

The KTH Innovation Support System

The innovation support system at KTH has been developed over a number of years and include a number of organisations within and around KTH. Together they provide comprehensive, professional support to promote innovation and entrepreneurship.

KTH Innovation

KTH Innovation is the innovation support organisation at KTH, and offers researchers and students hands-on support to commercialize their research results and business ideas. They coach the ide owner through the innovation support process and provide unbiased support, free of charge, within a number of areas such as market assessment, business law, patents, funding, customer contacts and sales.

Since 2010, KTH Innovation has been running the KTH student incubator, **Student Inc.**, jointly with the student association Excitera. Student Inc. is a pre-incubator for student cases in the innovation support process who have, or are going to, found a startup.

InterAct, the Innovation Office at KTH

In the proposition "A lift for research and innovation" (Prop. 2008/09:50) KTH and 7 other universities were given the opportunity to establish innovation offices. The innovation office at KTH should be set up in close collaboration with other universities in the region, and as a result, the partnership between KTH, Mälardalen University and Stockholm University under the name InterAct was formed. The partners share a broad view of commercialization, and based on existing support organizations at each university, the aim is to make the innovation support in our region broader, deeper and more effective. InterAct engages in very close collaboration with the innovation offices at Uppsala University and the Karolinska Institute as well as many research institutes and incubators in the region.

Stockholm Innovation & Growth AB (STING)

STING is an incubator for cases from KTH that have potential for building a company and global growth. KTH Innovation and STING have a mutually rewarding collaboration and cases from the innovation support process at KTH are transferred to STING via a defined process. These cases gain access to STING's business coaches and networks to continue their development and international growth. For the past nine years, the collaboration between KTH and STING has been regulated by an agreement and KTH contributes around SEK 2 million annually to STING. In recent years, an annual average of three projects from KTH have been accepted into STING, out of a total of 10-12 projects.

www.stockholminnovation.com

KTH Holding AB

KTH Holding AB is a government-owned corporation administered by the KTH University Board and utilized for commercializing immaterial property through licensing/sales. KTH Holding has also invested in venture capital funds tied to the KTH innovation support system in order to get leverage (KTH Seed Capital KB, STING Capital AB och KTH Chalmers Capital KB). The corporation also investes in selected companies tied to KTH.

EIT (European Institute for Innovation & Technology)

KTH is a partner in two out of three Knowledge and Innovation Communities (KIC's) launched by the EIT (European Institute for Innovation & Technology); ICT Labs and InnoEnergy. EIT expects the activities in the KIC's to contribute to new innovations on the market. Research and education is supported and funded through ICT Labs and InnoEnergy with emphasis on innovations being produced within the energy and ICT fields.

KTH Innovation is coordinating the KICs' innovation initiatives at KTH. As part of this arrangement, KTH and InnoEnergy co-fund a business coach at KTH Innovation focusing on the energy field. KTH Innovation also takes an active part in the project Tech Transfer Program and led the project Patent Booster within ICT Labs.

The operations in the KIC's are very similar to those of KTH Innovation, but what makes them unique is that they have formed new legal entities. InnoEnergy is set up with a corporate structure, a Swedish AB, ccSweden, which will be co-owned by the partners. The corporation will be responsible for activities in Sweden and be represented in the board of the European corporation. The ambition of InnoEnergy is to be a European business incubator with six regional entities within sustainable energy. www.kic-innoenergy.com

ICT Labs is organized as an association, with a local Swedish branch made up of all Swedish partners. ICT Labs aims to make Europe into the global leader in ICT and operations in ICT Labs are built on common development projects including all partners across all of Europe. www.eitictlabs.eu

Bild

Other entities

KTH Business Liaison is co-located with KTH Innovation and proactively approaches networks of contacts and companies in order to support innovation at KTH. The two organizations collaborate closely within the scope of the Innovation Office, where KTH Business Liaison run projects such as Aim Day, Forest Beyond and Kunskapslotsen. By establishing forums, networks and contact between industry and researchers opportunity for impact from KTH increases www.kth.se/samverkan

Over half of the industry research institutes in Sweden are located in close proximity to KTH, and their competence and networks can be used for verification and finding collaborative industry partners. A number of collaborations between KTH and the institutes have been set up on the research side, but actions are also taken to increase collaboration for innovation. Most such actions have been taken with the innovation office InterAct as the KTH representative.

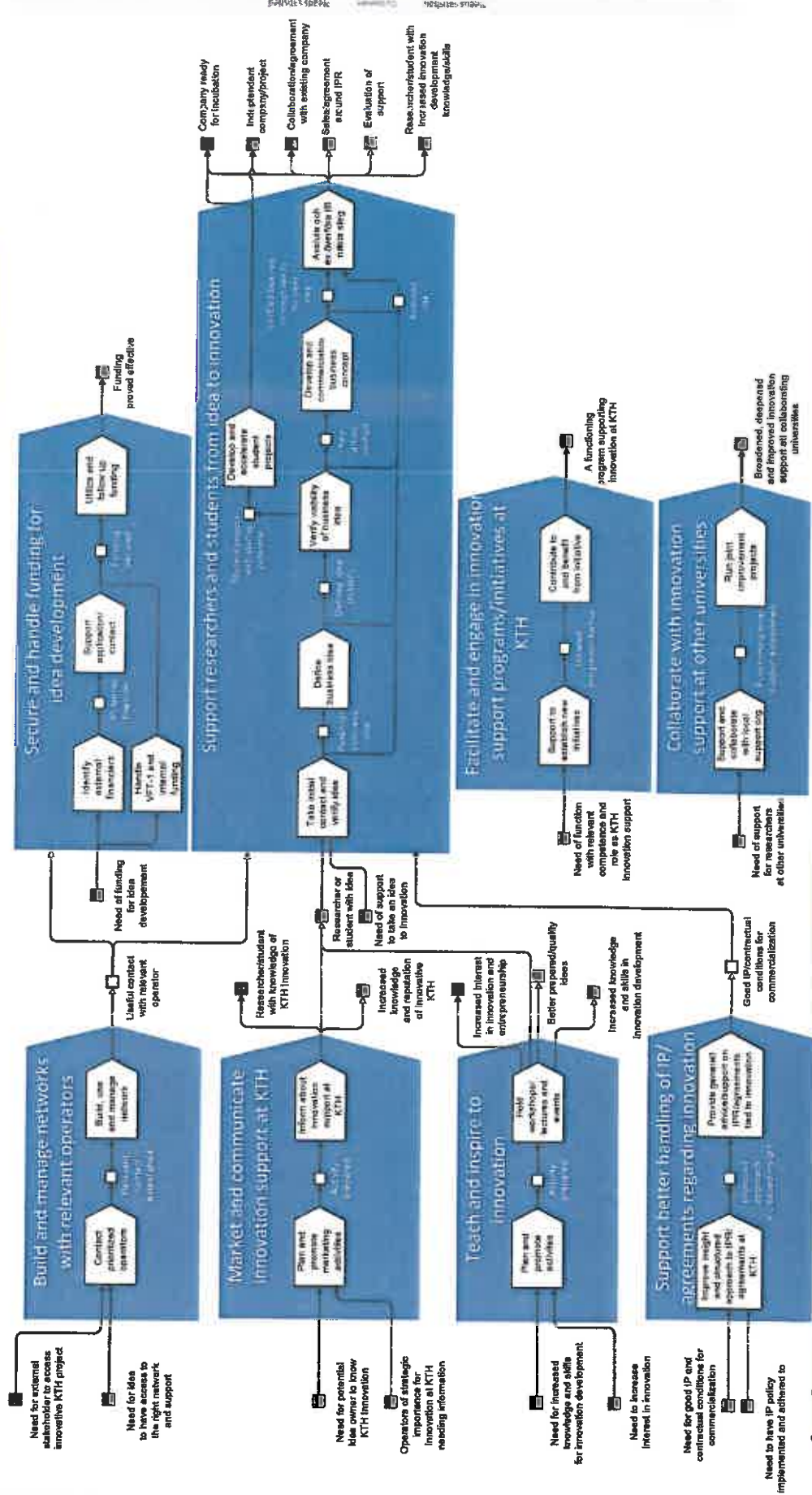
There are a number of other entities and organisations tied to KTH that promote innovation through projects or entrepreneurship programs. They are attending mainly to the inspirational and educational aspects of innovation. Examples of such entities are [Greenhouse Labs](#), [Stocholm School of Entrepreneurship](#) (SSES), [Venture Cup](#) and [Founder.org](#).



KTH Innovation Process Map 1.0

Management Processes

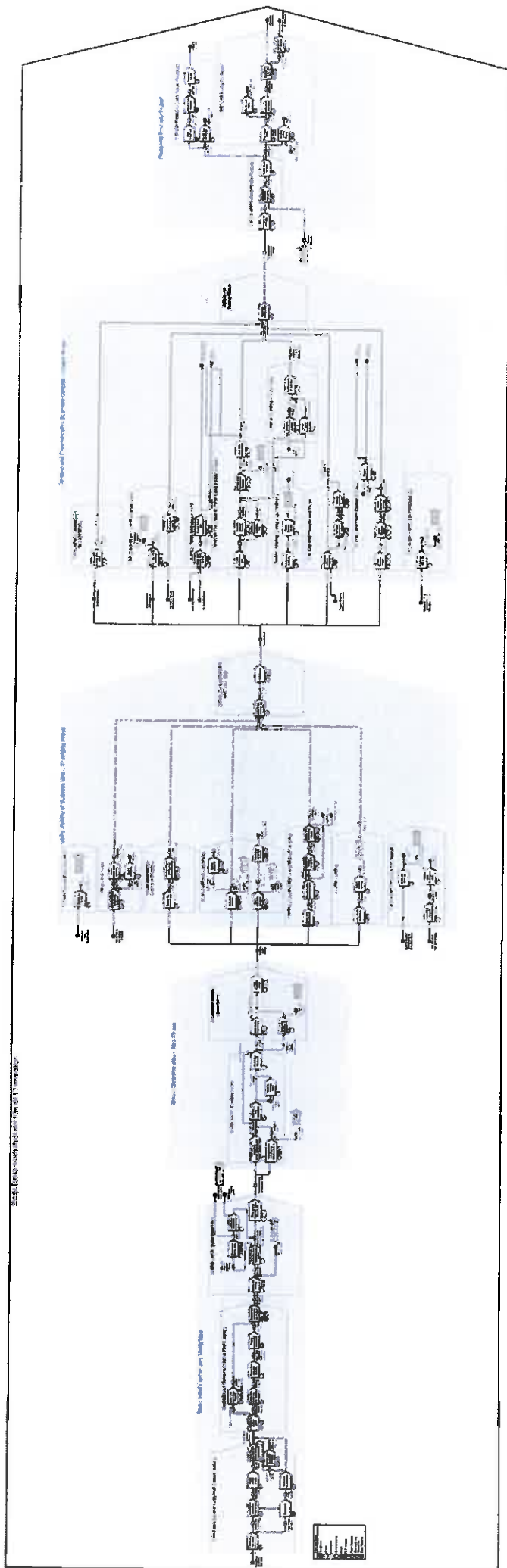
Product development	Develop operational strategies of KTH	Follow the innovation process	Utilize and follow up funding
Product development	Identify and manage relevant operators	Market and communicate innovation support at KTH	Develop and execute strategic projects
Product development	Plan and promote marketing activities	Teach and inspire to innovation	Facilitate and engage in innovation support programs/initiatives at KTH
Product development	Support better handling of IP/agreements regarding innovation	Support better handling of IP/agreements regarding innovation	Collaborate with innovation support at other universities



Support Processes

Research and track	Research and track	Develop strategic and collaborative	Develop and execute strategic projects
Product development	Product development	Product development	Product development
Product development	Product development	Product development	Product development

Annex 2a



Internal reference group

Name	Organization	Title	Interview
Mikael Lindström	School of Chemical Science and Engineering	Dean	x
Martin Ekberg	KTH Student Union	Student Representative	x
Ramon Wyss	School of Engineering Sciences	Vice President, Professor	
Carl-Gustaf Jansson	School of Information Technology and Communication	Professor	
Göran Stemme	School of Electrical Engineering	Professor	
Sebastian Lourdudoss	School of Information Technology and Communication	Professor	
Lars Kloo	School of Chemical Science and Engineering	Professor	
Josef Norlin		Student Representative	

External Reference Group

Name	Organization	Title	Interview
Kjell-Håkan Närfeldt	VINNOVA	Chief Strategist	x
Ylva Williams	Stockholm Science City	CEO	x
Pär Hedberg	STING	CEO	x
Gunnar Landgren	EIT ICT Labs	Node Director	x
Anders Brolin	Stora Enso	Director of Innovation Management	x
Peter Holmstedt	RISE AB	Senior Advisor	x
Joakim Ketonen	Bergenstråhle & Lindvall	Consultant, Innovation Management	x
Susanne Ås Sivborg	PRV	Director General	x
Staffan Helgesson	Creandum	General Partner	x
Ingvar Eriksson	EIT InnoEnergy	Director of Business Creation	x
Eva Klasson Wehler	Stockholms universitet	Head of External Relations Office	
Claes Djurberg	Uppsala University	Patent Engineer	
Lillian Wikström	Karolinska Institutet Innovation AB	CEO	

External Assessors

Name	Organization	Title
Lena Blomberg	Ochstra AB	CEO
Gunnar Brink	Fraunhofer Institute of Optronics, System Technologies and Image Processing	Head of Strategy and Innovation Management
Jeff Burton	SkyDeck Berkeley	Executive Director
Linus Wiebe	Lunds universitet	Director of Innovation



Interview Questions

1. **How have you come into contact with KTH Innovation? (Contact, who, when, scope)**
2. **From your perspective: What is your opinion of the KTH Innovation support process?**
3. **What effects would you like see from the KTH Innovation support process?**
4. **What needs and demands on the KTH Innovation support process do you and your organization have?**
 - a. It would be good if...
 - b. It would not be good if...
 - c. It is crucial that...
 - d. This should definitely not be allowed to happen:...
5. **Which similar organizations/companies/operators do you think KTH Innovation should compare themselves to?**
6. **What advantages and strengths do you associate with the KTH Innovation support process?**
7. **What weaknesses and improvement potential do you see for the KTH Innovation support process?**
8. **Do you have any additional comments or suggestions?**



Survey of researchers and students in feasibility and project phase

KTH Innovation is conducting a survey in order to improve the support for researchers and students. As a current or previous collaborator with KTH Innovation your opinion is very valuable to us. The survey should take no more than five minutes to complete. Thank you in advance for your participation!

Best regards,

KTH Innovation

1. How important is/was KTH Innovation for the development of your idea/technology/research result? (1=totally unimportant, 5=very important)

1 2 3 4 5

2. How has your theoretical knowledge of innovation development changed through working with KTH Innovation? (1=no increase, 2=small increase, 3=intermediate increase, 4=significant increase, 5=great increase)

1 2 3 4 5

3. How has your practical knowledge of innovation development changed through working with KTH Innovation? (1=no increase, 2=small increase, 3=intermediate increase, 4=significant increase, 5=great increase)

1 2 3 4 5

4. In what way did the support from KTH Innovation add the most value?

5. What important support is KTH Innovation currently not providing?

6. Name (optional)



Describe and evaluate your idea

Need Approach Benefits Competition

- *The value and potential of every idea can be described by trying to answer these four basic questions!*
- *The NABC-model is developed by SRI International and has successfully been used for early idea evaluation.*
- *Keep it simple but try to be as specific and quantitative as possible!*
- *Do not focus too much on your Approach but also focus on the Needs, Benefits and Competition!*
- *Having a first NABC is a starting point and it will change over time as you iterate and learn more! Talk to prospective users, customers and fine-tune your idea and NABC.*
- *KTH Innovation will help you on the way so provide us with a draft and any possible questions!*

Need?

- Which problem(s) or unmet need(s) are you addressing?
- Who is the customer? (i.e. has this problem/need and is willing to pay for resolving it)
- How important is this problem or need for your customer? Why?
- Can you somehow quantify the market such as overall size, prices, growth trends, profits?

Approach?

- What is your approach (concept, product, business model etc.) for addressing the need?
- What are the unique and/or most important aspects of your approach?

Benefits?

- What are the benefits for the customer by using your approach? (money/time/convenience/improved quality etc.)
- How large are the benefits in relation to the cost of your approach?

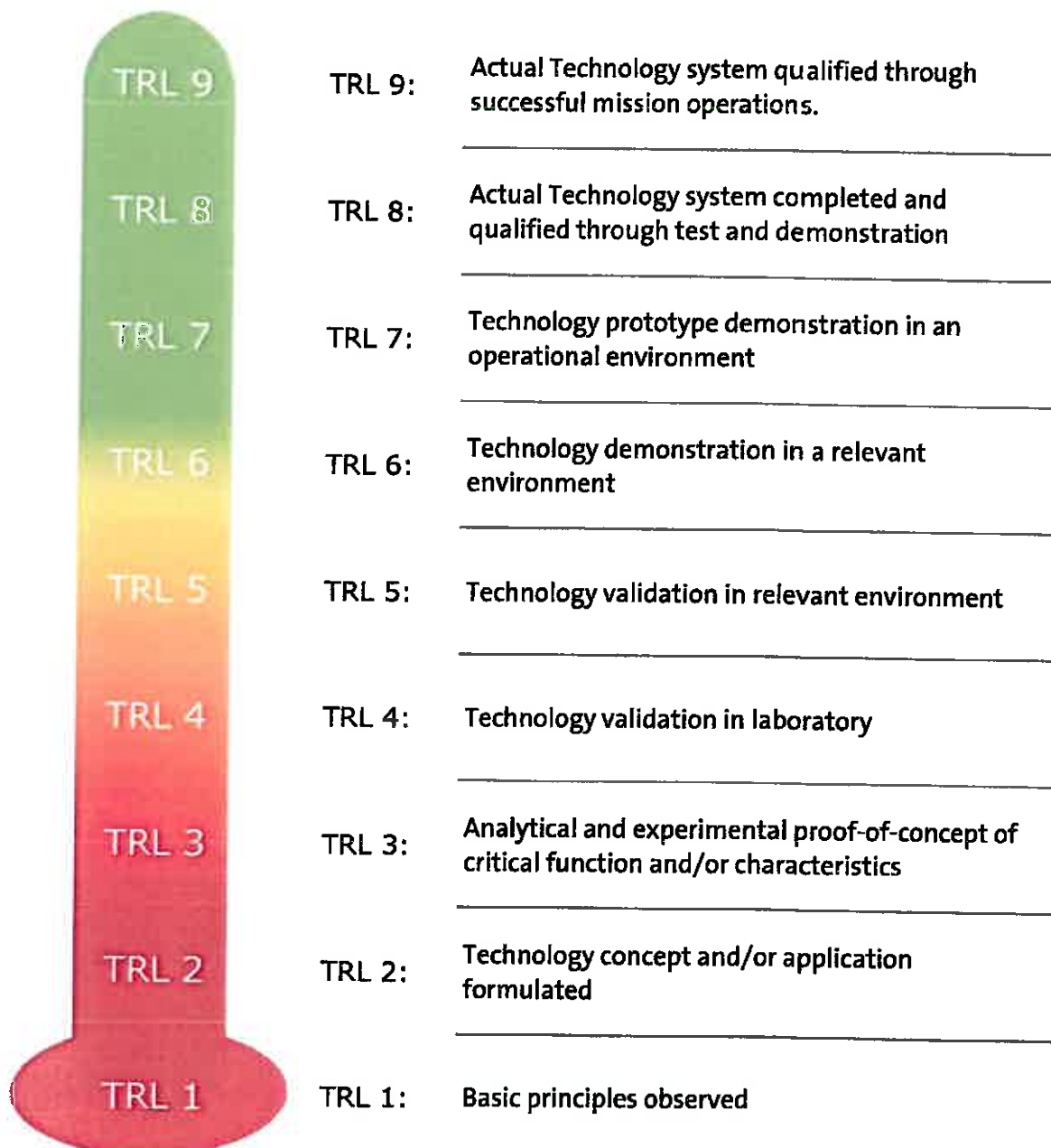
Competition?

- Which are the competing approaches (and competitor companies)?
- What are the alternatives (other ways of addressing the need)?
- Why is your approach and benefits better than the competition and the alternatives?

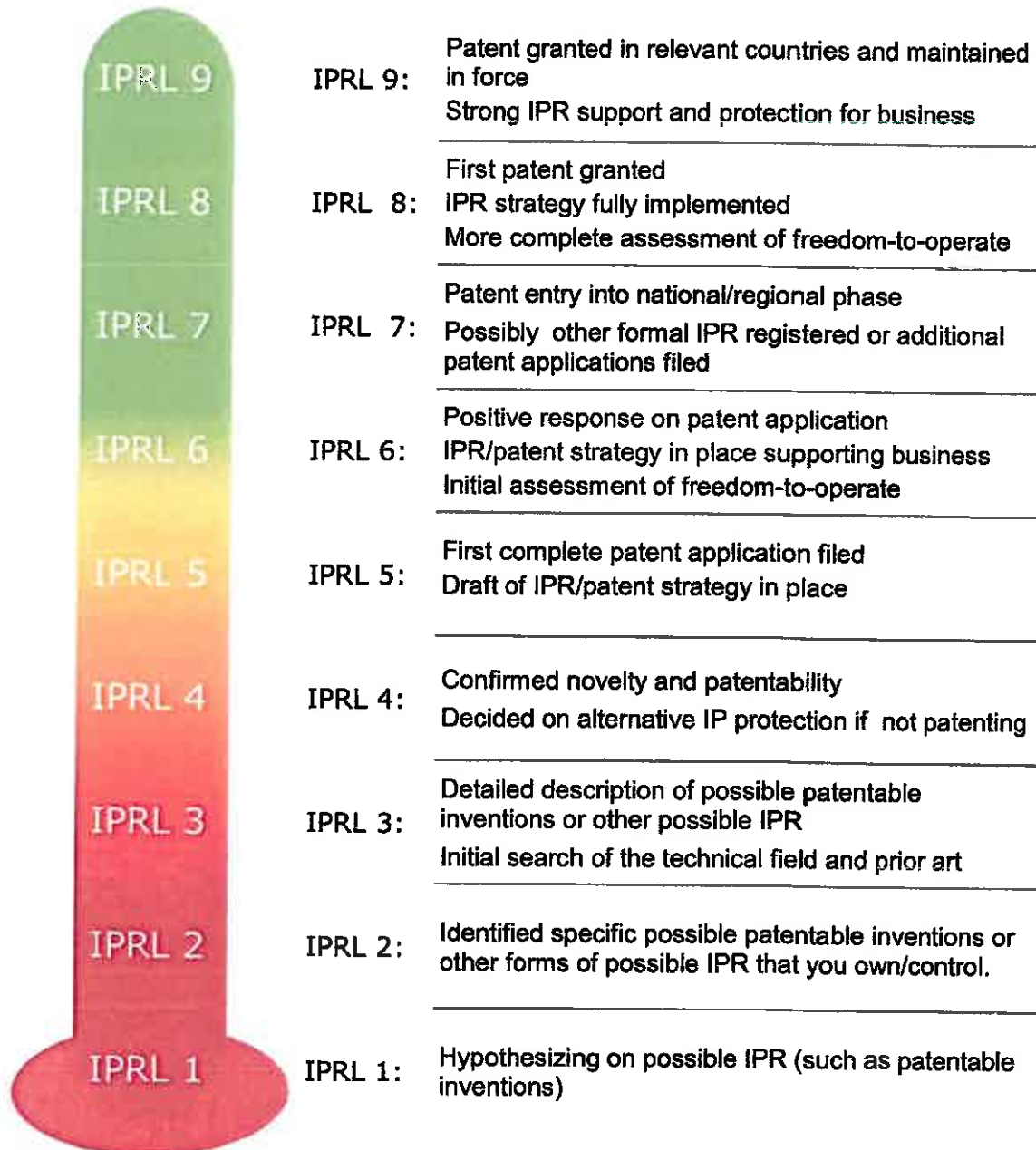


KTH innovation

Technology Readiness Level – TRL



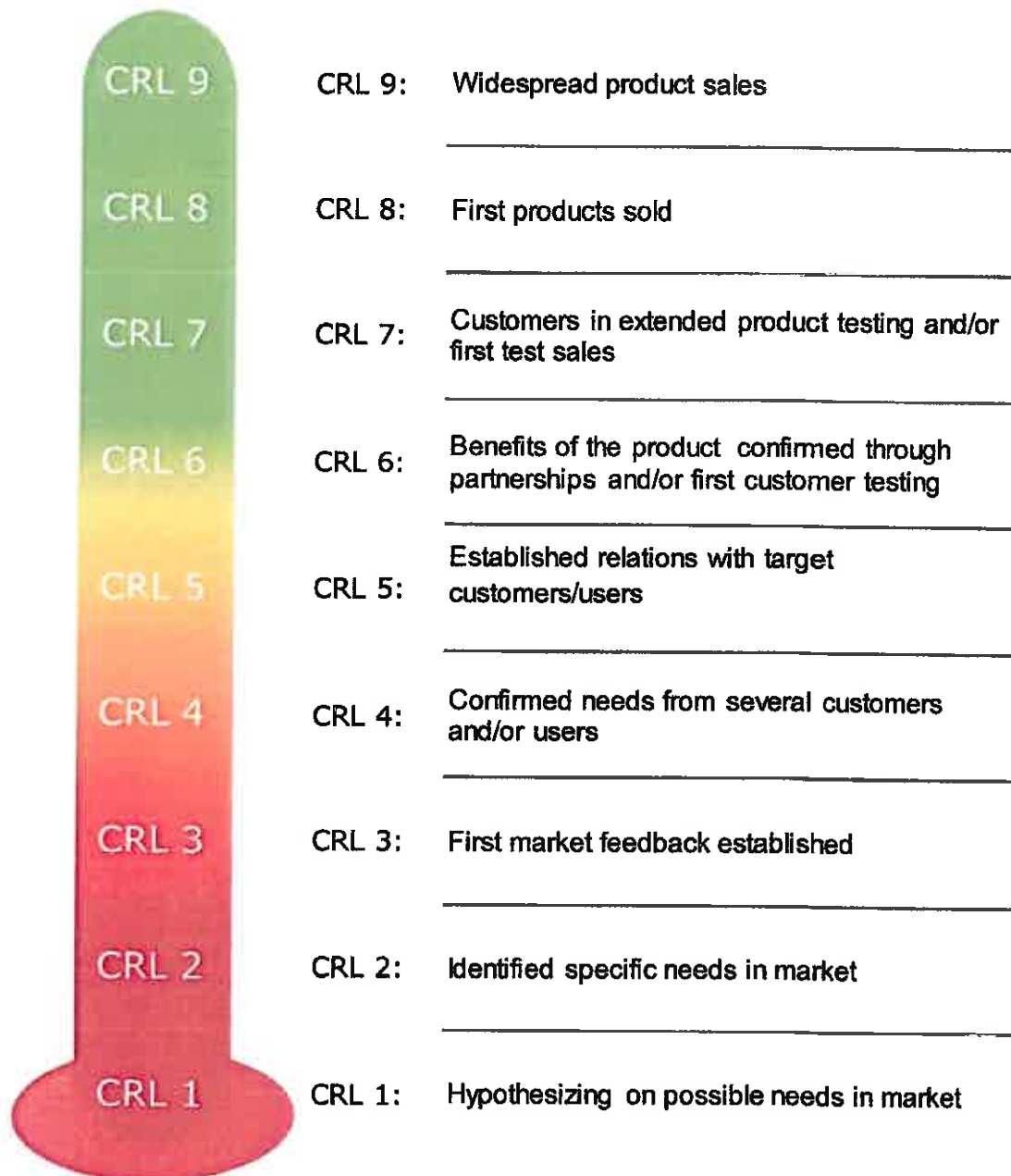
IPR Readiness Level – IPRL



IPR READINESS LEVEL		
Level		Description
1	Hypothesizing on possible IPR	<ul style="list-style-type: none"> - Hypothesizing there might be possible patents or some other form of IPR in results or ideas - Vague description of the IPR and what is unique - Some ideas for patenting etc. may exist, but are speculative - Limited or non-existing knowledge of the technical field, state-of-the art, publications etc.
2	Identified specific possible inventions and other IPR that you own/control	<ul style="list-style-type: none"> - Familiarity with the technical field, state-of the art, publications within the field - Specific ideas for patenting exist, but are unvalidated and not necessarily derived from commercial considerations - Agreements related to IPR are identified and ownership is clarified. IPR is verified to be under your ownership or control. - Inventors are clarified
3	Detailed description of possible patentable inventions (or other IPR) Initial search of the technical field and prior art	<ul style="list-style-type: none"> - Sufficiently detailed description of possible inventions (according to template) - Some description of other forms of possible IPR - Discussion/analysis is made by professional of what is actually patentable and what other forms of IPR exist in project. - Made own searches/analysis of prior art in the field - Possibly initial searches by professional to find prior art
4	Confirmed novelty and patentability Decided on alternative IP protection if not patenting	<ul style="list-style-type: none"> - Confirmed novelty through searches by professional - Confirmed patentability by analysis by professional - Possibly filed one or several "provisional" applications i.e. not professionally drafted and not complete with claims etc. - If patents are not considered suitable (after professional analysis) decided on possible alternative forms of IP protection
5	First complete patent application filed Draft of IPR/patent strategy in place.	<ul style="list-style-type: none"> - First complete patent application is filed in cooperation with professional (selected to be suitable for the field/business). - Patent strategy- professional analysis on what/how to patent and how to improve/build value of patent application (e.g. supporting data, new/additional details to be filed etc). - Draft IPR strategy- first analysis (preferably supported by professional) e.g. on how different IPR can be used - Basic agreements are put in place to ascertain control of IPR (e.g. assignments, ownership of copyright etc.)
6	Positive response on patent application IPR/patent strategy in place supporting business Initial assessment of freedom-to-operate	<ul style="list-style-type: none"> - Filed patent application claiming priority from first filing (e.g. PCT), possibly using strategy from 5 for improving. - Positive response on patent application received from authorities (national, EPO or PCT) and analysis of response performed. - If no positive response: analysis is performed together with professional with strong arguments and strategy for prosecution. - More full IPR strategy in place that is validated by professional and that really links to and supports business strategy. - Patent strategy in place-identifying possible additional patents, country strategy, possible claim changes etc). - Initial assessment of freedom-to-operate (e.g. competitor based,

		narrowed product scope etc.)
7	Patent entry into national/regional phase Possibly other formal IPR registered or additional patent applications filed	<ul style="list-style-type: none"> - Entry into national phase (US, EU, JP etc.) - Complementary or additional new patents might be filed - Other forms of IPR might be registered such as trademarks, designs.
8	First patent granted IPR strategy fully implemented/IPR proactively used More complete assessment of freedom-to-operate	<ul style="list-style-type: none"> - First patent is granted with relevant scope for business - No oppositions encountered for patent grant - IPR strategy is fully implemented. IPR is proactively used to support business, for example all IPR related agreements are professionally managed. - More complete assessment of freedom-to-operate
9	Patent granted in relevant countries and maintained in force Strong IPR support and protection for business	<ul style="list-style-type: none"> - Patent granted in several countries relevant for business - Patent is maintained in force - Patent is evaluated to provide business value - Patent is in force/valid with no invalidation procedures - Strong IPR support and protection for business, for example using various other forms of registered IPR (trademarks, designs etc) or for example using agreements, trade secrets etc.

Customer Readiness Level – CRL



CUSTOMER READINESS LEVEL		
Level		Description
1	Hypothesizing on possible needs in market	<ul style="list-style-type: none"> - Thinking that a need and opportunity might exist in a market - Limited or non-existing knowledge of applications and market
2	Identified specific needs in market	<ul style="list-style-type: none"> - Brief familiarity with the market, potential applications and customers. - Some market research is derived from secondary sources. - Product ideas may exist, but are speculative and unvalidated.
3	First general market feedback established	<ul style="list-style-type: none"> - First general feedback from primary market research i.e. direct contacts e.g. with one or a few possible users/customers or other contacts that has industry knowledge - A more developed understanding of potential applications, technology use-cases, market requirements/constraints. - Initial consideration of the technology as product where one or more product hypotheses are created.
4	Confirmed needs from several customers and/or users	<ul style="list-style-type: none"> - Contacts and feedback are established with several possible customers/users (typically limited number (e.g. 5-10) - The need and interest for a possible product/technology are confirmed. - A primary product hypothesis is defined and an adapted value proposition is developed through discussions with potential customers and/or users.
5	Established relations with target customers/users	<ul style="list-style-type: none"> - Contacts are established with larger number of customers and a deeper understanding of the market is achieved. - Target applications and customers are identified. - Customer need/interest is validated e.g. through relationships with potential customers, suppliers, partners, and users. - These are engaged in providing input on market requirements and product definition and the product is now becomes more defined.
6	Benefits of the product confirmed through partnerships and/or first customer testing	<ul style="list-style-type: none"> - Testing of product/prototypes by users/customers where the value and benefits of the product is confirmed. - Market/customer needs and how those translate to product needs are defined and documented (e.g. in market and product requirements documents). The product is now well defined. - Partnerships are formed with key stakeholders across the value chain (e.g. suppliers, partners, customers).
7	Customers in extended product testing and/or first test sales	<ul style="list-style-type: none"> - Product design is complete. - Supply and customer agreements are in place, and all stakeholders are engaged in product/process qualifications. - First sales/test sales of product versions may take place.
8	First products sold	<ul style="list-style-type: none"> - Customer qualifications are complete, and initial products are manufactured and sold to a few customers. - Commercialization readiness continues to mature to support larger scale production and sales.
9	Widespread product sales	<ul style="list-style-type: none"> - Widespread deployment is achieved with sales to several customers



TEMPLATE FOR NOVELTY SEARCH

Attach any possible article manuscripts, presentations etc. that further describes the invention.

1. Inventors

1.1. Name all inventors

2. The Invention

2.1. Proposed title of invention

2.2. Describe the invention:

- Make a general technical description of the invention. What is the scope of the invention and how does the invention work etc?

2.3. Describe in detail all parts of the invention:

- How is the invention made: which parts/steps/processes/materials etc. does it consist of?
- What are the functions of different elements and how do they interact?
- Which elements are really essential for achieving the effect
- Can you make figures/sketches of the invention (incl. different elements, steps etc.)?

2.4. Describe different alternatives to making the invention

- Describe different/alternative set-ups/process steps/materials/components etc
- What is the best way of making the invention?

2.5. Can you exemplify and describe a few practical examples or tests of the invention?

- For example, describe experimental methods and results, prototype manufacturing, testing etc.? (here you can use/attach drafts of articles/papers etc.)

3. Description of the technical problems that are solved

3.1. Describe the technical problems and how they are solved by the invention.

4. Describe how the invention distinguish from existing technology

- 4.1. Are there any existing similar or alternative solutions today to the problems? How do these solutions function? Do they have any weaknesses?
- 4.2. How does your solution distinguish technically from existing technology? What is novel with your invention? What are the unique advantages of your invention?
- 4.3. Which documents (articles, patents etc.) do you know of that are the closest prior art? Clearly specify which unique differences your invention has (Attach relevant documents).
- 4.4. Has any form of novelty search been performed regarding the novelty and uniqueness of the invention? If yes, what was the result (attach files)?

5. In which products or applications can the invention be used

- 5.1. Describe if possible one or several possible products or application areas. Which application is the most commercially interesting and why?

6. Describe any past or planned publication or use

- 6.1. Has the invention been published or presented (incl. parts closely related to the invention)?
 - Which research articles have been published or submitted (by you or by others in your research group)?
 - What research articles are planned and when?
 - Has it been presented at conferences, seminars, trade show, webpages etc.?
 - Has the invention been used somehow (in other products, in production etc)?
- 6.2. Does someone else have knowledge of the invention? Individuals and companies? Have confidentiality agreements been used during contacts?

7. Possible search terms

- 7.1. Do you have any suggestions on relevant search terms (and combinations) connected to the invention?



Analysing the market opportunity

1. Overall market attractiveness?

Objective: Assess if there is a market of substantial size with future potential

a. Are the different possible applications/markets?

A market consists of customers that would buy your product to satisfy a specific need. It is also relevant to consider different plausible applications, especially if it is a platform technology. However, it is important to eventually end up with a market/application to focus on initially.

b. What is the market size(s)?

If there are several applications with different markets you might need to look at their individual sizes. For quantifying the overall market size you will likely need to look into primary and secondary sources (i.e. talk to people and review literature and internet sources) as well as make your own assumptions and estimates (make sure you clearly state these). Some key numbers that can be used directly and for estimates are, for example:

- The number of customers, number of users, the number of sold units, unit prices
- Total sales in \$ within the area
- Total sales and margins for competing/substitute products

c. What are market growth rate(s)? What are the market drivers?

Define historical and projected future growth rates, e.g. from secondary sources or through own assumptions. Here some things forward are making comparisons with similar markets, looking at user number growth etc. What are the key factors driving growth?

d. Has a first target market/application been selected? Why?

If there are several applications it is often important to select a first market. This target market can then be analyzed in more detail in 2. The decision on first target market can be based on many aspects but size and growth are relevant factors.

2. Target segment attractiveness?

Objective: Assess who customers are, which ones we should target and why?

a. For a defined market/application: who are the customers or customer groups ("segmentation")?

Segmentation is about grouping potential customers for subsequent effective targeting. Segmentation for consumers is often done according to geography, demography, buying behavior, customer needs etc. If the customers are companies segmentation can be done according to company size, market/application, technology they are using, position in value chain etc. It is often valuable to make a gross list of potential companies that are prospective customers and then group them.

b. What are sizes of segments and their growth?

For example estimates on how many customers/how many sold units, share of overall market etc for different segments

c. Is there a target segment that is particularly interesting and from what perspective?

Has a target market already been defined and in that case why? Is there a target segment where entry is easier? The target segment selection can be based on numerous criteria such as size, growth, match with product features, less competition, suitable geography etc. It is important to have a target segment to effectively perform marketing and sales activities.

d. How can future expansion to additional segments be achieved?

How can we gain successive access to other segments after entering the first target segment? Why is the entry segment suitable for future expansion?

c. **What is the real major pain/problem that we solve in the target segment?**

Here primary sources i.e. talking to prospective customers or people with market insight are often necessary to gain a full understanding. Make sure that the problems you define are really important problems to the customer and not only problems that are interesting to solve.

f. **Who is the ideal customer/your first target customer?**

Who would you prefer to sell to, close your first deal with and why?

e. **What are our benefits to the customers in this segment?**

Benefits should preferably be expressed in relation to the costs of using/buying your product. These should also be benefits as customers see them. Consequently talking to customers and stating your selling points/ uniqueness and obtain their feedback on these are crucial.

f. **How are our benefits superior to or differentiated from what is currently offered by others?**

Differentiating your product from the competition is a highly important for customers to buy your product. Many aspects can be taken into consideration here (price, usage etc) and not only product features.

g. **What price could we ask?**

How can we argue that customers will buy at this price? Make estimates based on how much money/ time our product saves, comparing product prices, possible higher selling price for customer etc. Also consider if using your product comes with any costs/ sacrifices for the customer which affects how your price is considered.

3. Industry attractiveness

Objective: Assess how this industry is accessible for us?

a. Define the characteristics of the industry you are entering (for example using the 5 forces model)

1. **Barriers of entry-** is entry for new players difficult? Why?

Some factors to consider can be entry costs, proprietary situations, economies of scale, access to necessary materials or distribution channels.

2. **Supplier power-** are suppliers to this industry strong. Why?

Some factors to consider can be number of suppliers, your dependence to them, is it costly to switch supplier, can other materials/ supply means be used?

3. **Buyer power-** are buyers (customers) in a strong position to set terms and conditions? Why?

Some factors to consider can be number of buyers, volumes, their financial position etc

4. **Substitute threat-** is it easy for other substitute products to enter your market? Why?

Consider if customers have high or low switching costs, are there alternative emerging etc?

5. **Competition-** how tough is the rivalry in the industry?

List the different players and their strengths? How are the market shares distributed? How are they doing financially etc?

Gaining this industry insight is important. Even though it might be an attractive/ large market and we have an attractive offer to the customers, it might be a problematic industry to enter and sustain due to the factors above. Assessment of industry attractiveness can be done using secondary sources but it is important to talk to primary sources. People with experience and insights from the industry will know the landscape, what barriers exist etc.

4. Long- term competitiveness

Objective: Assess if this business viable long term for us?

a. How are our advantages/benefits maintained over time?

Do you have proprietary protection (patent, trade-secret etc) that cannot be duplicated or circumvented? How is this protection in comparison to others? Other unique feature of the business that other will not be able to create or duplicate?

b. Is there a viable economic business for us?

1. From what do we generate our revenue? Are there possibilities for multiple revenue streams?

Think about what it is that you are selling and when? Can we generate repeat sales, sell services, add-ons, upgrades etc?

2. How much revenue can be expected and when?

Make basic "guesstimates" based on your prices and the number of units/sales. Make the projection over a 3-5 year period, for example and remember that penetration occur gradually.

3. What margins will there be?

Consider price vs. cost of goods/ manufacturing cost (make rough estimates). Also remember that additional costs will come from R&D, IP, sales, administration etc. It is also possible to look at competitors' margins.

4. How much money/time will be needed to acquire customers?
5. How large investments do we need to make in development, production etc?



KTH Innovation

Annex 5g

INSWIN™

The KTH Innovation "INSTant WIN" pitch model

- Intro
- Need
- Solution
- Why us
- Investment
- Next step

Intro – Create contact and give some sort of introduction to who you are and what you do. A good intro puts you in context and leads naturally to the need you address.

Need – Describe the need(s) you are addressing. The point is to describe the reality of the context you operate in and why you and your idea have a reason to exist. The description could include a number of things depending on the situation, e.g. trends, the industry structure, the customers, the problems, the existing (inadequate) solutions, the consequences etc. Don't be accusing (...YOU have a problem...), if your description is correct, people will make the connections themselves.

Solution – Define your solution in concrete and easily understandable words

Why us? This is where you plug in most of the results from your preparations. The benefits you want the customer to perceive (to pump up the customer value), the reasons to choose you over the competition, and your credibility. Choose the relevant information for the particular target audience for the pitch.

Investment – Describe what investment the customer/investor/etc. has to make to get the benefits. Phrase it in a way that is true, but that does not create unnecessary barriers. You could also include options or strategies you have come up with to lower the total cost for the customer.

Next step – always finish by asking for some sort of next step or commitment. For example book a meeting, a lunch, sign up for a demo, etc.

About Centive Solutions GmbH

The company Centive Solutions GmbH develops and offers companies a virtual showroom called "Centive Showroom", where users can explore and interact with different types of environments and objects. Centive Showroom can be used in many areas such as kitchen design, CAD visualization, interior design and apartment sales.

As an example, with Centive Showroom, a kitchen can be experienced in an interactive and realistic virtual 3D environment. The user enters the virtual world by putting on a pair of high-resolution virtual reality glasses and can then move freely in the environment by performing body movements. This is made possible by sensors on the glasses and cameras placed in the interaction area where the user is located. Because the environment is interactive, the user is able to, while he or she is present in the virtual world, perform real-time changes to the kitchen's layout and also in choice of materials.

Centive Showroom is based on proprietary software used in combination with standardized and relatively inexpensive hardware. The business model is based on companies paying a fixed price that includes software, hardware, service and support. Centive also offers customization of the solution, the development of additional functionality and implementation support. The solution is simpler, more flexible, cheaper and more user friendly than other competing solutions on the market.

The company was founded in 2013 as a spin-off from a student project with two students from KTH, one student from Ecole Centrale Paris in France and one student from RWTH Aachen University in Germany. The students met while studying at the Ecole Centrale Paris. Thus, two of the founders come from KTH.

In January 2014, Centive had five employees. In May 2012, the company won Microsoft's annual and global competition "Imagine Cup" in France, as the country's best start-up. The contest had over 10,000 participants. The jury was impressed by the team and by Centive Showroom's degree of innovation as well as convinced of the great potential of the business model in various industries such as automotive, interior design and architecture. The first customer was acquired in 2013 and represents one of the largest architectural firms in Sweden. The second customer, acquired in 2013, is one of Europe's largest kitchen companies.

The KTH Innovation support process and Centive Solutions

KTH Innovation (KTHI) worked actively with Centive Solutions from May 2012 until December 2013. An initial meeting was held on 9 May 2012 with two of the founders. Prior to that, in 2011, one of the founders had been in contact with KTHI regarding a different business concept, for which he received coaching and advice.

After the first meeting, the team submitted a business plan which the responsible business coach at KTHI went through and gave feedback on. Additionally, an IPR strategy was developed in order to protect the business model and balance the different types of protection of intellectual property rights.

In May 2012, the company applied for participation in Student Inc - KTHI's incubator for students with promising business ideas - and was admitted in September 2012. In addition to the regular coaching and counseling, Student Inc gave the team access to, for example, office space, exchange of knowledge and experience with the other student projects in the incubator, courses and workshops.

During the autumn of 2012, a project was carried out to confirm the interest and needs of potential business clients. An appropriate consultant was selected by KTHI through procurement and was funded via the public financing program Verification for Growth (VFT). Mission size was 35 000 SEK excluding VAT. 14 potential business clients were interviewed from the architect-, construction-, and kitchen sector. This work confirmed the market potential and interest from potential business clients. All 14 companies declared their interest and willingness to discuss a possible pilot project. This process also led to increased knowledge of potential business client's needs, the potential use of the solution and the market value of the solution.

In parallel, the team continued to work on the technology and refined the prototype that was developed in 2012. The next step was to find a suitable customer pilot. An appropriate consultant was selected by KTHI through procurement and was funded by the next step in the public financing program Verification for Growth (VFT). Mission size was 50 000 SEK excluding VAT and one of the goals was to win a contract with a customer pilot and to perform a joint project. One of Sweden's largest architectural firms came forward, and the pilot project ran from August to December 2013. In the pilot, the team learned more about the customer's benefit, needs, requirements, usage, and value. The solution was used in real life customer meetings and at an event (open house) hosted by the architectural firm.

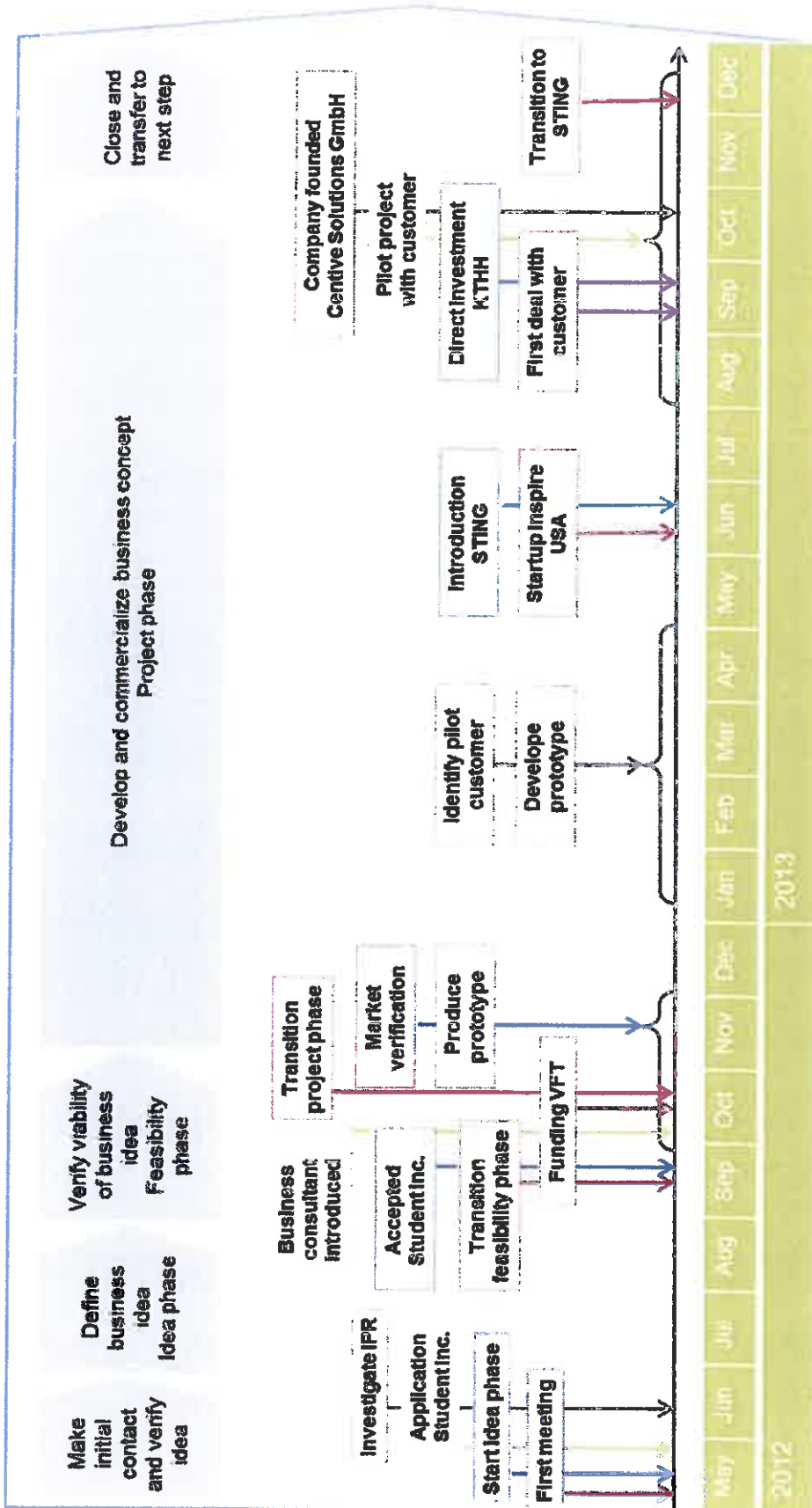
Part of the money, 16 000 SEK, excluding VAT, from the public funding program Verification for Growth (VFT) was used for the team's travel and living expenses in the process of finding additional pilot customers in other countries. They managed to acquire one of the largest kitchen companies in Europe as a pilot customer with the potential to launch the solution in more than 600 kitchen stores around Europe. KTHI assisted the team during the entire process from May 2012 to December 2013 with questions regarding sales, tenders, contracts, pricing, service and negotiation skills, and performed role play with the team in fictitious sales meetings. The responsible business coach at KTHI also participated via video link at the sales meeting with the kitchen company mentioned above, when the team presented the solution to the group company management.

Centive Solutions was selected in June 2013 to participate in KTHI's program "Startup Inspire", which offers a few high-performing entrepreneurs with promising business ideas the opportunity to go to Silicon Valley for a week. The program aims to inspire and develop the entrepreneurs, to increase their knowledge of the U.S. market and to expand their networks. In mid-July 2013, one of the founders attended the program, together with seven other entrepreneurs from KTHI and Mälardalen University. The program consisted of field trips and workshops. Experienced entrepreneurs and investors worked interactively with the participants on topics such as entrepreneurship, establishment in the USA, presentation skills and how to attract capital.

During the autumn of 2012 and 2013, KTHI also supported the company with the following activities:

- Coaching and counseling
 - Development and refinement of the business model.
 - Elaboration of budget.
 - Principles, structure and levels of participation and incentive schemes in the Company (the founder, key personnel, employees, directors, advisors, etc.).
- Legal issues
 - Writing and advising on shareholder's agreements.
 - Elaboration of agreements for the transfer of IP from individuals to the company.
- Funding
 - Presentation materials for investors.
 - Investment from KTH Holding AB by SEK 250 000.
- Miscellaneous
 - Introduction to and involvement in the EIT ICT Labs, for example, participation in international competitions and fairs, and access to international network.

In June 2013, KTHI arranged a meeting for Centive Solutions with the incubator STING in exploring possibilities within the incubator and preparing a possible next step. The interest was mutual, and it ended up with KTHI deciding in November 2013 that Centive Solutions was to join the incubator STING. The process of supporting Centive Solutions at KTHI ended in December 16, 2013 and was classified as a success.



About Volumental AB

Volumental is the world's first cloud-based services for 3D scanning. Volumental's service provides easy and quick creation of digital 3D models of people, objects and spaces. The models are shared online, downloaded, printed out in 3D or used in virtual environments. Volumental also offer customized solutions to companies in need of simple and robust 3D scanning.

The service could for example be used to scan and measure how a person's feet look like before custom-made shoes or soles are made. Another example is to scan and measure how a person looks and then be able to match the appropriate clothing. The service creates opportunities for customization of products on a mass market. The business model is based on to charge the customers once a 3D model is created.

The company was formed in 2012 as a spin-off from a research project, "Kinect @ Home" at KTH. The research results, in the form of algorithms and software, come from the Department CVAP (Computer Vision and Active Perception Lab) at the School of Computer Science and Communication (CSC) at KTH. Research within CVAP is conducted within the fields of computer vision and robotics. Three of the four founders come from KTH.

In January 2014 Volumental had 14 employees. The company was named Sweden's hottest digital entrepreneurs in 2013 by the magazine Internetworld. The first customer, which was acquired in 2013, is based in Australia and Hong Kong. Moreover, Volumental has customers and partners in Israel, Europe and the USA.

The KTH Innovation support process and Volumental

KTH Innovation (KTHI) worked actively with Volumental from January 2012 until May 2013. An opening meeting was held on 31 January 2012 with the co-founder and two researchers. Prior to that, one of the founders had approached KTHI with a different business concept in 2010, for which he had received coaching and advice. He had become aware of KTHI through active search of new ideas from the responsible business coach at KTHI, which took place via a telephone campaign in early 2010. During the same telephone campaign the responsible technology transfer manager at KTHI also had contact with a professor currently active at CVAP, who became an advisor to Volumental.

After the first meeting, the team and KTHI's business coach described the business idea according to SRI's model NABC (Needs, Approach, Benefits, Competition) from a template and a series of questions that KTHI provided. Another activity was to go through and analyze the ownership situation of the research results in order to have the opportunity and the legal right to go forward. KTHI's lawyer went through the relevant research contracts and presented the conclusion that it was possible to proceed with commercialization.

The next step was to initiate a process to confirm the interest and needs of potential business clients. An appropriate consultant was selected by KTHI after procurement and was funded through the public financing program Verification for Growth (VFT) and Almi feasibility study funds. The size of the mission was 25 000 SEK excluding VAT. Nine potential business clients were interviewed representing the sectors medical technology (e-commerce), retail (e-commerce), games, hotels, restaurants, real estate brokerage, real estate and industrial design. This work confirmed the market potential and interest from potential business clients. Additionally, the work led to increased knowledge about the potential business client's needs and the value of the business idea for them.

The team worked in parallel with the technology by developing a beta version of the service that was launched in August 2012. Thanks to the launch, it was possible to get feedback from consumers and users of the service in the fall of 2012 and to confirm that the technique worked. A part of this work, 40 000 SEK, excluding VAT, was financed through the public financing program Verification for Growth (VFT).

In the fall of 2012, the team was supplemented by another co-founder who eventually also stepped in as CEO of the company.

During the spring of 2013, possibilities in the consumer market was explored. An appropriate consultant was selected by KTHI after procurement and was funded through the next step in the public financing program Verification for Growth (VFT). The size of the mission was 56 000 SEK excluding VAT and was aimed at, among other things, finding out how the website and marketing strategy for the consumer market was to be designed. A campaign on Kickstarter was also held in August 2013 based on ideas that arose in this work. In total, 174 people invested 27 362 USD to develop an app for 3D scanning and printing.

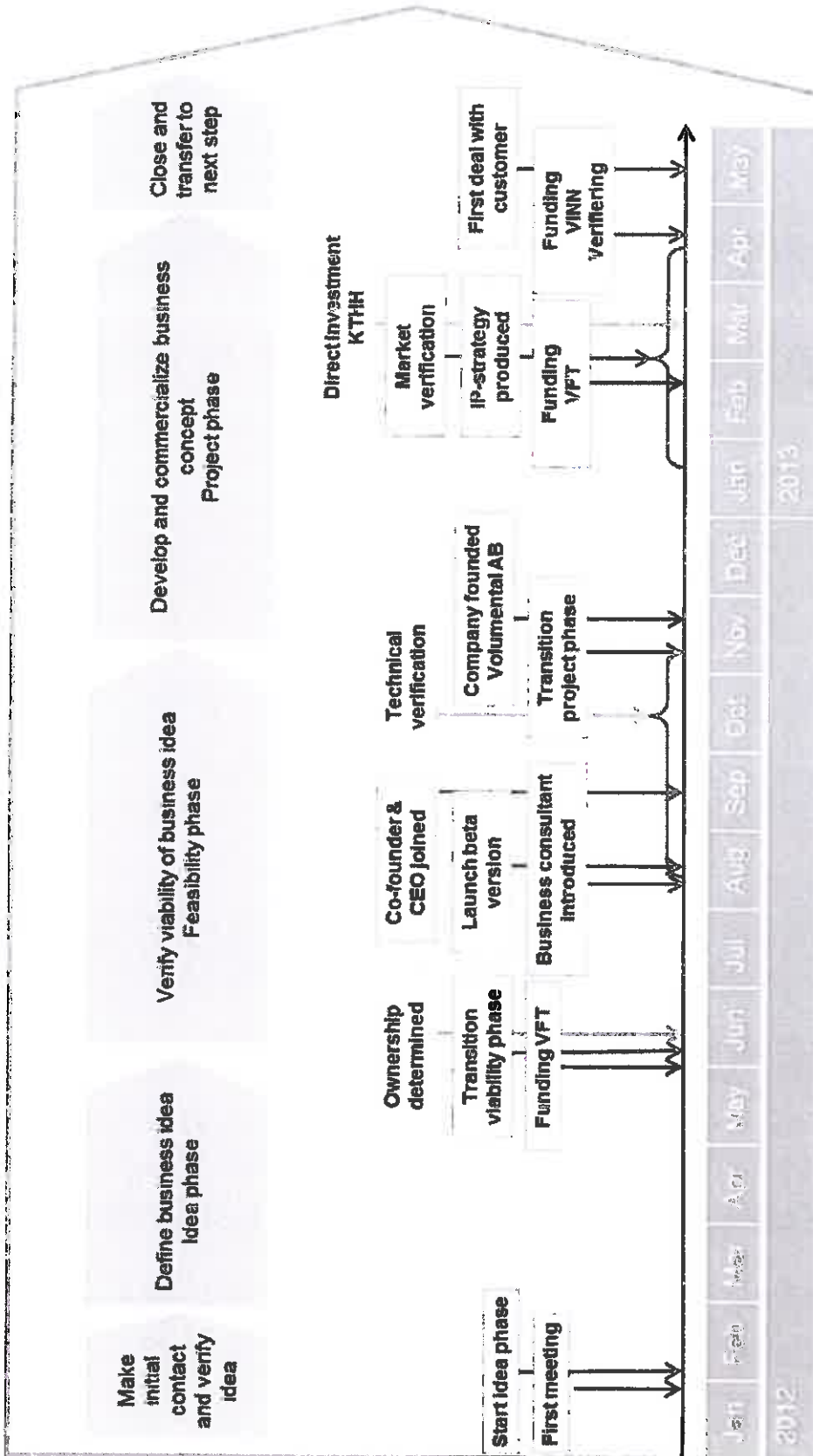
During this time, a work was funded to develop an IPR strategy for Volumental and the purchase of a market report on 3D printing through the public financing program Verification for Growth (VFT). KTHI's patent attorney helped with carrying out a novelty search and a patentability assessment. A brand consultant was hired by KTHI after procurement to develop a branding strategy. An IPR strategy was developed to protect the business model and balance the various forms of IPR protection. This was eventually implemented in the company by the CEO.

In the fall of 2012 and spring of 2013 Volumental engaged in discussions and negotiations with potential business clients and partners. KTHI assisted with questions about sales, tenders, contracts, pricing, service and negotiation skills. In May 2013, the company received a sponsored pilot customer.

During the autumn of 2012 and 2013, KTHI also supported the company with the following activities:

- Coaching and counseling
 - Development and refinement of the business model.
 - Elaboration of budget
 - Principles, structure and levels of participation and incentive schemes in the Company (the founder, key personnel, employees, directors, advisors, etc.).
 - Rules for outside activities at KTH related to the company.
 - Preparation for meeting with Vinnova for possible allocation of the public financing program Vinn Verifiering (Verification for Growth 2, up to 2 Million), which Volumental subsequently was granted in April 2013.
- Legal
 - Writing and advising on shareholder's agreements.
 - Elaboration of agreements for the transfer of IP from the individuals to the company.
- Funding
 - Presentation material for investors
 - Investment from KTH Holding AB by SEK 250 000.
- Miscellaneous
 - Introduction to and involvement in the EIT ICT Labs, for example participation in international competitions and fairs and access to international network.

In November 2013, KTHI arranged a meeting on behalf of Volumental with the incubator STING in order to explore the possibilities within the incubator and preparing a possible next step. The interest was mutual, and it ended up with KTHI deciding in January 2013 that Volumental was to join the incubator STING. KTHI continued to support the company in collaboration with STING until May 2013 in order to complete all ongoing activities and to successfully acquire the first paying customer. After that, the case was considered closed at KTHI and was deemed a success.



Project TSV- Through Silicon Vias

Through silicon vias (TSV) are in simple terms “holes filled with a conductive material” or vertical electrical interconnects through semiconductor substrates that are essential for next generation semiconductor devices. TSVs are part of the emerging semiconductor trend of 3D-integration to so called System in Packages. This integration approach enables the realization of devices with shorter signal lengths, smaller packages and lower parasitic capacitances, which can result in higher performance and lower costs. In this context realizing reliable and cost-effective TSVs, is a significant problem, especially for new and demanding applications such as high frequency electronics and applications that require high via aspect ratios.

At the department of Micro and Nanosystems researchers have invented and developed a novel method for fabrication of solid metal-filled TSV using pre-formed, magnetic wires as conductive paths. The ferromagnetic material is placed in holes with the help of magnetic assembly. This rapid metal filling technique enables through-wafer vias with high aspect ratios. Realizing high via aspect ratios is problematic to achieve and crucial in certain applications. The technology also eliminates characteristic cost drivers of today's production. Customers and users of the technology are companies within the semiconductor industry such as 3D packaging companies, suppliers of materials or manufacturers of semiconductor equipment.



The technology has been developed since 2010 and the technology concept has been developed and tested for various applications incl. various aspect ratios, sizes etc. A prototype machine for handling automated manufacturing of Si wafers have been developed and implemented. In parallel the IPR has been assessed and secured through patenting. The commercial strategy has evolved and is focused on developing a proprietary technology and based on this establish agreements with industrial players. These have the necessary resources and networks needed, such as ability to make substantial investments in R&D as well as existing marketing and distribution channels.

A large number of contacts with possible customers and partners have been established over the years. The technology has also been successfully feasibility tested by an industrial company at their facilities for specific applications where end customers face problems with today's solutions. Consequently, the concept is now ready for industrial testing under more realistic settings and specific application demands. Currently there are ongoing negotiations with a possible industrial partner for a commercial agreement on access to the technology and IPR.

KTH Innovation support process for the TSV project

KTH Innovation started working with the TSV project in October 2010 and continued up until May 2013 when the project became part of KTH Holding's support program IP-2- Market. The IP-2-Market program focuses on investing in KTH-patents and supporting commercialization through licensing or selling IPR to industry players. The TSV project is still ongoing within KTH Holding and is supported by the same business coach.

The starting point was an initial meeting during October 2010 with the main inventor who had contacted KTH Innovation after having attended a course on “Managing Innovation Processes” where KTH Innovation had participated and presented.

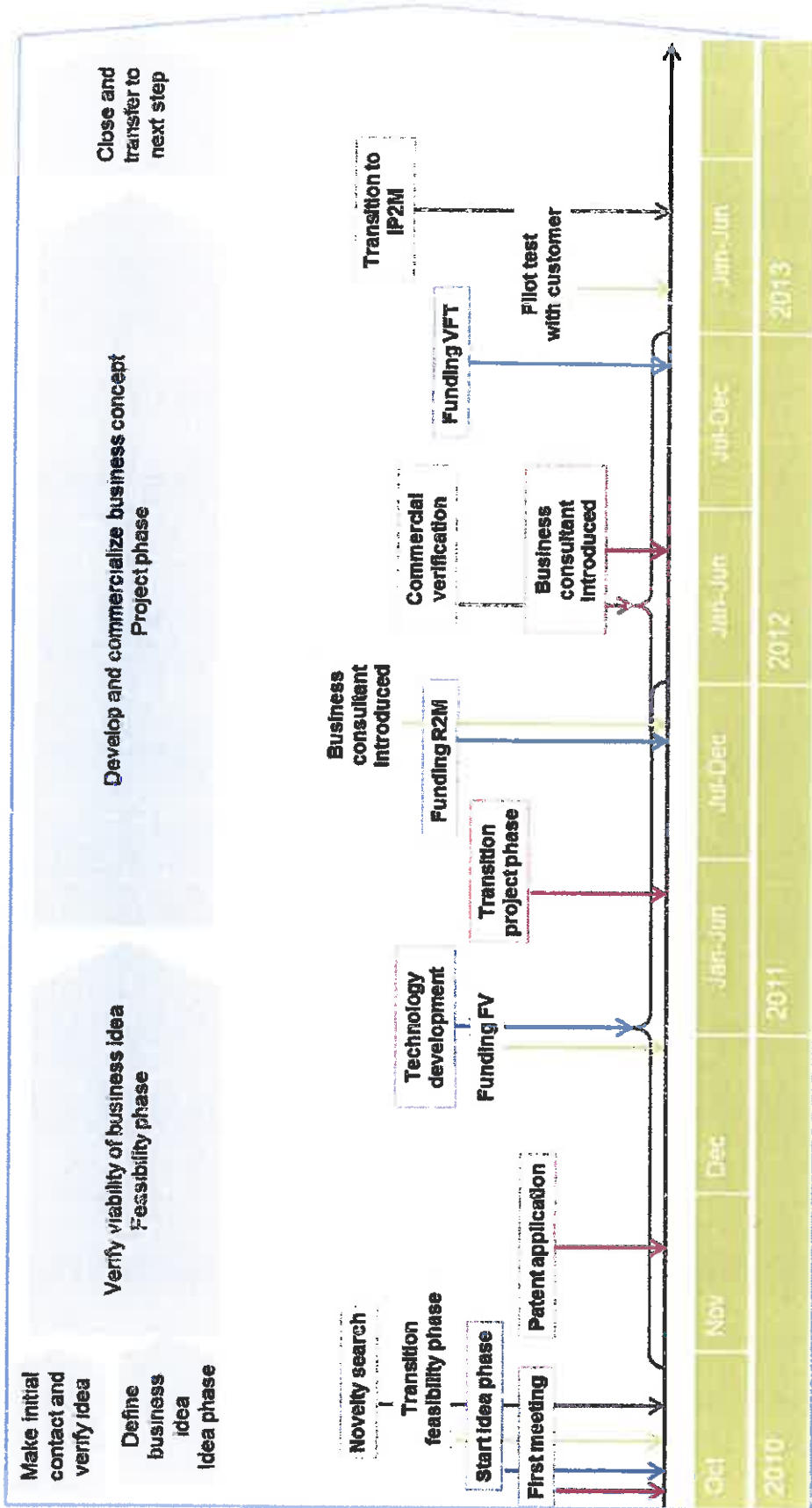
Initial key actions were to assess the patent situation to be able to in a short time span manage upcoming presentations. Initially a novelty analysis was performed by Forskarpatent Uppsala under the cooperation between KTH Innovation and UU Innovation. Subsequently a strategy was outlined and an initial patent application was filed with the support of a patent consultant from Forskarpatent Uppsala. The patent consultant had experience from the field which enabled a well-adapted claims structure.

During the autumn of 2010 KTH Innovation supported a successful funding application to Innovationsbron for a 100 KSEK grant for patenting and commercial verification. This grant enabled filing of a PCT-application together with an external patent law firm. In parallel technology development and proof of concept testing had been ongoing as well as initial discussions with possible customers and partners in the value chain, such as foundries and semiconductor manufacturers.

The technology was at this stage well described with an initial value proposition and market description. To be able to in-depth verify the market opportunity and define the TSV technology's value and benefits KTH Innovation used its internal funding program Research-2-Market to fund a commercial verification project (50 KSEK) during 2011-2012. KTH Innovation found and contracted a consultant with significant experience from the industry and a start-up within the same technology field. The objective was to perform a market and application analysis, benchmark and define the value of the technology. The consultant also made an outreach to select industry representatives. The outcome was a favorable and more evolved value proposition as well as a market analysis with an initial commercial roadmap incl. target applications. Using the same funding another consultant firm having strong networks within the semiconductor field was engaged by KTH Innovation. The goal was to establish contacts and feedback from industry players possibly to pave the way for upcoming prototype testing. A large number of contacts were taken and the researchers engaged in dialogue with a several companies.

As a result of the established contacts a relation was established with a semiconductor equipment manufacturer. In 2013 this resulted in the signing of an agreement for evaluating the technology. KTH Innovation assisted with legal advice around this. Following this, KTH Innovation assisted in securing funding through the program VFT-1 (110 KSEK). This was used to further improve and assess the IPR and patent position. KTH Innovation supported this together with external patent lawyers. In addition the funding enabled travelling to US where the prototype machine was shipped for on-site testing.

The testing was successful and during May 2013 the researchers decided to enter the IP-2-Market program operated by KTH Holding. This program offered additional support that was needed, primarily financial, to be able to enter patents into national phases. Following this KTH Holding supported negotiations that took place with a possible industrial partner. The support included analyzing the value of the patent and technology as well as strategies and term sheet drafting etc. This process and the TSV project is on-going.



1 Definition of Competence

The SIS definition of competence is, according to SS 624070:

Competence: ability and willingness to carry out a task by applying knowledge and skills

The following implications have been applied to the words used:

Ability: experience, comprehension and judgment to use knowledge and skills in practice

Willingness: attitude, commitment, courage and responsibility

Knowledge- facts and methods- to know

Skills- carry out in practice- to do

It is having the ability to use what we possess and create some kind of result.

Competence is also considered to exist in **an environment/context** which, in the case of KTH Innovation, could be defined as "early stage innovation development of technology based business ideas in a university environment".

As described above, competence also encompasses **personal traits and attitudes** which are desirable in the context and to reach results. Competence Areas and Competences in the KTH Innovation Support Process

1. Law and contracts

- **Contract management- the ability to produce and manage a wide range of relevant contracts that might be needed in the innovation support process.**
- **Legal and contractual strategies – proactively identify and produce suitable contracts that are needed/that create value.**
- **Determine inventorship and ownership**
- **Produce contracts that provide beneficial conditions in areas such as ownership/IPR/commercial exploitation**
- **Produce good contracts in areas such as licensing and assignment of IPR**
- **Lead and support contract negotiation**
- **Enable, facilitate and assure the quality of cost-effective work with external law firms.**

2. IPR- in particular patents

- **Competence regarding different patent strategies and the practical process of patenting**
- **Conduct a simple technical overview/quick search within the relevant field**

- Conduct novelty searches and assessments on patentability
- Identify and advice regarding possible patentable inventions in written descriptions as well as in discussions
- Identify and advice regarding appropriate and possible complementing IPR to protect/use
- Produce strategies for IPR/Patents adapted to the relevant business strategy
- Give feedback on and to assure the quality of patent registrations including claims/structure
- Enable, facilitate and to assure the quality of work with external law firms
- Enable, support and to further develop provisional registrations (taking into account time pressure, money and sustained patent value).

3. Determine market potential – market assessment and analysis

- Conduct or support quantitative market analysis/estimate for ide.
- Conduct investigation of competition – identification and analysis
- Conduct or support general market description/overview (CRL<2) including customer identification, segmentation, trends etc.
- Conduct and support prioritizing areas for application.

4. Determine customer need, establish customer relations and business development

- Enable, facilitate and handle market contacts with customers/partners (CRL 3-4)
- Guide market contacts towards end users and determine their need/demand/interest
- Structure, manage or support sales process
- Support and, when needed, negotiate with customer/partner
- Enable, facilitate, manage and quality assure work with external consultants in business development

5. Enable funding

- Enable and facilitate contact with private investors
- Produce good investor presentations (verbal and written)
- Assess funding needs and produce funding plans
- Produce financial forecast and budget
- Advise and support regarding public support system (insight into available funding)
- Support and improve/complete funding applications

- Write essential parts of public funding applications (plan, target, market etc.)
- Produce documentation indicating the potential valuation of the project (i.e. qualitative business case)
- Produce/write complete business plan (including giving feedback on them)
- Knowledge of content/process for due diligence for investment

6. Develop and verify business model

- Knowledge of potential, common and appropriate business models for various fields
- Support formulating business model and how it can be tested and refined
- Identify potential products and sources of revenue, revenue models etc.
- Conduct identification of and positioning in the value chain
- Produce and describe sound overall commercial strategy/plan/road map

7. Presentation and packaging

- Make a short, good and structured verbal pitch of an idea
- Produce and support longer and structured company/project presentation (verbal, PPT)
- Produce and support brief/neat/good marketing material such as teasers
- Support the production of well-designed logotypes/websites/materials etc.

8. Technology development

- Knowledge and understanding of technology within the KTH key area ICT
- Knowledge and understanding of technology within the KTH key area Materials
- Knowledge and understanding of technology within the KTH key area Transportation
- Knowledge and understanding of technology within the KTH key area Energy
- Knowledge and understanding of technology within the KTH key area Life Science Technology
- Knowledge of user driven development including generating and testing specification of requirements
- Enable and facilitate contact with suppliers/partners in technology
- Knowledge of critical regulatory aspects/demands, in medicine/pharmaceuticals for instance

- Knowledge of critical environmental provisions and certifications

9. Coaching and project support

- Coaching competence according to ICF definitions
- Project planning – able to produce project plan including activities, targets, milestones etc.
- Project management – able to project manage a project

10. Developing team competence and constellation

- Initiate and facilitate the team in exploring current status and development needs
- Analyze competence needs of a team
- Skills for teaching in various fields
- Enable and facilitate recruitment process or other way to add new team members

11. Administration and miscellaneous

- Competence in CRM-system LIME Easy and routine for registration etc.
- Knowledge of incorporation and practical/administrative process/demands

Summary of KTH Innovation staff

Hakan Borg, Business Coach ICT/Internet/Media

Hakan has a Master of Science degree in Business Administration from Stockholm School of Economics and has also been a Visiting Scholar at the Wharton School of the University of Pennsylvania. At KTH Innovation since 2010, Hakan supports researchers and students to commercialize research results and develop business ideas. Activities include funding, market analysis, business modeling, business planning, IP protection, marketing and sales. Prior to joining KTH Innovation, Hakan spent eight years as a Management Consultant and seven years in management, company and business development of ICT, Media and Internet companies in Sweden and abroad. Hakan also has a coaching diploma.

Daniel Carlsson, Business Coach Materials/Medtech

Daniels background is within medical device technology, polymers/biomaterials and microsystem technology with broad experience from both technical and business related fields needed to take an early technology idea to the market. Between 2003 and 2008 he worked at Micromuscle, a medtech startup focusing on electroactive polymers for cardiovascular applications. At Micromuscle, Daniel worked in the areas of project management, technical development and business development. He was, for a time, responsible for a patent portfolio and is a co-inventor on several patents. At KTH Innovation, Daniel focuses mainly on supporting business ideas within medtech, biotech, chemistry and materials technology, and is particularly engaged in issues around patents, funding and project planning. He is also responsible for the IP in KTH Holding AB, including the management and commercialization of intellectual property rights. Daniel is particularly interested in structured innovation and creating effective processes, measurability and standardization tied to innovation. Daniel has a MSc in Engineering Biology with a focus on biomaterials and aBSc in Business Administration with a focus on marketing, both from Linköping University.

Lisa Ericsson, Head of KTH Innovation

Lisa has held a number of roles at KTH since 2002. In 2006 she became CEO of KTH Holding AB and in 2007 she was recruited as Head of KTH Innovation. Today, she holds both these positions. Lisa has over 15 years' experience of working with innovation and entrepreneurship tied closely to the academic sphere. In 2000 Lisa was hired by the consultancy firm McKinsey with the specific commission to spin off the business plan competition Venture Cup and create a new legal entity. She continued as regional manager and before leaving she was responsible for starting Venture Cup North and the national organization Venture Cup Sverige. Lisa was a research assistant in the field of entrepreneurship for two years, and has been joint owner of a consultancy firm. From 1999 to 2003 Lisa was an advisor on small business issues to the then Commerce Ministers Björn Rosengren and Mona Sahlin. Lisa studied Economics at Örebro University and at HES Amsterdam School of Business, and has taken complementary courses at MIT (Massachusetts Institute of Technology) and IFL Stockholm School of Economics. In 2011 Lisa was one of three finalists for the management award Stora Chefspriset.

Anna Isoz, Coordinator

Anna joined KTH Innovation in 2010 and as coordinator is responsible for communication and marketing at the department. She is also in charge of the day-to-day administration and general organizational support at KTH Innovation. From the HR consultancy field she has many years' experience of the design, implementation and use of administrative systems and processes. Annas early career was within the travel, hotel and catering industry both in Sweden and internationally.

Patrik Lundmark, Junior Business Developer

Patrik is a Design Engineer and has a bachelor's degree in Integrated Product Development. He has hands-on experience of concept and prototype design, and product development for companies and individually. In addition, Patrik has a Master of Science in Innovation Management and Business Development from Halmstad University, focusing on innovation processes, entrepreneurship and business development on the international scene. He has taken two courses at the Shanghai International Studies University, including one on business development in China.

Donnie SC Lygonis, Business Coach ICT/Internet/Media

Donnie started his professional career in the Swedish Armed Forces as an officer in the Royal Engineers for eight years. He formed his first startup, the gaming company Romelix Interactive, together with his sister in 1995, a company they sold in 1999. He was then head-hunted for the position as CEO of the web agency Reference Interactive that was later acquired by the IT company Resco, where he took the position as Head of sales for the areas Market Communication and Internet. Then between 2002-2005 he ran a business development project for SIF (now Unionen) and then went back to his own businesses, first as CEO of the mobile service provider Micromarketing and then as a start-up CEO of the web based gaming community Playdo. He has worked as a business coach at KTH Innovation since December 2009. Donnie has been engaged in leadership, education and entrepreneurship for 15 years. He is an ICF certified coach, accredited facilitator for Firo-B, MBTI and Situational Leadership. He has been a jury member for Venture Cup since 2000, and for Ung Företagsamhet since 2006. He created and taught the course "Management of Growth Companies" at the School of Economics in Göteborg from 1996-2008. He also wrote and taught the course "Business Planning" at IHM Business School in Göteborg and Stockholm for 5 years. Donnie is a professional speaker on creativity and innovation, and is passionate about everything that has to do with new ideas. His main strengths are business development, concept development, leadership and organizational development.

Gustav Notander, Business Coach Biotechnology/Chemistry

Gustav has a Master of Science in Bio Technology from KTH and for the past six years has been working on commercialization of research results and giving innovation support to projects in all technical areas. He was the first employee of the "new" KTH Innovation that started up in February 2007. At KTH Innovation, Gustav has helped researchers and students design and implement commercialization strategies for research results and business ideas. The main focus has been on supporting the researchers and students in identifying customer needs, selling and marketing projects to customers and financiers, handling IP etc. Before joining KTH Innovation Gustav spent a year at Biopolisz Innovation Services, a technology transfer office in Szeged, Hungary, where he handled IP issues, customer contact, market research etc. for commercialization projects mainly within bio technology, physics and nano technology. Gustav is a certified coach, licensed personal trainer and was previously a division one ice hockey player.

Siimon Vaske, Business Coach Energy/Environmental Technology

Siimon has worked with small and medium sized companies since 2004, first at the Swedish Trade Council in Tallinn, Estonia, and then in a startup where he was responsible for developing technology based end products. He has had both his own consulting firm and been part of a joint venture, both active in the area of technology development. Up until 2011 Siimon was the CEO of the startup company, encompassing two subsidiaries of which one was a joint venture with a larger German company. Siimon was the chairman of one of the subsidiaries and a member of the board of the other. He has also been an

advisor to venture capitalists interested in startups within renewable energy. Simon has a Master of Science in Engineering from Chalmers University of Technology and has studied commercial law at the University of Gothenburg School of Economics.

Therese Viksten, Legal Counsel specialized in Intellectual Property Rights

Therese has a Candidate of Law from the University of Gothenburg School of Economics, specializing in intellectual property rights. After the Master of Science program Intellectual Capital Management in cooperation with University of Gothenburg and Chalmers University of Technology, Therese started working as an assistant Legal Counsel within Research and Innovation Services at the University of Gothenburg. She was also a consultant on intellectual property rights at Chalmers University of Technology. In 2006 Therese joined KTH and since 2008 she is working full time with IP issues at KTH Innovation. She has led a number of major contract negotiations between KTH and both Swedish and international companies and research institutes; written policies, guidelines and agreements covering IP; and continually advises on agreements, commercial law and intellectual property rights in the innovation projects that KTH Innovation supports. Therese is also educated at the Poppius Journalistskola and gives popular streetdance classes.

Tom Magnergård, Business Coach, Health Technologies

Tom Magnergård has a Master of Science in Industrial Economics from KTH. At KTH Innovation, Tom helps researchers and students commercialize their research results and business ideas in all technical areas. Since 2004, he has been working for his own company and was a co-founder of Activio AB, a company developing performance measurement systems for sports clubs and fitness centers. Activio was started at KTH with the help of KTH Innovation, and was afforded a place in the student incubator for the first year of operations. Tom has extensive experience of business development, funding, product development and customization, market entry and sales in many European countries. He takes a great interest in technology development and entrepreneurship, especially the early enterprise phase around new ideas.

Malin Luuke, Marketing and Project Coordinator

Malin has a B.Sc. from the Information & PR Program at Mittuniversitetet in Sundsvall. During her studies she worked as a web editor for a local website and has since the start of her career been interested in digital communication and web publishing. Malin has developed digital communication strategies for the Sundsvall Tourist Board and worked as a project manager on a number of projects, including the launching of a Norwegian children's book on the Swedish market. Malin built on her B.Sc. and through further education added journalism to her list of competencies. Before joining KTH Innovation she worked as a researcher at Sveriges Television and the largest morning program in Sweden – Gomorron Sverige.

Annex 9a

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Page 1 (17)

Only by post.

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KTH Innovation

Att: Anna Isoz, Lisa Ericsson

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Your ref

Our ref

Date

JK

25 February 2014

Internal University innovation processes

A BENCHMARK STUDY OF AALTO UNIVERSITY/Aalto Center for Entrepreneurship (ACE)

This report has been compiled at the request of KTH Innovation with the object of illuminating Aalto University's innovation process for the identification, verification and commercial development of innovations from the University's researchers and students. The source material comprises the material compiled for - and by - Tampere University of Technology, Aalto University's own descriptions as well as the evaluation of the TULLI-Programme carried out in 2012-2013.

Version 25/2/2014.

Joakim Ketonen

Version 25/22014.

Joakim Ketonen

Background to the Finnish innovation system

During 2013, Finland's support for the equivalent of the Swedish Regional Innovation Offices was overhauled. The previous programme, TULI (2002-2012), is similar to the Swedish VFT programmes, where one source of finance, in this case Tekes (Finnish Funding Agency for Innovation), funded the work of the innovation offices in supporting research groups in developing research results into commercial proposals, alternatively business ventures. With TULI, Tekes wished to raise awareness amongst researchers and to spur university administrations to invest in commercial projects, create functional and professional structures, develop collaboration/synergies between stakeholders in the commercialisation systems as well as generating results (e.g. in form of new enterprises, jobs, licenses and revenue). To a large extent, this is almost identical to the work which has been carried on in most European countries since the beginning of this millennium.

The principal difference to other investments of this type was that the Finnish innovation offices were not provided with any resources for the operational work. Instead, the funding would go directly to the research projects which would then buy services in order to supply the projects with the resources and support that were needed. De facto, nevertheless, part of the funding was used to finance the building up of infrastructure, support services and the innovation office personnel. However, this led to most offices having a significantly smaller number of employees than their Swedish counterparts.

During 2013, TULI was phased out in favour of a new initiative, TUTLI. Unlike TULI which had a similar funding structure and volumes as VFT, TUTLI entails that the universities are not provided with any financial resources as such. Instead, commercialisation projects seek funding from Tekes for the implementation of the commercialisation work. The Tekes funding now relates to larger volumes per project than previously (and thereby fewer projects receive funding). Since there are, in fact, no other public funding sources for commercialisation than TUTLI, the entire Finnish system has focused on developing successful applications for TUTLI funding.

This means also that the innovation offices do not have any direct funding from Tekes for their operational activities. This has been solved in different ways, on the one hand through participation in other projects, as and when the opportunity arises (ad hoc basis), which can then fund parts of operations, on the other hand through co-ordination/co-ownership of resources with the university and, finally, through the universities themselves having taken over parts – or all of – of the operational funding. The last scenario here applies to the case of Aalto University.

This also means that the small funding resources which are needed to verify results initially (cf. VFT0 and VFT1) are not supplied to the system from Tekes. This, too, is solved in different ways; for Aalto University, this means that it contributes the equivalent funding that the innovation office had under the TULI programme.

It is important to bear this information in mind when the stakeholders/actors in the Finnish system are analysed. Special preconditions apply which affect both the model and the working method.

Aalto University's innovation processes

In the case of Aalto University, it is the Aalto Centre for Entrepreneurship (ACE) which offers commercialisation support to research groups and students, i.e. the equivalent to the Swedish innovation offices. ACE has 13 employees who focus on offering commercial competence to the University's researchers, personnel and students. Each school within the University has its own dedicated commercialisation resource, called Technology Transfer Manager. Alongside these persons, ACE offers business developers whose task, above all, focuses on supporting the process of establishing start-up companies from research activities. Persons in leading positions in ACE, as a rule, possess extensive business experience, either from venture capital, licensing or business development; many with previous appointments within Nokia (e.g. Nokia Growth Venture Partners).

At the same time as ACE is responsible for the commercialisation work at the University, it has, over the years, grown to become an umbrella organisation for many programmes that directly or indirectly support this process.

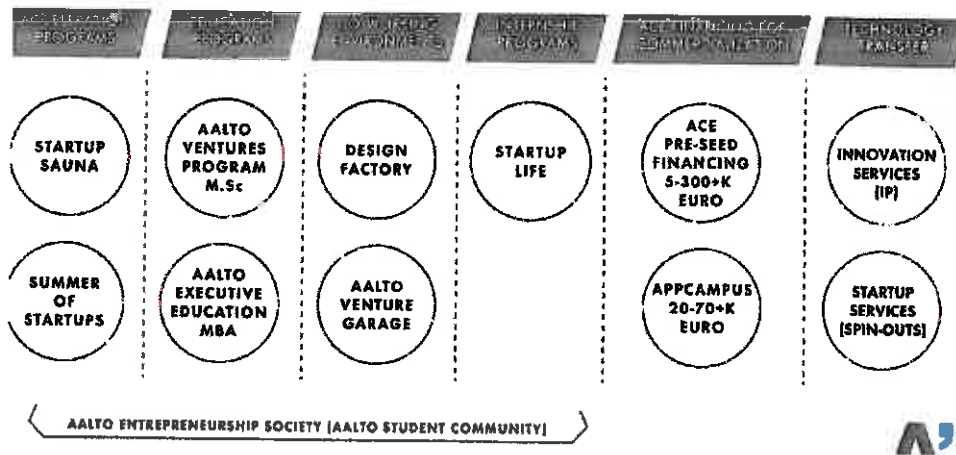


Fig. Diagram from Patrik Louko, Aalto Entrepreneurship Society, 2013

The most well known initiatives within this platform are Startup Sauna, Aalto Ventures Programme and the innovation activities, but other parts of the platform are also important in overall terms. Some of the more interesting of these are described in summarised form in the Annex at the end of the report.

Process description in outline

Since TUTLI funding has become such a crucial element in how the commercialisation work, conditioned by the funding structure, is now run this section commences with an outline process description of TUTLI at Aalto University.

/diagram/

Aalto's contribution to TUTLI program to create successful funding applications and commercialization support

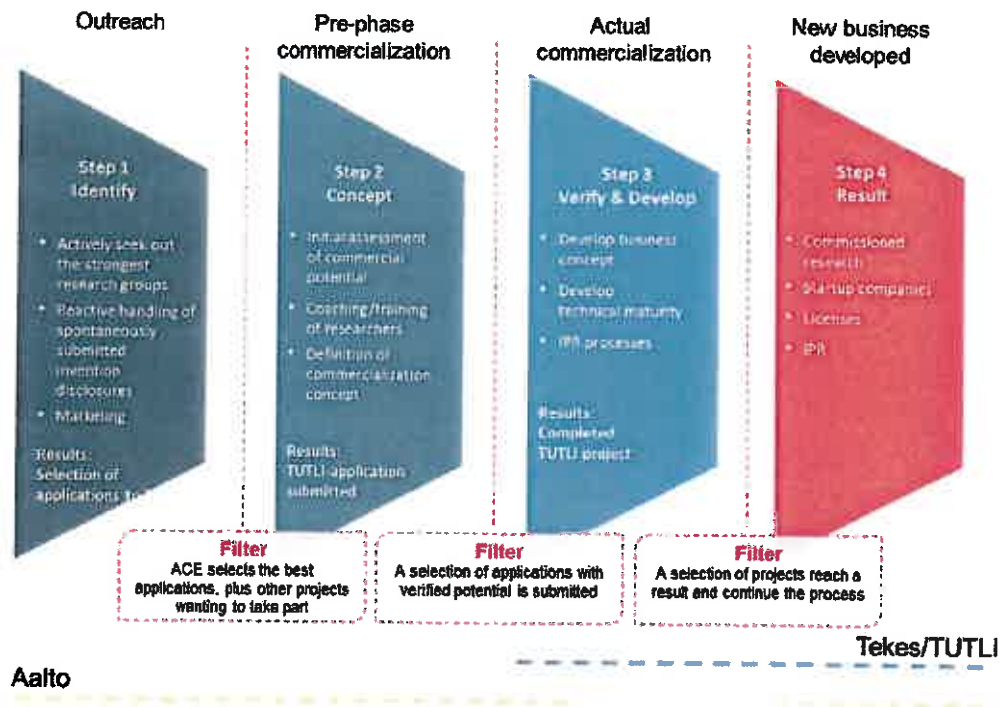


Fig. Own diagram of process based on the Tampere report.

The dotted lines at the bottom of the page describes how the funding structure looks, i.e. which elements Aalto funds through own resources (may also include project funds from state/regional funding sources) and the elements that are funded through Tekes via TUTLI.

In the new system, the projects are run for the purpose of qualifying for TUTLI funding. The parts of the process for which ACE takes responsibility are:

- **Search/scanning activities;** identification of potentially interesting cases
- **Conceptualising activities;** creation of commercial concepts in the form of project applications to TUTLI

- **Filter function**, i.e. filtering out the cases with very low innovation level/commercial relevance (advise against application), extract those applications that maintain the best quality level (evaluate and recommend)

After an approved application, ACE supports the projects that have secured funding, on the one hand through its own work and, on the other hand, through involving external consultants with whom there are arrangements for co-operation.

ACE's own process description

Parallel to operating within the programme established by Tekes, ACE has also drawn up its own process model for operations.

The process is intended to achieve two principal goals:

- Licensing for existing industry, which is a much more well-established activity in Finland than e.g. in Sweden
- Establishing new enterprises

There is also a desire to work for increased learning within the research organisation. The innovation process is described in four steps that aim to clarify and develop, in stages, the commercial potential.



Fig. ACE's own process description

Within each step of the commercialisation process (the orange block), following acceptance of the application, work is carried out in parallel at three levels (business

potential, feasibility and POC, as well as intellectual property) in order to enhance the value of the business proposal.

We shall now describe the four stages individually.

Stage 1. Application phase: Submission of application as well as ownership investigation

"The application" as one calls the case¹ in this situation (presumably as it is, in principle, an early funding application for one of the funding programmes, formerly TULL, now TUTLI) is submitted online through the university's webpage.

Every application is examined by an ACE employee in order to investigate ownership on the basis of Aalto University's and Finland's legal framework. This step leads to securing a clear ownership picture as to whether it is the researcher, university or a third party that owns the research results.

Where the case, depending on results from the ownership analysis, goes to the next stage of the process, ACE then appoints a person (case manager) to support the research group and expedite the case through subsequent parts of the process.

Stage 2. Evaluation phase: First evaluation of the business potential

In this stage, the case is prepared on the basis of a probable commercialisation strategy:

- Licensing case
- Start-up case, where no start-up team yet exists, but where the case has potential for company formation
- Start-up case, where a preliminary start-up team already exists

The commercial potential is here evaluated on the basis of three levels: business potential, technical feasibility and intellectual property. This is carried out in dialogue between the case manager and research team, and together with external experts (experienced persons in trade and industry and technical experts) as well as through using suitable analytical tools for market appraisals and patentability.

The researcher's own interest and engagement in moving on the case are essential indicators.

Funding, previously through TULL, now through Aalto University, may be contributed to examine these questions at issue. The funding may amount to a maximum of 5 000 Euros.

Stage 3. Concept phase: From idea to commercial concept with potential

A detailed project plan is developed around the case. The project plan is revised where a number of commercialisation options are assessed as possible. The development work takes on a more detailed character within the three levels:

- A business plan is created by the team, which is then examined and adapted with the aid of business coaches
- The development work is spurred on so that the most critical obstacles relating to technology readiness level and operability are solved

¹ Alternatively "invention disclosure"

- The IP work is commenced through the application work being initiated, IP Landscape Analyses are made and an IP strategy is prepared

Funding, previously through TULI, now through TUTLI (after approved application), is available in this situation. The funding may amount to a maximum of 50 000 Euros, plus a maximum of 20 000 Euros for the IP work.

Stage 4. Validation phase: Completed case for company formation, alternatively licensing concept

Those company cases with the highest potential move forward in the process into the validation phase for intensified inputs and funding for purposes of development of a credible company case.

Licensing cases with clear value creation potential enter the validation phase which implies increased IP protection that covers commercially strategic international markets.

Funding, previously through TULI, now through TUTLI, is available in this situation. Funding may amount to a maximum of 300 000 Euros, of which 20 000 to 35 000 Euros is available, as a rule, for IP work.

In general, it is emphasised that all cases are evaluated. This is an important part of the change management that is being undertaken at the University and which is intended to incentivise more and better quality applications in future.

The following diagram describes the same process, but places it in relation to where its "exits" are expected, in the form of licensing revenues alternatively start-up company.

/diagram/

Fig. Diagram from Patrik Louko, Aalto Entrepreneurship Society, 2013

Selection process and indicators

If a comparison is made over a period of one year, here 2011, of how many cases actually move forward in the process, it is seen that ACE has a fairly strict selection procedure. From the original 300 which arrive via the online form, 250 qualify for the evaluation phase. It is here that the great sifting out takes place, since only 10-15% of cases then proceed to the concept phase. This is presumably a result of the funding structure that exists, where those cases that fail to gain funding are eliminated. Since ACE itself does not possess resources to fund a case from stage 3 and onwards, there are no resources for continued work on the case or other reasons for having the case remain in ACE's case lists.

Indicators from the ACE innovation process, 2011

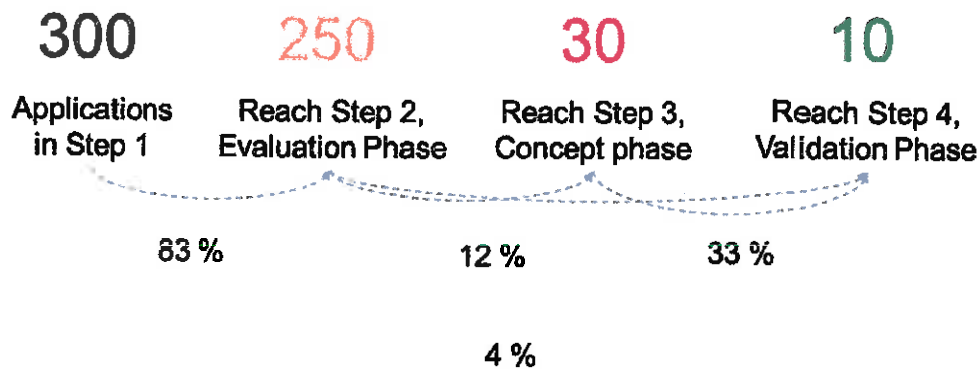


Fig. Own visualisation of ACE's selection process and indicators 2011

Characteristics of the ACE model

When one moves from the general to the more specific concerning ACE's innovation process, it is possible to draw certain conclusions from the HitSeed study made on behalf of Tampere University of Technology. HitSeed has analysed six innovation processes at other universities, including ACE.

ACE's strength is described as lying in the personnel's business competence. An evaluation of individual applications (at stage 1) is made, on average, within 30 days. Unlike 2011, when 12 % of the evaluated cases moved to the concept phase, i.e. they received TUTLI funding, in 2012 around 19 % moved to this phase (this corresponded to 30 funded cases at phase 3, i.e. the same as 2011).

The total budget for the cases which reach stage 3 is 600 000 Euros (approx. SEK 5 350 000 at today's exchange rate). This budget is mainly used for IP work, surveying of potential customers and market studies. On average, between 10 000 and 20 000 Euros is invested per case. On average, an individual case is handled in 150 days.

In connection with TUTLI funding having run out during 2012, the University has taken over the role of funding the infrastructure (ACE), i.e. the operational activities built up. According to previous interviews with ACE (Sami Heikkinen, Operations manager); in 2013 this support amounted to 3.5 million Euros (approx. SEK 30 million). This budget also includes certain funding for individual cases (mainly for Step 1 and 2).

ACE receives express support from the University administration. The importance of working together with the business sector and utilising the research results is clearly evident throughout the University. The University has also drawn up a Code of Practice in respect of innovations developed by researchers and University employees. In order to further incentivise this, a financial incentive structure has also been established. This means that the University offers a bonus to researchers and staff as follows:

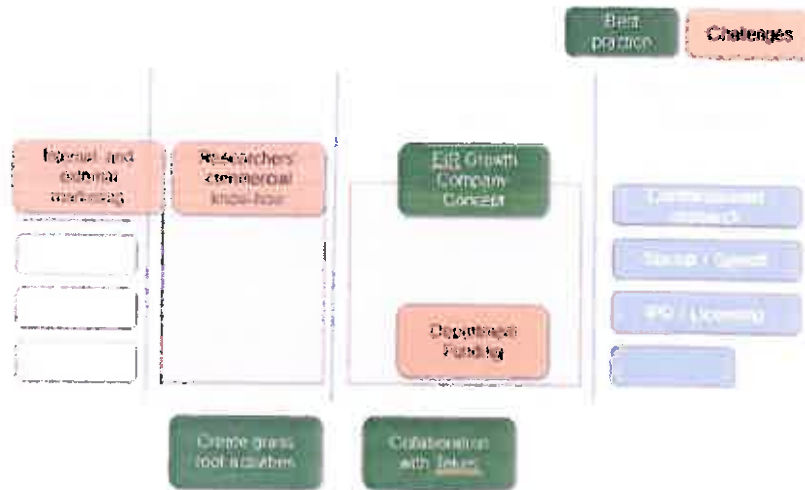
- Bonus per notified innovation (invention disclosure): 300 Euros
- Bonus per patent applied for: 800 Euros
- Bonus per granted patent: 1 000 Euros

Bonuses for the applied for, or granted, patent are paid on condition that the researcher/s take part in preparing the patent application and that all the necessary documents are duly signed.

Strengths and weaknesses

The following illustration shows the strengths and weaknesses in the process identified in the Tampere report.

University best practice and challenges Aalto universitetet



HiSeed – Tulosten raportointi – Joulukuu 2013

6

Fig. HiSeed's analysis from the report for Tampere University of Technology

The best practice identified is:

- **The "Entrepreneur-in-Residence" concept:** TUTLI does not allow funding or activities within established businesses or preparatory negotiation work with a view to licensing. To get round this problem, ACE has established an Entrepreneur-in-Residence programme where experienced persons are appointed from the business sector to set up, and start to run, the enterprises/companies.
- **Creation of grass roots activity:** ACE/Aalto have succeeded in establishing a really dynamic environment concerning innovation activities that comprises many subsidiary activities.
- **The collaboration with Tekes:** ACE/Aalto have very good relations with Tekes (ample dialogue, iteration concerning clean operations, but also the Finnish system as a whole) and, on several occasions, have been a selected test platform for Tekes investments. The fact that ACE is perceived to be the most professional of innovation platforms at Finnish universities has, of course, also helped ACE to obtain funding successfully through TULI/TUTLI, but also other project funding.

Challenges identified are:

- **Internal and external marketing:** The marketing has long been carried out on ad hoc basis, since trust was placed in spreading awareness through word of mouth. Since the goal exists of further increasing the inflow of innovations/inventions, in March 2013 a special sales team was brought

together. This seems to be a parallel function for the Technology Transfer Managers who are to work with the different schools.

- **Researchers' knowledge level:** An overriding challenge is the quality of the applications that, in general terms, is low. Generally, the researchers have no contact with trade and industry and no existing relations with potential buyers/collaboration parties. This represents a challenge for obtaining funding for the case (low points in the TUTLI evaluation process).
- **Funding structure of the departments:** Which sometimes can impede involvement in commercialisation projects (e.g. TUTLI funding)

Alongside these challenges, identified through the Tampere report, ACE has, on its own account, identified the following challenges/improvement potential²:

- **More competent/experienced innovators:** The researchers' knowledge level within commercialisation/entrepreneurship is a principal challenge for operations. This means that ACE loses too much valuable time in handling incomplete/poor cases. In order to rectify this state of affairs an attempt will be made to integrate a compulsory course in ways of doing business (entrepreneurship) within the research programmes (doctoral degrees).
- **Prioritise what is good:** Greater focus on the really good cases and finding ways (processes and communication) to reject, in a more effective way, those that are less satisfactory.
- **Clean out the pipeline:** Cases that get blocked in the pipeline tend to take up the valuable time of the personnel, partly through the need to maintain/check the status of "sleeping cases" and partly due to the fact that valuable momentum created is then lost when the case is to be restarted.
- **Build a clear IP portfolio:** ACE sees a value in creating a clear offer in respect of trade and industry. One will always try to commercialise individual, promising cases, but if one can create an IP platform, there exists the possibility of building up long-term, attractive collaboration and revenue prospects. In this way, ACE also goes from being a technology intermediary to becoming a technology partner.
- **Develop financial backers:** In the first place, they have in view Tekes, i.e. how can ACE/Aalto, in different ways, develop their financial backers so they become more effective, increase their grants, fund the appropriate things, i.e. how ACE can utilise its good relations with Tekes so as to create better preconditions for operations.

Interesting facts

The following information panel offers an overview of Aalto University's innovation system.

CASE STUDY: Aalto University

Aalto University represents an interesting story in both the Finnish and European environment, and has already in its very young lifetime (albeit with much older roots), continued to develop many innovative and internationally highly regarded and inspiring methods and tools for supporting innovation, entrepreneurship and commercialisation, such as:

- Aalto Center for Entrepreneurship (ACE)
- Startup Sauna – co-working spaces and program for start-ups, now encompassing several functions branded under the same name:
 - Internship program (previously Start-up Life)
 - Accelerator program (coaching program since 2010)
 - SUSHI conference
- Aalto Entrepreneurial Society (Aaltoes.com) – student-run entrepreneurship community
- Aalto Factories: Design Factory, Media Factory, Service Factory – platforms combining expertise
- Staffing – combining key competencies from public organisations, VC, industry and academy

A unique development, during a very short timeframe, that required the strategic vision, commitment and strong support of university management. At the same time the very structure is merger of three fundamentally different universities and mission of the university³ (that includes top-quality research, enabling renewal, and nationally supporting Finland's success and the society's competitiveness, thus linking to the original working name, an "Innovation University") makes this an interesting case to be viewed more closely.

University management showed inventive ingenuity when combining the three universities in 2010 and initially choosing the wording "Innovation University". However, Aalto seems to be now at a point where the community is in disagreement regarding the achieved results and part want to see the original mission even higher in strategy - excellence in research has received a lot of attention lately.³⁴

- When Aalto researchers and students who had received TULI funding were asked to rate the aspects of their local innovation system, Aalto received surprisingly low scores regarding strategic importance: "Commercialisation is strategically important in my organisation" - Aalto score: 2.0 of 5.0 compared to 4.4 of VTT and 3.4 of other universities.³⁵
- In other aspects, such as availability of resources, Aalto was on the same level or higher than the others.

The reasoning behind a high emphasis on top-quality research is that scientific excellence and publications in leading journals enable Finland to be part of the international scientific community, and leading companies looking for substantial innovative jumps want to build partnerships with the world's leading researchers. Aalto's approach is to combine top-level research to cross-disciplinary way of working in order to make an impact with the inventions originating from science. This is an ambitious task. A key question in this equation is that is there a good match between the needs of the Finnish society of and fields of research - and could this match be further improved by deeper partnerships between the key economic players and the research community.

Fig. Information panel. Aalto University's innovation system³

From the same report, it is possible to extract certain results from Aalto University's innovation activities. One reason for the clear decline, during 2011, in terms of start-ups, is that Tekes indicated that the TULI funding should cease during 2012. This means that ACE visibly cut back these activities, while waiting to see how the new programme (later to become TUTLI) would turn out.

³ "Path to creating business from research – Evaluation of TULI programmes", 2012-2013

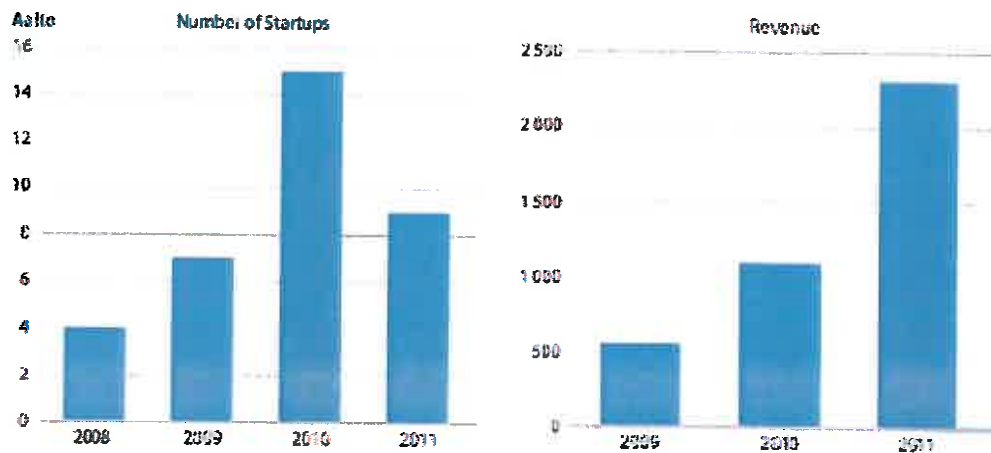


Fig. Start-ups and generated revenues (total) from ACE's innovation activities⁴

Other observations:

- (1) Finnish companies, in total, have made available 200 million Euros to the University as a result of the fund raising campaign that was carried out during 2008-2011. The money was invested in a foundation which acts to strengthen Aalto University's position in competition with international higher educational institutions up to 2020. There are also indications that Tekes will provide co-finance in the form of 2.5 times invested capital. The capital shall yield between 6-8 % per year and shall be used to finance parts of Aalto's operations. A part of this capital, according to Sami Heikkiniemi, shall also benefit ACE.
- (2) ACE is very interested in securing international collaboration with other universities. During 2012, prospects for collaboration were investigated with the innovation offices/technology transfer units at the universities of Lund, Copenhagen, Bergen and the University of Iceland. It is unclear whether this has led to actual collaboration. The purpose, at any rate, was to investigate common models, methods of collaboration and synergies, primarily in later phases of the commercialisation process.

⁴ "Path to creating business from research – Evaluation of TULI programmes", 2012-2013

Annexes

Aalto University Ventures Program

"Aalto Ventures Program provides you with the skills, tools and global networks you will need to create new businesses!

At AVP, you can study a minor in high-growth entrepreneurship for your master's degree or just take individual courses as electives. In addition, we're offering inspirational workshops.

You will learn through experimentation, cross-disciplinary teamwork, and insights of experienced professionals."

etc.

Unternehmer TUM: TUM's Center for Innovation and Business Creation

The centre "UnternehmerTUM" (Unternehmer: Entrepreneur) is a key, strategic component in the realisation of the vision: "TUM: The Entrepreneurial University". Since its foundation in 2002, it has occupied a central role as a leader within innovation and business creation in Germany's university world. The number of employees at present is more than 50. A thousand or so students and researchers within TUM participate annually in the TUM programme. Around 50 projects are concluded annually with new business start-ups, among other benefits, as a result.

Activities are carried out through three companies:

- **UnternehmerTUM GmbH** has the function, on the one hand, of inspiring students and researchers to think in innovative ways and, on the other hand, to equip them with suitable entrepreneurial tools via education and other forms of support.
- **UnternehmerTUM Projekt GmbH** specialises in arranging collaborative initiatives for business development, encompassing both established and newly started enterprises.
- **UnternehmerTUM – Fonds Management GmbH.** The structure's funding and networking company with focus on investments in spin-offs from TUM, based on early stage technology with great international growth potential. High profile areas are IT, medtech och cleantech. Four expert employees. Investment criteria: Market potential, technology's characteristics and intellectual capital protection, team behind the venture, the business model.

Operations are described, in summarised form, on TUM's homepages, as follows:

"UnternehmerTUM has developed a systematic and efficient approach to turn ideas and technologies from science, industry and the start-up scene into successful, sustainable products and services. Since 2002, UnternehmerTUM uniquely develops and connects talents, ideas, capital and customers....

Inspiring and empowering talent: We inspire and empower students, academics and professionals by providing outstanding, practically oriented training in the field of entrepreneurship education. We promote initiative, creativity, courage and responsibility, combining training with the initiation of innovation and start-up projects...

Technologies – the basis for successful new business: In collaboration with start-ups and established companies, TUM develops and realizes projects to successful new business creation through a systematic and efficient approach for the rapid establishment of start-ups, spin-offs and new business concepts.

Innovations need capital: UnternehmerTUM analyzes the ideal financing alternatives for start-ups and corporate innovations, and helps clients to acquire subsidies and venture capital, i.e. through the UnternehmerTUM Fund.

Access to customers: We work with the innovation and start-up team to assess the relevant market segments and target customers, as well as providing support with positioning...

A unique network: UnternehmerTUM offers an outstanding network of entrepreneurial talent, academics, experts and investors..." - 2 -

Under the watchword "From Research to Business", the following supplementary picture shows what UnternehmerTUM is able to offer the different target groups:

- **To students:** We teach you to act as an entrepreneur!
- **To researchers:** We teach you to see the market opportunities opened up by your research!
- **To entrepreneurs:** We show you the formula that can bring you success!
- **To employees in established companies:** We lift your career through knowledge of entrepreneurship and innovation!
- **To management teams:** Challenges over time – how does one create momentum for new business transactions?

TUM in brief

Milestones

1868: Founding of the Polytechnic School of Munich.

1877: Becomes college for education in engineering sciences (Royal Bavarian Technical School).

1901: Granted right to award doctorates.

1905: First female students.

1967: Establishes faculty of medicine with link to the University Hospital.

1970: Changes its name to "Technische Universität München", TUM.

1999: Far-reaching restructuring (new President of TUM from 1996). Idea of TUM as "The Entrepreneurial University" is born.

2002: Establishes operations in Singapore. TUM School of Management started.

2005: Institute for Advanced Study, IAS, established.

2006: TUM is one of the first universities to obtain status as "University of Excellence". Concept of "The Entrepreneurial University" integral to this status.

2009: TUM starts "School of Education" – teacher training programmes plus investment in internal pedagogy.

2010: Fundraising activities through establishment of "TUM University Foundation".

2012: Status as "University of Excellence" is renewed.

Data on TUM 2011 etc.

- 3 major campuses within the greater Munich area and 4 smaller ones further afield.
- 13 faculties(schools): Mathematics, Physics, Chemistry, Informatics, Architecture, Civil, Geo and Environmental Engineering, Mechanical Engineering, School of Management, Electrical Engineering, Sport and Health Science, Life and Food Sciences, Medicine, School of Education.

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19/2/2014 Göran Reitberger

- 142 programmes: 52 at Bachelor's level, 72 at Master's level (27 conducted in English of which 6 at TUM in Singapore).
- Selected international collaboration partners:
 - Europe: DTU in Copenhagen, TU/e in Eindhoven, EPFL in Lausanne
 - USA: Stanford, Georgia Tech
 - Singapore: National (NUS) and Nanyang Technological (NTU)
- TUM establishments outside Europe
 - Campus in Singapore
 - Liaison offices in Beijing (Tsinghua), Mumbai, Cairo, Sao Paulo
- Students: Total 31,000 of which 32 % women and 16 % international. Of the international students, just over 800 (17 %) – easily the largest group – come from China. (Total number of students: 36,000 students in 2013)
- 12,000 TUM entrants, 5,100 graduates.
- 500 professors of whom 18 % women. Increase in number from 7 female professors at end of 1990's to 88 at beginning of 2013.
- Total of over 9,000 employees, of whom 66 % are teaching staff, 33 % women.
- 900 theses defended.
- 270 active patents in TUM's patent portfolio. Where the number of annually granted patents is concerned, TUM lies in the top three among German universities. 35 patent applications in 2012.
- 980 ongoing research collaboration initiatives with companies.
- Total assets (balance-sheet total): 1,090 m. Euros, of which about 300 m for medical care at TUM's University Hospital. Excluding this item, around 800 m Euros with following distribution
 - Base funding via the Federal State of Bavaria 58 %
 - Student fees 2 %
 - Industrial testing services etc 5 %
 - Government research funding body, foundations, companies 35 %
- Results of just over ten years' targeted fundraising: Plus 190 m Euros – 50 % from companies, 25 % from private persons, 25 % other donations.
- Spin-off companies 1990-2011: Total 370 (around 20 per year) with 11,000 employees in 2011.
- 45,000 active in TUM's global Alumni network.
- 13 Nobel prize winners – of which 5 during post-war period – and a large number of famous inventors amongst former students. Examples: Diesel compression engine, von Linde – refrigeration technology, Dornier and Messerschmitt – aircraft, Leibnitz – nuclear solid state physics, Scheibel – biochemistry, Skerra – protein-coupled receptors.

- Growth data for period 2001-2010
 - Publications, Web of Science: +71 %
 - Professors: +22 %
 - Thesis defence: +11 %
 - University entrants: +61 %
 - Employees engaged in research: +45 %
 - Citations: +33 % (2001-5 vs. 2006-10)
 - Fundraising: +220 %

- Wolfgang Herrmann re-elected President of TUM in 2013: After 17 years as President – start 1996 – Herrmann was unanimously re-elected. Already during his first six years as President, it was he who formulated the strategy and process that led to the formation of “TUM: The Entrepreneurial University” and the eco system where the innovative and entrepreneurial results emerge.

Current Mission Statements

- **“We aim to serve the citizens in an innovative society”:** TUM’s employees shall feel a duty to participate in the innovative processes and progress that can yield substantial improvements in people’s way of life and their interactions with one another.
- **“We measure ourselves against the best”:** Scientific, organisational and structural benchmarking (best practices) in relation to “the best” shall develop both own capabilities and the networks with which TUM is connected.
- **“We shall be cosmopolitan with respect for cultural differences”:** Multiculturalism amongst students and within the faculty is an objective with great potential gains.
- **“It is today’s young talents who can create our future”:** Special initiatives on behalf of “Young Faculty” and graduate schools.
- **“Entrepreneurial thinking and acting shall permeate TUM”:** This means, in the first place, that TUM shall meet increased competition for talent with a well-formed and effective “Ecosystem” for innovation and entrepreneurship.
- **“We create values through practising what we teach”:** Essential element of a culture that helps to shape the approach of employees and permeates all aspects of the university’s operations.
- **“Our Alumni and Emeriti are resources that can both stimulate and support activities”:** Young People are the Future! To arrange things so that experience can meet enthusiasm and curiosity is essential within the university ecosystem.
- **“Public dialogue is an essential ingredient of the ecosystem”:** Initiatives of the “Open Labs” type, open lectures, ongoing dialogues with the political world. TUM’s programme to link all professors as mentors to the region’s high schools and their pupils (aged 13-16) is one element of this approach.

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 19/2/2014 *Göran Reiberger*

Present administrative organisation

It is, for example, through the TUM-wide and partly externally funded project "TUMentrepreneurship" that the innovation system is currently developed. An organisational chart:

TUMentrepreneurship – Management Board

- President Wolfgang Herrmann
- Vice President for "Entrepreneurship and IP issues"
- Vice President for "Resources and Organisation"
- Chairman of Board for holding company UnternehmerTUM GmbH

Project Office

Funding via BMW in Ministry for Science and Technology – TUM among the 10 universities – of 83 applicants – who received about 2.5 million Euros per year

TUMentrepreneurship – Advisory Group

- Prof Achleitner, entrepreneurial finance
- Prof Engel, Berkley
- CEO for holding company UnternehmerTUM GmbH

Topic

Effective spin-off process	Entrepreneurial culture	Entrepreneurial network	Research into entrepreneurship
Co-ordinated within UnternehmerTUM GmbH	Co-ordinated by TUM ForTe, Unit for Forschungsförderung & Technologietransfer (Research and Innovation) within TUM	Co-ordinated by UnternehmerTUM GmbH	Co-ordinated within TUM

Process diagram: "The effective path to a successful spin-off enterprise"

The following diagram is to be found on the homepage. No information on tools that are utilised within the different phases, Phases TUM support

"The Business"	Identification, inflow	Concept development	Development phase – characteristics of the business	Start phase	Growth phase
Stakes vs. idea owners	Filter with feeling – encourage new attempts in event of rejection	Create preconditions for long-term involvement	Which competencies are required in any possible enterprise arising? Support via consultants? Other forms of commercialisation?		Transfer to actors outside university itself – frequently with TUM link (e.g. incubators)

Link to educational programmes and courses, networks, alumni etc.
IPR issues

TUM ForTe: Unit within TUM which interacts with holding company within UnternehmerTUM

The unit is “TUM’s Research Office” with supplementary tasks relating to provision of expert research consultation within different areas of application. (ForTe stands for Forschungs-förderung & Technologietransfer.) Other elements are “TUM Talent Factory” for younger researchers and “TUM Emeriti of Excellence” i.e. retired researchers who offer support and advice to younger persons.

Within this unit also is TUM’s “Patent & Licensing Office” where three specialist staff members carry out TUM’s detailed patent policy. The following services are offered to TUM’s researchers free of charge.

- General info about IPR and employee rights.
- Novelty search and identification of patent research results.
- Drawing up of patent application and other IPR documents after decision is taken on investment/stake within the unit (and transfer of ownership). In event of revenues from patent, the originator (inventor) receives 30 % of the gross amount.