Need-based
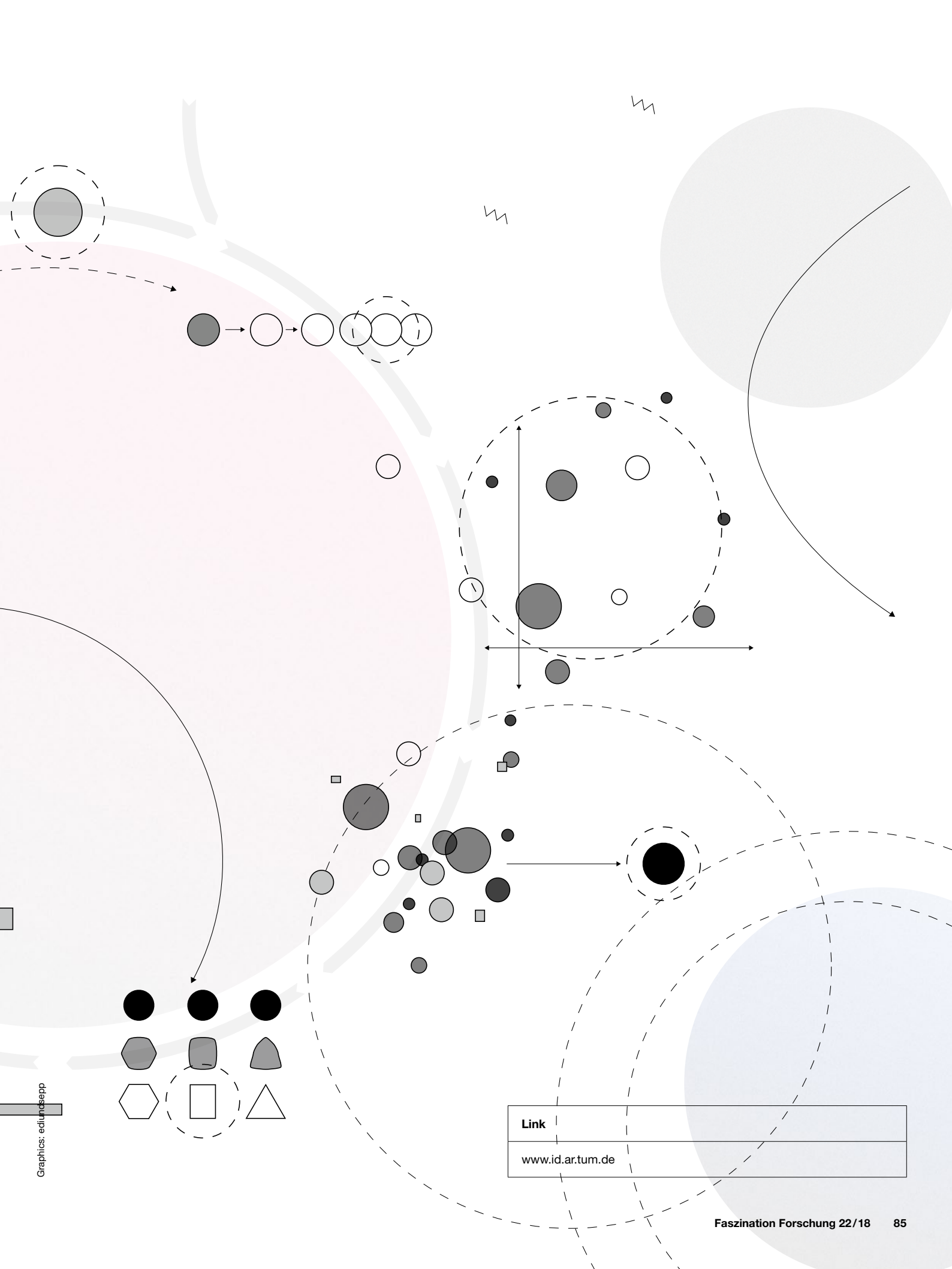# **Innovation**

As a designer, Fritz Frenkler is dedicated to products that inspire by combining form and function. TUM's Professor of Industrial Design brings budding designers together with young startups under the umbrella of the "Design Enterprise" program. This meeting of minds results in technologies and products that are aligned with real needs.

Thomas Edelmann

Die Erfindung des Notwendigen

Fritz Frenkler, Professor für Industrial Design an der TUM, bringt angehende Designerinnen und Designer mit Start-ups in Kontakt. Er hat das verpflichtende einsemestrige Modul „Design Enterprise" initiiert: Studierende im Masterstudiengang Industrial Design unterstützen junge Gründungsteams dabei, aus einer innovativen Idee heraus Produkte oder Dienstleistungen zu entwickeln, die gebraucht werden. Für Frenkler bedeutet das, ein Design zu schaffen, das die Funktion repräsentiert und eine Verbindung zur existierenden Produktwelt herstellt. Wird beispielsweise ein Produkt entworfen, das im Labor benötigt wird, sollte dem Designer zufolge auch bedacht werden, wo es dort Platz findet. Und ob es Probleme lösen kann, die auch im Kontext der Anwendung der Technologie bestehen. „Dann entsteht etwas wirklich Notwendiges", so Frenkler.

Mit seinem Team hat der Wissenschaftler im Rahmen von „Design Enterprise" mittlerweile über 80 junge Firmen begleitet. Sein Anliegen ist es dabei, ein unternehmerisches Verständnis von Design zu vermitteln. „Studierende und Gründungsteams haben einen gemeinsamen akademischen Hintergrund und begegnen sich auf Augenhöhe", erklärt Frenkler. Manchmal fassen die Studierenden Fuß im Team des jeweiligen Start-ups. Mitunter werden sie in den neuen Unternehmen gar zu Partnern. „Die meisten Start-ups, die zu uns kommen, erkennen Design als notwendig und wichtig an", sagt Frenkler. □

"Functional design, which is use-driven, remains a prerequisite for market success."

Fritz Frenkler

Faszination Forschung: What makes a design both successful and useful in the eyes of a customer?

Prof. Fritz Frenkler: The aim of design is to make meaningful products for people. And that is why functional design, which is use-driven, remains a prerequisite for market success. Nevertheless, design was packed under the marketing banner in the past. Not only that, but marketing massively influenced design – which did the companies involved no favors.

Why was that?

The product development focus usually boiled down to revamping existing products and coming up with variants – it was rarely about strengthening brands or values. Only in the last ten to fifteen years has design been considered in a broader context again, with companies such as Apple setting a strong example here.

What role does industrial design play in the innovation process?

As designers, we maintain an awareness of the social context and connect the challenges of our time with technological developments. Our approach these days is more scientific, so we can substantiate the design process more methodically. Sometimes our work is about making it clear to a company that the product it wants to bring to market is not necessary at all. For instance, because it is socially questionable, ecologically problematic or risky for the company in terms of sales. That is all part and parcel of industrial design. ▷

Prof. Fritz Frenkler
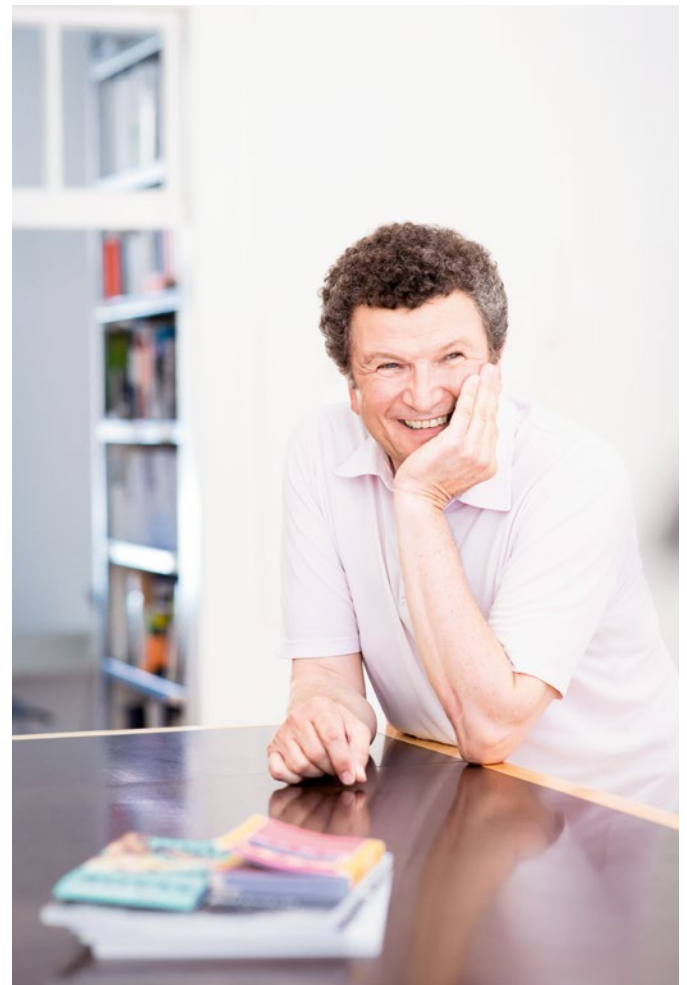
An entrepreneurial approach to design

Challenges associated with environmentally sound mass production, changes in society due to shifting demographics, and universal design are the research focuses of Fritz Frenkler's Chair of Industrial Design. Together with students and doctoral candidates, he is taking an entrepreneurial approach to design. In other words, embedding design to a greater extent into corporate decision-making processes.

Frenkler studied industrial design at Germany's Braunschweig University of Art (HBK). He was Managing Director of frog design Asia and part of the team responsible for designing the NeXT Computer for Steve Jobs. He was also Head of Design at German railway company Deutsche Bahn AG. In 2000, he founded f/p design, a design studio that now has offices and representatives in Munich, Berlin and Kyoto (Japan).

In 2005, Frenkler was made an honorary professor at the Braunschweig University of Art, before gaining a full professorship with his appointment to TUM's Chair of Industrial Design in 2006. He is committed to developing design as a career, for instance through his role as Regional Advisor for the World Design Organization (WDO). Frenkler has also been Jury Chair for the iF Product Design Award since 1995 and co-founder and board member of the iF Design Foundation since 2018. In 2013, he was appointed a member of the Architecture Section of the Akademie der Künste (Academy of Arts) in Berlin.

"The role of industrial design is to facilitate the product development process on an equal footing with all other stakeholders," says Prof. Fritz Frenkler, who has gained design experience both as an entrepreneur and as a university professor.
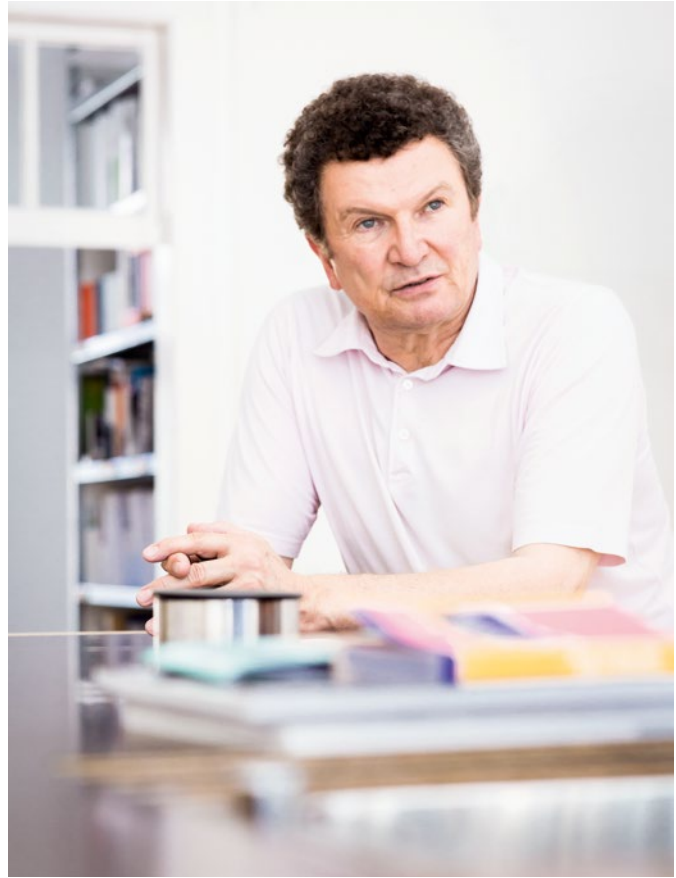
You travel a lot for work, especially in Asia. Are there differences between Asia and Europe in how industrial design is perceived?

In China and Singapore, you encounter the traditional approach, which emphasizes detailed solutions and differentiation. The challenge there is to create differences between products with a high degree of convergence due to the underlying technical developments. In Japan, Sony exemplifies how you define a brand through industrial design. Brands that did not systematically focus on design did not survive the economic crisis there. In South Korea, they put Peter Schreyer in charge of design throughout the entire Hyundai-Kia Group. Kia's market success underscores the importance of design in determining which companies will win through.

Design thinking – an approach where people are trained to think and act like designers – is playing a growing role in companies. It is applied to structural and organizational processes, as well as to product development. So does that mean the design profession is becoming redundant?

We shouldn't underestimate our role. Design thinking is rooted in tried-and-tested design methodologies based on prototypes. Design is an iterative process. In the course of trial, error and optimization, we circle back around, questioning what has already been achieved and bringing in new criteria to arrive at a meaningful outcome. As soon as this method is applied to other areas, as is the case with design thinking, that adds value to design. The only thing is, designers need to make sure they also harness this added value. We must reintegrate ourselves into the process we developed. The role of industrial design is to facilitate the product development process on an equal footing with all other stakeholders.

At TUM, you initiated "Design Enterprise" – a one-semester module in which Master's students support young startup teams in developing their product and corporate identity. How does the program work?
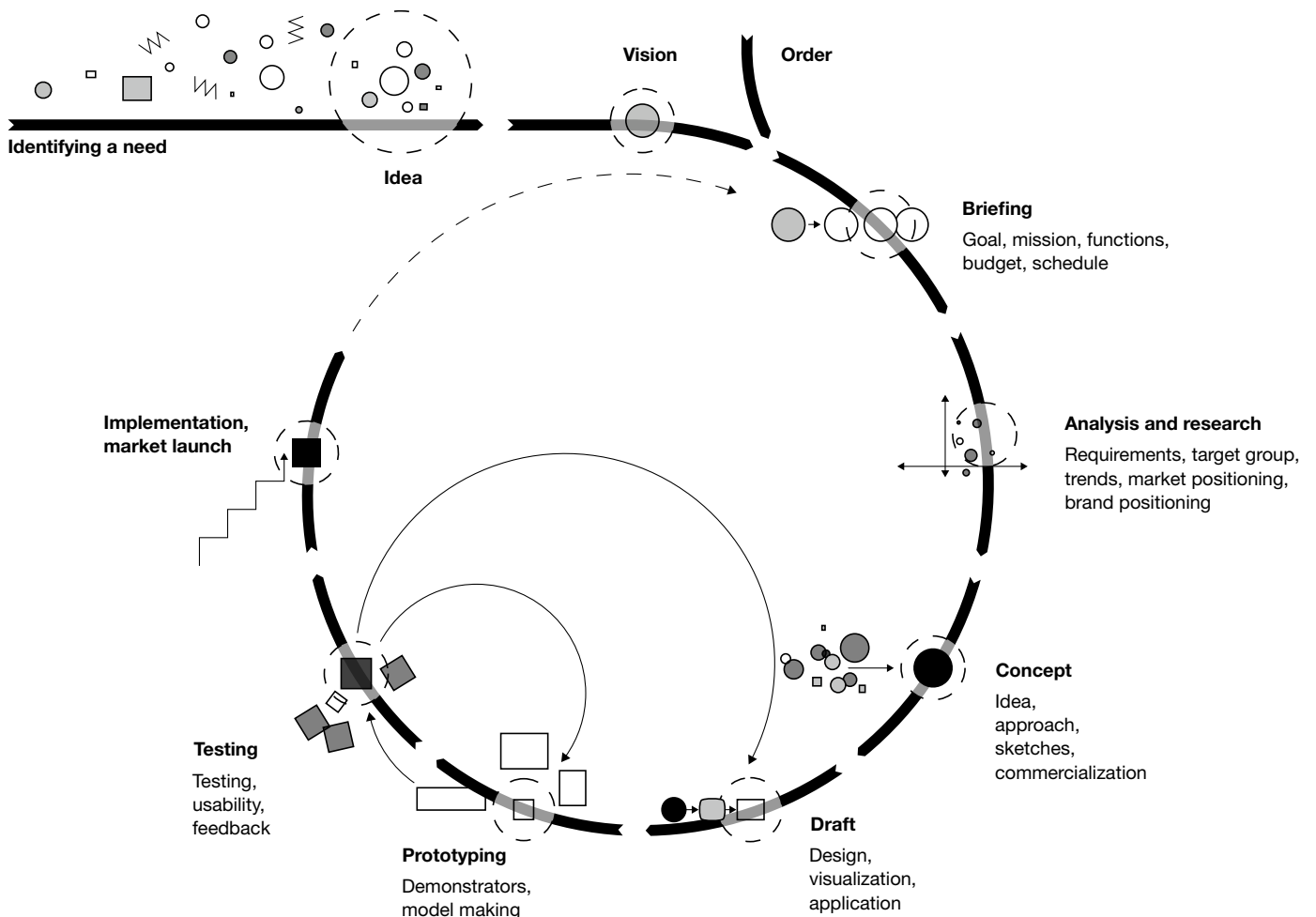
It is difficult for Master's students in industrial design to gain access to existing companies other than as employees. "Design Enterprise" is therefore a mandatory module that every student must complete. It brings them together with TUM scientists and engineers who have invented something or have an idea – the aim being to develop this into a product or service. We have now assisted more than 80 new ventures.

So where does design come in?

To take an idea further, you have to give it a concrete physical form. It needs to become tangible. A new technology must be practical and fit into our world of things. So entrepreneurs come equipped with their ideas and meet our design students. What my team and I try to do is bring both sides together in dialog. That means facilitating and providing intensive support. There are usually several entrepreneurs, due to the complexity of today's research topics. The goal is to come up with a name and consider questions such as: How should the company position itself? What does the brand look like – and what about the product? This goes all the way through to packaging.   ▷

Design process

The design process is made up of different stages – from the initial idea through development and testing of a prototype to market launch. These steps refer not only to product and service design, but can also be applied to organizations.

Identifying a need

Idea

Vision

Order

Briefing
Goal, mission, functions, budget, schedule

Analysis and research
Requirements, target group, trends, market positioning, brand positioning

Concept
Idea, approach, sketches, commercialization

Draft
Design, visualization, application

Prototyping
Demonstrators, model making

Testing
Testing, usability, feedback

Implementation, market launch

Graphics: ediundsepp, picture credit: Magdalena Jooss/TUM

How does that change the original product idea?

As you go through the different steps and stages of the design process, you can see whether there is more to a project or whether it should perhaps strike out in a different direction. For instance, one of our teams was focusing on software for indoor navigation. But we realized as we went along that there were only rudimentary solutions available for the necessary hardware. In this way, we identified a gap and came up with an initial product in response. The "Design Enterprise" development process then gave rise to NavVis – a company that now offers hardware, software and services. If this design process is well implemented, the engineers will also learn from it. So it might be that something completely different – but more fitting – emerges than was originally envisaged. In a young company, the opportunity is there.

And what about established companies?

It's a lot more difficult then. They come with a brief and all stakeholders will try to take the project in the planned direction, whether that really makes sense or not. Objections raised by the design team are often fruitless because there are certain production structures in place, along with fixed ideas about the market. By comparison, most startups are focused not on the existing market, but on a future market they are seeking to shape with their product. Their product has not yet reached maturity and they understand the importance of design. So there is a high degree of flexibility when dealing with future entrepreneurs.   ▷
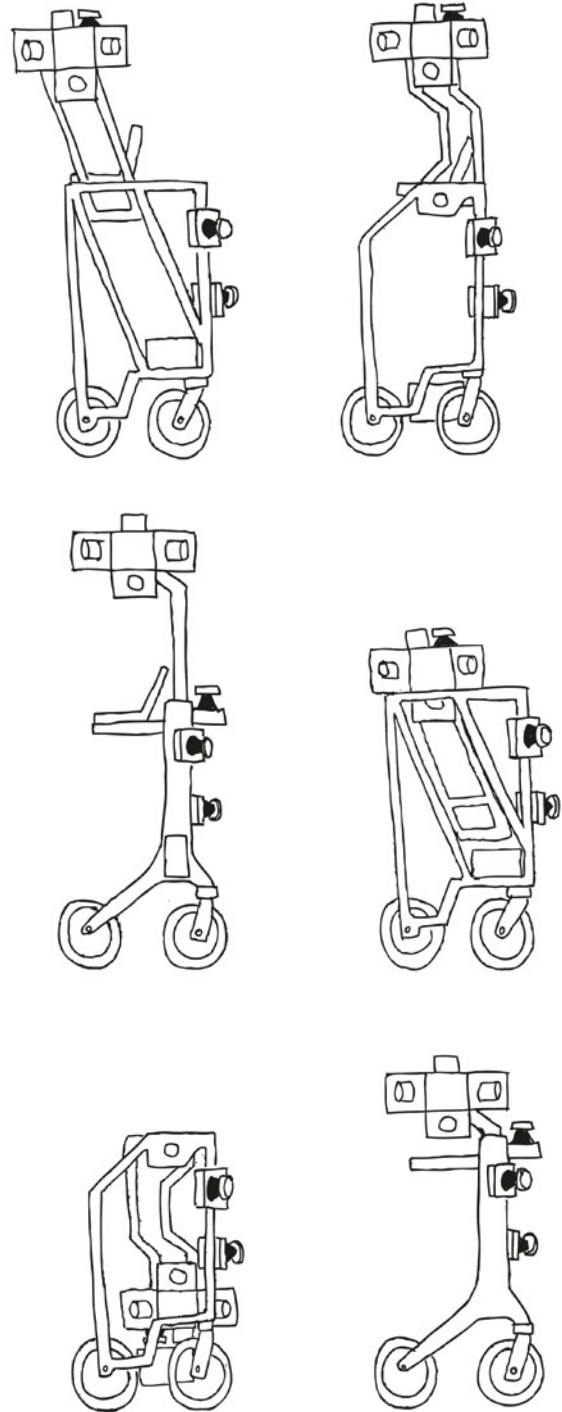

NavVis develops applications for mapmaking and navigation inside complex buildings like hospitals, airports or universities (see also p. 29). Several sensors and cameras mounted on a mobile trolley capture the data and footage necessary to create photo-realistic 3D maps. The main challenge for the design of the trolley (see sketches above) was to avoid its operator appearing in the image recording.
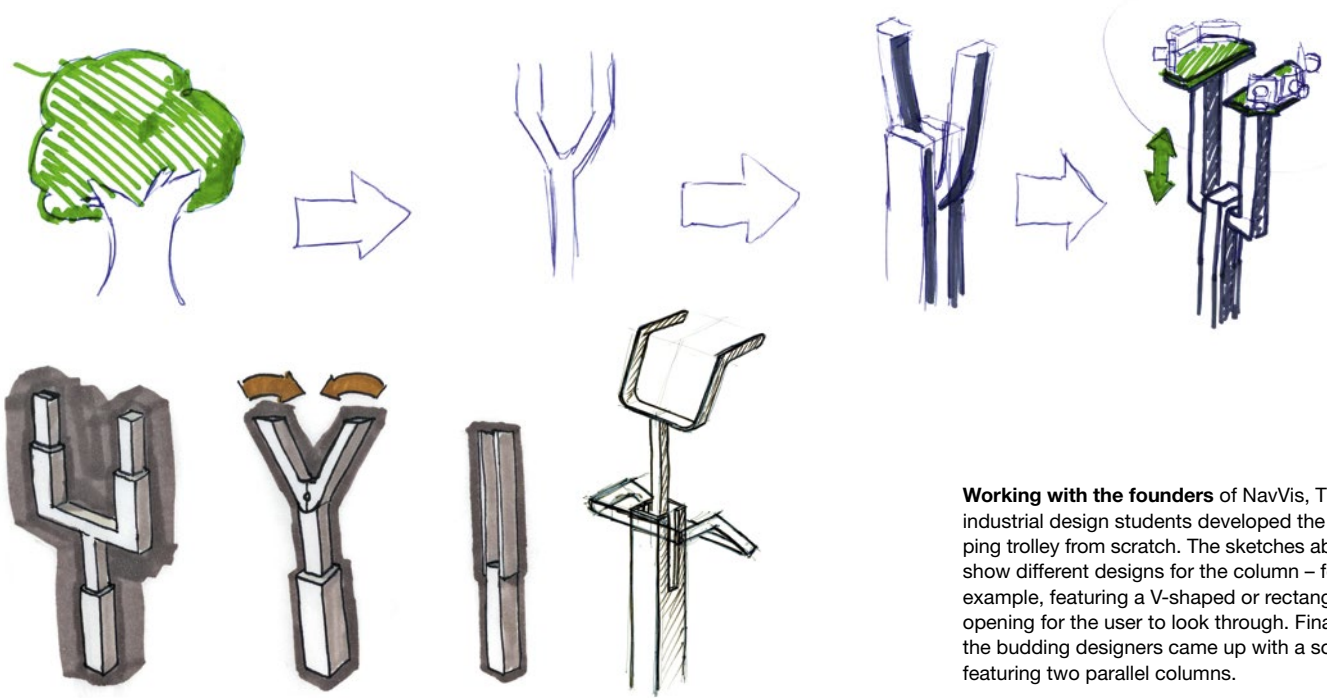
Working with the founders of NavVis, TUM industrial design students developed the mapping trolley from scratch. The sketches above show different designs for the column – for example, featuring a V-shaped or rectangular opening for the user to look through. Finally, the budding designers came up with a solution featuring two parallel columns.

In the current mobile mapping system commercialized by NavVis (left), most of the distinctive prototype features developed by the team of students have been maintained. Point clouds, such as the dataset recorded in the entry hall of TUM's Bestelmeyer Süd building (right), provide the basis for numerous applications, such as routing and navigation in buildings and building information management.

Head

Display

Handlebar

Body

Laser scanner

Wheel unit
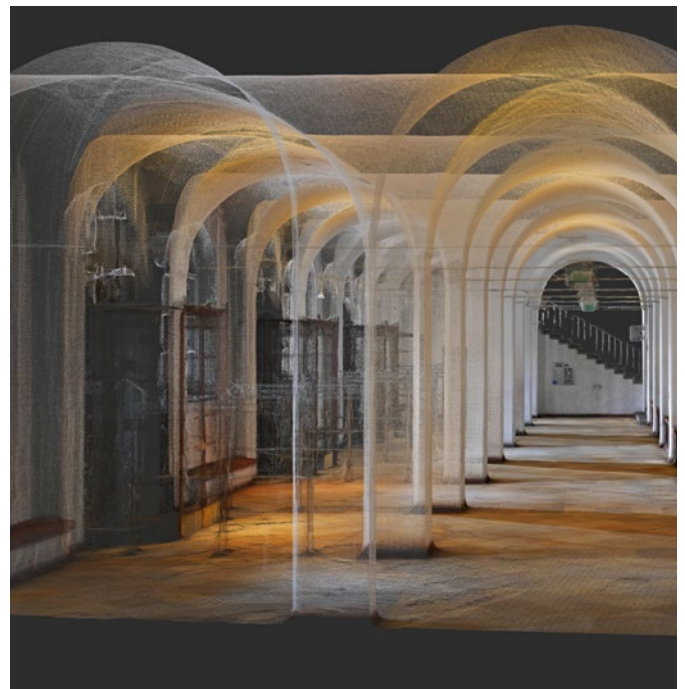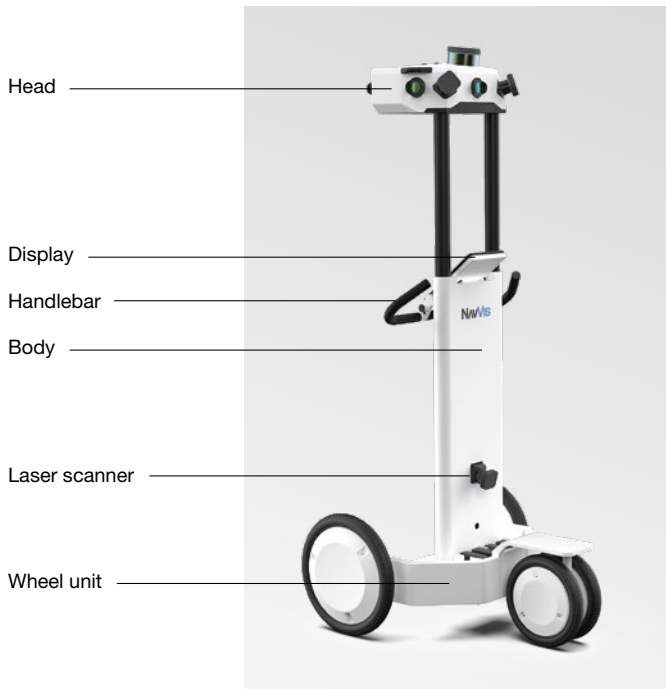
The aCar (above) is an electric car, custom-designed for the needs of a rural population in Africa. The vehicle was conceived by an interdisciplinary team of students and scientists from TUM. The design of the car and its various transport modules (right) stems from Fritz Frenkler's "Design Enterprise" program. With their startup EVUM Motors GmbH, TUM graduates Sascha Koberstaedt and Martin Šoltés now want to take the aCar to series production.

TUM spin-off Lilium GmbH is looking to develop an ultralight electric aircraft that takes off and lands vertically. It was inspired by an idea from TUM alumnus Daniel Wiegand and his team, namely a flying taxi that will whisk passengers to their destination at 300 kilometers an hour, avoiding all traffic and using climate-friendly energy. A team of industrial design students contributed to the original design.

So this interplay is the best way for companies to interface with design?

Yes, and it is generally successful with these young entrepreneurs. They are usually open to input because they recognize design as being necessary and important. Students come together with entrepreneurs and are able to draw on a common academic background and interact on the same wavelength. Sometimes new ventures emerge from these projects with our students as partners, or they join the team of the startup they're assisting.

What advice would you give students and academics who have a business idea?

As soon as you determine that it really is a good idea, you should try to develop a useful product from it. The key is to arrive at a design that reflects the function – there should be a certain logic to it. And it's important to reach out to the existing product landscape. The context always matters. Maybe I can create a new system around my product? If I design something for use in the lab, for instance, I also need to know how it will fit in there. I need to be familiar with the issues that users face in my target environment. Maybe I can solve two or three other problems with my product that might not be specific to my technology but to how it is used. That way, something truly necessary takes shape.

Thomas Edelmann

With his "Design Enterprise" program, Fritz Frenkler and his team have assisted more than 80 new ventures.