Paz Morer

M. Isabel Rodríguez-Ferradas

Aitor Cazón

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Paz Morer holds a PhD in Architecture (1991) from the TECNUN-University of Navarra and is a tenured lecturer at Artistic Expression in the Degree in Industrial Design Engineering. Her areas of research focus on graphic and computer visualisation and physical, cognitive and emotional ergonomics.

María Isabel Rodríguez-Ferradas holds a PhD in Engineering (2014) from TECNUN-University of Navarra. She is currently professor of Industrial Design and Creativity Techniques for the Industrial Design in Engineering degree. Her areas of interest include open innovation and creativity tools and methods for design-driven innovation.

Aitor Cazón, holds a PhD in Engineering (2009) from TECNUN-University of Navarra. He is professor of CAD/CAM, Prototypes and Eco-design of the Industrial Design Engineering degree. His knowledge areas focus on virtual product design and physical prototyping.

The social role of design

Industrial Design is a holistic approach for problem solving

All products are thought of to be sold to numerous potential consumers, so the responsibilities associated to this process are high. The environmental, social and ethical commitments of industrial designers are establishing universal principles in a common effort to foster a sustainable and more harmonious future.

Human-centered design aims to work for people. It is design geared toward issues such as promoting human rights, cooperation for development, the promotion of women, child protection, encouraging equal opportunities, environmental protection, social volunteerism, care for people at risk of exclusion for physical, social, economic, cultural or any other reason.

Along these lines, the HCD-IW (Human Centered Design - Improving the World) initiative was launched with industrial design students. It seeks to connect the professional development sphere and the knowledge in the industrial design degree, leveraging students' social sensitivity and groups known as the 90% of humanity no one thinks about (people with some sort of dysfunction, elderly people, low-income people in marginal sectors, etc.). This has resulted in synergies to significantly boost the emotional connection and passion with which students can tackle the design challenges that emerge. The aim is to harness the result of this experience. It showcases the generation of simple and useful ideas. The aim is not to come up with ground-breaking ideas, but ideas that work, that are useful to others and can be implemented.

Identifying design

The word design, in and of itself, is somewhat ambiguous. It is like a big umbrella term that covers a great variety of disciplines. If we specify further, the concept is more focused. Otherwise, it could mean practically anything. We can therefore speak of the design of a business plan (and thus the relationship with related disciplines in the company), interior design, fashion, graphic design or visual design, strategic design, product design, service design, interaction design (linked to new information technologies) and we can even talk of event design (whether professional, cultural or leisure).

We are also witnessing currents from an ever-changing society. They are dynamic due to the emergence of design-related concepts such as emergent design, diffuse design, design and innovation,

co-design (collaborative design), emotional design, social design, sustainable design and experience design. "Design can give shape to a changing world and offer opportunities to give rise to new types of behaviour" [Manzini, 1994]. We are speaking of designing for and with people. We are speaking of designing for everyone, universal design, inclusive design. "According to British Standards Institution, 2005, Inclusive Design is the '…design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible on a global basis, in a wide variety of situations and to the greatest extent possible without the need for special adaptation or specialized design" [Herriot, 2003].

This fact is reflected in the great variety of official university degrees linked to design (Ministry of Education, Culture and Sport, MECD) offered in the departments of Fine Arts, Humanities, Architecture, Communication Schools or Design University Centres, Social Science Departments, Fashion Schools and Engineering Schools (a total of 53 degrees).

All these specialisations underscore what a vague concept "design" can be. In relation to design, we can talk of the importance of creativity. Creative people are the great paradigm of our society. Will creative practitioners be the leaders in a company's work teams? Is creativity an important part of the first stages of ideation or is it necessary for the entire process until an ultimate solution is reached? How can it be developed? Creative capacity—like intellectual capacity—is intrinsic to people. They are capacities which can be and should be developed throughout the educational process. People are the only beings capable of coming up with novel answers to their presumably predictable daily activity. We may therefore consider it a basic human trait, common to all human activities. It is intrinsically human to add that something to daily work. "Every object made by man is the embodiment of what is at once thinkable and possible. Something that someone was able to both think of it and physically create. Every object made by man is situated at an intersection of lines of development of thought (models, cultural structures, forms of knowledge) with lines of technological development (availability of materials, transformation techniques, and forecasting and control systems). … This intersection between what is thinkable and what is possible, which we refer to as design, is neither simple nor straightforward. There is no broad, free-ranging Thinkable that has only to squeeze into the boundaries of the Possible, because the very awareness of those boundaries is a basic element of what can be thought of" [Manzini, 1998].

Therefore, the reality is that the work undertaken by a designer—regardless of the specialisation—is work undertaken by a good professional. He invests time, works on ideas, researches, analyses, is aware of trends, checks developments, knows materials at hand, is familiar with production processes, is aware of personal limits, etc. Having a brilliant idea does not necessarily mean it's going to be successful in the market. The designer must be able to develop that idea bearing in mind the entire life cycle of this product or service. This is why the training of industrial designers is so important. "Industrial designers must incorporate knowledge of multiple fields, including marketing strategies, design, research and development, basic knowledge concerning production as well as integration management and communication skills" [Keitsch, Prestholt, 2015].

What about industrial design engineering?

Where does industrial design engineering fit in? Is there any difference between industrial design and industrial design engineering? If we look back at the list of official university degrees published by the MECD we can see that there is no degree in industrial design. They are all "industrial design engineering" (21 of the 53 official degrees in design) and some of them add "and product development". Eighteen of them are offered in engineering schools and the three remaining ones in industrial design schools. There are currently two co-existing professional profiles: industrial designers from the old

design technical schools and industrial design engineers with the new degrees. The former have given more emphasis on training in the first phases of design, while the latter boast more complete training focused on the development stage. Real-life experience as designer or design engineer brings a balance to these profiles. For this reason, we speak of Industrial Design and Industrial Design Engineering interchangeably.

"We have gone from seeing the product as the heart of the business to a strategic vision that seeks to achieve a product/service embodied in a complex life experience for the user"

Industrial design offers a holistic approach for problem solving. This design requires three support points: the technological, business and creative components. It is eminently multidisciplinary. "Industrial Design is more than just the way a product looks or functions. It is a way of thinking about the world and how it works" [Edson]. Industrial design is a competitive tool in a global market to create value in products. It seeks to address a need, staying ahead of the times. An industrial engineer is "an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist" [Buckminster Fuller, 2010].

Looking back at history, we can identify three ages of consumption. First, since 1880 until the end of WWII the first mass markets emerged. These were followed by abundance consumption (1946-1975) and the emergence of shopping malls. Then, in the 1980s, experience-based consumption started and the first trend laboratories appeared. We currently witness clients who are better informed, more demanding, more free and more flexible. We have entered into the age of people. We can clearly state that the industrial age has ended. Mass industry has been depleted. We are witnessing a new revival, therefore, of new opportunities, as we are transitioning from the consumption of comfort goods to the consumption of personalised goods. In an era of material abundance, consumers look for products and services that help us add meaning and craft an interesting narrative about who we are and where we want to be in the world. We have gone from seeing the product as the heart of the business to a strategic vision that seeks to achieve a product/service embodied in a complex life experience for the user. We live in a fast-paced society where the "click" phenomenon—I see it, I want it, I have it—is taking over our way of life. Ours is an interconnected, relational, global world with local needs (global—think global and act local). Ours is a world that has become small for young people. In this world, the recurring issue of immigration comes from different angles and for different reasons. These are issues to which we can't turn a blind eye. We cannot live as if they didn't exist or as if they didn't affect us. Industrial design today is inextricably linked to the way society, culture and the environment interact.

We are likewise witnessing the emergence of new production technologies, emerging technologies and a globally connected world. All this is transforming the product design industry. Industrial designers are thus becoming entrepreneurs and independent. New technologies, especially additive manufacturing (also known as 3D printing) have the potential of radically redefining how products are manufactured and create new design possibilities. "This 'new industrial revolution' is enhanced by social media platforms, allowing designers to design, produce and distribute products whilst operating autonomously from the established manufacturing, sales and supply networks. The profession of Industrial Design is on the verge of a 'renaissance' as designers and consumers are empowered by these new technologies; which enhance creativity and innovation, facilitate new product development practices and enable design entrepreneurship and encourage a participatory culture" [Vere, 2013].

In addition, the concern for social and environmental impact is constantly greater. In fact, we find ourselves immersed in a society highly aware of respect for the environment, respect towards people with disabilities and towards people living in social exclusion and/or poverty. No one is less of a man or woman for being born in a specific country or culture or for having a certain physical or intellectual disability. Only when we can see people like this care we able to detect the true needs and think of solutions that add value. "We need to understand the upcoming changes as a historic opportunity to make a qualitative leap in how we understand the world around us—from Spain to Thailand, and from Brazil to Argentina. Something has definitely broken, inside and outside ourselves, in our way of assessing, judging, consuming and working" [Morace, 2010].

People require increasingly more information on the product they are acquiring. Companies seek a three-fold sustainability—financial, social and environmental—if they truly wish to stand out from their competitors and be responsible in their decision making. Industrial design is one of the disciplines which companies use to project future scenarios, to identify new innovation opportunities and materialise these opportunities in products and/or services. Every product created to be sold is linked to a production process and seeks to meet a need, so the associated responsibility is high. This is why industrial designers are now being seen as agents of change. Social trends and needs are, today more than ever, the driving force of innovation. Companies need to add to their teams professionals who are capable of integrating this knowledge in the earliest phases of their innovation projects. "Consumers wish to be sure that the products they are buying are worth it, and not just for the financial investment involved. They also wish to be sure that they have been manufactured by people who have social security and holidays, working in a safe and healthy environment" [Monocle, 2010].

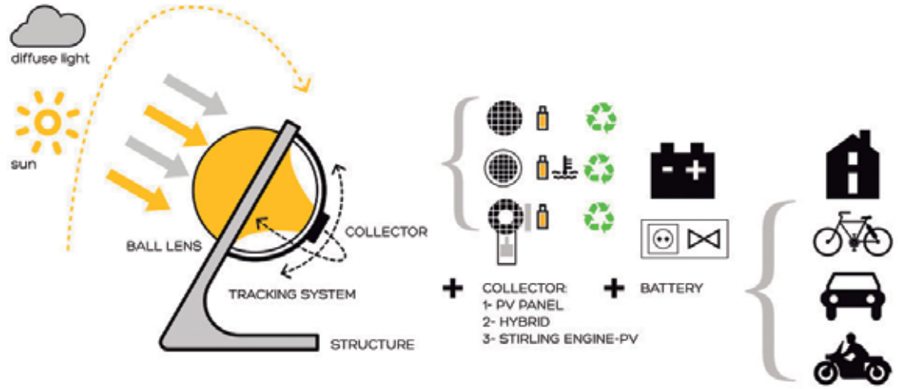
Some success stories

Aiming to depict these ideas, below are some success stories. They are all different, but each brings to light a specific aspect that makes it interesting. We have looked for products aimed at social and environmental sustainability. As Tim Brown says, "Why not put creativity at the service of ideas that create well-being without impairing the consumption of resources?" [Brown, 2009].

EMBRACE INFANT WARMER (2007)
(http://embraceglobal.org/)

"*But technology alone isn't enough to save lives*". Embrace global is a social company aiming to help millions of premature babies born in developing countries. They have developed a low-cost baby warmer. In contrast to traditional incubators that cost up to $20,000, the "Embrace Infant Warmer" costs less than 1% of that. The device can work with or without electricity. It has no movable parts, it can be carried, it is safe and intuitive to use. When babies are born prematurely, they lack the necessary fat to regulate their own body temperature. So at room temperature they can feel like it's freezing. In advanced societies, these babies are usually placed in incubators until they can live on their own. But this technology is sometimes not available in developing countries, so parents and healthcare workers barely have options for babies with hypothermia.

▲ "Embrace Warmer". © http://embraceglobal.org/



▲ "Rawlemon". Operating scheme. © http://www.rawlemon.com/

This start-up started as a class project at Stanford University when a group of students faced the challenge of designing a product to address neonatal hypothermia. They currently have a program with a triple mission: product access, education and training for both health workers and mothers, and the monitoring and tracking of the product that allows collecting data that results in improvements. It is supported by numerous companies.

It is a clear example of how technology and new materials can clearly contribute to progress in society.

RAWLEMON (2013)
(http://www.rawlemon.com/)

It is an electricity generator that uses solar energy. Designed by André Broessel, it is intended to be used where people actually live—in our cities. And it does balancing technology and beautiful form, transparency and a comfortable environment. We all know that the sun is the greatest sustainable energy source on earth. This technology has been known for 40 years. The important thing is knowing how to apply this knowledge [Reis, 2010]. One of the main problems of this technology is its low efficiency: 80% of photovoltaic panels installed worldwide have a yield of 15% or less. This product improves profitability.

This technology offers a highly sustainable, clean energy solution. It can be integrated into urban landscapes without destroying the environment. It minimises the footprint left by renewable energies in our environment. It seeks to achieve energy-independent buildings. The Micro-Track is one of the first prototypes built, studied at the German laboratory Zentrum für Sonnenenergie und Wasserstoff-Forschung Baden-Württemberg, with very positive results, reaching 150 kW/m² for façade modules.

This product combines the latest technology—clearly more sophisticated—with clean design and integration into the urban environment.

SULI LAMP (2013)
(http://www.sulilab.com/)

Suli is a Chilean company that seeks to create social impact through sustainable solutions by using sunlight, design and technology. Suli aims to democratise access to this natural resource in an easy, simple and accessible way, focusing especially on meeting the needs of those who, even today, do not have access to this resource. Under the slogan "Light, your

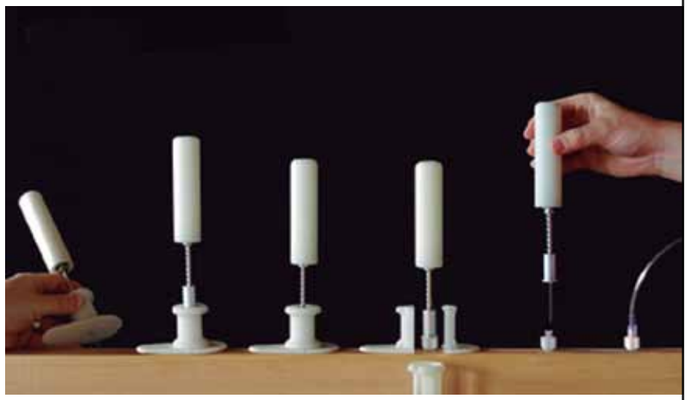
way," Suli seeks to offer this sustainable light for those with conventional electricity who seek a more sustainable lifestyle or for those seeking a portable source of light and power. "Behind Suli there are several types of impact. For me the first and most important is the democratisation of energy and its social impact," says Maca Pola, founding partner of Suli Lab. "Not only for those who do not have access to it, but the impact that we could all have, at a very low cost, a solar module which in the future may be powered by many other energy sources."

This solution is a clear example of multi-disciplinarity. The team is composed of an architect, Ximena Muñoz, an industrial designer, Macarena Pola, a publicist, Matías Casanova and a commercial engineer, Cristian O'Ryan. Born in Chile, they seek to impact society through sustainable solutions in which the sun is back in the limelight and technology serves strictly as the medium.

▲ "Suli lamp" © http://www.sulilab.com/

LUNAR (1984)
(http://www.lunar.com)
A Chicago-based design studio where designers and engineers work together, seeking to create more sustainable products that reduce the impact on our ecosystem. They have developed a guide that helps designers have an overview of the development of sustainable products and their life cycle. In turn, they have launched a strategy aimed at emerging markets with the aim of creating products related to the field of health and reduce the costs associated with this field. The IntraOz bone drill is one such project. It is a manual device developed specifically for the Indian market. It is a helical drive mechanism to access the bone and vascular system.

Devices used to access the bone and vascular system, used by most Americans in ambulances and emergency rooms, typically cost about $300 each. For developing countries such as India, where the need is huge, this cost is an insurmountable obstacle. And hence the opportunity. What if you could design a low-cost device that can do do the same job? This is the challenge posed to graduate students from Stanford-India Biodesign (SIB). The program was developed in collaboration with the Indian government and was launched in 2007. It is a partnership between Stanford and New Delhi, with the Indian Institute of Technology and the Indian Institute of Medical Sciences. Each year, four graduate students interested in medical technology design go to Palo Alto for a six-month period. There they learn the basics of process biodesign created at Stanford.



▲ "Intraoz bone drill" © http://www.lunar.com/

They return to India to research and detect needs by observing medical care provided to patients in two large urban hospitals and rural clinics.

It is a good example of how to help developing countries relying on country's people and thereby providing training that remains in the country for future generations.

"It is extremely important that students, future industrial design professionals incorporate social and environmental sustainability ideals to their professional profile in order to leverage this opportunity to positively influence society and the environment"

Students driving change

The above examples are but a few success stories that showcase what an industrial designer with social and environmental sensitivity can create. Now, is the "social" designator really all that necessary? Is not industrial design always about solving human needs? Why do we then need to designate it as "social"? I see it as an attempt to counter the consumer design that seeks to create unnecessary products without a significant value, irresponsible in the use of natural resources, of which over 80% are estimated to end up in the trash in less than six weeks. This explains the importance of the industrial designer who poses sustainable design as a corporate social responsibility, not only taking into account the production processes, the product life-cycle, but also its meaning, its relationship to people, to cultural environments, and thus achieving real social impact [Papaneck, 1971].

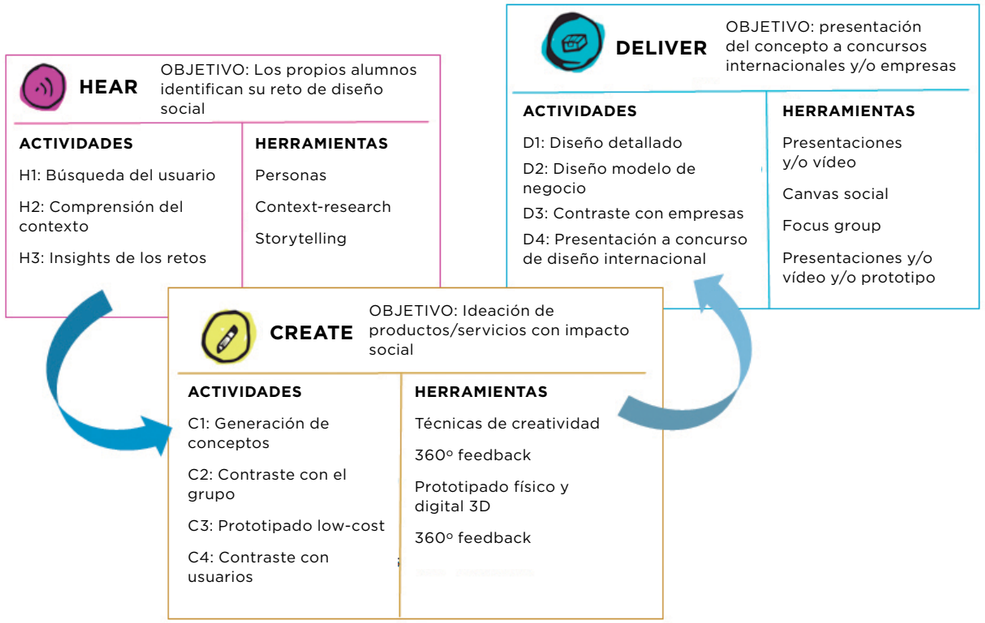
This task should start in college, through initiatives for training new professionals. It is extremely important that students, future industrial design professionals incorporate social and environmental sustainability ideals to their professional profile in order to leverage this opportunity to positively influence society and the environment.

In a constant search for actions that provide results in more real scenarios for developing its students' skills, Tecnun therefore has designed a project to connect what students learn in their various courses with their implementation. This project, "Improving the World", therefore seeks to develop the following skills:

1. Promote **eco-environmental and sustainable** awareness. A sustainable design project starts from the first moment, when the paper is still blank. Sustainability should influence the whole process of design, so it should be designed and planned from the very beginning with this criteria.
2. Developing **creativity** that will address the many facets of the problems that must be faced.
3. Creating awareness **of user needs**, to analyse and understand the needs of potential users of the products being designed.
4. Empowering in students the designer's vision **as a socially responsible agent**, capable of maintaining a balance between economic sustainability and contributing to generate real social transformations.

To carry out these responsibilities, the methodology shown in the following figure is followed, based on IDEO's "Human-Centered Design" guide for social innovation, and tailored to the specific characteristics of this project.

As part of this project and in this line, students have developed several projects, guided by department professors. Most of them arise from a combination of the proposals in the area and students' personal experiences.



▲ Flowchart used in "Improving the World" project methodology.

PSXTREME

This project seeks to redesign a wheelchair for physically disabled people to play paddle tennis. In all design processes we can see several phases, reflected in the Design Council double diamond (http://www.designcouncil.org.uk/). This project connects and goes through these phases: 1) **Discover**: Through market study, the designer seeks to record laws governing the sport, ergonomics, a field study with users through observation techniques, shadowing and interaction, etc. 2) **Define**: a series of concepts and study of the current structure, detecting critical and improvable points, an assessment of these concepts, 3) **Develop**: final specifications, virtual model, realistic rendering, final user feedback, etc. 4) **Deliver**: production and actual use by the user.

This challenge poses the complexity of having to combine different disciplines: ergonomic studies, materials to be used, knowledge of the sport and applicable safety laws. In turn, this project has brought together social sensitivity, passion for the sport, knowledge acquired in the degree and interaction with the end user, among others.

SOUND-IDENTIFYING BRACELET

People usually communicate acoustically. Deaf-mute people therefore need to establish alternative systems for communication or identification of common sounds around them. These alternative systems are usually visual or by touch. The language used in these cases is an iconic language. A project was developed along these lines aimed at identifying sounds in the home environment for deaf-mute people—sounds like the door, the phone or even the cry of a child. A wearable bracelet was designed that allows deaf people to program different types of home sounds, receiving a warning by vibrating bracelet and an icon indicating the type of sound detected.

▲ "PSXTREME". Redesign of a chair for paddel players.

MIO: PORTABLE AIR PURIFIER DESIGN

One of the major problems affecting cities in Asia such as Shanghai is air pollution, largely due to political decisions related to the country's industrialisation. To tackle this problem, a device was designed to remove pollutants from the atmosphere, thereby improving air quality. It is especially aimed at people suffering from asthma an allergies whose lifestyle is independent. The final product was projected as portable, customisable, with which children could interact, easy to carry, etc. After a study of the necessary components and the problems to be overcome and potential users, along with a survey of related legislation, the proposal was Mio.

▼ Bracelet for identifying sounds for deaf people, in collaboration with the Guipúzcoa deaf-mute association.

The air purifier aims to improve the health of children living in contaminated China. It seeks to provide a solution for Chinese parents concerned about the effects that pollution can have on the health of their children. This air purifier also solves a major social problem regarding children's identity and how it is communicated. Children who used to be just a figure would be shown as they really are. Its padded rubber coating allows children to see it as an object to play with. Parents are responsible for changing the filter and activated carbon each month and will that the device is charged and well placed. The device has few buttons and is easy to operate. Its sinusoidal shapes make it attractive to the eye. The purifier is designed for children to carry in their shirt pocket during the day and in their night stand at night—with them 24 hours. Thanks to the product's electromagnet technology, it could be placed in many places: handkerchief, backpack, etc. The most important part of this product is its ability to improve the quality of life for many children whose life expectancy is 5.5 years shorter due to pollution, and pollution figures will continue rising unless we do something about it. It's in our hands—or in our neck?

QUICK & EASY

Seniors have numerous ergonomic issues related to going shopping. The aim of this project is to design a device, designed from the point of view of physical and cognitive ergonomics, so older people can go shopping quickly, conveniently and securely, scanning the barcodes of items they wish to buy.

Conclusion

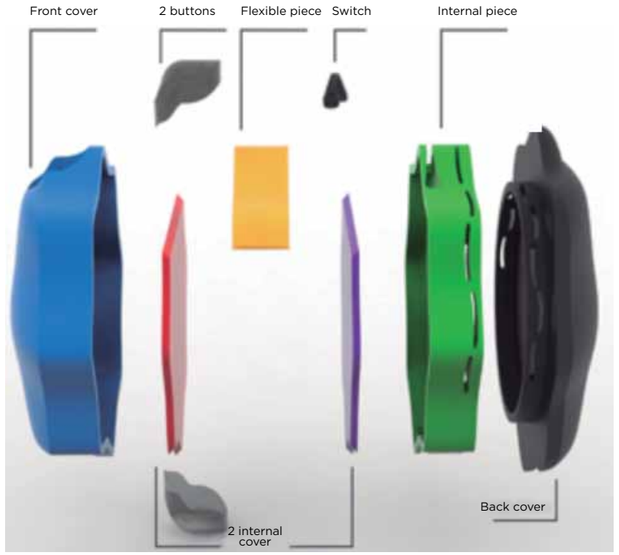
Contrary to what many adults think, the young people we are educating in college today have a great awareness of the problems in our society. A high percentage of these young people have direct contact (through various volunteer efforts) with people in disadvantaged groups who are often ignored by the professional design community, with honourable exceptions.

Harnessing this social sensitivity to teach our industrial design engineering students to use the tools inherent to their future professional activity to improve society, and with it the world around them, is a challenge and a responsibility that all teachers in the field of industrial design have today and to which we need to respond.

Initiatives such as those presented in this article can serve as best practices in many ways:

— Showing the intrinsic motivation brought by the possibility of using students' own experiences as a way to identify real social design challenges on which to work.
— Highlighting the importance of educating industrial design students to develop a vision of product and/or service business model designed from a perspective that includes social impact parameters.
— Helping understand the necessary connection and involvement of social organisations and companies in this training process, looking for a win-win effect. Student receive *feedback* rooted in the need and the market, social organizations receive valuable ideas that contribute to solving problems with the groups they work with and businesses can find new business niches with high social impact.

Current industrial design engineering students will play a key role in designing the world of tomorrow. They will be catalysts for needed change, steering society from a market geared primarily towards economic success through products and services towards a more balanced market where social and



▲ "Mio": Portable air purifier.

▲ "Quick & Easy". Scanner to aid the elderly in shopping tasks.

environmental impact will be the key tools when it comes to business competitiveness. We need to be aware of this and think how to train them in a participative manner so they accept their leadership and can boost this great change by responsibly carrying out their profession.

Given this role adopted by students, the involvement of companies in these training stages is one of the basic pillars of degree. "Among others, one of the notable strengths of Basque design lies in the close involvement it has with the industrial sector, its manufacturing processes and the viability of industrial projects it is involved in" [Sola, 2013].

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