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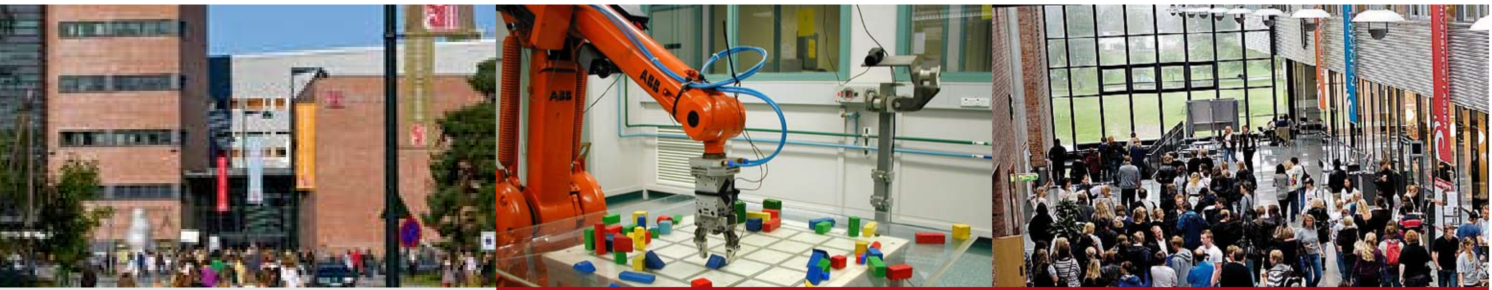

CSI ADVISORY SERVICES | PROJECT REPORT

Assessing the Impact of the Mechatronics Programme at the University of Agder

A Social Return on Investment Report to the Competence Development Fund of Southern Norway

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Sørlandets Kompetansefond

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Preface

The Competence Development Fund for Southern Norway, or Sørlandets Kompetansefond (SKF), has been giving substantial grants for the development of the Mechatronics Programme at the University of Agder (UiA) since 2007.
As a regional foundation, we have started funding activities in 2001 and have granted, by 2011, over 330 million NOK to competence building projects in Vest-Agder county. We took the 10th anniversary as a reason to look back and analyse what we have done and how we have possibly been able to contribute to protect and create jobs and good living conditions in Vest-Agder.

We commissioned the Centre for Social Investment (CSI) of University Heidelberg, Germany, to do this evaluation study of SKF past activities. In particular, the CSI team undertook detailed analyses of several key SKF projects, among them the Mechatronics programme at UiA.
The present study uses an approach which is increasingly used by philanthropic institutions to learn about the social effects of their funding and to account for their activities towards the public and their stakeholders: the Social Return on Investment (SROI) approach. As a result, we can now shed light on a number of positive social effects for the region which are created through UiA Mechatronics programme.

Funding the University of Agder is part of SKF's strategic approach to regional development. With our support for UiA Mechatronics we not only support academia – but we help to foster the relationships between academia and practice, in particular with the companies from the regional oil and drilling industry organised in the NODE cluster.
The results of the study presented in this report can show to what extend the Mechatronics Programme creates a positive social impact on the county of Vest-Agder.

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Managing Director
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Kristiansand, November 2012

Executive Summary

Mechatronics, i.e. the combination of mechanical and electronic engineering, is a comparatively new engineering discipline. It began to gain popularity in the mid-1980s, and has been taking a focus on communication technology since the 1990s. Since the 1990s, European Universities have been increasingly starting to offer Mechatronics programmes (Grimheden & Mats Hanson 2005).

University of Agder, Campus Grimstad, where the Mechatronics Programme is located

The Mechatronics programme at the University of Agder (UiA), set up in 1988 and sharply growing since 2007, was the first study programme in this engineering discipline in Norway – and is still the only one in Norway to date. It has three main academic focuses: engineering sciences, hydraulic / electric actuators and electronic control systems / automation. In addition, the UiA programme has two professional focuses: product design and materials technology.

With this skill set, the UiA Mechatronics programme is highly valued by the engineering companies in the region. The Mechatronics programme therefore collaborates closely with the regional companies, above all those from the '**Norwegian Offshore Drilling and Engineering' (NODE) cluster**. They work together to develop new study courses and to organise an exchange of HR (professors, researchers, lecturers at UiA from NODE companies). Ph.D.s are doing research in collaboration with NODE firms, and the NODE firms offer training opportunities for students (e.g. thesis, internships). The firms provide funds and donations in kind to UiA (e.g. lab equipment donations from National Oilwell Varco, ABB, Det Norske Veritas worth 3.5 million NOK), and UiA and firms share facilities such as labs to reduce costs and gain efficiency.

In order to develop the Mechatronics programme, the regional development foundation **Sørlandets Kompetansefond (SKF)** (in English the 'Competence Development Fund for Southern Norway'), has been contributing, jointly with other investors, to the funding of the UiA. SKF therefore has commissioned Heidelberg University's Centre for Social Investment (CSI) to analyse the social impact of the Mechatronics programme at UiA to the region of Agder.

The study: Our analysis focused on investigating different kinds of impact of the Mechatronics programme on different stakeholder groups:

- We identified four main beneficiaries: the region, the students, the university and the companies.
- Through theoretical analysis and interviews with representatives from the University of Agder we identified and refined relevant impact dimensions for these stakeholder groups.
- We developed a feasible quantification approach for any of those effects that we deemed to be measurable.
- Necessary data was collected via desk research and an online questionnaire survey among all current Mechatronics students and all graduates. In total more than 50 Mechatronics graduates and more than 60 current Mechatronics students took part in the study.

Social Return on Investment Overview

Project / Institution	University Mechatronics programme at the University of Ager (UiA), Kristiansand/Grimsdal, Southern Norway
SROI sponsor	Sørlandets Kompetansefond, Kristiansand, Southern Norway

1. Investment

Quantifiable		Non-quantifiable/ too hard to quantify
Monetisable	**Non-monetisable**	
▪ UiA Mechatronics budget ▪ Working time invested in starting and developing the programme by – UiA non-Mechatronics staff (e.g. recruiting efforts) – NODE companies (Could not be assessed)	–	▪ Commitment & networks of people starting/developing the programme (incl. UiA non-Mechatronics staff; NODE companies staff) ▪ Commitment of staff & students

2. Stakeholder & Outcome Analysis (selection)

Stakeholders	Outcomes	Indicators/Proxy	Type of data	Comment
Students	▪ Improved job options ▪ Improved study options/education	– time to job-entry – wage level	▪ quantitative ▪ monetised ▪ not checked	limited space in survey
University	▪ Academic productivity ▪ Increase in student numbers ▪ Relevance/visibility	– publication points – student numbers – fundraising success	▪ monetised ▪ quantitative ▪ not checked	no access to monet. data no access to data
Local firms	▪ Increased recruiting potential ▪ Reduced training costs Reduced time to-productivity ▪ Cost reduction via lab facility sharing; reduced R&D costs; outsourcing of basic costs)	– absolute # graduates – training costs time-to-productivity – lab/facility costs R&D costs	▪ quantitative ▪ qualitative ▪ quantitative ▪ not checked	no access to quant. data no access to monet. data no access to data
Region	▪ Population increase – consumption (students) – Increased local profits – Subsequent effects – Increased tax revenues – Increased demand for culture	– stud. loans+consumption rate – regional spending rate – multiplier model – VAT on consumption – culture spending rate	▪ monetised ▪ monetised ▪ monetised ▪ monetised ▪ monetised	

3. Returns

Quantifiable		Non-quantifiable
Monetisable	**Non-monetisable**	
▪ **Mechatronics students** (compared to fellow engineering students): no higher wage levels ▪ **University of Agder**: national funding of ~50.000 NOK/year for academic publications ▪ **Region** (effects through 449 additional students living 3 BA-years in Agder): – Additional local economy profits: 19 million NOK and regional surplus VAT share of 1.5 million NOK – Additional demand for culture: 11 million NOK. – Total effect (multiplier model): 390 million NOK ▪ **SROI for the Agder Region: 2.05** i.e. the generated value for the region amounts to more than the double of the invested costs Note: The SROI value is the expected value for a range from 0.20 (conservative calculation) to 3.9 (including subsequent consumption effects).	▪ **Mechatronics students** (compared to fellow engineering students): no shorter time to job entry; no reduction of on-the job training time ▪ **University of Agder:** student numbers: slightly above average increase in students (13% to 10 %); academic output: 62 % more publication points in 2010 compared to 2006 =18% above national average; staff: number of FTE increased by 13% (this equals national average) ▪ **Local firms:** Hiring of 100% of the additional UiA graduates produced by the Mechatronics programme	▪ **University of Agder:** increased reputation and visibility (e.g. they receive inquiries for cooperation from more established Norwegian universities) ▪ **Local firms:** no time-savings as for on-the-job training (time-to-productivity effect might be limited due to high degree of specialization in the oil and gas industry) ▪ **Mechatronics students:** satisfaction with quick career entry in the local industry

■ Applying the data to our model we could reveal the existence of an effect and its size. We could thus monetise this effect and compare it to the costs yielding a Social Return on Investment (SROI) coefficient.

The results of the study are summarised in figure 1 (previous page). Our main finding is that the Mechatronics programme has a positive effect on the region by successfully increasing the local population. In our survey among the Mechatronics students and graduates, 60% of the students state that they live in Agder because of the Mechatronics programme. Extrapolating this means that since its inauguration UiA Mechatronics has attracted a total of 449 additional students to Agder for the 3-years bachelor degree programme. Based on the typical student loan by the Norwegian State Educational Loan Fund this yields a total additional spending power in the region of 121 million NOK. It follows that student consumption contributed additional local profits of 19 million NOK, and additional tax revenues of nearly 1.5 million NOK were generated (value-added tax on consumption). Given these calculations, we used a multiplier model based on subsequent consumption of the students in order to estimate a total effect of the Mechatronics programme to the region of 390 million NOK. Summing up, the region profits from a large increase in consumption spending by the additional students, which raises local profits and tax revenues.
For the calculation of the SROI coefficient, we sticked with the regional perspective, since there were strong difficulties with monetising the effects for students, the university, and the local firms. The results opened up a range between a conservative regional SROI coefficient of 0.20 and, including subsequent consumption effects with a multiplier model, of 3.9. Since we can assume the total effect of UiA Mechatronics bigger than just the effect on the region, the coefficients are to be understood as lower bounds. Assuming a uniform probability for every value in the reported range, an expected value of **2.05** can be computed.
This indicates that the value generated by the Mechatronics programme for the region amounts to more than the double of the invested costs.

Conclusion: In our impact analysis study on the Mechatronics programme, we could show that SKF obviously has invested into a structure which is very successfully generating social value to the region.
It is interesting from the perspective of the foundation that the main effect that we could empirically trace is the positive effect on the region through the increased number of students that come to live in Agder. This effect does not seem to be necessarily connected to the subject of Mechatronics. It rather appears that Mechatronics has been a good choice at the right time to realise a successful development of the University. It seems that the positive effect of the programme could be repeated by funding extensions of further capacities at the engineering faculty of UiA more generally speaking – provided that other subjects could be established, and if so, were performing equally well as the Mechatronics programme obviously does. The key question is that of the absorption capacity of the local industry, which not only is critical for the employment effect, but – indirectly – for the effect of attracting additional students (or keeping young people for studying where they were born).

The general conclusion is that the impact of Mechatronics funding was particularly high because it was part of the SKF Value Creation Cycle (cf. page 16).

Introduction to the SROI Approach

How can you determine a "Social" Return of Investment?

1 The Classic SROI Model: Economic, Socio-Economic, and Social Benefits

The 'Social Return on Investment' approach (SROI) helps to determine the 'social value' generated by an activity or organisation. Typically, there is a "social investor" like a foundation, a public institution or a company engaging in Corporate Social Responsibility (CSR). The SROI approach views the activities of such institutions as 'social investments' and portrays their positive effects in terms of a 'social return'.

SROI was developed in 1996 by REDF (the Roberts Enterprise Development Fund), a US-based foundation that gives long-term grants to social integration enterprises in the Bay Area.
As an entrepreneur from a Private Equity background, REDF funder George R. Roberts asked for success measures or business ratio like indicators. This lead to the development of the SROI methodology which was pioneered by REDF CEO J. Emerson.

The British New Economics Foundation developed an enhanced version of the approach in 2003 which was meant to make the concept easier to adapt by other organisations interested in impact measurement.

FOUNDATIONS SEEK TO CREATE SOCIAL VALUE – SROI MAKES IT VISIBLE

CSI has been using the SROI methodology and working on its development, jointly with Jed Emerson, since 2006. We present the CSI approach to Social Return on Investment in the following section.

Lecture at the University of Agder

Campus Grimstad, students in the entrance hall

By translating certain aspects of social value into financial values, the SROI method can portray the relation between a 'social investment' and its social benefit, yielding an SROI coefficient. Doing so, SROI takes into account three important insights in social investments:

1. Monetisible value creation: economic and socio-economic value

Actually, some aspects of social value can rather easily be translated into financial values – or just are available in monetary terms. This holds true, for example, for so-called 'socio-economic value': If a public benefit organisation or project has a direct effect on the payment of governmental social transfers, then this effect can be calculated in monetary terms – and, as in a classical investment analysis, can easily be set in relation to the organisation's cost for the activity yielding a coefficient.

E.g. think of a job integration enterprise which gets unemployed youth into jobs. Instead of receiving unemployment aid they now pay taxes and social insurance. It is interesting to see how much money the social investor needs to put into the social integration enterprise to get a sustainable effect along these lines.

2. Non-monestisable value creation: social value

Other aspects of social value just cannot be monetised. SROI accounts for that by completing the SROI coefficient with additional information on social effects, using both quantitative and qualitative methods from social science. E.g. the non-monetisable effects of our job integration programme might involve improvements in self-assurance of the now-employed youth.

3. Value is primarily created for society, not for the investor

A third important insight into social investments is, that they create value for different stakeholder groups. The investor might be among them but usually is not the main beneficiary. Thus, the SROI method not only looks for returns generated for the investor, but usually focuses on what social value has been created for other stakeholder groups, including society as a whole.

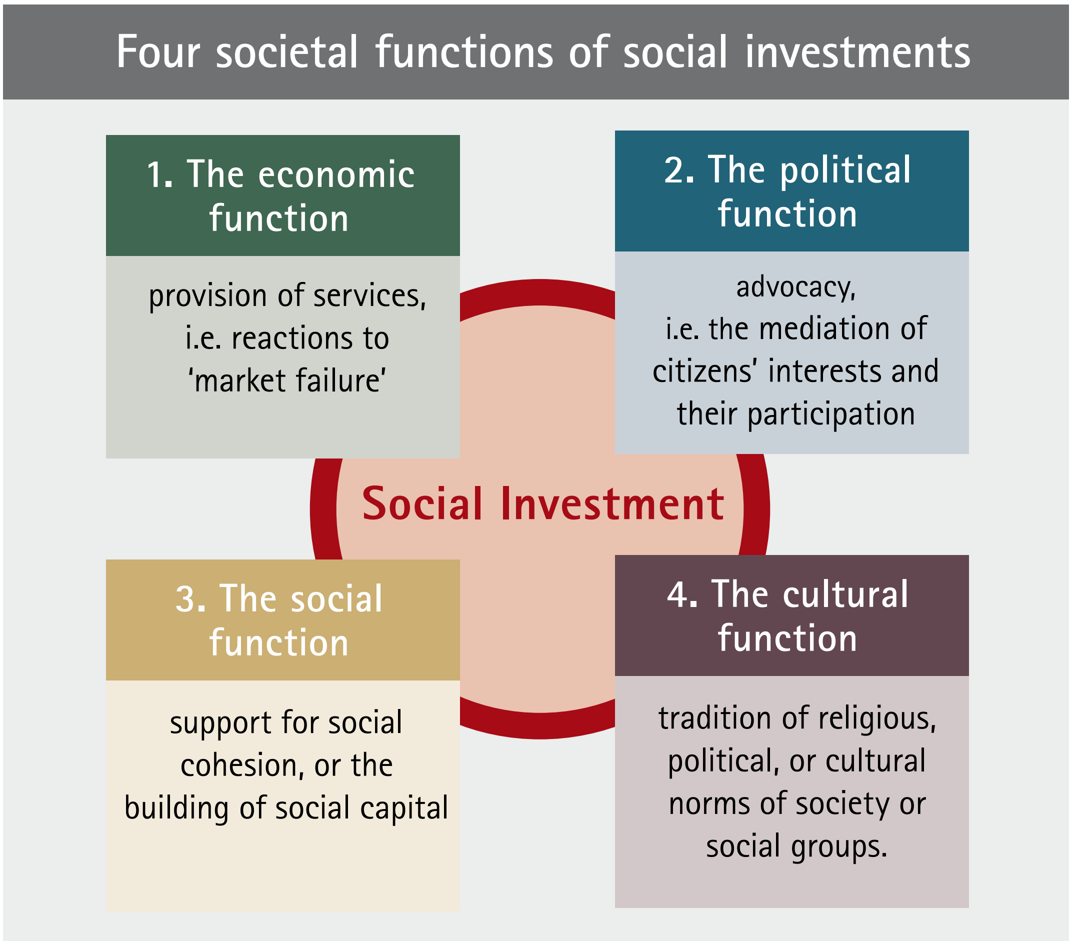
2 Fields of SROI Application, and the CSI Approach to SROI Analysis

The classic SROI approach has been build around REDF's focus on organisations which try to get people into jobs (job integration). REDF thus suggested ways to monetize the economic and socio-economic value of such social purpose enterprises, as well as a data gathering and tracking system that helps calculating the corresponding social cost savings.
REDF realized that the effects of certain programmes affect social transfer payments, so that their effects can be allocated with cost savings and/or revenues for the public sector. This provides us with a handle to monetize social value creation.

The CSI follows the basic philosophy to take an investment perspective on social or philanthropic activities or public welfare. But we suggest adopting a much broader perspective on social investment and social value creation. We argue that much more weight needs to be given to the genu-

SROI NEEDS TO GIVE MORE WEIGHT TO THE GENUINE SOCIAL RETURNS

The Centre for Social Investment, Heidelberg University, Germany



CSI approach to Impact Measurement: 4 societal functions

ine social returns – that in many cases might not be monetisable, or even not quantifiable at all.

A broader perspective on social investment and social value creation

The actual range of social value creation realized by social or philanthropic investments is much broader than the perspective of classic SROI. We therefore propose to distinguish four broad functions of social or philanthropic investments (cf. figure on page 11).

While classic SROI tends to focus on the economic side, we suggest that the complete variety of positive social effects should be taken into account and given full attention when analyzing the social impact of a given activity, programme or organisation.

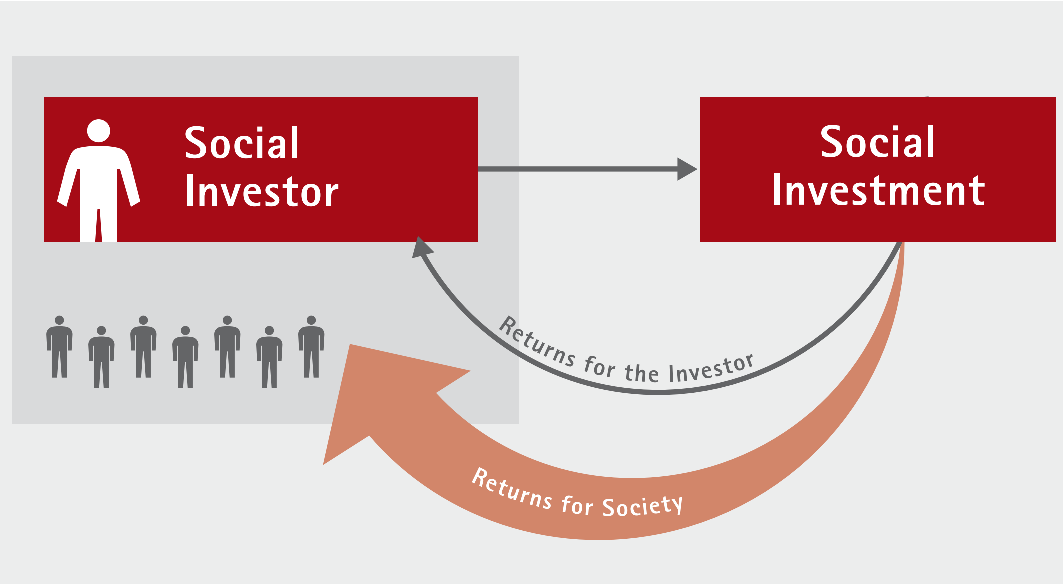
Taking this broader perspective means to check for all those functions of social value creation and, in a given analysis, focus on those functions that are most at issue in the project or social investment under analysis.

Methodological advancements

When adopting this broader perspective it becomes clear that the REDF methodology has a potential for refinement. This is why, at the CSI, we have been working on the methodological advancement of the approach for a number of years:

- For example, in the "SONG project" we did not chose the *Return Ratio Approach* but substituted it by a *Cost Differential Approach*, realized by running a control group design.
- In other cases it is advisable to compare the advantages of future projecting vs. past projecting approaches with longitudinal studies using multiple data collection points.

We are also working on the development of quantitative indicators in fields that formerly could only be addressed by qualitative approaches, for example in the field of qualitfy of life. Considering the international use of the SROI methodology, it is obvious that for each project there is still the need to identify or develop tailored indicators. Any



SROI takes social returns into account: the value-added for society (CSI Figure)

approaches to standardisation are still very much in their infancy. The CSI is interested in promoting the development of more standardised indicators for SROI which would enable us to better compare the results.

Practical use and advantages of SROI

The SROI approach represents a major step in the development of strategic problem-solving approaches in philanthropy. While the debate on strategy in philanthropy has been ongoing for years, it only makes sense to talk about strategy and impact measurement if we have a methodology which can actually account for social impact creation.

SROI IS A MAJOR STEP FOR STRATEGIC PROBLEM-SOLVING IN PHILANTHROPY

To sum up the advantages of the SROI method for foundations organisations in the field of philanthropy and social purpose endeavours, we would like to point to the following six issues:

- SROI takes an investment perspective. It helps to make visible to what extent a given social investment creates impact. Often the social value created is actually bigger than the resources which have been invested. But if we do not look “beyond” purely economic value creation, we might just not see that the ratio is bigger than 1.
- SROI thus delivers robust results that provide arguments for communication to boards, stakeholders and the public on how the organisation actually creates impact. Moreover, these results internally inform management staff as for issues of strategic decision-making and project selection.
- Through the process of analysis, SROI also fosters organisational learning and gives insights into how daily activities relate to achieving social impact. Employees learn how their work helps to achieve social impact which, after all, is a strong motivational factor.
- Many aspects of social value creation cannot be described in monetary values. Traditionally, SROI has most often been used in fields which readily provide financial indicators to calculate socio-economic value. But frequently, it is precisely the non-monetisable social impacts that are most significant. SROI projects can identify such impacts through quantitative or qualitative data collection methods, and stress their importance for social impact creation besides the SROI ratio.
- Finally, the impact dimensions or objective indicators developed in the course of an SROI analysis might be used for project tracking on a regular basis helping the management to run their organisation effectively.
- An SROI analysis should therefore not be seen as a ‘one-off‘-exercise. Rather, it is part of an effort towards continuous improvement.

Background of the Mechatronics SROI Analysis

Why Sørlandets Kompetansefond Set Out to Investigate the Social Impact of University Funding

1 The Mechatronics Programme at the University of Agder

The Mechatronics programme at the University of Agder (UiA), was set up in 1988, and the first cohort of Norwegian-Mechatronics engineers (19 students) graduated in 1990. It was the first study programme in Mechatronics in Norway and is still the only one in Norway to date.
In 2007, SKF took the strategic choice to fund studies connected to the local industry (rather than humanities) at the University of Agder, which just obtained the status of a university. Funding the Mechatronics programme and lending its name as a supporter, SKF also gave "reputational support" which helped to attract additional funders.

MECHATRONICS@UIA: THE 1ST IN NORWAY AND SHARPLY GROWING

The Mechatronics group actually has been sharply growing since 2007, and it has succeeded in diversifying its funding streams (cf. below).
Today, the group works with three academic focuses (engineering sciences, hydraulic / electric actuators and electronic control systems / automation), and two professional focuses (product design and materials technology).

Collaboration with NODE

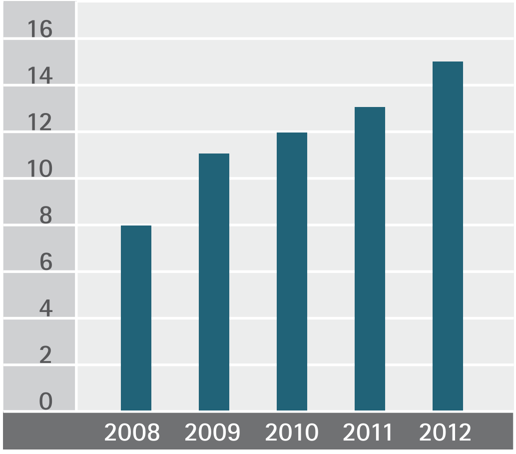
The UiA Mechatronics programme is highly valued by the engineering companies in the region. The programme closely collaborates with the regional companies, above all those from the 'Norwegian Offshore Drilling and Engineering' (NODE) cluster. They work together to develop new study courses and to organise an exchange of HR (professors, researchers, lecturers at UiA from NODE companies). Ph.D.s are doing research in collaboration with NODE firms, and the NODE firms offer training opportunities for students (e.g. thesis, internships). The firms provide funds and donations in kind share facilities such as labs to reduce costs and gain efficiency.

Mechatronics history

- The first study programme in Mechatronics at the University of Agder starts in 1988 at bachelor level. In its development, the NODE cluster gives it a new boost, by establishing a new strong relationship between the academic and the business environment.
- With the institution of a master programme in 2008 and a Ph.D. in 2010, UiA states the ambition of becoming a world leading institution in the field.
- Today, UiA offers an 8-year Mechatronics education at all levels from Bachelor to Ph.D..
- This has also led the partners to engage themselves in the realization of a broader and very challenging goal, to develop Sørlandet as a first class industrial region – more than a 'summer spot for tourists'.

Today, Mechatronics has become an established concept in Sørlandet, while the term is less used in the rest of the country.

Fig. 1: Number of Full-Time Staff Members



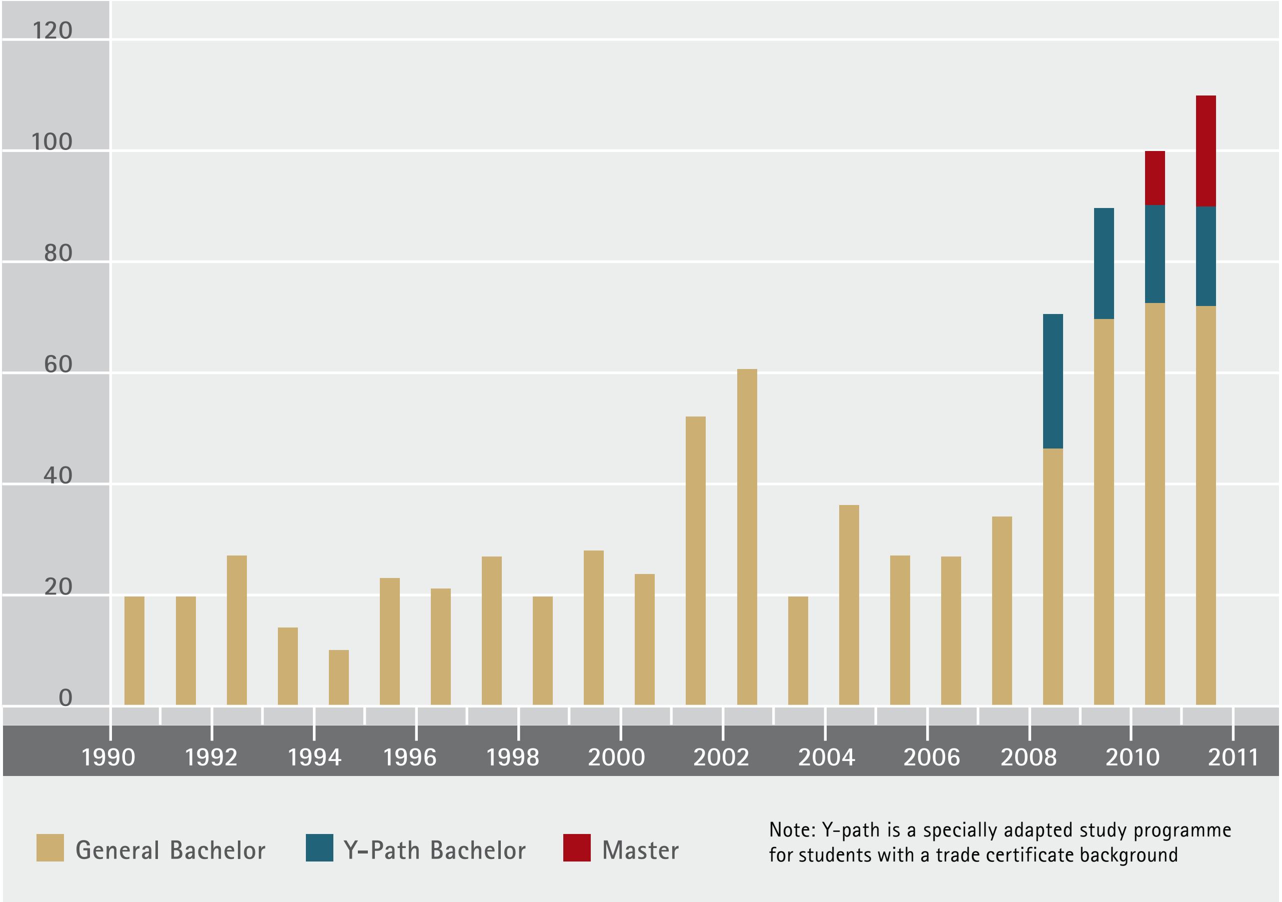


Fig. 2. Number of graduates of the Mechatronics programme

Development of staff

Current positions (2012):

- 4 Professors, 1 NODE Professor, 2 Associate Professors
- 1 Postdoctoral Research Fellow
- 8 Ph.D. Research Fellows
- 4 Lecturers from other UiA groups
- 4 Lab Engineers

Development of graduate numbers

UiA Mechatronics experiences a remarkable growth in teaching and research output since 2007. The student intake exploded from 20-30 students per year to about 90, with joining requests exceeding current capacity by 1.5 to 1."

Funding resources

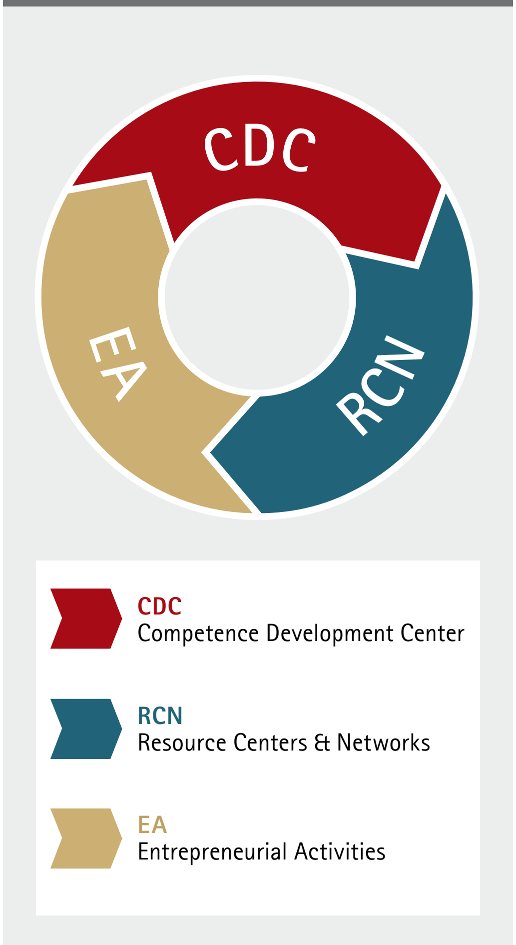
UiA Mechatronics has been successfully connecting, over the past years, to diversified funding streams, involving (as of 2011/12):

- the UiA (equipment, strategic funding)
- own income from selling lab services
- SKF (Sørlandets Kompetansefond)
- Research Council of Norway
- VRI (Regional R&D & Innovation Programme)
- NORCOWE, the Norwegian Centre for Offshore Wind Energy, a programme funded at the University of Agder)
- European Union (EU-ICT FP7 project Hephestos)
- NODE (the Norwegian Offshore Drilling and Engineering cluster): professorships
- Company donations in kind to the lab (e.g. National Oilwell Varco in Kristiansand, ABB in Sweden and the Norwegian Veritas in Oslo have donated laboratory equipment worth 3.5 million).

2 Kompetansefond's Support for Mechatronics at the University of Adger

Funding the UiA Mechatronics is part of SKF's strategic approach to regional development. The foundation's funding / support activities are meant to jointly realize a regional Value Creation Circle.
This Value Creation Circle (VCC) represents the three basic ways knowledge drives the development of society: 1. the creation of knowledge and education of people, 2. the distribution and exchange of knowledge across social milieus, branches or sectors, and 3. the use of knowledge in combination with the experiences of individual players and organisations in order to realise concrete activities. If all three aspects are supported strategically in one value chain, they form a self-reinforcing value creation circle (cf. figure).
In our strategy analysis of SKF (cf. CSI 2012: Creating Impact in Southern Norway) we found that, in order to realise its overall goals (create/secure jobs and improve living conditions in the region of Agder), the foundation actually supports all three of these basic drivers of development. Table 1 gives an overview of these three types of support and their interrelationship visualised in the value circle model.

SFK Value Creation Circle



SKF funding for 'Competence Development Centres' (CDC)

Innovation requires two factors: talent and competence. While talent can be nurtured it can hardly be created. Competence, on the other hand, is something that can be acquired, given adequate education and personal motivation. SKF has thus put much effort over the years to create, assist and grow Competence Development Centres in the Agder region.
CDC can be defined as organizations that provide competence to different social actors, in different forms: from consultancy to education CDCs provide useful knowledge resources that, properly employed, can foster social and economic growth. While the latter is especially evident when discussing, for example, service providers for firms, social benefits are easy to spot for educational institutions. Well-funded, flexible quality education provides the best way to successful entrance to the job market and social integration. Clear links between lack of education, unemployment, and antisocial behaviour are widely known both in the scientific literature and public discourse. While welfare can provide necessary life support, it is education that drastically improves the chances of future productivity and, in some ways, happiness.

SKF funding for UiA mechatronics

The Mechatronics programme has, over the years, benefitted from substantial SKF grants since 2007 and is a prime example for SKF's funding strategy to support Competence Development Centres. The Mechatronics programme delivers solid, quality engineering education immediately useful in a wide variety of industrial fields. Moreover, it provides access to academic research through a developing Ph.D. programme. While graduates enjoy the obvious career benefits, a local industrial sector starved for skilled employees benefits from a rare additional source of competence.

In 2009, SKF supported the Mechatronics programme by financing 2 Ph.D. positions. With this 2 million NOK funding for the establishment of the Ph.D. programme SFK made an important contribution to further connecting the Mechatronics programme to the NODE cluster as well as to the development of the University of Agder.

Contributing to a close linkage between the university ('knowledge creation & education') and the industry ('making use of knowledge') is an important aspect in the foundation's strategy. This linkage of the programme to the industry shows not only in the Ph.D. programme but also in internships, theses, mentoring relationships, and part-time professors working in the industry. From the perspective of the foundation, the Mechatronics Programme, is an important initiative for assuring HR supply to the local industry in the medium and long-run.

Competence Development Centres (CDCs)	Resource Centres and Networks (RCNs)	Entrepreneurial Activities (EA)
Def.: Institutions designed to develop knowledge and/or educate people	Def.: Institutions designed to realise, catalyse or enhance the transfer of knowledge and experiences among relevant actors in a given field, usually by a networking approach	Def.: New activities designed to make practical use of knowledge, experiences and ideas.
Basic function of competence development centres: - develop knowledge through research - develop HR through education.	Basic function of resource centres: - create an overview of available resources (knowledge, contacts, money, HR etc.) within a thematic area and make it available. - organise networks - communicate the needs of players in the field - build bridges between the business, public and academic sector in the field	Basic function of entrepreneurial activities: - translate knowledge/ideas into activities or organizational forms that create actual output or value. - To do so, entrepreneurial activities need to draw on existing knowledge and HR (cf. CDCs), and they need to have ways to access knowledge / ideas / contacts (cf. RCNs).
Such investments must first and foremost be considered as long-term oriented. The investments are meant to make knowledge and human resources available, so other segments of society can benefit from it.	Such investments must be considered as long-term oriented. They are not meant to produce a direct monetary surplus, but rather are to be considered as investments into the infrastructure necessary for creating value through EA. They are meant to be junction points or mediators in their fields.	Such investments can be considered to be rather short-term oriented: They aim at direct outputs / value creation. EA try to benefit from knowledge and HR produced by the CDCs and from networks, experiences and knowledge transfer possibilities created by the RCNs.

Tab. 1. Overview of the SKF Value Creation Circle: CDCs, RCNs and EAs

3 Applying the SROI Approach to the Mechatronics Programme at the University of Adger

Challenges

Using the Social Return on Investment approach to analyse a University programme has been a new endeavour in the history of SROI approach. The SROI methodology has been developed for the case of work integration enterprises in 2000, and in a large comparative study on how SROI has been used since then, we found that all in all about one third of all applications stick to this classical field of application.

We found the second and third most common fields of application to be life coaching/assistence (initiatives on e.g. prevention of youth violence, teenage pregnancies, domestic violence) and environment. All other fields of application range below 10%, and there was no single analysis of a university programme in our sample of 114 SROI studies (cf. table on this page; study published at www.csi.uni-heidelberg.de/SROI).

Typically fields of activity analysed in SROI studies	Percentage of SROI studies in these fields
Work integration	32
Life coaching/assistance	19
Environment	13

Tab. 2. Most frequent fields of application of SROI (Source: CSI-study, cf. www.csi.uni-heidelberg.de/SROI)

Using SROI to analyse the Mechatronics programme, we have been following on the one hand SKF‘s interest into the effects of University funding which has been an important part SKF's first 10 years of funding since its foundation.

USING SROI TO ANALYSE THE EFFECTS OF A UNIVERSITY PROGRAMME

A second issue was our postulation at CSI that it is generally becoming more important to measure and make visible effects created by social investors in various domains of society. Actually, we recognize a general trend towards adapting the SROI methodology to new contexts which go beyond its traditional realm.

Applying the SROI approach to a new context presents challenges. As a general rule, it is the easier to apply SROI, the easier you can access exisiting data on costs or savings occuring to the state or public bodies (e.g. unemployment aid, health care costs). If the connection of any programme to such public costs is less obvious and data access more difficult, SROI becomes more complex and costly. Additionally, the non-monetisable aspects of SROI become more important and should be stressed in the approach.

Applying the SROI approach to the UiA Mechatronics programme involved the following six steps:

1. Stakeholders analysis

We started by identifying the relevant stakeholders who bear the costs of the programme and who benefit from its effects. We identified four main beneficiaries: the students, the university, the regional companies, and the region.

2. Analysis of the Theory of Change and relevant Impact Dimensions

We then needed to clarify how the programme causes effects on which stakeholders. Through desktop research, theoretical analysis and interviews with representatives from the Mechatronics programme and University of Agder we identified and refined relevant effect, or impact, dimensions for all stakeholder groups. We could thus specify how the stakeholders benefit from the programme (and also, how the programme's costs are paid for). This yielded the basis for our empirical analyses and all our calculations of costs and effects rely on this detailed description of the programme's mechanisms.

3. Deciding on how to apply SROI

It turned out to be difficult to quantify the share which SKF-funding can claim in the impact actually created by the Mechatronics programme. The reason for that was, on the one hand, that SKF is one funder among several funding parties which contributed different shares of the UiA Mechatronics budget over the years. On the other hand, Mechatronics representatives pointed out that, due to the reputation of SKF, its funding has facilitated further fundraising – which again makes it difficult to assess the actual share that SKF had in the successful development and thus the total impact created.
We therefore decided to take a "Social Fund" SROI approach: This means, we determined the Social Return on Investment of the Mechatronics programme as for its total budget. This yields a ratio which not only informs current funders on whether they have given their money for an endeavour which actually creates socially returns. It also informs potential future funders on whether it seems promising to invest into UiA Mechatronics in order to support the region and create social return.

A SOCIAL FUND APPROACH: THE RATIO WHICH INFORMS CURRENT FUNDERS

4. Determining costs

The share of costs borne by the different stakeholders was deduced from the Mechatronics programme's budget. This helped to avoid bothering individual stakeholders. The SROI computation was realised referring to the observed costs and the estimated effects on the region. Potential further effects which could not be evaluated in monetary terms were thus obviously left out for calculating the SROI coefficient, and are described qualitatively in this report.

5. Determining impact

For the computation of the effect size we compared each beneficiary with an appropriate control group. We assumed that any average difference of the variable of interest arising from this comparison can be understood as caused by the Mechatronics programme.
It is key for this approach to choose a control group with the same characteristics as the Mechatronics stakeholders. Ideally the two groups differ only by the participation or non-participation in the Mechatronics programme, so this difference can be claimed to cause any observable deviance between the two groups. Furthermore the variable of interest may be defined as a difference over time to preclude any distortions from level differences. (The approach is much like a "difference-in-difference-approach".)

6. Steps in data collection

Finally, we used three ways to access relevant data:
A. Student/Graduate Survey: Necessary data on the students were collected in a survey (online questionnaire) among all current Mechatronics students and all graduates. More than 50 graduates and more than 60 students took part in the study. Further information on the University of Agder was provided by the University (Faculty of Engineering).
The effects on the region could be computed via the information given by the students. In the survey, they reflected on the hypothetical question of where they would have studied without UiA offering a Mechatronics programme. This counterfactual self-assessment facilitated the identification of the regional effects. The actual effect size was calculated via averages supplied by the Norwegian statistics bureau.

B. Use of national average data: Due to the unique character of the Mechatronics programme (only Mechatronics programme all over Norway) a comparison based on matching was infeasible. Consequently, we based the evaluation of the effects on comparisons with national averages in terms of aggregate values obtained from official statistics. This holds for the effects on the students and on the University of Agder.

C. **Case studies with firms:** To assess potential effects on the companies, we conducted case studies. Working with a small number of companies, we tried to elaborate the exact effect of the Mechatronics programme on the particular company. To do so, we used counterfactual reasoning via self-assessment by the company representatives.

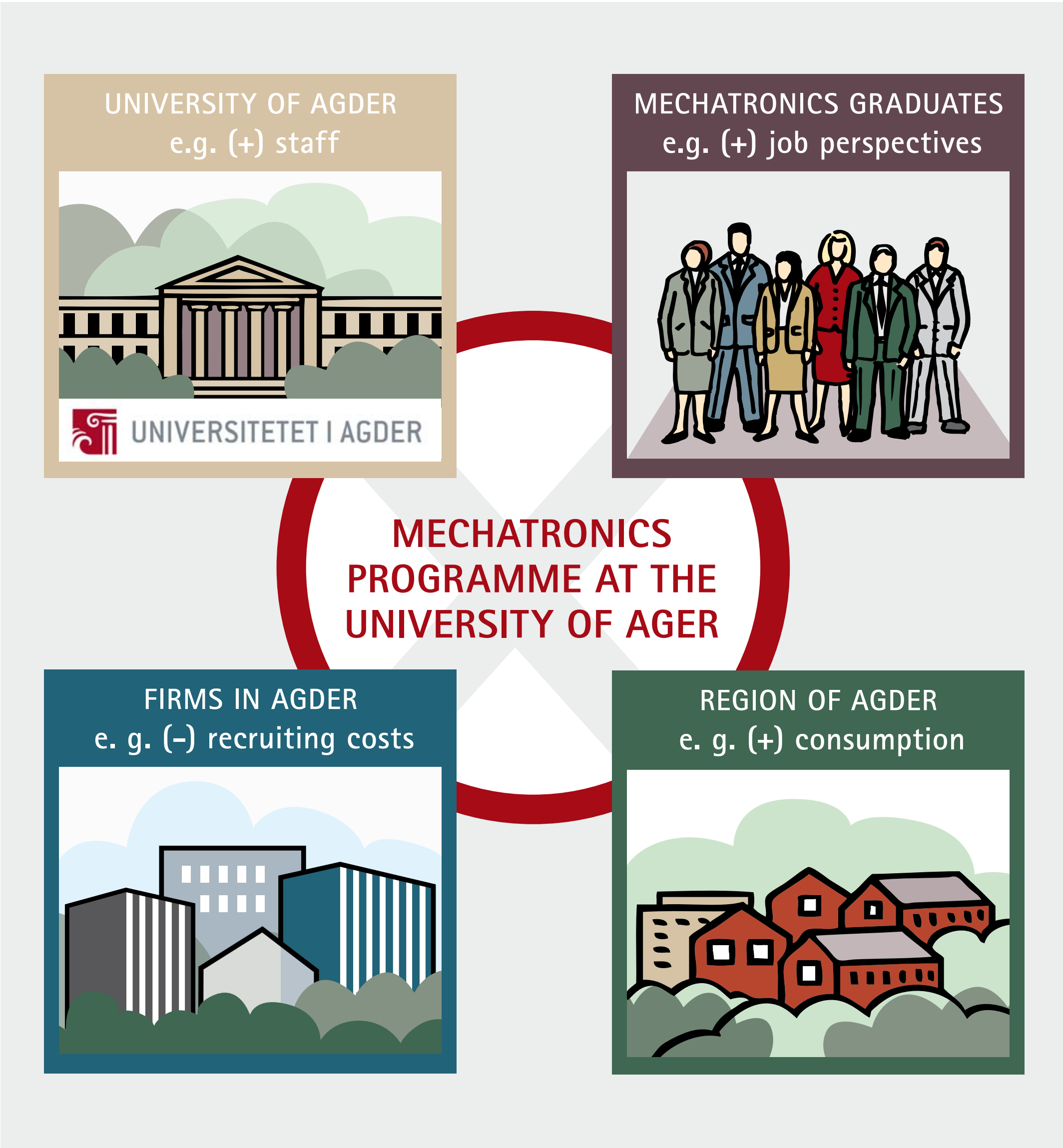
Stakeholders and Impact Dimensions of the Mechatronics Programme

Who are the Beneficiaries of the Mechatronics Programme? The Students, the University, the Regional Companies, and the Region

1 Stakeholder Analysis

We identified four major stakeholders of the UiA Mechatronics programme: There are, obviously, the students and graduates of the programme. The university with new staff and funding; the regional companies which can recruit the Mechatronics graduates, and the region altogether which benefits by the additional inhabitants and everything they bring to Vest-Agder (cf. figure 3.).

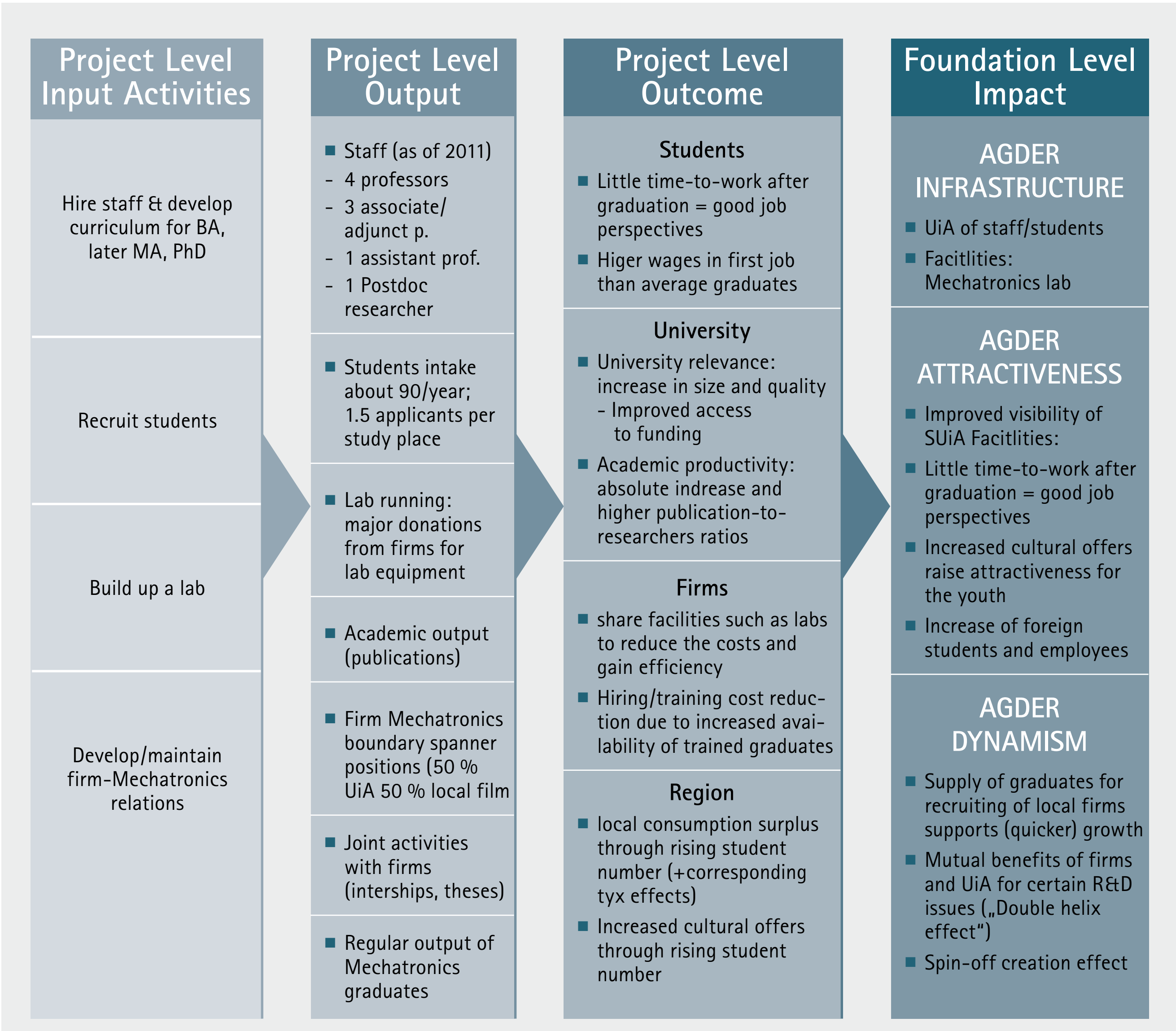
Fig. 3. Stakeholder Map of the Mechatronics programme



2 Theory of Change Analysis and Impact Dimensions

Theory of Change (ToC) analysis is a way to identify key impact dimensions for a social activity or for a foundation as a whole, as well as a traceable way towards realizing such impact. This is a basic requirement for any Social Return on Investment analysis, since no one can measure the impact of a given activity if the activity's goal has been left vague. A so-called "Theory of Change Map" (cf. below)

Fig. 4. Theory of Change Map of the Mechatronics programme



SECTION 3

helps to visualise the connections between activities, intermediate goals and the main goals of an endeavour. It has become some sort of standard in the field to distinguish three main categories in a theory of change map:

- the **inputs**: the actual activities (e.g. a training course for mathematics teachers)
- the **outputs**: the apparent and obvious products of the activity that are tangible and countable (e.g. number of participants)
- the **outcomes**: the intended results which were to be brought about by creating the "output products" (e.g. knowledge gains, behavioural changes).

In figure 4 on the previous page we present a theory of change map for the Mechatronics programme at the University of Agder.

At its core, any Theory of Change analysis aims at identifying both the relevant "impact dimensions" of a given programme, and a traceable way towards realizing such impact. To do so, a carefully elaborated Theory of Change should include the following steps:

- Identify concrete goals corresponding to the values of the foundation.
- Analyse the environment of the foundation: What are the social value chains the foundation wants to work on? What are potential partners: other institutions already working in the field that the foundation might partner with?
- Analyse what activities/funding ('inputs') can contribute to realising those goals and how.
- Specify intermediate goals on the way to realise ultimate goals (often called outomes).
- Define indicators / metrics for checking whether or to what extent both intermediate and ultimate goals are actually reached.

A Theory of Change analysis is a way to specify clearly (and in correspondence to the programmes goals) what kind of impact or social change the programme wants to create (cf. next chapter).

3 Detailed Impact Dimension Analysis per Stakeholder

In order to further prepare for SROI analysis, our next step was to analyse more precisely for each stakeholder what kinds of effects Mechatronics actually creates. The following tables list the impact dimensions for students/graduates, the University of Agder, the local firms, and the region.

Tab. 3. Impact dimensions as for local firms (particularly: the NODE firms)

Impact Dimension	Effect	Corresponding hypothesis
Time-to-productivity Training costs	+ –	Being trained as specialists (compared to pure mechanical or electronics engineers) and with the department closely collaborating with the industry, mechatronics graduates should be able to get quicker to the level of full productivity for firms hiring them. This should reduce costs for training newly hired graduates on the job.
R&D improvements through outsourcing of basic research	+	Being able to outsource basic research questions helpful but not directly needed to UiA/Mechatronics could improve R&D in the NODE cluster on the long run, especially given that through UiA/Mechatronics the firms have a way to profit from public funding.
Recruiting costs	–	Since the firms have been closely involved in the development of the Mechatronics programme, graduates fit their needs – and are easy to recruit without much additional cost (compared to average recruiting costs for engineers). Firms can already build relationships through cooperation during their studies (B.A./M.A. theses, Ph.D.).
Sector dynamism: start-up creation	+	The Mechatronics programme might increase the number of start-ups founded "out of university" in VA.

Tab. 4. Impact dimensions as for ***Mechatronics students and graduates***

Impact Dimension	Effect	Corresponding hypothesis
Time-to-work	–	Mechatronics graduates should have better job opportunities due to the close collaboration of the Mechatronics group with the local industry, particularly the NODE firms. They should be able to find a good job faster than the average graduate.
Wage in 1st job	+	Being trained as specialists for a booming industry, mechatronics graduates should realise higher wages than the average graduate.
Educational choice options	+	With the mechatronics department, the students have more academic opportunities (including the master and Ph.D. offers)
Optimism in life	+	Improved study conditions and job opportunities might lead to greater optimism and satisfaction in life. This in turn may lead to reduced prevalence and severity of mental health problems to be expected to a certain degree in young people.
Living standard / Cost of living	+ –	As for mechatronics students from the region, they save expenses / time connected to moving elsewhere and maybe, renting apartments or commuting. This frees money for consumption / higher living standard.
Life satisfaction	+	As for mechatronics students from the region, the option of staying close to relatives and easily keeping existing networks of friends may count for positive as for general satisfaction in life.

Tab. 5. Impact dimensions as for **the University of Agder**

Impact Dimension	Effect	Corresponding hypothesis
Relevance at national level (size)	+	The mechatronics department contributed to growth in terms of number of students and staff (professors!) thus helping to improve the relative size of UiA among Norwegian universities.
Internationalisation	+	The mechatronics department might have helped to increase the number of foreign students (increase of international visibility), i.e. starting/ contributing to a virtuous circle.
Access to funding	+	The mechatronics department represents an additional option for UiA to attract both public and private funding.
Academic reputation	+	The mechatronics department's research activity might have contributed to improving UiA academic productivity, i.e. increasing academic reputation of UiA
Academic fund-raising success	+	Increases in academic productivity result in additional public funding

Tab. 6. Impact dimensions as for **the region of Vest-Agder**

Impact Dimension	Effect	Corresponding hypothesis
Migration	+	Mechatronics both keeps "high potentials" from within the region from moving elsewhere to study, and might attract "high potentials" from outside the region to move to VA for studying Mechatronics .
Regional consumption	+	
1) Students' consumption	+	As for mechatronics students from the region (who, without UiA Mechatronics, would have moved to study elsewhere), they keep living in Vest-Agder and consume / spend money.
2) Locally hired consumption	+	Some of the additional mechatronics students will participate in provision of cultural offerings in the region, improving the attractiveness of the region for young people – and increasing its recreational value.
Creative economy	+	Concerts, sport and other public events
1) Cultural demand/ creative economy	+	The additional mechatronics students are additional consumers of cultural offerings in Vest-Agder, supporting the 'scene'
2) Cultural supply / attractiveness of local cultural scene	+	Some of the additional mechatronics students will participate in provision of cultural offerings in the region, improving the attractiveness of the region for young people – and increasing
1) Cultural de-mand/ support for creative economy	+	Both effects have positive influence on the use of community services such as libraries, clubs etc. This higher level of demand might have influence on the level of diversity and supply of local shops and services
Local taxes	+	
1) Level of wages	+	Mechatronics graduates will pay higher-than-average taxes on their higher-than-average wages
2) HR supply	+	Without Mechatronics graduates output, local firms could only hire more slowly – thus any increase in speed of hiring means a surplus on wages paid – and on taxes on these wages
3) Time-to-work	–	The sooner the graduates start working, the sooner they start paying income taxes.

Note: As is the rule in empirical investigative projects, not all impact dimensions which were identified theoretically could be actually addressed in the study. This is an effect of natural resource restraints and limitations of access to certain data or stakeholders. An overview of the dimensions which we were actually able to look at in our study is given in the table on page 5.

Assessing the Benefits for Each Stakeholder Group

How the Mechatronics Students / Graduates, the University of Agder, the firms in Agder, and the Agder Region benefit from the programme

1 Benefits for Mechatronics Students/Graduates

In the following sections we present the results of our study by stakeholder groups. We demonstrate how the Mechatronics students / graduates, the University of Agder, the local firms and the region of Agder benefit from the programme, and we describe the mechanisms by which UiA Mechatronics brings about these effects.
Furthermore, we explain where and how we could attach monetary values to these effects. SROI analysis requires finding ways to ascribe monetary values to effects where this is possible. We thus explain our “financial proxy variables”.
Finally, we will describe effects which are brought about by UiA Mechatronics but could not be monetized.

Introduction

The main beneficiaries of a study programme obviously are the students / graduates. From their perspective the Mechatronics programme increases the choices of study courses and improves their education. In detail, the potential effects can be distinguished by the time they occur.

Before enrolling

In the beginning, i.e. before students enrol in any university, they have to choose a study subject. In this regard the Mechatronics programme represents a further choice option, i.e. augments the number of study programmes students can choose from.

While at UiA Mechatronics

Once the students have embarked upon studying Mechatronics, they benefit in several ways.
1. Choice options within / intensity of the programme: the capacity of the Bachelor study course is increased over time, as various stakeholders increase their funding. This results in more students being able to study Mechatronics. Furthermore and on top of the Bachelor degree, the University of Agder started to offer a Master and Ph.D. programme. Hereby students may pursue the subject more intensively and dedicate up to eight years to the studies of Mechatronics. Apart from the academic gain of an increased study period, one would expect financial effects for the students in form of higher salaries. Concerning the study course itself, the increased capacities are supposed to transfer into a higher degree of specialisation and a greater variety of study topics. The students may study an enlarged range of different aspects of Mechatronics and specialise in the aspect which interests them most.
2. Practical relevance / connection to company reality: Several companies have donated to expand and update laboratory facilities and some companies share their facilities with the University of

Agder. Consequently students may access all necessary means for their practical education and in case of the shared facilities obtain a unique insight into business-driven research and production. The lab also helps to increases the practical relevance of the study contents in order to match job requirements. In general, students benefit largely from the intensive exchange with the NODE network. The involved companies provide lecturers, which work part-time at the companies and spend the rest of their time teaching. Thereby students obtain critical knowledge on the application of academic results to business needs. This approach is reinforced via several training opportunities such as internship or thesis support by NODE companies for students.

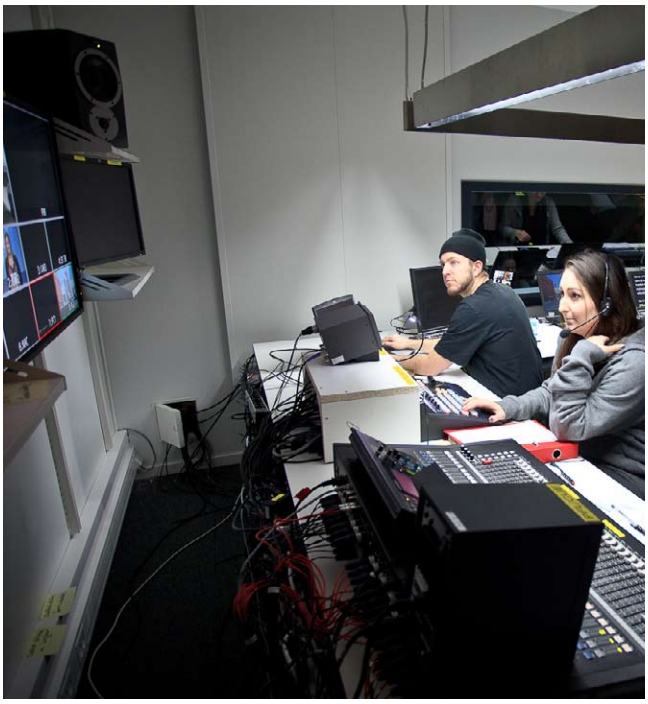
After graduation

After graduating students of the Mechatronics programme are thought to enjoy better job opportunities than their fellow students. As explained above NODE interferes to a large extent in the curriculum thereby improving the relevance of study contents and ultimately improving the market value of the graduates. Furthermore the intense contact between students and NODE companies may facilitate an easy career entry. In detail, the effect on the graduates may be accessible via the graduates' wage and the required time for job-seeking, if compared to fellow non-Mechatronics students. On average graduates from the Mechatronics programme are expected to need less time to find their desired employment and to obtain a higher salary. We would expect an increased job market value due to superior education.

MECHATRONICS GRADUATES: QUICKER JOB ENTRY AND HIGHER WAGES?

Most of the above described effects for students can hardly be quantified. Students may disagree that the improved education is a benefit to them if it is accompanied by more homework and less free time.

A feasible solution to this challenge of quantifying the effects on students is denoted by the effects for the graduates. The reduced time necessary for job-seeking and the increased wage describe the effects for the students on the job market – and



thereby a cumulated effect for students. Those two variables incorporate all previous effects, as obtaining a good salary and reducing job-seeking would be the ultimate goal for students (given we exclude any academic objectives).

Summary of the approach

Consequently, we concentrated on wages and time for job-seeking. Data was collected via an **online questionnaire** addressing all current and previous Mechatronics students and graduates.

We used the information from this survey for **comparison with non-Mechatronics students** in order to check for potential differences. Any substantial difference in wage level or time for job-seeking between the two groups might be discovered and conditioned on several assumptions could be attributed to the Mechatronics programme ("the effect").

But this comparison with a control group presented challenges: We had to assume that some students might may have been motivated to study Mechatronics only by the actual programme offered at the University of Agder. Without this offer, those students would have studied a different engineering subject. Other students, however, might have studied something completely different with significantly lower wage expectations and longer time for job-seeking.

In order to determine the exact level of effect, the composition of the comparison group needed to account for this counterfactual outcome for

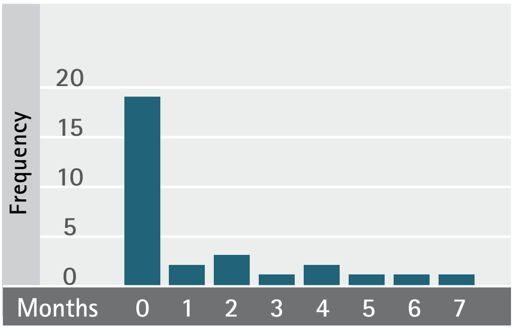
Mechatronics students. But the available information did not allow for such a detailed distinction, as the counterfactual situation does not arise naturally and may even be blurry for the students themselves.

Thus, we concentrated on a **comparison between the Mechatronics students and fellow engineering students.** This approach is justified by the assumption that Mechatronics students have a general interest in engineering and would have chosen a different engineering study subject if Mechatronics would not have been available.

Time-for-job-seeking

Our survey revealed how much time Mechatronics graduates spend looking for their first employment. The results are striking: Most of the graduates find a job in less than a month.

Fig. 5. Time for job-seeking after graduation



- This amount of time is clearly influenced by the skills gained via the study course which drives the graduates' "labour market value". Consequently a reduction of the necessary time to find an employment exposes an effect on the students by the Mechatronics programme.
- On the other hand, several further influences on the time frame are imaginable, e.g. macro economic factors which drive the job market or the student's preference for taking some time off. However, there seem to be no obvious reason, why these secondary factors should affect only one of the two comparison groups and the comparison is therefore understood as legitimate.

Results: Fig 5. on the left indicates the distribution of time for job-seeking among the graduates. More than half of the graduates report a time frame of less than one-month indicated by in the graph by the "0" value. The remaining students need between one and seven months to find a desired job. No pattern but rather an almost uniform distribution arises.

The analysis is complicated by the fact that adequate comparison data is not widely available. Time for job-seeking is typically not collected and not publicly available. However, we assume that engineering graduates in general do not face a high risk of unemployment, but that their labour skills are actually in high demand by the Norwegian industry. Therefore engineering students do not have to spend much time on finding an employment and the necessary time for job-seeking should be rather short. Mechatronics students do not differ to a large degree from their fellow engineering students and do also not have to spend much time looking for an employment. Consequently we observe no effect on the time frame and the Mechatronics programme apparently does not alter the job opportunities for its graduates in terms of shorter time for job-seeking.

Wage level

Our survey also revealed the wage levels of the Mechatronics graduates. The superior education of the Mechatronics programme should raise the labour market value of its students. Consequently we expected the graduates to report higher than average wages.
In order to observe a potential spread in wages, we compared the wage levels reported by graduates in our survey with average wage levels for graduates in the industry. Further factors which influence the wage like the general macroeconomic situation may impact both comparison groups and any spread in wages may therefore attributed to the Mechatronics programme.

THE STUDENTS' PERSPECTIVE: THERE'S ALMOST NO ROOM FOR FURTHER IMPROVEMENT

Fig. |X reports on the distribution of wages for Mechatronics graduates. On average these graduates earn between 400k and 500k NOK in their first year after graduation. A third of the graduates earn less and few graduates earn more than the average.
However, the comparison of the Mechatronics graduates with graduates of other study courses working in the same industry did not highlight any effects. A comparison based on industry wage levels by age reveals that Mechatronics graduates earn neither more nor less than their fellow students. Consequently we observe no effect on the wage obtained by graduates and the Mechatronics programme does not alter the job opportunities for its graduates in terms of wages.

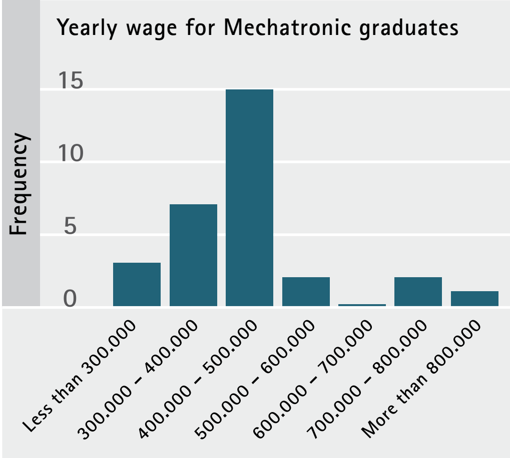


Fig. 6. Yearly wage for Mechatronics graduates in their first year in the job

Conclusion

In our comparison of Mechatronics graduates with fellow engineering graduates, we did not observe any quantifiable effect. According to our data the Mechatronics graduates do not earn a higher wage or need less time to find an employment than their fellow engineering students.
It thus appears that the effect of the programme on the students seems limited. However, the reason for the missing difference can be explained by the comparison group of engineering students. In general these students do not have to spend much time on job-seeking and already obtain high wages. Hence this excellent position of engineering students on the job market prevents the subgroup of Mechatronics graduates to outperform the average engineering student. Especially the time spent on job-seeking does not allow for a measurable difference, as a natural minimum of less than one month exists and is already achieved by 'ordinary' engineering students. Consequently Mechatronics graduates cannot surpass them. Furthermore, information from interviews with NODE company representatives highlights that Mechatronics graduates require additional on-the-job training like 'ordinary' engineering students do. So in this respect, the Mechatronics students do not differ from their fellow engineering students either and consequently do not qualify for a wage surplus.
Summing up, from the students' perspective there remains almost no room for improvement and the Mechatronics programme seems to operate in a situation which is extremely favourable for engineering graduates in general.

SECTION 4

2 Benefits for the University of Agder

Introduction

The inauguration of the study course of Mechatronics in 1988 and the subsequent enlargement by the Master and Ph.D. programmes denoted an augmentation of the study subjects offered by the University of Agder. The course allowed the university to increase the number of students and academic output shaping its academic profile. On the other hand it tied up university funds. This, however, could be offset by the increase in third-party funds (cf. 2.1).

Summary of the approach

Via an extensive collaboration with the University of Agder, a broad range of indicators were identified which reflect the benefits of UiA Mechatronics to the university:

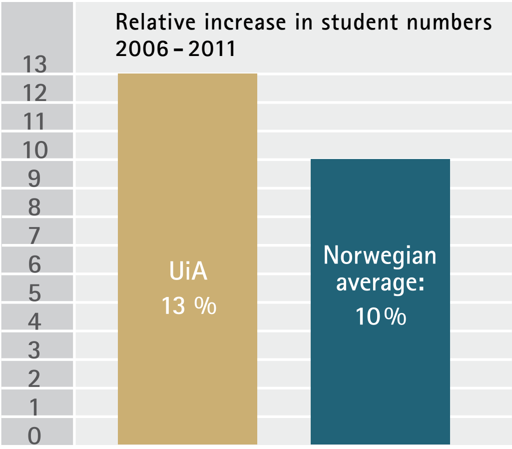
- An increase in the number of students
- Boosted attractiveness for students and researchers
- Amplified number of scientific publications
- Ample financial resources via increased third-party funding
- Expansion of university's capabilities, e.g. laboratory, staff, subjects offered in degree programme
- Intensified research activities

Obviously many of these indicators are connected to each other. We analysed the set and identified two of them as crucial: the number of students and academic productivity. The number of students reflects the university's attractiveness and relates to its teaching capabilities. The academic productivity is affected by several causes and hence informs on the attractiveness for researchers, the number of publications, additional funding via third parties and the general amount of research.
In order to assess the effects of the Mechatronics programme we compiled information on these variables from key Norwegian statistics and compared UiA to the Norwegian averages.

Number of students

Data on several educational indicators is publicly available in Norway. We could thus establish that during the 'boom years' of UiA Mechatronics the number of new students at the University of Agder increased to a slightly higher degree than at the average Norwegian university. The University of Agder reports a percentage increase of 13% between 2006 and 2011, whereas the average Norwegian university observed only a 10% rise in the same time frame. Although the University of Agder increased its number of students stronger than average, it welcomed fewer foreign students. There were only 7% more foreign students at the University of Agder in 2011 than in 2006. In the same period all Norwegian universities observed a combined increase of 24%.

Fig. 7. Relative increase in student number 2006-2011



Academic productivity

Apart from teaching an increased number of students, the Mechatronics programme is assumed to boost the academic productivity. In this respect a large increase in publication points can be observed. The University of Agder obtained 62% more publication points in 2010 than in 2006 and exceeded the national average of an 18% plus clearly. At the same time, the University of Agder increased their number of full-time employees by 13%, which is the same as the national average. Combining the average increase in employees and the higher-than-average increase in publication points, one can observe, that the University of Agder improved its academic productivity to a large extent. This also affects University funding: The Norwegian government remunerates UiA with NOK 34,201 for each publication point.

Conclusion

We found the University of Agder to score well in academic productivity measured in publication points. An average increase in staff and a large and above average increase in publications result in a comprehensive academic productivity of the Mechatronics research staff.

Our comparison of the University of Agder student numbers with the Norwegian university average produced mixed results. Whereas the overall increase in students at the University of Agder tops the increase in students at the average Norwegian university, we found that the increase in foreign students lags behind the national average rise of foreign students.

Since the positive finding of an above average increase in student numbers has been observed

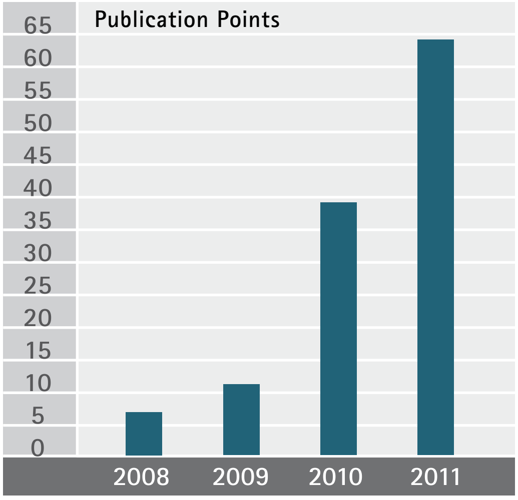


Fig. 8. Development of publication points by the Mechatronics department

at university level, we have to point to the fact that the reported changes may be caused by different factors than the Mechatronics programme. However, we can assume that the Mechatronics programme extensively contributed to the strong performance of the University of Agder.

Methodological note on assessing UiA Mechatronics' impact

The evaluation of the Mechatronics programme's influence on the university's performance is complicated by the absence of a national comparison group. Mechatronics is taught and researched at no other Norwegian university than the University of Agder course.

Thus, UiA Mechatronics does not extend an existing effect, but causes a completely new one. For this reason we could argue that we can take the absolute numbers to quantify the effect in order to assess the programme's impact on the university. As without the Mechatronics programme none of the 749 graduates of Mechatronics would have obtained this specific degree at UiA, one could argue that this number of graduates quantifies the programme's effect. The same approach would hold for the scientific staff. Furthermore the increase of 122% of yearly graduates in Mechatronics between 2006 and 2011 clearly surpasses the university's increase in students of 13%.

But the corresponding counterfactual situation (i.e. the University of Agder without the Mechatronics programme) cannot be sharply determined. The reason is that any funding that went into Mechatronics could have been given to a different study programme – thus increasing its student numbers, staff and academic output.

However, exemplary evidence – for example the big increase in graduates – suggests that the Mechatronics programme does indeed affect the university's performance to a large extent. Just the exact size of the effect cannot be determined due to the unknown counterfactual situation.

3 Benefits for Firms in Agder

Introduction

For the engineering companies in Agder, the Mechatronics programme represents an increased recruiting potential. This access to a larger number of potential employees may have different effects on the companies:

- Lower hiring costs due to an increased pool of candidates.
- More potential workers available to increase the companies' workforce and enable quicker growth.
- Less need for on-the-job training; this results in reduced training costs.
- Higher productivity.

Obviously, it was a challenge to evaluate this effect since one the one hand, access to relevant data is controlled by the companies and not available on a comprehensive basis – if available at all. On the other hand, comparison data is even less available, since this would require to access to companies in other regions.

Consequently, we conducted three case studies with companies representing different types: one big, one medium and one small enterprise. In interviews with company representatives we investigated whether the companies could confirm any of those effects.

THE CASES: ONE BIG, ONE MEDIUM, ONE SMALL FIRM

Case study results

All three companies report a positive effect on recruiting opportunities. In one case, the company pointed out that the effect was facilitated by the NODE cluster brand which helped to get students to apply to the local subsidiary instead of the Oslo headquarters.

However, the effect of reduced on-the-job training time which we had anticipated seems to be rather limited. The firms report Mechatronics students to require a similar amount of training as other engineering students. However, any such time-to-productivity effect might be limited due to high degree of specialization in the oil and gas industry: Academia can hardly prepare students to be productive in a specialised industry right from the start.

The reported recruiting effect is supported by the observation – reflecting the short time for job-seeking – that all graduates of the Mechatronics programme are absorbed directly by the local industry. The graduates seem to satisfy a demand for additional workers. The exact quantification and financial evaluation of this additional workforce, however, was not feasible.

4 Benefits for the Region

Introduction

The Mechatronics programme affects the region in several ways – which, finally, all result from the increase of the regional population through the Mechatronics students. The UiA Mechatronics study course offer attracts additional students to the region, which live at least throughout their study period in the region. Other students, which have grown up in the region, but were about to leave, may have been persuaded to stay by the programme. Additionally several students stay even after graduation in the region and start their occupational career in one of the local engineering companies – which may help the companies to grow quicker given that recruiting engineers usually is not easy. Altogether, the Mechatronics programme increases the local population and workforce.

UIA MECHATRONICS ATTRACTS STUDENTS

A regional population increase brings about a number of effects. We have decided to concentrate on three major effects which allow for a financial evaluation:

- An increase in local consumption will raise local profits
- Consumption is subject to taxation and will increase tax revenues via the value-added tax
- A large part of consumption is dedicated to culture and recreation which will increase the demand and consequently result in an expansion of cultural activities in the region
- We analysed these effects using data obtained from the survey of all Mechatronics students and graduates as well as additional information which was publicly available.

Additional students in Agder

In our survey among the Mechatronics students and graduates, 60% of the students state that they live in Agder because of the Mechatronics programme. This information forms the basis for calculating an estimation of the aforementioned effects. In detail, of the reported 749 graduates of the Mechatronics programme 449 students lived in Agder because of the programme and hence augmented the regional population. As there are relatively few Master graduates, we assume that all those 449 graduates lived at least three years in region to complete their Bachelor degree.

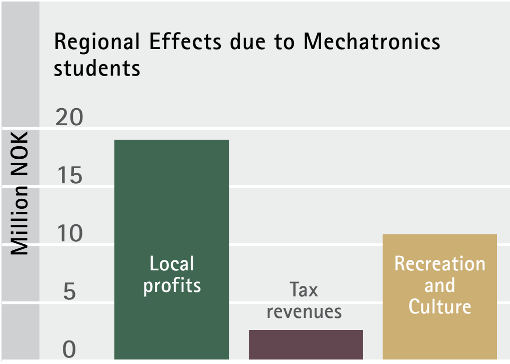


Fig. 9. Regional Effects due to Mechatronics students

The Norwegian State Educational Loan Fund provides every student in Norway with necessary financial recourses to cover their cost of living. At the moment the loan fund pays about 90 000 NOK/Year, which is spent by the students mainly in the region. The total spending power resulting from additional students can accordingly be estimated via the number of students, the time period living in the region to obtain a Bachelor degree and the yearly budget to cover living costs as given by the loan fund. This approach yields an additional spending on the region of more than 121 million NOK.

Local profits, taxes, demand for culture / recreation

An increase in spending on local products will increase profits of local shops, service suppliers and estate owners. To obtain an idea on the effect size we estimate the additional profit via consumption and profit rates. These are published by the Norwegian statistics bureau and facilitate a computation.
Statistics Norway reports that at least 87% of student's income is spent on consumption. Exact numbers on the ratio of profits on consumption are not available for the specific consumption by students. However, Statistics Norway reports a percentage on wholesale trade, which we adopt due to the lack of accurate information. As any subsequent effects like accelerator or multiplier effects are omitted in this perspective, the risk of overstating the effect size due to the incorporation of the wholesale trade number seems to be marginal.
The application of the ratios provided by Statistics Norway to the spending power of additional students results in 19 million NOK profits for regional shops, service provider or estate owners.

Any consumption by the students is subject to a value-added tax. Currently this tax rate amounts to 15% on food and 25% on non-food items. Statistics Norway reports an average share of 20% of consumption being dedicated to food expenditures. Applying these figures to the consumption of additional students reveals extra tax revenues of 24 million NOK.
Apart from studying for their degree, students also take advantage of their free time for recreation and culture. At this, Statistics Norway reports that an average Norwegian spends about 10% of his consumption on these leisure activities. Applying this statistic to the consumption of additional students returns an additional demand for recreation and culture of 11 million NOK.
Furthermore, we applied these figures to the consumption of additional students in order to check for VAT effects. Since VAT is a national tax, we estimated a 6% average reflux to the region according to the 6% share of the Agder population in the total Norwegian population, i.e. 1.5 million NOK.

Considering multiplier effects

If students spend money in the region, this money represents income for someone else in the region – who then might go out to spend his additional income in the region. This is called a multiplier effect. We thus used a statistical method to calculate the multiplier effect of Mechatronics student consumption in the region.
A multiplier effects perspective strives to include not only the direct effect of any additional spending but also account for secondary and subsequent effects. At this it applies a different perspective, which is characterized by a broader view and less attention to details. Consequently a multiplier model incorporates the whole effect. However, it

Student concert at the University of Agder

Tab. 7. Overview of the study results as for benefits for the region

Steps	Results
General idea	■ UiA Mechatronics programme attracts additional students and thereby increases the local population. ■ The resulting consumption of the additional inhabitants causes higher local profits, extended tax income and a stronger demand for culture/recreation
Additional students	■ 60% of the Mechatronics students were drawn to Agder because of the Mechatronics programme ■ In total, 449 students
Local profits, Tax and spending on culture/ recreation	■ Norwegian State Educational Loan Fund provides students with 90 000 NOK/Year ■ Most of it (87%) is spent on consumption resulting in 19 million NOK additional profits in the region ■ Corresponding regional share of VAT surplus amounts to 1.5 million NOK ■ 10% of consumption is spent on culture and recreation causing an additional demand of 11 million NOK
Multiplier effects	■ Different perspective than before, as it accounts for secondary and subsequent effects of additional consumption. ■ Broad estimate for this total effect amounts to 390 million NOK

also includes greater incertitude, i.e. the assumption that subsequent effects happen in the region and are not transferred to other parts of the country.

The multiplier effect in case of consumption by additional students can be described more precisely as follows: Students spent their income on consumption. The receiving retailers, service providers or estate owners will themselves spend part of this additional income on consumption. This process continues until the effect flattens out, because each recipient of additional income will spend only part of it on further consumption (saving rate).

This approach is appealing in order to estimate the regional effect, as only the region is of concern and the additional money is paid for by the central government (student loans). Therefore, in the limited regional perspective, any concern on financing the additional spending can be neglected.

The computation of a multiplier relies on the saving rate, which is reported as 27% for Norway in 2011. Consequently the multiplier amounts to 3.7 and the total effect according to multiplier perspective can be estimated as 390 million NOK.

Effects on the working population in Agder

Graduates in the region report a rather short time for job-seeking implying that the additional graduates by the Mechatronics programme satisfy a need for additional workers by the industry. Since it is not easy to recruit engineers in general, and specifically – given competition with other national industrial centres (Oslo, Bergen) – to Southern Norway, the Mechatronics graduates may enable local companies to grow more quickly than they otherwise could. Consequently the region of Agder benefits from an increased workforce and the corresponding increase of its population.

The resulting effects consist of consumption by additional workers with the resulting profits and tax revenues. Furthermore additional workers expand the business activities resulting in increased wage and corporate taxes.

However, empirically based evidence on additional workers in the region was not available and, due to a lack of up-to-date numbers, no empirical assessment of this kind of effects on the region was feasible.

A Regional Social Return on Investment Perspective

How can the Social Impact of a University Programme on the Region of Vest-Agder be evaluated?

1 Basic Considerations

An SROI approach balances costs with effects to produce a ratio which is understood to describe the Social Return of an investment. For calculating the SROI coefficient of the UiA Mechatronics programme we followed the basic idea of the generic SROI approach: we built the cost-effects-ratio for the Mechatronics programme. But while the costs for the programme mainly show in the Mechatronics group's budget, most of the effects are not available in monetary terms (except for, e.g. the income generated by selling services of the lab). This means two things:

FINANCIAL PROXY VARIABLES TRANSLATE EFFECTS INTO MONETARY VALUES

1. Having identified and assessed the effects, we had to find financial proxy variables helping us to translate the effects into monetary values. This is a key challenge for most SROI analyses.
2. Not all effects which we could identify could be reasonably and comprehensibly monetised, i.e. translated into monetary terms. This is a natural effect for most SROI analyses, too. The point of the approach is to make both monetisable and other social effects visible (cf. overview graphic on page 5 in the executive summary).

– Some of the effects could not be translated into monetary values due to the lacking information. In the analysis at hand this especially holds for effects on the University of Agder.
– Furthermore some effects could not be determined in their entirety since the exact effect mechanism remained vague. Sometimes, certain evidence from stakeholders (e.g. case study interviews with the companies), suggested that these effects persist.

When we had analysed which effects we could successfully monetise, it turned out that we should take a regional perspective and ask: what is the benefit (return) of the Mechatronics programme to the region of Agder? This means that we intentionally leave out any social value creation for other stakeholders, i.e. the students/ graduates, the university, and the local firms. The results are thus to be considered as a conservative estimate, the total social return being larger.

2 Calculating the Social Return on Investment

To calculate the ratio, we first applied the SROI cost / effect perspective to a single average Mechatronics student who takes the 3-years Mechatronics Bachelor degree course. At this he obtains 90 000 NOK/Year by the Norwegian State Educational Loan Fund to cover his costs of living and his education caused costs at the University of Agder. We then compared the estimates of the corresponding costs to estimates of regional benefits – in order to obtain an SROI coefficient.

REGIONAL CONSUMPTION OF ONE STUDENT DURING THE PROGRAMME AMOUNTS TO OVER 500.000 NOK

The costs for the Mechatronics programme (budget) and the corresponding number of graduates were available for 2007-2011. In order to avoid tedious calculations, we generated averages over time. This approach was facilitated by the repetitive structure of the data, i.e. yearly budget data and yearly graduate numbers. Since in total 291 graduates have obtained a degree between 2007 and 2011, the yearly average costs per graduate amount to about 134.000 NOK (according to the programme's budget).
We decided to neglect the comparatively small number of Master graduates. We thus obtained the following direct effects for a three-year Bachelor degree:

a. The estimation of the increase in local profits was based on the 90.000 NOK/Year income for three years (State Student Loan Fund), a consumption rate of 87% (Statistics Norway) and a loose estimation of profits in terms of a share of consumption of 18% (Statistics Norway). Furthermore only 60% of the Mechatronics students cause additional spending, as without the Mechatronics programme they would have move somewhere else. The resulting computation revealed an additional regional profit of more than 25.000 NOK per average student.
b. The tax effect was based on an estimated 6% regional reflux from additional VAT which is applied to any consumption by the average student. In detail, a tax rate of 25% is utilized for non-food items and a 15% rate applies to food items. The resulting computation returns nearly 2.000 NOK as regional effect per average student.
c. As before, a multiplier approach can be taken to incorporate subsequent effects (cf. 4.4). The Norwegian saving rate of 27% yielded a multiplier of 3.7. Applying this value to the consumption of the average student returned a total effect of 522.000 NOK per average student.

Obtaining the financially evaluated effect and the corresponding cost enabled us to calculate the SROI coefficient.
Since we had taken two ways to approach the effect calculation (without and with the multiplier effect included, cf. b & c), we can report two distinct coefficients. The difference is caused by the financial evaluation of the effects, which in the first case is very conservative, and in the second case (multiplier effect model) is less conservative. The results are given in table 8 on the following page.

3 Interpretation of the Results

1. Due to the reasons given above, both approaches do not include any effect on Mechatronics students, the University of Agder and local companies employing Mechatronics students. Especially effects on the University of Agder and regional companies seem to exist, but could not be quantified in order to include them in the SROI calculation.
2. Furthermore, the stated costs already include the Master programme, whereas due to small number of Master graduates the effects are based only on the Bachelor programme.

These factors necessarily worsen the coefficient and all given coefficients may therefore be understood as lower bounds. Taking into account the missing parts in the effect evaluation, there is reason to believe that even the conservative regional SROI coefficient would have turned out bigger than one, if all effects could have been transferred in a monetary value.
On the other hand, the full regional SROI coefficient with its value of 3.9 may overstate the social return for the region – but not for Norway. The assumption that all subsequent effects affect solely the region may not hold in practice.
Assuming a uniform probability for every value in the reported range, an expected value of **2.05** can be computed. **This indicates that the value generated by the Mechatronics programme for the region amounts to more than the double of the invested costs.**
The exact size of the effect, however, remains less obvious since some effects could not be included in the calculations and we need to consider the general complexity of evaluating a university programme.

Tab. 8. Overview of the SROI calculation

Monetised effects	Students are provided with 90.000 NOK/year by the Educational Loan Fund. There are two approaches to transfer this number into a monetised effect: - The corresponding direct consumption results in 25.000NOK additional regional profits and 2.000 NOK additional tax revenues per student. - A multiplier approach also accounts for subsequent effects and reports a total effect of 522.000NOK per student
Costs	Costs per graduate amount to about 134.000 NOK/year.
SROI coefficient	The coefficient is obtained by dividing the monetised effects by the corresponding costs.
Conservative regional SROI of UiA Mechatronics	A conservative regional SROI coefficient includes only the specific effects on the region (profits, tax revenues), and neglects any subsequent effects. This estimate amounts to 0.20 (= a social return of 0.20 NOK for each 1 NOK invested).
Plausible regional SROI of UiA Mechatronics	A plausible regional SROI coefficient also incorporates subsequent effects via a multiplier approach. This perspective results in a coefficient of 3.9 (= a social return of 3.9 NOK for each 1 NOK invested).
SROI	**0.20 – 3.9 with expected value 2.05**
Comment	Note: **Only regional effects** were considered in the calculation, since the effects on other stakeholders were too hard to monetise. The coefficients are thus to be seen as lower bounds. This means that considering the **total effect** we can safely assume the conservative coefficient to be clearly bigger than one – which means that **the Mechatronis programme generates substantial value for the region.**

Conclusion and Recommendations

1 Conclusions for Sørlandets Kompetansefond, other Social Investors, and the Region of Agder

Foundations generally should strive to invest in successful social initiatives that create a high social impact – even if the initiatives did come about without support from the foundation. Sometimes the support of a foundation can boost an existing initative – both through financial support and through reputation effects. All this holds true for SKF's support for the Mechatronics programme at the University of Agder.

Our SROI analysis of the Mechatronics programme clearly shows that, from the perspective of SKF as well as of the region, this funding was really well invested. The Mechatronics programme works as a structure which is very successfully generating social value to the region, not only through its interconnections with the NODE companies, but more generally through its positive effect on the region through the increased number of students who live, consume, and later work in the region. Not only is it, obviously, a growth story (cf. charts on p. |X), but also, each cohort of graduatess find entirely and without the least delay its way into jobs in the local industry.

We have to add, that SKF's funding for Mechatronics can also be seen in the context of the more general SKF successful strategy to support the former College of Agder to become a full university.

Generally speaking, from the perspective of SKF or other regional social investors, our findings suggest the following consideration: The main effect that we could empirically trace is the positive effect on the region through the increased number of students (and later employees). This effect does not seem to be necessarily connected to the subject of Mechatronics. It rather seems that the effect can be produced by funding extensions of capacities at the engineering faculty of UiA more generally speaking – provided that other subjects could be established, and if so, were performing equally well as Mechatronics obviously does. The key question rather is that of the absorption capacity of the local industry, which not only is critical for the employment effect, but, indirectly, for the effect of attracting additional students (or keeping young people for studying where they were born).

The general conclusion is that the impact of Mechatronics funding was particularly high because it was part of the SKF Value Creation Cycle (cf. page 16).

2 Conclusions for the Students, the University of Adger, and the Regional Companies

In our impact analysis study we identified, besides the district of Agder (and SKF as a foundation with the goal to support regional development), three other main beneficiaries of the programme: the students, the University of Agder, and the regional companies. Let's sum up, what the results offer from the perspective of the various stakeholders.

■ Obviously, the Mechatronics programmes offers young people from the region the possibility to realise promising studies where tehy were born. The have the opportunity to get an education which opens them a direct door into attractive jobs in the industry.

■ However, it was an interesting finding of the study that while the Mechatronics programme preforms high in terms of graduate job entry success, we could not find clear indicators of superiority compared to graduates from other engineering subjects hired in the local companies. It just seems that programme operates in a situation which is extremely favourable for engineering graduates in general – which does not diminish the credits of high performance of the programme.

■ As for the University as a whole we found for the period under consideration that UiA improved its academic productivity to a large extent and surpass the national average. Evidence suggests that the Mechatronics programme contributed to this effect.

UIA IMPROVED ACADEMIC PRODUCTIVITY & SURPASSED NATIONAL AVERAGE

■ Regional companies report a positive effect on recruiting opportunities and, obviously, the additional graduates of the Mechatronics programme satisfy a demand for additional workers. Interestingly, we also found that the NODE brand (those regional companies associated throught the "Norwegian Offshore & Drilling Engineering" network) additionally fosters the recruiting effect for some companies. It raises student awareness of the local job opportunities compared to the possibilities of going to Oslo, Stavanger, or elsewhere.

■ The district of Agder benefits via an increase in its population which results in additional consumption, profits and tax revenues. We refer to this clear effect on the region in the calculation of the SROI coefficient in order to highlight how the Mechatronics programme generates additional value for the region. However, the size of this surplus cannot be determined exactly due to estimation variance of the monetized benefits.

Imprint: This is the comprehensive version of the report "Assessing the Impact of the Mechatronics Programme at the University of Agder. A Social Return on Investment Report to the Competence Development Fund of Southern Norway". It was elaborated by the Centre for Social Investment (CSI) of Heidelberg University, Germany, for Sørlandets Kompetansefond (SKF). A short version is contained in the CSI report "Creating Impact in Southern Norway. A Social Return on Investment Report to the Competence Development Fund of Southern Norway", which is available at Sørlandets Kompetansefond. Picture credits: University of Agder (1:1, 1:2, 1:3; 3.1; 3.2; 4:1; 8:1; 9:1; 13:1; 15:1; 19:1; 18:1; 20:1; 24:1; 28:1; 29:1; 35:1; 37:1; 39:1; 45:1); Fotolia (7:1); CSI (10:1): VisitKristiansand (27:1; 44:1); NODE (21:1; 30:1; 34:1); Wikimedia Commons (Hkv: 6:1; Cocu: 40:1; Skifte Eiendom: 41:1; Averagejoe76:43:1).

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Sørlandets Kompetansefond

CSI

Centrum für soziale Investitionen und Innovationen
Centre for Social Investment