Kenneth Rohde Christiansen, Intern at
Institut für Informationssysteme und Softwaretechnik
Universität Passau, D-94030 Passau

Internship (Bedrijfsstage),

Masters Software and Systems Engineering

at

This document contains the following:

- An internship report as specified by the University of Groningen.
- A week-based list of work accomplished during the internship.
- An evaluation of the internship (In Dutch).
- A signed evaluation schema, filled out by the person in charge of the intern.

To be send to:

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Att.: R. Moddemeijer
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NL-9700 AV Groningen
Nederland/Die Niederlande

Internship Report

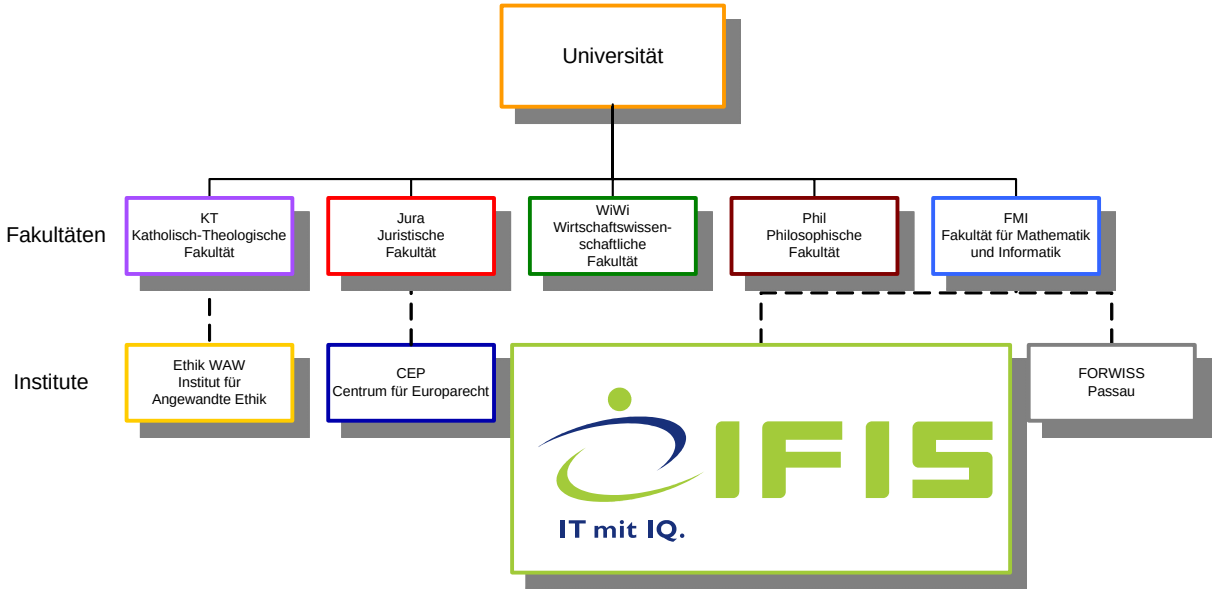
The company

About the company / Company history

With the motto "Science to Business" the company IFIS is presenting itself as a company giving consultation and producing solutions within the field of information management.

IFIS stands for *"Institut für Informationssysteme und Softwaretechnik"* and is a small company consisting of 5 full-time employees and 15 part-time student colleges working on different projects. IFIS also has a project manager, a technician, a secretary as well as a CEO.

The company is quite young and was established in May 2000 as an institute at the University of Passau though a financing of the HTO (High Tech Offensive [Freistaat] Bayern). The company thus functions as a bridge function between science and business and is run by Prof. Dr. Burkhard Freitag (CEO and Head of the institute) and Dr. Ulrich Zukowski (Project Manager / Geschäftsführer)



Institut für Informationssystem und Softwaretechnik

IFIS derives from the "*Lehrstuhl für Informationsmanagement*" and is integrated in the inter-disciplined network of expertise existing at the University of Passau. This makes it possible for a great knowledge exchange and therefore an optimal cooperation between theory, the newest science research and their use in practice.

IFIS has partnerships with many private companies, and is developing software for companies such as *Deutsche Bahn*. In year 2002 IFIS were selling for 578.000 EUR.

How the company exactly fits into the university can be seen on the above illustration.

The fields the company is reaching for and their special properties

IFIS bridges science with business and has its expertise in the field of information systems and software technique:

- Technology consultation
  - Studies, Appraisal, Concepts
- Technology transfer
  - Research and development projects [Where I fit in]
- Certification and further training in Information Technology
  - Colloquia, In-house Schooling, e-Learning

The domain and markets that the company is reaching for are within the field of information management, in particular IFIS has products within the field of Knowledge Management, e-Learning and Workflow Management.

These fields are particular as they work within the domains of Semantic Web and most developed applications are thus web applications developed with XML and middleware such as EJB, .NET, and CORBA.

Assignment

The Assessment.Suite

The assignment is developing an extension to the IFIS Assessment.Suite product:

The IFIS Assessment.Suite enables easy development of interactive learning environments, exercises, and online/offline examinations. The Assessment.Suite supports the entire life cycle: creation and maintenance of learning tasks –online training –automatic compilation of tests - customized examinations offline and online even on mobile devices –evaluation and analysis of the results. The experience of the IFIS developers in tandem with newest technologies such as XML, Semantic Web and Intelligent Tutoring yield excellent acceptance, productivity, and sustainable success.

Die Bahn DB BWB Profi

The Assessment.Suite is used by some big clients as for instance *Deutsche Bahn* who have fully redesigned their train driver education and based it on the Assessment.Suite. The suite is

also used by the University of Passau itself, in particular by the *Sprachenzentrum* who use it for their *Russisch Online* system. The assignment involves implementing a feature request from this client.

Context of the assignment

It is my task to implement support for graphical maps that can be used to select exercises / examinations. These graphical maps will be dynamically generated per user depending on which exercises that are made accessible for the user and not already complete nor out of date. This also includes developing a maintenance system for the maps so that new maps can easily be added and exercises can be added to a given map by using the mouse device. The user interface is a web interface which limits the possibilities somewhat.

The assignment is not set in stone and it is also my assignment to specify exactly what is possible and what we are going to implement.

The problems that the assignment tries solving

The assignment tries solving a customer request. The Assessment.Suite is in use by teaching institution *Sprachenzentrum*, who wants to be able to associate their online exercises with particular places in Russia. *Sprachenzentrum* more precisely wanted to be able to add exercises to a graphical map of the country Russia.

Instead of just implementing the request, IFIS wanted me to implement a more generic system that covers similar use-cases. This includes support for multiple maps, map administrations, support for later extending the system with new marker types and easy editing of the maps.

My contributions to the assignment

The assignment has largely been implemented by me alone, with guidance and review of my design by my supervisor Wolfgang Völkl.

This involves:

- Technology study;
  - Getting to know the Assessment.Suite, its code base and the architectural design patterns used.
  - Learning new tools as Eclipse, Borland Together, Hibernate client
  - Learning new frameworks and tools like Struts, JSP, Tomcat, and Hibernate.
  - Prototype implementation
- Design of the system
  - Use cases
  - UML design

- Design discussions – most written down as well
- *Pflichtenheft*
- User-interface prototypes

- Actual implementation and testing

Future Works

The system is functional and basically complete. Currently only one type of markers are supported, namely the point markers. In order to make the system work with other kinds of maps as for instance mind maps and not only country maps, other marker types need to be implemented. Doing this should be straight forward as the system has been designed this way and only evolves making a new subclass of the Marker class as well as make the appropriate changes to the editor JSP-page and associated form and action beans.

Organization

The organization of the company

The company consists of a CEO, a project manager, a secretary, a technician, 5 full-time employees and some student helpers.

Prof. Dr. Burkhard Freitag:	Chief Executive Officer / Head of the institute
Zukowski, Ulrich:	Project Manager / ”Geschäftsführer”
Falenczyk, Ursula:	Secretary
Lenk, Guido:	System administrator / Technician
Full-time employees:	Dziarstek, Claus; Guppenberger, Michael; Lehmann, Markus; Nitsche, Thomas; Völkl, Wolfgang;

The formal work process used in the company

The methodology of product development at IFIS is characterised by the interaction of careful planning and creative realization of innovative concepts. This way IFIS develops optimal, modern solutions, which meet all requirements and are reliable and maintainable at the same time.

The project phases are roughly divided into the following phases, whose realization in each case is adapted to the requirements of the individual projects:

During the project development, the satisfaction of the customer and the quality of the results is of most importance. Because of this reason the customer plays a central role in the requirement analysis in the course of the project. The involved persons are included by the use of co-worker questionings and workshops incorporated into the project planning.

In project meetings the concrete need will be determined and the exact aims of the project will be specified. Product requirement specifications resulting from the meeting will be compiled and documented in a so-called *Pflichtenheft* and form the basis for the further project completion.

Based on the results of the analysis, custom-made, innovative IT concepts are developed as well as derived recommendations for the employment of software products. For requirements, which go beyond the capacity of commercial products, IFIS in coordination with its customers offers the development of individual components, which are efficiently realized under employment of adequate technologies. Basis for this is the use of object-oriented analysis and design methods of software engineering and a model-based proceeding with the development and in particular also the quality assurance.

After a solution is developed, an intensive quality assurance is performed; IFIS is also guiding the deployment of the system on all levels in the enterprise. On a technical level, the provided components are installed and an evaluation is performed. On the non-technical level, co-workers have been included in the entire development of the new system which helps the acceptance of the system. This is additionally promoted by intensive training and support and also ensures that the new system can be used from the beginning without difficulties.

The informal work process used in the company

The informal work process is more lax that the formal one, though the formal one is aimed for. The reason for this is that most projects have only one or two employees working on them.

Projects are planned by making a time plan and by using Microsoft Project.

The formal process says that the customer plays a central role in the requirement analysis. This has been a bit different in my case as my advisor Wolfgang Völkl has acted as intermediate link between the customers and me, and due to the fact that IFIS wanted not only to implement the customer request but to implement a much more general solution that can be used by other companies as well.

This means that the IFIS wanted to extent the feature set of their Assessment.Suite and at the same time fulfil a customer request. Due to this fact, IFIS has been the customer in my case and the co-worker Wolfgang Völkl has acted as the representative for IFIS and has played a central role in my requirement analysis.

Projects meeting have then also been between me and Wolfgang Völkl and the exact aims of the project have been compiled in a *Pflichtenheft*, which formed the basis of the further project completion.

During the development, object-oriented analysis and design methods of software engineering have been used. Some of the architectural design patterns have been guided be the frameworks and tools in use at IFIS, such as the UML-designer Borland Together and the web-application framework named Struts. This has resulted in a good quality assurance.

The developed solution has been tested by making a testing plan and realizing it. Further more, the structure of the code base has been looked over by a member of the Assessment.Suite team, before it was integrated in the CVS HEAD branch of the Assessment.Suite.

I have not been part of the deployment or the education of the users of the system.

How does the organization structure function?

In order to explain how the organizational structure at IFIS function in practise, we show the typical course of a project and who are responsible.

1. Customer advertisement/first contact:

   Professor Freitag (Sometimes with Ulrich Zukowski)

2. Second phase

   Investigation of the customer's requests to find out what the customer exactly wants, what the technical requirements are, and how to deploy the software:

   Numerous discussions with the customer(s).
   Demonstration of existing systems/solutions.

   The manager Ulrich Zukowski and a developer

3. Project

   On behalf of the identified customer requests, a solution is presented:

   A rough product requirement specification (*Pflichtenheft*)
   (Maybe) a prototype, which is easier to understand for the customer
   Cost estimate / Offer

   Developer (+ Ulrich Zukowski in the customer discussion)

4. Product requirement specifications (*Pflichtenheft*)

   After placing an order, detailed product requirement specifications are compiled. Together with first prototypes, these serve for the fine tuning with the customer.

   Developer

5. Draft - detailed specification - implementation – testing

   Developer

6. Delivery for the customers

   IFIS frequently takes over the hosting of the web applications (at least in a sample operating phase). This means that the delivery frequently only consist of handing over some passwords.

   Developer

7. Testing phase

   From the result of the testing, the customers can deliver their last suggestions for improvement, which will then be considered.

   Developer

8. Acceptance by the customer

   Customer

What could be better

As I haven't worked in many companies it is not so easy to pin point what could be better.

The company seem to work quite well and people seem to like their job. This has also to do with the fact that the company leaves much flexibility and responsibility in the hands of the employee.

An example of this and a fact that I really like, is that the company is very flexible on time. There is no fixed meeting time though it is normal to meet between 9:00-9:30 and leave again around 17:00. This means that if you need to do something one day then you can go a bit earlier and just stay a little longer another. This is of course given that you don't have appointments in your Outlook calendar such as the weekly company meeting that you need to attend on time, and where punctuality is expected.

The organization structure and work processes also seem to work quite well. Projects are finished in a timely manner, and the quality of the result is high as well as the satisfaction of the costumers.

How I fit into the company

I work here as was I a full-time employee. I work on my own part of the system (my project) and thus have my own area of responsibility. Since I am doing an internship it is, of course, a bit differently as was I hired by the company. In particular, people understand that the things are new to me and that I thus work slower and ask basic question from time to time. Even thought this is the case, I have felt that I was an employee of the company the time that I have spent here and have thus gotten a good idea how it would be working here for real.

Conclusion

What I have learned

Some of these things that I have learned have been technically and others are more related to working in a company. It has been very nice for me to feel how it is to put my many years of study into practise. Working turned out to be approximately how I expected it to be, and I have confirmed that I can easily fit in a software company.

On the technical front I have learned much. Before my internship at IFIS, I have mostly worked with developing standalone programs (mostly for the GNOME desktop environment) and have seldom touched web development, as it did not caught my interest.

Working at IFIS I have learned how to develop large scalable, easy maintainable enterprise web applications and I have since become very interested in web development and the associated techniques.

Most of the web solutions that I have developed before joining IFIS have been using PHP with embedded database assess. This has worked satisfactory for my small projects, but now I have the knowledge to develop large enterprise web applications with the business logic, etc nicely separated from the user interface using the Model-View-Controller-II design pattern.

During my work here I have had to use two tools that I have never touched before. The first is the open source IDE called Eclipse. Though, I have heard about Eclipse before and even developed a small Java project with it, I was unaware of the power and flexibility of this integrated development environment. The other tool was Borland Together which is a UML modeller which can work on the Java code directly.

The web products at IFIS are realized by using a collection of Java compatible technologies, many of which are open source. The Model-View-Controller-II design is realized by using Java, JSP and the Apache Struts framework. Additionally, a persistence framework is used for database access which is called Hibernate. Many other smaller technologies are also used as Display Tag Lib, Java WebStart, Logging libraries etc.

It has been a joy to learn these technologies and how they fit together, and I have also had some time to look into alternative techniques and evaluate them a little bit.

For my assignment I had the design option to use JavaScript or a Java applet for my user interface and ended up going for a JavaScript solution, though that I have never worked with JavaScript before. I have learned that JavaScript is a bit "dirty". With this I mean, that it is hard to write good JavaScript code and it is very hard to debug it. JavaScript is supposed to work in all major web browsers but it turns out that the implementation for each browser is a bit different and you have to special-case most of your code. Another problem is that JavaScript doesn't integrate very well with other technologies used as for instance Struts.

Generally, I have learned that developing web applications for different web browsers can be a pain. Since things that you expect to work the same way just does not and you have to find alternative solutions which do not improve the usability. Developing interactive Web Interfaces is hard and it makes you idolise the good people at Google for developing such complex Ajax [1] applications as for instance GMail (http://www.gmail.com) and Google Maps (http://maps.google.com).

Another thing that I have learned during my internship is how easily I can fit into a different culture. My internship has been completed in Bavaria in Germany and language and culture differences have not proven a problem in my work, though all oral communication has been in German.

Things that I have over- and under-estimated

I do not think that there are particular things that I have over- or under-estimated. If there is something that I have underestimated then it is how complex the code of such an enterprise web application can be at first sight.

The amount of code in the project that I worked on was of a reasonable size and it was impossible for me simple to look a bit around, do some code reading and then understand the structure. Instead, I went the road of implementing a prototype with a design that I thought would fit into the system. When I ran into problems I consulted my superiors and they explained me the particular part of their system and showed me where to look. This gave me the option to incorporate my new findings into my design and continue developing my prototype.

To give some numbers the Assessment.Suite consists of:

More than 320 classes
More than 11.000 lines of pure code (comments, braces, brackets and the like are not counted)
More than 45 database tables

What I could have done differently and why

I do not think that there is much that I could have done differently. One thing I could have done though was doing a bit of check-up on the technologies used by the company before I started my internship. This would have made the first couple of weeks a bit easier, but on the other hand that would have given me too little to make. Without this check-up, the period of internship and the project fitted well together, as when the personal at IFIS were not at the disposal to answer my questions, I could spend my time reading up on the technologies on the internet.

What I would like to work on in the future

My main interest in Computer Science has always been human-machine interaction and programming languages and tools. I am a perfectionist and would like to make the computer experience better. I am of the belief that a computer should be as easy to use as a television; a computer should be immediately accessible when it is turned on and it should be almost impossible to mess your system up so that it does not work properly any more. I feel the same way about programming languages, frameworks etc.

Web design has not caught my eye before this internship, due to the fact that it was almost impossible to make well-designed user-friendly applications. During this internship I have learned that web development have undergone a huge development since I have touched it last, and web applications as Google Maps and GMail show me that it is now possible to develop applications that live up to my quality criteria. Ajax [1], together with new Web Frameworks shows a promising future that I can see myself being part of.

My main interests are still human-machine interaction and programming languages etc, so let me touch these separately:

Human-machine interaction

With human-machine interaction I mostly mean making the computer experience better than it is today. For many years I have worked on the GNOME project, which is a project to develop a user-interface for UNIX-like operation systems. I have found this very interesting due to a few facts.

First of all, I have worked on a product for a broad user-scale. Working on a product with a periodic release schedule is very nice, as you get something shipped which you later can be proud of. It also results in lots of feedback (directly from users, reviews, articles etc) that you can consider in your next version.

The other reason is that I am working with new technology and have the option to invent – to go beyond what others do today! Whether my work should be developing a new desktop-wide search tool or working on the user-interface of a particular program, I do not mind, but developing software for a broad audience and inventing is what I really like.

Due to these facts I would like to work on GNOME professionally by for instance working for Red Hat, Novell or Nokia. I would also very much like working for a company as Apple, working on an operation system that is much more close to what I want: the MacOS X.

Programming languages

My other interest is programming languages and related technologies. Due to the fact that I have been programming for many years now I have grown to hate and love different programming languages, tools, and class libraries. This has made me very interested in new trends on this front such as Aspect Oriented Programming, .NET, Architectural Frameworks etc. Working on the GNOME project I have also been following the design of much of the infrastructure and have learned from the mistakes made by the GNOME project.

A project spawning from the fact that the GNOME infrastructure was to hard to use, is the Mono project. A project with the goal of implementing the Microsoft .NET framework for UNIX-like systems as well as integrating it well with the GNOME project.

I could see myself working on this project by for instance working for Novell, Mainsoft or one of the other contributors.

References

[1] http://www.adaptivepath.com/publications/essays/archives/000385.php

Accomplished work (Verslag van werkzaamheden)

The first week

The first day was spent by getting acquainted with the company and my fellow co-workers, as well as getting a computer and a place to work. An account was created for me, and I spent the rest of the day configuring the computer, installing the required software packages, as well as checking out the many modules that I needed from their local CVS.

The next day I spent my time setting up Eclipse, Tomcat, PostgreSQL, so that I could build the Assessment.Suite product that I worked on and run it locally.

The rest of the week was used to get to know the product in detail, as well as being introduced to my assignment and doing preliminary analysis.

On Thursday, I went to the weekly company meeting as I have been doing every week that I have been at IFIS.

The second week

In the second week I did further brainstorming and planning. My preliminary analysis was written down on a day to day basic and was given to my product advisor Wolfgang Völkl. We then had short meetings and I got feedback on my work so far. This also involved learning the design of the product and learning new tools as Borland Together and IBM Eclipse.

I developed new user-interface prototypes in order to see what was possible to do. This also involved searching for already developed software to ease the implementation, as well as evaluating the software and making sure it was using a compatible license.

By the end of the week I had a good idea of where I was heading and had some static interface prototypes.

The third and fourth week

In the third week I continued working on the prototypes and on the analysis. I wrote a *Pflichtenheft* (in German) to the customers explaining the product and where we were heading. I also made a presentation where I introduced my self and explained my project. This presentation was given Thursday at the weekly company meeting.

At the end of the week and the following week I took a little break from the analysis in order to do technology research, which basically means getting acquainted with the code base of the product as well as the many libraries, tools and methods used. This involved reading about and playing with new tools and technologies as: Tomcat, Hibernate, PostgreSQL, Java Server Pages, XDocLet, Ant, Struts etc.

The only way to really get to know the product was trying to implement my prototype with my preliminary design and then ask when I ran into problems and then adapt my design. This way I got to know how the system worked and got better ideas on how to design my extension so that it would work with the existing system.

Doing this wasn't as easy task as I had not worked with many of the technologies before, the code base is reasonable large, and because some of the technologies used were abstracted in the actual implementation.

By the end of forth week I had the user interface working on the web server generating dynamically pages and maps (images) based on static data.

The fifth week

Week 5 I started working on the backend and the business logic to actually generate my pages based on data from the database. I got quite far doing this, but realized that I had not fully understood some of the design patterns and had to change my way of thinking.

I updated my design and discussed some design issues with my colleges and we settled on a final design. Unfortunately, discussing some minor issues some days later revealed that there were some serious problems with the design that we had not dealt with so far. The problems were due to parts of the system that I am not working on directly and we postponed dealing with these until my superior had time to explain me the other parts of the system and the problems that we were facing.

The sixth and seventh week

In week 6 I wrote my *tussenrapportage* and sent it to my school. Furthermore, I talked with my superior about the remaining design problems and came up with some solutions.

After all remaining design issues had been settled; I started working on the actual implementation of the design by using various parts from my prototype implementation. This work continues into week 7 where it was finished.

Unfortunately, I had some computer problems during the week as the computer kept crashing. At some point it crashed during a refactoring in Eclipse, with the result that some important files were overwritten with garbage. My code was not in CVS at the time, as my superior did not want it integrated with the main product and because he hadn't figured out where exactly to put it. After the crash, quite some time was spent saving my work and rewriting what was missing. After the setback was solved we found a way to store my code in a different CVS branch.

The eighth week

In week 8 a few remaining issues with the implementation was worked out and I started making a testing plan as well as compiled a new document consisting of all our design decisions.

A careful Quality Assurance test was fulfilled and it revealed some new problems. After discussion with my superior it was clear that many of the problems were known problems in web application development and that most was handled by the Struts framework used, or by the actual Assessment.Suite framework. The last of the week was spent solving these remaining issues.

The ninth week

In week 9 I demonstrated the system to the project manager at IFIS and he seemed to be positively surprised. We decided that it was time to integrate my code with the main branch in CVS and a day was spent doing this in order to make sure it was done the right way.

A few issues arouse in the next days and were immediately fixed.

The rest of the week was spent writing my internship report as well as arranging when I had to make a presentation during week 10.

The last week

In the last week I worked on updating all the documents that I have been writing to reflex the latest changes. I also had to prepare a presentation of my product for the whole company and before doing so, my supervisor gave me a list of changes that he would like to see changed before the presentation.

All changes were made and the presentation was given on Thursday.

As I had a bit time over, IFIS asked me to evaluate the new Eclipse 3.1 in order to see if they could make an easy transition. Unfortunately, I came to the conclusion that that was not possible, as not all their plug-ins work with the new release. I found alternative plug-ins that IFIS could use, but these will first be released for Eclipse 3.1 in 1-2 months time.

Evaluatie Software-Engineering-stage

Kenneth Rohde Christiansen, July the 1st, 2005-06-24

Legenda:

a = helemaal mee eens
b = mee eens
c = mee oneens
d = helemaal mee oneens
n.v.t. = niet van toepassing

1.	Ik vond het fijn de vrijheid te hebben mijn eigen stage te kunnen regelen.	**A**
2.	De begeleiding bij de stage vanuit de opleiding was goed.	**B**
3.	De begeleiding bij de stage vanuit de installing/het bedrijf waar ik stage liep, was voldoende.	**A**
4.	Wanneer ik problemen had, kon ik die goed bespreken met mijn stagebegeleider.	**A**
5.	Wanneer ik problemen had, kon ik die goed bespreken met mijn dagelijks begeleider.	**A**
6.	Mijn begeleider besteedde voldoende tijd aan mijn begeleiding.	**B**
7.	Mijn dagelijks begeleider was voldoende kritisch.	**B**
8.	Eigenlijk werd ik niet begeleid	**D**
9.	Ik werd tijdens mijn stage teveel aan mijn lot overgeladen	**C**
10.	Er waren duidelijke afspraken tussen mijn stagebegeleider en mijn dagelijks begeleider.	**n.v.t.**
11.	Tijdens mijn stage kreek ik goed inzicht op mijn tekorten in vaardigheden.	**B**
12.	Mijn inhoudelijke kennis was voldoende om goed te kunnen functioneren op mijn stageplaats.	**B**
13.	Tijdens de stage zou er meer contact moeten zijn met de opleiding.	**C**
14.	Het schrijven van het stageverslag kostte mij meer tijd dan ik had verwacht	**B**
15.	De eisen die aan het stageverslag gesteld werden waren mij vooraf duidelijk	**B**
16	Tijdens het schrijven van het stageverslag had ik graag meer begeleiding gehad.	**B**
17.	Door de stage heb ik een beter beeld gekregen van de beroepspraktijk	**A**
18.	Ik heb tijdens mijn stage veel geleerd.	**A**
19.	Het was mij duidelijk hoe de stage beoordeeld werd.	**B**

Welke vakken, die je gevolgd hebt zijn nuttig geweest voor de stage?

Software Architecture, Student Colliquium + veel Bachelorvakken die ik in Denemarken gevolgd heb.

Welke vakken, welke je nog niet hebt gevolgd denk je dat nuttig zullen zijn?

Organization and Management of Software Project Teams

Welke vaardigheden/kennis heb je gemist, maar heb je toch nodig gehad in de stage?

Meer kennis van Web-Application Frameworks, van Integrated Development Environments (IDEs) net als Eclipse en een beetje meer kennis van vaak gebruikte Design Patterns.

Was het werk dat je doen kreeg uitdagend genoeg?

Ja, en ook zeer interessant!

Zou je het werk wat je tijdens je stage hebt gedaan ook na je afstuderen willen doen?

Ja, maar er zijn een paar dingen die ik liefer wil doen.

Eventuele overige opmerkingen:

Nee.

STAGIAIR-BEOORDELINGSFORMULIER IN TE VULLEN DOOR DE STAGE-VERLENER

Naam stagiair: Kenneth Rohde Christiansen

Naam stage-verlener: Ulrich Zukowski

Gegevens bedrijf

Naam: Institut für Informationssysteme und Softwaretechnik (IFIS)

Adres: Universität Passau, Institutsgebäude

Gottfried-Schäffer-Straße 20,

D-94032 Passau

Betreft Stage-periode van 25.4.2005 tot 1.7.2005
Aantal werkdagen afwezig:

BEOORDELING:

Praktische vaardigheden	○ onvoldoende ○ voldoende ● goed
Inzicht in de werksituatie	○ onvoldoende ○ voldoende ● goed
Zelfstandigheid	○ onvoldoende ● voldoende ○ goed
Initiatieviteit	○ onvoldoende ○ voldoende ● goed
Belangstelling	○ onvoldoende ○ voldoende ● goed
Contactuele eigenschappen	○ onvoldoende ○ voldoende ● goed
Probleem oplossend vermogen	○ onvoldoende ○ voldoende ● goed

Algemene indruk: ○ onvoldoende ○ voldoende ● goed
(eventueel kort omschrijven)

Eindoordeel stage (cijfer tussen 1 .. 10): **9** (Neun)
Toelichting bij een negatief oordeel:

Beoordeling stageverslag (cijfer tussen 1 .. 10): **10** (Zehn)

Datum: 1. Juli Handtekening:

Er wordt vanuit gegaan dat dit beoordelingsformulier met de stagiair is besproken.
Gelieve dit formulier getekend mee te geven aan de stagair.