysis 1

- Programme priorities in Austria are only partially defined on the basis of holistic strategic analyses
- National strengths and key thematic areas have not been examined on a systematic and regular basis
- Foresight activities and technology radars have not been used on a comprehensive and integrated level
- Existing multitude of players is only insufficiently coordinated
- Need for improvement in Austrian practice with regard to the establishment of mission-oriented and thematic programmes has been identified

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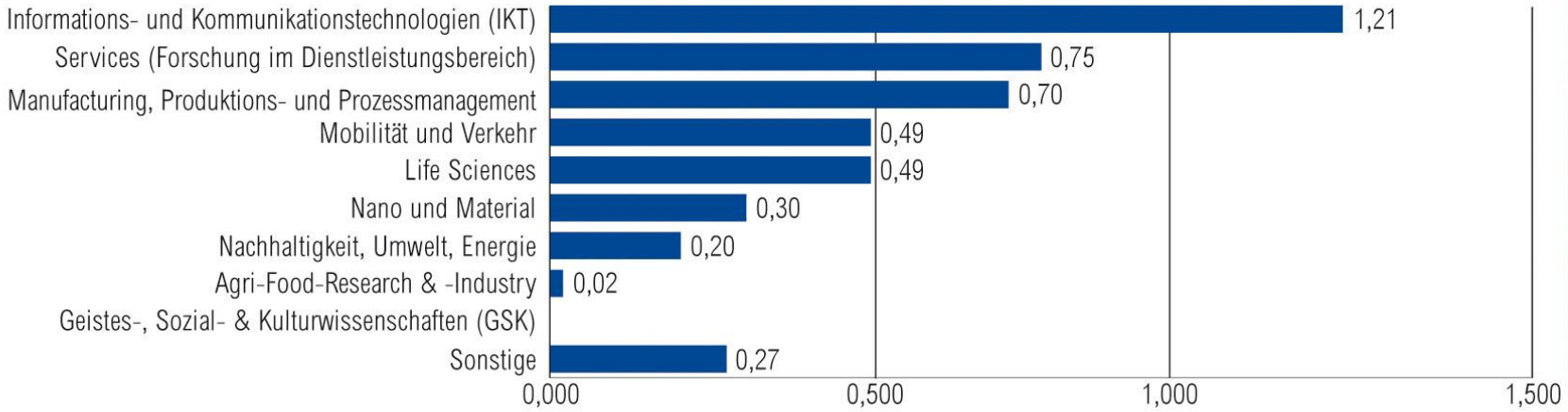
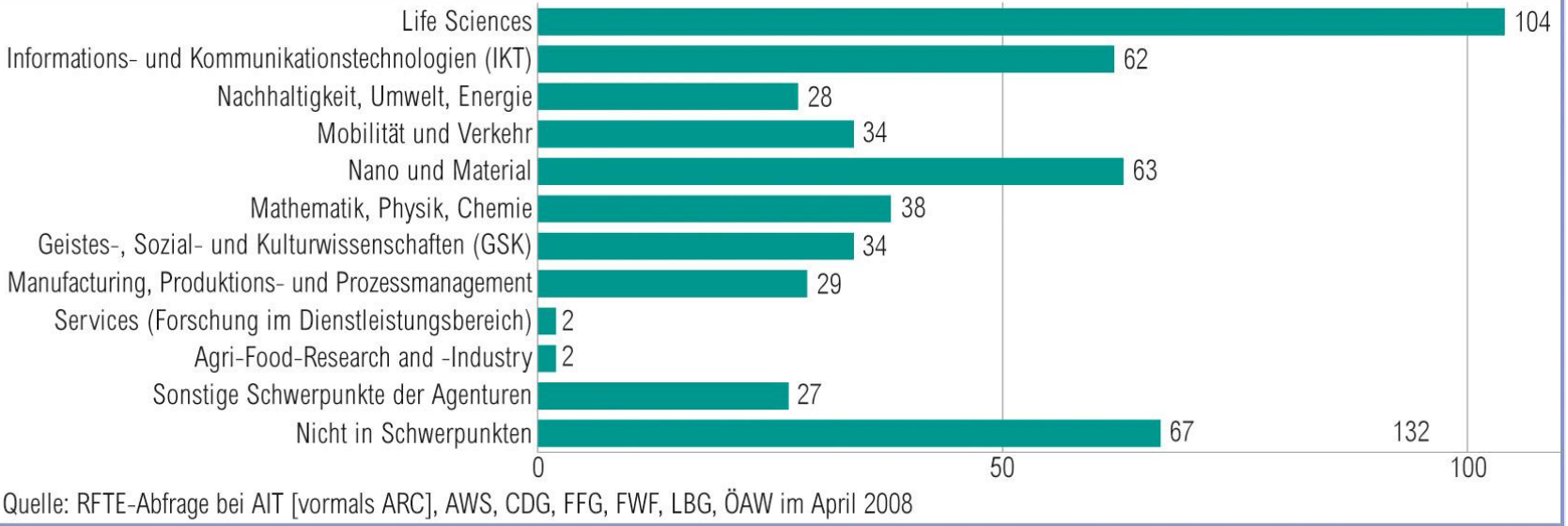
KEY AREAS - Analysis 2



Quelle: eigene Berechnungen auf Basis Statistik Austria 2006 (ges. F&E-Ausgaben 2006: 4.449 Mrd. Euro) und Unternehmensabfrage des RFTE

Allocation of business R&D-expenditure according to key areas, in bn. Euro



Quelle: RFTE-Abfrage bei AIT [vormals ARC], AWS, CDG, FFG, FWF, LBG, ÖAW im April 2008

Allocation of public R&D-funding according to key areas, in mn. Euro

KEY AREAS - Recommendations

- **Comprehensive and concerted setting of priorities at the inter-departmental level**
- **Elaborate detailed strategies for key areas** (most important in the fields of "sustainability, environment, and energy" as well as "mobility and transport")
- **Pursue niche strategies** (in the sense of focusing on specific markets and fields of knowledge whose long-term importance for the state, science, the economy and society in Austria has been identified)
- **Focus thematic programmes on a few, broadly-based key areas**
- **Restrict funding budgets by imposing upper limits for thematic programmes**
- **Systematic approach to regular foresight activities and technology radar**

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INFRASTRUCTURE – Objective & Background

- Objective: Define target research infrastructure for an internationally attractive research location in 2020
- Obtain a consistent overview of existing national and international research infrastructure as well as current and future demand
- Research infrastructure is a key determinant for the performance of the RTI system
- Comprehensive nationwide survey and analysis of the research infrastructure, including that outside universities, in companies and cooperative institutions, which provide or use publically accessible research infrastructures
- Databases on the orders of magnitude, research disciplines, geographic distribution etc.

INFRASTRUCTURE - Analysis

- Survey of science sector (universities, Fachhochschulen, non-university research) and industry (LCUs and SMEs)
- RTI infrastructure in Austria is inadequately coordinated
- There is a lack of top-down approaches and responsible contact partners
- There is a need for balanced, top-down and bottom-up approaches with a long-term focus
- Link-up with international RTI infrastructures in key thematic areas
- Beyond basic funding predominantly project orientation -> Advance funding by applicants, neglect of supra-regional and cooperative possibilities of utilisation and impacts
- Poor basic infrastructure at universities

INFRASTRUCTURE - Recommendations

- **Establish links with international RTI infrastructures with a view to thematic key areas**
- **Create a platform for the strategic planning of RTI infrastructure in consultation with ESFRI**
- **Greater joint (supra-regional) use of large-scale infrastructure**
- **Expand programmes to promote cooperation to include key infrastructure**
- **Multi-year budgets for infrastructure**
- **Fund basic university infrastructure through the global budget** (but preserve competitive tendering processes for additional research infrastructure)

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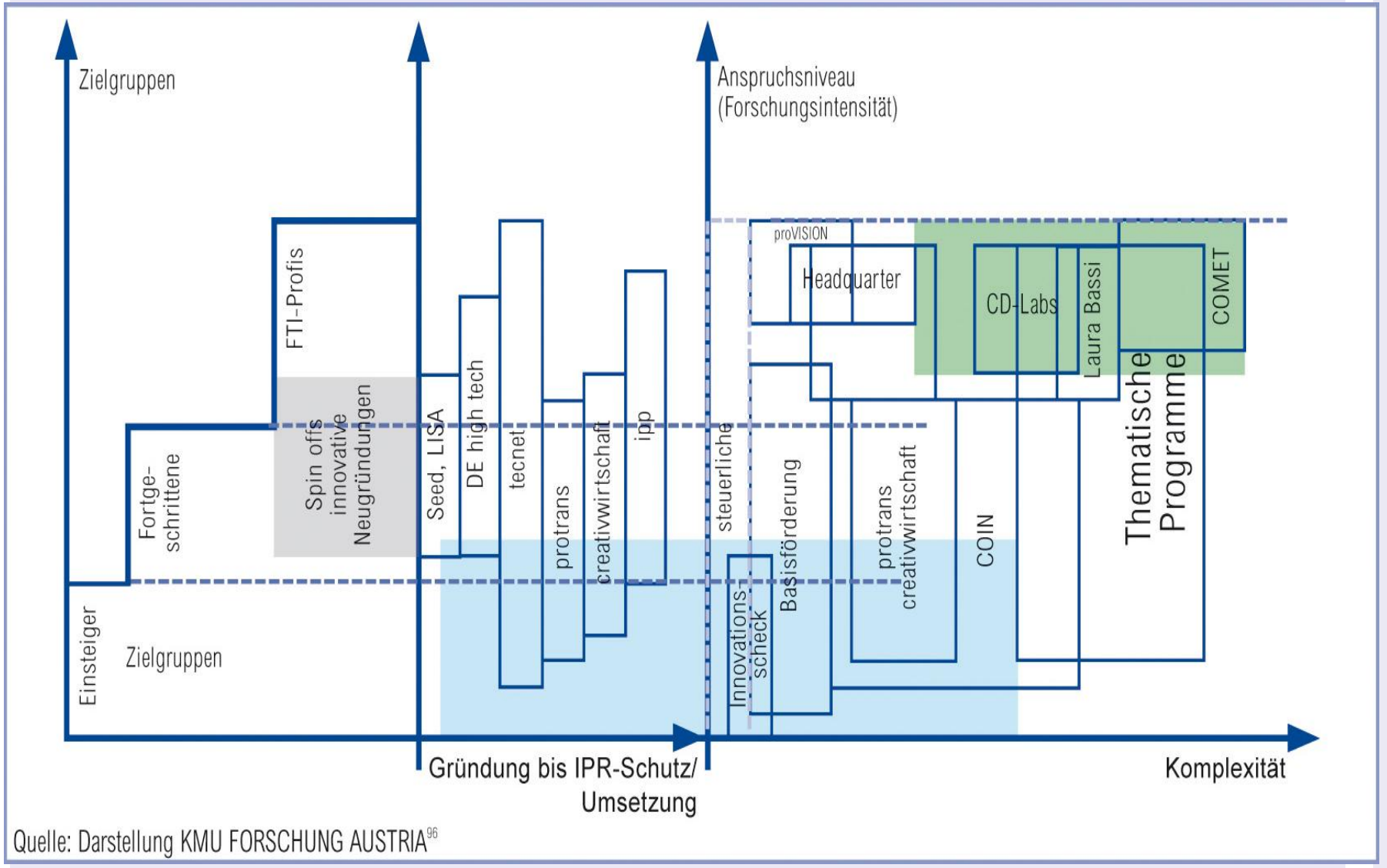
INSTRUMENTS – Objective & Background

- Objective: Formulate the optimal target structure for the use of instruments until 2020 according to performance sectors:
  - Universities
  - Industry
  - Collaborative Sector
- Excellence and risk as cross-sectional topics
- Take account of the instruments / measures implemented by the regions / *Länder* and their interfaces in the federal government‘s instrument portfolio
- Comprehensive funding system in Austria that permits both simple access (bottom-up) and targeted interventions (top-down), but which requires efficiency and a more targeted use of funding

INSTRUMENTS - Analysis 1

- System evaluation: major cornerstones of the strategy element
- Survey and analysis of the *Länder*-specific funding portfolio and its interface to the RTI policy measures of federal government
- Problem solving primarily through the funding system instead of structuring a framework that is conducive to research and innovation
- Programme overload due to the large numbers of small programmes that have evolved over time and have low visibility
- Focus on dissociating from other programmes instead of on problems / topics
- Strong propensity to innovation, but little corporate willingnes s to take risks or ability to engage in radical innovation -> greater risk orientation in the evaluation system

INSTRUMENTS - Analysis 2



Quelle: Darstellung KMU FORSCHUNG AUSTRIA[96]

INSTRUMENTS - Recommendations

- **Simplify and increase indirect funding**
- **Streamline the multitude of thematic programmes**
- **Increase the proportion of companies engaging in research and innovation, in particular among SMEs and LCUs**
- **Expand risk and growth-oriented financing opportunities for young, innovative, technology-oriented companies**
- **Improve the availability of and access to equity capital and venture capital**
- **Optimise and continue programmes that promote cooperation between science and industry**
- **Greater concentration of collaborative institutions**
- **Develop a long-term strategy for the tertiary education sector as a complete portfolio to be implemented through performance agreements**
- **Increase the proportion of funding awarded using competitive procedures**

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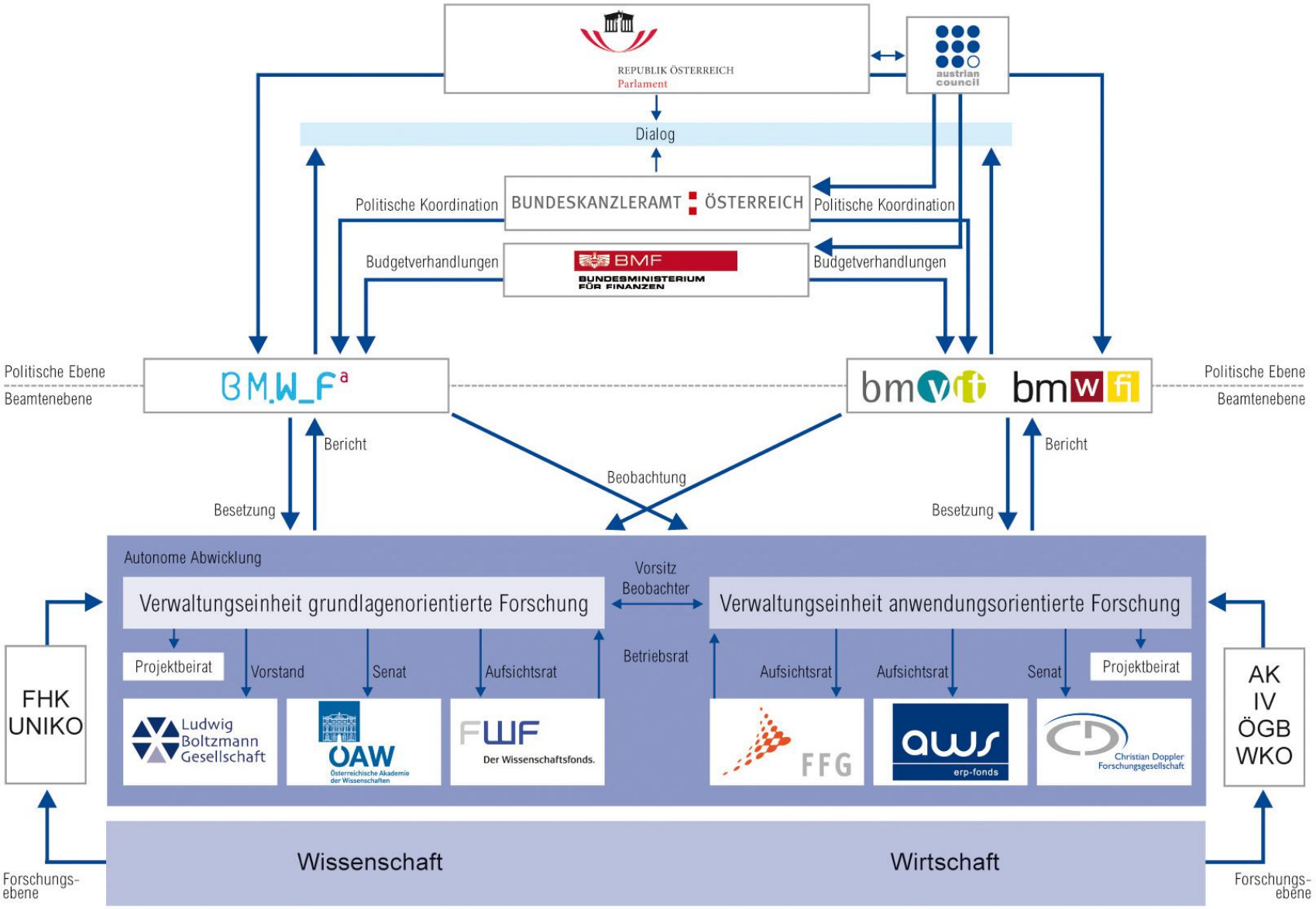
GOVERNANCE – Objective & Background

- Objective: Optimise the steering and interaction of the institutions which are responsible for the implementation and handling of public interventions in the RTI system
- Governance is understood as the entire web of relationships between the players in the RTI system
- Governance is a key indicator for the performance of the RTI system
- Generally speaking, in the area of governance answers are given before the right questions have been asked

GOVERNANCE - Analysis

- Governance is a key element of the system evaluation, the strategy element builds on these results
- Recommendations from the CREST Report (Research Dialogue) are incorporated
- Structured hierarchical relationships are only partially implemented > organisations take on a life of their own
- Strong focus on the TARGET structure in 2020 > then relation to the current status
- Overcome limitations with regard to the interface at the regional level and the EU

GOVERNANCE - Recommendations 1 (Model Structure)



GOVERNANCE - Recommendations 2

- **Concentrate research agendas at the ministries responsible for applied and application-oriented research – BMVIT und BMWFJ**
- **Merge the supervisory and steering structures of the agencies** (also with a view to being able to allocate funding to the key areas flexibly and as needed)
- **Autonomy of the agencies** (in the sense of agencification in terms of jury and guideline decisions on the basis of the strategic specifications of the ministries)
- **Increase the flexibility of employment contract structures at the ministries**
- **Advisory services of the Austrian Council for Research and Technology Development should be directly addressed to members of the government** (focus on the use of funding including definition of key areas and monitoring of the implementation of the federal government‘s RTI strategy)

INTERNATIONALISATION – Objective & Background

- Objective: Development of an internationalisation strategy for science and R&D, which covers both European and international agendas
- Internationalisation as a strategic cornerstone
- Strategy 2010 aimed to position Austria as a strong and active partner in the European Research Area and develop the country into a key network node in the European, and especially the Central and East European, Research Area
- Integration in international networks is relevant
- International mobility is a key element of scientific and research work
- It is necessary to develop neighbourhood strategies

INTERNATIONALISATION - Analysis

- Compilation of an overview of relevant RTD programmes and initiatives at both the national and European levels (ERANETs)
- List of official foreign missions and agencies in Austria with a relevance for RTD
- Survey of official Austrian institutions abroad that implement RTD relevant agendas
- Comparison of the claims of the individual programmes with actual funding reality

INTERNATIONALISATION - Recommendations

- **Reorientation of responsibilities at the ministries: coordination function replaces management function**
- **Implement new methods of coordination between departments and agencies.**
- **Joint development of participation strategies for European approaches to internationalisation (e.g. ERA-NET)**
- **Strengthen Neighbourhood Policy** (by intensifying scientific collaboration and cooperation in education, research and development in the Central, Eastern and South East European Research Areas)
- **Promote Austria as a research and university location** (in Central, Eastern and South East Europe, in selected non-European countries and in selected cooperative networks)

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Summary

- **Austria has become a dynamic and competitive knowledge-based economy over the last years**
- **In the context of the global crisis it will be even more crucial to strengthen competitiveness and dynamics of the Austrian economy**
- **Policy has to rectify weaknesses in order to further develop the national innovation system and increase its efficiency :**
  - **Optimise innovation output**
  - **Launch a (tertiary) education offensive**
  - **Strengthen links and cooperation between science and industry**
  - **Make structures more flexible**

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