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JAHRE

THE FIRST TEN YEARS – HUMAN TECH CLUSTER CELEBRATES

We look at the past, present and future of the Human Technology Cluster.

styria region unlimited

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Ten More Years … !

Dr. Johann Harer
CEO, Human.technology
Styria GmbH

Ten years ago the Styrian Human Technology Cluster was brought into being. Since then, much has been achieved; a whole sector of industry has redefined itself. Now human technology is one of the three major strategic topics of the regional government of Styria. As incoming manager of the cluster (from 1 November) I would like to thank my predecessors: Robert Gfrerer, who spent ten years setting up the cluster and developing it, and Richard Schanner, who has managed this year's transitional phase and set the cluster on the path to a new orientation. I'd like to thank all the people working in the cluster organization who have done excellent work and made the success of the cluster possible. My thanks also go out to all the members of the cluster, who have supported the initiative loyally; by sharing their ideas and their expectations of the cluster, they have helped shape its direction and profile.

If I may introduce myself: I have been working in the pharma and medical devices industries for 25 years. I worked for AVL Medical Systems and, from 2000 onwards, in management positions at Roche Diagnostics. The goal and motivation of all my activities was to successfully bring innovative products to market.

As CEO, I will keep my sights on the same goals the cluster has been pursuing in recent years, continuing the focus on the three strategic corridors: pharmaceutical process and production technology, biomedical sensor technology and biomechanics, and biobank and biomarker technology. We are committed to use the synergies that exist within the cluster to benefit as many companies as possible in Styria, and to attract entrepreneurs and companies from outside Austria to set up operations here.

I am taking over a house in the best of order, but as we say, "what was good yesterday is not enough today".

I am looking forward to working with you all!

Sincerely,
Johann Harer

From Nowhere: Ten Years of Human Technology

A report on a newly discovered sector of industry, the emergence of a cluster, a level of active cooperation rarely observed, and a future perspective. Franz Zuckriegl gathered the pieces.

It is the year 2004. One year after Graz made a splash as Cultural Capital of Europe; the year when Austria's neighbors Slovenia, Hungary, Slovakia and the Czech Republic, as well as Poland, Estonia, Latvia, Lithuania, Malta and Cyprus became members of the EU. It was the year of the great Indian Ocean earthquake and tsunami, which claimed over 200,000 lives. The Austrian word of the year was 'pension harmonization', Heinz Fischer was inaugurated for his first term as president of Austria, Ernst Strasser resigned as Minister of the Interior and Elfriede Jelinek was awarded the Nobel Prize for Literature. A lot and not much has changed in these last ten years.

2004 was also the year of a European-wide boom in interest in the life science business. And in Styria – the region that had pioneered the cluster idea in Europe by launching the automotive cluster in 1995 – the makers of economic policy were considering whether, and how, they should sponsor emerging technologies. At the Styrian Business Promotion Agency SFG it was quickly realized that the life sciences were a good place to look for such technologies; but why were they not involved in that area and where would the region's potential lie? To answer these questions, an exploratory study was commissioned.

"We found out that Styria had a lot of activities that fit into the classical definition of Life Sciences, but also that we had something rather unique, in the form of an interface between engineering and medicine", recounts Dr. Karin Schaupp, an innovation and strategy consultant specializing in the area. "And in 2004 a lot was happening on the university front, for example with the foundation of the Medical University of Graz (Med Uni Graz)." Someone who experienced that side of events up close was Dr. Sabine Herlitschka, the then vice-rector for research management and international partnerships at the Med Uni – and now CEO of Infineon Austria. She says "It was a very smart decision, because individual organizations – whether they are universities or companies – don't have sufficient mass on their own. And, where else would this approach succeed if not in the 'clusterland' of Styria? For us as a freshly created university, the fact that the regional agencies demonstrably knew how to set up a cluster gave our confidence a big boost."

Looking back on the launch phase of the cluster, it is immediately striking that all the actors involved, from government, academia and industry believed equally in the potential of such a venture and all pulled together. Dr. Robert Gfrerer, the first CEO of the cluster, remembers "The mood was of an exciting new departure. Some people in the industry still had their doubts whether there would even be enough companies in the sector, because at first, only the few big players were visible. Essentially it was a start-up situation." For Karin Schaupp it was especially important at the beginning "to make clear to all the players how medicine and the pharma industry tick. This is a group of highly complex industries with high value-creation potential. And for one particular branch of these industries, Graz had a very special environment to offer – the constellation of a close relationship between engineering and medicine, and innovative companies like Roche, VTU and Neuroth was really quite unique."

From this bundle of competences came the name 'human technology', as an intentional contrast to the more biological-medical emphasis of 'life sciences'. "Looking back, I find the best part was

discovering that with a common understanding and fantastic cooperation between the three groups of actors – business, basic science and politics – we were able to set something in motion, even though at first it seemed that the potential was not sufficient."

The cluster's first lighthouses

Some months after the cluster was founded, at the first 'Future Conference' in 2005, the first milestone was reached: Representatives of the government, the companies and the universities signed the 'Declaration of Graz' and committed themselves to the new focus area of human technology. In 2006, the cluster began its training programs in quality management. The former CEO Robert Gfrerer remembers: "As a cluster we were able to help people understand the importance of quality certifications for suppliers. Together with our shareholder organizations we were able to raise awareness of this across the cluster member companies, and we developed shared introductory training programs for GxP certifications. As a result of this support by the cluster, for example, Payer GmbH achieved ISO-13485 certification and became a supplier of Roche Diagnostics."

Another beacon for the sector came into being with the foundation of the Research Center Pharmaceutical Engineering (RCPE). Robert Gfrerer tells the story from his side: "When Graz University of Technology (TU Graz) succeeded in bringing Johannes Khinast back to Austria in 2006 with a Marie-Curie professorship, a brand new topic became visible in Europe: pharmaceutical engineering. The strategy consultant who was working with us at the time bumped into Khinast by chance in town. He called me right away and said we had to meet urgently. What he told me was that Khinast had just gotten approval for a fifteen-million-dollar grant from the National Science Foundation in the USA, together with Prof. Fernando Muzzio, for a project on 'Structured Organic Particulate Systems Engineering'. In Europe there was no equivalent and no partner institute for this subject, but it was important for us to get a bridgehead in the field. As we now know, this idea led to much more: After much negotiation with the regional government, the Federation of Austrian Industries and many other decision-makers at all levels, a K1 center was proposed and in December 2007 the RCPE Research Center Pharmaceutical Engineering was approved as part of the COMET program."

Karin Schaupp tells of more lighthouse projects: "The 'Future Conferences' were an excellent way of bringing people to Styria who didn't know the local scene. Their visits, and also the perfectly organized presentations at the big trade fairs such as Medica, were also lighthouse projects, because the companies saw that they were getting first-class support and international exposure." Another initiative that Schaupp values for its lighthouse effect is the RCPE. "The RCPE is world-class. That's what is bringing the biggest pharma companies to Graz." As in any sector, there are downs as well as ups: The transfer of the Roche Diagnostics operations from Graz to Rotkreuz in Switzerland was a big blow. Karin Schaupp: "Roche was a piece of good luck and a piece of bad luck rolled into one. We can't dictate business strategy to international concerns."

The highlights of the sector in the last ten years include the setting-up of further competence centers: the Austrian Center for Industrial Biotechnology (acib) in the field of industrial biotechnology, the Know-Center for big data and data-driven business, and CBMed, which is starting in 2015, for biomarker research. And it's also very important that many innovative enterprises in Styria, from small and medium enterprises to big companies, have discovered human technology as a market. In 2005, the cluster had 22 member companies, with 4700 employees and revenues of € 783 m. In 2006, there were 33 companies employing 10,500 people, with revenues of € 1.54 bn; and by the end of 2013, the tally was 80 companies, 14,300 employees and € 2.29 bn.

Future prospects

The philosophy of the cluster for the near future is smart specialization. At the moment about 14,800 people are employed in the entire human technology sector with around 130 companies and € 2.9 bn per year in revenues are being earned. The cluster is concentrating thematically on three main focus areas, the so-called 'strategic corridors': pharmaceutical process and production technology, biomedical sensor technology and biomechanics, and biobank and biomarker technology. Dr. Johann Harer, who is taking over as CEO of the cluster in November 2014, says he will continue the strategic emphasis on these three areas. And he says: "We are committed to using the synergies that exist within the cluster so that as many companies as possible in Styria benefit, and so that we can attract entrepreneurs and companies from outside Austria to set up operations here. And for me it's a big part of the mission to involve the non-industrial sector – clinics, university and non-university research centers – more strongly in the commercial economy."

From her vantage point as someone who knows the cluster well but is outside the organization, Karin Schaupp also sees very concrete future prospects: "The cluster has grown up. The existing strategic corridors still make sense and would be easy to expand. In future the cluster should become an even stronger platform for participative processes; the users should be involved earlier and more intensively. Internationalization is a key aspect, because pharma and medical technology are an international business. I believe that not many years from now, Styria will be one of the European hotspots for 'personalized medicine'."

Karin Schaupp

"I believe that not many years from now, Styria will be one of the European hotspots for 'personalized medicine'."

K Centers in Human Technology

COMET – Competence Centers for Excellent Technologies is the name of the Austrian competence center program.

The COMET program is supported by the Ministry of Science, Research and Economy and the Ministry of Transport, Innovation and Technology and its mission is to implement a high-quality R&D program defined jointly by partners from science and business. The program encompasses three strands, dealing with different scales and types of initiative: K2 centers, K1 centers and K projects.

K2 centers are characterized by a particularly ambitious research program and consequently a very high risk in development and realization. They have a high level of international visibility and international connectedness. The support of the COMET program is intended to enable the group to jump to the forefront of the research field.

K1 centers focus on scientific and technological developments with a perspective in future markets. This strand of the program supports the establishment of competence centers that carry out research of both academic and commercial relevance in projects that are defined cooperatively between academic scientists and industry partners.

K projects give cooperative research teams space to pursue new ideas that have future development potential. The goal of this strand of the program is to kick-start high-quality research in collaboration between basic research and industry with a mid-term perspective (and possibly as a preliminary phase to starting a K1 center).
The federal state of Styria has a leading position in the COMET program and is currently involved in 22 of a total of 50 K centers in Austria. From January 2015, when the next round of K centers are due to be launched, Styria will be participating in 23 of 47 centers. The following Styrian centers are working in the field of human technology:

acib (K2 center): The Austrian Center of Industrial Biotechnology (acib) is developing new processes for industry (biotech, chemicals, pharmaceuticals) that are more environmentally friendly and more economical than existing processes. The new processes imitate natural processes and use them as tools. acib is Austria's competence center for industrial biotechnology, with locations in Vienna, Graz, Innsbruck and Tulln as well as in Germany (Hamburg, Heidelberg and Bielefeld), Italy (Pavia) and Spain (Barcelona).

CBmed (K1 center): The goals of the Center for Biomarker Research in Medicine (CBmed) are to identify novel biomarkers, to validate biomarker candidates and to carry out a full program of systematic translational research on biomarkers in order to facilitate development of new products for clinical use.

evolaris (K1 center): With the research area "Connected Life", evolaris is taking a logical step in the evolution of business-model innovations based on new technologies. The focus is on digital assistance systems based on wearables and mobile devices that make use of personalized and context-sensitive human-machine interfaces.

Know-Center (K1 center): The Know-Center is Austria's research center for data-driven business and one of the leading solution providers in this field in Europe. In the Know-Center an interdisciplinary research team uses cutting-edge knowledge-processing methods to generate added value from in-house and outside data sources for companies in the medical and pharmaceutical sectors.

RCPE (K1 center): In cooperation with the global players of the pharmaceutical industry, the Research Center Pharmaceutical Engineering (RCPE) does top-quality research on optimization of products and processes. The focus is on developing new delivery forms for medicines, production processes for these medicines, and monitoring methods for these processes.

The Underestimated Sector

Launched in turbulent times for economic politics, the Human Technology Cluster has been a very positive surprise even for insiders.

When the Human Technology Cluster was born, Styrian economic politics was just going through a rough patch. The political father of the cluster idea, long-time minister for economy of the Government of Styria, Herbert Paierl, fell out of favor with the then Governor Waltraud Klasnic in early 2004 and resigned in Holy Week, when politics traditionally takes a time out. As his replacement, Klasnic conjured up the professor of economic history, Gerald Schöpfer, who faced a degree of skepticism not only from the media as to whether he could successfully pick up the reins.

However, only a few months after Paierl's resignation, Schöpfer announced the creation of a human technology cluster and freely admitted that the project had been prepared by his predecessor. The new minister had at least one advantage: At that time, people in Styria already knew what a cluster was. Eight years earlier that had been different.

Clusters are breakfast cereal?

Having taken office at the beginning of 1996, Herbert Paierl spent months bothering everyone, whether they wanted to listen or not, about the importance of the automotive cluster. 'Cluster' was a foreign-sounding word and to most people who heard it, it wasn't immediately clear what he was on about. At a press conference just before Christmas of 1996, a Styrian journalist rewarded Paierl for his efforts with a box of Nestlé Clusters breakfast cereal, to the general amusement of the assembled company.

Nowadays nobody is laughing about the cluster that Paierl inaugurated with massive support from the Federation of Austrian Industries and in which more than 150 companies have come together to form a network. One in ten employed people in Styria works directly or indirectly for the automotive industry. There were also other measures which did not have the same glamour factor as the automotive sector but were just as successful in their way. The wood cluster started in 2001 may not sound very exotic, but Styria is a heavily wooded region where the sector still plays an important economic role and the cluster supports development of advanced wood-based technologies.

And that's enough?

By 2004, people in Styria knew that the automotive industry was important for the region. And wood had a tradition older than anyone could remember. But human technology? Sure, there were a couple of firms, for example Roche Diagnostics or Fresenius Kabi, that had a certain level of recognition among the general public. People who were a bit closer to the industry probably were aware of VTU, who made production plant, or Stölzle Oberglas, who made glass containers, for pharmaceuticals. And everyone knew of the Med Uni Graz, which had a good reputation across Europe – even if the fact that Graz was home to one of the continent's largest biobanks remained a bit of a secret. But were these things enough for a cluster of their own?

Underestimated potential

As it soon turned out, they were. Ten years ago, the potential of the human technology sector in the region was massively underestimated, even by people who had professional knowledge of the Styrian industry, even by business journalists ... but they were in good company; even many people in industry were surprised to learn that there were more than 120 companies operating in this area in Styria.

Raising awareness

The Human Technology Cluster has raised awareness of this potential – if not always among the broader public, then definitely among decision-makers. That is probably its biggest achievement.

Without knowing about this potential, organizations such as the Research Center Pharmaceutical Engineering (RCPE) or the Austrian Center of Industrial Biotechnology (acib) probably could not have been set up in Austria.

The bottom line of the sector in general and of the cluster in particular is impressive. The approximately 120 relevant companies in Styria have a combined turnover of around € 2.9 bn. About 80 of them cooperate in the Human Technology Cluster and with revenues of € 2.2 bn are responsible for the lion's share of the sector's business. 80% of revenues are earned with exports and about 22% of revenues are invested in R&D.

Painful setbacks

However, ten years don't go by without low points. The loss of Roche Diagnostics, who have now almost completed the transfer of their activities out of Austria, was one of these. That a company which had been a founding member of the cluster decided to leave Styria was a double blow. But it does not spell the end either for the sector in Styria or for the cluster. Preparations for new competence centers in these fields are at an advanced stage. And the innovations in the sector will open up new fields of business for Styrian firms.

A demanding field

Human technology has always been a tricky subject area for us journalists. The things that people are researching, developing and producing are usually not easy to explain in just a few words. But that is just what makes them interesting. Not only for journalists, but also for economic strategy.

Human technology isn't something that low-wage countries can easily replicate. It needs deep know-how, a spirit of innovation and at the same time extremely high quality and production standards, which can only be achieved with excellently trained, conscientious and motivated employees. These are the factors that a region like Styria can and must use to prevail in global competition.

Author: Andreas Kolb

Shaping the Strategy

The VTU group in Grambach is not only a founding member and partner of the Human Technology Cluster, it also played a major role in shaping the HTC from the beginning. "We were involved in preparatory work on the strategy of the cluster a year before it was officially established", remembers Michael Koncar, CEO of the VTU holding group. It mattered a lot to VTU to make sure this sector set up its own cluster in Styria. "The development of the cluster over the ten years of its existence has been just fantastic", says Koncar. The number of companies that have come on board has been well beyond expectations. Now, says the VTU manager, it is important to keep the cluster's activities running steadily and to keep adapting to current market conditions.

Half of the business

VTU was set up in 1990 as an engineering consultancy for process and environmental technology. In the meantime, what began with an exclusive specialization in biodiesel projects has been diversified to encompass pharma and biotech, oil and natural gas, chemicals and metallurgy. About 50% of the revenues of around € 35 m now come from the human technology area. The biggest chunk of this business is designing production plants for the pharma industry. As Koncar reveals, the clients include names such as Fresenius, Roche, Sandoz and Aventis. The human technology segment equally accounts for about half the jobs at VTU, which now has offices in Germany, Italy, Switzerland and Romania as well as Austria.

Essential GMP standards

One area of expertise that VTU had to develop was GMP certification. The confirmation of GMP compliance is absolutely essential in the pharma industry. But as Koncar says, "This is an area where people on the engineering side often don't know their way around. We were able to bring our experience with this into the network."

Also for the pharma industry, the VTU group developed software called REXS, which is used for risk assessment and risk management. According to Koncar, it can also be adapted for use in other industries.

In total, VTU spends about € 1.5 m on research and development for its pharma-related business. Koncar explains: "Usually more R&D effort is needed in human technology than in other fields of business."

In the near and mid future, Michel Koncar foresees big developments in personalized medicine. As well as the challenges that will bring, this development is a "fascinating story, even for us engineers".

Author: Andreas Kolb

Read more on page 15.

Crossing Frontiers in Theory and Practice

Dr. Christian Buchmann, Minister of the Government of Styria for Economy, Europe and Culture.

The first ten years of the Styrian Human Technology Cluster have without doubt been a success story. With the launch of the cluster in 2004, an effective linkage between business, industry, research and public-sector organizations was created; lasting synergistic relationships in the sector were begun and existing ones strengthened. Companies profit from the sharing of each others' strengths within the network, which has supported their dynamic development in the intervening years.

Human technology is now one of the areas of the Styrian economy that have an especially high growth potential. Because of this, the area 'Health Tech' is one of the three major strategic topics, alongside 'Eco-Tech' and 'Mobility', in the Styrian Economic Strategy 2020, which are all connected by the principle of growth by innovation.

Progress through cooperation

The beginning of this successful development was marked by the founding of the cluster management company Human.technology Styria GmbH (HTS). From the very start, the most important players from the industry and research were involved. In 2005 the first cluster team was in position and at the first HTS Future Conference, the 'Declaration of Graz' was signed by representatives of business, academia and politics.

Guided by this declaration of intent, the cluster manager Robert Gfrerer and his team began the gradual, but constant work of making human technology in Styria into a more coherent and connected field. The cluster was able to generate enthusiasm for innovative projects from the word go. A lot of things have happened in the last ten years: New technologies have emerged right across medicine, biotechnology and the pharma sector. Today, 'personalized medicine' is no longer just a phrase, but is on the verge of its first real applications, in which Styrian companies are international leaders.

In the last few years the cluster has focused its efforts on three strategic corridors: pharmaceutical process and production technology, biomedical sensor technology and biomechanics, and biobank and biomarker technology. In all of these areas the region has lighthouse projects that are visible across the world. Many of them you will find mentioned in this anniversary edition of *botenstoff*.

Growth beyond borders

Today, Styria has an R&D intensity of 4.7%, which puts it clearly ahead of all other regions in Austria and also in the top group of Europe's 274 regions. This is fertile soil for growing jobs. This level of innovative energy is only possible because Styrian companies are constantly crossing frontiers – geographical borders and also limits of thinking and doing. The companies of the human technology sector are making a huge contribution to Styria's international success: They employ more than 14,000 people and make revenues of around € 2.9 bn. With over 70% of those revenues coming from exports, the sector is successful far beyond the borders of Styria.

In 2014 we have succeeded in giving the sector another impulse with the opening of the ZWT, the Center for Knowledge and Technology Transfer in Medicine at the Med Campus Graz. At the ZWT, which provides space for international groups such as B. Braun Melsungen, a number of Styrian spin-offs and the European Biobanking Research Infrastructure BBMRI-ERIC, industry and basic science are working together on the medicine of the future.
I would like to congratulate the team of the Human Technology Cluster on their tenth anniversary; as Minister for Economy I thank them for their excellent work and wish them every further success for the next ten years!

Info

Read more about Styria as a business location ...

Value Chains in Human Technology

Pharmaceutical Products

IDEA

01 Laboratory experiments/ API

02 Clinical trials/approval

03 Process development

04 Engineering/ plant construction

05 Production

06 Marketing/sales

PRODUCT

Medical Devices

IDEA

01 Product idea/ preliminary study

02 Development/prototype

03 Certification

04 Production

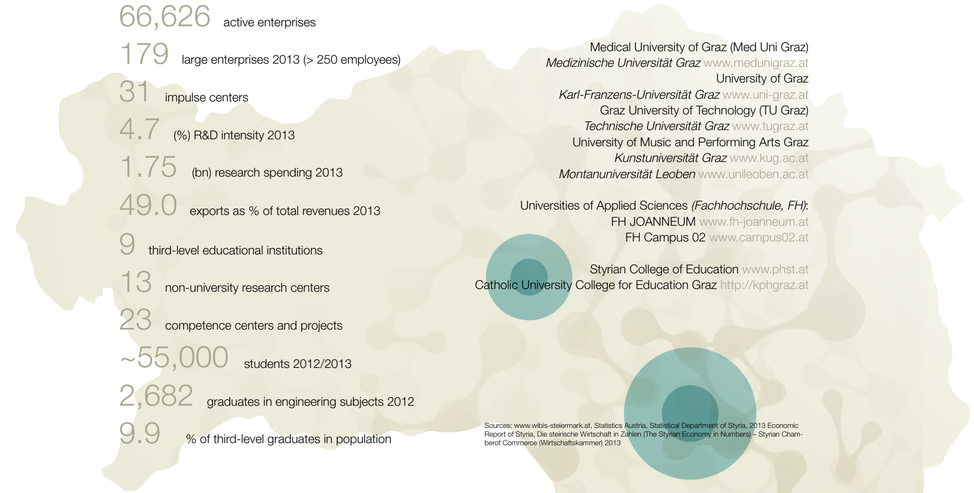
05 Marketing/sales

PRODUCT

Industry & Science in Styria

With an R&D intensity of 4.7%, Styria is the most innovative *Bundesland* (federal state) of Austria and is one of the leading regions of Europe. A further outstanding characteristic of Styria is the level of synergistic cooperation between industry and non-commercial research.

1,215,246 population (on 31.12.2013)
16,401 km² land area
42.7 average age of the population in years
84.0/78.9 average life expectancy f/m
39.065 regional GDP 2013 in billion euros
599,000 people in work 2013 (including self-employed)
66,626 active enterprises
179 large enterprises 2013 (> 250 employees)
31 impulse centers
4.7 (%) R&D intensity 2013
1.75 (bn) research spending 2013
49.0 exports as % of total revenues 2013
9 third-level educational institutions
13 non-university research centers
23 competence centers and projects
~55,000 students 2012/2013
2,682 graduates in engineering subjects 2012
9.9 % of third-level graduates in population



Sources: www.wibis-steiermark.at, Statistics Austria, Statistical Department of Styria, 2013 Economic Report of Styria, Die steirische Wirtschaft in Zahlen (The Styrian Economy in Numbers) – Styrian Chamberof Commerce (Wirtschaftskammer) 2013

Bundling Positive Energies

In this interview with Franz Zuckriegl, Dr. Sabine Herlitschka, CEO of Infineon Technologies Austria AG, reminisces about the how the Human Technology Cluster began ten years ago in Graz and reflects on the challenges she now faces as head of an international concern.

botenstoff: Dr. Herlitschka, Infineon has an R&D intensity of around 23% and your own background is in university-based science. Back in 2004, when the Human Technology Cluster was founded, you were vice-rector for research management and international partnerships at the Med Uni Graz. Where do you see the biggest differences in the day-to-day management of a university and a commercial company?

Sabine Herlitschka: The differences aren't as big any more as you would have imagined in earlier times. The universities think more like businesses than they used to. I worked at the university in the phase when the Austrian universities were being made legally autonomous. At the same time, we took the medical faculty of the University of Graz and transformed it into a separate medical university, the Med Uni Graz. In that phase, it was very relevant to think about many things in an entrepreneurial or business management way – and it helped us succeed with many of the things we were trying to do. The founding of the Human Technology Cluster became possible because multiple interested parties came together and created it as a joint initiative.

On the other hand, as an organization, Infineon is about twice the size of the Med Uni Graz and then it is also part of a big international group. We are responsible for over 3,000 people in Austria and we have to succeed by selling physical products in specific markets. With our focus areas of energy efficiency, mobility and security we also want to help find answers to some of society's big issues.

b: When you think back ten years – what did you personally expect from the cluster when it was founded?

Herlitschka: Clusters are a huge thing here in Styria: just think of the automotive cluster AC Styria. After the collapse of the nationalized industry in the 1980s, the cluster strategy was a major factor in turning Styria into one of Europe's most competitive regions. And when we had this one strong leg to stand on, it was absolutely the right thing to branch out and use the cluster strategy in other sectors, including life sciences. Ten years later, the cluster's success shows that we were right to take the chance when we did.
It was a smart decision, because individual organizations – whether they are universities or companies – don't have sufficient mass on their own. And, where else would this approach succeed if not in the 'clusterland' of Styria? For us as a freshly created university, the fact that the regional agencies demonstrably knew how to set up a cluster gave our confidence a big boost.

b: If you think about the whole period from then until now – what things succeeded and what still needs to be improved, or strengthened?

Herlitschka: Well, we have certainly succeeded in bringing together the positive forces, both the universities and the companies. All the organizations involved came together with the best of intentions and with a real will to achieve something for the region. That was successful. The first head of the cluster, Robert Gferer, can take a lot of the credit because he did an outstanding job for the first ten years. The success of a cluster depends a lot on having the right personalities in the right positions.

b: And turning to the present: Which fields in the Life Sciences are especially attractive for a company like Infineon?

Herlitschka: Infineon is already working in a number of life science fields and there are many points of contact in the pipeline, for example in lifestyle apps based on smartphones. Sensor technology is going to be a big area, for example for measuring physiological parameters or using electronic microfluidics-based sensors.
In the 15 years of its existence, Infineon has experienced more change and development than many companies do in a hundred years. We already invested in the heath and medical field many years ago, for example working on 'lab on a chip' concepts and on wearable electronics. Today we are concentrating on our three focus areas of energy efficiency, mobility and security. And clients regularly come to us with inquiries about developments in the life-science sector.

b: What do you see as really big themes of the future?

Herlitschka: Energy efficiency is definitely one. Saving energy is one of the biggest energy resources of all. The potential for improving energy efficiency is breathtaking, and the same goes for mobility. In these areas we provide technologies that account for only a small fraction of the overall product costs and have big benefits. This is how you can make growth affordable.
Data security is another big topic – so, for example, we produce the chips for the passports of US citizens. How did we manage to get this job as a European company? We developed a technology that allows encrypted processing of data. Of course, this kind of technology could also have a role in the healthcare sector, for example with 'ELGA', the electronic patient file.

b: Infineon itself almost has its own cluster in its network of suppliers. How do you involve your suppliers in what you're doing?

Herlitschka: At our location in Villach we have about 2500 employees, out of the total workforce of around 3100 people in Austria. If you add all of our suppliers, then it comes to a total of almost 4000 people who are constantly in contact with us and who work with us. With some of these suppliers we can say there is a conceptual partnership, that is, we are doing developments together. That's especially true of manufacturing. SMEs usually get in touch with a large industry player like Infineon because the things we are interested in are the same or complementary in some way. We want to work with the best, and I hope we're attractive to the best.

b: Do you find that being physically close to the supplier companies, like here in Villach, is an important factor?

Herlitschka: It's an interesting paradox, isn't it, that we communicate with people all around the world and at the same time we find that being close to each other, going for coffee together in the real world in a cafeteria, is so enormously important. And when we get back from the cafeteria, we write each other e-mails about who is going to fly out the next day to go to a meeting in Malaysia ... I think both sides of this are important. But research usually happens in a regional context. That's why the discussion of 'regions in Europe' matters to us, because we too will be able to grow better in a strong region.

b: On the subject of R&D: Infineon's R&D intensity of 23% sounds very impressive. What does that mean in hard numbers?

Herlitschka: : It means that in the last business year, we invested 270 million euros of real money in R&D. Of course we also take part in public research programs, whether they are European or national projects or collaborations with university researchers. But you can't do research just based on what you can get a grant for; everything we do is based on deep strategic convictions. If you look at the EU strategy 'Europe 2020', then the work we are doing can definitely contribute a lot to reaching those goals. We have our headquarters in Munich but we are in global competition with China/Asia and the USA.

b: Many thanks for the interview!

Sabine Herlitschka

"I believe it was absolutely the right decision at that time for the Government of Styria to extend cluster activities to a sector such as life sciences."

"In the 15 years of its existence, Infineon has experienced more change and development than many companies in a hundred years."

"We provide technologies that account for only a small fraction of the overall product costs and have big benefits. This is how you can make growth affordable."

"We want to work with the best and I hope we're attractive to the best."

Prof. Jan-Eric Litton

Towards Personalized Medicine

BBMRI-ERIC is a new research infrastructure for European biobanks with its headquarters in Graz. Franz Zuckriegl and Ben Hemmens interviewed the Director General, Prof. Jan-Eric Litton, in the offices at the new Med Campus Graz.

A major trend in medicine is towards finer differentiation of subgroups of patients – groups with similar combinations of genetic markers, shared lifestyle factors, male versus female, etc. Ultimately this may lead to 'personalized medicine' in which every patient's therapy is tailored to their individual profile. Biobanks are an essential part of this future vision. A biobank is a collection of biological samples such as human blood or tissues, along with the data associated with these samples, such as the clinical records of the patients and the genetic and diagnostic information that has been derived from them. Such collections of samples and data have become an essential resource for medical research, to the extent that the patients give their consent to their use.

Biobanks as a research resource

These data are specially important for understanding diseases in which relatively similar clinical presentations actually reflect a diverse set of different underlying pathologies. For example, we now know that breast cancer is not one single disease, but consists of many different subtypes with different causal mechanisms. Increasing knowledge of these subtypes brought the opportunity to develop specific therapeutic approaches for each type. This process of stratification, that is, of differentiation of patients into subgroups for which different treatments are indicated, is now well under way for many other common diseases. And the process is being supported by several hundred biobanks across Europe, who mostly make their data and samples available to local research partners.

Stratified medicine and networking

"Stratified medicine is already working and will be important in the near future. Personalized medicine is many years in the future," says Prof. Jan-Eric Litton, Director General of BBMRI-ERIC. He cites a practical example: "Sometimes a pharma firm develops a new drug and then has to withdraw it shortly after going to market because a subgroup of patients has an adverse reaction. If you can identify that subgroup and filter them out, the drug can be used for the others."
The chances of accurately identifying subgroups of patients increase with the size of the datasets. Especially when researchers are searching for statistical patterns made up of multiple parameters, meaningful conclusions are only possible on the basis of large numbers of cases. Especially research on disease prevention depends on statistical analysis of big numbers and, in order to filter out region-specific factors, on international data collections. All in all, this leads to a need for a framework in which the European biobanks can cooperate – and that is what BBMRI-ERIC aims to provide..

History

BBMRI-ERIC has its origins in the consultations of the European Strategy Forum on Research Infrastructures (ESFRI), which in 2006 drew up a roadmap identifying over 30 research infrastructures that were needed in Europe. One of these was an umbrella organization for biobanks. After that, a preparatory phase followed, which was led by Prof. Kurt Zatloukal from the Med Uni Graz as coordinator of the EU RP7 project BBMRI (Biobanking and Biomolecular Resources Research Infrastructure).
This preparatory phase involved discussions with a broad group of stakeholders and resulted in the definite plan to set up an ERIC (European Research Infrastructure Consortium) for biobanking. What exactly is an ERIC? It is a non-profit consortium of at least three EU member states, which has to be approved by the European Commission. BBMRI-ERIC was officially founded in December 2013 with twelve full members and five observers, with headquarters in Graz. In mid-2014, the organization set up its offices in the ZWT Centre for Knowledge and Technology Transfer at the Med Campus Graz and began regular operations.
The mission of BBMRI-ERIC is to be an organizational and methodological platform for cooperation between European biobanks. As the Director General emphasizes, the goals do not include either directly controlling access to the individual collections – this responsibility must remain decentralized – or running the sharing of data as a for-profit business. Rather, the mission is to "set up an expert center to find new ways for researchers from academia and industry to work together", says Prof. Litton.

Coming challenges

Among other tasks, Prof. Litton identifies two particular challenges. Firstly, Europe speaks many languages, which can create barriers to the transnational use of clinical data. "A big problem in finding and sharing data is that Europe doesn't speak English. We are working with different kinds of text mining tools to try to extract information from medical records."
Another problem is the often poor reproducibility of results in biomarker research. One cause of this is the lack of standardization (and/or documentation) of how the samples are handled from the moment when they are taken from the patient to their arrival in storage in the biobank. Therefore, another task of BBMRI-ERIC will focus on the "needle to freezer" phase. "Developing shared quality standards for many aspects of biobanking is a central part of our mission", concludes Prof. Litton.

Info

Read more in the cluster blog ...

Starting Out Small

M&R Automation is a specialist producer of automated industrial plant based in Gambach, near Graz. It's eight years now since the company got its first contract for the human technology sector. "It began with small jobs for Roche Diagnostics", recounts CEO Herbert Ritter. "As often happens with a new field of business, you start off small; it takes a while for you to gather the resources and expertise you need to take on larger projects." From these beginnings, human technology has now become a strategic focus of the company. In 2011, M&R set up a separate department dedicated to the pharma, medical devices and healthcare sectors.

New segment boosted business

Depending on the volume of the projects, M&R now make between 10–25% of their revenues from equipment for human technology. Their products have included sterile filling lines for liquid pharmaceuticals, production machines for blood gas sensors, cleanroom systems, and assembly lines for electric dental hygiene and shaving appliances. As Herbert Ritter says, this market segment has been a big step forward for M&R. Also in 2011, M&R joined the Human Technology Cluster. "The Cluster gives us good opportunities to present ourselves together with other companies serving these markets", says Ritter; "Obviously the HTC doesn't organize jobs for us, but it puts companies that make different things in touch with each other. It's important to present Styria as a technology and innovation champion to the outside world".
One organization which Ritter sees as making a big contribution to this international profile is the Research Center Pharmaceutical Engineering in Graz. "But we also need companies that implement that technology", the M&R manager believes.
Herbert Ritter is also of the opinion that innovations that are generated with the help of subsidies should be kept in the region for the production phase. Citing an example from the IT industry, Ritter says "We can't allow situations like with the MP3 format where one person develops it and someone else makes the money". In line with this thinking, M&R has ambitions to convert ideas to reality within the HTC. This would mean investing in fields that do not generate profits immediately. Ritter sees the future optimistically: "We want to show that Styria can set the pace in medical and pharmaceutical technology", he says. "And we have enough highly educated people who have all the necessary expertise to meet the demands of the pharma industry."

Author: Andreas Kolb

Read more on page 7.




Microbiomes, Neuroplasticity and a Go-Between

The cooperation BioTechMed Graz is combining and expanding the scientific know-how and technical infrastructure of the three big universities in Graz. Three new professorships have already been taken up. Here, the appointees give a first insight into their work. An interview by Franz Zuckriegl.

botenstoff: BioTechMed Graz has been in the news recently with the appointment of new professors and the new investments in infrastructure and equipment. In the meantime three professors have taken up their posts. To begin with, I'd like to thank you for making time for an interview in this busy phase. And I'd like to begin with Prof. Schöpf; can you describe your first impressions?

Veronika Schöpf: Well, I just started work at my institute at the University of Graz a couple of weeks ago and of course I'm busy getting to know my new surroundings. As a professor of neuroimaging I am working on imaging of the brain. Previously, a simple map of the brain with structures and functions was enough; that isn't true any more. For example, to develop useful imaging biomarkers, we need to link the structure and function of the brain to other pieces of information – such as genetic or therapy-related data.

My goal is to bring this technology to the next level and make it scientifically practicable. What I find especially interesting are questions about neuroplasticity: What happens in the brain and how does it change when specific kinds of information are no longer present, for example when a sense is lost? For investigating questions like this I'm sure we will discover capabilities in Graz that people haven't noticed yet.

b: Do you already have definite ideas?

Schöpf: It's really too early for that; we'll have to get to know each other better first ...

b: Prof. Moissl-Eichinger, your subject is 'interactive microbiome research'. How is your settling-in phase going?

Christine Moissl-Eichinger: I've been here for exactly four weeks longer than Prof. Schöpf, so I'm at much the same stage. I'm also enjoying getting dug into my new job. The subject of microorganisms is my life and actually microorganisms shape all of our lives. For example, did you know we have more than a kilogram of pure microbial matter in our gut? You can imagine how important that is – how the microorganisms transform nutrients, what metabolic reactions are happening there that we don't understand at all yet. Microbiome research is about understanding these processes better. It's not just about the gut, it also applies to the skin. A human individual has more microbes living on them than there are people in the world. And these microbes are a key to our wellbeing.

My background is in classical microbiology; I have also worked in environmental microbiology, and then I got into a very exciting area which has to do with the cleanliness of spacecraft. The cleanroom analysis we did for that work took us back to the human microbiome, because the microorganisms in these cleanroom environments are a picture of what the humans bring in. We discovered microbes on the skin that you can't detect with the classical medical diagnostic techniques. Here we have to develop new techniques and find new approaches for new questions. In this area I have brought several big research projects with me. One project chosen by the European Space Agency has to do with the international space station: There we are looking at how the microbiome inside the station has changed over the years. Another project has to do with the microbiome on the skin, and we have some more astrobiology work to do besides the space station. Just now I'm busy talking to many colleagues in Graz who are doing research on the microbiome.

b: Is the popular-science explanation that the microbiome defines the person as individually as the genome really true? Or is the microbiome more complex and more variable?

Moissl-Eichinger: The microbiome is enormously complex, and we still have the chicken-and-egg question. Does the body become sick and then this is reflected in the state of the microbiome, or is a problem with the microbiome the cause of the disease? How does the body interact with the microbiome? And to what extent can I control my microbiome by eating sensibly or by doing physical exercise? There is still a lot of basic research to do on these issues.

b: And now Prof. Albrecht, how has your time in Graz been so far?

Mario Albrecht: I've been in Graz since March now, and I think that bioinformatics as a subject is really a kind of go-between that connects the life sciences, medicine, biological sciences and informatics and IT. In the context of BioTechMed the focus is on analysis of the large volumes of data that are generated by modern instruments with high-throughput processes. It's not possible to analyze these amounts of data manually, so we have to use informatics methods. We are working on the development and application of specialized bioinformatics methods.

It's relatively easy to continue research in this area in Graz, because this work has a long tradition here. Right now we are working on both basic and applied projects, for example in developing special prediction methods. To support better understanding of data we are also interested in visualization, both in two and three dimensions. And we can represent knowledge as a network, for example a network between molecules and proteins that shows their interdependences and interactions.

b: Have you already been in touch with the Know-Center?

Albrecht: We have already been in touch, and the Know-Center is also developing software for the life sciences. Yes, I think there are some interesting possibilities for cooperation when it comes to tool development and knowledge visualization.

b: Are you open to specific requests from industry?

Albrecht: Of course we are.

Schöpf: Of course financial support in shared projects is always welcome, for degree or doctoral projects or even bigger research projects.

Moissl-Eichinger: From my point of view it's important to increase the awareness of the relevance of microbiome research for industry, so in that sense contacts from industry are very welcome. And then – and I know my colleagues agree with me on this – we have to strengthen the interactive elements of BioTechMed in teaching, which would include a shared series of lectures.

b: Many thanks for the interview!

Prof. Moissl-Eichinger (center)

"Microorganisms shape all of our lives. Did you know we have more than a kilogram of pure microbial matter in our gut?"

Prof. Veronika Schöpf

"My goal is to bring this technology to the next level and make it scientifically practicable. What I find especially interesting are questions about neuroplasticity."

Prof. Mario Albrecht

"Bioinformatics is really a kind of 'bridge' subject function between the life sciences, medicine, biological sciences and informatics and IT."

Info

BioTechMed: The New Professorships

The call to take up the chair for interactive microbiome research went to Christine Moissl-Eichinger (center of photo at top). The German scientist (38) will make the study of microorganisms in a variety of contexts in the human body the center of her work.

The new chair in bioinformatics at TU Graz, which is supported for three years by the Government of Styria, has been taken up by Mario Albrecht (top left). The 39-year-old will focus his efforts on the field of 'big data'. He will find ways to filter the most important results out of the flood of biomedical data and to reveal hidden functional interactions.

Veronika Schöpf (top right) has taken up the professorship of neuroimaging at the University of Graz. Brain research using functional and structural MRT imaging is currently a highly successful area of research in Graz.

A fourth professorship in the cooperation BioTechMed with potential for significant future developments in biopharmacy will be located at TU Graz. The position should be filled by the beginning of 2015.

Read more about BioTech Med ...

Prof. Harald Kainz
Rector of Graz University of Technology (TU Graz)

„TU Graz is proud to have Human.technology Styria as such a strong, innovative and long-term partner in life science at the interface between business and basic research. Human- and Biotechnology is one of the defined Fields of Expertise of TU Graz. These are key technologies that are enormously important for the economy and society. The responsibility for their development is shared cooperatively by the cluster partners, who represent an impressive spectrum of what Styria has to offer in this sector. The activities of the cluster are making the region stronger, giving it a unique profile as a location for technology, and making it more competitive. TU Graz congratulates the Human Technology Cluster and its team on ten years of successful work!“

Prof. Josef Smolle
Rector of the Medical University of Graz

„It's not by chance that the cluster Human-technology Styria GmbH is exactly the same age as the Med Uni Graz: The year 2004 was when the universities finally left the proverbial ivory tower and arrived at the midpoint of society. As a shareholder of the cluster, the Med Uni Graz embraced the opportunity to enter into intensive dialog with industry and to impart and receive impulses across this interface. The cluster is a living embodiment of the overall Styrian economic strategy of smart specialization and shows that it is working well in the life science field.“

Prof. Christa Neuper
Rector of the University of Graz

„The Human Technology Cluster fulfills an important function as a platform for networking and exchange of information and is an important counterpart of the research initiative BioTechMed Graz. This initiative bundles competences of the University of Graz, the Med Uni Graz and TU Graz at the interface between basic biomedical research, technological development and medical application. The Human Technology Cluster offers a space where these academic initiatives can find ways to cooperate with industry; and in cooperation lies the opportunity to actively shape the future.“

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