

Tentamen Requirements Engineering (232081) 9 september 2011

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Ten geleide

De casustekst voor dit tentamen is geformuleerd in de vorm van een opdracht voor een requirements engineer. Van deze opdracht zult u delen uitvoeren aan de hand van de tentamenvragen op pagina 5. Bij het tentamen mag u gebruik maken van het boek van Lauesen.

Context:

H&M is a very successful and expansive Swedish fashion group. It is a multicultural company that employs 76 000 people, and sells clothes and cosmetics in about 2000 stores in 37 countries. The company's central functions are based in Sweden, and there is a national office in most of the sales countries. H&M gets 90% of its sales outside Sweden. And the company has every intention of getting bigger.

H&M is a franchise therefore it needs to have strong operation method to insure that at every location the franchise will be the same as the other franchise around the world. The benefits of globalization are that H&M are able to increase their popularity, therefore more profitability. Profitability comes from distribution channels such as stores; stores are the only way that H&M are able to sale their products to their consumer. From that H&M has income. The struggles that company will experience during globalization are that the company will have to adapt to the culture differences and change their operational methods so that it matches the local legislation.

In this context, the company has successfully made the shift from developing fashion at the lowest price to focusing on quality products (at the best price) designed to last, with the hopes of addressing the inherent unsustainability of the fashion industry. H&M is incorporating organic cotton into its garments and is working with suppliers on chemical restrictions, resource efficiencies and the development of environmental management systems. The company has a number of products meeting the strict environmental criteria for "The Flower", the official eco-label of the European Union. The environmental principles are an integral part of both Swedish and H&M culture. The senior management team of H&M suggests that H&M could improve its reporting by covering environmental metrics for global locations. Additionally, they suggest the company develop a clearer strategy for integrating green building techniques in its new and remodeled stores.

H&M has adopted the so-called "Best Practice Handbook for Green Retailers", an international standard that each franchise organization should obtain compliance to, within three years since its opening. There are 14 best practices in the Handbook and they include the following:

- corporate environmental policy,
- energy efficiency,
- green energy,
- transportation,
- green influence on supply chain purchasing,

- green products,
- environmental donations and support,
- solid waste reduction,
- water use reduction,
- staff training,
- customer education,
- benchmarks and indicators,
- financial impact,
- quality of air.

The compliance of each H&M store to this environment handbook has been tracked through an Environment Management System (**EMS**), an application built in Sweden by a local IT services provider. Since its adoption, the EMS application has supported European H&M stores in obtaining compliance, however it does not scale up to the needs of the global H&M network of stores (for example, H&M is expanding in China, India and more). For this reason, the H&M's senior management team decided to replace the system with a new solution that meets the global needs of the company and helps the global organization meet its environment commitments.

Mark Jacobsson, a Program Manager for Environment Compliance met with the chief requirements engineer of the IT vendor in Sweden and below is what he said:

"We want to make it easy for our customers to live green. We are committed to help all people in the countries where we run business to make energy-efficient and money-saving purchase decisions, in addition to reducing the impact of our operations on the environment and nurturing a culture of sustainability with our associates, customers and communities where we operate. So, our strategy aims at sustainable, profitable company growth. We look for a new Environment Management System – we call it EMS-Plus, that will help us in our effort get more opportunities to achieve significant savings by aggregating actions across many stores that become more environment-friendly.

Our old environment management system, that we call EMS, is used for assessing how each of our stores meets the criteria with respect to the 14 Best Practices in our Handbook. The system is an English-only application and is currently used by 74 people in the 37 countries where we have store. In each country we have two people responsible for assessing our stores regarding how well the stores are doing regarding environmental matters. One of the two people has an overseeing role (we call this person an Environment Team Lead) and is responsible for preparing semi-annually three kinds of country-specific reports: the so-called sustainability report, the environment report, and the safety report. The second person is an Assessor who goes to visit our stores in a certain country and collects data to evaluate how each store is doing according to the 14 practices.

As you know, the EMS has worked for the last three years while using it in Europe, Canada and the United States. We were very happy with the system and we are glad to have you again in this project, as we appreciate very much your knowledge of our business.

So, the EMS system was good..., but with our expansion to Asia and Eastern Europe the EMS system is no longer enough. We need now to replace it with a new system, which is easier to use and which is inclusive in the sense that is adapted to the local requirements of the countries where we extend our business to. We tried EMS in Asia, and we found that its Asian users are only partly satisfied.

Currently, the Assessor in each country executes two tasks with the application:

- (1) he/she sets up a documentation folder for each store in a country,
- (2) he/she evaluates the stores.

This is no longer enough, because we want Assessors to be able to do comparisons between the evaluations of different stores within a country, and make suggestions for improvements in those stores that are less environment-friendly.

We want the new EMS-Plus system to support those tasks that the current system supports, plus the following very important tasks that Assessors will do:

- the Assessors should be able to compare the store-specific data in their country with international data. In each country, the Assessor wants to know how H&M scores compare to other retailers regarding environment factors as gas emissions, power consumption and waste management. Comparisons of these three types should be done automatically in the new system.
- For those stores who score low in terms of environment-friendliness, the Assessors should be able to prepare an improvement plan that the stores would work on, in the next two years after the plan creation. As part of this task, the Assessor should be able to send the improvement plan to the Store Manager whose store scored low.

I must confirm that the procedure for evaluation of the compliance of each store with respect to the 14 Best Practices in the Handbook, remains the same as you know it from the old EMS system: when our Assessors have to evaluate a store, they first get access to a checklist in EMS with all the criteria pertaining to the 14 Good Practices; they print out this checklist, go to the store and for two days they collect all pieces of data they need. The completed checklist is signed off by the Store Manager and his environment staff. Then, the Assessors return to office and enter the data into the system. When the data is entered, the country's Assessment Team Lead receives a notification by email with an invitation to review the checklist and approve the data entry. He/she will not approve it, if he/she finds missing data on some criteria. He or she, basically, makes sure that all data are present for the evaluation to happen. Upon his/her approval, the Assessor runs an evaluation calculation procedure which results in a number that indicates the extent to which a store meets our Best Practices from the Handbook. This number is sent in an email to the Assessment Team Lead and to the central H&M Environment Manager in Stockholm. He creates reports for me, whenever I have to present them to the Environment Counsel of Sweden. This happens 3-4 times per year. So, the Environment Manager will need to have access to the system, but I would not need it. And because our evaluation process remains unchanged, please have in the ESM-

Plus the same screen pictures as in the old system. This will make the EMS-Plus solution easier to be accepted among the users.

Our Assessors also added that they would like the ESM-Plus to have a function for extracting the evaluation data based on key words (I mean here some words from the names of the 14 practices; for example "waste", or "energy").

We will need the new system to be multilingual in English, French, Spanish, and Chinese. We also take a new criterion for usability: we would like a novice Assessor to be able to perform the task of data entry in 20 minutes. The current EMS system has menus that are at many levels. I'd like to ask you to have in the new system menus at most four levels. This is our most important thing to say about usability.

Also, some of our Assessors asked for usability testing. Therefore, we would like to ask you to provide us with two prototypes that will be tested for usability.

In the past year, we experienced loss of data in China because of a disk breakdown. This represents a kind of a security threat. For this reason the new system should meet some new security requirements: please include duplicate disks that will be used if the user's disk crashes.

Last thing to add: our Environment Manager knows a lot about EMS. And he appreciates that you wrote a good dictionary for the data in ESM. Therefore, we would appreciate to receive again a new dictionary for the new system ESM-Plus. Indeed, he will use the data dictionary to validate any data model you may have to create in this project."

Imagine you are the requirements engineer who attends this meeting to get understanding of the EMS-Plus project.

Let a.u.b. op het volgende.

• *Bij het tentamen mag u gebruik maken van het boek van Lauesen (2002): Software Requirements – styles and techniques. U mag geen gebruik maken van andere meegebrachte papieren, bijvoorbeeld het huiswerk of aantekeningen over het proeftentamen.*

Opgave 1:

- a) Make a list of the stakeholders for the project. (8 points)
- b) Is Mark Jacobsson a part of the inner domain or not? See page 4. Motivate your answer. (4 points).

Opgave 2:

Identify and formulate 2 domain-level requirements, 2 product-level requirements and 2 design-level requirements (if there are any of each type). (6 points)

Opgave 3:

Knowing the information in the case study text, would you, the requirements engineer, take the time to write the data dictionary? Motivate your answer. (5 points)

Opgave 4:

- a) Create a context diagram for the project (9 points).
- b) Below, there is a list of techniques for specifying functional requirements. Which of the techniques from this list would you use for specifying the functional requirements in this project and why. Write down any assumption you make, when answering this question. (18 points)

- Features
 - Event lists and function lists
 - Screens
 - Task descriptions
 - Data flow diagrams
 - Use cases
- c) Write one task descriptions for the Assessor who will use the ESM-Plus. Use the information you have in the case study text. (6 points)

Opgave 5:

In Chapter 8.2 (pages 338-372), you see 19 techniques for requirements elicitation. Please choose 4 techniques that you think are suitable for requirements elicitation in the ESM-Plus project and that you would use. Motivate why you think each of the 4 techniques is suitable. (20 points)

Opgave 6:

- a) Security is a concern in this project. Formulate one security requirement. (4 points)
- b) Formulate three usability requirements. (10 points).

Tentamencijfer $T := (\text{aantal punten} + 10) / 10$

Huiswerkcijfer $H := \text{gemiddelde van de 6 huiswerkopgaven}$

Eindcijfer **if** $H \geq 5.5$ **and** $T \geq 5.0$ **then** $E := \max(T, (T+H)/2)$