Version 2 October 2014

3 YEAR PLAN 2015-2017

FOR THE KK RESEARCH ENVIRONMENT AT MID SWEDEN UNIVERSITY

STC Sensible Things that Communicate

PART OF MID SWEDEN UNIVERSITY

FSCN

PART OF MID SWEDEN UNIVERSITY

Executive Summary

Mid Sweden University is working to systematically increase its national and international profile in the research that is driven in two research centres FSCN and STC. The target in this work is to make a powerful contribution to the regional renewal and growth in accordance with the vision *Transforming the Industrial Ecosystem – TIE*. Since 2011, the Knowledge Foundation has been supporting this development through the program KK Miljö.

The document at hand is the second 3-year plan for this development process that is strongly supported by the Knowledge Foundation. The most important development areas for the 3-year period 2015-2017 are:

Goal #1: Stronger research profile nationally and internationally

The key instruments to fulfil this goal are the Strategic Actions **e2mp**, **FORIC**, **EISS** and **KM2** and the development of strong research on "New Cellulosic Materials" and "Measurement Systems".

Goal #2: Systematic development of personnel resources

We will develop and start implementing a systematic recruitment plan on senior level. The focus will be in recruitments that support the strengthening of our research profile as defined above.

Goal #3: Broader and deeper co-production

We will nurture broad and intensive industrial collaboration and competence development related to the Strategic Actions and build industrial networks to guide the planning of research in the two development areas. We will also develop new industrially relevant education programs that are connected to our research.

Goal #4: Efficient organization characterized by a well-functioning quality system

Particularly important is to engage researchers in strategy development.

Revisions

Original version 1 in April 2014

Version 2 in October 2014.

After feedback from our Reference Group, Knowledge Foundation and its Expert Group, we have made following changes:

- In the Introduction, clarify our long-term ambitions and process to reach them; especially that we let the identity (including name) of the joint research environment of FSCN and STC to emerge through the development of Strategic Actions
- Throughout the document, communicate the distinction between our joint research environment and the *KK Miljö* program that Knowledge Foundation uses to support our development process
- In Chapter 4, amend the goals so that they cover all of our research instead of just the new areas as in the original plan
- Throughout the document, update the name of the Strategic Action **EnergyWiser** to **Embedded Industrial Sensor Systems (EISS)** that better reflects the research focus
- In Appendix 4, the signed development agreement between Mid Sweden University and Knowledge Foundation has replaced our first proposal for the goals.

Contents

About our terminology

This is a short summary of the most important terms used in this document.

Research Action	Structured research project, program etc that has specified goals, implementation plan and schedule.
Strategic Action	Strategically important Research Action. Currently we have five Strategic Actions; **e2mp**, **FLEX**, **FORIC**, **EISS** and **KM2.**
Research Area	Definition of a research direction that depends on the context and can change with the evolution of science and technology. Thus our Research Areas can overlap and do not correspond to the organisational structure. Currently we have two internationally recognised strong Research Areas, High-yield Pulping and Embedded Sensors, and one area, Nanomaterials Systems, for which our goal is to reach such a status. "New Cellulosic Materials" and "Measurement Systems" are tentative names for additional Research Areas that are under development.
Research Group	Organisational unit that has a group leader. Currently 19 research groups are included in our joint research environment. Each of the strong Research Areas is driven by one strong Research Group and supported by others.

Please note our notation: Research Actions are marked with **bold font**, key concepts with Capital Initials, and strategic goals with *italics and underlining*.

1. Introduction

Mid Sweden University is working to systematically increase its national and international profile in the research that is driven in two research centres FSCN and STC. The target in this work is to make a powerful contribution to the regional renewal and growth in accordance with the vision *Transforming the Industrial Ecosystem – TIE*. Our development of a strong research environment is especially supported by the Knowledge Foundation through its program KK Miljö.

The *TIE* vision builds on the rich natural resources that our region has in the renewable forest resources, sustainable energy and pure water. Another important starting point is that over time our region has also accumulated remarkable competence in the processes of forest industry, in information technology and in digital services. In addition to these areas, Mid Sweden University also has strong research in new materials and strong programs in design education. By developing research that includes renewable raw materials, information and communications technology, and new materials, Mid Sweden University will make a strong contribution to the regional renewal and growth within forest industry, Information and communication technologies (ICT) and other related industrial sectors.

The document at hand is the second 3-year plan for our development process that is strongly supported by the Knowledge Foundation through its *KK Miljö program.* In the previous 3-year period, goals were defined only for the development financed by the Knowledge Foundation (Appendix B). The present 3-year plan covers all our operations, including the regional networks (Appendix C). The goals defined here are included in the development agreement between Mid Sweden University and the KK Foundation (Appendix D). The implementation of the 3-year plan will be described in the Work Plans for 2015, 2016 and 2017 which are written every fall.

The outline of the following discussion is as follows. We first clarify and sharpen the long-term goals (Chapter 2), then analyse current status in relation to the long-term goals (Chapter 3), and finally define new goals.

2. Long-term goals – what do we mean with TIE

2.1. External impact

Our long-term goals are defined in the Vision Document *Transforming the Industrial Ecosystem - TIE*. The title sets an expectation on the external impact that we will make on the surrounding society. It is our mission statement and can therefore be used to sharpen the targeted organizational scope of the research environment. In this context, the three words in the title carry a message. The by-line *through augmented products and efficient manufacturing processes* was added to the Work Plan 2014-2016 as part of the process towards a clear identity for the research environment. The reasoning is following:

Transformation: The emphasis on research that creates opportunities for new business, new products and services, in short industrial renewal, is what characterizes our research. For us, "new" means better products – or *Augmented Products* (including service products) where new technology gives added customer value. Lower cost to just secure market shares is not a transformation, whereas lower cost to allow increased functionality and use is a transformation.

Industrial: We do research for and together with industry and infrastructure companies, mostly in co-production. This anchors our pursuit of transformation on business realities, because otherwise no company would work with us. Depending on the industrial sector, transformation may have to be

evolutionary, based on the existing, rather than revolutionary, starting from zero. A lot of our research has traditionally been applied towards *Efficient Manufacturing Processes*. Better efficiency lowers manufacturing costs but usually does not transform the manufactured products. Efficiency becomes transformative when it is enabled by a completely new product. Increasingly, this happens through a service product that is augmented with information and communication technology.

Ecosystem: In our region, much of the economy builds on the industrial utilization of the forest resources. However, the word Ecosystem emphasises the belief that regional renewal is a systemic change where many new actors, small and large, enter and interact with existing companies so that new business networks are formed. Broader industrial partner network is needed to reach this. Our ambition is also that some of the new actors come from our joint research environment.

The mission statement in the TIE Vision Document is good and shall remain intact.

Of the three words, *Transformation* is the crucial one when we steer our research. For new Research Actions this means that those actions that do not directly aim at the radically new are needed to secure that an industry under transformation will have the economic and intellectual resources to do so. A key learning challenge for our organization is to learn to understand how our research results can lead to transformative new businesses, to a paradigm shift. This requires understanding about the earning logics, business models and strategies of the enterprises and industries that we work with.

2.2. Internal profile

Our purpose is to build a unique and internationally recognized research organization so that we can play a vital role in the success story of Mid Sweden University.. This vision has two interconnected components, strong organization and leading research. In the TIE Vision Document the goal is divided into five sub-goals (see Appendix A) that focus the attention on strong resources (*TIE 1*), leading research (*TIE 2*), new enterprises (*TIE 3*), attractive education (*TIE 4*), and international collaboration (*TIE 5*). In other words, the TIE vision addresses all the operations that connect to and share resources with our joint research environment.

The five long-term goals give a good structure to our planning.

The process to consolidate our research identity is proceeding. In the TIE Vision Document we used four thematic research areas[1] as the first effort to describe a common research focus. However, even though they narrowed the scope, it was still too broad. At the same time we had large Research Actions with clear focus. It was then natural to instead use these large actions – called Strategic Actions – to communicate about the emerging research identity. Behind each of these Strategic Actions is at least one strong research group. These strong groups and their competences, naturally define our research profile.

In addition to the Strategic Actions it is easy to identify important areas that fall between them. In these latter areas further consideration is needed in order to see what kind of development is needed so that we can best make use of the related competences. In this way we try to include everyone in the high-level definition of our research profile.

The thematic research areas in the TIE Vision do not correctly describe the development of our research. Instead, the development happens through Strategic Actions driven by strong research groups.

[1] Improved Efficiency, Pure Environment, Renewable Energy Systems and Augmented Products.

This change has already been implemented in the Work Plan 2014-2016 and can be communicated without now rewriting the TIE Vision Document. The development of strong research profile is described in Chapter 3.2.

3. Long-term goals – where are we

Progress towards leading research is in good progress. In the organizational development the gap from the long-term goals is largest in the international interaction and visibility, and in the systematic development of personnel resources.

We summarize here our development status in relation to the long-term goals (Appendix A), first the organizational status (Chapter 3.1) and then the development of a strong research profile (Chapter 3.2). The fulfilment of the current 3-year goals agreed with the Knowledge Foundation was analyzed in the Progress Report 2014 and is not repeated here.

3.1. Strong organisation

The long-term goals defined in the TIE Vision Document (Appendix A) concern primarily the organizational development of the joint research environment of FSCN and STC and the related educational programs.

First of the long-term goals, *TIE 1 Resources*, measures our ability to attract research competence. In the past three years, we have recruited a new professor in wireless industrial communication systems, which together with a group of new research assistants has strengthen the embedded sensor areas considerably. Apart from that, the recruitment has consisted of an increase of adjunct professors. We must now put effort in to systematically strengthen our personnel resources.

When it comes to the second goal, *TIE 2 Leading*, we are making good progress as the discussion about the research profile in Section 3.2 shows. Where more work is definitely needed is visibility in important conferences, recognized publications and in contacts to the most important national and international research units.

The third goal, *TIE 3 Start-ups*, underlines the engagement of researchers and students in the creation of innovations (in the commercial meaning) as a key indicator of a successful research organization. We have a good track record on the ICT side where Fiber Optic Valley is the regional innovation system we work with. We are also making progress in the forest sector (Appendix C). New major actions are not needed.

Attractive education program (*TIE 4*) is an important source of graduate students to research and competent personnel to industry. For FSCN's part this has not worked well but improvements are in progress. New education programs in engineering have been developed in the areas of energy technology and systems, automation, and chemical engineering (together with KTH). Utilizing e-learning tools and blended formats (accepting both on-campus and online students) enables a much richer selection of courses and expertise, and gives our industrial partners a channel for competence development. A new organisation for all the engineering programs has been established with common processes for quality development, external relations, and coproduction in education with industrial partners.

In international interaction and mobility (*TIE 5*) we have much room for improvement. STC is clearly better in this respect, with e.g. collaboration with Analog Devices that is one of the globally leading companies in the rapidly growing area of sensor devices for embedding and system integration in industrial applications. STC also has one international adjunct professor and several exchange

doctoral students who study part time at STC. At FSCN the international research collaboration is strong in mechanical pulping.

3.2. Current and desired profile in research

We have internationally strong research in High-yield Pulping and Embedded Sensors. KM2 is a Strategic Initiative with the goal that we become strong in Nanomaterials Systems as applied on e.g. paper-based solar cells. In addition, two development areas show good potential to grow strong.

We have currently two areas where we have international research leadership and one area where we have good prospect of developing a leading role:

- **High-yield pulping**: We are already in a globally leading position in this area, with strong research together with industry in the Strategic Action **e2mp**. We have high visibility in the scientific community e.g. as organiser of international mechanical pulping conferences and publisher of the Nordic Pulp and Paper Journal. The group of researchers is strong (headcount 20+). The contribution to *Industrial Transformation* should increase, in part through the Strategic Action **FORIC**. Also the development areas explained below should help.

- **Embedded sensors:** We address the key technologies for distributed and embedded sensing with our research on autonomous sensors. The research has developed during years of dialogue with a large number of industrial partners, and supports well *Industrial Transformation*. In ARC13 the research field scored excellent in impact and very good in scientific quality. The group has over 15 researchers. The research vision and visibility on the international level should be developed further. **EISS** is the Strategic Action to achieve this.

- **Nanomaterials Systems**: In this area we have an engaging transformative research vision ("paper solar cells"), competent scientific leadership, and a strong and versatile group of researchers (headcount 20+). The research engages both FSCN and STC. Our target is to reach strong international position with the Strategic Action **KM2**.

Our Strategic Actions support and strengthen this profile of leading research in the manner summarized in Table 1. The content is slightly updated from the Progress Report 2014.

We naturally want to make maximal use of all the competences we have. In addition to the above three strong research areas we have identified two development areas. We recognize the possibility for a nationally or internationally strong position and transformative applications, but need to improve research focus. We want to further consider the following two areas in order to see if a stronger position can be developed.

- "New Cellulosic Materials" (tentative name) has the motivation that we should be able to use more of our expertise in High-yield Pulping to develop transformative new applications for the forest-based raw materials. We see good potential in the combination of Surface and Colloid Engineering, and Complex Systems with High-yield Pulping. According to ARC13, FSCN should refocus towards advanced biomaterials, non-traditional industrial networks and interaction with industrial design.
- "Measurement Systems" (tentative name) where our industrial partners see new business opportunities, especially in environmental surveillance and in process control for much higher resource efficiency. When the development of functional surfaces in KM2 moves to pilot phase, the quality assessment of coated surface layers requires new methods.

Strategic Action	Contribute to goals	Keep or develop strong research profile in	Improve the quality of co-production with	Support the Industrial Transformation towards	Strengthen the organization through
e2mp (running)	TIE 2 TIE 5	Keep international leadership in High-yield Pulping	Strategic partners in paper industry and suppliers	"Bioeconomy"	Adjunct professors, access to industrial facilities
FLEX (running)	TIE 1 TIE 4	Develop regional and national visibility	Region's companies in competence development	Life-long learning	Master-by-Research model for MIUN and industry personnel
FORIC (starting)	TIE 1 TIE 3 TIE 4	Develop regional and national visibility	Broader co-production with paper, energy, logistics, recycling etc	"Bioeconomy"	Increase the synergy FSCN-STC; study environment for industrial PhD students
EISS (in preparation)	TIE 2 TIE 5	Improve international leadership in Embedded Sensors	Strategic partners in energy, infrastructure, process control	New business models for process control	Adjunct professors
KM2 (in preparation)	TIE 2 TIE 5	Develop international leadership in Nanomaterials Systems	Broader co-production with material and equipment manufacturers	Renewable energy systems	Increase the synergy FSCN-STC; consolidate physics and mathematics groups; adj profs

Table 1 Summary of Strategic Actions.

3.3. ARC13 assessment of STC

The STC centre is nationally well recognized, conducting innovative and multidisciplinary technology research in electronics and computer science. The centre produces highly innovative research of very good quality and very good productivity in excellent cooperation with a large number of industrial partners. The impact on society is very good for STC and regarded as excellent for electronics.

From an international perspective, STC is non-traditional in the sense that pure electronics and computer science as disciplinary research subjects are less pronounced in favour for a more industrial information technology identity. This profile, however, gains support from the evaluators. At the same time the evaluators express the need for STC to broaden its research base. The latter recommendations are especially directed towards the area of computer science which can partly be understood by the UoA structure in ARC13.

The research subject was divided into two UoAs (RF8 Computer Science and RF6 Information Systems). From a subject perspective the STC part, RF8, should maybe have been named computer

engineering rather than computer science. The international view of computer science does not fully match our research profile within computer engineering and ignores the strategic context of the joint research environment of FSCN and STC. We were not evaluated as one unit because consistency across the university required that the assessment was done on the scientific disciplines and research centres. Thus, the expert did not have access to the full picture, and could not fully appreciate the strengths and relevance of the chosen strategic direction of STC. The same could be said by the review team of FSCN but here the emphasis on the need of transformation are supported by the current mainstream perspective and the engineering physics research field, with the closest relations to STC, provided a strategic opportunity in favour by the review team.

The strategic vision of STC must be different from that mainstream IT research centres. There are several reasons for this:

- Our geographic position and the synergies with FSCN calls for an industrial profile which is not mainstream IT.
- A 'me too' ambition is not easy to pursue with impact on the international arena of IT.
- Co-production with non-traditional industrial partners is important for our ambition to enable industrial transformation through the integration of IT in industrial processes and new augmented products.

Instead of the mainstream approach, STC is pursuing a role as an enabler for industrial transformation, bridging the gap between traditional and emerging industrial sectors.
STC needs to position itself on the international arena as a centre. Several research groups in STC have an international position, but the centre as such has so far not pursued such visibility.

3.4. ARC13 assessment of FSCN

The FSCN centre is nationally and internationally well recognized, bringing together broad expertise and excellent infrastructure to create a critical mass and relevant research strategy and direction. It has exceptionally strong co-production and impact on the traditional paper industry, and holds unique opportunity for renewal through engineering physics.

FSCN conducts research of very good quality. The production rate is equally very good and with very good production rate. The centres strategy process works well, being strongly supported by capable members from collaboration companies in the FSCN steering group. The efforts to refocus FSCN towards advanced biomaterials, non-traditional industrial networks and interaction with industrial design needs to be accelerated.

The centre needs strategies for publication that includes both industrial and high-level academic journals to ensure success in a broad range of funding programs and increase international collaboration. The centre also needs to include strategy for to evaluate the research program with future scenario process, and to further consolidate MIUN expertise and infrastructure into FSCN strategy.

The FSCN centre has a position well in-line with the strategy of the Mid-Sweden University i.e. taking advantage of regional strengths on an international level to provide visibility and impact. However, this strength is also a weakness. In the TIE Vision this is indicated by stating that opportunities need to be addressed from the global perspective. As the global competitiveness of the industrial base in the region is challenged, so is also the position of FSCN. Hence the Strategic Initiative **KM2** and the development area "New Cellulosic Materials" are very important.

Nevertheless, the regional strength of the research field makes it possible to recruit strong researchers at an international level. This is an important advantage for FSCN. On the other hand care is needed

to renew the competence of the centre to support the much needed industrial transformation in the sector.

The FSCN evaluation report, like that of STC, lacks input regarding the opportunities given by the collaboration with STC and the research groups in the disciplines of electronics and computer engineering. This lack can be understood since the material prepared for the review covered years 2007 – 2012. On the other hand, the expert panel gave highest marks on scientific excellence to the UoA of Engineering Physics which has several strong collaboration areas with researchers at STC.

4. Development goals for the period of 2015 – 2017

When considering the new development goals we first gathered the issues discussed in the previous Chapter and in the Progress Report 2014, and then organized the development needs according to the long-term goals (Appendix A). We used the same structure as in Chapter 2, i.e. separate external impacts and internal development. Sections 4.1 and 4.2 present the all the conclusions. The most important development goals can be summarized with the following list:

Goal #1: Stronger research profile nationally and internationally

The key instruments to fulfil this goal are the Strategic Actions **e2mp**, **FORIC**, **EISS** and **KM2** and the development of strong research on "New Cellulosic Materials" and "Measurement Systems".

Goal #2: Systematic development of personnel resources

We will develop and start implementing a systematic recruitment plan on senior level. The focus will be in recruitments that support the strengthening of our research profile as defined above.

Goal #3: Broader and deeper co-production

We will nurture broad and intensive industrial collaboration and competence development related to the Strategic Actions and build industrial networks to guide the planning of research in the two development areas. We will also develop new industrially relevant education programs that are connected to our research.

Goal #4: Efficient organization characterized by a well-functioning quality system

Particularly important is to engage researchers in strategy development.

4.1. Efforts towards Transformation of the Industrial Ecosystem

Co-production and industrial networks

Development of industrial networks and co-production continues to be a highly important development area. We rank it #3 among the goals because in many areas we have already reached a good level in co-production. Broadening and strengthening the industrial (and academic) networks are important for success in **KM2** and **EISS,** and for development of research agendas in the two development areas, "New Cellulosic Materials" and "Measurement Systems". Non-traditional industrial networks towards advanced biomaterials were called for FSCN in ARC13. **FORIC** makes an important contribution in this direction. At STC, stronger industrial network is needed especially in the selection of future applications of "Measurement Systems". Hence we will

Nurture broad and intensive industrial collaboration in e2mp and FORIC, increase the breadth and depth of industrial collaboration in EISS and KM2 and build industrial networks to guide the planning of research for "New Cellulosic Materials" and "Measurement Systems".

This applies irrespective of the funding source. We will also establish new industrially relevant education programs that are connected to our research. We use the following measures to quantify the extent of co-production and the value delivered to industry:

- Recruit new adjunct professors from new industrial sectors (at the pace of 1-2 new per year)
- Continue to deliver on average 10 researchers p.a. (licentiate or PhD) to industry and society
- Increase the enrolment of industry-employed students to 5 by 2017 using the Master-by-Research model developed in **FLEX**.

Regional development and growth

In this area (long-term goal TIE3 in Appendix A) we have several processes in good progress, see Appendix C for the current plans. The measures for success by 2017 are:

- The long-term funding of Bio Business Arena has been secured.
- The innovation projects, demonstrators and showcases together with the city of Sundsvall have attracted national attention.
- New regional development projects (Mål 2) with broad partnerships have started and support our Strategic Actions.

Education system

The development of new educational programs (long-term goal TIE4 in Appendix A) progresses well and will improve support to FSCN's research. New major actions are not planned. The development is led by the Faculty Board. This includes the continued development that is needed in graduate education. We expect that our joint research environment will benefit from the new educational programs, including the model developed in the **FLEX** project, through the production of students who can continue as graduate students. The progress will not yet be visible during the next 3-year period.

4.2. Development of strong organization

Strong Research Profile

Research content is the most important part in the development of every research organization. For us this development challenge (long-term goal TIE1 in Appendix A) is closely related with international collaboration and mobility (long-term goal TIE5). Therefore we explicitly express the international dimension in Goal #1.

In the three Strategic Actions that are already running, we naturally aim to deliver the results specified for each of them. The new Strategic Initiatives **EISS** and **KM2** are important efforts to *strengthen* our research profile in Embedded Sensors and Nanomaterials Systems. For **EISS** the main task is to secure the funding, while for **KM2** the research agenda still needs work. We expect that **KM2** will receive funding from several sources nationally, regionally and internationally, among others through the Strategic Research and Innovation Area **New bio-based Materials, Products and Services.**

The development areas "New Cellulosic Materials" (tentative name) and "Measurement Systems" have potential of also building strong research identity for us, but this will take some time. The first task is to work on the research agenda.

The key instruments to fulfil this goal are the Strategic Actions e2mp, FORIC EISS and KM2 and the development of strong research on "New Cellulosic Materials" and "Measurement Systems".

The strength of a research organisation can be measured by its output, its international visibility and its ability to attract funding. We discuss visibility under the next subheading that concerns internationalization. Regarding the output, our target continues to be to publish more in high-quality journals. This is also in line with recommendation from ARC13; to strengthen fundamental research. In order to emphasize the importance of high-quality publications, we will require for every Research Action a short publication plan with targets for relevant applied forums and high-quality scientific journals. We will set up a list of high-quality journals.

Regarding funding as a quality measure, the success with VR and FORMAS applications is a good indicator. We believe that our joint research environment as a whole must first increase its visibility in academically exciting research before real improvement in VR or FORMAS applications can be expected. Therefore progress can reasonably be expected first in the next 3-year period. We naturally continue to develop useful support to these applications.

The measures for progress in publication quality by 2017 are:

- All Research Actions, starting with the Strategic Actions have a publication plan.
- Increasing trend is shown over the coming three years for publications in high-quality journals that will be defined and backtracked.
- To balance the high quality ambition, it is sufficient to maintain the current mean volume of publications relative to funding volume.

International research collaboration and mobility

International collaboration and mobility (long-term goal TIE5 in Appendix A) are possible only in strong research areas. Therefore, as explained above, internationalization and building stronger research profile cannot be separated. Instead, together they form Goal #1. The time-span of development is longer than single projects. The highest expectation must therefore be put on the three areas where we have or aim at a leading position, i.e. High-yield Pulping, Embedded Sensors and Nanomaterials Systems (Chapter 3.2). In High-yield Pulping we already have a very strong position and this shall be maintained. In the other two areas, more visibility in important conferences, recognized publications and in contacts with the most important national and international research units must be developed. The strategic initiatives **EISS** and **KM2** should be used as platforms to meet these goals. In the other parts of our research, the evolution of research agenda will also set the ambition level. Thus we must require this in the next 3-year period:

International collaboration and mobility increases, especially in Embedded Sensors and Nanomaterials Systems

Following actions are planned to support the expected increase in internationalization and mobility:

- Recruit and maintain on the average two high-profile international visiting professors.
- Increase the number of international post-docs (i.e. 1-2 year term) from current 0 to 4 per year.
- Plan and implement a support program for the outward mobility of MIUN researchers.

The measures selected to demonstrate success by 2017 in this area are:

- Increased funding volume to international projects
- Increased number of international visitors (including short visits for seminars etc.).

Personnel resources

Good personnel resources are the prerequisite of any strong research unit (long-term goal TIE1 in Appendix A). Five senior-level retirements will occur within our joint research environment by the end of 2020: two from mechanical pulping and three from materials technology. Economic constraints in previous years have prevented recruitments which is why we have selected this as Goal #2:

Develop and start implementing a systematic recruitment plan on senior level.

The goal with new recruitments will in general be to strengthen our research profile. Robust strategic motivations are needed when choices are made between the areas that already are strong and those that have the potential to become such. Aside from the strategic recruitments of senior researchers, we can also strengthen the personnel resources through:

- Increased coherence within the joint research environment as demonstrated by projects that engage different research groups, including projects that engage both FSCN and STC.
- Use MIUN funds to recruit graduate students to strengthen our research profile.

Efficient organisation

Well-functioning organization is the final requirement (Goal #4) that we define for a strong research environment. The further development of the organization concentrates on the quality system where development is especially needed in the processes for strategy development and communication. The process should build understanding of and engagement in the development of the strategic goals of research. The understanding about the earning logics, business models and strategies of enterprises and industries can be shared across the entire organization.

A future scenario analysis related to the implications of industrial transformation would be highly valuable but also requires more maturity of the organization, broader industrial contacts, seasoned Reference Groups and competent process support. The main point is that:

The development of strategies and Future Scenario Analyses engage the entire research environment.

Progress in the organizational development by 2017 is measured through the following measures:

- Lower cost in project planning and higher success rate of funding applications.
- Systematic increase in the internal communication and external visibility of our joint research environment.

Appendices

Appendix A: Long-term strategic goals (TIE)

The 10-year goals of the TIE Vision are summarized in the following table. For clarity, a short title has been added to each of the five goals. We interpret the goals in a slightly sharpened way in order to better separate them from one another. Thus, the concern in *TIE 1* is on the "permanent" personnel while *TIE 5* connects internationalization with mobility. With *TIE 2* we want focus on developing our profile as a leading research organisation. In *TIE 3* the creation of new ventures is seen as part of the development of the regional ecosystem. In the table below, the corresponding adjustments have been made to the funding sources while the text of the goal itself has been left intact.

Long term goal – 10 years perspective	**Strategic funding partner**
TIE 1 Resources: The environment has attracted the research competence needed to stand strong as an attractive research institution in the selected profile area. (organisational)	Strategic recruitments and Prospect (KKS), Sundsvalls kommun, Län, Tillväxtverket
TIE 2 Leading: The environment is regarded as one of the leading research and innovation locations in the targeted area. The research has a strong influence in the research community as well as in important industrial networks. Large visibility at the most important conferences, well recognized publications and established contacts to the most important competence environments. (scientific)	Vinnova, VR, SSF, Tillväxtverket, Sundsvalls kommun, Industrial research grants (national and international), KKS (HÖG/Profil), EU
TIE 3 Start-ups: The environment attracts business angels and venture capital investing in new ventures from our research and education. (collaboration and innovation)	Innovationsbron, Vinnova, Business angels and venture capital, industrial contracts, Sundsvalls kommun, Län, Tillväxtverket
TIE 4 Education: The education programs related to the environment is attractive and young students compete to take part in the development. Well established master by research education in collaboration with leading industrial networks attracts good international students from all over the world. (organisational and collaborative)	Partner industries and industrial networks, partner universities (ex KTH, SU)
TIE 5 International: The environment attracts international collaboration and exchange programs with leading academic institutions and leading industry. The environment takes part in shaping the future research agenda for both national and international research programs. (scientific and collaborative)	Visiting professors (KKS), EU Horizon 2020, Vinnova, STINT,-EU Interreg, Mobility (EU)

Appendix B: Development goals for 2012-2014 agreed between Knowledge Foundation and MIUN

Mittuniversitetets avsikt är att utnyttja det instrument som KK-stiftelsen ger via KK-miljön som en drivande kraft för att utveckla universitetets forskning inom ramen för KK-miljöns strategi Transforming the Industrial Ecosystem – TIE. I Mittuniversitetets omland finns rika naturtillgångar av förnyelsebara skogsråvaror, hållbar energi och rent vatten. Regionen har också utvecklat avsevärd kompetens inom industriella processer, IT och digitala tjänster. I arbetet med att stärka och vidareutveckla forskningsmiljön under treårsperioden kommer följande delområden att vara speciellt prioriterade:

- Resurssnål skogsindustriell produktion (material, energi, miljö)
- Rengöring av processvatten som en källa till värdefulla material
- Avancerade förnyelsebara pappersmaterial
- Sensorbaserade system och tjänster för ett hållbart samhälle
- Industriell IT för utveckling av en effektiv och hållbar industri

KK- miljön vid Mittuniversitetets mål för åren 2012-2014

Profilering och kvalitetsutveckling

Mål: Att profilera KK-miljön som en internationellt framstående forskningsmiljö

- Att profilera forskningen inom industriell IT till en nationellt ledande miljö inom sensorsystem för effektivare och miljövänligare energiproduktion och energianvändning.
- Att bredda skogsindustriella forskningen genom att öka och konsolidera forskning om avancerade pappersmaterial i 1-2 inriktningar som öppnar nya tillämpningsområden för pappersbaserade produkter.
- Att öka andelen publiceringar i journaler av högre kvalitet.
- Att genomföra systematisk kvalitetsutveckling av forskarutbildningen.
- Att bli tydlig i kommunikationen om Kk-miljöns strategi och identitet till omgivande samhälle och företag, liksom till forskningsfinansiärer (kommunikationsprocess i samverkan med regionen).

Synergier och miljöutveckling

Mål: Att baserat på den gemensamma strategin TIE öka forskningssynergier och utveckla miljöernas respektive styrkor enligt

- Augmented functionality:
  - Att skapa utökad funktionalitet på fiberbaserade material
- Effektiva processer:
  - Att effektivisera industriella processer genom att i realtid interagera med processen.
  - Att skapa kunskap om växelverkan mellan processteg i industriella tillverknings-system.
- Förnyelsebar energi:
  - Att skapa lösningar för effektiv och säker producering och användning av förnyelsebar energi.
- Ren miljö:

- Att säkerställa kontinuerlig uppföljning av miljövärden.
- Att utveckla teknologi för att rengöra processvatten.
- Att utveckla teknologi för att ersätta miljöfarliga kemikalier med biobaserade alternativ.

Samproduktion med befintliga och nya partners

Mål: Att utveckla formerna för samproduktion både vad gäller fördjupade relationer med existerande partners och breddade relationer med nya kompetenskluster och applikations-områden

- Att rekrytera adjungerade professorer med inriktning mot gröna produkter, processer och intelligenta tjänster.
- Att FSCNs styrgrupp utvidgas mot andra material och bioenergi.
- Att industridoktorander från olika branscher erbjuds en sammanhållen miljö.
- Att säkerställa kompetensförsörjning inom industrin genom hög examinationsgrad (ambitionsnivå 8-10 år) av licentiater och doktorer.
- Att skapa tydliga strukturer för uppföljning och utvärdering av resultat, insatser och strategier vad gäller samproduktion, utveckling av internationella nätverk och allianser, samt åtgärder för breddad finansiering av KK-miljön.

Appendix C: Regional networks

We use the regional innovation systems and collaborations as a platform for networking, development of start-ups, and demonstration of new concepts in the following manner:

Fiber Optic Valley

- Connection to IT companies for **EISS**.
- Fibre optical and laser competence for emerging **KM2** products.
- Commercialization of and need for new technologies in "Measurement Systems".

Bio Business Arena

- The first task we are involved in is to secure the funding of BBA by the end of 2015.
- Forum to identify industrial competence needs that **FORIC**, **FLEX** and the engineering education programs can supply solutions for.
- Connections to companies that can contribute to the planned research agenda of "New Cellulosic Materials".

Processum

- Support spin-offs projects from **e2mp**.
- Connection to biorefinery companies and regional cluster that can contribute to the planned research agenda of "New Cellulosic Materials".

The city of Sundsvall

- Attract new skills and competences to the region.
- Initiate transformation oriented innovation projects, demonstrators and showcases.
- Strengthen the educational programs in engineering to support transformation and competitiveness in industry.

Appendix D. Development agreement for 2015-2017 between Knowledge Foundation and Mid Sweden University

Dnr Mun 2013/390

KK-stiftelsen

Treårsplanering

Projekt (nedan kallat ”Projektet”)	Treårsplanering 2015-17 (Bilaga 2A till ramavtal för KK-miljön vid Mittuniversitetet)
Projekthuvudman	Anders Söderholm
Projektledare	Hans-Erik Nilsson
Diarienummer	20110292*
Projekttid	2015-01-01—2017-12-31

*Diarienummer skall alltid anges vid kommunikation med KK-stiftelsen

PARTER

Mittuniversitetet (nedan kallat ”Lärosätet”) 851 70 Sundsvall Organisationsnummer: 202100-4524	Stiftelsen för kunskaps- och kompetensutveckling (nedan kallad ”Stiftelsen”) Mäster Samuelsgatan 60 111 21 Stockholm Organisationsnummer: 802400-4213

Stiftelsens noteringar	
Ramenhet KKS	
Utlysningstillfälle	
Underskrift ansvarig handläggare	

KKS100 v2.0 2007-12-06

Denna överenskommelse inbegriper följande:

AB MD

1 Introduktion

För reglering av Treårsplaneringen av arbetet i KK-miljön vid Mittuniversitetet har mellan Stiftelsen och Lärosätet träffats följande avtal. Avtalet är en bilaga (2B) till RAMAVTAL för KK-miljön vid Mittuniversitetet, dnr 20110292

2 Treårsplanering

Syftet med denna överenskommelse om Treårsplanering är att skapa realistiska och uppföljningsbara mål för Lärosätet inom KK-miljöprogrammet. Målen ska skapa stabilitet i högskolans planering och därmed inte behöva omförhandlas varje år. Målen ska utvärderas och omförhandlas efter tre år.

Verksamheten inom de av KK-stiftelsen finansierade delarna i KK-miljön sker genom insatser. Insatser är forskningsverksamhet och utbildningsverksamhet (på avancerad nivå och forskarnivå). Dessa ska vara kvalitetssäkrade i KK-miljöns kvalitetssäkringssystem. Insatserna dokumenteras i och styrs av separata avtal för respektive insats.

3 KK-miljöns mål

Mittuniversitets avsikt är att utnyttja det instrument som KK-stiftelsen ger via KK-miljö programmet som en drivande kraft för att väsentligt öka profilering av universitetets forskning genom att samla ihop forskning som drivs av forskningscentra FSCN och STC. Målsättningen är att universitetet kraftigt bidrar till regional utveckling och tillväxt, i enlighet med visionen *Transforming the Industrial Ecosystem - TIE.*

Vår vision *TIE* utgår från att i Mittuniversitetets omland finns rika naturtillgångar av förnyelsebara skogsråvaror, hållbar energi, och rent vatten. Regionen har också utvecklat avsevärd kompetens inom skogsindustriella processer, IT och digitala tjänster. För sin del har Mittuniversitet förutom dessa områden stark forskning även inom nya material och starka utbildningar inom design. Genom att utveckla forskning som binder ihop förnyelsebara råvaror, informationsteknologi och materialteknologi kommer Mittuniversitetet att kraftigt bidra till regional utveckling och tillväxt inom skogsindustri, IKT och andra relaterade industriella sektorer.

Internt kommer utvecklingen att bilda en kraftig och sammanhållen identitet och profil för Mittuniversitetets forskning. Vi vill låta denna identitet växa upp genom konkreta stora forskningsinsatser som vi kallar Strategic Actions. Dessa insatser utgör kärnan av vår forskning och omges av mindre projekt som på ett dynamiskt sätt ger ökad kraft på viktiga specialfrågor eller utvärderar lovande nya forskningsspår. I arbetet med att stärka och vidareutveckla forskningsmiljön under treårsperioden kommer följande forskningsområden att vara prioriterade:

- Resurssnål skogsindustriell produktion och bioekonomi (especially Strategic Actions **e2mp** and **FORIC**)
- Inbyggda sensorsystem (Strategic Action **EISS**)
- Förnyelsebara energisystem genom stora ytor (Strategic Action **KM2**)
- Nya cellulosamaterial (utvecklingsområde)
- Mätsystem (utvecklingsområde)

KK-miljön vid Mittuniversitetets mål för åren 2015 – 2017 är:

Goal #1: Stronger research profile nationally and internationally

The key instruments to fulfil this goal are the Strategic Actions **e2mp**, **FORIC**, **EISS** and **KM2** and the development of strong research on "New Cellulosic Materials" and "Measurement Systems".

The measures for progress in this area are:

- Increase the number of publications in high-quality journals (determine first criteria and reference).
- Recruit and maintain on the average two high-profile international visiting professors.
- Increase the number of international post-docs (i.e. on 1-2 year term) to 4 per year, from currently no one.
- Plan and implement a support program for the outward mobility of MIUN researchers.
- Increase the share of funding received for international projects.

Goal #2: Systematic development of personnel resources

We will develop and start implementing a systematic recruitment plan on senior level. The focus will be in recruitments that support the strengthening of our research profile as defined above.

The measures for progress in this area are

- Increased coherence within the Research Environment as demonstrated by projects that engage different research groups, including projects that engage both FSCN and STC.
- Use of MIUN funds to recruit graduate students in the areas defined above as soon as they provide strong environment.

Goal #3: Broader and deeper co-production

We will nurture broad and intensive industrial collaboration and competence development related to the Strategic Actions and build industrial networks to guide the planning of research in the two development areas. We will also develop new industrially relevant education programs that are connected to our research.

In order to quantify the extent of co-production and the value delivered to industry we use the following measures:

- Recruit new adjunct professors from new industrial sectors (at the pace of 1-2 new per year).

- Continue to deliver on the average 10 researchers per year (licentiate or PhD) to industry and society.
- Increase the enrolment of industry-employed students to 5 by 2017, using the Master-by-Research model developed in the project **FLEX**.

Goal #4: Efficient organization characterized by a well-functioning quality system

Particularly important is to engage researchers in strategy development.

The measures for progress in this area are

- Improved processes for strategy development and communication that builds understanding of and engagement in the development of the strategic goals of research.
- A future scenario analysis related to industrial transformation.
- Lower cost in project planning and higher success rate of funding applications.
- Systematic increase in the internal communication and external visibility of the Research Environment.

4 KK- stiftelsens åtagande

KK-stiftelsens mål för KK-miljöprogrammets för åren 2015-2017 är att:

- Bidra till Mittuniversitetets profilering genom finansiering av kvalitetssäkrade insatser för forskning och utbildning på avancerad och forskarnivå efter granskning och bedömning av de årliga verksamhetsplanerna.
- Mål och genomförandeplan för nästkommande period av KK-miljöprogrammet, 2018 – 2021, ska vara fastlagt.
- Bidra till genomförandet av en studie av effekterna av Mittuniversitetets KK-miljösatsning för lärosätet såväl som för samproducerande näringsliv.

5 Treårsplaneringens upphörande

Detta avtal ska löpa från den 1 januari 2015 till och med den 31 december 2017, vid vilken tidpunkt överenskommelsen automatiskt upphör. För ramavtal och avtal gällande insatser regleras upphörande i respektive avtal.

Part äger rätt att säga upp denna överenskommelse till omedelbart upphörande:

- Om den andra parten väsentligen bryter mot sina åtagande enligt detta avtal.
- Om den andra parten i övrigt bryter mot sina åtagande enligt detta avtal och inte inom tre (3) månader efter en skriftlig anmodan att vidta rättelse vidtagit sådan rättelse.
- Om Stiftelsen efter sina egna bedömningar, studier, granskningar eller utvärdering finner att KK-miljön inte utvecklats i enlighet med de mål som beskrivits i

verksamhetsplanen och/eller inte förmått att realisera de insatser som beslutats om.
- Om Stiftelsen eller av stiftelsen utsedd tredje part nekas insyn, oavsett skäl, i KK-miljön enligt punkt sju (7) nedan

Uppsägning av avtal ska ske skriftligen. För det fall detta avtal upphör ska även parternas åtaganden i enlighet med ingånget RAMAVTAL och ingångna avtal gällande insatser omprövas.

6 Ansvar för Treårsplaneringen

Lärosätet svarar för att Treårsplaneringen genomförs mot mål i enlighet med punkten 3 i detta avtal.

Vid ett byte av projektledare eller inför andra väsentliga förändringar i Treårsplaneringen ska skriftligt godkännande ovillkorligen inhämtas från Stiftelsen. Detta ska i normalfallet regleras i verksamhetsplanen som årligen lämnas till Stiftelsen.

7 Stiftelsens insyn

Stiftelsen äger rätt till all insyn i Treårsplaneringen som Stiftelsen anser erforderlig.

8 Utvärdering och revision

Stiftelsen kan komma att utvärdera Treårsplaneringen snarast efter avslutande. Stiftelsen äger rätt att utvärdera KK-miljöns verksamhet även vid andra tidpunkter.

Stiftelsen kommer att genomföra olika typer av studier, granskningar och utvärderingar bland annat i syfte att utveckla och förbättra Treårsplaneringen.

Lärosätet ska medverka vid ovanstående verksamhet genom att tillhandahålla upplysningar, lämna information om resultat samt i övrigt aktivt medverka för att KK-miljön ska kunna utvärderas på bästa sätt.

9 Ändrade förutsättningar

Alla ändringar och tillägg i detta avtal ska för att äga giltighet upprättas skriftligen.

Vid väsentligt ändrade förutsättningar och då Stiftelsen och Lärosätet inte kan enas om innehållet i ett avtal, äger stiftelsen bringa detta avtal att upphöra med omedelbar verkan.

KS NS 89

10 Arbetsgivar-, uppdrags- och bolagsförhållanden

Lärosätet äger inte i något sammanhang företräda Stiftelsen eller agera för Stiftelsens räkning. Stiftelsen är inte i något fall arbetsgivare eller uppdragsgivare för i Treårs-planeringen anställda eller anlitade personer.

Stiftelsens stöd till Treårsplaneringen är inte att tolka som att Stiftelsen inlett samverkan i bolag med Lärosätet eller annan i Treårsplaneringen medverkande eller som att Stiftelsen i annat fall deltar i genomförandet.

11 Överlåtelseförbud

Rättigheter och skyldigheter i detta avtal kan inte överlåtas.

12 Villkor för avtalets ikraftträdande

Avtalet träder i kraft då det i sin helhet returneras och inkommit till Stiftelsen med erforderliga underskrifter och övriga ifyllda uppgifter senast 2014-10-15.

13 Underskrifter parter

Detta avtal har upprättats i två exemplar varav parterna tagit var sitt.

Stockholm den 13 okt 2014

Stiftelsen för kunskaps- och kompetensutveckling

Madelene Sandström
Verkställande direktör

Sundsvall den 8/10 - 14

Mittuniversitetet

Anders Söderholm
Rektor

Mittuniversitetet

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