



Business Innovation Observatory



Smart Living

Ingenious home products

Case study 19

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Table of Contents

1. Executive summary	2
2. Smart living: ingenious home products	3
3. The potential of ingenious home products and socio-economic relevance	3
3.1. The market potential of companies that operate in the ingenious home products market	4
3.2. Companies offering innovative solutions in ingenious home products	6
3.3. The impact of ingenious home products on home-related industries	8
3.4. The development of ingenious home products relies on collaborations between designers, entrepreneurs and clients	9
3.5. Client perspectives and challenges for ingenious home products	10
4. Drivers and obstacles	11
4.1. The emergence of home automation will empower the creation of ingenious home solutions	11
4.2. New technologies and materials are opening new opportunities for ingenious home products design	12
4.3. Lack of consumer awareness might slow the uptake of ingenious home solutions	12
4.4. There is a lack of support for small companies within the ingenious home products sector	12
4.5. Crucial need for establishing substantial partnerships	13
5. Policy recommendations	13
6. Appendix	15
6.1. Interviews	15
6.2. Company websites	15
6.3. References	15



1. Executive summary

The concept of the home has been evolving over the past decade. Homes are becoming smarter and allow for increasing interactivity between living spaces and their inhabitants. Innovative products such as connected devices and ingenious home products are transforming the way we live at home by introducing home automation through controlled lighting, heating, ventilation and air conditioning (HVAC) appliances, security locks of gates and doors and other systems. Innovative home products provide improved convenience, comfort, energy efficiency and security.

There are several social and macro-economic factors driving the growth of the ingenious home products market. One such factor is an ageing population. More and more elderly people prefer to stay at home instead of living in assisted living residences or retirement homes. New user-friendly products and services are being developed for the home to make lives easier and safer and to increase the autonomy of people with special needs. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care.

Population increases and urbanisation also mean that space comes at a premium and lead to an increase in the demand for solutions to save and optimise space. Moreover, globalisation has increased labour mobility. People are constantly moving. As a consequence, workers and especially young workers are more and more looking for modular, flexible home spaces and products. Furthermore, people are becoming more aware of environmental issues, and looking for innovative solutions to decrease the negative impacts of their lives on the environment. Also, increases in energy prices and the economic crisis have encouraged the uptake of ingenious home products that provide new means to save energy and money. These new challenges have opened a large window of opportunity for companies, architects and designers.

Ingenious Home Products is a nascent market covering several industries such as home furnishings, household appliances, and home design. The creation and the development of ingenious home products require

collaborative work between different types of actors who combine their knowledge and expertise to reinvent the home space. Collaborations between designers, architects, companies and scientific researchers are crucial for the development of highly-efficient and ingenious home products and appliances that can make life easier, safer and more energy efficient. The progress of science and technology will continue in the coming years, further extending the range of opportunities to turn disruptive innovations into marketable home products.

A key determinant in the success and adoption rate of ingenious home products is consumer acceptance and trust in the products. Indeed, consumers do not always recognise their true value. They sometimes focus on the cost of the product, instead of looking at the future benefits in improving quality of life or in saving time and energy for example. Ingenious home products can be perceived to be expensive, complex and potentially unreliable compared to traditional products that have proved their efficiency and reliability over time. However, the younger generation is more willing to test new products at home, which will contribute to their market uptake.

Designers' imagination is a significant source of ideas for the development of ingenious home products that could improve daily life at home. However, competences to further develop innovative ideas into marketable products are often missing in small design companies. Start-ups in particular have difficulties in securing support for the development of their products, and access to finance is usually one of the main obstacles.

To support the development of ingenious home products, policy makers could focus on measures that support partnerships between large companies, start-ups, designers, researchers, and investors; create centres that would connect design agencies and enterprises and public sector organisations that require design-intensive services, simplify and clarify IP procedures to support access to the international market, and facilitate access to finance for start-ups.



2. Smart living: ingenious home products

The way we live and behave has dramatically changed over the last decade. The concept and notion of the “home” has changed. Today, the home is no longer seen as a simple and passive place for sleeping and eating, but as a dynamic and lively place that has to be comfortable, secure, sophisticated, and energy efficient. Through the development of new technologies, people are constantly looking for solutions that could make their home life easier, greener and more comfortable and functional.

Ingenious Home Products refer to a wide variety of home devices ranging from home furnishings, household appliances to innovative solutions controlling security, electrical, heating and water systems. Ingenious home products are a key component of the transformation of homes into smart places.

Ingenious Home Products aim to provide innovative solutions to address four main concerns of households:

- **Space optimisation:** People are living in smaller spaces that require a complete rethinking of the ways to

furnish rooms. It is becoming crucial to maximise and optimise space in order to offer a comfortable and pleasant living space independent of its size.

- **Time saving:** The number of active people within each household is increasing. As a consequence, finding solutions to do things in a more efficient and quicker way at home are becoming essential.
- **Need for user-friendly interfaces:** Every home space needs to be easily accessible and manageable by each inhabitant of the home whether they are a child, an adult, an elderly person or someone with reduced mobility. Daily life has to be made easier.
- **Desire for design, sophistication & functionality:** People are not only looking for a practical home but they aspire to fashionable, original and functional homes that combine sophisticated interior design with uncompromising comfort.

3. The potential of ingenious home products and socio-economic relevance

Ingenious home products constitute a new market that has clearly shown signs of take-off in recent years. Addressing key consumer and societal challenges, ingenious home products present a high growth potential over the next years.

Underlying trends that have been identified as drivers for the market up-take of ingenious home products include:

- **Society is ageing and the dependency ratio is increasing.** In 2020, one fifth of the European population will be over 65 years old.¹ As people grow older, they face an increasing risk of losing autonomy. More and more elderly people prefer to stay at home rather than move into residential care. However, staying at home for elderly people requires assistance in daily living activities. Besides the home and medical help, it appears essential to develop new user-friendly services at home to make their life easier and safer and to increase their autonomy.²
- **Global population is increasing and space is getting more limited** leading to a higher demand for saving and optimising space. The world population is

expected to reach 7.6 billion in 2020, and a majority of people will live in cities. According to a study of the UNO, 55% of the world population will live in big cities in 2020 compared to 29% 60 years ago.³ As a result, people will be living and working in increasingly smaller spaces. Homes across the EU have become smaller making it crucial to develop ingenious solution to maximise and optimise space.⁴

- **Labour market mobility is intensifying:** the enlargement of the European Union, supported by intensive developments in transport, communication and information technology infrastructures, has considerably increased the flow of people and resources between regions. People are constantly moving, especially for professional reasons. The economic crisis has also led to increases in unemployment across the EU and caused people to consider moving to other regions or countries to find work if they were unemployed. As a consequence, the number of workers and especially young workers looking for modular, flexible home spaces and products has increased.⁵



- **Increased awareness on environment:** close to half of the population indicates to be "very worried" about climate change, air pollution, and water pollution and its impacts on their own health.⁶ Increases in energy prices have also encouraged consumers to implement energy saving solutions at home. Ingenious home products can provide innovative solutions to households to save energy and money.

These new challenges have opened a large window of opportunity for companies, architects and designers to reinvent the home space with a new range of highly-efficient and ingenious home products and appliances that can make life easier, safer and energy efficient. Collaborations between designers, architects, companies and even researchers are crucial for the future development of innovative home products. This necessity leads to the emergence of new R&D infrastructures mostly in the form of public-private partnerships such as Design Centre, Living Labs, Fablabs, etc. where innovation can be achieved, prototyped and tested before commercial production via collaborative work between different stakeholders.⁷

3.1. The market potential of companies that operate in the ingenious home products market

The evolution of people's ways of life presents a real development opportunity for designers and companies, especially SMEs in the areas of furniture, home appliances, home design, electric and electronic, computing and ICT. Ingenious Home Products is still a rather nascent market covering several industries such as home furnishings, home design and home appliances.

Home furnishings market

The EU furniture sector makes up about 50% of the world's furniture production valued at about EUR 82 billion. Germany is the biggest furniture producing country in the EU, accounting for more than 27% of total EU furniture production.⁸ Europe leads the home furnishings industry in terms of revenues, followed by North America and the Asia-Pacific region.

In a context of changing living standards and people's preoccupations, a large number of significant changes have taken place in home furnishings over recent years. The global home furnishings market is forecast to reach EUR 508 billion by 2015.⁹ The growing of the home furnishings sector is driven by multiple factors such as: increasing interest of consumers towards the domestic and decorative products; the increasing demand for organic home furnishing products due to their eco-friendliness, in addition to the style, comfort, and quality they can provide; the increasingly widespread role of the electronic media leading to the development of

furniture integrating electronics; increasing product lines and store design giving more choice to consumers.

The home improvement industry is likely stimulating by factors such as baby boomers upgrading to bigger homes, increase in the purchase of second homes or going for remodeling or repairing, and higher disposable incomes, specifically in the developing markets.

Home design market

As part of the creative industries, design has become an important competitive factor for the European economy and industry. Design is not only limited to matters of "styling" but it is seen as a driver of innovation that can support sustainable growth and improvements in the quality of life.

The global design industry is a large and diverse sector. The industrial design and the interior home design constitute the second largest part (44%) of the entire industry. It is estimated that there are approximately 410,000 professionally-trained designers practicing in Europe generating an annual turnover of EUR 36 billion.¹⁰ Design is offering a wide range of opportunities for growth particularly for micro-companies and SMEs.

Home Design has impacted many industries related to home interiors. The way to conceive furniture, home devices or lighting systems for example has completely changed. Even the way houses are built today is being influenced by a design approach. Designers are transforming home interiors by providing new creative competences and new visions.

Companies and particularly SMEs can make a use design as a strategic tool to create innovative products and services addressing new consumer standards and societal challenges while assuring competitive and durable development.

Home appliance market

The home appliance industry is a multi-billion euro industry. Despite the recent economic crisis, global demand for electrical and home appliances has been increasing consistently. Home appliances include a wide range of home products designed for cooling, heating, cooking, washing, cleaning, etc. as well as for providing comfort.

The value of global demand has been estimated to almost EUR 440 million by 2012.¹¹ Within the home appliance industry, the "smart-appliance" market (including the ingenious home products) is expected to flourish in the coming years. By 2015, the value of the smart appliances market is predicted to reach up to EUR 4 billion. According to a recent report from Pike Research, a part of Navigant's Energy Practice, the annual value of the smart appliance market will grow from EUR 444 million in 2012 to EUR 18.7 billion in 2020.¹² The world's main household appliances exporting countries are China, Germany and Italy.¹³



Eastern Europe demonstrates strong replacement demand, reflecting rising standards of living in the region, and also a high desire to introduce innovative products in home daily life.

The five companies included in this case study have developed innovative products or services on these markets.

In order to better understand and assess the market and the applications of ingenious home products, this section of the case study presents the innovations of five companies (Table 1). By showcasing their products and services we will demonstrate how their novel business innovations can lead to successful business development and growth.

Table 1: Overview of the company cases referred to in this case study

Company	Location	Business innovation	Success signals
Decolabs	Belgium	Decolabs has developed an application that virtualises the decoration of home interiors in a matter of seconds. The Augmented Reality virtualisation tool allows selections of objects to be put inside the interior to facilitate better evaluations of how it will fit in the space before buying it.	<p>Decolabs has been selected as one of the best Augmented Reality (AR) practical case studies for 2013 for the AR Summit. This summit is a platform designed to recognise & reward companies who successfully adopt AR, producing creative strategies, adopting new techniques, and enhancing technologies.</p> <p>Decolabs has also been nominated for a SpinAward and a Dutch Interactive Award in March 2013.</p> <p>Decolabs application has been downloaded 6,000 times since it was released in May 2012.</p>
El Studija	Lithuania	El Studija has created the Boxetti Collection that offers multifunctional home furnishings that are transformable. Every piece of furniture designed by El Studija's designers optimises space and offers multiple functions combined into one ingenious module.	<p>The Boxetti team has been contacted by area magazine's editing group for the publication of BOXETTI SOUND, in a special issue entitled "Ouverture 2012 - Design On/Off".</p> <p>The exhibition, curated by the editor, Prof. Arch. Marco Casamonti, sought to explore the result of innovative work in industrial design. The Boxetti Lunch Module has been exhibited to explore the themes of movement, opening and closing (www.archea.it/en/ouverture-2012-design-onoff/).</p> <p>The Boxetti collection has been presented at contemporary interior and architecture events such as the "100% design London" (www.100percentdesign.co.uk).</p>
3.14 Innovations	France	3.14 Innovations has come up with a potentially disruptive innovation: the ON/OFF paint. This new generation of paint can make an entire wall act as a light switch. The system, consisting in the paint and a specific electronic mechanism, reproduces the tactile technology we experiment everyday with smartphones and tablet.	<p>Created in 2011 by Nicolas Triboulot, 3.14 Innovations has been the winner of the "Design" category of the 2011 edition of the competition "Les Grands Prix de l'Innovation of Paris".</p> <p>3.14 Innovations is supported by the e-lab Bouygues Innovation & Optimisation for accelerating the access to market for the ON/OFF paint and the development of new applications for this product.</p>



Company	Location	Business innovation	Success signals
Transalpin	Germany Italy	Transalpin's designers have developed "electrified material" named Wood.E for the design of a new type of furniture which can integrate lights without bulky electrical wiring.	Wood.E materials received the MATERIALICA Design Award which is the Europe's top event for material-driven and supplier-oriented product innovations organized in Munich.
Orbital Systems	Norway	Orbital Systems has developed a new generation of shower based on a disruptive water recycling technology that purifies water while an individual is showering without compromising comfort. This new technology allows savings of more than 90% in terms of water consumption and more than 80% in terms of energy consumption.	The creator of the OrbSys Shower has been interviewed by the CNN Blueprint's team on November 11, 2013. http://edition.cnn.com/2013/11/11/tech/innovation/futuristic-water-recycling-shower-orbsys/ OrbSys Showers have been installed for a test in Ribersborg's Kallbadhus, a coastal bathing house in Sweden. More than 1000 bathers had a shower after swimming in water rich with plankton and algae. The OrbSys Showers were working for about 10 hours per day and the user feedback was quite positive.

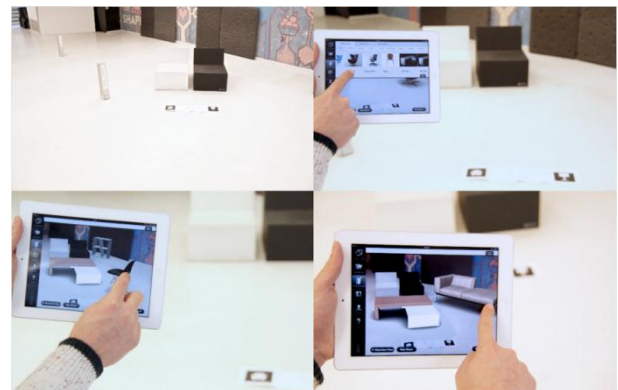
3.2. Companies offering innovative solutions in ingenious home products

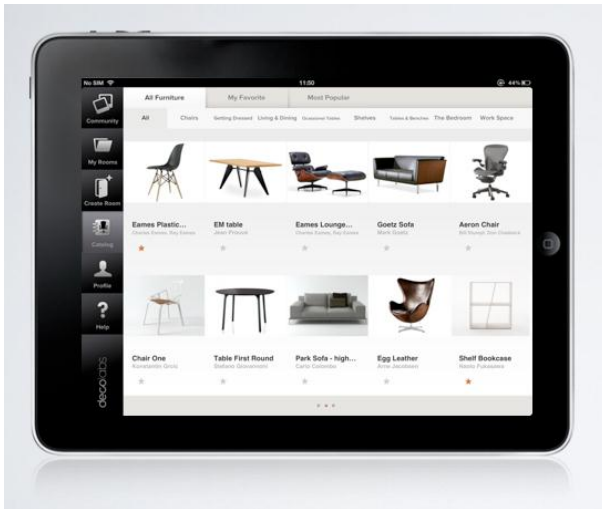
The innovative solutions developed by the case study companies address societal challenges and bring solutions to unmet client needs. Their solutions help households to improve their quality of life within their home interior. Decolabs, El Studija and Transalpin provide solutions for home interior design aimed at saving and optimising space, and creating uncluttered space while maximising comfort. 3.14 Innovations offers their customers a disruptive technology that can dramatically improve mobility and security of people at home. Then Orbital System provides solution for energy and water savings.

Problem 1 – More than 85% of the world's online population has already used the Internet to make purchases.¹⁴ Buying home products on internet is becoming increasingly widespread over the world. Besides, the social network communities and discussion forums provide ideas for interior design, and reviews on home products that can be conferred before buying. However, when shopping online consumers can find it more challenging to visualise how a particular piece of furniture would fit into their own space in terms of size and style before making their purchase decision.

Innovative solution 1 – Decolabs addresses this problem through an iPad application based on augmented reality virtualisation. This application allows the client to arrange virtual pieces of furniture in a photo of their interior and see how the items (accessible on the multi-brand e-catalogue) will look in their room before buying. Complete product information: models, texture, colour, designers and more are available. Once their interior design has been completed, the client can, through this application, easily share it on social media before ordering the selected items. Moreover, clients can also ask the Decolabs community of designers for recommendations and creative and original advice for the design of their rooms.

Decolabs was released in May 2012 and has been downloaded 6,000 times since as of February 2013 with most of its users being 25 to 45-year-old women in Europe (<http://mashable.com/2013/02/08/decolabs/>)





Source: <http://www.decolabs.com/>

Problem 2 – The construction of new building or houses required the set-up of complicated and expensive electrical systems. Moreover, people with reduced mobility (disabled and elderly people) may have difficulties walking meters to reach a switch to turn off or put the light on.

Innovative solution 2 – Nicolas Triboulot, Laurent Grapin and Thibault Thomas came up with an innovative and potentially very disruptive product that can bring a solution to each of the problems listed above.

Every week, Nicolas Triboulot proposes an “Innovation Day” to his team within his design company “Quarks Design”. The theme is “Painting”. Once after an intensive brainstorming, they came up with the idea of the ON/OFF paint. This new generation of paint, in conjunction with a special electronic mechanism, can turn an entire wall into a touch-sensitive light switch. It can also be applied as a thin painted strip that runs around the entire perimeter of a room. The ON/OFF paint is composed of natural materials and can be applied to any type of surface: plastic, concrete, wood, and plaster, which can then be covered by different colour paints or even wallpaper without compromising the functionality of the system.

The ON/OFF paint has successfully passed multiple tests and is expected to be available for the public and professionals in the first quarter 2014.

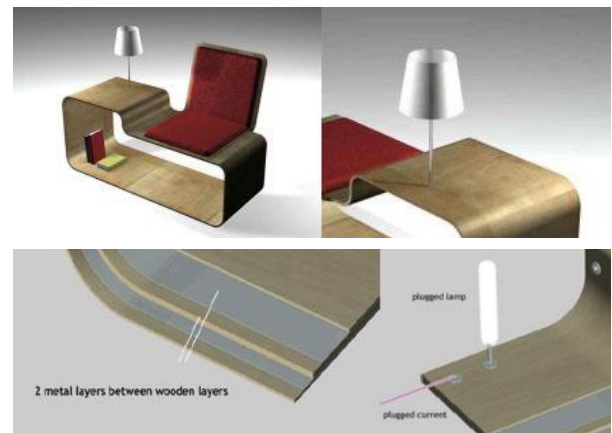


Source: <http://www.peinture-interrupteur-on-off.com/>

Problem 3 – The increased number of electric devices at home leads to the multiplication of cables and electric wires everywhere. As a consequence, home space is becoming cluttered, not aesthetical and even dangerous as people can get their feet caught in it and stumble.

Innovative solution 3 – The industrial designers of Transalpin have created a new composite material named Wood.E and made of pre-formed wooden elements with metal layers so that electrical elements such as lamps can be plugged directly into the wood without any cables. Wood.E is a new plywood-like material, with an electrical current of 12V that allows designing fashionable furniture in which it is possible to plug in appliances with different applications: light, sound and motion are some examples.

Wood.E system offers a large range of design possibilities for home furnishing creating an integrated and cable-free environment.



Source: <http://transalpin.net/>

Problem 4 – In developed countries and especially within big cities, homes surface has significantly decreased. The increase of the urban population, the desire to keep energy costs down, the tighter credit standards for buying home have led to the development of smaller houses

Innovative solution 4 – El Studija has created an innovative furniture collection based on a high-tech approach that aims to maximise efficiency in furniture by making it multifunctional and space-saving for small places. Each Boxetti collection piece of furniture can be folded into itself when not in use in order to get an uncluttered and comfortable space. The collection has been designed based on “three basic design principles: functionality, advanced technologies and contemporary aesthetics of minimalism”.¹⁵ Besides, more than saving space, the Boxetti furniture is an exclusive, high-quality and handmade collection that is constantly improved by the El Studija’s designers.



Boxetti Lunch is a multifunctional kitchen island unit containing all the necessary kitchen equipment.



Source: <http://www.boxetti.com/en/>

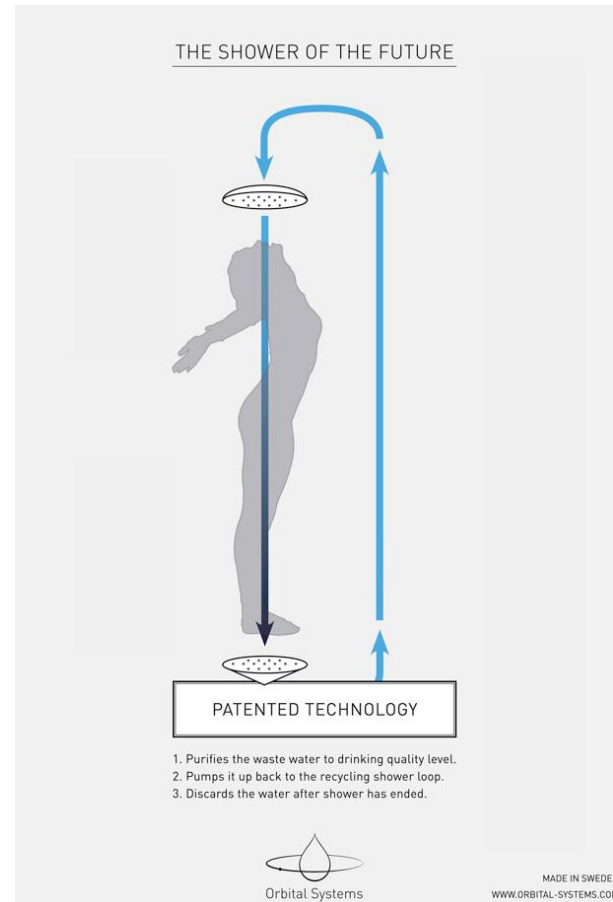
Problem 5 – A trillion litres of water are used every year for showering in the world. For a ten minute shower in a conventional shower, 150 litres of water are used.¹⁶

The number of home appliances has dramatically increased over the last years. As a consequence, energy and water consumption are constantly growing in homes.

Innovative solution 5 – Orbital Systems has created an innovative shower based on a high-tech purification system that recycles water to drinking water standard while the shower is in use without any compromise on water pressure and comfort. The OrbSys Shower is based on a closed loop system: “hot water falls from the tap to the drain and is instantly purified to high-level standard and then pumped back out of the showerhead. As the process is quick, the water remains hot and only needs to be reheated very slightly.”

The concept of a water-saving shower is not new. However, the OrbSys Shower is different and more innovative from the conventional shower and the other existing water saving solutions because it doesn't compromise on comfort: constant water pressure and stable flow are guaranteed.

Mehrdad Mahdjoubi, the inventor of the OrbSys Shower claims that this new patented technology can save more than 90% water consumption, meaning also saving over \$725 a year per household.



Source: <http://orbital-systems.com/technology/>

3.3. The impact of ingenious home products on home-related industries

Driven by new consumer living standards, the increasing demand for ingenious home products has changed the way we conceive and build houses. Innovative design has been integrated within a wide range of home-related sectors such as construction, interior design, furnishings (bedroom, bathroom, kitchen, and living room), lighting, etc. The way to design home structure and home devices is changing to fit to user needs and desires.



The furnishings and construction/architecture industries have been particularly impacted by the emergence of demand for ingenious home products. Home devices have to be smarter, greener and adaptable to the new way of living of consumers. To support this trend, production processes have evolved and new materials and technologies have emerged to provide new functions and services.

For instance, the technology developed by 3.14 Innovations is completely challenging the installation of electrical route and light mechanisms within new buildings. The future use of ON/OFF paint in the construction industry could have a significant impact. This new technology allows for a reduction in costs of electrical installation. Light controlling could become easier, faster and accessible for everyone, included disabled people or people with reduced mobility.

The electrified material developed by Transalpin could transform the furnishings industry. By integrated electricity inside material, furniture can become more practical by integrating new functions such as lighting.

Ingenious home products have applications in a range of different market segments from ecological devices allowing to save energy and natural resources, smart objects designed for optimising space, to products that make home life easier and more secure. This wide range of possible developments to improve daily life at home gives to many entrepreneurs the chance to develop businesses and smart solutions based on their own life experience.

Entrepreneurs motivation and passion for innovative home design, the development of new technologies and advanced materials, have allowed the realisation of the most innovative ideas involving the expertise of designers, engineers, researchers, and entrepreneurs.

Also, the growing client appeal for home smart devices might drive the growth of jobs and new companies in this sector.

3.4. The development of ingenious home products relies on collaborations between designers, entrepreneurs and clients

Ingenious home products and their corresponding markets are quite nascent. Two types of businesses are currently operating in these markets: on one hand, large companies which can afford in-house innovation labs to develop the most innovative home products; and on the other hand, start-ups or spin-off which come up with disruptive innovations having more flexible structure but limited resources at their disposal to bring their products to the market.

Whatever the size of the company, collaboration appears to be a key element of their business models, above all for small companies. Indeed, to develop marketable and successful products, companies are empowered by the creation of partnerships between researchers, designers, design students and entrepreneurs. The combination of multiple experiences and skills appears to be essential for the development of ingenious home products.

The creation of ingenious home products is not only a matter of technology. Designers have become major actors in the creation and innovation processes. Today, design is not only a question of “styling” or creating something purely aesthetic. Design requires a holistic approach involving different types of technical and creative competences. Design turns out to be a competitive factor for companies. Collaborations between designers, engineers and entrepreneurs are becoming essential for the creation of ingenious products that bring innovative solutions to daily life and that fit perfectly into the building.

For instance, From 2006-2011 the National University of Ireland, Galway undertook the development of a New Engineering Building aiming at merging five engineering disciplines previously spread across 13 locations. The delivered new university is a world class example of innovative and sustainable design that was achieved thanks to a co-ordinated and collaborative approach across the whole project. Designers, architects, construction companies worked together and the University's staff, building managers and end-user occupants were also invited to engage with the design process, so that their specific requirements were integrated into the final design. Collaborative working practices such as co-ordinated communications protocols and an electronic document management system were used during the design and construction stage to ensure the latest information was available to relevant individuals.¹⁷

Other example, The Norwegian Thor Heyerdahl School of Advanced and Further Education is one of the largest schools in Norway inaugurated in 2009 by the Vestfold County Council. The construction of the building was managed under an interactive model based on partnership and focusing on the skills that the different actors in the construction project possess and how they can be exploited for the benefit of the project. Architects, designers, construction companies work together to meet end-users requirements. Indeed, the employees of the school appointed a representative who worked full time on the project to ensure that their needs were integrated into project planning. Besides, the interaction model applies a principle of “open book” which means that there should be full disclosure, transparency and access to all documents for all parties. Vestfold County found the interaction model to be successful in encouraging teamwork. The excellent collaboration between the different participants was one of the reasons for the success of the project.¹⁸



The case study companies have mostly been created by designers, collaborating with entrepreneurs and engineers. For example, Nicolas Triboulot, the designer of 3.14 Innovations, has closely collaborated with an SME named SLPV specialised in the production of paints and varnishes.

Further, consumers present an important role within the innovation and creation processes. As ingenious home products have to meet customer requirements and bring concrete solutions to their daily problems at home, it is crucial to collect their opinion. As a consequence, some companies have developed web sharing platforms linked to their products (e.g. Decolabs) or have launched test phases in real-life situations (ex. 3.14 Innovations and Orbital Systems) in order to collect consumer feedback.

Decolabs offers a disruptive innovation that was initially conceived for the client. Each home becomes a showroom and each iPad becomes a large catalog of furniture. From the retailer's and manufacturer's points of view, the Decolabs app is a key source of marketing data. Indeed, the application offers the possibility to:

- **Have access to market intelligence data** on client preferences in terms of colour, texture, material, etc. and even knowing how one object is manipulated and positioned by the client.
- **Pre-launch new products and test their acceptance in the market** before starting production.
- **Get insights** from the discussions that take place within the social and designer communities.

Unlike large companies having significant financial resources, the start-ups described in this case study mostly rely on simple business-to-consumer (B2C) or business-to-business (B2B) business models consisting in responding directly to client orders. For instance, 3.14 Innovations is working in collaboration with real estate companies to directly integrate their technology in the building construction, and retailers for the distribution of the product. El Studija is dealing directly with their clients. On the other hand, Decolabs has developed an original business model to diversify their sources of revenues. Decolabs combines four types of business model including both B2C and Business-to-Business-to-Consumer (B2B2C) models:

- **Decolabs Affiliate Model:** The e-catalogue provides a large range of home objects manufactured by multiple brands. Through the app, clients are able to buy the furniture they have chosen for their interior directly. Brands pay a monthly fee to include their items in the multi-brand catalogue.
- **Whitelabel Model:** Some manufacturers and retailers do not want their products to be included in a multi-brand catalogue and want to be distinctive through their own app. Showrooms are becoming too small to exhibit

all their products. Through the app, the space is unlimited allowing manufacturers and retailers to present all their products providing a very wide choice to their clients. Decolabs adjusts and re-brands the application according to the specifications of the manufacturer for a onetime fee and a monthly fee.

- **Sales Empowerment Model:** For retailers with a showroom, Decolabs offers a tool that empowers sales representatives in the retail environment. With Decolabs for Sales, the sales agent can immediately engage with his potential clients by creating on the spot quick visualisations, understanding their taste and preferences and sending the first ideas already by email. This creates a unique and engaging experience that saves time and facilitates decision making.
- **Real Estate Projects Model:** Apartments can be sold off plan before they are built. Thanks to Decolabs, future owners will have the opportunity to visualise their future interior (based on construction plan) and start their own home design even if the house is not built yet.
- **Open and Independent Designers Platform:** A carefully curated platform powered by Decolabs which makes a bridge between interior designers and furniture designers.

3.5. Client perspectives and challenges for ingenious home products

Nowadays, many people are making efforts to reduce their energy use in their daily life and especially at home. Indeed, an increasing number of individuals are aware of the negative environmental impacts that human activity can have and are willing to act. Some progress has already been made towards reducing consumption, for instance by replacing power-hungry devices such as incandescent light bulbs by fluorescent or LED light sources. Besides, changing the energy-guzzling lifestyle and banning energy-hungry appliances is a hot topic on the political agenda in a growing number of countries.

Despite the willingness of individuals to change their way of life in order to limit their impact on the environment, households have a growing need for energy. Consequently, ingenious home products that help to minimise energy consumption without compromising comfort, appear as an emerging market. These eco-friendly home products represent a significant business opportunity for companies, and interesting solutions for consumer to become aware of their energy use, to reduce their energy bill, and to live in a healthier and sustainable space.

"It's not just about saving water. The motivation is to be smart about how we use our planet's resources." — Orbital Systems



The Orbital Shower Concept (also called “OrbSys Shower”) fits into this context. By saving up to 90% of the water, and 80% of the energy, while increasing comfort and hygiene, the OrbSys Shower enables a comfortable, eco-friendly and economically smart water consumption.

Furthermore, the number of household appliances is increasing as well as multimedia and ICT at home. Many households have more than TV set, PC’s, laptops but also smartphones, tablets and other new media continue their diffusion within home. The adoption of smart devices across Europe is rapid. As a consequence, ingenious home products that will be able to interact with smartphones or tablets are about having huge perspectives of development considering the client’s appeal to be always connected to their smartphones. Considering that, from a client perspective the uptake of the Decolabs application for instance should be easier and faster in the next coming years.

Moreover, today, furniture is not only a matter of comfort, but sophistication and functionality have also become its key elements. Modern furniture pieces are experiencing increased popularity and demand among people. Fashionable home furnishings represent a symbol of modern lifestyle and are considered as a part of the homeowner’s personality.

“Design is a crossing-area combining technology improvement and fashion.”
— **Transalpin**

The furniture industry has been completely transformed by this new way of thinking and living. The need for saving space and optimising comfort within small houses is becoming an important part of client demand. Ingenious solutions that combine sophistication and user-friendly interfaces represent an important client demand that will quickly go up in the next years and especially for certain persons such as elderly and disabled people.

Take the example of Transalpin, El Studija, and 3.14 Innovations. Transalpin and El Studija propose practical and sophisticated furniture with original shapes and styles that allows space saving (e.g. Boxetti furniture by El Studija) and getting rid of unwieldy electrical wiring (e.g. Wood.E solution by Transalpin). Further, 3.14 Innovations is working with Bouygues real estate to explore the integration of the ON/OFF solution directly in new buildings. This innovative product represents an outstanding opportunity to be free from having to route electrical wires everywhere.

However, there are a number of challenges that hinder client’s uptake of ingenious home products. First, an important adoption determinant will be the price of these solutions. Within an economic crisis context, in case of high prices, client’s interest for ingenious home devices is likely to be low. Secondly, the novelty of the innovation may slow down the client’s uptake. Indeed, the market acceptance of the product might be hampered by the client’s reluctance to use a disruptive technology whose reliability has not been proved yet.

4. Drivers and obstacles

The trend of the ingenious home products and solutions is still emerging. There are a number of factors driving the market uptake of these new home products. Indeed, ingenious home products are expected to provide solutions to some of the main societal challenges (ageing population, growing urban populations, smaller living space, etc.).

Besides the trend drivers, there are a number of issues that hinder client uptake of ingenious home products. The client awareness and perception of these products is one of the main obstacles. Indeed, switching user habits by changing traditional systems and objects of their daily home life to disruptive technologies may be difficult.

Further detail on such drivers, as well as obstacles, are provided in this section.

4.1. The emergence of home automation will empower the creation of ingenious home solutions

While automation has already been implemented in commercial buildings for security purposes, automation in private homes is still in its infancy. However, considering some aspects such as energy management, lifestyle & convenience, safety & security, and health monitoring, this may change in the future. Indeed, from client’s point of view, home automation can provide many valuable advantages:

- It can increase comfort, thanks to sophisticated monitoring and temperature control systems;
- It can help the elderly and people with reduced mobility to be independent in their homes, for example by opening/closing windows and doors or switching lights on/off using remote control units;



- It may be also possible to save energy, for instance by automatically switching off appliances when they are not needed or in standby power function.

The ON/OFF paint developed by 3.14 Innovations has excellent development potential considering its utility for the users. Initially conceived for controlling lighting systems, the ON/OFF paint concept is infinitely flexible and can be applied to the control of various other electronic devices such as alarms or blinds. For example, a home safety solution has been developed for a seniors' residence. A strip of ON/OFF paint is placed on the ground to detect any fall and activate the alarm by warning the medical staff. A strip of ON/OFF paint can also be placed in the middle of the wall and running around the entire perimeter of the room to serve as a sensitive light switch for people with reduced mobility.

4.2. New technologies and materials are opening new opportunities for ingenious home products design

This last decade has seen the development of new technologies and advanced materials that have considerably opened the door for the development of intelligent home products. The progress of sciences, technologies and production processes will continue in the next years extending the range of opportunities to bring disruptive innovations to reality through marketable products.

Indeed, new materials are at the core of new designs. Significant jumps in design fields are often associated with significant innovation in technology and/or materials. These latters have completely changed the way to tackle design problems by offering a wider range of possible solutions.

4.3. Lack of consumer awareness might slow the uptake of ingenious home solutions

A key determinant in the success of an ingenious home product is consumer awareness about the product and their willingness to use it. Some clients might be sceptical about the disruptive technology on which the product relies or the novelty of the solutions. For instance, some furniture retailers and manufacturers adopted a "wait-and-see" position before deciding to showcase their products on Decolabs' multi-brand e-catalogue because they were used to have their own single-brand website and were not convinced about the relevance and the success of virtual interior design through augmented reality technology.

Aside from the perceived complexity of some ingenious home products, they are sometimes perceived as being very

costly and reserved for luxury housing. The installation of ingenious home solutions at home can also require calling upon professionals which increases the costs for these solutions. Consequently, the interest of a large part of consumers might be reduced.

Moreover, clients are not always convinced about the efficiency of these new products compared to more conventional ones. For example, saving 5 or 10% energy is not really seen as a significant improvement by clients. As a result, insufficiently tangible benefits may also negatively impact on the consumer's interest in ingenious home products.

Also, there is a need to better promote ingenious home products developed by SMEs to potential client. Indeed, architects and retailers should be more efficient in sponsoring the purchase of these products.

Even if people are becoming more and more used to integrating high-tech solutions in their daily home life, it might take time and education to bring awareness of and interest in ingenious home devices to the forefront of consumers' minds.

4.4. There is a lack of support for small companies within the ingenious home products sector

All the companies described in this case study have experienced significant difficulties in gaining access to finance. Due to the high risk associated with their disruptive innovations, accessing public funds was quite difficult. Despite the participation to design fairs and innovation competitions, attracting investors was quite hard. Consequently, the development of these start-ups was, in the beginning, completely financed by shareholders' equity. For instance, 3.14 innovations has been created with its founder's personal funds and incubated into his design agency: Quarks Design.

The companies included in this case study highlight the difficulty to find support for developing and commercialising their ideas. The two main barriers faced by start-ups are: first, inadequate access to funding, and then insufficient support for intellectual property protection. Besides, the interviewees suggest that the creation of new ingenious home products constitutes a small part of their activity and that their core business consists in providing traditional design services to various industries: jewellery, furniture, home decoration, interior design, and internet (for graphic/web design services particularly), etc.

"The unreadiness of the industry can dramatically slow down the market uptake of the product." — Decolabs

willingness to use it. Some clients might be sceptical about the disruptive technology on which the product relies or the novelty of the solutions. For instance, some

"Designers are coming up with cutting-edge ideas. To transform their ideas into marketable products, designers need visionary and courageous partners who will be able to see the future potential of the product and support its development."

— **Transalpin**



For instance 3.14 Innovations and Transalpin came up with their innovative ideas during special brainstorming sessions organised in parallel to their core activity. The ON/OFF paint, for example, was born during one of the “Innovation Days” organised by the designers’ team of Quarks Design agency. As they have to continue their daily business, companies don’t have time and enough human resources to develop and communicate about their product, and bring it to the market. For example, due to a lack of time and money, the Wood E. technology developed by Transalpin is still in prototype stage and not commercialised yet even though many companies demonstrated real interest. Thus, 3.14 Innovations is thinking of potential buyers to continue the development and commercialisation of their product.

4.5. Crucial need for establishing substantial partnerships

Interviewees indicated that collaborations with larger companies will help them to further develop their products and bring them to the market more quickly. Indeed, all the companies agree that large companies can provide support in terms of finance, marketing, distribution, and communication. Big companies have the capabilities to take

the risk to support them for developing and commercialising their products. Small companies are typically unable to absorb the risk they face when developing disruptive technology/product by their own.

Besides, the companies highlight also that partnerships are an efficient means to reach international markets. Mainly, these start-ups are seeking retailers across Europe and North America to distribute their products. 3.14 Innovations aims to set up collaborations with professional DIY shops to distribute the ON/OFF paint. Based on a licencing agreement, local retailers distribute the product on the local market.

“The creation of innovative home products is not our core business. We are above all designers. Without substantial support and collaborations with bigger companies, it takes a lot of time and energy to bring the product to the market.” — 3.14 Innovations

At the end, collaboration and networking appear to be an important element for the innovation process itself. Indeed, public-private partnerships, especially in the form of Living Labs and Design Labs can particularly boost innovation on ingenious home products.

5. Policy recommendations

Ingenious home products constitute a nascent market that has clearly shown signs of take-off in the last few years. Addressing key consumer and societal challenges, ingenious home products present high growth potential over the coming years. However, the widespread adoption of such technologies remains uncertain and conditional on the removal of some obstacles.

While ingenious home products constitute a cross-sectoral market covering different types of industries (furnishing, appliances, design, etc.) **there is no specific EU legislation** for regulating this sector. Different pieces of EU legislation can however have an impact on the manufacturing of ingenious home products based on their impact on the environment, health, etc.

There is a **lack of substantial support for start-ups particularly in terms of access to finance**. Bank loans are difficult to access for start-ups, which are forced to find private investors who would see the potential of the product, be willing to take on risk and invest in its development. Start-ups do not have the same resources as large firms, which have the necessary means in-house to manage the entire product value chain from conceiving prototype to commercialising the product. Lack of financing may prevent start-ups from continuing the development of a product, keeping them in the prototyping phase. **The existing public**

mechanisms that aim to support entrepreneurship and innovation (e.g incubators, accelerators, chambers of commerce, innovation agencies) are useful but **not efficient** enough due to **a lack of strategic competence and necessary local knowledge to build effective bridges between design agencies and enterprises and public sector organisations that require design-intensive services**. The tools to connect companies and organisations looking for design intensive services across Europe remain under-developed.

Besides, there is a **lack for promoting collaboration between research institutions, design intensive industries and the design sector**. Design is becoming a value creator and a key driver in innovation processes. However, designers don’t proactively take part to innovation policy discussion and are not represented in the making of Europe’s innovation policy.

Furthermore, **designers have significant difficulty to access to finance** for the development and commercialisation of their products. Usually, they end up provide their products to well-known brands that set up unfavourable contractual terms giving to them very low royalties. Means to directly connect designers and clients and potential investors are still missing in Europe.



Finally, **IP procedures tend to be complex, time-consuming and costly for small companies.** Patenting product technologies can be a significant administrative burden, and consequently prevents these companies from entering into new markets. Policy measures to simplify and facilitate IP procedures would help.

The development of ingenious home products could completely change the daily home life of people. Elderly and/or disabled people will be able to maintain a certain degree of autonomy thanks to these innovative products. The implementation of policy measures to support the development of this sector is crucial considering such social challenge. Recommendations to support the development of the sector are provided below.

Administrative procedures required for intellectual property protection and patenting should be simplified. This simplification would be particularly helpful for start-ups by placing a lesser burden on them in terms of time and money. Small businesses in particular should also be helped to better understand the extent to which their innovations can be protected. Also, the standardisation of IP procedures at EU level would definitely help the internationalisation of start-ups within the single market.

Regulatory enforcements could be taken to increase the market uptake of ingenious home products within European households. To handle future societal challenges, ingenious solutions are becoming necessary to control and optimise the home space. In order to fulfil these commitments, governments could set up public demonstrators (ex: show apartment) to showcase the value of the ingenious home products.

Moreover, **European and national subsidy programmes** could be tailored to support European and national projects involving large companies, start-ups, innovators and designers to share competences and experience with the aim to develop new ingenious home products.

Today, the role of design as a user-centred driver of innovation is not sufficiently recognised in the EU's R&D and Innovation programmes. In order to support the dissemination of design-based innovations developed by SMEs, the **development of European technology and innovation centres offering design services to industry and the public sector** would be an effective channel. These centres would provide opportunities for

citizen-business-public partnerships to explore the potential of design in developing user-centred innovation.

Furthermore, particular attention should be paid to **design students** who represent an important source of innovative ideas for home products. **Policy measures could be taken to encourage companies to involve students in the creation and innovation process during their studies.** Electrolux is a good example of such initiative through its Electrolux Designlab.¹⁹ This is a competition inviting creative design students around the world to show their innovation skills through the creation of an ingenious home product prototype under a defined theme. The winner receives a cash prize and a six-month paid internship at an Electrolux global design centre. The theme of the 2014 competition is "Create the future of healthy homes". By supporting this kind of initiative at SMEs level, policy makers could bolster the training of future designers and stimulate at the same time entrepreneurship in the student population.

Finally, **policy makers should also facilitate access to finance for designers to bring innovative ideas into the marketplace.** This can be facilitated by supporting initiatives and partnerships around ingenious home product through, for example, the organisation of international fairs gathering designers and investors, but also through original funding systems such as the crowd funding. **The development of crowd funding platforms would help designers find funding for their products.** Indeed, young designers are usually generating innovative products for well-known brands while getting back insignificant royalties due to unfavourable contractual terms.

The **crowd funding platforms could be the direct link between designers and clients.** For instance, CrowdyHouse is a platform combining crowd funding and retail. It offers to designers the opportunity to self-produce their work and allows consumers to buy directly the products (ranging in price between EUR 65-3000) in a transparent and fair manner. A minimum order number has to be reached before the designer begins to manufacture the product and distribute it to investors. Details about the designers and the story behind the products, how the funds will be used, and the progress of funding and product development are described on the website. CrowdyHouse has been launched during the Dutch Design Week, October 21st 2013, in Eindhoven.²⁰



6. Appendix

6.1. Interviews

Company	Interviewee	Position
Decolabs	Gabriela Aguirrezabal	Business Development Manager
3.14 Innovations	Nicolas Triboulot	CEO/Founder
El Studija	Rolands Landsbergs	CEO/Founder
Transalpin	Reinhard Zetsche	CEO/Founder

6.2. Company websites

Decolabs	www.decolabs.com
3.14 Innovations	www.peinture-interrupteur-on-off.com
El Studija	www.elstudija.lv
Transalpin	www.transalpin.net
Orbital Systems	www.orbital-systems.com

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- ¹⁴ Small Business Trends, 2013, "Habits of Online Shoppers That You Should Know" Available at: <http://smallbiztrends.com/2013/10/consumer-shopping-habits-online.html>



¹⁵ Boxetti company web site : <http://www.boxetti.com/en/>

¹⁶ CNN web site, 2013, “Futuristic water-recycling shower cuts bills by over \$1,000”, Available at:
<http://edition.cnn.com/2013/11/11/tech/innovation/futuristic-water-recycling-shower-orbsys/>

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¹⁸ Procuring innovative and sustainable construction solutions, European Public authority snapshots, Available at:
http://www.sci-network.eu/fileadmin/templates/sci-network/files/Resource_Centre/Guide/SCI-Network-Snapshots-www.pdf

¹⁹ Electrolux Global Design Centre web site : <http://electroluxdesignlab.com/en/>

²⁰ Dezeen Magazine, 2013, <http://www.dezeen.com/2013/10/18/crowdyhouse-crowdfunding-platform-for-designers-launches/>