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The City of Vienna in a dynamic regional environment

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Introduction: The advent of a wider context – urban development embedded in trans-border regional co-operation

The City of Vienna lived through changes of historic magnitude during the 20th century: By the turn of centuries around 1900 Vienna was among the five largest cities in Europe and the attractive and influential capital of an imperial European power. After World War I, Vienna shrank in population, international relevance, and economic potential. Yet in large parts of the small population which inhabited the Republic of Austria after dissolving of the Austro-Hungarian Monarchy it was perceived as too big (“water head”; a phenomenon that is neither unique, nor surprising: it obviously is related to the fact of a sudden disproportion between the size in population and structures of a big city and its environs). After World War II, and as long as barbed wire fences cut across Europe, Vienna consolidated at a level of about 1,5 million inhabitants (compared to more than two millions by 1910¹), yet development was limited. Nevertheless, in the course of Austria’s favourable economic development since the reconstruction period of the 1950’s Vienna re-gained some of its previous economic capacities and became the strong centre of the “*Vienna Region*”² However, socio-economic development in Austria indicated well into the 1980’s a clear West-East decline, thus establishing in terms of regional development a classical centre-hinterland relation between Vienna and its environs.

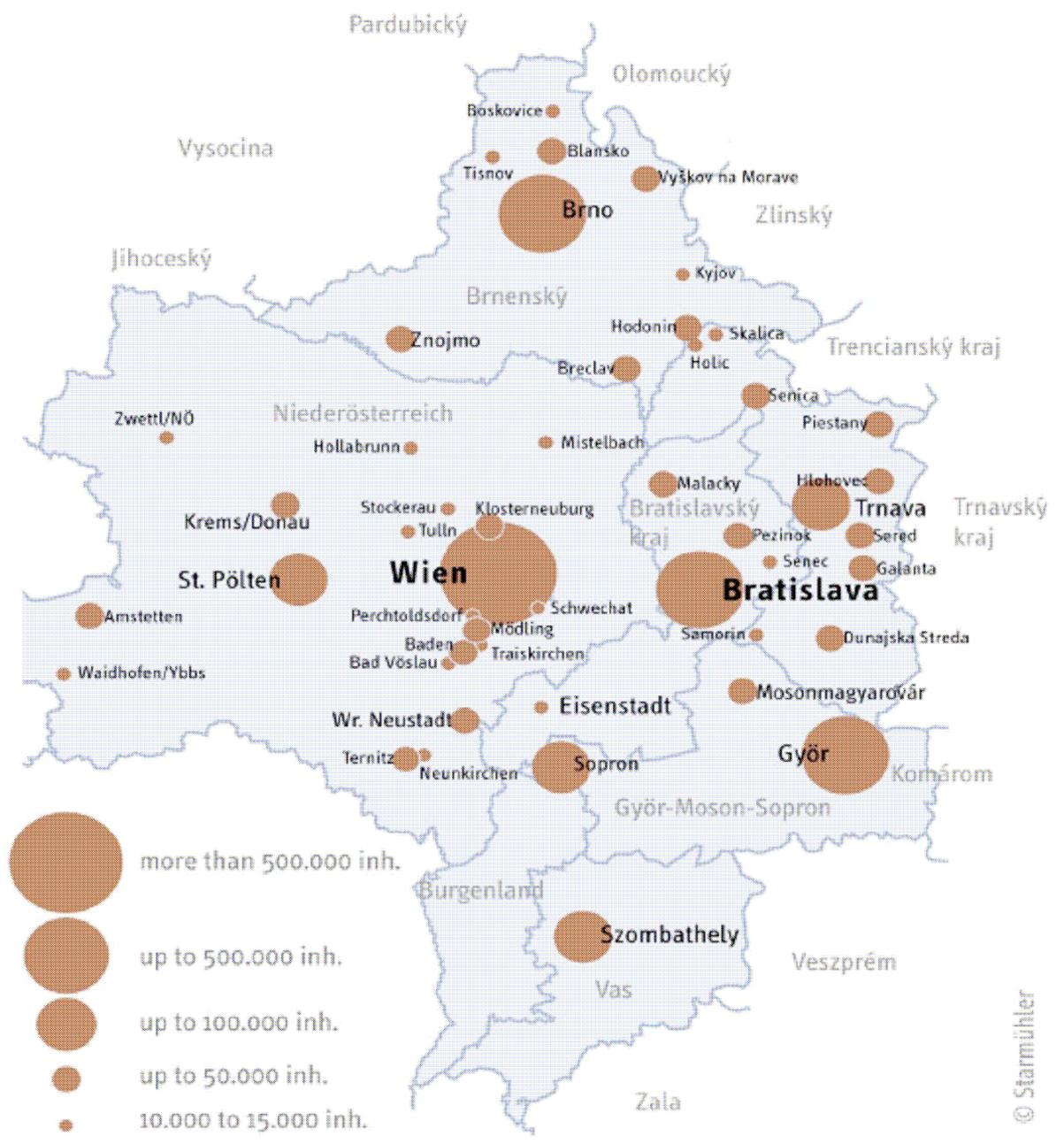
Within few years after the political systems changed in the neighbouring countries, Vienna found itself by the turn of centuries again in a totally new situation: At the beginning of the 21st century the borders to all neighbours are not only open but economic ties are increasing. Within short time the still existing borders between Austria, Slovakia, the Czech Republic and Hungary are expected to become merely administrative limits separating very closely related regions. Particularly because of the proximity with Bratislava (SK), and the short distances to Brno (CZ) and Győr (HU), Vienna is less to be seen as a major urban centre with hinterland. Much more so the new situation sees Vienna in the position of a major urban centre in a very large region with more dynamic centres in an trans-national region cutting across borders between Austria, Hungary, Slovakia, and the Czech Republic.

¹ As matter of fact, population in the greater Vienna vicinity nowadays also amounts to more than 2 mio. inhabitants. Yet the 2 mio. people of one hundred years ago lived in extreme density in the small-sized area, on which currently 1,66 mio. live. (source: www.wien.gv.at/statistik/daten/pdf/bev-entwicklung-lang.pdf)

² A term often used to indicate socio-economic inter-relations between the three eastern provinces (“*Laender*”) *Burgenland, Niederoesterreich, Wien*. Vienna has the status of a province as well as that of a municipality. Thus the city of Vienna is perceived as the municipal centre in the eastern part of Austria. In official terms (to avoid mentioning the dominance of Vienna) the three provinces established an administrative body (involving delegates and civil servants from the provincial governments) which is in charge of co-ordinating regional planning. It is called the “Planning Community East” (*Planungsgemeinschaft Ost, PGO*).

This is why a *new vision* emerged: The vision of a CENTral EuROPEan Region, bridging the borders of four countries (Austria, Czech Republic, Hungary, and Slovakia). Since a first meeting of political decision makers representing regions and cities from the south of Moravia, the western parts of Slovakia and Hungary, and the east of Austria, this area in the border quadrangle is called “CENTROPE”, a densely populated area, home to some 6.5 mio inhabitants.

Figure 1:
“CENTROPE” – A trans-border region across four countries in Central Europe: the current extension of Vienna’s inherited areas of co-operation



The visionary concept of Centrope³ adds a new notion to the understanding of Vienna as a region:

- According to the most narrow and traditional concept of the term “region”, the Vienna region is the city of Vienna, and at the same time one of the nine Austrian provinces (and a NUTS 2 region).
- In national context “*Region Wien*” sometimes rather informally is denoted as the city of Vienna plus the directly surrounding administrative districts of Lower Austria (to a large extent also urban municipalities and suburban areas).
- In a more formal way, and relevant to administration and planning, Vienna often is referred to as part of the eastern region of Austria, composed of the three provinces (*Bundesländer*) Lower Austria, Vienna, and Burgenland (named “*Vienna Region*”).
- In the broadest sense of a wider regional context Vienna is perceived embedded in the larger trans-border region of “Centrope”.

Obviously the definition of Vienna as a region ranges from the narrow – yet clear – definition of the municipality (or the province, “*Bundesland*”) of Vienna as an administrative body equal to all other eight provinces of Austria, on to the new concept of being part of the emerging cross-border region Centrope.

In this presentation of the Case of Vienna, data and development strategies analysed are concerned with the City of Vienna in the narrow sense of the definitions provided. This is due to the fact that in the framework of ProAct Vienna was chosen as a case of an urban area with socio-economic indicators which compare with top industrialised regions of Europe. Moreover, most relevant statistical data and strategic policy papers are concerned with the City of Vienna as an administrative unit. Nevertheless, to mention and to refer to the new notion of Centrope is necessary, as **Vienna increasingly is turning towards this larger concept of a trans-border region, when it comes to issues of future developments and strategies**. In the new Europe, on the one hand national borders become less relevant in regard of curbing free personal and economic movements. Yet on the other hand, there are quite a number of Member States in the EU with relatively small or even very small territory, population, and small-sized economies as well.

³ “we grow together - together we grow: Vision Centrope 2015”, Vienna 2006; for information please refer to <http://centrope.info/baernew>

Thus growing together economically – with a major thrust provided by the “four freedoms” (capital, products, services, people) – will spark off the emergence of numerous “trans-border regions”. These regions may soon reach consolidation, so that perhaps in only half a working life previously hard borders may sink into oblivion (even though no political unification will take place as was the case in Germany).

On top of the four freedoms, the internet and seamless trans-border flows of communication bear the capacity to lead to a fifth freedom, the “freedom of knowledge”.

For the time being and within the scope of this report on the case of Vienna, it may suffice here to conclude that evidently the term “European region” should be recognised as either depicting a “large European region” (such as “the Nordic countries”, or “South-East Europe”), or a “small European region” (such as Centrope). Actually Centrope may serve as a model case: It does not cut across the administrative or institutional borders of existing NUTS⁴ regions, but it links together several NUTS regions of levels 2 and 3, to form a region in the size of NUTS 1⁵. In addition, Centrope exhibits the specificity that some of the institutional borders between NUTS regions also are borders between states.

⁴ “The Nomenclature of Territorial Units for Statistics (NUTS) was established by Eurostat more than 25 years ago in order to provide a single uniform breakdown of territorial units for the production of regional statistics for the European Union”. (source: http://ec.europa.eu/eurostat/ramon/nuts/introduction_regions_en.html)

⁵ NUTS 1 regions usually comprise a population ranging from three to six million.

1. Practices of strategy formation during the past two decades

The period since end of the 1980s has seen profound changes of conditions for urban and regional development in and around Vienna. As a result, also strategic objectives to position Vienna in European culture, politics and the global economy had to be revised.

To provide initial orientation, a general overview of the strategic positioning of Vienna highlights significant specialisation and improvements related to mainly external conditions:

- Up to 1990: “Cultivating the image of a cultural signpost“
Preservation (by means of museums, leisure facilities) rather than innovation (incubators, universities etc.)
- 1990 – 1995: „Transition period“
Re-orientation *towards Western Europe*, structural adaptation to open markets according to EU membership
- 1995 – 2000: „Preparing for change“
Initiation of strategies and reforms on national and regional levels; adaptation to growing flexibility, yet still high responsiveness instead of pro-active policies
- Since 2000: „Re-positioning in the wider Europe“
Business goes East; Vienna wants to become (again) a capital of science, research and industry in Europe

The new self-confidence of Vienna, unprecedented since the First World War, is expressed very clearly by the WWFF on its website when advertising Vienna as a business location⁶.

Box 1: “Why Vienna?”

There are many reasons for selecting Vienna as a business location

- Vienna is international
- Vienna lies in the centre of the new Europe
- Vienna is the economic engine of Austria
- Vienna is a fiscally attractive business site
- Vienna is a top location for research and development
- Vienna is well recognised as a European high-tech location
- Vienna offers security, stability and quality of life

“Siemens Austria highly values Vienna as a business location, because the superbly qualified employees, a broad range of R&D facilities as well as one of the most liveable metropolitan areas in the world provide an outstanding basis for economic success. In addition, Vienna is the pre-eminent interface for doing business in the Central and Eastern European markets.”

Brigitte Ederer; CEO, Siemens AG Austria

⁶ WWFF: „Wiener Wirtschaftsförderungsfonds“ (Vienna Business Agency); http://www.wvff.gv.at/wvff.aspx_param_target_is_104947_and_1_is_2.v.aspx

1.1 Finding a vision

Up until now it seems difficult to identify a single “current valid strategy” for the regional development of the City of Vienna. There are four types of papers that encompass a broader strategic focus:

- **Government statement:** delineates objectives and political guidelines for the following legislative period (five years; last elections: 2005).
- **Strategy Plan of Vienna** (“*Strategie 2000*” and “*Strategie 2004*”): contains action fields for various types of politics for a period of four years.
- **Urban Development Plan** (“*Stadtentwicklungsplan*”; STEP) of the years 1994: (STEP94) and 2005 (STEP05): These “steps” are of relevance for strategic orientation as well, yet with emphasis on urban development and urban structures, providing a mission statement and an outline of objectives to be achieved within a period of the next 10 years.
- **Development of a Strategy for Research, Technology and Innovation** (“*Strategie für Forschung, Technologie und Innovation*”, FTI-Strategie): Initiated in November 2006, its timing reaches out to 2015.

On a more concrete level, these papers are amended and specified by numerous other thematic papers concerning climate and environment, mobility, traffic and transportation, energy etc., that can be conceptually or operationally oriented. Having said that, one might think that Vienna has a segmented strategy. Yet in fact **the Strategy Plan and the Urban Development Plan were created in perennial processes**, involving the stakeholders from all areas of politics and different working areas of administration, as well as the NGO’s and the public.

The strategic papers deal with different topics – thus one can find a multi-layered timeframe. Considering the political implications of the Government Statements, the Strategy Plan and the Urban Development plan fulfil a depoliticising function – they build up a framework with a certain degree of stability, which at the end assures that the objectives do not change completely in every legislative period, but rather offer something like a red thread preserving objectives and strategic projects.

Joining the European Union in January 1995 was an event of exceptional importance for Austria. Strategic papers that followed this event were more and more influenced by the EU politics and aims. In this respect it is important not to reduce the focus only to the change of objectives, but to bear in mind issues of governance and implementation as well.

The latest **Urban Development Plan for Vienna (STEP05)** is the successor to the STEP94. While STEP94 was earmarked with the need for reorientation of a recently revitalised city within New Europe, STEP05 places in the forefront the development and positioning of Vienna as a leading metropolitan area within South-Central Europe. It does not concentrate on the development of Vienna in respect to the economy alone, but also on the improvement of quality of life for all citizens, additionally introducing measures that aim to enhance employment opportunities, leisure activities, mobility, consumption and communication.

The Urban Development Plan lays out the integration of economic, functional and spatial areas in the “Vienna Region”, adhering to the following principles:

- Quality of life
- Sustainability
- Participation
- Gender mainstreaming
- Diversity

The main objectives stipulated, are⁷:

- a) To make Vienna more competitive as a city and a region through infrastructure and innovative facilities and to create an investor-friendly climate for economic development.
- b) To improve the variety and quality of life in the region of Vienna through the construction of the green circle around Vienna and along the Danube as a regional development principle in cooperation with Lower Austria.
- c) To efficiently concentrate the structural development along the public transportation system with minimum land-use, and to force the vertically mixed use in order to prevent functional and social segregation.
- d) To increase the share of environment-friendly means of transport, such as bicycle, pedestrians and public transportation and reduce the share of motorised individual transport.
- e) To improve the quality of life in Vienna through equal opportunity for all inhabitants.

⁷ In implicit and sometimes explicit phrases these objectives appear in the programmes of Vienna’s main agencies to promote economic and technological development, research and innovation (WWFF, WWTF, ZIT; to spot their inter-relation please refer to Fig. 3 in Chapter 2.2, below)

In more detail it lays down the following:

- Duties (institutional responsibilities) and approaches that shall be taken to achieve targeted benchmarks of the regional development plan.
- Current *State-of-the-Art* and challenges in Vienna, including international, national and regional contexts of Vienna; demographic and societal change; infrastructure; health and social infrastructure; spatial aspects of culture.
- Activity areas of the city development, comprising regional development and spatial concept of Vienna and Centropo; housing; economy and employment; green spaces.
- Thirteen priority areas of city development

The most recent initiative aims most explicit on strategic improvements concerning knowledge generation and innovation: On 6th November 2006 a public kick-off conference in the City Hall marked the beginning of a one year discussion process to establish a coherent **Strategy for Research, Technology and Innovation** (“*Forschungs-, Technologie- und Innovationsstrategie Wien*”, in short *FTI-Strategie*). Acting promoters were city councillors of relevant departments, eminent figures representing business⁸, universities, research organisations and media.

Major objectives (until 2015) of Research, Technology Development and Innovation (RTDI) policies, based on the forthcoming FTI-strategy, are:

- To increase R&D expenditures in Vienna from currently 3,13% beyond 4%
- To increase the percentage of employees with academic degrees from 16,4 to 20%.
- To increase the number of researchers by 25%
- To double the number of enterprises engaged in R&D (Research & Development)
- To exceed the target number of 200 companies participating in FP 7 projects

Improvement of RTDI requires rising investment, more intensive collaboration between academia and industries, public awareness and overt support for a creative environment, which stimulates research and innovation. In order to learn mutually and from the best, the City of Vienna invited from the beginning some 100 relevant stakeholders (“proponents”, representing universities, major business corporations, research centres, politics, also including social partners organisations) and experts from Europe and abroad (USA).

⁸ Multinational corporations as well as the Chamber of Commerce (SME association) and start-ups. For more information please go to <http://www.wiendenktzukunft.at>

In the kick-off event, which attracted some 300-400 participants, they informed four panels which were established during this conference and comprise together about 120 relevant local stakeholders from science, business, administration, politics. Their consolidated working reports provide the basis for an operable FTI-strategy.

Focus of the four panels is on the following topics:

- (1) **Economy** – Research, technology and innovation in the business sector
- (2) **Science** – Research focuses and knowledge transfer
- (3) **Society** – Science and society inter-relations
- (4) **City** – Urban development favouring the research location Vienna

Measures and projects discussed in the panels are now consolidated in five different areas of activity – incorporating an integrated guideline for the RTDI Strategy.⁹

- Human Resources: Masterminds for Vienna
- Thematic Focus: Visible and relevant
- Research meets the City: Communication, Learning, and the Public
- Forcing House for Research and Innovation: Reaching out for new horizons
- Location for Research and Innovation in Europe: Vienna as an international node

1.2 Stakeholder involvement and the consequences of involvement

In the course of the process of this new strategy development a very high level of public involvement took place. Above systematic participation of a wide variety of stakeholders also the broad public, i.e. citizens as end-users were invited to contribute to the debates of the panels. Intermediate results were discussed publicly in early spring 2007¹⁰. Public presentation of the final results in November 2007 marked the endpoint of this endeavour. Nevertheless – and as a crucial lesson to be considered in any other such exercise – invitation and offering a forum alone can not compensate unequal powers of participants. When it comes to draw conclusions, and even more so in the later process of implementation, when proposals may be

⁹ The strategy is quite new. Initial “Start Projects” will provide impact by 2008/2009. There is the idea to establish a co-ordination unit for the implementation, taking responsibility for progress reports, etc. – The Process of “*Wien denkt Zukunft*” [“Vienna thinks future”] is designed as reflective strategy. Measures developed will be evaluated. In proper lags particular measures and components of the strategy may be redesigned.

¹⁰ In addition there were two timeslots of several weeks to suggest ideas and problems by using the projects’ platform (www.wiendenktzukunft.at). But this possibility was used less frequently than expected. Experience indicates that „virtual“ discussion is not efficient enough to substitute personal (face-to-face) interventions.

turned-down or carried out into effect, rather vague representation of various stakeholder groupings may lose ground compared to better positioned and more focused vested interests.

Precautions to guide the appropriate policy development should include:

- Transparent monitoring of official and unofficial channels of communication
- Availability of enough time to discuss proposals in detail
- Enable debates and presentations in small groups and in variably composed large settings

Compared to the process of the current FTI-strategy development, stakeholder involvement has never been tried out and executed in such broad arrays. However, similar initiatives to advance participation and public debate were introduced and deployed on smaller scale earlier, e.g. in drafting and finalising the STEP05 (Urban Development Plan 2005) in the years 2004 and 2005. Workshops drafting first concepts concerning key topics of urban development were followed by dialogue and feed-back workshops. After this first loop of drafting, the interim results were published and discussed in public, supported by strong involvement of media and relevant stakeholders. Further dialogue and workshops with stakeholders contributed to finalising STEP05.

1.3 Co-ordination of and facilitating strategy development

As a matter of fact, the **Government Statement** is preceded by political decision making and – if necessary – coalition agreements between parties involved. *Strategie 2004* primarily is based on internal expertise of the municipal departments relevant (much more than **STEP05**, and – in particular – the new FTI-strategy).

The most recent **FTI-strategy** development has been co-ordinated by the Municipal Department (MA) 27, “EU Strategy and Economic Development”, being in charge of project management. Organisational matters (conferences, public events, website, documentation) have been dealt with by *Europaforum Wien*, a centre for urban dialogue and European policy, established by the municipality of Vienna in 1995 (<http://www.europaforum.or.at>).

External scientific advice was provided by three organisations, namely ARC/*Austrian Research Centres systems research* (<http://www.systemsresearch.ac.at>), WIFO/*Wirtschaftsforschungsinstitut* (Institute for Economic Research; <http://www.wifo.ac.at>), and *L&R Sozialforschung* (<http://lrsocialresearch.at>).

Two municipal departments (MA7: Culture and Science; and MA18, Urban Development and Planning), and the two major organisations established by the City of Vienna for funding research and innovation (WWTF and ZIT) were engaged and responsible for guidance and to educe results from the four panel debates. Panel discussions were independent. Every panel has been a “think tank” for new ideas and also for a more integrated perception of regional needs and opportunities.¹¹

1.4 The emphasis placed on innovation and research at the regional level

“Public Understanding of Science” and awareness concerning innovation and research:

Concerning **public awareness** the government statement still provides the broadest impact: Since the declaration by the mayor of Vienna in his government statement 2005, that Vienna should become a “**European capital of science and research**”, this ambition is taken serious in the public and is often referred to. Experts and stakeholders receive more reputation when working now towards the FTI-strategy, compared to similar ambitions that were projected in the process leading to STEP05. In turn, promotion of FTI-activities also helps improving public awareness – expanding from core communities to wider circles. In monetary figures it is difficult to figure out exact budgets (available and required) to raise awareness. It would necessitate great efforts to calculate the marketing budgets of the agencies, then adding up the budgets for special activities of the municipal administration and of local government bodies.

Raising awareness to innovation and R&D has an important role. It addresses different levels:

- Raising awareness in the public:
 - a. Reduction of fear of contact with high-tech (e.g. genetic manipulation) or new technological application in general (e.g. paying parking fee by cell phone)
 - b. Inspiration/stimulation to use new technologies – upgrading public openness
 - c. Support for life long learning
- Raising awareness among decision makers in business
 - a. Increasing the share of researching and innovating companies
 - b. Achieving more cooperation projects in RTD
 - c. Introducing R&D and innovation in all economic sectors (not only in high tech areas)
 - d. Reducing mental distance against (financial) risks
 - e. Increasing information access to regional, national and EU funds for RTDI support

¹¹ Regarding the benchmarking of multi level governance it has to be mentioned that representatives of different RTDI-related federal agencies participated as experts in the panels.

- Raising awareness in science
 - a. Increasing an understanding the importance of science – industry cooperation
 - b. Enhance awareness in scientific communities concerning science – society issues
- Raising awareness in politics
 - a. Spreading information about the context: what can be influenced – and what cannot
 - b. Positioning of the agencies to secure and raise budgets for RTDI activities
 - c. Winning regional politicians for “lobbying” on national and EU levels

It is of the utmost importance to mention the important role of the Viennese mayor in this respect. Dr. Michael Häupl – mayor since 1995 – a biologist by vocation, has shown profound understanding and support for the efforts being made, all the way promoting RTDI friendly policy. For the running election period he stated that Vienna should become the R&D Capital of the Central European region. Needless to say, this kind of support makes raising public awareness much easier.

1.5 Balancing between EU, national, regional, and local policies

National–regional negotiation and accordance of aims, strategies and instruments:

Mainly due to financial contributions from EU structural funds (ERDF, ESF, EAGGF¹²) in almost all EU Member States sub-national regions gain ground in RTD-activities compared to their respective national governments. In Austria funding and support of RTD and innovation by the regions (provinces, *Bundeslaender*) began to rise already since the end of the 1980’s and early 1990’s.

In particular since the mid 1990’s a growing tendency towards decentralisation is notable. This may have been sparked off primarily by crossing critical thresholds of growth in GDP and higher donations to RTD from the state and from businesses (resulting from structural changes in the economy).

Moreover, since the year 2000 revenues from privatisation of state owned businesses (in first place in the energy and banking sectors) were used to fuel fresh money in RTD activities. New programmes for research and innovation have been set up, whereby collaboration with private businesses as well as with *Bundeslaender* and municipalities were

¹² ERDF: European Regional Development Fund, ESF: European Social Fund; EAGGF: European Agricultural Guidance and Guarantee Fund; the fourth existing EU-fund, the Financial Instrument for Fisheries Guidance (FIFG), the specific Fund for the structural reform of the fisheries sector, is not relevant for Austria.

stimulated. This added another push and incentives to improve funding and capacities for research, technology development and innovation on regional levels.

Centre-periphery relations and regional competition in Vienna's strategies:

Austria and the City of Vienna have a long tradition of functioning as a bridge between the Western and Eastern Europe. Government statement, as well as the Strategy Plan and the Urban Development Plan all have a strong focus on the role of the City within the European net of metropolitan areas and its function for the Centroe Region in particular. According to this strategic direction, the Viennese position is viewed as having the potential, or rather the opportunity, of becoming the economic centre of the Central European region. Education, R&D, Financing and Services are the main assets of the Viennese portfolio.

Concerning **competition and competitiveness**, the Viennese point of view changed dramatically in the last decade. In mid 90s, the main concern evolved around problems like de-industrialisation and fear of losing jobs due to the inter-sector migration and job growth outside the city limits. Since then Vienna has re-gained a position of being attractive to high-tech industries and services on one side, and as a target area for job seekers in general. Yet even today, there is still a certain level of attention focusing on low-paid competition, but belief in the currently existing window of opportunities is becoming dominating more and more.

Cooperation with other European cities and metropolitan areas is of particular interest for the City of Vienna: "An active city foreign policy and corresponding international activities should strengthen the position of Vienna as an international, open, integrating city as well as a place for dialogue."¹³ Therefore, Vienna takes part in several city networks as well as multi- and bi-lateral co-operations: *Union of Capitals of the European Union (UCUE)*, *Council of European Municipalities and Regions (CEMR)*, *Assembly of European Regions*, *Cities for Cohesion*, *Eurocities*, *Telecities*, *Interreg III*. Cooperation and participation in such and other ESF or ERDF co-financed activities, document a high degree of accordance with the European regional policies, as well as with many activities in the fields of RTDI:

A multitude of co-financed projects (together with structural funds (ERDF and ESF) – particularly under the INTERREG Programme (ERDF co-funding, e.g. Jordes+¹⁴), collaboration in various Community Initiatives, and in the "Territorial Employment Pact" (ESF

¹³ City of Vienna, Strategy Plan 2004

¹⁴ A project providing impact – among others – on the "green heart" (Danube national park along the Danube) between Vienna and Bratislava; for information see <http://www.jordes.org>

co-financed¹⁵) - and participation in a number of EU-RTD projects since FP4 (4th EU Framework Programme) drove the total of Vienna's participation in EU projects to a total number of 1055⁺. Results of these projects are being fed into various units of the municipality.

According to the classification established by the relevant unit MA 27 (co-ordinating and supervising EU project participation), there are 18 areas of impact to which EU projects contribute (in the order of highest to lowest numbers of projects).

Box 2:

Topical areas of projects in EU-Framework Programmes, co-financed by Vienna and EC

- | | | |
|----------------------|---------------------------------|------------------------------|
| 1. EU Enlargement | 7. Economy | 13. Health |
| 2. Education | 8. Administration | 14. Networks among cities |
| 3. Social welfare | 9. Culture | 15. Information technologies |
| 4. Labour market | 10. Research and development | 16. Energy |
| 5. Environment | 11. Urban and regional planning | 17. Youth |
| 6. Urban development | 12. Transport | 18. Agriculture |

Source: The Municipality of Vienna, MA27; for more information please consult <https://www.wien.gv.at/euf/internet/>

It is interesting to note that the top-five on this list are topics of obvious international and inter-regional interest. Only the next following seven targets address topics of particular urban interest.

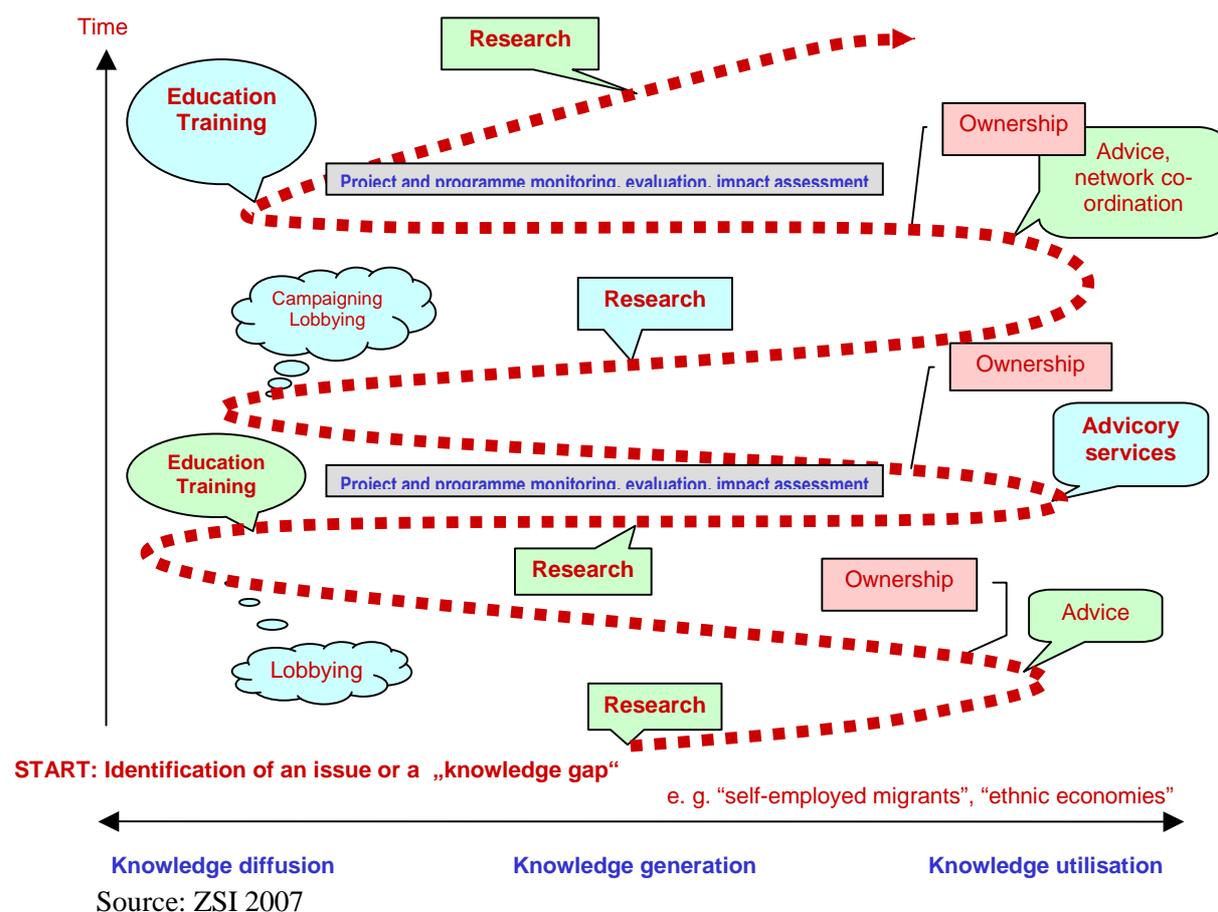
The municipality of Vienna found a way to **utilise opportunities provided by the EC** to promote developments in domains of pressing relevance to a greater public – and, as a tendency, with inter-regional and transnational impact. Moreover, practical relevance of many projects proved to be relevant not only for research communities and actors in fields targeted, but also for wider circles of citizens in Vienna.¹⁶ Usually projects geared towards training (e.g. in programmes like Youthstart ten years ago, or Equal projects nowadays, and research projects funded by an IST RTD programme) are perceived separate activities. Consequently, their impact (if ever) is evaluated project by project, and programme by programme – all in the same line. Cross-programme comparison not even seems to be thought of. However, most productive impact may result from strategic combination of projects receiving funds over time from different programmes to address largely consistent target groups from different angles.

¹⁵ For information please consult <http://www.pakte.at>

¹⁶ Based on membership in Eurocities- and Telecities-consortia Vienna participated in many projects of the various Telematics and IST (Information Society Technologies) programmes, which not at least contributed to eGovernment and many other developments in support of user perspectives.

To give an example, based on empirical ZSI-experience: A basic research project (financed by the Ministry of Science and Research, 1997/98) concerning “ethnic economies” delivered results that initiated a number of follow-up projects. These were about awareness raising activities addressing the issue of self-employed immigrants, training courses for immigrant entrepreneurs, education for “second generation” drop-outs from school. Funding for such activities was obtained from Vienna, the EC (co-financed programmes, e.g. URBAN), and from other agencies. More awareness concerning issues at stake led to advanced planning and realisation of training activities, supporting shop owners, relatives, and civil servants in professional contact with relevant groups (migrant organisations) and their representatives. The next turn involved new social topics and players in decision making, and further research (e.g. in FP5 and now FP7). In such enduring networked exercises, innovation supporting projects oscillate between knowledge generation, knowledge utilisation and knowledge dissemination¹⁷.

Fig. 2: The “research-application-slalom”



¹⁷ A regional innovation system should be capable to support suchlike achievements, and to apply from time to time – as a thumb rule: in periods from about 4-7 years – co-ordinated evaluation of programmes *and* projects (“process evaluation”). In our case, all projects established, executed and finished in the course of this “slalom”, involving many different and often complicated procedures of application and performance, are documented on the ZSI-website under <http://www.zsi.at/en/projekte/abgeschlossen/list>

If developments progress that way, new research on more or less the same topics is able to synthesise and build on considerably higher levels of knowledge including practical experience and lessons learned from previous research (concerning seemingly disparate topics, e.g. life-style, financial capacities, behaviour patterns, technology use etc.). Until now monitoring and evaluation of such inter-related practical and research activities are not the usual case. Would this be done – instead of time-linear succession of research project after research project on the one hand, and training activity after training activity on the other hand, efficacy and impact of mutually fruitful projects would be much higher, both in scientific merits as well as concerning practical relevance for higher numbers of people in target groups.

On national level the intra-regional discussion concerning the relationship between the City of Vienna and its suburbia is ongoing. In the field of regional development or planning there is a determining divergence between the fundamental approach of the City of Vienna – aiming at development along axes – and the fundamental approach of the surrounding *Land* of Lower Austria – which aims at “de-centralised concentration”. Compared with other metropolitan areas in Europe, the cooperation between Vienna and its suburbia runs at low standards, posing quite serious challenges to future strategic planning. Due to the fact that any area municipality collects own taxes and has a budget (including allotments from revenue sharing [“*Finanzausgleich*”] which is negotiated at a time – and agreed for periods of up to six years – between the state, provinces and municipalities) to cover own expenses, there is sometimes fierce competition between the *Land* Vienna and the *Land* Lower Austria¹⁸.

The City of Vienna is the undisputed centre of the region – this core function comprises services, education, R&D, culture, access to financing and human resources. The degree of student-flow and influx of workforce from suburbia as well as from the Centrope region is increasing. In Vienna, currently nine universities educate some 130.000 students (of which about 20.000 or 15% are foreigners), and five universities of applied sciences (*Fachhochschulen*) are attended by about 5.500 students.

¹⁸ E.g. Vienna needs good transport systems (both, public transport and highways). These enable immediate bordering municipalities – which belong to Lower Austria – to establish huge shopping malls just outside of the city limits with good connections into the city. The result is that these small towns in Lower Austria became the richest municipalities in Austria, whereas traditional shopping areas in the city of Vienna are threatened by shrinking purchases. Other issues of competition, overshadowing a otherwise logical cooperation, derive from the business of public utilities on both sides, e.g. concerning energy provision. Very recently Lower Austria won a battle over where to locate a new high-tech university installation. The so-called “ISTA” (Institute of Science and Technology, Austria”) was founded last year as *near* as possible, but *outside* of Vienna. The location chosen has the advantage of a green environment and promotes the nearness of Vienna as well – even though there is no adequate infrastructure. A more suitable development area within the city limits lost a strong attractor. All these and many more cases make it difficult to identify such a thing that might be referred to as a coherent cooperation strategy in regional development conjoining the city of Vienna and its hinterland.

As the universities by tradition are financed and supervised by the state, the municipality of Vienna for long time did not really conduct an own policy concerning the higher education sector. However, given the current situation of rising awareness regarding the relevance of education, research, and innovation, the city of Vienna increases active support of universities – and of science and research in general – by direct funding of research and the endowment of professorships¹⁹, and intensified mutual collaboration and communication with the science sector. Endowments of professorships are implemented by the *Wiener Wissenschafts-, Forschungs- und Technologiefonds* (WWTF). The first endowment has been established in the field of biotechnology – currently the most important area of frontier research and technology development in Vienna²⁰.

The mayor Vienna, Michael Häupl, is president of the *Wiener Wissenschafts-, Forschungs- und Technologiefonds* (WWTF). His statement, opening the web-information (as of Nov. 2006, <http://www.wwtf.at/wwtf/>), reads as follows:

“Vienna as metropolis and region of Europe is required to invest in relevant future scopes. Only if we improve our strengths and position ourselves in increasingly mobile and networked markets as a headquarters of knowledge, we will be able to further enhance economic prosperity and quality of life.”

1.6 Dealing with risks in the strategy

In general, the strategies overriding aims – as discussed here – are to counter challenges to urban and regional development. In fact, the new FTI-strategy addresses such topics (e.g. economic competitiveness, development of living standards, quality of live) in a more explicit way than the STEPs, and in a more detailed and systematic manner than any government statement.

Three types of measures to prevent a strategy from failing can be identified:

- (1) *Provide reliability* “bottom-up” by a broad basis formed by solid institutions and relevant stakeholders

¹⁹ The main instrument to do so is a new research fund established in the year 2002, the WWTF (*Wiener Wissenschafts-, Forschungs- und Technologiefonds*), <http://www.wwtf.at>

²⁰ Strategic decisions have been put into practice to align priority areas of funding for research and technology development in industry (addressing Small and Medium Sized Enterprises [SME] as well as major corporations), carried out by the ZIT (*Zentrum für Innovation und Technologie*), with highly overlapping priority areas of funding for basic and applied research in the science sector, carried out by the WWTF.

- (2) *Secure credibility* through “top-down” support by key figures in politics and by institutions carrying out RTDI and economic policies
- (3) *Establish monitoring*, evaluation and control mechanisms in order to balance as much continuity and change as required for success

Key objectives in strategic policy papers and their continuity:

Quite often key objectives are formulated on a very abstract or general level. Thus, pointing out key objectives is not an easy task. However, policy debates also display certain foci, which repeatedly show in Government Statements, background studies for major activities, and in public debate. In particular, motives and rationale expressed in written and spoken statements published in the wake of debates concerning the *FTI-Strategie*²¹ mainly address objectives in the realms of economic development, employment and social security, competition and competitiveness, and – last but not least – environment, ecological issues, and quality of life.

The most relevant and persistent strategic objectives are:

- To secure local employment, economic development and quality of life
 - Regional R&D and innovation policies since the early 1990ies can build on old traditions since the 1920ies (after Vienna lost its role as an imperial centre). In this past reform period, housing programmes were at the same time employment programmes, promoting education and bringing science to the public were accompanying measures.
 - Vienna connects with and benchmarks more against Budapest, less so with Prague. Planning (since 1988) a twin-city World Expo Vienna-Budapest for 1995, mutually boosted city development and technological innovation even after the collapse (1990) of the idea. In Vienna, as one of the results, the TechGate Vienna²² emerged.
- To be competitive among cities
 - Policy makers understood (at least after EU accession in 1995) that Vienna will not remain competitive if it was only to attract tourists; it needed to attract business, high-tech companies and research institutions providing industrial spin-offs. Significant investments increased since 1995.
 - Biotechnology and IT have become lead sectors. In recent years creative industries get more attention and active support by funding from financial sources of the City.
 - Cities, Vienna compares itself with primarily, are Budapest, Munich, and Prague.

²¹ *Forschungs-, Technologie- und Innovationsstrategie Wien*, in short *FTI-Strategie* (Research, Technology and Innovation strategy of Vienna)

²² For information please go to <http://www.techgate.at>

- To meet future [global] challenges, main policy areas are being addressed
 - Education, science, research and innovation are seen as engines of growth and facilitators to further secure high standards of living and quality of life in Vienna.
 - Improvement of infrastructure, environment and energy still are very relevant business areas of Vienna's public utilities. This extends in particular to the municipalities' public transportation system and policies concerning traffic control.
 - Living up to the vision of trans-border regional inter-relations (Centropo) is one of the topical issues of the new "external relations" policy of the City of Vienna.

2. Policy deployment, strategy implementation and flexibility of policies

2.1 Innovation and research policy tools

In Vienna the most relevant activities to implement strategies and policies of the City concerning *RTD and innovation in the business sector* are carried out by the ZIT²³.

ZIT's funding activities are pooled in eight different programmes (cf. "ZIT 05 plus" guideline):

1. Calls for R&D (pre competitive development) – 3 to 4 calls per year
2. Vienna Spots of Excellence – long-term R&D cooperation between research organisations (universities, et al.) and companies in industrial research.
3. F&E-Public: Projects funded under this programme aim to pursue greater acceptance for science and technology in public
4. Innovation support: support for indirect costs of R&D projects (for example: initiating co-operations, market studies)
5. Technology Networks: networking of science, economy, education, etc.
6. Competence centres (*Kompetenz-Zentren*) regional co-financing of national programmes (K^{ind} - K^{net} - K^{plus} for competence centres as regional science centres)
7. Start Up: funding of new business connected to a national programme by FFG (*Forschungsförderungs-Gesellschaft*), the Austrian Research Promotion Agency.
8. Early stage innovation, connected to a national programme (ERP-Fund²⁴)

The "ZIT 05 plus" guideline ends in 2008²⁵. ZIT disposes over an annual budget of about 20 million EUR for monetary support. Further activities are the development and management of technology specific real estate projects (e.g. establishments and buildings for media and life

²³ *Zentrum für Innovation und Technologie*, for information please refer to <http://www.zit.co.at>

²⁴ "European Recovery Program" Fund. ERP is probably better known as "Marshall-Plan", a US-investment in economic recovery of (Western) Europe, stabilising weak economies, the market economy as such, and of course also the democratic systems after the Second World War ("West-integration"). Measures were introduced after a speech of US Secretary of State, George Marshall in 1947. From 1948-1953 the US provided goods, products, and grants. These were not used for purchases or other immediate consumption. Instead these resources were provided to industry in the form of loans that had to be paid back into the ERP-Fund for re-investment. Thus the ERP-Fund still exists and works even after 60 years of its initiation. – More information: http://www.trumanlibrary.org/whistlestop/study_collections/marshall/large/index.php (original US documents) <http://www.germany.info/relauncch/culture/history/marshall.htm> (a German view on the Marshall Plan, EN) http://aeiou.iicm.tugraz.at/aeiou.encyclop.m/m261146.htm;internal&action=_setlanguage.action?LANGUAGE=en (the Marshall Plan in Austria; link to ERP-Fund provided; EN); for current developments concerning EU and the world: http://www.globalmarshallplan.org/index_eng.html

²⁵ The new guideline „ZIT 08 plus“ will follow without interruption. The new guideline is in line with the RTDI-Strategy developed from 6th November 2006 to 6th November 2007. As a consequence of the new Community Framework on state aid for research, technology development and innovation, ZIT 08 plus is also now open for innovation too (not any longer limited on R&D). In doing so, ZIT is targeting the benchmark of capability building by supporting a broader group of companies – particularly SMEs.

sciences). In addition ZIT is shareholder of different networking activities like LISA VR (cluster-initiative in life sciences for the Vienna Region), ACVR (automotive), or INITS (start up support for spin-offs out of Viennese universities).

New developments which may change strategies and specific policies should be considered. Among these certainly are increasing mobility in and between labour markets, as well as migration in and to Europe.

Appropriate new strategies may need to switch basic approaches from the current dominance of competitiveness to what can be called “co-opetition”: the distribution of burdens on more shoulders. To co-operate in the neighbourhood is a potential asset to become more competitive in the world (moving from Regional Innovation Strategy (RIS) to Inter-Regional Innovation Strategy (IRIS)).

2.2 The governance of implementation

Any assessment of the practices of strategy implementation (regarding management in general, competencies, quality assurance, monitoring and supervision etc.) needs to take into account that in political as well as in administrative terms the municipality of Vienna is very powerful, and – as a matter of fact – well organised. It has all political functions of a *Bundesland* (federal province) with an elected parliament (= municipal council), a governor (= mayor) and appropriate legislative and executive power. Administration is carried out by as many as 62.000 employees in 71 Municipal Departments²⁶ and separate offices of the 23 districts (which again have their own elected district councils). **The City of Vienna actually is a huge public enterprise** (comprising a great number of public utilities, ranging e.g. from public transport, energy supply, on to burial services) with immense economic and public influence. The mayor and city councillors are most relevant figures and yield extremely relevant top-down capacities in their respective policy areas.

Therefore the most important policy paper addressing issues of research and innovation every year in fact is the municipal council’s agreement on next years’ budget. In his announcement of the budget plan for 2007 the City Councillor of Finance recently summarised the economic position of Vienna and key priorities:

²⁶ “*Magistrats-Abteilung*”, abbreviated “MA”.

“2005 the GRP (Gross Regional Product) of Vienna amounted to 67 bill. € (27.8% of the whole GDP of Austria) based on the labour of 910.000 employees. EUROSTAT ranks Vienna 6th of the richest regions in Europe, 2nd concerning RTD expenditure (behind Stockholm), and 5th in regard of increases in service production. In order to continue success, Vienna will increase public investment to boost the following key aspects of activities:

- Investment in public orders increases from 1.3 to 1.4 bill. €
- Support to secure industrial infrastructure (funds and measures provided by WWFF)²⁷
- Additional 30 mio. € in support of innovations in SMEs
- Specific measures to support the creation and international activities of SMEs
- 12 mio. € to facilitate training of apprentices”

All strategies, and related measures based thereupon, are attributed for execution to (usually) one of the municipal departments, or in many cases (particularly regarding measures to boost RTDI) to specified funds, organisations and agencies of the City, e.g. the ZIT, WWTF.

Concerning STEP 05 (the **Urban Development Plan** 2005) the *Magistratsabteilung* 18 (*MA 18*: Municipal Department for Urban Development and Planning) is responsible for building up the plan and co-ordinating interests and persons (stakeholders) involved. Decisions taken by the municipal council over the STEP 05 are legally binding for the administration and down-streaming units. All other relevant players and organisations are required to support that development with their own activities. STEP 05 includes a running monitoring and a periodic evaluation every five years. A city development report (*Stadtentwicklungsbericht*) shall be prepared and has to be presented to the municipal council. Amendments and adoption of continuation are based on the evaluation and monitoring processes.

As regards the development of the **new strategy for Research, Technology and Innovation** (“**FTI-Strategie**”), main players behind the mayor are three city councillors: The Councillor of City Development and Transport, the Councillor of Culture and Science, and – most important – the Councillor of Finance. To the latter’s division of competence belongs the Municipal Department 27 (*MA 27*), “EU Strategy and Economic Development”. MA 27 is responsible for the co-ordination of activities in the roll-out of the FTI-strategy. Partners in relevant processes, such as to convene panels, workshops, and to provide results, are other

²⁷ Vienna Fund for the Promotion of Economic Development (“*Wiener Wirtschaftsförderungsfonds*”); information available at <http://www.wwff.gv.at/wwff.aspx?target=104241&l=2&>

municipal departments and agencies, namely WWTF and ZIT. Another agency, *Europaforum Wien*, is in charge of administrative issues and logistics.

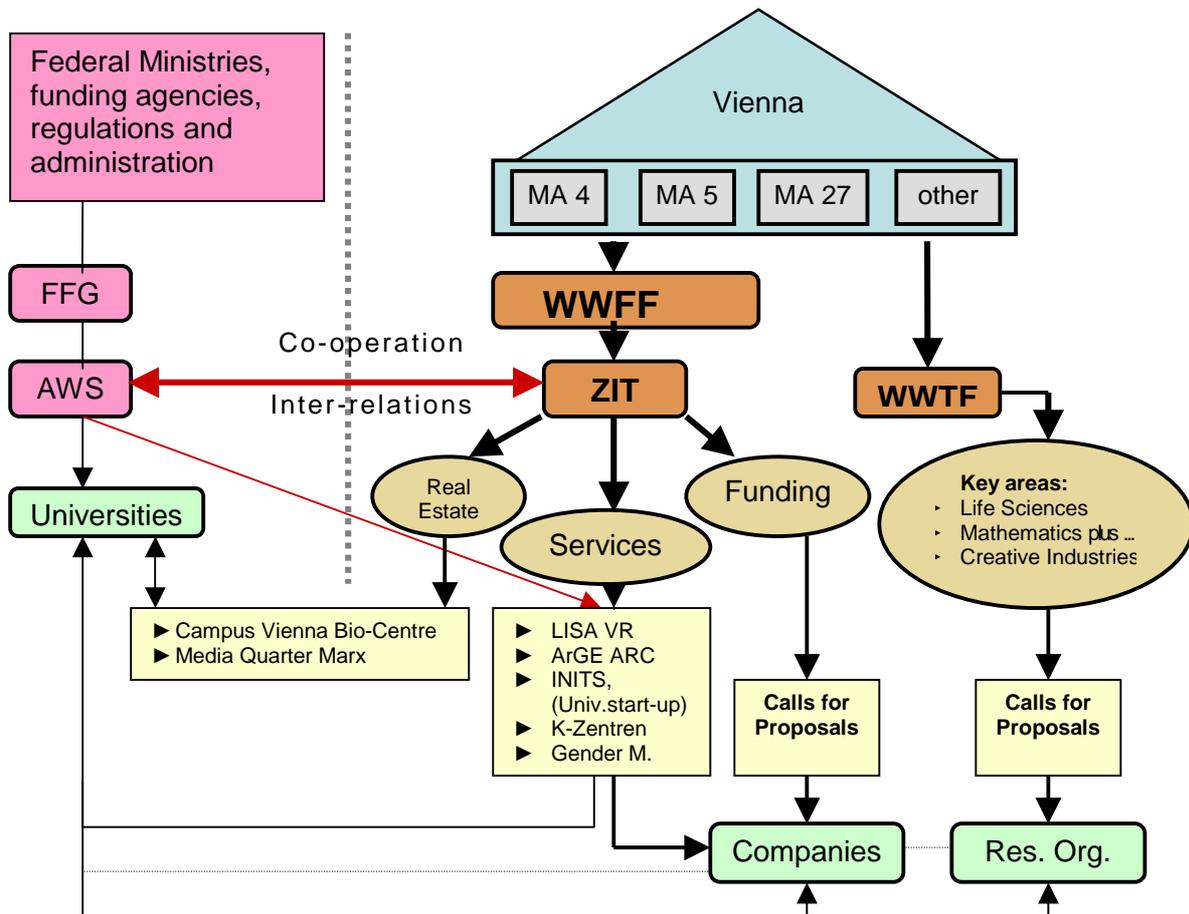
End of June 2007 the four expert panels on Economy, Science, Society, and City delivered final reports presenting the results of their panel debates and inputs. The four reports contain an assessment of Vienna's position, developments and potential concerning the areas discussed, an analysis of the respective strengths and weaknesses, and recommendations on measures that should be implemented by the city government and its municipal departments. Recommendations address issues such as institutions to be approached, reformed, or newly established; key projects that should be carried out; and – not the least important, yet at this stage only of indicative accuracy – financial requests and related efforts. Within a period of about three months these recommendations were under consideration between officials and politicians in the city government. Conclusive decisions concerning costs and funding will be made on high political levels (City government and municipal council), and are foreseen to be implemented by the budget plan 2008.

Vienna with its tradition of being a dominating capital – bearing in mind the federal system of Austria – has always played a role in numerous infrastructural or strategic decisions. In addition, trends towards decentralisation and intensified involvement of the municipality in RTD gained more relevance since about ten years in Vienna. The most relevant indicator for such developments lies in the establishment of permanent institutions with a clear division of labour and competencies. Decisions concerning RTD investments and joint activities are not made up only by negotiations between politicians of the municipal and federal levels. At a certain stage – particularly when it comes to the issue of co-financing research projects, research programmes or research institutes – political decision makers need more than individual advisors. In order to improve and also monitor impact of budgets earmarked for research and innovation, an appropriate system of funding agencies is required. They act independently within their respective work assignment, yet under supervision of control institutions and politicians responsible.

In Vienna, the most relevant bodies of this kind were set up to co-ordinate funding, to provide various services and control mechanisms, and to support initiatives advancing the transfer and dissemination of knowledge and products (cf. Fig. 3).

Figure 3:

Major inter-relations between institutions for the promotion of structural change and of economic growth (WWFF), and of research, technology development and innovation (RTDI) in Vienna



Abbreviations:

“Vienna” here indicates the political bodies (particularly the city parliament, the council, city councillors, the mayor), and the municipal organisational structure

MA ## : “Magistrats-Abteilung”, Municipal Department responsible (in total ca. 70)

MA 4: Municipal Department for Finance and Economy

MA 5: Municipal Department for Public Finance, Budget and Statistics

MA 27: Municipal Department for EU Strategies and Economic Development

- WWFF “*Wiener Wirtschaftsförderungsfonds*”: Vienna Business Agency, establ. 1982 (the primary business promotion vehicle); for information please go to http://www.wwff.gv.at/wwff.aspx_param_target_is_104465_and_1_is_2.v.aspx
- ZIT „*Zentrum für Innovation und Technologie*”, Centre for Innovation and Technology; established 2000
- WWTF “*Wiener Wissenschafts- und Technologie-Fonds*”, Vienna Fund for Science and Technology; established 2002
- LISA-VR Life Sciences Austria – Vienna Region (www.lisavr.at)
- ArGeARC Cooperation with Austrian Research Centres (ARC) (www.arcs.ac.at)
- INITS “*Universitäres Gründerservice*”, Academic Incubator Service (www.inits.at)
- K-Zentren “*Kompetenz-Zentren*”, Competence Centres; in addition to the funding programme COMET (provided by Forschungsförderungsgesellschaft/FFG), ZIT offers a complementary support programme for the existing K-Zentren. Information about all Viennese Competence Centres (12) at a glance: http://www.zit.co.at/page.aspx_param_target_is_270418_and_1_is_2.v.aspx
- Gender M. Gender mainstreaming; because of the under-representation of women in RTDI all applications for funding are evaluated – amongst other criteria (primarily excellence etc.) – also against the background of gender issues.
- FFG “*Forschungsförderungsgesellschaft*”; Austria’s central Research Promotion Agency (www.ffg.at)
- AWS “*Austria Wirtschafts-Service*”; a special bank in charge of promoting businesses and economic development at large, owned by the Federal Republic of Austria (www.awsg.at)
- Res. Org. Research organisations of many kinds; public (including institutes of the Austrian Academy of Sciences, institutes owned by public authorities, e.g. by the municipality of Vienna), and private (of which some are for-profit, yet most are not-for-profit organisations).

2.3 Networking practices of the programme implementing organisation

Main stages of regional innovation and research policy and achievements 1990-2006:

The particular keys to successful regional RTD policies are hard to identify. It is also difficult to define instruments or strategic fields as successful or even non-successful. It is more a question whether or not current instruments are modern and capable enough to satisfy the requirements concerning regional competitive pressure (globalisation), demographic transition, the emerging economics of the knowledge society, etc.

Complementary to national funding, the City of Vienna – as well as all provinces in Austria – established own activities in RTDI-policy and funding. As mentioned above, communication and coordination amongst different policy-levels is a *conditio sine qua non*: Networking is not only an issue on operative business level. More than ever it becomes essential in regard of interactions among donors of RTDI-budgets and between funding agencies. Ever since the mid 1990's there is a trend to build-up regional clusters. Instruments are more and more concentrated on stimulation of development in selected *strengths*. In the last years there is also a growing propensity for excellence and specialisation – focussing on international competition and image building.

The year 1994 can be denoted as a turn-around for the city of Vienna. The First Viennese Technology Strategy was established – starting from that point in time, one can speak of regional RTDI-policy in Vienna. It was also the beginning of planning of bigger Technology Parks like the TechGate Vienna – established (first stage) in 1999 (second stage in 2005).

The creation of specialised Agencies (Departure, ZIT, WWTF) was a trend of the early 2000s. Service, short time decision making, information brokerage and the idea of “one-stop-shops” are not only buzzwords – yet their realisation actually requires functional networking practices between the agencies. They show that RTDI policy is becoming more and more a mandatory task: Viennese policies adhere to the fact that the region has to take care for local RTDI-players and needs to collaborate with all stakeholders involved.

Similarly to the field of general promotion of economic development, there is also a necessity to support SME in the field of R&D and innovation. Another approach that can be used in this respect is establishing calls for proposals, thus awarding financial sources by the way of contests.

A big change in the field of technology and knowledge transfer has been implemented by federal legislation by the new University Act of 2002. It provokes more competition, and favours research closer to regional needs and user oriented applications. The new autonomy of the universities enhances flexibility, yet also more exposure to business requirements, international knowledge transfer, benchmarks and mobility (Bologna-process).

In a nutshell, the most relevant developments in networking concerning innovation and research, are:

- RTDI – policies are top on the agenda of the **mayor**
- RTDI stimulated by **European Framework Programmes** (well received and utilised by the relevant stakeholders in academia and industry)
- Spill-overs from European collaborative RTD-practices knit tighter **networks** of more heterogeneous R&D communities
- New **University Law** (2002) forces universities to behave more entrepreneurial

2.4 The way the money goes

With an annual budget of about € 20 mio. disposable for funding, ZIT is the main regional player responsible to promote company research and innovation in Vienna. In order to optimally and efficiently fulfil this technology policy mandate as defined by the City of Vienna, a comprehensive and progressive research promotion and funding programme is in place. It takes into consideration the distinctive economic features and structural characteristics of Vienna as well as the specific requirements of research-oriented companies and institutions. As a consequence, a diversified range of tailor-made promotional instruments, incentives and grants are available. They are designed to make a significant contribution to stimulate the intensity and quality of research in Vienna, and thus to increase the attractiveness of Vienna as a business location.

ZIT supports companies in the form of **direct financial grants**, from funds supplied by the City of Vienna.

The mission of funding is multifaceted:

- To promote the know-how transfer between the business and scientific communities
- To create innovative cooperation structures
- To tap the full potential of Vienna's universities and their graduates
- To raise overall public awareness for the fundamental importance of research and development as a basis for maintaining employment and prosperity

The target groups of ZIT's research promotion programmes are:

- Existing Vienna-based companies
- Start-up companies
- Other potential recipients (e.g. research institutions) can be supported if they actively work together with, or on behalf of Vienna-based companies

All applications for financial grants are submitted and processed on-line. The “*Fördercockpit*“ of ZIT provides any time a comprehensive overview of grants available and open calls.

Grants are awarded on a competitive basis only, following specific **Calls for proposals in various categories**²⁸, namely:

- o **Competence Centres**

Co-financing the funding programme COMET, provided by FFG (*Forschungsförderungsgesellschaft*), ZIT offers a complementary support programme for Competence Centres established in Vienna. The total of funding granted to Competence Centres in Vienna amounts to € 182 mio., of which the contribution from Vienna is about € 26,6 mio. (cf. Table 5 below).

Starting in 2008, ZIT provides Competence Centres with a bonus following thorough evaluation of the projects. Additionally small and medium sized businesses are supported by technology consultancy services (costs borne by ZIT). Existing Competence Centres in Vienna will be co-financed by ZIT until 2010 through the programmes K^{plus} as well as K^{ind/net}.

- o **Calls for company R&D**

Calls are actually competitions. With these “calls“, ZIT funds research and development projects of Vienna-based companies and start-ups. Each year, three or four calls are carried out. Each call has a specific thematic focus (e.g. ICT) or a structural focal point (e.g. the cooperation of the business and scientific communities).

Competitive tendering ensures the comparability of submitted proposals, and fast decision-making. The evaluation of the projects is implemented by an international panel of experts. ZIT strictly insists on independence when selecting the members of the panel. Applicants have the possibility to exclude up to two members of the panel from evaluating the particular project. The composition of the panel evaluating a given project is published on ZIT's website.

²⁸ For more details please refer to http://www.zit.co.at/page.aspx_param_target_is_104249_and_1_is_2.v.aspx

- **Vienna Spots of Excellence**

“VSE” represent multi-year research partnerships between companies and research institutions, initiated by Vienna-based companies. By its technology promotion programmes, ZIT pursues the goal to create internationally recognized “spots of excellence“ by means of supporting basic research and industrial research as well, and by promoting the transfer of know-how between the business and scientific communities. There are no pre-defined thematic guidelines limiting the technological areas in which a VSE may be created.

The decision to grant support through the Vienna Spots of Excellence programme is made once or twice per year. The applications filed are in direct competition with each other. The decisions are made on the basis of expert opinions submitted by national and international specialists.

- **R&D – Public**

Acceptance of new ideas and technologies by the public (or special target groups) are key to the success of innovations. Thus the programme “R&D Public” provides support to projects that increase the exchange of information between the science and business communities. Moreover, projects are funded which inform the public about new technologies and make a contribution to leverage acceptance of technology in the public. Decisions on funding are taken on a quarterly basis.

- **Innovation Support**

The implementation of research and development work is an important component in the innovation system, but not the only one. For example, complex research projects or the commercial exploitation of research findings in the market require activities which must be carried out in advance or as a follow-up to the actual research work. ZIT provides support to such activities within the framework of this specific programme. This programme does not offer any support to research and development work. Decisions on funding are taken quarterly.

- **Technology Networks**

Cooperation between the business and scientific communities, educational facilities and other players in a particular technological area of focus promote the economic prosperity of the business partners and enable synergies, especially by transfer of know-how. Through this programme ZIT supports the creation and development of networks in specific technological

fields or at local technology Centres. The promotion of the preparation and start-up phase (three years) encompasses all network activities which make a contribution to the success of the innovation network (e.g. information services, events, publications). Decisions on funding are taken on a quarterly basis.

- **Start Up**

The Start Up programme promotes the founding of companies applying research-intensive domains of technology. In collaboration with measures implemented by the Federal Government of the Republic of Austria, ZIT aims to increase numbers and success rates of business start-ups in the technology sector. Viennese start-ups and young high-tech companies (maximum three years after establishment) are provided with support to implement research and development projects.

The pre-requisite is the official approval of a start-up grant, which was not authorized more than two months beforehand by the FFG (the federal research promotion agency). A total of 25% of the cash value of the subsidy (up to max. € 50.000) may be granted in addition to the FFG-grant. Decisions as in other cases made quarterly.

Funding for basic research, provided by the “Wiener Wissenschafts- und Technologiefonds”:

The “WWTF” (Vienna Science and Technology Fund) is funding excellent basic research, the results of which have a potential to benefit the location of Vienna in the medium term, either in form of a public good or commercialisation. Applicants comprise Universities, non-university research institutions. Also individual scientists are eligible for submitting applications. The annual budget ranges from about 7 – 9 mio. €.

Thematic programmes and funding instruments:

WWTF applies two different funding instruments (research projects and endowed chairs) within defined thematic programmes, all on a competitive basis, involving international juries in evaluation and decision making.

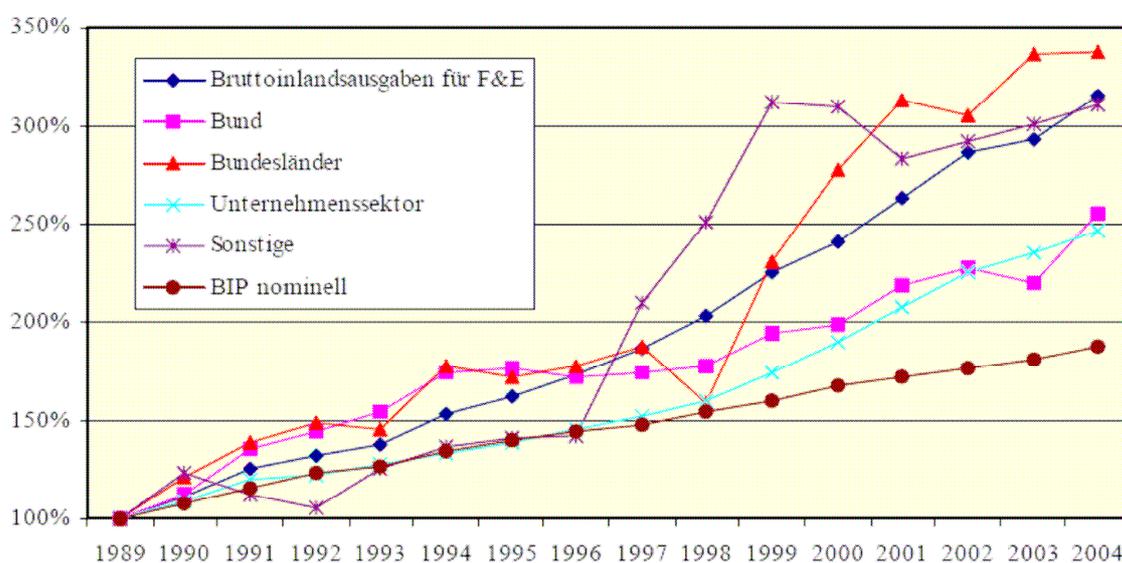
Currently the following thematic programmes exist:

- Life Sciences
- Mathematics *plus* ...
- Science for creative industries

RTDI-funding of Vienna in the framework of total spending on R&D in Austria:

Since 2002 new government programmes for research, technology development and innovation are mainly proposed, introduced and monitored by the new “Austrian Council for Research and Technology Development”²⁹. The Council develops strategies and measures, regularly in dialogue with relevant stakeholders in business and scientific communities. Acting as direct advisor to the federal government, it has become also very influential concerning the implementation of programmes (despite the fact that it is not a funding body itself).

Figure 4:
Increases of RTD expenditure in Austria by donors 1989 – 2004

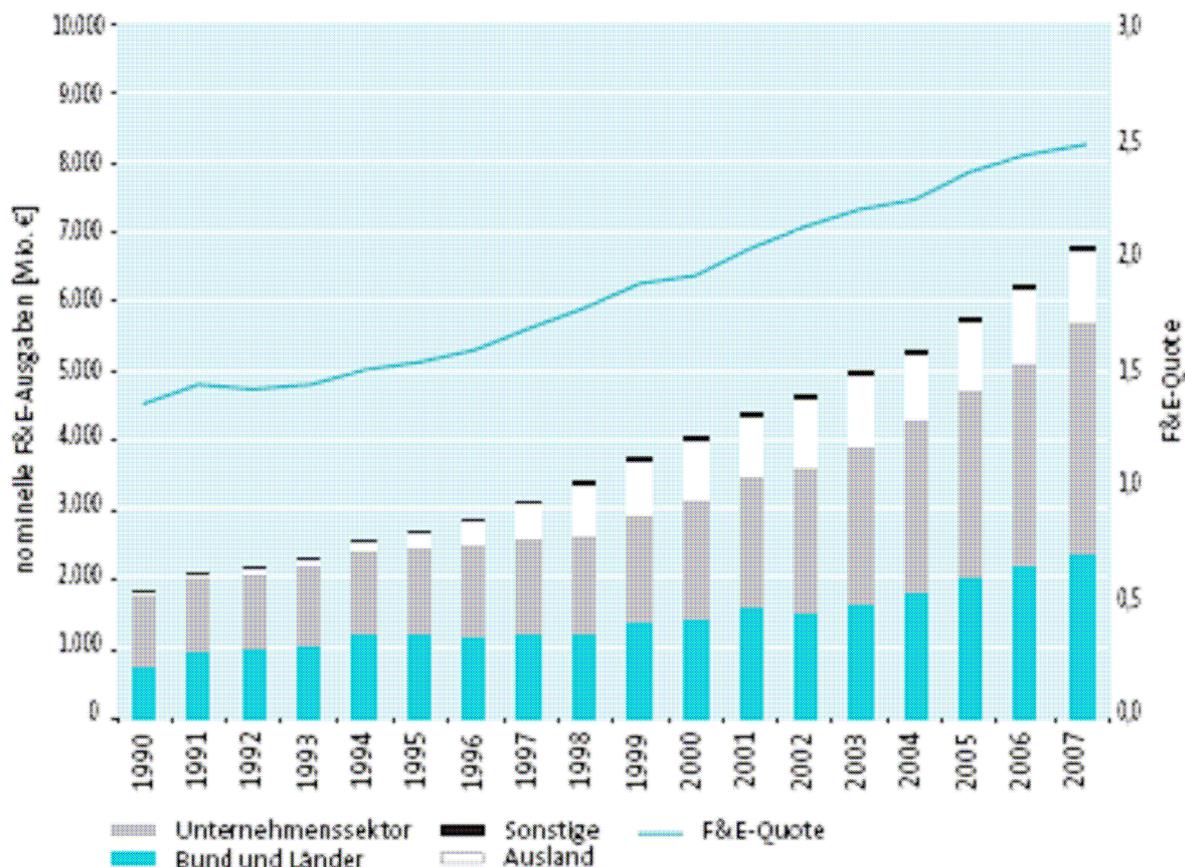


Source: *Forschungs- und Technologiebericht 2004* (Government Report on Research and Technology 2004)

Total expenditures: <i>Bruttoinlandsausgaben</i>	Federal Government: <i>Bund</i>
Provinces/NUTS-2-regions: <i>Bundesländer</i>	Business sector: <i>Unternehmenssektor</i>
Other (in particular: EU): <i>Sonstige</i>	GDP (nominal): <i>BIP nominell</i>

The graphs demonstrate the obvious surge of additional spending from regional and EU sources since about ten years. It needs, however, to be noted that both started by 1989 from either scratch or very low absolute figures, whereas expenditures by the federal government and the business sector of course have been and still remain the most relevant donors in total (cf. Fig. 5).

²⁹ *Rat fuer Forschung und Technologieentwicklung (RAT-FTE)*, established 2002. For information see <http://www.rat-fte.at>

Figure 5: Increase and composition of total R&D-expenditure in Austria, 1990 – 2007

Source: Statistik Austria; published in: BMWF/BMVIT/BMWA, 2007; p. 21

Translation of key:

Nominelle &E-Ausgaben:
Nominal R&D-expenditure

F&E-Quote:
Total R&D-spending in % of GDP/year

Unternehmenssektor: Corporate sector
Bund und Länder: Federal state plus provinces
Ausland: Foreign
Sonstige: Other donors

Due to obligations like co-financing and competitive tenders or calls for proposals in many of the federal RTD programmes, regions with strong research potential and infrastructure are favoured even though there is little need to negotiate directly between federal and regional authorities. Nevertheless, of course the various regional agencies and planning committees of regional development plans take potential linkages with federal and European programmes and measures in support of RTD into consideration.

Thus governance takes place with very little effort of direct control – and re-enforcement of strengths is on its way³⁰ – a process that certainly is conducive to let RTD and innovation prevail in Vienna.

In particular from a perspective considering regional innovation policy development it is important to note that Austrian R&D spending appears extremely concentrated in three regions: Namely in the provinces (*Bundesländer*) Vienna, Styria, and Upper Austria. These three comprise 51,5% of Austria's population, produce together about 56% of the total GDP, yet they provide for about 73% of all R&D expenditures (Table 1).

Table 1: Concentration of R&D-expenditures in few populated areas

Austria	Population	Area	GRP (2004)	GRP spent for R&D	Share of total expenditure for R&D in Austria (2004):	
Consists of nine provinces = nine NUTS-2 regions	Total: 8,3 mio	Total: 84.000 km ²				
	%	%	Mio €	%	Mio €	%
Vienna	20,1	0,5	64.965	3,10	2.184	42
Styria	14,5	19,5	29.684	3,60	949	18
Upper Austria	16,9	14,3	37.555	2,00	714	14
Other six provinces	48,5	65,7	103.615	[1,34] [average]	1.403	26
Total	100	100	235.819	2,23	5.250	100

Sources: Statistik Austria <http://www.statistik.at>; BMWF/BMVIT, ed., Österreichischer Forschungs- und Technologiebericht 2007, http://www.bmwf.gv.at/uploads/tx_bmwfcontent/ftb_2007_01.pdf; own calculations

Such evidence of concentration is of general relevance, since it can be observed within many other countries as well, and actually across the whole (see Box 3).

Thus any regional innovation policy can neither be separated from inter-relations to other (adjacent) regions, nor from the national innovation system. As a principle, building on existing strengths, continuous development, and clustering is indispensable in order to assure that more money spent will be invested efficiently, capable and productive to deliver the results expected.

³⁰ Fritz Ohler, 2004: *Neue Wege in der Forschungs-, Technologie- und Innovationspolitik zwischen Bund und Bundesländern*; Vienna. Based on R.K. Merton (1968) he refers to the „Matthew-principle“: Those who have will be given.

Box 3: Concentration of RTD-spending – a topical and crucial issue concerning regional innovation policies***Technological capacity highly concentrated at the regional level...***

The regional distribution of innovative capacity in the EU reflects the structure of national scientific and technological systems, though regional differences within Member States serve to widen disparities even further.

There is a strong concentration of RTD and innovation in the most advanced regions of the EU, the top ten regions (in Germany, the UK, France and Finland) accounting for around a third of all expenditure in the Union. At the same time, 17 of the 25 regions with the lowest RTD intensity (less than 25% of the EU average) are Objective 1 regions. Similar disparities are evident for business expenditure, human resources and patent applications.

Interregional differences are particularly large in the cohesion countries. In Greece, for example, over half of RTD expenditure is incurred in Attiki (where Athens is located), which is also responsible for two-thirds of patent applications. In Spain, over three-quarters of business RTD is located in just three regions (30% in Madrid alone).

Source: http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/p146_en.htm

© European Communities, 1995-2007, from: *Regional Policy - Inforegio, Chapter 4.6: RTD and Innovation*

2.5 Ex-ante, interim, and ex-post evaluations

Concerning the strategic documents existing, the STEP 05 includes a running monitoring and a periodic evaluation every five years. A city development report (*Stadtentwicklungsbericht*) shall be prepared and has to be presented to the municipal council. Amendments and adoption of continuation are based on results of evaluations and monitoring processes.

Concerning funding agencies, the WWTF and ZIT use an equal set of indicators to analyse the RTD location Vienna in the context of the state and developments of Austria, and in comparison to the European situation. In substance, the jointly applied 90-pages document (*“Forschungs- und Technologiestandort Wien, Strukturdaten, Wien – Österreich – EU”*) provides the following statistical data:

- R&D expenditures (absolute and per capita)
- Knowledge intensive workforce (absolute and per capita)
- Output-Indicators (patents and scientific publications)
- High-Tech exports
- Participation in Framework Programmes (FP’s)
- Stock of national and regional funding
- University ranking
- Selected indicators for main technology fields
- (Infra)structures

Additionally there are some documents like the CIS (“Community Innovation Surveys”), the “Innovation Scoreboard” by CORDIS, and the *“FuE-Erhebung”* by Statistik Austria (R&D surveys). But from these specific documents it is rather difficult to obtain valid regional data.

It is important to stress the existence of a considerable number of studies dealing with Vienna from the economical perspective, from the innovation system perspective and from the science perspective. Moreover, there is an increasing number of activity reports and performance reports by RTDI performers located in Vienna, providing data on their organisational setting and RTDI activities. Other examples of valuable resources are several evaluation reports on RTDI programmes and funding agencies. Though they are mainly covering the national level, it is also possible to split results according to the level of federal states (*Bundesländer*) or individual institutions. However, there are only few papers that engage in some kind of systematic benchmarking exercise, providing a more detailed insight of

the regional RTDI system as a whole. As already mentioned, in principle many data sets exist, but they are scattered in different papers, based on different methodological approaches, thus assuring only limited comparability.

Nevertheless, there are some good practice examples: In 2005, ZIT and WWTF published a compendium of common indicators used to describe RTDI settings limited only to Vienna. Even though this document provides very important data on the Viennese RTDI system, as most statistics do it mainly presents only input indicators and output figures on the basis of existing data. The impact of regional RTDI policy measures can not be evaluated sufficiently.

Concerning changes in steering committees and supervisory bodies in case of ZIT – as an affiliate of WWTF – all guidelines, programmes, calls for proposals and other activities set by the agency need approval by the WWTF presidency. In case of calls for proposals independent experts are asked to help with their expertise in the evaluation (peer reviewing).

Indicators of innovation performance in Vienna and some comparisons with other regions:

Table 2: Patent applications to the European Patent Office per mio. inhabitants

	High Tech-Patents	Total
Uusimaa (incl. Helsinki and Espoo)	286,3	582,4
Bavaria (<i>Oberbayern</i>)	282,1	824,2
Stockholm	246,0	610,3
Ile de France (incl. Paris)	80,7	311,8
Berlin	59,0	217,3
Vienna	41,0	156,2
London	41,0	112,5
Brussels	31,6	170,4
Nord-Holland (incl. Amsterdam)	24,0	140,4

Regional Innovation-Scoreboard 2003

Source: Eurostat; NUTS 2 - City regions

Table 3: EPO Patent applications 2002

City Region	Patent applications per mio. inhabitants				
	Hi-tech	ICT	All	NUTS Region (name)	Year
Stuttgart	74,2	162,4	736,2	Stuttgart	.
Munich	209,2	276,9	669,1	Oberbayern	.
Öresund	145,6	177,9	402,8	Sydsverige	2002
Helsinki	171,4	196,7	383,7	Etelä-Suomi	2002
Copenhagen	39,2	46,3	217,5	Danmark	2002
Vienna	62,2	78,6	203,9	Wien	2002
Berlin	56,3	63,1	201,4	Berlin	2002
Barcelona	6,9	8,9	72,8	Cataluna	2002
Budapest	7,5	9,6	46,6	Közep-Magyarország	.
Prague	2,4	5,0	32,4	Praha	2001
Bratislava	5,8	7,4	18,7	Bratislavský kraj	2001
Brno	0,5	1,8	9,2	Jihovýchod	2001

Source: Eurostat

Table 4: Participation in EU Framework Programmes

City region	Number of project participations		
	FP 4	FP 5	% change
Copenhagen	502	497	-1
Öresund	1555	1676	8
Berlin	743	811	9
Helsinki	942	1108	18
Barcelona	988	1271	29
Vienna	619	917	48
Budapest	238	194	108
Prague	175	407	133
Bratislava	70	195	179
Brno	41	124	202

Source: ARC Systems Research

Table 4: Selected performance indicators from 1970 – 2002

Indicator	Vienna
R&D Performance	
Public R&D expenditure in % of GRP ^(b) , 2002	1.42
Thereof government sector	0.28
Thereof university sector	1.14
Private R&D expenditure, in % of GRP ^(b) 2002	1.91
Human resources	
Number of R&D personnel ^(*) , 2003	16,45
Share of R&D personnel, in % of total employed, ^(*) 2003	4.14
Participation in the EU Framework Programmes ^(**)	
Number of project participations in FP 4 (94 – 98)	619
Number of project participations in FP 5 (98 – 2002)	917
Change from FP 4 to FP 5, in %	+48
Patenting	
Number of patent applications to EPO, ^{(d)(c)(*)} 2002	203.9
High Tech patent applications, ^{(c)(*)} 2002	62.2
ICT patent applications, ^(c) 2002	78.6
Number of inventors of global patents, ^{(c)(***)} 1970 -79	33
Number of inventors of global patents, ^{(c)(***)} 1980 -89	295
Number of inventors of global patents, ^{(c)(***)} 1990 -99	389

Sources:

- *) EUROSTAT; **) ARC systems research; ***) OECD, calculation by ARC systems research

Notes:

- a) 2002
b) Gross Regional Product
c) per mio. inhabitants
d) European Patent Office

2.6 Learning and feed-back

Improving the relevance and impact of specific programmes on regional innovation and RTD:

As mentioned already, there is no one single strategy, but several – more segmented – papers that define the frame for implementation of RTD-instruments. These Instruments (programmes, special measures, investing in infrastructure, cluster-networks, etc.) are developed in iterative processes. As indicated in *Figure 3*, agencies such as WWFF, WWTF, and ZIT are developing guidelines and programmes in cooperation with administration and politicians, but also the target groups (companies, R&D capacities) and their representing organisations.

The negotiation and the feedback processes are clearly focused on regional needs. These needs serve as a basis for the strategic documents and in conclusion for the programmes and guidelines. A systematic assessment is done by the agencies but it is communicated also to politics, administration and other relevant players. Therewith, systematic assessment requires a continuous process, comprising communication and discussion, rather than just a periodic activity of certain players.

As many experts do, also the Austrian Council (*“Rat für Forschung und Technologieentwicklung”*) states that the regional RTDI-policy follows a demand-oriented approach (*Rat-FTE, Strategie 2010*, p. 28).

Each Agency is responsible for a special part of the RTDI policy. This delimitation prevents from redundancy of instruments on one side, but on the other side it enables complementary instruments. The Viennese RTDI relevant agencies pursue a broad approach: They provide support for technological and organisational innovation, process and product innovation, as well as the leading-edge and low-tech technology.

During the last years several programmes, many new measures or guidelines were developed by different agencies. As far as they relate to Vienna, all of them demonstrate a close connection to strategies pursued by expert groups, politicians and administrative units in the municipality of Vienna.

When highlighting the most relevant and highly efficient approaches concerning regional innovation and research policy development in Vienna, the following measures and decisions appear of topical importance:

- **Priority setting** and focus of investments on existing strengths, i.e. Life Sciences/Biotechnology, ICT, transport and logistics, creative industries.
- **Development of Infrastructure:** Investment in research and innovation infrastructure, e.g. TechGate, Techbase Floridsdorf, Vienna, Campus Vienna BioCentre, will continue (the expansion of the BioCentre already is in its third stage).
- **Advancement of Polytechnics** (Universities of Applied Science): Not in the form of conversions of old institutions. They are all new in concepts, however many installed by existing and experienced education and training centres.
- **Promotion of private sector innovation:** Additional funding provided through new and additional programmes, primarily implemented by ZIT (co-financing, loans).

3. Practices at programme level

3.1 Initiation and decision on programme

Alignment of research, technology development and innovation with industrial needs:

In Vienna – as in other Austrian regions – the Competence Centres (“*Kompetenzzentren*”) resume a crucial position in promoting and enhancing the accordance of R&D capacities with industrial needs. Initiated through national activities in 1996/97, the Competence Centres now represent important interfaces of long-term collaboration between science and businesses in most relevant areas of innovative technologies. This is why this programme has been selected to present a closer look on actual practices. An analysis of all existing programmes (as indicated briefly in Chapter 2.4) would necessitate efforts beyond the scope of this case Study.

It has to be stressed that – as a principle – R&D capacities are substantially financed at the national level. That means the major part of influence and impact concerning the improvement of research competencies and industrial capacities derives from the national level. However, the strong position of Vienna as capital city leads to self-driven reinforcement of agglomeration effects (please refer for more information on the leading role of Vienna in R&D: Table 1; and on important institutional relations: Fig. 3).

Promotion of science-industry relations:

In general, the awareness on science-industry collaboration has been increasing since the early 1990’s. The instruments and structures have changed. In Austria, this collaboration is becoming more and more institutionalised: the Competence Centres were, and still are, playing a groundbreaking role.

Improved consciousness concerning science-industry relations, renewal of appropriate concepts, and the implementation of better tools follow a pan-European development and corresponds to the guidelines of European RTDI-policies. Increasing competition in scientific research is an additional turnout, occurring parallel to the strive for more innovation, to generate new technologies and competitiveness in global markets.

Vienna is home to several big companies with quite global and international influence on the one hand, and asserting important R&D capabilities in the Viennese Innovation System on the other hand. With accession to the EU, the margin for direct financial support became

delimited. The fact is, however, that regional (and sometimes national) governments, use all disposable legal means to save (or upgrade) existing R&D capacities in private enterprises if required.

It comes without surprise that RTDI-investments of the biggest companies play an important role in the Viennese innovation system. They form central cores of sector networks, induce spin-offs and form nodal points to external and specialised know-how. A recent study on Innovation Networks has been done by the “ARGE Innovation oriented sustainable regional development” (Späth, P., Rohracher, H., Weber, K.M., Oehme, I., 2006).

3.2 Elaboration of calls and concrete actions

Introduction: Competence Centres – Linking Science to Industry

The *K^{plus}* programme improves cooperation between business and research sectors through the establishment of competence centres.

Competence centres must undergo a competitive selection procedure based on established quality criteria and are funded for a period of seven years.

K^{plus} is a funding initiative established in 1998 by the BMVIT³¹, and the running of which has been entrusted to FFG / Structural Programmes³².

The K^{plus}-Competence Centre Programme stimulates the long-term cooperation between innovative enterprises and top-quality research in order to contribute to a lasting improvement of the cooperation between science and industry. On the basis of already existing top-level research, competence and knowledge exchange, pre-competitive research and development is supported on international competitive level. K^{plus}-Competence Centres develop R&D competence as well as human capital in promising fields of research.

One of the key features for the establishment and the operation of a Competence Centre is the **long-term participation of research institutions and at least five enterprises**.

K^{plus}-Competence Centres are often located at universities, although an extra-university research institution or an enterprise may also form the core of a Competence Centre. Virtual centres or networks do not qualify as K^{plus}-Competence Centres.

³¹ Federal Ministry for Transport, Innovation and Technology (*Bundesministerium für Verkehr, Innovation und Technologie*)

³² *Forschungsförderungsgesellschaft*, <http://www.ffg.at/content.php?cid=10>

The following objectives give an outline of the general orientation of the programme. They form the basis for founding guidelines and selection criteria for K plus-Centres as well as for the evaluation of the K^{plus}-Programme.

List of objectives in the K^{plus} programme:

- Development of the cooperation between science and industry in Austria
- More efficient use of existing competence and resources
- Stimulation of the pre-competitive R & D cooperation
- Performance of long-term research programs
- Pronounced strategic orientation of research
- Improvement of Austria's quality as a business and scientific location
- Generation of competence and critical masses at a national level
- Improvement of Austrian integration in international research initiatives
- Development of human resources

Early 1998 a pilot phase was introduced in which a number of proponent groups with experience in cooperative initiatives were invited to submit tenders according to the requirements laid down in the guidelines of K^{plus}. This procedure and the resulting evaluation were carried out in much the same way and with the same stringency as the two subsequent public Calls for Tender. By the end of 1998, five K^{plus} competence centres were selected from this pilot phase. The start of the year 2000 saw the approval of seven additional centres, six more were accepted and selected for funding in 2002. Following systematic investigation of the results achieved by the various Competence Centres established, again another Call for Proposals to form *new* competence centres (“K^{neue}”) under a farther advanced programme named COMET³³ was published in the year 2006.

In 2006 some 270 enterprises of different size were involved in K^{plus} centres, generally in the form of multi-company projects with several enterprises, collaborating with various scientists (mainly from universities and universities of applied Sciences [Polytechnics]) on problem-solving research.

³³ COMET - Competence Centers for Excellent Technologies; for information in English please refer to <http://www.ffg.at/content.php?cid=715>

It appears important to note, that no particular enterprise, nor any particular research centre (be it public or private) qualifies as such as a “competence centre”³⁴. To formerly constitute a “K^{plus}-Centre” according to the K^{plus} programme, a new company has to be set up which has to include partners from business, universities and other research organisations. As a principle, no legal entity in these fields is excluded. However, all partners engaged in a K^{plus} proposal need to bring certain *qualifications and sources* (finance, personnel, infrastructure, equipment) to the centre. What is required beyond the availability of such sources, is the ambition to be innovative, and to take the risks of jointly forming and running a new company as well.

This implies, in terms of excellence and competition, and in regard to ranking of research organisations (public and private), that **K^{plus} centres become additional competitors in their field of expertise** concerning the relevant business or scientific sectors. Being *not* partner in a K^{plus} centre does not – on its own – provide any indication of low performance, because K^{plus} centres by far do not cover all possible areas of competence. If there is an overlap of competence, a situation of more or less rivalry may emerge – as everywhere else as well. On the other hand though, being invited to participate in a strong consortium that is capable to successfully establish a K^{plus} centre, certainly adds to existing reputation. This kind of interrelation is **comparable to partnership in a distinguished IP** (Integrated Project) **or NoE** (Network of Excellence) with support of the European Framework Programmes for RTD.

Time Schedule to implement the **new competence centres (K^{neu})**:

- Opening of the Call: 01.10.2006
- Deadline Short Proposal: 01.12.2006
- Decision: 30.03.2007
- Deadline Long version of Proposals (for well evaluated Short Proposals only): 28.06.2007
- Final Decision: 28.09.2007
- Contract Negotiations: finished in 2007
- Start of Centres: 01.01.2008

³⁴ Nevertheless, stimulated by the K^{plus} programme and the many K^{plus} centres that have been established with success, it has become a widespread habit to arrogate the term “competence centre” as a self-denotation to pretend high reputation of ones own research centre.

What is the general practice of project financing?

- The proportion of **public funding** for K^{plus} centres is limited to a **maximum of 60%**.
- The FFG/Structural Programmes carries out the largest block of public funding with **35%** of the total budget. The next **20%** of public means is split between federal provinces, communities, interest groups (e.g. chambers) and **5%** are awarded to the research institutes involved.
- **40% of the financing is contributed by the companies** as capital (cash contribution), supplementary a maximum of 50% may be contributed in personnel or material costs (in-kind contribution).
- **Duration and sequences of payment:** Funding is provided first for a period of four years; after evaluation of performance, achievements, and of market opportunities, funding may be extended for another three years. Tranches of the funds agreed are paid in case of K^{plus} quarterly in advance, in case of $K^{\text{ind}}/K^{\text{net}}$ every six months.

3.3 Responsibilities and management

Competence Centres in Austria. The Contribution of the City of Vienna

The programme marked a new policy in Austrian RTD promotion and management, as it enforced business type collaboration between research organisations (mainly universities) and corporations in the private business sector. Main actors in the beginning were Ministries:

- Ministry for Transport, Innovation and Technology (BMVIT): Designed and started the K^{plus} Programme in 1998
- Ministry for Economic Affairs and Labour (BMWA): Designed similar programmes $K^{\text{ind}} / K^{\text{net}}$ (“*ind*” stands for “Industry”; “*net*” stands for “Networks”)
- The Ministry for Transportation, Innovation and Technology (BMVIT) and the Ministry for Economic Affairs and Labour (BMWA) jointly commissioned assessment of the Competence Centres and Competence Centre Programmes (K^{plus} and $K^{\text{ind}}/K^{\text{net}}$), which assists concerning the decision-making on the further development (COMET programme) and the future options for the centres established.

- TIG (*Technologie Impulse Gesellschaft*) was funded in the late 1990s. TIG was responsible for the implementation of the K^{plus} programme and is now part of FFG.
- FFG (*Forschungsförderungsgesellschaft*) was founded in 2005. This Company is a merger of the former TIG, FFF (*Forschungsförderungsfonds für gewerbliche Forschung*, which offers bottom up subsidies for applied R&D projects; ASA (Austrian Space Agency), and BIT (*Büro für Internationale Technologiekooperationen*). FFG is responsible for all Competence Centre programmes (K^{plus}, K^{ind}, K^{net}). The programmes are operated by the relevant departments of FFG.
- City of Vienna, Department of Finance and Economic Affairs: Participated in co-financing of Competence Centres since their implementation. The proportion of funding is 7:4 (national level : regional level) for K^{plus}, and about 2:1 in the case of K^{ind} and K^{net}.
- ZIT (*Zentrum für Innovation und Technologie*) is responsible for processing Co-Financing Subsidies for Competence Centres (cf. Table 5). In practice ZIT maintains a strong cooperation with TIG/FFG. Evaluation processes, controlling and financial supervision is primarily carried out by TIG/FFG.

In the ZIT, two experts are responsible for the Competence Centres programme. One of them has been dealing with Competence Centres from their beginning, while the other one focuses more on cooperation projects and therefore increasing expertise about the topic.

Interactions between ZIT and the many particular K-centres vary. In some Centres, ZIT is represented in the general assembly – which means that there are meetings held every few months. Other Centres just deliver reports every six months.

About twice a year (on average) ZIT has bilateral meetings with the managers of the Centres to discuss the situation and needs of the Centres and other topics that are of interest.

Meanwhile some Centres play the role of supervisors for ZIT. They are consulted to identify new technological trends or to analyse the potential of a new initiative. All the Centres are addressed by any of the ZIT-calls or other ZIT-activities.

Table 5: Competence Centres that are co-financed by the City of Vienna

Pro-gram-me	Estab-lished	Dura-tion (yr)	Name		Total Volume [EUR]	Funding Contribution Vienna (€)
K ^{plus}	1999	7	FTW	Forschungszentrum Telekom Wien	31.460.445	6.839.379
K ^{plus}	2000	6	BMT	Biomolecular Therapeutics	16.402.951	3.490.731
K ^{plus}	2000	7	VRVIS	Virtual Reality and Visualisation	19.986.134	3.777.602
K ^{plus}	2000	7	ACV	Advanced Computer Vision	16.609.148	3.211.665
K ^{ind}	2000	4	EC3	E-Commerce Competence Centre	11.936.059	2.308.208
K ^{ind}	2001	4	KERP	Kompetenzzentrum für Elektro(nik): Altgeräte-Recycling und nachhaltige Produktentwicklung	11.827.217	1.454.358
K ^{ind}	2001	4	ACBT	Austrian Centre of Biopharmaceutical Technology	13.735.166	1.176.728
K ^{net}	2003	4	KFZ	Fahrzeugkonzepte der Zukunft	21.061.266	588.768
K ^{net}	2000	4	AAR	Austrian Aeronautic Research	21.186.441	524.195
K ^{net}	2002	4	LICHT	Kompetenzzentrum Licht	29.597.550	368.190
K ^{net}	2005	4	JOIN	Kompetenzzentrum für Fügetechnik	11.999.872	758.271
K ^{ind}	2006	4	SBA	Secure Business Austria	9.080.064	1.524.460
K ^{net}	2006	4	COAST	Competence Network for Advanced Speech Technologies	10.793.100	1.578.578
Total					182.660.648	27.601.133

Source: ZIT

3.4 Documentation, monitoring and evaluation

Documentation is available at the funding agencies involved (FFG, ZIT), as well as in the form of annual reports of the companies and their balance sheets.

A critical and comprehensive assessment of the *Kompetenzzentren* programmes K^{plus}, K^{ind}, and K^{net} has been carried out by "Fraunhofer Ges., Institut für Systemtechnik und Innovationsforschung" in collaboration with "KMU Forschung Austria". The results are available in an Executive Summary and in a detailed Final Report³⁵.

Box 4: Extract of the K^{plus} programme evaluation (2004)

The assessment of Kplus showed that this programme has a clearly science-oriented profile, a theoretically based justification and simultaneously meets very high standards as regards objectivisation in implementation. Thus, the funding quote appears appropriate for the time being. The most crucial question for the future of the programme is therefore not how the programme principles and implementation should be adapted, but whether there is still sufficient need and relevant demand in industry and universities. For this reason we suggest – as also for the Kind/net programme – to find out, by means of a call for interest, whether concrete interest and potential exist in possible industry – science associations and to issue a further regular invitation to tender depending on the result of this survey. Even if the demand has waned somewhat recently, a latent need in the future can still be assumed in any case, in view of the dynamically developing research contexts. In order to serve this need, the call procedure could be modified to an application process with periodic cut off-dates, however strictly adhering to the established evaluation principles. Furthermore, the programme guidelines should be amended so that the centres are assessed at an earlier point in time on their development of strategy for the time after the end of the promotional measure. Finally, coordination with the states (Bundesländer) should take place earlier, not only between the federal government and the states, but also between the centres and the states.

Source: <http://www.kmuforschung.ac.at/index.htm> (Final Report, Executive Summary, p. 20)

Following decision making in government politics and administration (ministries) concerning the continuation of the Competence-Centres programme, FFG (Department Structural Programmes) was entrusted with drafting and implementing the new Competence Centres

³⁵ Fraunhofer Institut für Systemtechnik und Innovationsforschung, *KMU Forschung* [SME research] Austria, 2004: "Zukunft der Kompetenzzentrenprogramme (K^{plus} und K^{ind/net}) und die Zukunft der Kompetenzzentren", Vienna. The report is written in German; 167 pages, including an 8 p. Summary in English; it is available for free download at <http://www.kmuforschung.ac.at/index.htm> - go to:

► *Forschungsberichte und Vorträge* ► [Forschungsberichte der KMU FORSCHUNG AUSTRIA seit 2003](#)

programme “COMET”, which shall address existing K^{plus}, K^{ind} and K^{net} Centres, as well as potential new consortia, encompassing entrepreneurial and scientific partners.

The federal government’s agencies were addressed to participate in a consultancy process. Some regions were represented by units of the federal government, others by own agencies in charge of funding schemes for innovation and technology. Endowment of different agencies is organised in different ways. There is no specific incentive to harmonise their programmes.

The FFG/Structural Programmes assigns great importance to the evaluation of the work done and the success achieved by the projects and Centres. Therefore, the criteria for the evaluation are developed individually for each programme and published before its start. This ensures transparency and fairness: All projects know when they will be evaluated and what consequences the evaluation will have. As mentioned above, the programmes themselves are also evaluated.

The ZIT itself was evaluated recently in order to learn of employment impacts of the programmes which are in place to foster innovation and technology development in Vienna. The report (“*Beschäftigungswirkungen technologiepolitischer Maßnahmen*”, available in German only), elaborated by *KMU-Forschung Österreich*³⁶ on this analysis was delivered in March 2007, stating a number of recommendations for future development of measures and programmes.

3.5 Other practices

Because of the relevance of the Competence Centres – Programmes, results and developments are frequently discussed in the public. In accordance with other topics of research and innovation policies experiences, lessons learned from results of assessments were inserted in the current debates concerning the development of the new Viennese FTI-strategy³⁷, and will certainly also be of great relevance to the new national dialogue on research, initiated by the

³⁶ <http://www.kmuforschung.ac.at/de/Projekte/Besch%E4ftigungswirkungen%20innovations-%20und%20technologiepolitischer%20Ma%DFnahmen.pdf>

³⁷ <http://www.wiendenktzukunft.at/>

Minister of Science and Research in autumn 2007³⁸. (Please refer also to Chapter 2.6 above on learning from successful practices/programmes.)

Not only because of the strategic concept of “Centrope”, but also due to the fact of globalisation in growing internationalisation in research, particular attention needs to be paid to cross-border collaboration in regional RTDI-policies. This is why Vienna increasingly turns to observe external contacts and options for collaboration more excessively than in previous times³⁹.

Management of international relations:

International relationships should be designed and generated on different levels, concerning and involving a variety of stakeholders.

- Agencies
 - Identify opportunities to achieve support for international RTDI projects
 - Promoting the Vienna location in different regions (global)
 - Establishing new markets
- Politics
 - Establishing and building up international regional partnerships
 - Integration of RTDI-issues into these partnerships
- Science-Research-Educational system (universities and non-academic facilities)
 - Exchange programmes for scientists, fellowships, PhDs, students
 - International cooperation on R&D projects
 - Recruitment of human resources (excellence strategy)
 - Financing (international cooperation as an additional source)
 - International positioning (patent applications, scientific publications)
- Companies
 - Cooperation as a possibility for market access and expansion
 - Looking for specialised partners to build up niche markets
 - Using regional comparative advantages (R&D in Vienna, producing in new member states)

³⁸ „Österreichischer Forschungsdialog“, <http://www.forschungsdialog.at/>

³⁹ <http://www.wieninternational.at/en/node/3020>

Internationalisation is closely connected to the discussion of international competitiveness. In the field of RTDI policy this is the total of different activities as focused in the points above. Only partial aspects can be influenced by regional policy or agencies.

A recent activity of the City of Vienna was the attempt to establish the ISTA (Austrian Institute of Science and Technology, Austria) in Vienna. Due to a very particular political constellation and the higher financial promises by the state of Lower Austria, the institute actually has been located in the suburban area of Vienna – in *Maria Gugging* (for information please go to: <http://www.ist-austria.ac.at/>).

Further initiatives of the City of Vienna – including policy and agencies – were the establishment of a Fraunhofer Working Group in Vienna (2006, in collaboration with the Vienna University of Technology), and of the IMBA (Institute of Molecular Biotechnology⁴⁰) in 1999.

⁴⁰ <http://www.imba.oeaw.ac.at/index.php?id=start&L=0>

4. Conclusions

The case of Vienna highlights the fact, that the concept of “region” and the range of “regional innovation policy” demand particular consideration under the auspices of European integration on the one hand, and of globalisation on the other hand. The issue of congruency between administrative borders and the extent of a cohesive economic area becomes amplified in Vienna as a region because of the very near national borders to the Czech Republic, Hungary, and Slovakia. In the latter case the special proximity to Bratislava even provokes the vision of a twin-city future. Therefore a variety of definitions exists of what may be the “Vienna region”.

Actually politicians and experts increasingly conceive Vienna as part of an emerging trans-border region (labelled “*Centrope*”), comprising a number of NUTS 2 and 3 regions from four different Member States of the EU, forming together a multi-national economic space of a NUTS 1 region. This may indicate a trend towards the appearance of more trans-border regions in Europe, as *Schengen* and EU-integration progress.

However, in the course of the case Study at hand, concrete data addressing the regional RTDI-system of Vienna still refers to the narrow definition of the municipality of Vienna (representing at the same time a *Bundesland* [one of the nine provinces] of Austria, and – in terms of EU statistics – a NUTS 2 region).

Finding a strategy

In Vienna, developing a strategy for the advancement of regional innovation policies can build on traditions established and usually rely on perennial processes. As a result of the major changes that occurred in the economic, political and administrative environment of Vienna, strategic perceptions have been converted basically as well since 1990.

Research, technology and innovation are much higher now on the agenda in political decision making, and public awareness on these topics has risen similarly. Obviously RTDI-friendly policies depend on public opinion, tradition, knowledge, human resources, and last but not least on key political figures making policies for RTDI their cause. So did the Mayor of Vienna, when he claimed in his Government Statement (2005) that Vienna should become “a European capital of science and technology”. Against the background of this proclamation, in 2006-2007 a new Strategy on Research, Innovation and Technology (the so-called “*FTI-Strategie*”) has been developed in Vienna, involving great numbers of relevant stakeholders from politics, administration, science and industry.

Implementation

Capabilities of well organised administration, continuity of RTDI policies beyond terms of political bodies and functions, and certainly also stability regarding economic and fiscal potentials for funding, are essential for successful implementation of strategies. However, good administrative units, working on behalf of municipal or regional governments are just a necessary, but no sufficient condition to execute successful innovation policies. Effective settings and durable outcomes of governance in a regional RTDI-system require specific institutions, in particular agencies to administer funds, calls for tender and calls for proposals on the principle of competition.

In this regard Vienna has a well established system of own agencies, acting, networking, and collaborating together with similar organisations on the federal level and in other regions. Funding is also obtained from external sources, e.g. opportunities provided by the EC. Systematic collaboration in wider networks and periodic process evaluation is required to assure that propensity to invest in RTDI (from private and from public sources) is not lost or diminished in efficacy, but leads to the ambitious results expected.

Practices

Concerning practices, the example of the “*Komptenzzentren*”-programme (competence centres) has been chosen for presentation in detail, although this is a programme which was initiated on federal level by the Ministry BMVIT. However, this programme demonstrates best the capability of joint support for improved development of technologies and innovation, as in this case the contributions for research and innovation are split between industry (40%) and the public (60%), whereby “the public” is composed of funding agencies of the federal and of provincial/regional levels, communities and some other organisations. The City of Vienna invests a total of about 27 mio. € in existing K-Centres. Own programmes to support RTDI activities in Vienna complement the K-Centre achievements in areas of special interest of economic and urban development (e.g. media, creative industries, life sciences).

Strengthening existing potentials in science and industry, and fostering science-industry collaboration is assured by several measures: Competition between proposals which are being selected for funding in a two-step process – by the help of many experts from domestic and foreign science and industry – is only a part of appropriate arrangements. Another is the unavoidable requirement to take risks – not only on the basis of own contributions, but primarily by the obligation to jointly form a new company that shall prosper beyond the

funding period of max. seven years. As a matter of fact, science and industry partners who create a K-centre become connected for long time, not only for one research project, rather for the development of new, innovative products and marketing activities alike. In doing so, K-Centres turn up as new players in science and in markets, thus increasing competition in certain areas. Therefore one can expect very careful planning from the beginning of such an endeavour, and clustering of further investments and co-operation agreements.

Beyond individual evaluation of the K-Centres themselves (which is compulsory after four years), thorough evaluation of the K-programme has been carried out after the first six years of experience and led to a re-development of the programme under a new header, namely COMET (“Competence Centres for Excellent Technologies”). The first centres funded under this new scheme will go in operation by January 2008.

Overall, concluding from the experience in the case of Vienna: Innovation is not only about money, technology, and industry. Starting from motivation and reasoning for innovation, the socio-cultural environment seems as important as economic and technological pre-conditions. Drafting strategies, making decisions, implementing and realising strategies are likely or even deemed to fail if trust (based on reliability, credibility, and monitoring), in innovation policies is at stake. Therefore, e.g. education and training of personnel in many institutions is indispensable. Stakeholder involvement, monitoring and control processes are challenges to regional innovation policies that should never be underestimated or above all neglected.

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Annex: K^{plus}, K^{ind}, and K^{net}-Centres established in Vienna (Number of ZIT-clients in the programme)

Centre	Research partners	Number of res. partners	Corporate / business partners	Number of bus. partners	Total Number
K ^{plus} Forschungszentrum für Telekommunikation Wien (FTW)	<p>Institut für Informationssysteme, Distributed Systems Group (TU Wien)</p> <p>Joanneum Research, Institut für Informationssysteme und Informationsmanagement</p> <p>Institut für Nachrichtentechnik und Hochfrequenztechnik (TU Wien)</p> <p>Institut für Elektrische Mess- und Schaltungstechnik (TU Wien)</p> <p>ARC Seibersdorf Research</p> <p>Institut für Breitbandkommunikation</p> <p>Institut für Signalverarbeitung und Sprachkommunikation (TU Graz)</p> <p>Institut für Angewandte Informationsverarbeitung und Kommunikationstechnologie (TU Graz)</p> <p>Norwegian University of Science and Technology- Department of Electronics and Telecommunications</p> <p>TU München- Lehrstuhl für Netzwerktheorie und Signalverarbeitung</p> <p>Institut für Nachrichtentechnik/ Informationstechnik (Universität Linz)</p>	11	<p>Alcatel Austria AG</p> <p>FV der Elektro- und Elektronikindustrie</p> <p>Infineon Technologies MDCA GmbH</p> <p>Kapsch CarrierCom AG</p> <p>Logico Smart Card Solutions</p> <p>Rundfunk und Telekom Regulierungs GmbH</p> <p>Mobilkom Austria</p> <p>ON DEMAND Microelectronics</p> <p>Siemens</p> <p>Telekom Austria</p> <p>Dipl.-Ing. Dr. Hermann Bühler</p> <p>Thomas Neuroth</p>	11	22

<p>K^{plus}</p> <p>Advanced Computer Vision (ACV)</p>	<p>ARC Joanneum Research Institut für Rechnergestützte Automation (TU Wien) Institut für Geometrie und Diskrete Mathematik (TU Wien) Institut für Maschinelles Sehen und Darstellen (TU Graz)</p>	5	<p>Böhler Edelstahl Böhler Schmiedetechnik DIBIT Messtechnik GE Medical Systems Kretztechnik Siemens Biso Schrottenecker GmbH Fronius International GmbH</p>	7	12
<p>K^{plus}</p> <p>Zentrum für Virtual Reality und Visualisierung (VRVis)</p>	<p>CURE Centre for Usability Research and Engineering ÖFAI Austrian Research Institute for Artificial Intelligence Institut für Elektrische Messtechnik und Messsignalverarbeitung (TU Graz) Institut für Maschinelles Sehen und Darstellen (TU Graz) Institut für Computergrafik und Algorithmen (TU Wien)</p>	5	<p>A.R.T. advanced real time tracking ABIS-Softwareentwicklungs GmbH Alicona Imaging AutomationX AVL List GeoData Ziviltechnikergesellschaft mbH Imagination Computer Services Mischek Ziviltechnik Vexcel Imaging GmbH Tiani Medgraph GeoData Informationstechnik Eybl Development GmbH</p>	12	17
<p>K^{plus}</p> <p>Bio-Molecular Therapeutics (BMT)</p>	<p>Zentrum für Ultrastrukturforschung (BOKU) Abteilung für Dermatologie (Medizinuniversität Wien) Institut für Gefäßbiologie und Tromboseforschung (Medizinuniv. Wien) Institut für Immunologie (Medizinuniv. Wien)</p>	4	<p>Baxter AG Polymun Scientific, Immunologische Forschung Technoclone GmbH</p>	3	7

<p>K^{ind} Electronic Commerce Competence Centre (EC3)</p>	<p>Universität Wien Technische Universität Wien WU Wien</p>	<p>3</p>	<p>apc interactive solutions AK.net/Xdb ITBI Isolab Software prolytic ABC-markets Lixto Software Paradigma Consulting SAP Österreich Mind Take Swarovski t-mobile austria Tiscover Webges (WebDesign GmbH)</p>	<p>14</p>	<p>17</p>
<p>K^{ind} Kompetenz- netzwerk Biotechnologie (ACBT)</p>	<p>Institut für Biochemie (Uni Innsbruck) Institut für angewandte Mikrobiologie (BOKU)</p>	<p>2</p>	<p>Sandoz GmbH Boehringer Ingelheim Austria Polymun Scientific, Immunbiologische Forschung</p>	<p>3</p>	<p>5</p>

K^{ind} Kompetenzzentrum LICHT	TU Graz Universität Innsbruck Universität Karlsruhe	3	alanod Electro-Terminal OSRAM Knobel AG Steindl Glas Tridonic.Acto Tridoini Opto Zumtobel Staff Luxmate Lichtakademie Bartenbach AE Austria Außenleuchten und Entsorgungssysteme GmbH J.T. Kalmar GmbH Luger research lumitech	14	17
K^{ind} Kompetenzzentrum für Elektro(nik): Altgeräte-Recycling und nachhaltige Produkt- entwicklung (KERP)	Institut für Werkzeugmaschinen und Fertigungstechnik (TU Braunschweig) Institut für Wasserversorgung, Gewässeröko- logie und Abfallwirtschaft, Abteilung Abfallwirtschaft (BOKU) Campus 02 Graz, FH Studiengang Automatisierungstechnik Inst. für Nichteisenmetallurgie (MU Leoben) FH Technikum Wien Institut für Wirtschaftsgeographie, Regionalentwicklung und Umweltwirtschaft, Abt. für Wirtschaft und Umwelt (WU Wien) Institut für Werkzeugmaschinen und Fertigungstechnik	7	BECOM GmbH, Lockenhaus Kapsch BusinessCom, Wien AKG Acoustics GmbH UDB - Umweltdienst Burgenland, Oberpullendorf U.E.G. Umwelt- und Entsorgungstechnik, Neuseiersberg GUA Gesellschaft für umfassende Analysen, Wien ABB, Wien Tridonic.ATCO	8	15

<p>K^{net} Kompetenz- netzwerk Austrian Aeronautics Research (AAR)</p>	<p>Austrian Research Centre Seibersdorf, Aerospace materials technology (ARCS) Institute of Lightweight Structures and Aerospace Engineering, Vienna University of Technology Institut für Maschinenbau, Montanuniversität Leoben</p>	<p>3</p>	<p>Austrian Aerospace, Wien Böhler Schmiedetechnik, Kapfenberg Fischer Advanced Composite Components (FACC) Pankl Fahrwerks- und Antriebssysteme, Bruck an der Mur Plansee Aktiengesellschaft, Reutte MAGNA STEYR Fahrzeugtechnik Isovolta, Airvolt Composites, Wr. Neudorf FWT Wickeltechnik, Neunkirchen</p>	<p>7</p>	<p>10</p>
<p>K^{ind} FAKZ Fahrzeugkonzepte der Zukunft</p>	<p>ARC systems research GmbH Institut für Verbrennungskraftmaschinen und Kraftfahrzeugbau (TU Wien)</p>	<p>2</p>	<p>arsenal research ATB Technologies GmbH AVL List GmbH Magna Steyr OMV</p>	<p>5</p>	<p>7</p>

K^{net} JOIN- Kompetenz- netzwerk für Fügetechnik	Institut für Fertigungstechnik (TUGraz) Institut für Werkstoffkunde (TU Graz) Schweißtechnische Zentralanstalt Schweißtechnik und Spanlose Formgebungsverfahren TU Wien, Institut für spanlose Fertigung und Hochleistungslasertechnik	5	Berndorf Band GmbH Böhler Schweißtechnik Austria GmbH HAGE Sondermaschinenbau GmbH&Co KG Magna Steyr Fahrzeugtechnik AG voestalpine Schienen Chemetall Ges.m.b.H. img Robotersystem AG Siemens Transportation Systems GmbH & Co KG Steyr Daimler Puch Spezialfahrzeug GmbH Fronius International Voestalpine Stahl TMS Produktionssysteme GmbH	12	17
K^{ind} SBA	Institut für Softwaretechnik und interaktive Systeme (IFS - TU Vienna) Institute for Applied Information Processing and Communications (IAIK - TU Graz) Department of Knowledge Engineering (DKE - Uni Vienna)	3	Kompetenzzentrum für Geschäftsprozessmanagement Adobe Systems Österreich Negpoint OCG (Austrian Computer Society) OWASP	5	8
K^{net} COAST	Österreichisches Forschungsinstitut für Artificial Intelligence Fachhochschule Technikum Wien Technische Universität Graz Institut für Signalverarbeitung und Sprachkommunikation	3	ebit ebusiness & IT Entwicklungs GmbH NOA Audio Solutions VertriebsgesmbH Philips Austria GmbH Bereich: Philips Speech Recognition Systems Sail Labs Technology AG Zydacron GmbH	5	8

