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Extracts from the brochure with references to the original German passages.

DesignSeed
How designers and engineers work together successfully in start-ups

DesignSeed is the name of a research project at the Lucerne School of Art and Design, which is backed by the Gebert Rüf Foundation. Its goal is to assist seven hi-tech start-ups during the incubation phase through design and design management.

Preface and introduction [From p. 4]

The word design is often used in conjunction with the arts, an area where the pioneer fellows and future young entrepreneurs, most of whom come from the natural sciences or technical disciplines, often lack the right vision, time or money. They want to demonstrate the operability of their technologies as soon as possible and follow the systematic approach they have learned from science. Products are often created without an initial awareness that users must also understand and use technology intuitively and feel a connection to it. The question that arises is the following: “When should design thinking be introduced, and how much of it do we need? Is it enough if we develop a new cover right before roll-out or change the color of the user interface?” There are countless studies and opinions on the topic of design, but can we measure the success of design and design thinking directly?
Taken from the foreword by Prof. Detlef Günther and Prof. Peter Seitz, both from ETH Zurich
The project “DesignSeed: Design in the incubation- and early-stage-start-up-phase”, which enjoys the backing of the Gebert Rüf Foundation, fills a gap in the science and design field between hi-tech start-ups and design. To do so, it is focusing on the incubation phase. In “DesignSeed”, seven pioneer fellows from the Innovation and Entrepreneurship Laboratory (ieLab) of the Swiss Federal Institute of Technology in Zurich (ETHZ) are given an early, compre-

hensive and professional introduction to design and design management for varying lengths of time. The support includes an analysis of how design can generate added value in a given project, for example through the development of an appropriate design strategy for products and services, for markets and corporate identity; by sourcing the right design skills for the project; the development of customer experience strategies (CX-strategies) for the right contact points.
Taken from the introduction by Prof. Claudia Acklin, HSLU

Terms [From p. 9]

The term **engineer** can be traced back to the Middle English word engyneour, and refers to someone who is inventive and works to solve practical problems. To this end, in principle engineers develop more or less complex instruments to help them perform their goal-oriented tasks. As engineer and researcher David Blockley writes: “Some tools are complex systems, like an airport or the Internet, and some are simple, like a safety pin or a paper clip.” The technologies that the engineering sciences develop should primarily be useful and practical as well as safe, cost-effective and sustainable.

Design The term design is a multifaceted notion in English and has no standardized definition in German; we envy Blockley for his brevity and clarity as far as engineering is concerned. However, if we also start with the English word design, it refers to both an activity (to design) and the end result of this activity (a design). This goes right to the heart of the complexity of the term: design is generally an organized, systematic activity within a structuring process, which seeks to find the right solution to a problem or a question. In short, this is the design thinking part of design. But in order to structure the right solution to the idea, we need a kind of “shaping”, for example a transposition to material, color, form, proportion, etc. This is the only way that a marketable material product, website, logo, an intangible service or a customer experience comes into being. Just as with engineering, design also involves developing, building, structuring and “making”.

Design management Design management is a management function which emerged in the 1960s, above all in the English-speaking world and later in European countries like the Netherlands, Sweden, Denmark, Norway, Italy and Germany. A couple of illustrious design management precursors were Olivetti in Italy or AEG in Germany, where designers and architects were not only involved in developing new products but also made sure that the company image and architecture reflected the corporate philosophy.

Design and the engineering sciences In his short introduction to the engineering sciences, David Blockley presents the two premodern concepts of mythos and logos, in order to explain what paths of knowledge lead to the truth. Mythos comes from storytelling, and describes a mystical, religious and emotional approach that is deeply rooted in the subconscious. In this mode, it is legitimate not to produce proof but rather to rely on intuition or belief. On the other hand, logos is rational and pragmatic, dealing with facts and the external reality. This path to knowledge is generally used when the goal is to perform a task.
Even at the risk of reinforcing stereotypes and although many creative processes function in a rational fashion, we can say that engineers tend to function using logos while designers rely on mythos. Exaggerating a bit, we could say that in the relationship between engineers and designers, sense meets sensitivity.

Innovation Exactly what role do science, engineering/technology and design play in innovation? Bonsiepe compares the three fields using goals, typical discourses, standard practices, institutional settings and success criteria.This comparison reveals that one of design's strengths is its ability to act as an interface in adapting or rather embedding an invention in the market. Whereas technological innovation tends to spring from the interface between science and the application of new technologies, design generally comes into play at the interface between technology and customer needs, between concrete products and services.

Investment A seminal study by the British Design Council researched design's impact on the share prices of listed companies which use design actively. The study came to the conclusion that the share prices of design-driven companies outperformed the market indexes of non-design-driven companies on key markets. During a given timeframe, the share prices of companies in the first group were higher and fell less in crisis years. Consequently, this study implies that market participants understand that investing in design-driven firms pays off.

Cooperation models [From p. 25]

A systemic model for cooperation
From the above explanation of terms, we know that engineers and designers are generally doers and developers who seek to solve practical problems. But while engineers are responsible for technological development and for so-called hard systems, designers tend to structure the interface between technology and the individual, the so-called soft systems.

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The core elements of the cooperation model are hard systems like technologies and their derivatives, namely instruments, hardware, software, processes, etc., which have the potential to become products and services.
Soft systems consist of:
— The individuals who found the start-up (with their business models, resources, processes, strategies, communications and distribution channels, financing, etc.)
— Stakeholders like partners, investors, media representatives, pilot customers
— Markets with competitors, customers, sectors, industry representatives, etc.
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In the DesignSeed project, we successfully identified and fleshed out the contribution and added value from design. This is developed through a business process featuring three focal points: “Market close-up”, “Development of corporate and market identity”, and “Integration via a design strategy and development of persuasive power”.

Case studies

rqmicro – The prototype and the “aha” effect [From p. 39]

The firm rqmicro, with its founders Hans-Anton Keserue and Daniel Schaffhauser, and initially David Bertsch as well, developed the CellStream device which analyzes water samples for microorganisms. The device identifies and separates organisms like legionella using magnetic nanoparticles, which are separated magnetically. A second commercial device, a so-called flow cytometer, counts the organisms by means of a laser. With this method, it is simple to check water quality in hotels, swimming pools or sprinkler systems to ensure compliance with sanitary standards.
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Cooperation with rqmicro covered the entire spectrum of our design skills: we developed product-, interaction-, information- and corporate design in parallel, using design management to integrate them into an overall concept. At an early stage of cooperation, the founding team identified the key user requirement for the product: it should inspire trust. Future users will be responsible for the health of many people and need to be sure that water quality measurement is accurate.
...
The first cardboard prototype featuring a small footprint rose up from the lab bench, creating a buzz compared to other devices. At the prototype roll-out, when details of the mechanical sealing mechanism were given, cooperation

with rqmicro reached a first high point. The prototype literally created an “aha” effect for the founders, laying the foundations for trust in the added value that design as a discipline can provide.

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Our cooperation efforts led to a functional prototype with working mechanics and a design prototype with a touchscreen offering a simulated user experience. The high level of execution helped position the technology credibly as a product suitable for use in numerous communication channels. This concrete, credible introduction to and representation of the future product has enabled rqmicro to confidently accept many nominations and awards, including the Heuberger Winterthur Young Entrepreneur’s Award, which the team won.

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By observing flow cytometry and the magnetic separation process, and through persistent research and prototype development, we helped define the product. By asking questions like “How does it work?”, “How do you imagine that?” and “What do you mean?”, we helped to refine the conceptual thinking and clarify strategic issues.

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British design researcher Chris Rust calls this kind of clarification process “investigative designing”. He describes how discussions between designers and scientists have yielded in-depth insights for research as well. Our intervention in the technical processes, the materialization of a draft design as a prototype and supervision of the production process meant that our role as designers changed from contractors to project partners, who occasionally also led the development process.

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The presentation of the first prototype was a key moment with a major impact in various directions. It helped build trust between designers and engineers, giving the latter both an internal identity (“aha, that’s us”) and an external identity (“aha, that’s how we appear”). Moreover, a physical prototype renders the implicit explicit, as Rust also describes.

As a prerequisite for successful cooperation trust developed, which we then proceeded to consolidate. Here, what helped was our technical ability to understand and think through the technical aspects of the product as well. In addition, rqmicro recognized that design is of practical use and leads to concrete results. This trust must be earned: designers cannot assume it from the outset.

Cooperation-related issues [From p. 99]

The right moment for cooperation
A good time for cooperation between engineers and designers is when a team decides to market its technology as a product or service.

The right kind of cooperation
Communication is probably the most important element for good cooperation. Given that the two professional groups bring different perspectives to the cooperation process, exchanging ideas takes a long time at first. In this phase, designers are often ambassadors for their own guild, and must convey what drives them and how they work. Conversely, engineers have to help non-scientists understand what their core technology consists of. Over time, a common language evolves and even a share cultured to a certain extent.

Sense and sensitivity
Given that every new technology has to prove that it can do certain things better, measure or perform faster and more reliably, innovation is the core concern with this type of innovation. In turn, technology is based on exact, explicit knowledge. In addition to this sense, sensitivity is in helpful for understanding and feeling like future users. Whereas "form follows function" was the motto of modern design, today we have a human-centered understanding of design rather than a mechanistic vision, and one that includes emotionality and aesthetics.
Both sense and sensitivity are necessary for successful market positioning.

Design thinking, design doing and design management skills
As a result of the democratization of design, the designer's job profile is sometimes a bit blurred. Anyone who has trained at the design school in Potsdam-Babelsberg or elsewhere as a design thinker is still a long ways from becoming a designer. Designers study up to six years at a design school to acquire the requisite knowledge to design a product, interface or website. Design doing includes much more than meeting a challenge with a specific solution process. Design thinking only comes into play in the beginning, whereas the rest consists of the embodiment and implementation of the ideas in products, services, experiences and systems.

The educational and innovation system of a Switzerland without bridges
Unlike in other countries, for example in northern Europe or the English-speaking world, training for designers and engineers is separate in Switzerland. Design schools rarely offer training courses on basic technological knowledge or scientific research methodology, and designers often lack the necessary vocabulary to communicate with engineers. On the other hand, engineers are not taught how designers work and that design is not just about "prettying up"

technology right before product roll-out. However, a new era of mutual interest is dawning. And that is a good thing.

Interview with the company Taptools [From p. 93]

Interview conducted with Clara Beck (C) and Tom Reuter (T) on 10 November 2015.

What does good design mean for you?
T: User-friendliness is very important or, more precisely, intuitive user-friendliness, so that it's easy to understand a device and get started. In our firm this means, for example, that a construction worker understands that a device isn't for scraping away concrete residue or phoning… He must be able to pigeonhole it intuitively right away.
C: Design must be consistent. We have learned from you that there are many types of designers. And not all are equally good at designing good products or interfaces. Good design is when everything fits together.
T: What I like is when design makes things simpler. For example, we have a simple logo, but it says everything.
C: Good design is not flashy or effect-seeking either. I know right away what the product is and how to make it work.
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Has design contributed to your identity as a start-up in any manner? If so, how?

T: When I saw the logo for the first time, that was the day I said to myself: "Now it's for real. We're a company now." I felt spontaneously happy. It was a big step forward for us and for outsiders as well.
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If you had it to do over, would you work together differently with designers?
C: For the next project, I would get the designers on board right away and let them help with decision-making. Because when we mechanical engineers stick together, we stay in our comfort zone. And we always talk about science and technology. So it's good to have a designer who says: "The technology may be good or not, you know that better than I, but my question is how many fingers do I need to click on this product?" Designers must have the courage to ask lots of questions and not let themselves feel intimidated.
T: And when engineers fend off these questions and say that designers really don't get the product, that is precisely when you need designers most.
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The DesignSeed Team [P. 117]

Prof. Dr. Claudia Acklin: Director of the Competence Centers (CC) Design & Management of the Lucerne School of Art and Design (HSLU); research in the field of design management, design-driven innovation and creative entrepreneurship. Establishment and management of the BA Design Management, International since 2011; Managing Director of the Creative Hub, a platform for supporting the Swiss design industry. PhD in Design from Lancaster University/UK and Professor and the Lucerne School. Further studies in Social Education and Journalism.

Andres Wanner: MSc in Experimental Physics and Computer Science, diploma as a Visual Communication Designer and MAA in Visual Arts; researcher and lecturer at CC Design & Management of the Lucerne School of Art and Design (HSLU) and the University of Applied Sciences Northwestern Switzerland (FHNW); instruction designer at Neurostatus Systems GmbH; Adjunct Professor at Simon Fraser University, Vancouver/Canada.

Moritz Reich: Scientific Assistant at the Lucerne School of Art and Design (CC Design & Management); BA in Industrial Design (FHNW) and studies in Design Management (HSLU); apprenticeship as a car mechanic, co-founder of the agency Pibiri & Reich with commissions in various fields.

Stefan Fraefel: Scientific Researcher at the Lucerne School of Art and Design (CC Visual Narrative); research in the field of complex visualization, wayfinding systems and navigation in outdoor spaces MA in Design with a major in Data Narratives (HSLU); commissioned work in his own design studio for visual communication.

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