# 1 - 6: Core Competency Areas

The core competency areas are typical for the field of Industrial Design, they distinguish our programme from the other ones at the TU/e. When observing an industrial designer at work, you would certainly see these competencies being put into effect. The first ones that spring to mind are: being creative and making a lot of drawings. Of course there is more to it. As a designer you must have a solid view on the end user of your product and you have to know about the latest technological developments. Finally, you should be aware what influence your design might have in society and how you can position it in the market.

## 1 Ideas & Concepts

- 1.1 Idea Generation
- 1.2 Idea Selection & Communication
- 1.3 Concept Development
- 1.4 Concept Appraisal

## 2 Integrating Technology

- 2.1 Sensors & Actuators
- 2.2 Transformations & Intelligent Control
- 2.3 Physics for ID
- 2.4 Material Properties & ManufacturingTechnology
- 2.5 Technology Integration & System Level Engineering

## 3 User Focus & Perspective

- 3.1 Understanding the User
- 3.2 User-Centred Design
- 3.3 Interaction Design

## 4 Socio-cultural Awareness

- 4.1 Design & Art History
- 4.2 Socio-cultural Trends
- 4.3 Design for Sustainability

## 5 Designing Business Processes

- 5.1 Idea-to-Business
- 5.2 Future Proof Design
- 5.3 Design for International Markets
- 5.4 Business Model Design
- 5.5 Global Design Processes and Dynamic Global Business Networks

## 6 Form & Senses

- 6.1 Visual Language
- 6.2 Auditory Communication
- 6.3 Haptic Experience
- 6.4 Combining Senses
- 6.5 Symbolism & Semantics

# A B C D: Meta competency Areas

These are named 'meta' because they involve you at a higher abstraction level. At the TU/e other programmes also require most of these competencies because they are closely linked to being an academically educated engineer. For instance the ability to work in multidisciplinary teams, mastering the processes of design and research and abstract thinking. Last but not least, there is one metacompetency typically linked to the educational model of the faculty Industrial Design: the ability to reflect on your own learning process and to direct it actively into the right direction.

| A Multidisciplinary Teamwork & Communication | B Design&Research Processes | C Self-directed & Continuous Learning | D Analysing Complexity |
|---|---|---|---|
| A.1 Multidisciplinary Teamwork<br>A.2 Verbal Communication<br>A.3 Presentation<br>A.4 Written Communication<br>A.5 Professional Conduct | B.1 Design Process<br>B.2 Research Process<br>B.3 Scientific Research Process<br>B.4 Reasoning | C.1 Learning Ability<br>C.2 Self-Regulation<br>C.3 Reflection | D.1 Generic Modelling<br>D.2 Mathematical Modelling<br>D.3 Data Modelling<br>D.4 Logic & Language |

# Competency Framework Department Industrial Design


Ideas and concepts are initiated through different ways of thinking according to your attitude, influences and experiences such as: empathic thinking (concerned with feeling and sensing your way), associative thinking (compares and makes connections with different objects, places and experiences), different analysis and selection processes to select and match the best design, observing the flow of experience and actions, and physical modelling, as a part of the concept forming process. The process of generating ideas to develop into selected concepts is a major step. It is worthwhile to practice your ability to generate and select ideas, as the key to producing effective design concepts. Ideas are born from your observations and experiences. Both non-explicit and purposeful observations provide natural conclusions about the immediate human/space/object relationships – basically 'the world around us'. As an industrial designer you need to have a variety of activities and tools for the process of ideas generation and concept development.

# Competency Framework Department Industrial Design


Issues of a technological nature are very common for designers. Your design will need to meet all kinds of functional requirements, or demands related to prototyping and volume production. For industrial designers in the field of intelligent products, systems and services, 'design with intelligent technologies' is considered a essential topic. Intelligent products, systems and services integrate specific technologies to become more adaptive to the environment and to enable improved human experience.

Integrating Technology is a competency area that needs to be considered during the whole design process. Sometimes the focus lies at the end of the design process, sometimes technology can also be an inspirational part of the design process.

# Competency Framework Department Industrial Design


With observation and insight of how people interact with products and the environment, designers can create products, systems and services that improve the quality of life. Design can also recognize key attributes that focus on the needs of each individual user or user group. With thorough user research and testing, products, systems and services can be optimally tuned to match these user needs.

The designer needs to take into consideration the cognitive limitations and capabilities of users, according to what they can learn, remember and how they think, etcetera. Human emotions and attitudes will also influence the appearance of objects and the user-interaction with product systems. People have different personalities, age groups, cultural groups, social groups, all of which influence their requirements and needs and the way they form communities and social relationships.

# Competency Framework Department Industrial Design


Industrial Design is inevitably part of the larger human society and culture. Global society develops at a breath-taking pace. Mega trends like ageing, globalisation, new technology and issues like scarcity of resources, political power, economic and demographic development, play an important role in what the world will be like in the future and inevitably influence each undertaking in life. A designer needs to develop a keen bird's eye perspective on this continually changing cultural landscape turning observations and knowledge into products, systems or services which match the needs of societies and cultural communities.

# Competency Framework Department Industrial Design


This competence covers the topics that relate to bringing new products to users in a global market using a dynamic international industrial context. It focuses on (structures of-) industrial business processes that are currently used to bring high-tech products to the market under the influence of a continuous influx of new technology with a high degree of uncertainty of future user profiles. In this context it has a strong relation with competences that deal with product design; often this competence deals with activities that are also addressed in Product Design but now focusing especially on the industrial context.

# Competency Framework Department Industrial Design


The human senses form the basis for the way we understand the world around us. Vision, hearing, touch, taste and smell all affect our reactions to objects, spaces and the physical world we inhabit. Form is the arrangement of a set of elements – these can be visual elements comprising the shape, size, or colour of an object, it can be a set of sounds arranged in time, or it might be a series of smells selected to create a specific effect. Form is what the designer creates; senses are the human tools for perception.

# Competency Framework Department Industrial Design




Design projects by nature involve many different stakeholders and experts, where designers can play a leading role in the assimilation and integration of many different parts of the project. Inevitably this requires special skills and experiences to work in multidisciplinary teams, which are often internationally based.

Teamwork is about working together, where the whole is of more value than each person working alone. Teamwork is about understanding the differences between people, how to work together towards a positive goal and most of all, teamwork is about good communication and project management.

# Competency Framework Department Industrial Design


An Industrial Designer should be able to run the design processes efficiently and effectively, to reflect on different kinds and different ways of designing and be able to choose an appropriate design strategy for their design challenges. Therefore you need to understand what kind of activity designing is, how it differs from other human activities, and which abilities you should develop to become a designer.

A successful design is highly dependant on a thorough research process as a 'knowledge builder' and 'information gatherer' about the subject domain. Specific research and design processes are planned and organised according to the nature of the design subject and context, these can be quite different and need to be considered carefully according to the required project deliverables.

# Competency Framework Department Industrial Design


Developments in society are characterized by an enormous growth in available knowledge and information, which makes it impossible for graduates to have a complete command of their academic discipline. There is just too much to know and to learn, and what you know today may well be out of date in a number of years.
In your professional life as an Industrial Design engineer you will be challenged to create an environment that adapts to and supports the lives of individual people. This will often ask for solutions on the cutting edge of technology. Becoming an ID engineer enables you to accumulate new knowledge and skills and gives you the ability to continue this learning development during future professional experience (well after your graduation). This requires an open attitude in your professional work and towards our society, including your own performance and learning needs in professional situations. You graduate once but you will never stop learning.

# Competency Framework Department Industrial Design


Design problems generally are complex and ill defined. Analysis and formal modelling can be powerful tools to unravel principle patterns and mechanisms in the complex reality, and to explore the potential impact of design decisions.