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WALK THE TALK OR A DESIGN DRIVEN APPROACH TO DESIGN DESIGN EDUCATION

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ABSTRACT
The world is, at the moment, rapidly transforming and incites us to rethink and redesign society. Innovation itself is transforming, changing the way organisations and industry innovate and cooperate. Contemporary education in industrial engineering design needs to correspond to the industry and societal needs. This calls for new designers, which we call open innovators.
This rapidly transforming world also involves its habitants. Current 18-year olds have grown up in a digital knowledge focused world. These new students have different needs and values. As teachers we are very aware of this transformation and explicitly looking for new ways to teach, tutor and challenge our students. In this paper we will describe the innovative way in which we designed a new international bachelor program Industrial Design Engineering (IDE) where designers from all over the world are educated to become such open innovators.
We applied a design driven approach, consisting of four pillars (future driven, value driven, participative, and design thinking). We share our insights by explaining what and how we did, and why and how this could be interesting to translate to other programs or contexts.

Keywords: design education, open innovation, design thinking, co-creation

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1 INTRODUCTION

The world keeps spinning and is, at the moment, rapidly transforming. Economical, ecological, and technological developments transcend existing boundaries and incite us to rethink and redesign society. Whether or not to innovate is not the issue. The challenge lies in the way we innovate; are we able to rethink, redesign and realise the solutions to transform our society? (Valkenburg 2010; Brown 2009).

Innovation itself is transforming, changing the way organisations and industry innovate and cooperate, with two thoughts that connect the creative industries with economic evolution. Firstly, for the structure of the economic system is evolving, with the creative industries becoming a more significant component of the economic order. Secondly, the creative industries are themselves part of the process of economic evolution across the economic order (Potts 2009). This creates a need for a new type of designer, "the open innovator", who can guide this change and uses the opportunities for creating a better future for all of us (Norman 2010; Brown 2009). Someone who opens up the process to involve more stakeholders and who keeps a focus on creating value. This is changing innovation within organisations and industry into design driven innovation.

Contemporary education in industrial engineering design needs to correspond to the industry and societal needs for developing new products and services where innovation and creativity is central.

This rapidly transforming world also involves its inhabitants. Current 18-year olds have grown up in a digital knowledge focussed world (Prensky 2001). They are our new students, with different needs and values. As teachers we are very aware of this transformation and explicitly looking for new ways to teach, tutor and challenge our students. Instead of protecting them for this changing world, as many parents and educators seem to do these days (Furedi 2012), we challenge them to take risks and discover the world in their own way. We act as open innovators ourselves.

At The Hague University of Applied Sciences (abbreviated as THU from now on) in the international bachelor programme Industrial Design Engineering (IDE) we educate designers from all over the world to become such open innovators. We educate innovators who apply and integrate research, design, testing and business skills in an international context. At IDE we support students to start up projects that explore new possibilities, reframe contexts and create value for people. The first year focuses on exploration. Students become researchers into global trends, developments, consumers and users and are able to identify needs and challenges for innovative solutions. The second year focuses on creation. Students become designers of new products and services and learn how to realise their ideas. The third year focuses on entrepreneurship. Students gain the skills to either start their own businesses or become change agents of innovation within companies.

The implications of the change in innovation and the need for education to resonate with this allowed for us to take similar principles to developing the program (Valkenburg 2010). The kernel for open innovation and what it means for the development is:

- Future driven: explore the context of the entire system and identify the drivers for change.
- Value driven: work from what matters to people and explore values through co-creation.
- Participative: invite for diversity for the added value of different minds and involve different disciplines and stakeholders in steps in the process.
- Design thinking: design driven and solution oriented, explore the power of visualisation and experimentation.

In this paper we will describe the innovative way in which we designed the new educational program. Our approach is a free interpretation of Matt Kingdons 4i's of innovation (Kingdon 2011). All four have to be considered, if one is zero then the product will be zero too:

itch x insight x idea x impact = innovation

This approach also forms the back bone of the program itself. The same approach will be used for this paper. Section 2 describes the itch of the transformation that is going on right now in our society. We used a future telling research and participatory approach to define the vision and mission of the new program. Section 3 describes the insight: the unique starting point from which to develop the fundamentals of the breakthrough solution. We performed a student research into the needs of our target group and co-creation for a blue print of the three years. Section 4 describes the further idea and design of year 1 in co-creation sessions together with companies and other stakeholders. Section 5 concludes on the open innovation approach towards designing contemporary education.

2 2 THE ITCH

Innovation happens everywhere. The changing times stimulate some major transformations in our society and these transformations interact and influence each other (Karakas 2009; Watson 2008; Tackara 2006). We see a world changing in different directions. How do these influence innovation and the way designers work? To get a better view on this transforming world we did two research projects. First we went outside, identifying trends and talking to people 'in the field' to see if our hunch could be justified. These inputs were used in plenary sessions inside, where we gathered a team of people to make sense of all information. Finally this results in final 'itch' articulated in a vision and mission for the new educational program.

2.1 Future Telling research

If one thing becomes clear it is that things are changing; our society is going through transformations in different directions. These also influence the field of innovation, concerning:

- We live in a unique era. Through internet and social media we are able to cooperate on a scale and in a manner that was not possible before. These opportunities will only grow in the future. We can make much better use of talents, ideas, knowledge, creativity and manpower that are available in our society. Through this 'wisdom of the crowd' we can improve our quality of life, solve societal problems and design better products and services (Kreijveld 2012).
  Communities and movements make innovation socially driven. People are creating their own desirable worlds using whatever suits their purpose.
- There is a strong transformation in innovation where intangible value and user experiences are taking centre stage, reaching beyond products or technology. This also led to the rise of attention for service design (Stickdorn and Schneider 2010). Services are non-physical, intangible concepts, inciting more emphasis on designing the desired experience for the end users. Articulating and visualising the added value of the experience becomes more and more important (Tackara 2006). This attention for experiences and added value helps people to recognise the meaning of the solution and to take more social responsibility for themselves, for others and for the environment.
  Added value is based on intangible issues and user experiences, reaching beyond products or technology.
- There is a transition in innovation towards participating in networks that transcend existing boundaries of existing organisations. Joint business models for the innovation must be created, to add more value on different levels of the system (Den Ouden 2012). This changes the role of the innovator, creating an open and collaborative project, involving more stakeholders and end users to create the innovation together.
  Questions and problems transcend existing boundaries and require a participatory innovation approach, involving more stakeholders.

The initial exploration was enriched by interviewing industry thought leaders in the field of product design and development and we asked them in what way they recognised the changes we uncovered and how an open innovator program could answer to the needs that manifested because of these changes.

> *"Change agent instead of product developer will broaden the focus area beyond mere product development. Seeing product development from an entrepreneurial perspective can really deepen this new curriculum."*
> ***Jos Oostendorp, Royal Grolsch***

> *"It's a pity that this curriculum didn't exist in my study time. Companies definitely need people who can't do just one thing but more things."*
> ***Bas Hoppe, Atos Origin***

> *"In the entire process from idea to product there is a place for designers that create "the best ideas" and that realise "the best solutions"*
> ***Rene Bubberman, Fabrique***

> *"The future will be less about predicting it and more about collaborative designing it"*
> ***Josephine Green, Beyond20***

> *"In 10-15 years the world of artefacts will be changed radically towards a sustainable future"*
> ***Stefano Marzano, Philips Design***

From the interviews it became clear: not only did it resonate with the exact problems the industry is dealing with right now, they were eagerly looking forward to the design and development of the program.

2.2 Participative innovation

In order to enjoy diversity in thinking the initial development team was slowly formed in the course of several months by inviting different people from different disciplines within THU. Invitations went to those who were passionate about creativity and innovation and could complement the diversity in disciplines and knowledge.
The team consisted of a mixture of educators from THU with different backgrounds and experiences in industrial design engineering, business, facilitating creativity, open innovation, user-research and innovation management. Especially the business discipline was refreshing to this technology-driven domain. The mix of disciplines also forced to elucidating interests, ideas, concepts and terminology explicitly to create a shared understanding transcending the discipline knowledge and building the new insights for the open innovator.
Since the program was under development there was no working room to work in. This resulted in a nomadic display, building creative settings throughout the university. The working sessions in these different settings allowed for creativity, content and reflection to emerge. The multidisciplinary formation of the team resulted in very diverse knowledge which was integrated in these working sessions.

2.3 The result: vision and mission of the IDE program

The right way of answering to these trends feeds the hunch for new challenges and opportunities to create a better world. The itch we feel is the vision that innovators can make a huge difference for society if only they could see the possibilities and are willing to take responsibility for their creations.
These changes in companies' and organisations' awareness on innovation, changes the role innovators play. Organisations express an increasing need for professionals who can deal with this complexity and who can create and realise meaningful solutions. There is a need for a new paradigm with a broad view on entrepreneurship and innovation. From all the previously gained insights a vision and mission was created for the IDE program to explain this perspective and create a common ground from which new collaborations could emerge.

Vision:

The sky is the limit. As a result of globalisation and modern technology, we see a world of opportunities that keeps evolving. Boundaries between products, services and consumer experience are also becoming increasingly blurred. This requires a new type of designer - with a broad view: the 'open innovator'.

Mission:

Our English language Industrial Design Engineering study program teaches you to design solutions for today's and tomorrow's complex challenges and to combine creativity with entrepreneurial skills, so that the products and services that start in your mind, end up in the real world.

3 THE INSIGHT

The insight we identify is the need for innovators with different abilities than mere industrial design. To uncover how these innovators will drive change we wanted to know what drives this generation and this specific student. The results of this study were elucidated through persona's to inspirer and challenge the design team.

3.1 Value driven: research on student experience

At THU research is conducted regularly regarding student's satisfaction about the study, teachers, facilities the university offers etc. This gives good insights into the specific points for improvement from a student's perspective. However an exploration regarding the student's experience, values or motivations has never been conducted on this specific level as of yet. We have conducted a workshop where different students or graduate students from THU were invited to tell their story and envision their ideal learning environment and program. The students were selected firstly because of their outstanding performance in their own program and secondly because they showed ambition to grow

beyond the boundaries of the programs. The students from different programs represented the diversity of skills an open innovator could possess such as: (user) research, (Human Technology), design (Dutch) Industrial Design Engineering and business (International Business and Management Studies and Small Business and Retail Management). From the workshop with students we took some principles to represent the ambitious student we are designing the program for and with, and highlighted their motivations.

Interests:

- Creating "tangible things"
- Create a better world
- Competition and challenge
- Group atmosphere
- Fun
- Real life- outdoors
- Freedom without constraints

Figure 1 Student experience research

We expected most of these principles to be found, however some functioned as true eye-openers, such as the competition and challenge, or real life-outdoors. In the process towards designing the concept the vision and mission and these principles were our starting point. The students themselves were also asked to represent their ambitions in the co-creation sessions (see section 4).

3.2 Design driven: the concept, blueprint for a 3 year bachelor

Now that we have gained the insight: a new role for innovators, how can we get a good understanding of the skills and abilities that we have to teach students and – evenly important – how can we share this understanding with all of the members of the design team?

From a design driven perspective we used the outcomes of student experience research as an inspiration for the development team. Together we created different personas to represent our target student, throughout the years. This way we were able to imagine what kind of students we would welcome, how they would develop but also what skills and attitudes they should be developing. Each persona explains who they are and what drives them. This resulted in the description of the learning outcomes of each year, subsequently, the explorer, the creator and the entrepreneur.

The open innovator curriculum aims at curious, motivated young people who strive to make a positive change.

Who: *Nora, (Dubai, United Arab Emirates) 20 years old*

Characterised by global citizenship and living in a modern world. Because of her very socially active Saudi-Arabian father and Dutch mother, she travelled a lot during the summers to support local communities. With friends and connections all over the world, she uses social media to keep in touch with them. **Enjoys** the people around her and helping them make the right choices. **Aspires** a world where wealth is equally distributed among its inhabitants. She sees there are many people willing to help but don't really know how to. She is inspired by initiatives like KIVA which provide help suited for specific cultures.

Figure 2 Persona and competences of entering student

The first year of the open innovator curriculum aims to create an explorer, who will investigate the real underlying needs of people and blaze new trails.

Year one focusses on the Human Values. Students will learn the methods, tools and abilities to become an excellent researcher on the future, society and people. At the same time they learn to use research results to design sustainable solutions. Being an explorer, who will investigate the real underlying needs of people and blaze new trails.

Who: *Mandy (Leipzig, German), 22 years old.*

Characterised by passionate curiosity. With an open mind she explores new situations, trends, but also cultures, contexts and different people only to find more questions. Sincerely curious and keen to learn more about how the world works. **Enjoys** being headstrong and slightly rebellious to provoke the status quo. **Aspires** to make the world a better place.

Figure 3 Persona and competences of the explorer

The second year of the open innovator curriculum aims to create a creator, who will design the world around him and create solutions beyond products.
Year two focusses on Technology and Design Methods. Students will learn the methods, tools and abilities to become an excellent designer of products or services. Being a creator, who will design the world around you and create solutions beyond products.

Who: *Kim, (Shenzhen, China) 23 years old.*

Characterised by optimism and guts. Through last year's study he is gaining confidence in his role as a designer and his vision on innovation. He engages
with large projects and challenges the rest of the team to enjoy to complexity.
Enjoys creating tangible results and being in the action. He enjoys collaborating and is a friendly and supporting team player. **Aspires** to play a crucial role as an innovator to solve societal problems.

Figure 4 Persona and competences of the creator

The third and last year of the open innovator curriculum aims to create an entrepreneur, who will know how to create belief and make things happen.
Year three focusses on Business. Students will learn the methods, tools and abilities to become an excellent entrepreneur, either inside a company or being independent. Being an entrepreneur, who will know how to create belief and make things happen.

Who: *Joost, (Haarlem, The Netherlands) 26 years old.*

Characterised by authenticity and confidence. He is a socially involved entrepreneur since he started his own company aimed at children's health.
Enjoys working hard and seeing results from his hard work. He also enjoys raising the bar for organisations and companies and pushing their ambitions as well as his own. **Aspires** a world where every individual and groups of individuals take responsibility for what they bring to the table.

Figure 5 persona and competences of the entrepreneur

An open innovator/ industrial design engineer from THU will have a unique set of skills that distinguishes them from other design engineers or innovation managers. The capacity to deal with complexity, combined with the practical tools to create and realise sustainable solutions. Innovators, who act consciously, with a heart for the people and the planet, who do not just understand the transformation our society goes through, but also really believe that they can make the difference.

4 THE IDEA

There are many ways to work from the exploration of the field, our vision and mission and the elaborate personas we created for each year. From this we got to concrete results really fast by combining the industry, the students and the development team in co-creation sessions. All

stakeholders were involved in decision making in this point of designing the blueprint for the first year.

4.1 Participative: co-creation sessions

To integrate all the knowledge so far and create a blueprint for the first year a total of four sessions were organised. Four extensive afternoons with at least twelve persons each were held at THU. Invitations went to the exemplary students, the development team and to professionals from companies which were either expert in an area which was important to this curriculum and could function as partners for the program later on. The willingness to participate in the co-creation sessions was overwhelming and a lot of knowledge and experience was shared in a short amount of time.

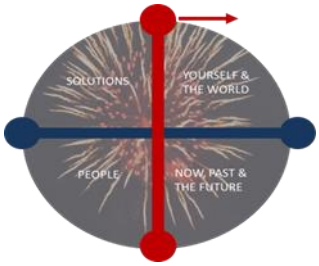
Figure 6 Co-creation with companies, students and teachers

4.2 The result: blueprint year one

The four co-creation sessions have led to a blueprint of year one, the explorer, which you can see in figure 8. The most important projects and supporting subjects are illustrated. Some characteristics will be explained to illustrate how knowledge or principles were integrated.

4. Project solutions & prototyping; implementing business & products; visualisation & communication.

3. Project society and you; user research; global context; visualisation & communication.



1. Project communities; personal branding; cultural differences; visualisation & communication.

2. Project future; basics of technology, visualisation & communication.

Figure 7 blueprint year one, the explorer with details on the most important subjects

The personal branding and cultural differences courses in the first module should ensure a trustful learning environment where each student knows what they want to develop and how to cooperate with others. The students work with actual assignments from partner companies from the second module on. The partnerships resulted from their participation in the co-creation sessions and from their enthusiasm afterwards. The third and fourth module are consecutive, in the sense that the insights from the research in module three will be the direct input for the design of the solution in module four. This will also ensure a smooth transition to the second year, that of the creator. This blueprint was taken up by the development team to elaborate on the specific lessons.

5 THE IMPACT

In September 2011 we kicked off with 66 students from with 19 different nationalities. The first year was a rollercoaster ride for the students and for the teaching staff. The blueprint entails a new design of the curriculum where different projects, trainings and subjects had to co-evolve into a coherent whole. Three out of four modules of education in the first year involved projects with companies. Most of the ties with companies were new, as were the projects and their context. For many of the companies the cooperation with these students and the results of the projects were unexpectedly good regarding the fact that the students are in their first year. Some quotes of the partners:

> *"Working with students really boosts the creative process within an organisation!"*
> ***Human Involved Architects***

"Good team work, great presentations!! I don't even have employees who present with that much passion."
Unilever

"The students are really working on what matters, impressive."
Philips

Since the development of the program is participative by nature and value driven the curriculum as well as methods of teaching are designed to meet these same principles. A dedicated room for working was put into use, where students and teachers work alongside each other. Inviting the students to be part of making the program a success (for example help in open days, organise end presentations of projects or co-create lectures) resulted in the establishment of new forms of relationships. Figure 9 for example shows how communication was expanded from mere official channels to Facebook groups and messages.

Figure 8 Post on Open Innovator group on Facebook

Since this year has been a year of firsts reflecting and reframing was key to learning from this first run. A year into the program results in 24 out of 66 students who received a certificate (propedeutical diploma) for acquiring the first 60 ects within one year of study. This percentage exceeds the average of that of the academy and that of the university. However over 20 students dropped out, 6 of whom have successfully acquired the certificate. Some have left the program in search for more traditional approaches to design and engineering. During the year the teaching team transformed from an 8 headed self-directed and nomadic team to an almost tripling in size (+15) with an undeniable presence in the academy and in the University. On the academy day, once a year, visited by over 60 of our colleagues within the field of technology, innovation and society, a few of the first year IDE students presented two of their projects. After the presentation we received a number of requests for collaboration and the colleagues were impressed by the professional presentation skills of these first year students.

6 CONCLUDING

After a year of running and further developing the program learning continues and it is time to reflect on our design principles to see what translates to different contexts and to share our insights on how to continue to apply these principles. We reflect on them by explaining *what* we did, *how* we will continue to apply this and *why* this could be interesting to translate to other programs or contexts.

- ***Future driven: explore the context of the entire system and identify the drivers for change.***

What: During the development this has been a first step into the process of designing education. We explored the possible futures by interviewing the industry and asking about their drivers for change. While detailing what this meant for a new open innovator program we iterated regularly with the industry to match expectations and create more relevant value.
How: Our challenge still lies in being an open innovator as a program. That means it should be flexible enough to deal with changing needs and situations. This is less easy than it sounds when situated in an environment that thrives on stability and organisation.
Why: This exploration and continuous check with the industry can be valuable to any program to match and meet the changing needs in the field of work you are training your students for.

- ***Value driven: work from what matters to people and explore values through co-creation.***

What: In the development phase the value of co-creation displayed itself and this proved to be the starting point for more co-creation activities on different levels. We focus on facilitating the student's curiosity increasingly and intentionally. This is a delicate balancing act between giving enough freedom to feel personally engaged and giving ample of guidance, to not drown.
How: We will continue to experiment with personal engagement into the program or one's own learning process and find ways to facilitate this as teachers.
Why: Current 18-year olds have different needs and values. As teachers we are very aware of this transformation and explicitly looking for new ways to teach, tutor and challenge our students. The field of education will go through an evolution similar to the developments in innovation. Our students are used to change, insecurity and experimentation and co-create new contemporary education with us. But the application of new forms of education is not restricted to design education and can be extended to other domains (see also Van Onselen and Valkenburg 2013).

- ***Participative: invite for diversity for the added value of different minds and involve different disciplines and stakeholders in steps in the process.***

What: In the development phase we have invited different minds and disciplines to co-create the program. From it different partnerships with the industry arose where the students, teachers and professionals learn from each other. The program has also increased in diversity of teachers and practitioners, with very different expertise such as, industrial design, engineering, business, communication, sketching, roadmaps, online communities etc. The confidence of the teaching staff has grown and it results in a sturdy motivation and enthusiasm which seems to be contagious towards the students.
How: We will continue initiating partnerships and build on the existing ones. At the time of writing the second year has commenced which brings an entire new dimension into the program; two years of students who can benefit from each other's growth and shared knowledge as well as encourage and inspire each other.
Why: The willingness of industry professionals to think along with futures which might or might not concern them is exceptional. The knowledge and experience external professionals can bring into (the development of) a program is worthwhile, for the students, the teachers and for the professionals as well.

- ***Design thinking: design driven and solution oriented, explore the power of visualisation and experimentation.***

What: In the co-creation sessions during the development a design approach to facilitating the thought processes was helpful in the sense that it brought structure and invited for creation on different levels of abstraction, ranging from describing the big idea of a project, to specific lessons and to atmosphere or skills.
How: The second run of the program has resulted in paying closer attention to the starting conditions which create the culture of students and teachers. The first three days of introduction are designed to represent the three years of the program, subsequently; the explorer, the creator, the entrepreneur. Here we intentionally displayed and invited for a culture of the open innovator and the behavior that fits that culture.
We also experience an instant and widespread recognition in organisations and the industry regarding what an open innovator could do. However regarding communication within our own organisation or team, or students for that matter we experience very different interpretations and nuances. We therefore wrote a book in the summer of 2012 in which the open innovator is explained in an inviting manner, including examples of projects written by the students (Valkenburg et al. 2012). Everyone involved in the program can receive a book as to gain a clear understanding of why this program exists and how the students (will) work.
Why: A design driven approach to designing education helps to uncover the collaborative potential of a group that is very diverse in cultural or professional backgrounds. It creates a common language and ground from where creation can emerge.
Overall it can be stated that the way we designed the program also had many implications for how to run the program. It has been a year of many firsts, where reflection, reframing and iteration was key to further development. The warm welcoming arms of the partner companies a year after and the overall enthusiasm that resounds in the room and the people contributing to the program incite us to keep improving the quality of education as well as continue development for the years to come. Further

clarification on the design principles helps us to understand how results have been established and what intentional changes would benefit that open innovator we see changing the world.

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