COURSE MANUAL

Minor Responsible innovation

Innovation and Interface Management

2016

<mark>Version 2</mark>

Teacher:

Dr. Ir. Henk de Vries
Rotterdam School of Management, Erasmus University
Department Technology & Operations Management
Mandeville Building, 9th floor, Room T09-39
hvries@rsm.nl, , Phone (010) 408 20 02

Theme

Using fuel cell technology, hydrogen can be used in cars as an alternative to petrol-based or electric cars. From a sustainability perspective this might be the better alternative but it would require an entirely new infrastructure with standard interfaces between the cars and the 'fuel' stations in this infrastructure. The possible new technology competes against existing ones, the question is how to measure environmental performance, serious safety issues apply, and companies compete with each other but also need a common solution in order to make things happen. So at the supply side we observe a dynamic process of cooperation and competition between a large variety of stakeholders which should result in products (or services) that will be accepted in the market while addressing societal needs, and for which shared interface specifications are essential. Interfaces link the different parts of the system and link the system to human beings. These interface specifications should remain stable during a longer time period, which allows innovations in other parts of the system, such as the cars. Increasingly, innovation is about integrated systems of products and services rather than single products or services and this course provides you with knowledge and skills on you how to manage such innovation projects.

Learning objectives

This course aims to provide you with basic knowledge about interface management and, next, its integration in innovation management. After this course, you will be able to:

- explain how interfaces support complex systems of processes, products and services.
- illustrate interfaces' roles in innovation of such systems.
- describe how standards can be used to specify interfaces.
- distinguish between different ways in which standards can be developed.
- formulate a strategy for a company to influence interface specifications in a multi-stakeholder setting.
- make concrete recommendations on using innovation and interface management to enable responsible innovation.

Approach

This course provides you with basic knowledge about interface management and, next, its integration in innovation management. This should enable you to develop and employ a strategy for an individual company, a supply chain or a branch of business. Or, as in case of the SPG theme, a municipality. The multidisciplinary scientific basis of this course will be complemented with business input in the form of business cases and assignments.

The course covers the entire area of interface management, not only at company level but also at the level of industry associations and governments, nationally as well regionally and globally and relates this to (responsible) innovation management. After a general introduction, the course addresses subsequently interface management in the form of formal standardisation at the national, regional and global level, interface management by industry associations and by industrial consortia, interface management at company level, and interface management in chains and networks of organizations. A next topic is conformity assessment: how to make sure that interfaces indeed meet the specifications set for them. Then we pay attention to methods and techniques of standardisation, and the several legal implications (including the use of standards as 'soft laws' and the relation with Intellectual Property Rights). Next, we connect all this to innovation by linking

interface management, standards and standardisation to the phases of the innovation process and seeking evidence for the impact on innovation. Finally, the question is how to manage an integrated approach of innovation and interface management, including the way of organizing it, within companies and in cooperation between companies and other stakeholders.

The course includes scientific contributions from disciplines like economics, law and political science – and the challenge is to combine these disciplines to solve real business problems and generate new business opportunities.

The teaching method is a mixture of
- lectures;
- teaching cases;
- role playing game;
- class discussions;
- company visit;
- individual and group assignments.

Literature

Scientific and professional papers and teaching cases, to be provided or indicated via Blackboard.

Class participation

Presence during class is mandatory; if you have compelling reasons for being absent, please inform Henk de Vries beforehand. Your job, if any, is not a compelling reason nor are holidays or other courses. Unjustified absence affects your grade for this course.

Grades

For each of the assignments, individuals and groups will receive a grade (1-10). The final grade will be a weighted average of the grades for the different assignments.

- Small individual assignments[1]   :   50%
- Group assignment[2]   :   50%

In case you impress the teacher repeatedly through the way you participate in class discussions, he may decide to slightly increase the final grade. Criteria include:
- Are points made relevant to the current discussion? Are they linked to the comments of others?
- Do the comments show clear evidence of appropriate and insightful analysis of the topic?
- Do comments clarify and highlight the important aspects of earlier comments and lead to a clearer understanding of the concepts being covered?

---

[1] Assignments 2, 4 and 5: 10% each, Assignment 2: 20%.
[2] Assessment criteria: see Annex B.

Assignments

General requirements for the assignments can be found in Appendix A. All assignments except Assignment 1 are individual assignments.

Assignment 1: Group assignment (50% of final grade)

Write a paper on how lessons from interface management and/or standardisation can be used to better understand your group's responsible innovation project. Your report has the character of an advice based on a thorough analysis.

Your study may include an analysis of stakeholders and the innovativeness of the municipality or one or more other stakeholders. You can use innovation theories and match them to the specific characteristics of your case.

In case of an advice to the municipality, you analyse its strategy, its current activities, the role of innovation for improving these activities, the way innovation is organised, and the results achieved so far, and relate all this to the management of interfaces. Then you provide the municipality with written advice: What to do? Is it sufficient to define own standards or should they get involved in developing external standards? You may also choose the perspective of another stakeholder.

Appendix C provides the assessment form for this assignment.

Schedule:

- September/October   Possibilities to get feedback from your supervisor.[3]
- Friday 11 November   Hand in the report (paper version)[4] and mail it to Arjan Engelbracht (Engelbracht@rsm.nl).

---

[3] Not available in Week 41 (10-14 October).
[4] Paper version to be handed in in Henk de Vries' postbox, Erasmus University, Mandevill;e Building, 9th floor, box 19 (to be found in the corridor between rooms T09-19 and T09-20), or at his home address (Lentepad 3, 2614WB Delft). Please also hand in earlier drafts, if any, with his comments included.

Assignment 2: Managing the human interface (20%)

A human factors/ergonomics (HFE) view on designing products and processes focuses on systems in which humans interact with their environment. The environment is complex and consists of the physical environment ('things'), the organisational environment (how activities are organised and controlled), and the social environment (other people, culture) (Moray 2000, Wilson 2000, Carayon 2006). The system can be a work system (where the human is a worker and the environment is the work environment) or a product/service system (where the human is a product user or person who receives a service and the environment is the environment where the product is used or where the service is received).

Traditionally 'work' is a central issue in HFE, as indicated by the etymology of the word ergonomics (ergo=work). However, HFE is concerned with all kinds of activities that go beyond (paid) work and includes activities carried out by a range of users, e.g. customers, citizens, patients, etc. with different characteristics (e.g. age), in a range of domestic, leisure, sport, transport and other environments. When we use the words 'work system' it includes other living systems.

The focus of HFE is to jointly improve performance and well-being by designing the integrative whole better, and by integrating the human into the system better. This is done by fitting the environment to the human. HFE typically takes a hierarchical approach where environmental design to fit the human is seen as the priority, and selecting people to fit the environment or training people to fit the system is only considered when the former is not possible. With a better fitting environment, humans are better able to contribute to performance. Other contributors are the effort taken by the human independently of the environment, as well as contributions from other components of the system.

Over the past 50+ years, the HFE community has developed and documented a substantial body of knowledge and skills regarding interactions between humans and their environment, and methodologies for analyzing and designing systems. The definition of HFE and HFE specialists (adopted by the International Ergonomics Association (IEA) in 2000) reflects this body of knowledge as follows (IEA 2000): 'Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize well-being and overall performance.' 'Practitioners of ergonomics, ergonomists, contribute to the planning, design, implementation, evaluation, redesign and continuous improvement of tasks, jobs, products, technologies, processes, organisations, environments and systems in order to make them compatible with the needs, abilities and limitations of people.'

Three fundamental characteristics of HFE can be derived from these descriptions: 1: HFE takes a systems approach. 2: HFE is design driven. 3: HFE focuses on two related outcomes: performance and well-being.
Source: Dul, J., Bruder, R., Buckle, P., Carayon, P., Falzon, P., Marras, W.S., Wilson, J.R. & Doelen, B. van der (2012). A strategy for Human Factors/Ergonomics: Developing the discipline and profession. *Ergonomics, 55*(4), 377-395.

Description of the assignment

You are asked to either analyze a work system situation or a product/service system situation. Based on your analysis you make a PowerPoint presentation that includes only the slides listed below. In the space for notes located under the PowerPoint slide, you should elaborate on the topic presented in the slide in no more than 120 words. You will be graded on the contents of your elaboration (most important), as well as on the quality of your slides. In this way you are able to show your ability to explain the concept content-wise as well as your ability to make proper slides.

The presentation has to be handed in not later than **Tuesday, the 20th of September 8:00 (a.m.) hours** by sending an email to engelbracht@rsm.nl along with the attached presentation (add as subject "Innovation and Interface Management"). Be aware that you may be asked to present your slides in class. Recommended reading: Section 2 of the paper mentioned above.

Start by making a choice whether you want to analyze a work situation or a product.

*Option 1: Make the following slides if you analyze a **work situation.***
Slide 1.

- Select and describe a **job/work situation** that you have been working in as a worker (e.g. your side job).
- Describe one **specific task** within that job/work situation (including its task elements and required activities/steps) and how this task is part of the broader job/work situation.
  Examples of specific tasks could be stocking shelves in a supermarket, billing customers in a restaurant or moving elderly people out of bed in a care home.

Slide 2

- Describe the **interactions** of the worker (you) with the physical, organisational or social work environment while performing this specific task. Descriptions of these interactions should include specific actions taken by the worker in the work situation and the consequences of these actions.

Slide 3

- Give an overview of (potential) **interaction-problems** between the worker and the environment, from both the perspective of worker and the perspective of the organization. Also reflect on the consequences of the interaction-problems (e.g. inefficiencies, quality risks, health and safety risks). Focus on interaction problems that result from the way the environment (physical, organisational or social) was designed.

Slide 4

- Find one **academic paper** (e.g. using Web of Science data-base) that discusses one interaction problem for this particular task (or a similar task) and summarize the findings. Again, focus on an interaction problem that fits the definition of the paper above. The paper should be relevant to your interaction problem.

Slide 5

- Formulate concrete and feasible **suggestions for improvements** of the interactions, by improving the design of the work task and the design of the physical, organisational or social environment.

Slide 6

- Speculate about the **causes** of the identified (potential) interaction problems during the development of the work situation (could be in all stages e.g. planning, design, implementation, evaluation, maintenance, redesign, improvement).
- Explain how **managers** can prevent the identified (potential) interaction problems and how this affects the way they manage innovation in their companies.

Slide 7

- What **lessons** have you learned from this assignment?

Option 2: *Make the following slides if you analyze a **product** (a good or a service).*

Slide 1.

- Select and describe a **product** that you have used as a user (e.g. in everyday life). (Do not select an ICT product).

- Describe one **specific use** of the product (and describe the elements and activities/steps of that use) and how this use is part of the broader use of this product.

  Examples of specific uses could be making a cup of coffee with a coffee maker, cutting vegetables with a knife, walking up some stairs or entering a station through the ticket barriers.

Slide 2

- Describe the **interactions** of the user (you) with the product and the physical, organisational or social work environment while using the product for this specific use. Descriptions of these interactions should include specific actions taken by the user in the use of the product and the consequences of these actions.

Slide 3

- Give an overview of (potential) **interaction-problems** between the user and the product (and/or product environment), from both the perspective of the user and the perspective of the organization that has produced the product. Also reflect on the consequences of the interaction-problems (e.g. inefficiencies, quality risks, health and safety risks). Focus on interaction problems that result from the way the product was designed.

Slide 4

- Find one **academic paper** (e.g. using Web of Science data-base) that discusses one interaction problem for this particular use (or a similar use) and summarize the findings. The paper should be relevant to your interaction problem.

Slide 5

- Formulate concrete and feasible **suggestions for improvements** of the interactions, by improving the design of the product and the design of the physical, organisational or social environment.

Slide 6

- Speculate about the **causes** of the indentified (potential) interaction problems during the development of the product (could be in all stages e.g. planning, design, implementation, evaluation, maintenance, redesign, improvement).

- Explain how **managers** can prevent the identified (potential) interaction problems and how this affects the way they manage innovation in their companies.

Slide 7

- What **lessons** have you learned from this assignment?

Schedule:

- Tuesday 20 September   Mail your presentation to Arjan Engelbracht (Engelbracht@rsm.nl). The filename of your document should be "Minor Ass. 2 <your name> <your student number>".

- Tuesday 4 October   Be prepared to present your presentation to your fellow students.

Assignment 3: Impact of standardisation on innovation (10%)

Please think of three ways in which standards might either support or hinder innovation which were not mentioned in the readings. You can use your own ideas or look for additional sources.

Write a short document (½ page is enough, no more than one page) in which you briefly explain these three ways. Mention any sources that you used in this document.

- <u>Tuesday 27 September</u>   Mail your presentation to Arjan Engelbracht (Engelbracht@rsm.nl). The filename of your document should be "Minor Ass. 3 <your name> <your student number>".

Assignment 4: Certification (10%)

Read the paper *Conformity Assessment* (Henk de Vries, Albert Feilzer, Harry Gundlach & Jan Simons (2010) In: Univ.-Prof. Dr-Ing. Wilfried Hesser, prof.dr. A.J. Feilzer & dr.ir. H.J. de Vries (Eds) Standardisation in Companies and Markets. 3rd edition. Hamburg: Helmut Schmidt University Hamburg, pp. 871-904).

In Japan, a key societal issue is the ageing population. Responsible innovation may address this issue. Would it make sense to issue a certification programme in Japan (and, at a later stage, maybe also in other countries that face this issue) to demonstrate products' and services' fitness for use by elderly people? This may include the use of 'normal' products or services (e.g. the ability to open a jar of jam, easy access to a bus) or specific products or services (e.g. a walker ('rollator'), physiotherapy for elderly, home care). Please underpin your answer. Maximum length (excluding references to literature, if any): one page.

- <u>Tuesday 4 October</u>   Mail your presentation to Arjan Engelbracht (Engelbracht@rsm.nl). The filename of your document should be "Minor Ass. 4 <your name> <your student number>".

Assignment 5: Standardisation for societal issues (10%)

Read the paper *Impact of changes in regulatory performance standards on innovation: A case of energy performance standards for new-built houses* (Henk J. de Vries & W. Pieter Verhagen (2016). *Technovation*, **48-49**, 56-68, http://dx.doi.org/10.1016/j.technovation.2016.01.008.
.
The paper suggests that addressing societal issues and stimulating business to innovate can go hand in hand. Please think about another societal issue not previously addressed in this course and argue whether or not a similar approach may be feasible, also resulting in a win-win-situation. Maximum length (excluding references to literature, if any): one page.

- <u>Tuesday 11 October</u>   Mail your presentation to Arjan Engelbracht (Engelbracht@rsm.nl). The filename of your document should be "Minor Ass. 5 <your name> <your student number>".

Course Overview

Week #	Session #	Date & Time	Room	Topic	Deadline Assignment #	Teacher/ Guest Speakers
1	1	Tu 6 Sept 9.00-16.00	T3-24[5] T3-31	Introduction Game: setting standards for innovation		De Vries + Engelbracht + Wiegmann
2	2	Tu 13 Sept 8.45-11.45	T3-17	Interface management: introduction and history Standardisation at the national, global and regional level Tracing and classifying stakeholders		De Vries
3	3	Tu 20 Sept 9.00			2	
	3	Tu 20 Sept 10.00-12.00	AVR	Company visit		De Jong, Slob
4		Tu 27 Sept 8.45			3	
	4	Tu 27 Sept 8.45-12.00	T3-17	Smart cities Standardisation and authenticity		Hofman-Zuter De Vries
5		Tu 4 Oct 9.00			4	
	5	Tu 4 Oct 8.45	T3-17	Modes of standardisation Conformity assessment		Wiegmann
6		Tu 11 Oct 9.00			5	
		Tu 11 Oct 8.45-11.45	T3-17	Managing the human interface		Engelbracht
7	6	Tu 18 Oct 8.45-12.00	T3-31	Impact of standardisation on innovation		De Vries
10		Fr 6 Nov 16.00			1	

---

[5] This is in the Mandeville building.

• Appendix A: General Assignment Requirements

During this course you are required to hand-in several assignments. You should keep the following requirements in mind:

1. Assignment Content
- The content of the assignment will be judged on the correct use and understanding of the information provided in the question.
- Do not write 'to fill the pages'
- Where applicable, the content should be based on scientific literature found in the Erasmus (electronic) library or the libraries in Delft or Leiden, completed with other literature, e.g. from professional journals.

2. General lay-out
- The assignment should include your student number and name and, in case of group assignment, group number and name (on the front page for the final report). With the exception of the final report of the group assignment, please start the story on page 1 already so do not waste paper for front pages.
- All assignments in English (UK)
- References in a proper format
- A4
- Font 12, Times New Roman
- Line spacing 1
- Margins (top, bottom, left, right): 2 cm.
- Do not exceed maximum amount of pages (reference list, figures and appendices not included)
- Pay attention to readability (formatting, layout)

Appendix B: Assessment form Assignment 1

Student number	Student names

Title paper:	

	Criterion	Score **Weak = 1** **Average = 2** **Good = 3**
1.	The problem formulation is weak/average/crystal clear	
2.	The way the topic is being addressed is original (no/to some extent/yes!)	
3.	The way the topic is being addressed can be used as example for other groups (no/to some extent/yes!)	
4.	The argumentation / line of reasoning is weak/average/well structured	
5.	The paper's topic is treated at a weak/average/good level	
6.	The paper's conclusions match weakly/average/good with the problem formulation and follow logically from the arguments.	
7.	The paper uses literature and course materials weakly/average/good	
8.	The paper is expected to be relevant for practitioners (no/to some extent/yes!)	
9.	The paper's structure, length (could it be shorter?), and the division of content over the paper's sections are weak/average/good.	
10.	The paper's layout, language (including source citing and referencing, and typing errors), style and overall impression are weak/average/good	
	Total score	

Grade:	

Comment:

Score	Mark	Score	Grade
11	2.7	21	6
12	3	22	6.3
13	3.4	23	6.7
14	3.7	24	7
15	4	25	7.4
16	4.3	26	7.7
17	4.7	27	8
18	5	28	8.5
19	5.3	29	9

Elucidation
The maximum score is 30 points. Instructors can deviate from this score based on general impression. Especially in the case you really add to the common understanding of innovation and interface management you can get a higher grade.