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# Smart Living

Connected devices for intelligent homes

Business Innovation Observatory  
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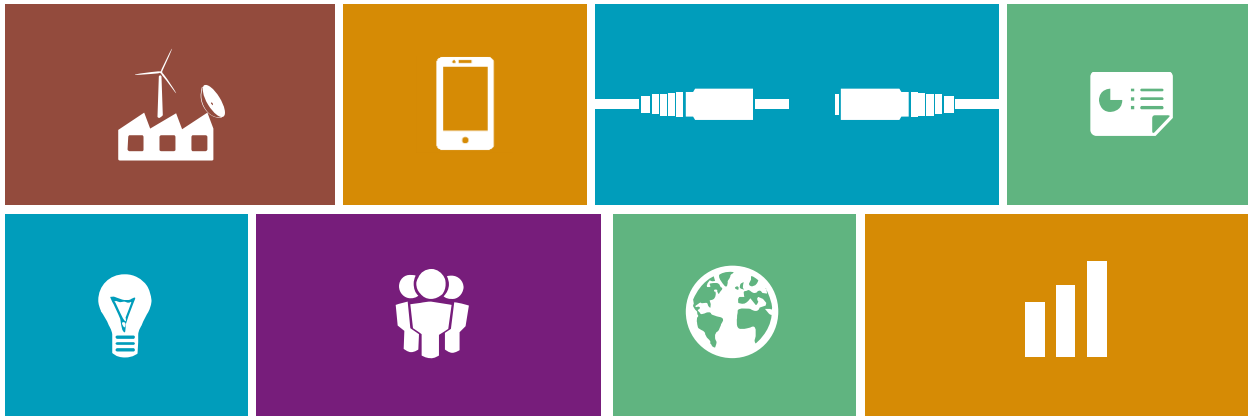
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# 1. Executive summary

The Internet of Things (IoT) seems like something out of a science-fiction movie but it is set to radically change our way of life by connecting every device we interact with. It is the next major step in the development of computing technology, and especially the Internet. Connected devices are a combination of sensors, actuators, distributed computing power, wireless communication on the hardware side interacting with applications, and big data on the software side. This enables a wide variety of devices to understand their environment and act accordingly.

Today, it is possible to install the necessary hardware in all kinds of products, physical (light bulbs) and even living organisms (plants monitoring). With the rise of connected devices, our homes are transformed into data generators with the objective to improve our lives. The new data unlock great opportunities that many visionary entrepreneurs are seizing. A new wave of SMEs is already emerging, some of which are showcased in this case study.

The potential market for connected devices is tremendous. The number of units is expected to reach tens of billions with estimates averaging around 50 billion. This is only for the hardware part of the IoT. As underlined by the success of search engines and social networks, the data also represent a potential goldmine. Yet, business models to leverage them are still undefined.

Plenty of drivers explain the recent emergence of connected devices, such as technology. Moore's Law on the doubling of transistor densities on integrated circuits every two years

still applies. This allows the size of connected devices to keep shrinking, their power to increase and their prices to decrease. Further drivers include the quality of the available workforce. For example, the opportunity to collaborate with technical university is an asset for European start-ups as it provides skilled labour.

Although a driver, technology sometimes impedes the emergence of the Internet of Things. One of the main obstacles for a full adoption of connected devices is a lack of standards. As long as there are no predominant standards, connected devices will not convince common users, aside from tech-savvy early adopters. To achieve maturity, the creation of a stable market with compatible protocols is needed. Moreover, a smooth transition from IPv4 toward IPv6 is critical for the spread of the connected devices. Additional barriers are data related. End-users' apprehensions about privacy and security will decide upon the success of connected devices. Further, the access to finance was found to be a recurrent issue for our companies. Indeed the combination of hardware and software proposed by the showcased companies, repelled most investors.

Finally, Europe has multiple ways to encourage the full emergence of connected devices. By supporting the implementation of standards, Europe would help the sector to get stronger. Besides, the Internet of Things is a field where all companies are born global. Internationalisation is a key success factor for each of them. Hence, strong European support is needed to maximise opportunities for our innovators.

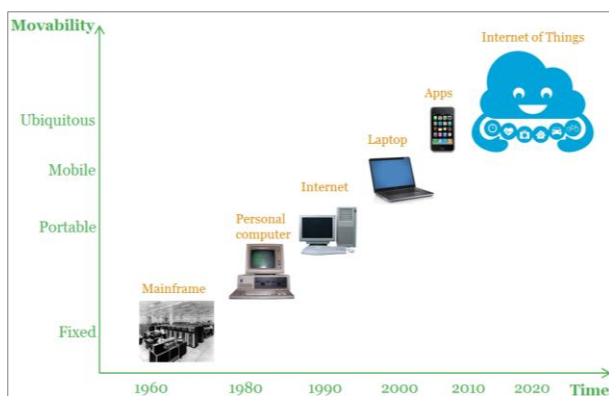


## 2. Connected devices for intelligent homes

The word “Revolution” is often improperly used. However, when speaking about connected devices for intelligent homes, the potential impact of the trend on our daily lives is so significant, that revolution is undoubtedly the proper word.

Connected devices should be considered as part of the Internet of Things trend, which is driving the user towards a new age of computing technology. As shown in Figure 1, previous technologies required the user to go to the device (fixed computing era), then multiple periods of increased mobility followed, in which the several devices had to follow the users. Now, we finally reach the ubiquitous state: the functions performed by devices are spread throughout the living ecosystem, and are available to provide the user with a wide panel of tailored services.

**Figure 1: Timeline of the computing technology steps**



Source: PwC Analysis

Connected devices for intelligent homes are the first wave of the development of the Internet of Things. According to Ericsson<sup>1</sup>, the IoT is developing in three main waves:

- Networked consumer electronics: the introduction of connected devices in basic electronics (smartphones, tablets, TVs)
- Networked industries: the adoption of connected devices by businesses to increase productivity, cost-efficiency, monitoring and control of assets
- Networked society: the wide adoption of connected devices by individual consumers in every object of their daily life to achieve sustainability, safety and cost-reduction

The rise of networked consumer electronics is what has made intelligent homes possible. This is a concept that enhances the users' lifestyle by increasing their convenience. Intelligent homes are also safer and more sustainable, as

they allow for more monitoring and control. The next wave consists of networked industries, and focuses on improving efficiency of companies. The third and last wave serves to network every object to improve the efficiency of the devices operated by users.

The revolution brought in by connected devices is gradually taking place: information systems are deployed, and some can even work independently from human intervention. The business community is embracing the new offered possibilities to operate more efficiently and to introduce IoT-based products and services. Early adopters show strong signs of enthusiasm and support toward the pioneering products. The highly reviewed Nest Thermostat is already selling at an impressive rate of 40,000 to 50,000 units per month.<sup>2</sup> Within five days after launch, pre-orders of Lockitron, a keyless lock, reached a stunning \$ 1.5 m (€ 1.10 m) in revenues<sup>3</sup>. These two products are only the tip of an ever-growing iceberg.

Such innovative devices were long awaited and expected. In fact, even the term “Internet of Things” is twenty years old. It was allegedly invented fifteen years ago by Kevin Ashton for a Procter & Gamble presentation, which linked the use of Radio-frequency identification (RFID) in P&G's supply chain to the Internet<sup>4</sup>. However, our imagination progressed faster than our capabilities. Up to now, the technological limitations were too hard to overcome. For example, the ability to reduce the size of hardware was attained only recently. It is this hardware size reduction that permitted the integration of the sensors into almost any device. The barriers and challenges presented by the transfer of data is another reason which hindered the development of the IoT. Data can now be transmitted to a local hub (router, smartphone, tablet, box) or straight to the cloud. They can travel through multiple means: radio whitespace, mobile networks (3G, LTE, 4G), Near-Field Communication (NFC), RFID, Wi-Fi, and the latest Bluetooth Smart.

Finally, the role of the cloud and big data in the rise of the IoT is also critical. The cloud can cope with the pace and volume of the generated data. It also has the capability to adapt according to the demand, while staying reachable anywhere from any connected device. Big data is not limited to the data size: it is a way to discover insights and opportunities.<sup>5</sup> Recent progress in big data analysis provides cost-effective opportunities to improve decision-making.<sup>6</sup>

There are currently six main types of new applications that are categorized in two IoT large sub-trends: information and analysis, and automation and control (Table 1 on page 4)<sup>7</sup>

**Table 1: Categorisation of the main IoT trends**

Trends	Applications	Definition
<b>Information and analysis</b>	Tracking behaviour	Monitor the behaviour of persons and things through time and space
	Situational awareness	Real time awareness of environment
	Sensor-driven decision analytics	Decision making based on data visualisation

<b>Automation and control</b>	Process optimization	Improve process in closed systems
	Resource consumption	Optimize the use of resources
	Complex autonomous systems	Automated control in open systems

## 3. Socio-Economic Relevance

According to Cisco, 99.4% of “things” are still not connected. The number of devices that could potentially be connected worldwide is estimated at around 1.5 trillion. So, it means that almost 10 billion devices are currently connected, which is an average of 200 connectable devices per person.<sup>8</sup> The most popular ones are smartphones, tablets and TVs. Nonetheless, at the moment, only a limited number has already entered our homes. This is what our showcased companies try to remedy.

### 3.1. The market potential of the trend

The potential market of the Internet of Things is much bigger than the billions of mobile internet devices. In terms of units, it could potentially reach the 1.5 trillion devices around the

world. But in this fast evolving market, where new technology blossoms each day, it is difficult to determine a precise figure. Yet, everyone agrees to expect a market of tens of billions of devices. The latest estimation for 2020 ranges between 30 billion for ABI Research<sup>9</sup>, 50 billion for Ericsson<sup>10</sup> and even 75 billion for Morgan Stanley<sup>11</sup>.

Focusing on intelligent homes, these will contain multiple and diverse connected devices such as appliances, sensors, and displays. The connected devices will concern a range of fields, from automation to security to medical monitoring. The size of the market is also tremendous. For example, there are currently 1 billion electricity meters in the world, which corresponds already to a potential market of 1 billion connected devices.

**Table 2: Overview of the company cases referred to in this case study**

Company	Location	Business innovation	Signals of success
CubeSensors	Slovenia	Wireless Cubes that continuously measure temperature, humidity, noise, light, air quality and barometric pressure for every room with its dedicated app	<ul style="list-style-type: none"> <li>- Winner of TechCrunch Hardware Battlefield at CES 2014</li> <li>- Winner of Launch Festival Hardware award</li> <li>- Extensive international media coverage</li> <li>- Invited to major trade show</li> </ul>
GreenWave Reality	Denmark	Smart Home Services solution that includes Connected Lighting, Home Automation and Media-enabled Home Management services	<ul style="list-style-type: none"> <li>- Winner of “Nobel Sustainability® Supported Clean Tech Company 2013” award</li> <li>- Close \$ 19 m (€ 14 m )Series B</li> <li>- Partnership with E-ON</li> </ul>
Green Momit	Spain	Smart thermostat with a solution based on a Software as a Service (SaaS) for the control and management the energy consumption	<ul style="list-style-type: none"> <li>- Large media coverage,</li> <li>- Finalist of LeWeb 2012 conference</li> <li>- Distribution agreement with major players such as Telefonica, Sauter</li> </ul>
Koubachi	Switzerland	Wi-Fi plant sensor with an app for taking care of plants.	<ul style="list-style-type: none"> <li>- Venture funding</li> <li>- Swiss government grants</li> <li>- Multiple awards (Red Dot Design, App of the Year, Finalist of T3 award)</li> </ul>



## 3.2. New technologies drive connected devices innovative solutions

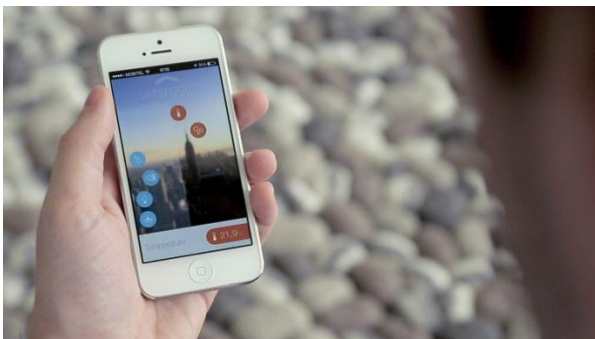
**Problem 1** – People spend 90% of their time indoors. Except for the temperature, they know nothing about their indoor environment.

*Innovative solution 1* – The need to manufacture products for monitoring environmental parameters such as air quality, noise, and humidity pushed CubeSensors to create a full-of-sensors device. This can assess the air quality according to different parameters, while continuously sending data to the cloud. The data are accessible online via an app on smart phones, tablets or browsers. When installed, the Cubes create a mesh network. They communicate to one another and relay the data gathered using the ZigBee protocol. Zigbee is a set of wireless protocols used for data transfer, using low-power wireless sensors. CubeSensors help users to understand their environment and thereby provide tips on how to improve it. For example, the settings for an office differ from the ones for a home and likewise, the settings for a bedroom are also not the same as the ones for a living room.

*The Cube can now proudly glow in the dark when the environment is healthy*



*Data from the Cubes are accessible from everywhere thanks to an app.*



Source: CubeSensors<sup>12</sup>

**Problem 2** – Energy efficiency is enhanced when all devices work together. Hence, there is a need to monitor and control all the connected devices in a single cloud-based platform

*Innovative solution 2* – The lack of an universal solution provided an opportunity for GreenWave Reality to propose an end-to-end solution called Home2Cloud. On the one side, end-consumers can connect every smart device in their intelligent homes to the cloud. The scope of connectable devices includes smartphones, TVs, routers, and smart appliances enabling them to access rich cloud based applications and services. On the other side, GreenWave Reality's clients (service providers, utility partners) have a better control and monitoring of the real-time consumption, which allows them to anticipate the peaks and lows. The added-value for the end-users is an enhanced home experience with tangible information, more comfort and energy savings. All this information is also accessible and manageable on the cloud provided by GreenWave Reality to enjoy smarter, healthier and more efficient lives.

*Illustration of the Home2Cloud Platform*



Source: GreenWave Reality<sup>13</sup>

**Problem 3** – Mankind is currently exploring any possible means to optimise energy efficiency. As heating covers a large part of our energy consumption, the need for a smart thermostat is an obvious priority.

*Innovative solution 3* – North America has launched the Nest Thermostat, an undeniable hit. Until recently, Europe had no similar product. GreenMomit has now addressed this market gap by introducing a smart, fancy thermostat. Connected via the Wi-Fi, the thermostat is of course controllable via an app and a Software as a service (SaaS) platform. An average end-user can expect to save up to 20% of their energy consumption. User's habits are registered and algorithms allow providing inputs based on that knowledge. Even though the user can control it at any time, the Momit Smart Thermostat will self-program to reflect its owner's daily routine.





An installed Momit Smart Thermostat with its 3.5 inch touchscreen



Source: GreenMomit<sup>14</sup>

**Problem 4** – Each plant has its own specific features and requires personalised care. Yet, it would be too time consuming to follow closely the needs of each plants.

*Innovative solution 4* – Everyone enjoys the pleasure of having flowers at home. Koubachi has understood that maintaining them can be a hassle. So, the company developed a solution, which combines hardware and an app. The hardware is full of sensors to determine the vitality and needs of the plant. It communicates wirelessly through Wi-Fi to feed the app with information (moisture, light and temperature) about the plant.

The end-user does not need to worry about his plants' needs anymore. He is notified about these by the app. Thanks to these notifications, the level of care given to plants can be greatly improved, even up to the standards of a professional gardener.

*Koubachi's sensors measure many parameters to determine the health of the plant*

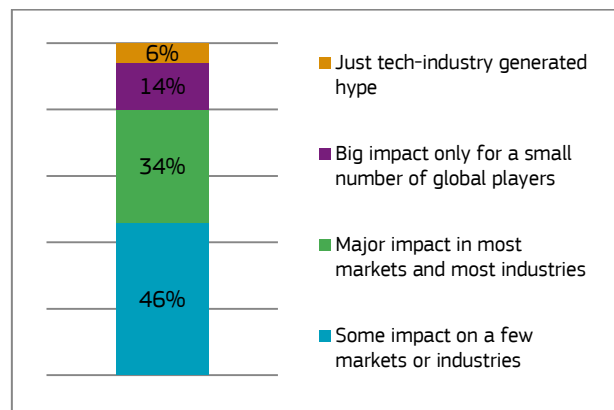


Source: Koubachi<sup>15</sup>

### 3.3. The creation of new markets and jobs

The emergence of connected devices is already having an impact in many fields. As shown in a survey by the Economist<sup>1</sup> (Figure 2), a lot of the expectations of the Internet of Things concern the creation of new markets. 96% of respondents expect their business to be using the IoT in some respect within the three next years. They also agreed (61%) that companies which fail to cope with the IoT revolution will inevitably lag behind their competitors. Hence, for a majority of business leaders, the question is not if but when and how early they should dive in the connected devices.

**Figure 2: What impact is the IoT likely to have on business over the next three years?**



Source: The Economist Intelligence Unit, 2013

When asked about the specifics of the impact, the leaders identified multiple opportunities. As expected, the most obvious ones are the new markets and services. Yet, nearly a quarter of the respondents expect their business model or strategy to be affected. According to 16%, they will enter new markets or industries (Figure 3 on page 7).

CubeSensors started as a group of acquaintances sharing a common goal. Today, the company has already created 5 direct jobs. Moreover, CubeSensors is strongly attached to Slovenia and tries to stick with local suppliers: "We did everything here in Slovenia". Faced with the feebleness of investors, CubeSensors decided to test the market for their product. The company quickly sold out the first batch of Cubes announced for summer 2013. With limited marketing effort, it proved to the company that there is a market and a strong demand for such products.<sup>16</sup>

*"It really helps when you are a 15 minutes' drive from production lines, prototyping shops and everything you need" – CubeSensors*

<sup>1</sup> The Economist conducted a survey about the current and future use of the IoT. 779 senior business leaders worldwide participated in June 2013.





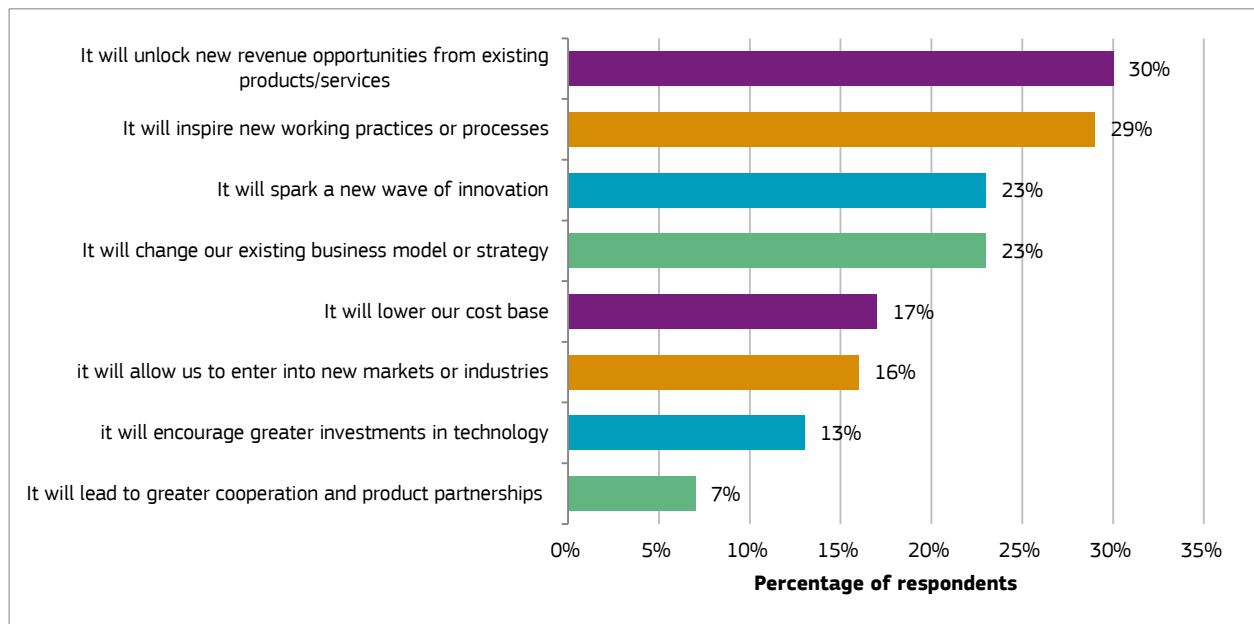
In the next five years, IMS Research estimates that shipment of connected devices for intelligent homes will reach a huge 400 million devices<sup>17</sup>. So, it was no surprise that GreenMomit had also to deal with high sales numbers. Within its first week on the market, the Momit Smart Thermostat had sold over 100 units. A recent agreement to appoint Sauter as distributor in Spain and Portugal is likely to provide orders for at least half a million euro.<sup>18</sup> Moreover, the company is also preparing to widen its range with new products in the coming months. To achieve such a growth, the team of 16 is expected to more than double by the end of 2014.

GreenWave Reality also closed deals with major retailers. For example, an agreement with The Home Depot, the largest home improvement retailer in the United States, will impact the sales of connected lighting. Moreover, thanks to its scalability, the GreenWave Reality software is sold to major Telco and utilities companies, such as the German E.ON. The progression of the number of jobs created has also been tremendous. Founded in December 2008 in Copenhagen, the company already gathered a team of 20 employees by the following summer in 2009. Less than five years later, the workforce reached a staggering milestone of 150 and job creations are expected to continue at the same pace.

Koubachi is also currently undergoing a recruiting period and is particularly looking for engineers. To cope with its international expansion, around five new employees will extend the workforce to amount to nearly twenty. The company estimates to have sold a 100,000 Plant Sensors since its foundation. This rising numbers of sold Plant Sensor lead to the creation of indirect jobs, in the production and logistic side of operations. And Koubachi also plans to expand its range of products to achieve a smart garden. Better irrigation is the new focus of the R&D with a soon-to-come smart sprinkler.

Gathering, analysing and distributing the newly generated data is the next step in the development of the IoT. It will allow for the transformation of these data into knowledge. And some of the showcased companies are already taking it into consideration for their future development, such as GreenWave Reality or GreenMomit. Connected devices for intelligent homes are thus a clear driving force in the creation of jobs and markets. As shown in Figure 3 Internet of Things as a whole could be a game changer for many industries in the near future.

**Figure 3: How will the IoT change the way your company operates? (% of respondents)**



Source: The Economist Intelligence Unit



### 3.4. Client perspectives and challenges related to the uptake of connected devices

One of the main elements for the uptake of the connected devices is the rising importance of design. The showcased companies have identified the need for a nicely designed product as a requirement from the end-user. As the devices will likely be visible in the homes, they have to be pleasing to the eyes. This concern led CubeSensors to push the boundaries of plastic: the design of the Cube needed a plastic transparent only in one direction. The first reaction of the company's plastic suppliers was to deem this as mission impossible. However, with enough persuasion, the Cube proudly glow in the dark when shaken. At GreenMomit, the design is emphasised by the large touchscreen of the thermostat. The means of display is revolutionary, as well as the content. The attention to details drove GreenMomit to allow a high level personalisation of the display. The client can choose if they want to display information with numbers

*"In order for people to adopt it, we needed it to have a beautiful design" –  
CubeSensors*

(e.g. "20") or words (e.g. "twenty"). The race for a nice design is spreading among a lot of IoT companies. For example, Netatmo is a French company specialised in weather stations. Their latest product was designed by Philippe Starck, one of the most famous product and interior designers<sup>19</sup>. He combined an E-ink screen with a minimal device. The idea of customisation is also introduced with interchangeable films used to colour the transparent edges of the devices.

Another common driver for all the connected devices is that their final objective is to improve the quality of life of their end-users. CubeSensors' monitoring enables the user to improve the quality of their environment, and thus enhance their comfort. Koubachi gives a voice to a user's plants. Both applications let the user free up his mind, but still they manage to have a significant impact on his life. GreenMomit and GreenWave Reality focus on saving money thanks to more efficient energy management. These themes fall both under the umbrella of the 'energy efficiency' topic, which is on top of the agenda of both policy makers and users. The general public is already receptive and culturally aware to such arguments, which will drive faster adoption.

## 4. Drivers and obstacles

Technology is a strong enabler of connected devices. Yet, it has not reached a high level of maturity and it is still pretty much at an experimental phase. So, at the same time, technology enables the development of connected devices and also hinders it. The same applies to the Human Resources and related skills which are perceived to be conducive to the development and adoption of the IoT. The quality of education and of the workforce in Europe has a positive effect on the development of European companies. Yet, talent recruitment and retention is still seen as tough challenge for many SMEs.

### 4.1. Adoption slowed by lack of standards

Nowadays, technological progress is both a blessing and a burden for the development of connected devices. Without recent advances, the trend would have never existed. The sensors and actuators in the devices are linked to the Internet and often communicate using the Internet Protocol (IP). To be able to communicate, each connected devices need an IP address. The previous version of the IP addresses, called IPv4, allowed about 4.3 billion IP addresses. It limited the number of connected devices to 4.3 billion and the number of available addresses was running out. The risk was to not be able to connect any new devices. Hence, a new version (IPv6) was launched in June 2012, which allowed

about  $3.4 \times 10^{38}$  addresses. This number equates to 340 trillion trillion trillion, that is that is 340,282,366,920,938,463,463,374,607,431,770,000,000 addresses. This number permits virtually every device to be connected. But, the transition toward the IPv6 remains slow, as the migration rate is reaching around 25% in Europe.<sup>20</sup>

Apart from the IPv6, another main technological issue hinders the growth of connected devices: the lack of standards and open protocol. For devices to communicate, there are currently multiple coexisting bandwidth standards such as ZigBee, Wi-Fi, Bluetooth Smart, radio whitespace. Closed systems are dominating the market, and they wall the users. Some of the larger companies start to cooperate to finally introduce a standard, as widespread practices and protocols will benefit everyone. For example, Samsung and HTC will implement Zigbee (a home automation protocol, used by CubeSensors) in their future phones<sup>21</sup>.

The importance of this consistency across the industry is also underlined by the creation of the Global Standards Initiative on Internet of Things (IoT-GSI). It promotes a unified approach in telecommunication standardisation for the development of technical standards.<sup>22</sup> The less user-friendly the products will be, the fewer customers will want to use it. With open standards, data would be simpler to share. And once the Internet of Things is as easy as an app, the adoption rate will see a boost of its adoption.



## 4.2. Quality of the available workforce

The quality of the available workforce is a topic that rose multiple times in our interviews with the showcased companies. For example, Koubachi and GreenWave Reality stressed the good relations they shared with universities. Universities provide skilled and affordable workforce that can grow along with the companies. Hence, the co-founder of GreenWave Reality shared this passionate appeal: *“If you are a technology company, work closely with a technical institute and university!”*. The commitment of GreenWave Reality is underlined with the partnership between the company and Swinburne University, signed in 2011.<sup>23</sup>

*“We have a lot of ties still to the Swiss Federal Institute of Technology Zurich, being one of the best University in this field” – Koubachi*

However, a major problem for GreenWave Reality and GreenMomit has been finding subject matter experts. The Spanish company insisted that the impact of recruitment differ for a start-up and a major player. When both companies are subjected to the same taxes, the relative cost is much higher for a start-up.

*“When someone is rapidly integrated, then the whole family feels at home and wants to stay” – GreenWave Reality*

Moreover, a wrong recruitment can greatly endanger the survival of the start-up, whereas this risk is diluted for a bigger company. Hence, the risks are much higher for start-ups, which can explain their reluctance to hire. GreenWave Reality also touched upon another challenge the company has been facing regularly. After having successfully recruited talents, the trouble has been retaining them. GreenWave Reality shared a specific situation that the company had to deal with on multiple occasions. Even though both the company and the talent enjoyed working together, their collaboration ended. The reason has to be found outside the company. When an international talent is brought in, the talent or the spouse sometimes has an issue of integration into a new culture. So, after a while problem arises, and often the less harmful solution for the talent is to quit and join a new cultural ecosystem which is more tailored to the needs of the whole family. When this occurs, it is a significant loss that slows down the company.

## 4.3. Data issues: privacy and security

The data is both a huge driver but also a source of concern for the connected devices. Firstly, the recent expansion of the cloud along with the new capability to analyse big data has enabled companies to create value from connections. By analysing data, it is now possible to gather information that creates knowledge. This knowledge represents a huge driver of the IoT; this value is tremendous, as it could potentially improve every aspect of our lives.

However, while a connected world leads to new opportunities, it is also related to new risks. Privacy on social media, tracking scandals on smartphones or data extraction from email are just some of the heated debates that have emerged recently. These are the precursor of the next generation of IoT debates. The privacy talks are likely to raise awareness of everyday users on the issue, even though many users are willing to allow the data be used to improve their well-being. For example, a better outlook on future energy consumption would drive the price down. Yet, with a little more thinking, difficult questions arise. Who owns the data? Who will keep it?

Obviously, not all data share the same sensitivity: Koubachi's plants data are less sensible than health monitoring data. What if an insurance company learns that the CubeSensors repeatedly told the user, who is also the policy-holder, about its unhealthy environment? Such sensitive data must be treated with the utmost privacy, as they can tell a lot about the end-user. Hence, securing the data must be a top priority.

## 4.4. Access to finance

Insufficient access to funding for entrepreneurial ventures is a recurring barrier to more success stories in Europe. Even though it is a known problem, the showcased companies had a lot to share on the topic. With offices in the United States, in Asia and Europe, GreenWave Reality offered an invaluable insight on the business climate in different parts of the world. For example, the company felt that when raising capital in the US, especially in Silicon Valley, the focus is more on the quality of team. The same diagnosis applies to Asia, where the company found its early funding. The team of serial entrepreneurs with proven track records and successful experiences was one of the reasons for achieving this first funding. It was only four years later after having cumulated successes that it became easier to get funding from both public and private sources. The company finally managed to raise a total of \$ 31 m (€ 23 m) in series A and B funding.<sup>24</sup>

*“Even though you have a track record, it is virtually impossible to get funding. And if you get something, you get a € 100,000 or € 200,000, which is nearly nothing compared to the scale of the investment you'd actually need.” – GreenWave Reality*

CubeSensors was also created by experienced entrepreneurs, who were aware of the hardships of fundraising. However, they did not expect that producing hardware would make it so much more complex. CubeSensors' CEO founded previously software companies such as Zemanta, DeckReport, Friedworks. He felt that investors were reluctant to invest in anything with hardware. Working capital, supply chains are issues inherent to hardware.

*“We talked to probably 40 investors and yes, our Slovenian origin doesn't help in fundraising either” – CubeSensors*



However, designing hardware is a strong barrier to entry and is easier to defend. Hence, some investors will see it as a better investment. This type of investors is the one that CubeSensors targeted, even though they are not the most common. Koubachi faced the exact same problem, as the

company proposes hardware as well as software, a combination that the co-founder deemed “unusual” in Europe compared to the Silicon Valley. For Koubachi, being on the Business-to-Consumer (B2C) market also thwarted the investors, who are culturally reluctant to such venture.

## 5. Policy recommendations

A survey by the Economist<sup>2</sup> has indicated that 58% of business leaders would appreciate if the government got involved in developing and promoting the adoption of IoT. In the interviews, we faced a similar response with companies expecting regulations (such as GreenMomit and Koubachi on standards), whereas others were less enthusiastic (GreenWave believed the industry could achieve it alone).

### 5.1. Implementation of regulations

Some regulations have already been introduced. Generally speaking, regulations can play a role to push a product, or to pull the demand for a product. For connected devices for intelligent homes, the regulatory push partially already exists. For example, in the context of Europe 2020, the EU is targeting the installation of smart utility meters in 80% of homes. The smart meters will become a driver for intelligent homes, as well as for smart grids.

What is now lacking are measures supporting the market pull. The EU could particularly play a key role in defining the standards for the industry. According to Koubachi, regulations would help in many ways. For example, they would facilitate the chosen technology to sink its costs and get embraced more quickly across the industry. By implementing a standard, the EU would also enable synchronisation and collaboration between devices and companies through a co-opeting more than a competitive approach, which would provide a strong added-value to the customer.

Finally, regulations about the privacy and the security of data will play a critical role. This will soon become an urgent matter, since the first connected devices are entering our homes. In France, where the smart meter Linky is deployed, no relevant regulation is implemented yet. Only in late January 2013, some recommendations were provided by the Commission nationale de l'informatique et des libertés (CNIL), an administrative regulatory body whose mission is to ensure data privacy. Understanding a new industry based on connectedness and on data collection is a tough task, especially considering that there is not necessarily a business model.

<sup>2</sup> Op. cit.

### 5.2. The need for incentives

Three types of incentives should be taken into consideration. Two would target companies whereas the third would target end-users. Incentives for companies could be covering two main areas. The first type is directly linked to the regulation. After establishing standards, incentives would help push their implementation across the industry. By avoiding closed systems, competition would be fostered, and benefits would also hit the end-users.

Secondly, SMEs could greatly benefit from tax schemes. The costs of recruiting are often too high for a start-up. Even if the company is willing to recruit more, the risks may be too high. Hence, our showcased companies had a recurring plea asking for a tax rebate. According to GreenWave Reality, tax advantages linked to human resources could prove to be even more efficient than funding provided by some EU schemes.

Thirdly, many of the connected devices arriving on the market focus on energy efficiency. To help the emergence of such solutions, GreenWave Reality suggested introducing the idea of deduction, subsidies or incentives for the acquisition of such devices. Obviously, the company underlined that the product needed to have a proven efficiency. Such subsidies already exist for solar panel. Yet, is it still relevant today to subsidise solar panels? For the EU to make the most out of these costly subsidies, the company also argued that multiple products should be compared to ensure the best return on investment of the public funding. Such an initiative would definitely help raise awareness of the potential of the connected devices.

*“EU should make sure that the ROI of their incentives is as high as possible” – GreenWave Reality*

### 5.3. Help for internationalisation

The companies introduced in this case study share a common feature: they are all born global. They aimed at an international market right from their creation. Whether they use a wholesaler (such as GreenWave Reality with HomeDepot, or GreenMomit with Sauter), or direct selling (like CubeSensors), international expansion is part of the

*“For us it is really important to have the information in real-time” – GreenMomit*



companies' DNA. But, internationalising a company is very expensive. Both GreenWave Reality and GreenMomit had to raise more capital to fund their global expansion. None of the showcased companies drew on European initiatives to help them, because of the gaps between their expectations and the proposed expertise and funds. For example, GreenMomit emphasised the importance of having feedback in real-time.

Further, the Plant Sensor from Koubachi is a physical object that needs to go through electronic testing for each market. Europe is quite unified on this testing but international markets can be a real burden for start-ups. In Asia, a certification is needed to get access to each country. Koubachi evaluated the cost of certification around €10,000 per country, which is a significant investment for a start-up. The European Union could play a role to break these issues, which could be assimilated to trade barriers.

The European Union can also still improve its business environment. CubeSensors and Koubachi both explained their hardships with European value added tax. As companies are tax collectors, they have to cope with an increasing compliance burden. A single rate across all the Member States would be welcomed, but this may only be a potential long term objective. Short term objectives would rather focus on simplifying the number of exemptions, special cases and national specifications.

## 5.4. Improve support and communication of EU initiatives

During the interview, it appeared that many companies were oblivious of EU initiatives. Most of them did not seek any support through these initiatives, even if they would have been interested. Looking for national support was a common approach for Koubachi (with VentureLab) or GreenMomit (with Enesa). Yet, none of them was aware of relevant support schemes, such as the Enterprise Europe Network. So, it is important for the EU to communicate directly with the relevant stakeholders. Busy CEOs cannot always take the time to explore these potential opportunities. They should have a simplified access to the right information.

Furthermore, the complexity of the application processes drove some companies away from support schemes. According to GreenWave Reality, the potential outcome was not worth the time spent on applying. SMEs and especially start-ups simply cannot afford losing too much time on these schemes, as they do not have the resources to do so. Europe has an interest in starting to build bigger companies. GreenWave Reality claimed that with just a little help, we could see some of the current established companies develop even further, and become champions.

*“We have spent some time getting in some EU funded projects, but so far it looks like being a loss of our time” –  
GreenWave Reality*



## 6. Appendix

### 6.1. Interviews

Company	Interviewee	Position
CubeSensors	Alja Isaković	Outreach
GreenWave Reality	Martin Manniche Peter Wilmar Christensen Nate Williams	Founder, Chairman of the Board, CTO CFO CMO
GreenMomit	Miguel Angel Sanchez	Co-Founder, CEO
Koubachi	Philipp Bolliger	Co-Founder, CEO

### 6.2. Websites

CubeSensors	<a href="http://www.cubesensors.com">www.cubesensors.com</a>
GreenWave Reality	<a href="http://www.greenwavereality.com">www.greenwavereality.com</a>
GreenMomit	<a href="http://www.greenmomit.com">www.greenmomit.com</a>
Koubachi	<a href="http://www.koubachi.com">www.koubachi.com</a>

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