INTERNET OF PLACES

CONNECTED CAR

ROBOTS ARE COMING

SUSTAINABLE DEVELOPMENT

ECONOMIES OF UNSCALE

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I would like to express my sincere gratitude to both Partners of this year's TrendBook – Intel Polska, the Strategic Partner, and Universal McCann, the Edition Partner – for their content-related support, access to analyses, reports and internal data, opportunity to talk to the most prominent experts in various fields and for genuinely close and partnership-based cooperation.
Julek and Tadeusz, it has been a pleasure working with you again this year.

I would also like to thank all the experts, all of whom are really outstanding (and very busy) people, for agreeing to comment on trends in this year's TrendBook and for their time and willingness to share their experience and expertise.

INTRODUCTION

At the beginning of this year, I got a call from a journalist representing one of the industry magazines, asking me what trends we should expect in 2014. I mentioned connected cars and rambled on a bit longer about automation, robots and drones. Having listened to what I had to say, the journalist asked, "But couldn't you tell about something more down-to-earth? Something like '2014 will be the year of mobile,' for example?" Her question made me freeze at first, but after a while I thought to myself that it wasn't as uncalled-for as it might have seemed. No, I'm not going to claim that 2014 will be the year of mobile. What I want to focus on is the fact that we find it difficult to pinpoint what trends really are. Personally, for the sake of order and for my own use, I have divided them into several categories.

The first category is **mega-trends** – significant global economic, social and climatic changes. Here, I include such phenomena as progressing urbanisation, global warming or something we can relate to more – being available 24/7. One mega-trend is made up of at least several **leading trends**. For example, the 24/7 mega-trend encompasses mobility, cloud, Internet of Things, etc. To me, a leading trend is not something emanating from the statistics (these, although important in trend prediction, tend to be misleading – hence the unremitting anticipation of the year of mobile), but something that influences our behaviour and is visible in every domain of our life (despite the relatively low level of smartphones' penetration in Poland – little more than 30% – mobile solutions are applied everywhere, from trade to religion). The next category is **counter-trends** (visible reactions to a leading trend or a mega-trend, but with little influence and a definitely narrower range; e.g. the phenomenon of logging-out (JOMO) which I described in the first (sic!) TrendBook in 2011 is a counter-trend to 24/7). The final group is **micro-trends** (important changes, but still with a narrow range and therefore with fairly precarious future – a micro-trend may well prove to be a passing fad or a leading trend).

To me, micro-trends are the most important – if we, marketers, entrepreneurs and start-ups, act fast enough to diagnose them properly, we may be able to react to the market before our competition. Today, in this unique moment when their usage is not that widespread yet, it is micro-trends that I am trying to focus on in this year's TrendBook, because you can already see their powerful impact on our lives and their gradual transformation into a leading trend. Take a look at the chapter about connected cars. They might not seem such a big deal, but the changes they bring are going to be colossal. Internet in the car today, the era of self-driving cars tomorrow. 'Self-driving' means accident-free (now, 95% of road accidents are caused by human error), and accident-free means that the day after tomorrow cars will not necessarily look like they do today – Elliot Garbus, Vice President of Intel, claims that, in terms of car material, it will be possible to supersede steel with lightweight plastics (see the interview on p. 41). That opens a whole new world of opportunities!

I hope that this is the attitude you will adopt while reading this edition of TrendBook – I hope you will try to find the answer to the question of how this year's trends are going to influence your business and your category in the long term. The coolest thing about predicting trends is that they are almost never straightforwardly handed to you on a silver platter.

I wish you a good read and a lot of inspiration :).

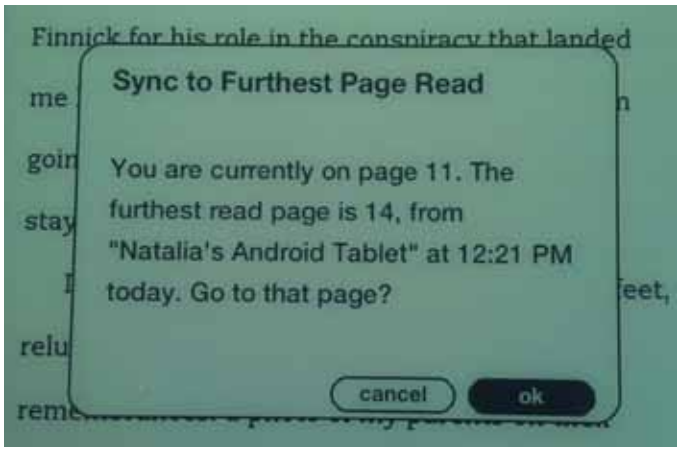
Natalia Hatalska
Gdańsk, May 2014

photo. Renata Dąbrowska

WHICH PREDICTIONS FOR 2013 HAVE COME TRUE?

INTERNET OF THINGS

This is the real key word of 2013, particularly in the context of media – it is enough to look at the chart from Google Trends (**Chart 1**), which shows interest in this subject over the past 10 years (2004–2014). It's easy to notice the exponential growth in late 2013. Internet of Things was also one of the main topics at this year's CES; CEA (Consumer Electronics Association) included it in its report on the five top trends in technology (*5 Technology Trends to Watch*, 2014). Last year, we saw a visible transition of this phenomena from the category of gadgets (connected socks, toothbrushes, travel bags, etc.) towards more practical solutions (e.g. Nest, which Google bought earlier this year for more than $3 billion). In its *Internet of Caring Things* report (April 2014), trendwatching.com placed Internet of Things in the categories of objects that care for people (i.e. mainly related to health, well-being, physical activity and security). Clearly, the use of Internet of Things in marketing today is mostly based on providing users with new products and practical solutions. In the report *Forecast: The Internet of Things, Worldwide*, 2013, published last December, Gartner predicts that by 2020 the development of Internet of Things will have definitely outpaced the development of other connected objects. It is estimated that by that time the global number of smartphones, tablets and PCs will have reached 7.3 billion units, and the number of all connected objects – 26 billion units. Communication between devices, being a natural consequence of Internet of Things, is not a vision of the future, but something that already occurs in everyday situations. The picture on the right shows the message that appeared on my Kindle when my husband and I were reading the same book at the same time, though using two different devices. My tablet and my Kindle "thought" it was only me reading the book and started to "talk" to each other behind my back to make the process easier for me. The issue of devices being able to adjust to being used by several people at the same time is something IoT product developers still need to address – and that is what I am talking about with Matt Webb from BERG (p. 5) and Elliott Garbus from Intel (p. 41).



Today, devices can communicate with each other to enhance specific user experience. The problem is that they do not fully understand that they can be used by several different people at the same time.

chart 1
Interest in the key word *internet of things* over the years, 2004–2014, data from Google Trends.

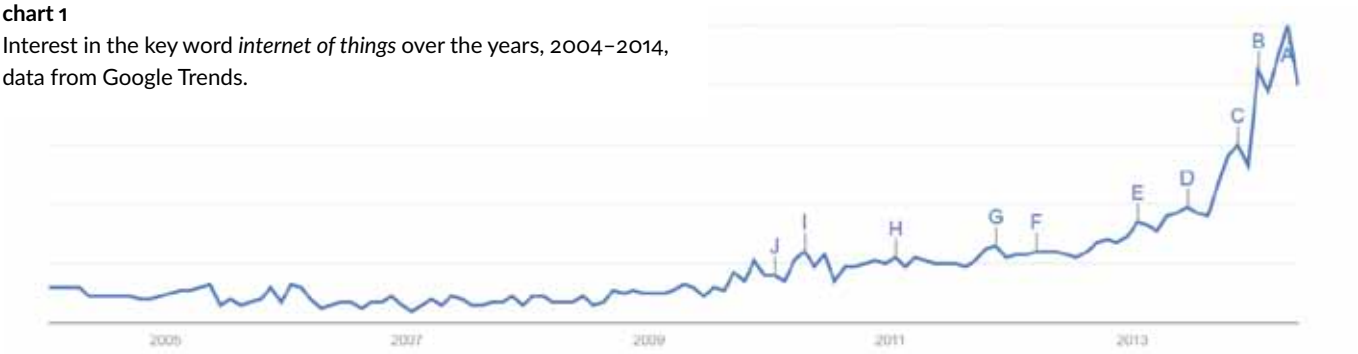



photo. Timo Arnall

Matt Webb
BERG

Matt Webb is co-founder and CEO of BERG, recognized by Fast Company as one of the world's 50 most innovative companies. BERG provides cloud services for connected products and created Little Printer, the web-connected printer, nominated for Designs of the Year in 2013. Matt Webb is one of the most important champions of Tech City and the earlier Silicon Roundabout. He was featured in the "2012 Wired 100 List" as one of the UK's digital power brokers. He is also co-author of Mind Hacks (O'Reilly, 2004), a popular collection of explorations into the workings of the brain.

"We should be thinking about connected devices more as pets."

Matt Webb, co-founder and CEO of BERG – hailed by Fast.Co as one of the 50 most innovative companies in the world – talks about Internet of Things and connected objects.

Natalia Hatalska: In Poland, BERG is probably the most known for the Little Printer project. But, as a company, you're not only doing and selling your own products. You also work for other companies.
Matt Webb: BERG has changed a lot over the last few months. We started as a design consultancy and we worked for all kinds of companies over the last few years. We made the first magazine platform for the iPad called Mag+; we work for Bonnier in Stockholm. We've designed videophone prototypes for Google and we've done work, kind of behind-the-scenes, that I can't really talk about for companies like Intel and Samsung. But over the last few years, we've been doing more and more connected product design. So we've made Little Printer as a way to test out our ideas we've developed in technology that would make it easier for us to make new products. And that was really interesting. We found that we have built something – the platform behind Little Printer – that we could use for lots of other things. Towards the end of last year, 2013, we raised a bit of money and we took the job from being a design consultancy to a tech start-up, so now the purpose of the company is to commercialise the platform that we're developing. We just refer to all now as BERG, so BERG is the platform, BERG is the company, BERG is the people.

NH: You also work for Twitter now…
MW: Yes, our focus of the moment is to build a platform, help people use it. People come to us and they want help making connected products. They come to us because we've got this platform that makes it possible to build these products more easily. And that means we can concentrate more on design. So, Twitter UK came to us and they asked us to help them make a cuckoo clock that sings when you get a tweet. We designed and created that and they went to top advertising clients. They're really beautiful objects. We like working, just on special occasions, with companies where we can really help them by using the BERG platform to accelerate some kind of design.

NH: The platform you provide is free of charge.
MW: At the moment, until we make it really useful for people. It's already useful for us, but as it develops, we'll figure out the way to charge for its features. What we're seeing is that more and more people are making connected products. And it's really difficult to make connected products, because you've got to make hardware, which is hard, and you've got to do the web service bit, which is difficult as well. And we make technology which connects the two together, because you shouldn't have to care about that as well. And as it actually gets better, we'll figure out how to charge for it in the future.

NH: In Poland, the Little Printer was pretty successful, especially in the media. Everybody was talking about that. Was it also successful in terms of sales?
MW: I think it was more successful in media than sales. It's sold the decent number, a few thousands, it still sells. It's a bit like a web, actually, in that we keep on adding features to it to find what makes customers most happy. So, as we have more goals, it becomes a more successful product in its own right. The other thing that we didn't expect at all about it is people using it for businesses, so using it to connect it to their websites, to accept orders from the web and print them out in

restaurants, those kinds of things. We didn't expect those uses at all. So, we're now making a kind of a business version of Little Printer as well, which isn't about fun, it's about very practical things.

NH: This is my question. When I looked at the Little Printer for the first time, I thought that it's all about fun, so I thought that we are starting to move from the practical solutions in the Internet of Things trend towards other scenarios. But it seems that we are still at this practical stage. Am I right?
MW: Yes. My feeling is that it's going to be a little bit of time before we figure out what are the really good uses of connected products and Internet of Things. And a bit longer before we start finding out the really brand new products. We're still in the era of the Web before Google, the Yahoo era. We're still at an early stage. At the moment, the important thing with the Internet of Things is: can we make devices which can be hacked and adapted in order to find out the really good uses. And that's one of the things we found with Little Printer.

NH: You mentioned hacking the products and making them connected. Can we hack the already existing products? Like you did with Zanussi washing-machine? Or should we develop new products?
MW: Well, there are a few stages. I think the first stage will be that we make novelty gadgets or we make versions of existing products which are just a bit different by being connected, but not fundamentally different. The thing that happens after that is people will create entirely new products. We're not entirely sure what those are yet. We're speculating a bit with some of the features of the connected washing machine, for example. I think the Zanussi hacked washing machine we did is not something you would do to your own machine. We did just for prototyping.

NH: What care onnected devices going to be like? There's a great sentence you said in one of your previous interviews, "It's all about designing products for the world as it should be, not for the world as it is now." What can we expect then?
MW: It's a really difficult thing. I think at the moment we're kind of in discovery phase. At the moment, it's good to experiment. I think one of the things that I like about Little Printer is that it's owned by a a group of people and lots of people have their own interactions with it, this place is social and it has its own character. I wonder whether we're going to see more of that in product design in the future.

NH: When you look at Little Printer, it seems to have some kind of a personality. It has a face hair. Do you believe that the connected products will be smarter and more intelligent than us in the future?
MW: Maybe not smarter than us. I think of slightly smart. There was that article about Little Printer that somebody wrote recently where they said that the fact that Little Printer's hair grows and that it sometimes has glasses, was a quite shocking reminder that they have product in their homes which isn't entirely in their control. I think that's a really important observation they made. It IS really shocking that there are products in your home you don't really control. But the thing with connected products is that they are controlled by people outside your house. We did that deliberately with Little Printer, we gave it a personality and we gave it kind of a changing face almost in order to remind people that they have this slightly-out-of-control product in their homes. I think those reminders are really important. It's going to get more important once we have more serious products living with us. You know the X-box Kinect, the little thing with the camera on it?

NH: Yes.
MW: It's actually really weird there's the camera pointed at my room. I wish to have a little indication on it. It doesn't need to be a face, but something that reminds me: this is connected to the Internet; it's not entirely controlled by me.

NH: We humanise these objects somehow. When we look at them, we start thinking that they are kind of alive.
MW: Yes, maybe we should be thinking of them more as pets. With pets, you understand when occasionally they do something unpredictable. And that would be a nice way to design these things.

NH: You've said that Little Printer is very social, that it can be used by lots of people. And in your previous interviews, you said that connected products can be used by different people at the same time and that the products change themselves towards people's individual preferences.
MW: I think connected products should understand that they are being used by groups, not by individuals. My mobile phone, my smartphone is still very much stuck in the PC paradigm. It's my phone and it's really hard for me to use it with groups. Even my iPad, which could be a really good shared computer, it's made to log in to one iPad account. But when you look at Cloudwash or my Nest thermostat, or Netflix on my TV, all those things are made to be used by groups of people. Even something like Netflix, an incredibly successful product, is not really a connected product. To me it doesn't quite understand that it's used by a group of people. When I use mine at home, it's got my and my wife's programme preferences and the recommendations don't really work for her. I know it's got kind of profiles and you can switch between them, but I don't really want to log in to my TV. But how can these things understand that they're being used by groups, by households? It's a really difficult thing. One thing that Netflix could do that is to understand that Netflix that runs on my TV should have different recommendations to Netflix which runs on my phone. Because Netflix on my phone is going to be only me, but Netflix on my TV is going to be me plus other people. And that would be just the acknowledgement of these things of kind of group use. It's a very new challenge.

We're still in the era of the Web before Google, the Yahoo era, an early stage.

Little Printer – a miniature web-connected printer developed by the London-based design consultancy called BERG. It is used for many things, including receiving the latest publications from more than 160 world's leading titles (from New York Times articles to BBC Good Food recipes), as well as receiving and printing photos and messages from friends. You can use the application to select sources and frequency of information to be printed, thanks to which each time Little Printer creates a personalised newspaper for its owner. This pocket-size printer has already been sold to buyers in England, Australia, USA, Hong Kong and Spain. Moreover, it was nominated for many awards in the category of design.
http://www.littleprinter.com/

NH: What are other challenges concerning designing the connected products?
MW: There's a lot of engineering challenges. Power is one thing. I'm really interested if Apple do release a smart watch. Do I really have to plug it in and charge the batteries every day or two? That would be really bad. But with interaction challenges, group use is really important, and making it fit around the existing activities. I see a lot of connected products which are just starting at the moment and they really still have to understand what they're good for. You see smart fridges which have

a recipe book on the front. And it's just like: "Really? Do I want to pull out my recipes on my fridge?"

NH: So, it's all about the value for the end-consumer. Is it also more about design than technology per se?
MW: Yes, design is very important. My view is that the technology that was done about a year ago – is enough. The wi-fi chips are cheap enough, Bluetooth works, they're all going to get better but it's kind of done. The job is now how we make products where it's worth it. I think one of the most interesting products I've seen was the new Amazon device for ordering groceries (Amazon Dash), which fits in really, really well into an existing activity. You swipe on a bar code, it adds things to your grocery cart, you can speak into it and it orders that product as well. It's one of the first times with a connected product when I'm just like: "Yeah, that makes a lot of sense. This fits."

It IS really shocking that there are products in your home you don't really control. They are controlled by people outside your house.

NH: This is probably because they want to be the most consumer-oriented company in the world. That's why they launched this Mayday button. If you have any problem using your Kindle, you just press the Mayday Button and then in real-time there's somebody, a real person, not a bot, answering your question. It's all about user experience.
MW: I think what Amazon understands is what their business is about. They're about selling what people want - making buying really easy. And everything else - they'll do anything they need to do to make that easier. So, the question for me about this device they've just released is why didn't an existing supermarket, why didn't the existing retailer do that. I think it's because existing retailers have forgotten that they're all about shopping. They're also thinking: "Oh, we're about the physical locations," "Oh, we're about helping people figure out what to eat for dinner." They're doing loads of other things as well. That's taking their focus away, whereas Amazon is like based on one particular activity and it's just making it better. It's a pretty tough world where they're operating, but we have to use these products to find out whether there's any good. I'm being a bit overeager to judge it on a couple of articles and a website.

NH: If you could name some implications that are extremely important in designing connected products. What will we have to keep in mind?
MW: I think we have to keep in mind the intimacy. These products, when they're in people's lives, they have a real tendency to dominate interactions. It's very easy to turn a screen off and put it in your pocket. But when a product is in your home, it's very easy to say: "this thing can tell you when you've run out of milk" and actually this empowers me. Or it could force me to log into it. That's a really horrible thing; it would make me feel like an alien in my own home. So I think these things are in intimate places in people's homes, and that's one thing. The other is group use. We've talked about that before, but these things are used by lots of people. Let's say you have a voice recognition system in your home like the "what's on TV." There's going to be lots of people calling out to it. So how can that work?

Connected products should understand that they are being used by groups, not by individuals.

NH: You've mentioned the creepy side of connected products. You were talking about feeling like an alien in your own home. Do you believe that we should connect all the products? Or are there some products that should not be connected?
MW: I think that, in the long term, connecting to the network is just going to be like connecting to electricity. Like the most things, it will just

Drukarka Little Printer stworzona przez BERG.

#Flosk, a cuckoo clock that sings when you get a tweet - built by BERG for TwitterUK.

make sense. You can make things slightly better by putting a network in it just a little bit. It will take a while to get to that point. And I think we'll have to look really carefully for uses that matter, but I think making sure we don't make products creepy is really important. So, if you look at Cloudwash, there's the platform which you press to order more detergent. There's a couple of ways we could have done that. We could have made it count how much detergent you have. We could say: "Oh, you press the button that orders ten," and it counts down ten washes, and then it automatically orders you more. To me, that would be something that would feel creepy, it would be like the washing machine was monitoring me. So, I think it's much better to leave the power in the hands of the customer, to say: "What we do is we have the button here for your convenience. You don't have to use it. If you drive for more detergent to the shop, that's fine too. But it's here if you want it." As long as we keep that in mind while we're designing our products, that's good. That's interesting, because to me that says that the product isn't smart so much. It's at hand, it's convenient, it's not intelligent, and it's just kind of waiting for you. I don't think it would be appropriate to have all my devices trying to pre-empt me, trying to figure out what I want and then offer stuff to me. I think that would be slightly intrusive. Just to offer me the right opportunity when I wanted - that would be good. That's what we're trying to accomplish. Connected, but not smart.

Connected products, when they're in people's lives, they have a real tendency to dominate interactions.

NH: How can marketers use this trend in their job?
MW: I think marketing is a slightly different use. The main use of connected products is their very, very high engagement. When something is in somebody's home or on their office desk, it's there, it's fixed, you can continuously refresh it. Now, the thing is you have to not annoy, to make sure that people keep it switched on, and after a while you have to make people really want it there. It's much more powerful than a pushing notification. It's a powerful tool for marketing if people want to use it like that.

NH: Can you give me any specific examples of connected products or connected objects used in marketing?
MW: I think the most powerful ones at the moment are ones which are being sold as products and they're used to help people think about the concept. About a year or two ago Evian released a water droplet shaped fridge magnet, which was an avatar to their subscription water service.

NH: I haven't heard about that.
MW: It made me really think that suddenly a product is like a concrete relationship in people's lives. This thing can talk back to you and say how much water you've got coming. There's really a lot of opportunity. Now at that time, I think that product would have been too expensive for a marketing person to build. Nowadays, I think it's possible.

NH: But it's also about the publicity.
MW: Yes. That product was a PR thing. I think the other wave of opportunity is not around Internet of Things so much as the entire new hardware revolution. It's become much easier than it used to be a few years ago, to make the short runs of hardware, connected or not. It's easier now to operate in factories; it's easier to get things designed. You can get things manufactured in hundreds instead of the hundreds of thousands. And if you want to get extra funding, you can use Kickstarter. And this is all new in the last few years. I find that really interesting that we're kind of on a trend to make it as easy to start a hardware business as it was to start a web business.

In the long term, connecting to the network is just going to be like connecting to electricity.

NH: How do you come up with things like Cloudwash? For me, it's not only about design and products, but it's also about some kind of art. Useful art.
MW: What's the translation of "design" in Polish, just out of interest?

NH: In Polish, "a design" is translated as "a project." It's about "projecting" things, making things visible.
MW: I think in Danish, the literal translation is "applied arts." German

has two words: "form giver" and "form thrower". Design is such an interesting thing, because we all know what it is when we see it, but we don't really know how to describe it. We have a process we call "thinking through making." We like talking about stuff but we don't know where the design really happens in our hands. So we try to be experimenting, and that's making, just trying things out. When you experiment, you find new opportunities and the material kind of speaks back to you. While we were working on Cloudwash we were able to do this thinking through making and we would go "Oh, that's useful," or "Oh, that's annoying," or "Oh, that doesn't quite do what we thought it would do." Eventually, you come up with something new. I think a design process is always a conversation between the designer and the brief. Writing a good brief with the client is really important. And also the material. And kind of getting your hands dirty.

NH: So this is like going back to the concept that the product or object is alive...
MW: Yes. It's always a collaborative process between people and the material.

NH: Before, design was all about furniture, buildings, architecture. Now, especially producers from the technology field know that they have to incorporate design strategy at the beginning of the product strategy.
MW: I think design is incredibly more important than it was 10 years ago. My guess is there are two reasons. 20 years ago technology was quite simple. Whereas now, my smartphone is so complicated or my washing machine could do anything. We have to figure out the way to make it human. That's one thing. I think the other thing is that, and this is maybe more a hope, that general public is more educated in design. I think now everyone is much more creative than they used to be. People are very comfortable with things like making videos for YouTube, recording our music and giving it to friends, making Photoshop pictures, designing their own business cards, creating things like their photo albums. We've become very creative.

A design process is always a conversation between the designer and the brief.

NH: Chris Anderson says we are all makers now.
MW: In big ways and in small ways. It's really nice to see people making a photo album or photoshopping pictures and doing it for their families. I think once you start understanding how design is used it makes you much more demanding of the product you buy. Although you might not know how to design and invent it yourself, you can imagine how they could have been better. You become less tolerant of that design. ■

WEARABLE COMPUTERS

Although still at a nascent stage, wearable technology underwent a significant change last year. It started to be perceived not only as a gadget for geeks, but as a lifestyle trend. Smartwatches were talked about not only in the industry- and technology-related media, but were all over the pages of such magazines as Elle or Shape. However, the category of smartwatches was not the fastest-growing one in the realm of wearable devices (their manufacturers still have many questions to answer, including the one about the possible edge of smartwatches over smartphones – I touch upon this issue in the interview with Chris Dancy, see p. 12) – it came third and lost to sport/fitness and healthcare devices (see **Table 1**). Most reports and analyses are predicting that this category will not be successful until 2014 (provided certain barriers are overcome, including battery longevity; other barriers are mentioned by Bartosz Rychlicki from Quantum Labs, p. 11).

Samsung Galaxy Gear ad at Warsaw's Okęcie Airport.

	2013	2014	2015
wearable cameras	6,64	13,61	15,81
smart glasses	0,01	2,13	10,57
smart watches	1,23	7,44	24,92
healthcare	13,45	22,59	34,25
sports/activity trackers	32,46	42,64	57,42
wearable 3D motion trackers	N/A	0,87	2
smart clothing	0,03	0,72	1,24
totals	**53,9**	**90**	**164,2**

Table 1
Sales of wearable technology by category (in million units) *Source: ABI Research World Market Forecast, 2013–2019.*

Bartosz Rychlicki

CEO, Quantum Lab

Undoubtedly, wearable devices are on the agenda of many conferences, fairs and articles. They are definitely in vogue, and many people buy such devices as Jawbone and Fitbit. I count myself among the customers of these companies. However, it's high time we let the cat out of the bag and answered a fundamental question, "What for?" What do we need step- or sleep-measuring devices for (truth be told, they cannot measure anything more advanced than that right now)? What needs do these devices cater for? What value do they bring to the lives of their users?

The way I see it, they mostly serve to tickle the vanity of their owners. Hence, devices with the best design become best sellers. They arouse the curiosity of those around, are a semblance of something new and fresh and attract attention. Don't get me wrong, there's nothing wrong in that. But if they are meant to match the last-century popularity of TV or radio, the mere "wow" of your friends won't do the trick. Of course, there are situations where such devices answer specific questions (e.g. Do I sleep long enough? How many calories do I burn? Do I move enough at work?). But then the role of the device is different. It's not a "wearable device" any more, but a measuring device that you wear and treat like a good old blood-pressure monitor, for example.

For now, let's focus on what these devices are and what their fundamental role is. Their task is to gather valuable and otherwise unavailable data for us. But what do consumers pay for instead? For design, PCBs, elements and form. It seems to me that wearable devices have still a long way to come, and the first step should be changing the business model into the one where the key element is using data and not a device itself, reduced to the role of an ornament. Whoever develops such a business model and product will gain a substantial competitive advantage. It won't be easy-peasy-lemon-squeezy, because we don't like to spend our money on something in which we cannot see the direct cost related to manufacturing and distribution (that's why we have no problem with the illegal downloading of music from the Internet, and to us it's not tantamount to stealing an iPad from a store).

One thing is certain – the market of wearable devices will continue to grow and eventually become part of our lives, just like cars, household appliances or the Internet. However, in order for this to happen, wearable devices must stop being a fancy gadget and start being a useful tool. I bet their applications in medicine will pave the way. Medicine is where it's the easiest to show a particular value for users and justify the model of making money out of data, because medical applications involve professional medical opinions and intervention of trained personnel. Moreover, introducing the devices like Google Glass, which we could tentatively label as "second generation" and which can do more than accelerometer bands, will open the door to a new land of opportunities in this field and introduce more mature solutions on the market.

Chris Dancy

Chris Dancy, known mainly as "the most connected man in the world" or the most quantified human. He has been engaged information systems for over 25 years, wearing as many hats as there are heads in the IT industry. He currently works as an ambassador to the future, serving the role of Data Exhaust Cartographer - he utilizes 300-700 sensors, devices, applications, and services to track, analyze, and optimize as many areas of his existence as he can think of. This quantification enables him to see the connections of otherwise invisible data, resulting in dramatic upgrades to his health, productivity, and quality of life.

"Your body isn't a program that has to be hacked."

Chris Dancy, known as "the Most Connected Human on Earth" talks about wearable devices, huge amounts of data they generate and how the human body might change in the future.

Natalia Hatalska: It is said that you have about 700 sensors, devices and apps altogether to monitor everything on your body and at your home. What kind of devices and apps do you have?
Chris Dancy: I just sent you the list so you can see the actual names of things. All the devices have been divided into either black devices or white devices, like my Google Glass and my Pebble watch. White devices display information and black devices record information. So the heart rate monitor, the back sensor, sensors in my arm and the white ones just display information. I also have the Galaxy S4 that does ambient light, temperature and humidity in the room, because when I'm at home, I have all the sensors in my house, but when I travel, I have something for a hotel room. So, the Galaxy S4 does that. Then, the sensors that I use at home are environmental sensors and the triggered lighting sensors. Even the dogs have sensors. My house has motion detectors all around it, so when I enter a room, the activity is recorded. The mattress has a sensor, because I got tired of wearing a lot of stuff at night and it's just not easy to sleep. And then my car. Lots of things. You've seen the list.

NH: Are they connected together? For example, when you wake up, your coffee maker gets ready and when you enter the room in the evening, the lights go on?
CD: Yes. All the information I record goes into a calendar, a flat file and a spreadsheet, and basically certain information triggers events, so if my sleep wasn't restful, I can make lights lower or change the temperature in the house. I take all the information and I pipe them into one repository and I use service called Zapier to grab that information and then trigger events either in my home or on my body.

NH: So, it is not only about collecting data but also about analysis of these huge amounts of data. This is analyzed automatically? You're not sitting in front of your computer, analyzing all the kinds of data?
CD: No. In the beginning, I had to, because I had to understand where all the data went. I didn't have any categories. Now, all the data is in categories, so it's health, entertainment, environment, social media, knowledge work, which is like what you do for your job, travel, opinion, content creation, money, and spirituality.

NH: What is spirituality about?
CD: I wanted to learn to meditate. But I didn't know what meditation was. For years, I listened to people and I couldn't quite understand it, so what I did was I just used sensors to try to understand: is my body meditating? But you can't figure that out from sensors. What it did was it actually allowed me to be aware that my body was at rest. It allowed me to say, "Oh, look, I'm watching myself, I'm here." Then, I thought, "How can I go deeper?" And that's when I started playing with lighting, humidity, posture, and a bunch of other things. Sometimes, I wonder if there is a way that you can enter those states quicker? Because sometimes your mind is so busy. You need help to close this curtain. My voice right now is about 74 decibels, but talking at 71 decibels actually slows my heart rate and I can breathe better. So it's a big feedback loop that happens in my life.

It's a big feedback loop that happens in my life.

NH: But having so many systems, devices, all connected and all gathering data, can be distracting rather than calming. Isn't it distracting for

you, in interacting with other people, in having connections with them?
CD: I try to wear things that people don't see. I used to wear something on my head when I slept, but that's distracting when you're sleeping with someone and it's not comfortable. So, I moved to something that works around my bed. I see your point, because of the state of wearable devices and the state of sensors; there are some things that just aren't possible. If you're wearing Google Glass, people are going to think, "Am I being recorded? Are you watching?" I try actively to find new services and new applications, new sensors, new devices that are low-friction, I don't have to see them. If I don't have to wear them - even better. The sensor should be in the chair, not around my back. Because I've spent five years mapping all these things, I know they can be distracting. But they haven't been to me personally for about three years, because I really work hard to find ways to take information out of them without doing any work and find ways to wear them under my sleeves, so no one sees them. But it's an active process and I'm aware that some people might not be comfortable with.

I would be willing to investigate implantable technology. I think in some ways those systems are easier to live with.

NH: Isn't this amount of data overwhelming for you? You know almost everything: your heart rate, your voice. How do you cope with that amount of data about yourself?
CD: In the beginning, it was really overwhelming and actually that's why I was interested in learning to meditate. I'm sure you've seen pictures of my Google Calendar. Being able to visualize the data actually makes it easier to comprehend, because it's not massive amounts of data. The problem really comes when you want to solve a particular habit or change a particular behavior, and you have the data to understand it and you turn yourself into a science experiment. As humans, we like to solve problems. Sometimes, it's hard to be objective, because it's you. Sometimes, there's some things that you don't have to fix. Your body isn't a program that has to be hacked. I think it's easy when you have a lot of information about yourself to try to use that to be optimum.

NH: You said that you treat yourself like some kind of a science experiment. Was it your main motivation?
CD: I think I don't treat myself like a science experiment. Sometimes it's easier just to accept the fact that not everything needs to be fixed, which is really something I got out of meditation. Sometimes, it's easier to be okay with not being like a machine.

NH: Probably this is not the final step. Probably, in a few years, we will have chips in our body. Will you go for that?
CD: Absolutely. No one's really asked me in any of the interviews I've done how I feel about that, but, again, I believe the information should be low-friction and cause minimal disruption in your life. I would be willing to investigate implantable technology and imperceptible technology beneath the skin. I think in some ways those systems are easier to live with, because you don't have to search them. That's ultimately what I would like.

NH: In some interviews, you mentioned the issue of data intimacy. Could you comment more on that? Gathering so much personal data and then showing this data or sharing this data with insurance companies, for example, raises some questions about privacy. But intimacy is very interesting for me.
CD: My point about intimacy is a little bit different from the privacy issue. I meet people all over the world, because I travel and speak about tech, not just this. If you look at the different social networks that I'm a part of, everything from Twitter to LinkedIn, to Facebook, to 23inMe, which is a genetic social network, it's interesting that many people will try to connect with me on intimate social networks like FitBit and 23inMe before they try to connect with me on LinkedIn, Facebook or Twitter. I find that people don't really understand intimacy when it comes to information, and I think because I'm on a lot of biological social networks, people instantly want to connect and share gene information. Maybe I'm old-fashioned but I think that sharing information should be like dating. The first date - you maybe just go out for dinner, the second date - you hold hands, very slow. It seems to me that some humans have a problem understanding the level of intimacy that their data has, and when and where it's appropriate to share it.

NH: But when they use such services like 23andMe, they use them for a specific purpose; they want to know more about themselves, about their heritage and history. Maybe that's why they try to connect with you there.
CD: But these are people that I don't share genes with. I have people who try to connect with me because they've seen me at a conference. I think it's nice and I know they're not malicious. I have people who try to connect with me on FitBit that I don't even know. They just read about me in a newspaper. And that's a lot different than sharing a picture of my dinner.

NH: But I think this is the same with the whole social media. People who you met at a conference and with whom you talked only once ask you to be friends with you on your private account on Facebook.
CD: We need to address the data discussion about wearables, because we didn't address it when it came to e-mail. When we had telephone numbers when I was growing up, you could make your telephone number private and you paid extra. And that was in the eighties. In the nineties, you could pay so that your phone number was not in the phone book. But then, when we got e-mail, we gave our e-mail to everyone and then we tried to make our e-mail private but it was too late. Then, we got involved in social networks and a lot of people just said, "Oh, I'll just invite everybody because I like seeing what everybody's doing." But they forgot that for me and maybe for you, my telephone, my e-mail, my social networks, and my biological social networks are safe places. Those are where I live. You just don't invite yourself into someone's house like that. But not everyone behaves that way and I have to understand that some people don't think about it. I don't want people to think it's wrong and I think some people will get upset because I won't connect to them, but I always tell people, "I'll talk to you, I'll make five hang-outs and two Skype calls to make this work." But that doesn't mean we need to have this intimate relationship on-line with our data. People really don't understand that.

It seems to me that some humans have a problem understanding the level of intimacy that their data has, and when and where it's appropriate to share it.

NH: I fully agree with you. So on the other hand - what's your attitude towards the usage of your personal data by insurance companies, for instance? They can charge you more or less for your insurance based on your health, well-being and data from your body.
CD: I think the insurance companies think it's a very interesting opportunity for some people who have paid health insurance. For example,

my car insurance - if I let them put a tracker in my car, they charge me less for my car insurance, because they know I'm driving well. If I carried a pedometer, the company I was at actually charged me less for my health insurance if I met my goal in exercise. So, there's this very fine line where it's already happening and a lot of people in the United States will trade away very personal information for discounts.

I believe in the future, in less than 10 years, all of our personal information will replace traditional currency.

In the future, though, I belive that for the volumes of personal information we collect on ourselves not only will there be discounts but it will replace traditional products and services that we use currency for today. Yes, it's kind of a dark scenario that these companies could use this information, but they are already using it in the United States. Many insurance companies already offer you a monitoring system for your body or for your vehicle. And in home insurance, I'm sure there are companies that, will give you a discount if you have a security system on your home which is just monitoring. So, your home, your body, and your vehicle – all in the United States – are cheaper for the insurance if you let them watch it. If we're going to go down that road, then we should go all the way and say, "Wait a minute, I'll give you more information, but I want the insurance for free, not discounted."

NH: So we are becoming our own money. We trade our bodies for services.
CD: Exactly. And I believe in the future, in less than 10 years, all of our personal information will replace traditional currency.

NH: Let's go back to smartwatches - they are having a pretty tough time at the moment, because it needs to be figured out how they can be used over smartphones. What's the role of your Pebble among all the other devices?
CD: For me, there's Google Glass, which is a heads up display, there's a smart watch, and then there's my phone. If it's an urgent message from someone I know or if it's something that's critical that I'm waiting for, that alert goes to Google Glass. If it's something that I don't need to reply to, I don't need to type, it goes to my Pebble. If it's something that's really low-priority, it goes to my phone.

NH: Are these three devices you mentioned the most important devices that you cannot live without?
CD: I don't think there are any I can't live without. You're the only journalist that has ever asked me that. I can live without all of them – now that I understand how it all works and how they all can work together but we just haven't built an infrastructure for that. They make life easier, it's definitely easier having a smartphone, and it's definitely easier having a smart watch so I don't have to put my phone out of my pocket to read a text message. It's definitely easier having Google Glass for directions than using my phone. But I don't think they're necessary.

NH: Do you see yourself living without any devices at all?
CD: I hope one day I will have no devices external to my body and they will be just internal.

NH: So this is the future that awaits us in terms of wearable tech? All the devices will be implemented in our bodies?
CD: Yes. You and I, we should set a date on our calendars and talk in six years, because I think many people will opt for implantable technology. Right now, a lot of people have pacemakers, insulin pumps or cochlear ear implants; there are multiple patients who've gotten low-grade bionic vision. That's what's in today's tech. If we go five years or six years to the end of this decade, I think some people will actually opt to have electronic parts like we opt to have cosmetic surgery nowadays.

NH: So you're saying that at the beginning of the 22nd century, there will be some people who are more computer-like than biological?
CD: We already have people behaving more computer-like even without the implants. I think we'll have people who are more cybernetic around 2030 than the end of the decade. A company just contacted me and offered to upload my data to IBM's Watson. I didn't think we'd see that till the end of the decade – the idea of uploading massive amounts of data to something like a super-computer that can do deep learning and you can have conversations with yourself or if you pass away, people can continue to communicate with you. That's very real. It's not even like if it's possible. I've been offered to do it. ■

What Chris Dancy wears:

1. Narrative Camera
2. Google Glass
3. Body Media Fit
4. Fitbit
5. Blue HR (wahoo) heart rate monitor
6. Lumoback
7. Pebble watch
8. iphone 5s
9. Samsung Gear
10. Galaxy S5

What he has around himself:

1. Netatmo - Sound, air quality, temperature
2. Wemo - Motion sensors
3. Aria - Wifi Scale
4. Hue - Wifi Flighting
5. Tagg - Dog Activity Trackers
6. NetGear VueZone - Live Video through my home wifi
7. Nest Thermostat - temperature regulation wifi
8. Nest Protect - Carbon / Smoke wifi detector
9. Beddit - Mattress cover to measure sleep
10. Automatic - In car statistics on driving
11. Estimote - Proximity system to give me information when I'm near something in my home.
12. Sonos - Wifi speakers
13. Cube Sensors - Temp, Air Quality, Humidity, noise, light, pressure

BIG DATA AND PRIVACY

In 2013, the topic of data privacy on the Internet was dominated by Edward Snowden and the PRISM-gate, focusing mainly on issues related to on-line information security and the degree of Internet surveillance practised by governments and corporations. Despite heated debate, internet users don't seem to comprehend the gravity of the problem. A lot of Poles still share Instagram pictures of their identity cards, credit cards and passports. According to the Wave 7 research report, currently 67.4% of respondents in Poland agree with the statement, "I'm concerned about the amount of personal data that goes online." However, compared to the last year's figure (62.2% agreeing with the same statement) and given the context, the increase is not that dramatic (merely 5 pp). On the other hand, one in three respondents in Poland "doesn't mind companies tracking his online behaviour" (see **Chart 2**). In reality, big data is an area primarily related to the Internet of Things and the necessity of processing unimaginably large amounts of data in real time with the aim of e.g. increasing user comfort (this year, I discuss this issue with many experts, including Scott Sedlik from INRIX, a company that monitors real-time data on the speed and direction of over a hundred million vehicles and smartphones around the world; see page 44).

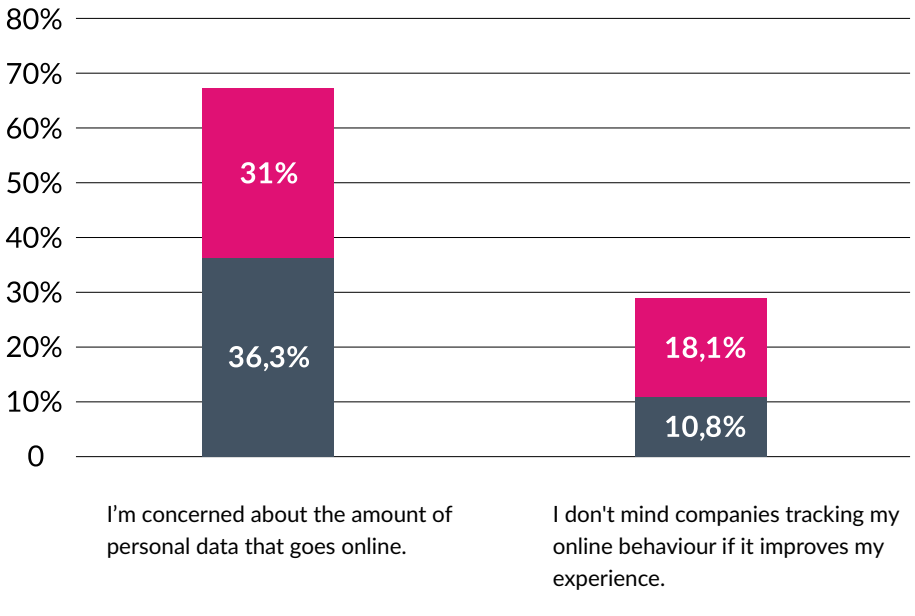


chart 2
People's concern about the amount of personal data available online vs. Attitude towards companies tracking our online behaviour (the figures represent Poland) *Source: Społecznościowy kod złamany, Wave 7 report, Universal McCann, November 2013.*

Michał Sadowski

founder and CEO of Brand24

Internet is generating an increasing amount of content, but it is content described better than ever. We add tags, hashtags and extensive descriptions of materials that we publish. This creates unique opportunities. Moreover, in terms of technology the big data trend has caught up with the enormity of the user-generated content. The valuations of companies creating database technologies in the spirit of big data reach skyrocketing amounts of money. One of them is Mongo DB, recently valued at 1 billion USD. According to Gartner report, big data will have created nearly 4.5 million jobs globally by 2015.

The popularity of this trend is also confirmed by the current interest in the services based on huge amounts of data. Any type of social media analytics sells well both domestically and abroad. A big challenge for this type of services will be analysing the content without metadata. This includes image monitoring and capturing text, logos or even faces on pictures without descriptions. Naturally, the challenge will involve gigantic amounts of content to be processed.

In the nearest future, we will also observe more and more services that use big data in a spectacular and unexpected way. I'm talking about such services as SickWeather.com, for example, which uses Twitter data to create the epidemiological map of the world. It provides you with an easy tool to check if there's any epidemic in your region, e.g. a flu epidemic.
Another interesting thing will be the marriage of big data and new types of mobile devices (e.g. wearable tech). The possibility to process data in real time, e.g. data from a camera in your Google Glass, will create a new ecosystem that will become a breeding ground for new, exciting services.

Bartosz Nowakowski

Business Development Manager, FanTuner

As early as last year, it was clear that the big data trend is huge because of the scale and size of generated data. This is partly due to the ease of collecting information (web pages, social networks, Internet of Things, etc.), but also due to a dramatic cutback in data storage costs. The last twelve months have shown, however, that making the most of the potential such amounts of data have is not a no-brainer. For this reason, certain commentators refer to the current stage of knowledge about big data as the stage of data collection. They believe such data will not be useful until some time in the future when there's the technology in place to analyse data in order to uncover hidden relationships. Critics of the above viewpoint may consider it an exaggeration. After all, based on the analysis of the interaction of a Facebook user with other users, we are already able to predict (with 70% accuracy, which is not at all bad) that he will start a relationship with somebody. In the meantime, smartphone data can be used to determine the probable location of a user at a set time of day (with 80% accuracy). The above examples undoubtedly provide some knowledge that can be utilised, even if for marketing purposes only. Its usefulness, effectiveness and scale of application, however, do not match the level of added value generated by such predecessors as Data Mining or Business Intelligence techniques applied to data sets smaller by at least several orders of magnitude.

I believe that the most auspicious way to use big data is the automatic creation of user behavioural models, which can make it possible to personalise communication and customise the offer to suit genuine customer preferences. Current solutions in this area are too general and imprecise (Google Ad Sense) or do not allow to reach a narrow and specifically defined audience (Facebook Ads). Social networking sites open up new horizons for marketers in terms of both the amount and quality of data to analyse. Discovering the full latent potential of the collected data is far ahead of us.

The Data Society

Gathering big data is often a misunderstood concept. What does it really mean, and how can it be beneficial to society? Data is a valuable resource for companies, but it can also be used to empower citizens. At Intel Labs, data comes alive to make life better for people.

2.5 quintillion
Bytes of data created every day.

Did you know?
90% of the data in the world was created just in the past two years.

500,000
The number of jobs expected in five years just to be able to process data.

The Big Picture

Here are some of the many areas that benefit from collecting and sharing data.

DAY TO DAY PLANNING

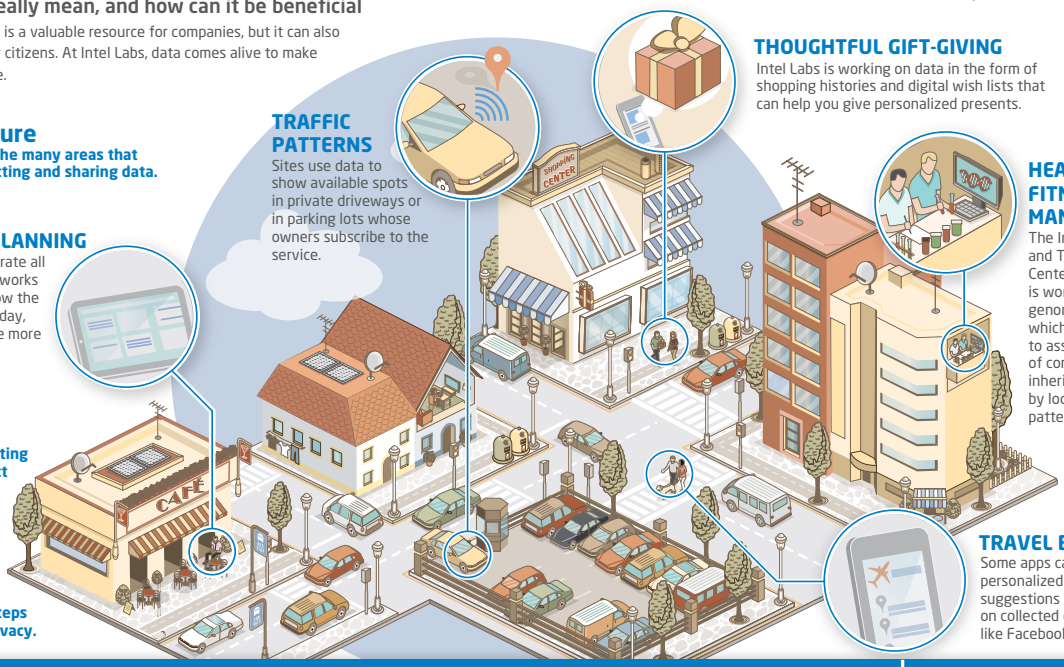
Apps like Saga integrate all applicable social networks to give an idea of how the user spends his/her day, and how to make life more efficient.

Engineers are creating solutions to protect user privacy while transferring data.

85% of mobile and computer users say that they have taken steps to protect their privacy.

TRAFFIC PATTERNS

Sites use data to show available spots in private driveways or in parking lots whose owners subscribe to the service.



THOUGHTFUL GIFT-GIVING

Intel Labs is working on data in the form of shopping histories and digital wish lists that can help you give personalized presents.

HEALTH AND FITNESS MANAGEMENT

The Intel Science and Technology Center for Big Data is working to advance genomics analysis, which allows patients to asses their chances of contracting an inherited disease by looking at DNA patterns.

TRAVEL BOOKING

Some apps can make personalized itinerary suggestions to users based on collected data from sites like Facebook and Expedia.

How Data Can Change the World

How can people access it to make their lives better? Intel Labs put a premium on research that can benefit billions of people around the world.

Prediction

Use of sensors to monitor extreme weather conditions to be able to distribute real-time information.

Prevention

The United Nations' Global Pulse Initiative maps data to point out vulnerable areas.

Protection

Data collected by satellites allows scientists to map trends and detect changes brought by deforestation and climate change.

Source: Urban population growth (World Health Observatory); Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update 2012-2017; Intel Data

HUMANISATION OF MACHINES

When writing about the humanisation of machines last year, I focused primarily on one aspect – vending machines. In fact, the entire realm of products equipped with human features of some sort has recently burst out. Of course, the movie "Her," directed by Spike Jonze and starring Joaquin Phoenix in the lead role, was the icing on the cake. It answers the important question of whether an operating system (artificial intelligence) is capable of behaving like a human. The by-product of the movie was elevating the human-machine relation to an even higher level, stirring a debate on whether a human being is able to fall in love with an operating system. There's no denying the fact that our attitude towards devices, especially when they help us in everyday life and are intuitive and user-friendly, has shifted. Nevertheless, the statement that we want to build relations only with machines and we don't need interaction with other human beings is not true. According to data from Intel Innovation Barometer (October 2013), Generation Y (Millennials, aged 18-24) expects that their interaction with devices will be highly personalised on the one hand (36% of all respondents claim that it is technology that should learn how humans work, not the other way around), and, on the other hand, as much as 61% (vs. 53% in the age group 25+) claim that progressive technology makes them feel less human. What is more, a very intriguing book entitled It's Complicated came out last year. Its author, Danah Boyd, argues that young people feel a great need for socialisation. Due to the fact that we live in the so-called culture of fear and parents do not allow their children to spend free time in public places (e.g. playing outside and tree climbing), young people build their social space on-line.

A photo taken at this year's SXSW festival in a café near the conference centre. Contrary to what may seem, people do not build relationships with a computer or a mobile device, but use these devices to build a relationship with other human being.

Simone Rebaudengo
Frog

Simone Rebaudengo is an interaction designer at Frog in Munich, where he designs digital, physical and behavioural interfaces and tortures every now and then some appliances. His work focuses on exploring the implication of designing products with behaviours, memories, goals and relationships as new material to be shaped. In 2011 in collaboration with Usman Haque, he designed Addicted Products, a speculative sharing service based on the needs of the objects themselves. He tried to install one of them in David Cameron's office, but failed due to secret services concerns. Since then, he 's been talking about it at conferences around Europe and has been awarded Best in Show and Best in Engaging at Interaction Awards 14 and for Speculative design at Core77 awards.

"I don't think the future is going to be where you have central neural system and everything connected to that."

Simone Rebaudengo, interaction designer at Frog, the author of acclaimed Addicted Products project (see box – page 21) talks about the products, which have their own personality and memory and about product-nota man oriented design.

Natalia Hatalska: You are most famous for your Addicted Products project. What was the aim behind it?
Simone Rebaudengo: I did it in collaboration with Usman Haque, the founder of Pachube, now Xively, one of the first platforms for the Internet of Things. He sold the startup to a bigger company, now he's back into doing a lot of experimental things. I basically approached him to do a collaboration project on addictions. My main aim was looking at how to implement an addiction as a behavior of a product. I didn't really start from connected products but I arrived at them in the process. I wanted to create peer pressure with things, and it is only possible when your products are connected, because then they can somehow relate to each other, and by relating to each other, they can compare themselves to one another. What does it mean to compare for a product and what would they compare? It's a question behind what it means to connect products, what kind of relationship happens between these objects, and if these objects are semi-smart, does it mean that they have a goal, or an algorithm that determines their behavior? It's much more complicated when you connect two products with two different goals. What do they do?

NH: Wait a minute, you're talking about addictions, relationship, peer pressure, having own goals and different behavior. And you're not talking about humans but products, inanimate objects. Are you saying that connected products are somehow alive or human?
SR: I don't like that humanization, because I think it's a very tricky term. We don't want products to be too human, it's scary. But that's where a lot of technology is going. I think there are too many ways where technology is pushing towards; one is about embedding technology so much into us, so basically things are seamlessly a part of us. The other part is creating objects that we don't have any control over, because they're self-reliant. So these are the two extremes for me and I think there is something in between where there is a bit of humanization of technology.

NH: What do we expect from the connected products?
SR: What we have to aim at is in between, because I don't think products should have a complete life of their own. I really like what Matt Webb says – building things that are as smart as a puppy. In a way, that's the relationship with a person that makes them learn and become better, but they don't have full autonomy. I think that's the very dangerous part. As soon as you talk about the humanization of technology, it suddenly goes into this idea of "Oh my God, I don't want toasters like that." I really like the reaction that my project raised with people, because there are people who are like, "Oh my God, this is so great, I want to have things with personality;" on the other hand, there are people like, "What the fuck is happening? Are you crazy? Is this the future?" For me, it was a moment of saying, "OK, there is a very problematic issue which is the way we treat objects." In a way, I was looking at the addiction of people in consuming objects and then I said, "What if a product instead is addicted to me?," which basically goes against the addiction of the person.

NH: This is the concept behind the machine which doesn't know what it wants but it wants more, right?
SR: Yes, there was the initial experiment that I did which then became a toaster at the end. For me, it's not really about a toaster; it's the idea of having products that have their own goal and thus make certain decisions that sometimes might go against our own perception. In this case, this perception also goes against ourselves, because if we want more and more products, we want to keep them, we'd like the future where there's enough for everyone, while, in this case, the idea is that the object somehow chooses its own scenario. Therefore, in a way, products adapt to people rather than we get products and then we see what we want to keep. So, my project is mostly about two things – one is about the meaning of connecting, and the other one is about the need of changing the consumption towards products.

Now, when the products have become much more intelligent, we need to design also with the product as one of the users of the system.

NH: You flip the relationship upside down. Instead of people or consumers being users, people are used by products, right?
SR: Yes. I think it's something we need to think about in terms of design as well. We used to design machines to be usable by people and we needed to create this interface by making the person better understand the machine, because the machine was very complicated and a bit stupid. We always designed with the person at the center. Now, when the products have become much more intelligent, we need to design also with the product as one of the users of the system. The product also has a life of its own and it's no longer designing the interaction only when there is a person, but it's a continuous interaction which is not any more about "I turn it on, I turn it off." The object is continuously learning and exchanging data, so there is something behind that is also part of how you design a product. That influences its behavior – the data that comes in. It's much more complicated.

NH: We'll come back to this design problem later. Did the Addicted Products project really work? I remember that you produced five toasters and then you distributed them among people in London. Were they really connected and could they send information or not?
SR: Yes. I built five of them and, at the best moment, I had three or four of them running at a certain point. They were tweeting, sending data, and the interface was alive. You could really see the daily amount of toasts done, and there was also this weird situation whenever an office was making much more toasts, the other office created a party in order to make more toasts, and so they started to have this kind of weird relationship of how to keep a product. Maybe there's the future where, instead of buying products and having the buying power, we will have the keeping power. It's kind of like reverting the value of an object. I don't think that this is what we want for real – things that have extreme personalities, but there is some value in having a relationship with an object.

NH: Have you seen the film by Ericsson called "Social Web of Things," about a man who enters the house and all the objects at home anticipiate what this man wants...
SR: Yes.

NH: Do you mean this kind of relationship? He prefers to spend evenings with his house instead of with his girlfriend?
SR: It's quite sad. First of all, I really don't like this idea of the house as the center of intelligence. I much more believe in very tiny stupid things. I don't think the future is going to be where you have this central neural system and everything connected to that. I think we're still going to have things that are going to be very, very dumb, like my kettle, that is probably not going to be smart at all. But maybe we're going to have other products that are a little bit more intelligent. So, there's never going to be this perfect situation in which everything works perfectly. I wouldn't like to have a real relationship with my house. It was also very funny to watch "Her" and look at this future that is not really the future. That's the relationship that we have with our phones as well, it doesn't have a voice, but...

NH: We humanize them, right? We treat them as something personal, we miss them, we're angry at them. We already have this relationship.
SR: Maybe humanization is not about clearly mapping human behavior to products, but it's more about finding ways in which we have a relationship, which might be very different. I think it's more about companionship, about things that have their own control but they're not in total control of themselves, because they still need you as the main controller.

NH: Do you think that when the objects and products are getting smarter, people are getting dumber? Objects start to think for us, for example Brad the toaster knows how to make toasts and reminds us about toasts. Have you heard about smart socks?
SR: Yes. For me, those aren't projects, they are the aberration of the Internet of Things. It's so easy to connect stuff, and suddenly there are problems everywhere. I still believe that these things don't necessarily make us stupid. But it also depends on how they are designed. It's also about finding those triggers, those errors, those little things that make you think. For me, humanization is not necessarily about behavior, but about imperfections, maybe. It's about making things more acceptable. Lately, I've been reading a lot about memory and I'm really fascinated about how memory is not perfect. It's not perfect for a specific reason. It's both for the sanity and for continuing your life.

NH: Like our DNA copying system – it needs to be imperfect so we can evolve. If it was perfect and always the same, we wouldn't thrive.
SR: For me, it's probably more about human character. If something is perfect, it's not acceptable, and if it's more perfect than us, it becomes even less acceptable. If it mimics us, it's weird, it's uncanny. So, I think the whole point of humanization needs to be a little bit re-thought; we need to re-think what we mean by it. Maybe humanization is not the right word.

I think that in future we're still going to have things that are going to be very, very dumb.

NH: Which word would you use then?
SR: I don't know. If only I had the answer... Maybe this is like a wordplay, it's more about humane rather than humanized. "Humanized" means mimicking, while "humane" is more about humanly acceptable. I think that's the little shift, the little change. I don't know if I'm answering your question, I'm just ranting now:).

NH: What are the implications of designing connected objects?
SR: First of all, compared to other products, there is a different scale and different materials you need to design. There are different levels. Normally, we focus on the one-on-one interaction with the person.

That's why it's user-centered design, because you have the person at the center, an eco-system around the person, and a product that has an interface, and you want that specific experience to be great. While with the connected product, you have a lot of things happening behind. You have relationship with other products, and companies behind them that get specific data and change the behavior of the product depending on the data. You have time to use different material that you have to take care of, because when you think about products that learn, you also need to design that learning part: What are they learning? How are they learning?

NH: Are you talking about 4D printing products?
SR: No, I'm talking about something like a Nest.

NH: Objects that learn from and adapt to our behavior.
SR: You need to design how they learn, when they learn and how they communicate while learning. But then, there is also this infrastructure behind, which is very interesting. What's the relationship of that object in the eco-system in the house or in the eco-system of other products similar to that? With my own project, I tried to check if an object has the possibility of going over the one-on-one relationship, and then what it can do. There are other objects around it, similar products in the network, and other people. I was even looking at making a deal with a bakery to see if a certain toaster could get a discount for its own host to buy more bread. These are all the things that are a bit freaky and they are critical experiments. They are not reality, but they kind of make you ask the question of what are the limits that an object can break. For me, it's fascinating. It's an open field.

NH: This is what's so fascinating about working with objects?
SR: Since I started doing design, I've always wanted things to grow for some reason. I want things that change and look older, which behave differently. And this is the time when it's weird, because it's kind of doable and kind of acceptable. It's the right time. Ten years ago, these things would have been like "WTF?" Now, it's somehow possible and acceptable. First of all, we can do it technically, it's not too complicated. Also, people are more okay with it. 10 years ago, it would have been very different. People start to ask the question, "What does it mean that objects listen to me?" or "How many things are out there that have their own life or their own behavior and processes?" There are so many things with cameras, sensors and microphones, and we are starting to understand now that they are also more active agents in the system.

NH: Do you think people really understand this new reality? Or they are just not aware of that?
SR: I don't think it's yet public domain, but it's more understandable that a phone can talk or a thermostat can learn. We are starting to accept the specific processes that are much more complicated than before. Before, it was always in the realm of robotics, which was very, very far away from the daily lives. Now, we are talking about objects in our daily lives, so it's more about in which context these things are, and now it's much more in real life.

NH: You are talking about the product's perspective. But when we look at this new reality and people, what do people - the consumers - expect from products now? What's the most delighting for them when they interact with the product? Is it that the product can respond or that the product understands this person, or that it knows what we want before we say what we want?

Humanization is not necessarily about behavior, but about imperfections, maybe. It's about making things more acceptable.

SR: It's related to your earlier question - what is acceptable, is it scary. I think it's always this balance between giving away control for comfort and keeping control for just feeling more human. There are certain things that we enjoy being difficult, and there are other things that we like being simplified. For example, playing an instrument is always going to be an enjoyable yet complicated task, while taking care of your heating is something where you would love to have help. It's about finding where help is needed and still leaving certain challenges for people.

NH: When I look at your work, it's about design of course. But for me, it's more like art. Do you feel more like a designer, an artist, or maybe both?
SR: In this case, there is a very nice framework called 'critical design.' It's a nice escape for us to be able to point at questions rather than solutions while designing objects. Especially doing things that are real. Art sometimes is very abstracted from reality. I still think about situations where there are people, and reactions. Art does the same, but in a much more abstract way. I still think about using and about mechanisms. The work I was doing before was much more about questioning rather than solving. And that's the biggest difference – it's not really about being an artist or a designer, but about having a chance to point at questions rather than find a perfect solution. I'm still a designer, I still love to solve issues and work with real-life problems, but at the same time you need this high-level space in which you can explore different scenarios that don't really exist. Design fiction and critical design are these nice islands that are extremely interesting for the design community. If my project was only a concept, if it was on paper, it wouldn't have had the same impact, because in the end using it and having real people experiencing what it could mean to have this reality is something that makes it more relevant.

Addicted Products – a graduation project by Simone Rebaudengo, implemented during his internship in Haque Design & Research company in London. The project outcome is the toaster nicknamed 'Brad' and a group of other toasters communicating with one another via the Internet and exchanging information on the extent to which they are being used by their owners. The project assumes that toasters cannot be purchased to become one's exclusive property and that machines (just like people) are influenced by peer pressure. Therefore, if the efficiency of the toaster (measured by the number of toasts made) is low compared to other connected toasters, the device feels abandoned and starts looking for a new owner. The project won many awards, including Best in Show and Best in Engaging during Interaction Awards 2014.
http://www.addictedproducts.com/

NH: What are the real consequences of the Internet of Things then?
SR: For me, the main issue is that there are still not clear values for a lot of the things that can be connected. One thing that I always try to point at is that we're still talking about the same scenarios that we used to 20 years ago. It's always about perfection, about efficiency-driven future, where everything works perfectly and is seamless. The alarm clock, the fridge. For some people it's great. But I don't think that's it. For me at the moment, the biggest problem is finding interesting reasons behind connecting objects that are not only efficiency and companies' goals. Because at the end of the day, when we talk about machine-to-machine, it's always about finding extreme efficiency for whoever produces the product, which is the understanding of how a product is used and being able to update the

The communication platform of the Addicted Products project.

software. It's basically time we found more interesting scenarios that are not only efficiency-based. How can things be more experiential or interesting? There's going to be someone that's going to develop the right infrastructure, and there are a lot of companies running for those. At the moment, it's still about giving enough freedom to people. It's just very early now - that's the main issue. It's the solution, but we don't really know what the problem is. For me, it's only about time and building complexity on top of the very simple use cases. How do you feel about this?

NH: I think we are moving to bigger problems now, because when talking about the Internet of Things, we mainly focus on how we live in the world of our data, our private issues. For me, the Internet of Things is more about useful products.

SR: I agree. Even though my project was a critical experiment, it was still aimed at behavior change, at making people realize how they use products, if they really care about those products and why they care about them. Is it because ownership is the value per se, or is it because they actually need that product? So, suddenly you have much more possibilities as a designer to create a much richer experience. Whether it's because that object has more data points that it can read from, or whether that object is connected to many more objects so it can have a different level of interaction, or whether the object has a possibility of reaching other people outside, or other products. I think it's about being able to reach at a different scale which was not really possible before. ■

HYBRID WORLD

I honestly admit that when I got down to summing up last year's trends for TrendBook 2014 and saw "hybrid world" on the list, I was taken aback. During the year, the trend became so common and obsolete that I got the impression that I had described it 3 years ago. Manufacturers exploited it to the maximum and in many fields – advertising campaigns (e.g. H&M's #HMLookNbook campaign), sales (TweetShop launched by Marc Jacobs) or merchandising (apps such as ShopKick, which reward users for entering a brick-and-mortar store by showing them product locations and the quickest way to get to them). In Poland, one of the most hyped up hybrid world actions was the recruitment campaign by Hypermedia Isobar – using a rover (Isobar Explorer), you could tour the agency headquarters or talk to its employees. Nevertheless, a real showpiece of hybrid world was the former Burberry boss Angela Ahrendts joining Apple as its new SVP of Retail and Online Stores, the move which was announced in late 2013 (she officially took the position on May 1 this year). Her famous words, "Traditionally, wholesale is wholesale. Digital people are incentivized to drive digital. And store managers are interested in the store. We blew that all up. I said, No, no, no, store manager in Detroit: You're responsible for digital too. You're telling me nobody in Detroit is shopping online? Wrong!" show that the hybrid world today should be directly incorporated into the business strategy of each company.

photo. Hypermedia Isobar

As a result of the non-standard campaign launched by Hypermedia Isobar, the company received almost 300 CVs

Reliability of the trends predicted for 2013

TREND	YES	NO	TO SOME EXTENT
internet of things	✓		
wearable computers			✓
big data and privacy			✓
humanisation of machines	✓		
hybrid world	✓		

TRENDY 2014

INTERNET OF PLACES

i.e. context and micro-location

Despite the word "smart" in their name, our smartphones are not as intelligent as you would expect. First of all, they do not learn "us" and our behaviours – after two years of usage they know about us as little as they did at the time of purchase. Second of all, they are not aware of the context they are in at a given moment, so they do not know whether we are in the bathroom or at the mall. It is the second issue the Bluetooth Smart technology is likely to change very soon.

INTERNET OF PLACES

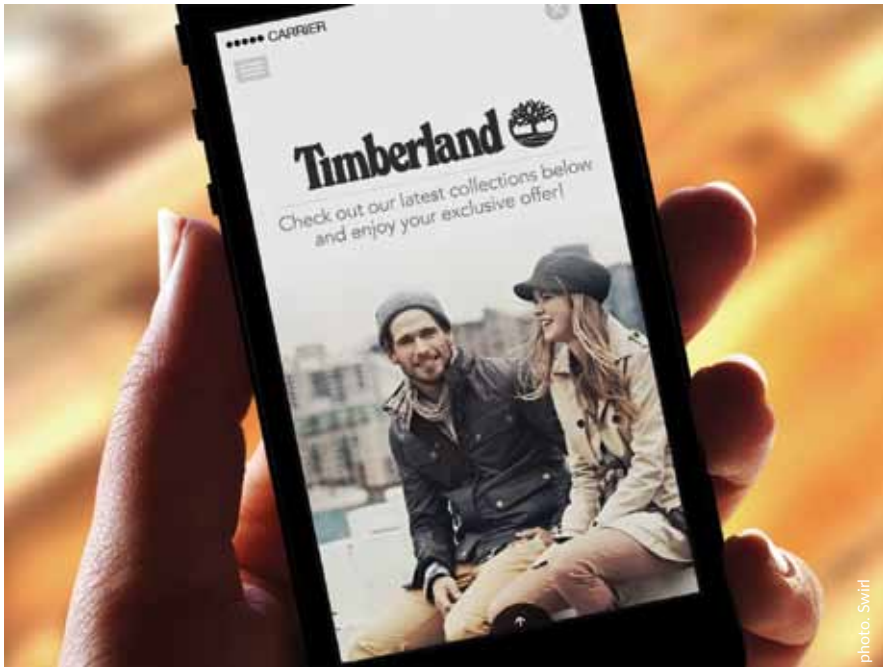
Trend

Internet of Places is a trend that is inextricably linked to the development of the new technology referred to as Bluetooth Smart. Although the name has the word 'Bluetooth' in it, it has nothing to do with the Bluetooth that pops to mind. First of all, it is a low-energy technology and does not consume batteries like the conventional Bluetooth. Second of all, it does not require the so-called pairing, which means that the message between devices is sent without much user involvement. Finally, it is the short-range technology – using it in any physical location (shops, hotels, train stations, museums, airports, schools, etc.) allows you to send information which is perfectly tailored to the context in which the user is located. This is because the technology "understands" if the user, or – more specifically – his smartphone (or tablet), is located 2 or 20 meters away from a particular place and, depending on the distance, matches the appropriate message (hence the name Internet of Places). This technology is integrated by default in all Apple products, from iPhone 4S and iPad3. It is also in the majority of new Android phones and all Nokia's Windows Phones. This means that each of them can not only receive information, but also transmit it (in practice, however, the transmitters are usually an additional device, such as the one offered by the Polish start-up called Estimote). Taking into account only the number of commercially available iPhones in version 4S and higher, Ben Bajarin (columnist at Techpinions) estimates that there are 200 million beacons on the market.

Due to the consumers' ever-changing shopping habits, and especially because of the increasingly popular showrooming (the Mobile Institute's mShopper research done in April 2014 shows it is at the level of 30% among all Poles and at the level of 75% among smartphone users), the Bluetooth Smart technology seems to be the holy grail, primarily in trade. 72% of respondents declare that they are more willing to buy things in a physical store, having received an offer sent to their mobile device and tailored to their interests or their current location while shopping (Swirl data, March 2014). No wonder that today most of the players move around this area.

How Bluetooth Smart operates

A beacon placed in a physical location (e.g. in a store) identifies the user's phone and sends information adjusted context-wise to the user's current location. Because the phone "can hear" what the beacon "is saying," it receives this information and displays it on its screen in a particular application.



The Bluetooth Smart technology allows the user to send information which is contextually adjusted to where he happens to be at a given moment. The image shows the Swirl's solution for the Timberland brand.

Key words

microcontext, context is king, beacons/ibeacons, bluetooth smart, bluetooth low energy (BLE), bluetooth 4.0

Accompanying trends

mobility, showrooming, Internet of Things, retail everywhere, connected consumer, Generation L (especially in the context of the desire to receive information quickly and automatically instead of searching it on one's own)

Reasons behind the trend

From the market's perspective: the development of a proper technology. Granted, geolocation technologies, including NFC and RFID, existed before (geolocation and proximity technologies as important trends were described in TrendBook 2011), but the Bluetooth Smart is more souped-up in at least several aspects (see the interview with Jakub Krzych from Estimote – p. 29). From the consumer's perspective: perpetual lack of time, the nanosecond culture and the expectation that the information will find us instead of us finding the information (a distinctive feature of Generation L). Finally, from the seller's perspective: on the one hand, constant pursuit of ways to root out the phenomenon of showrooming and of consumers switching to online stores, but, on the other hand, providing users with better (richer) experience related to shopping in brick-and-mortar stores and making shopping easier for them.

Examples of the trend today

In late 2013, Apple set this technology in motion in all its American venues (more than 250 in total). Moreover, last November, ShopKick (a mobile shopping app provider) gave it a test run under the name of ShopBeacon in selected Macy's (in New York and San Francisco) and American Eagle stores. The functions which ShopBeacon enabled included personalised greetings for people entering the store and offering them discounts and recommendations. ShopBeacon is compatible with the ShopKick app; therefore, if someone liked a particular product in the application itself, the app reminded him of this product while in the store and it was all context-sensitive (if the person liked shoes, the information popped up in the shoe department, not in textiles, for example). PayPal too has its own beacon (PayPal Beacon), whose target is to facilitate the payment process – the ultimate vision is that a person walks in to a store, takes a product they want to buy, walks up to a shop assistant, says "I'm paying with PayPal" and leaves – the entire process is carried out directly between devices and is only voice-controlled.

Apart from the big players such as the above Apple, PayPal, ShopKicks or PassMarket Beacon (the last one being offered by iMobile3 in collaboration with Ingenico), the beacon market is a hotbed for many start-ups, among which I should mention our native Estimote, or Roximity, and for companies like Swirl or inMarket, which are marketing platforms for beacon management (services of these two companies have been used by such brands as Timberland and Procter&Gamble).

Applying the trend in marketing solutions

Applications are almost unlimited provided we assume that the most obvious usage of Bluetooth Smart is linking a physical location with digital information. Today, beacons are utilised mainly in trade (providing users with e.g. additional information about the product which they are close to and about discounts, organising contests, showing routes to a specific place in the store and offering personalised greetings e.g. upon walking in to a store or a specific department, upon payments, etc.), but it is easy to picture them in many other places, too. When Apple first rolled out its technology for developers, they decided to experiment on a museum – additional information about a particular work of art popped up on an iPhone screen when the user stopped next to it.

The Bluetooth Smart technology can also be used at airports (we can receive departure time information when too far from the gate (up to 100 m) and unable to read information from the departure board), fuel stations (it can activate a coupon for a free coffee while we are refuelling) or in any place of public use (it can indicate a route to the nearest toilet, exit, etc.). Beacons are a boon from a marketer's point of view too, as they allow for in-store analytics – a sales assistant can use them not only to check how long a client was watching a dress, but also how many times she came back to it.

Jakub Krzych
Estimote

Jakub Krzych, co-founder and CEO of Estimote – a start-up supported by the California-based seed accelerator YCombinator. Estimote was chosen the best hardware start-up at TechCrunch Disrupt 2013 for its small sensors, called beacons, which enable communication with the consumer in retail space. Prior to founding Estimote, Jakub Krzych founded and co-created AdTaily, the largest self-service ad network in Poland, where he served as Board Member and the Head of Product.

"We build an operating system for the physical world."

Jakub Krzych, co-founder and CEO of Estimote, which TechCrunch Disrupt SF 2013 hailed the best hardware start-up, talks about the Bluetooth Smart technology, its applications and why it's going to swap places with NFC and RFID.

Natalia Hatalska: I'd like to ask you about the technology itself – first of all, what is it all about? Second of all, which name to refer to it is the right one – Bluetooth 4.0, beacons, ibeacons or BLE? Does it even matter which one we use?

Jakub Krzych: That's a valid question. Let me start with the basics. Historically speaking, in order to connect to simple devices like speakers or headsets, smartphones used to use Bluetooth, which, in terms of technology, is similar to Wi-Fi, has the same frequency and also enables audio streaming. The thing is that Bluetooth has been designed to require pairing, and it doesn't always work. That's why efforts were focused on streamlining this connection, and their outcome is Bluetooth 4.0. This version of Bluetooth uses the technology developed by Nokia, which is a low-energy technology, i.e. it enables the exchange of minute portions of information in a simple and straightforward way. It eliminates pairing, so devices can share portions of information whenever one of them is near the other. In this way, the so-called Bluetooth Low Energy (BLE – author's note), aka Bluetooth Smart, has become part of Bluetooth 4.0. When promoting this technology, the Bluetooth organisation uses the marketing name Bluetooth Smart. Since iPhone 4s, the technology has been installed in smartphones.

NH: In all of them?

JK: Yes, in virtually all of them today. But a year or a year and a half ago, it wasn't this many devices. So, Bluetooth Smart is just Bluetooth which doesn't need pairing and which enables the exchange of small portions of data, while consuming very little energy.

NH: One question though, 'doesn't require pairing' means that if you want to send something from your mobile to mine, I will get this data without having to enable Bluetooth on my phone?

JK: Not exactly. There are certain layers where you have to give your consent anyway; all iBeacon-related devices require the opt-in function and your permission. But what it means is that this particular version of Bluetooth doesn't need pairing to the extent it used to in the past. No need to provide any passwords; it works after you press the button on your device. That's the difference. From a technical point of view, Bluetooth is just a radio working on the frequency of 2.4 GHz. This radio announces small portions of information around. Your mobile phone is able to 'hear' this radio, and as soon as it hears it, it starts to 'talk' to it, and the radio answers back. The frequencies used by Bluetooth are the same frequencies used by Wi-Fi or microwave ovens, only that the waves emitted by Bluetooth Smart are extremely low power, so they won't cook anything, don't worry.

NH: Why aren't we using Wi-Fi then? What makes this technology better than NFC, RFID, GPS or Wi-Fi?

JK: Wi-Fi has been designed to send very large portions of data: movies, mp3 files, etc. As a result, the power of signals sent from Wi-Fi routers must be a lot higher, and Wi-Fi routers must be powered by electricity. In contrast, the power of Bluetooth Low Energy signals is very, very low. Bluetooth Low Energy has been engineered to send tiny portions of information.

NH: Is it only text information?

JK: It can be anything. These are just bits. Small portions of data like an URL, a number, that sort of thing. You're wondering what the main

difference is? Wi-Fi couldn't be used for this type of solutions, because Wi-Fi simply requires a lot of power. NFC, on the other hand, is the so-called passive system, i.e. NFC sensors have no power supply at all, they are excited by an antenna. Note that as you walk into an H&M store and take a random T-shirt, it has a tiny NFC sticker inside, which, de facto, is an antenna itself. Then, you walk up to this whopping gate near the exit, which is also a giant antenna emitting waves and only then inducing electricity in this tiny NFC. For obvious reasons, a mobile phone cannot have such a large antenna. That's why Bluetooth is an ideal solution in devices where we can put a teeny battery and just use the device as it is, without additional modifications.

NH: So, is it possible that Bluetooth Smart will supplant NFC and RFID?
JK: Yes, without any doubt. We have to remember that beacons such as Estimote have a small coin battery inside. One such battery is enough for a beacon to transmit information around for two years within the range of up to 70 meters. A mobile phone 'can hear' the presence of this beacon from 70 meters away and, more importantly, can estimate the distance between itself and the beacon based on the signal – obviously, the closer the beacon is, the stronger the signal – in other words, a phone is able to determine whether it is 70 m, 10 m or 10 cm away. Since a phone can hear the signal and knows how to estimate the distance, something like NFC can be readily replaced by Bluetooth: you bring your phone near the beacon to make a transaction. Therefore, NFC automatically becomes dispensable. When it comes to RFID, the QR codes, etc., they will also vanish, because everything they do is possible thanks to Bluetooth. Nothing else is needed: no gate, no readers, no scanners. A simple Bluetooth-enabled smartphone will do, and we're going to have a bunch of these.

NH: What does a consumer have to do to have this information displayed? You said there's always the opt-in function.
JK: Let me tell you how it works from a technological point of view. Imagine a blue beacon stuck to a blue H&M T-shirt. When you enter an H&M store, your phone begins to hear the signal from this beacon; it knows that the beacon is there and can hear his number. That's it. Unless you have an application that knows what to do with this number, nothing happens. However, if you have the H&M application and this application listens out for this particular number of the blue beacon, the application may trigger some action, depending on the distance. For example, if you're standing 2 meters away, it will display the price of the T-shirt. This rule is embedded in the application, and you as a consumer have to meet three conditions. You must have your Bluetooth enabled. In fact, most people do, because it is enabled by default. You must have an application that is compatible with this particular beacon. Finally, you need to approach the beacon close enough to trigger action. If these three conditions are met, there will be action. So, the basic difference between the beacon technology and other technologies such as SMS, for instance, lies in the fact that, first of all, the user remains in full control. If you don't want to receive any messages, you just turn off your Bluetooth and become invisible to all systems. Second of all, if you don't want certain messages, you simply delete the application or you don't install it in the first place. Let me give you an example. If you go to an IKEA store and want to shop faster, because instead of scanning QR codes or jotting down product names you can approach an item and simply add it to your cart, you just install an application. The application allows you to do what you need to do faster and better. You get the added value as a consumer, but the brand or the store owner gets his own value too.

Bluetooth Smart is just Bluetooth which doesn't need pairing and which enables the exchange of small portions of data, while consuming very little energy.

NH: What value?
JK: All things that I've mentioned work in the opposite direction too, i.e. the application can hear the beacon and is able to convey this information to the server. As a result, in the context of our example, H&M knows that you've just approached the blue T-shirt, that you visited the store a week ago and that now you've just spent 10 minutes looking at the T-shirt.

NH: That's interesting. I thought the way it works is that a retailer installs the Estimote device in his store and that my phone has some default Estimote app. But now I can see that application development

photo. Estimote

is the responsibility of a retailer or the one who wants to send messages, isn't it?
JK: There are several solutions. There are models in which the application is developed by you yourself. But a model with an application delivered by other brand seems the easiest. Another thing is that brands are likely to become more incentivised to develop their own applications and thus provide the consumer with added value. In fact, over time this technology is going to replace loyalty cards and other communication channels and allow such processes as payments and analytics.

NH: Today, BLE is considered mainly in the context of trade, and most of the examples come precisely from this category. What could be the applications of Bluetooth Smart outside stores?
JK: Well, we're focusing mainly on trade because trade is the holy grail for this type of technology. Keep in mind that 95% of all transactions globally are still made in brick-and-mortar venues. Allegro, eBay, Google, Amazon and the like constitute mere 5% of the total trade. Traditional trade in physical stores is gigantic. As a result, such technologies see trade as an opportunity to grab, but of course they have much wider applications.

NH: One more thing. Indeed, on the one hand, we are still very attached to shopping in physical stores, but, on the other hand, we increasingly often shop with our phones. Most traditional retailers cringe in horror at the thought of the showrooming trend and consumers checking prices online or maybe even buying online while in a physical store. Can BLE be a solution dissipating this fear?
JK: Yes, it can. One important remark, though. 60-70% of the American population today has smartphones, and this figure will reach 90% within two years. In Poland and in Europe, this number is much smaller, but it is the fastest growing segment, so we can safely assume that, in two years' time, the number of smartphones will be tremendous. The trend you've mentioned is mainly observed in the United States now. It is true that big American chain stores such as Wallmart or BestBuy are afraid of showrooming. Some of them are even trying to fight it, disabling Wi-Fi or banning the use of mobile phones. But it's futile. Instead of fighting it, why not take advantage of it? So, if you like a telephone or a TV, you can use the application of the store to order and buy it at any time, no matter whether in the store or at home. You don't need to scan QR codes or write down numbers, you just come closer, pull out your phone and the item is already there. That's how we imagine it. But to answer your question – stores are the application that we all know and understand, but beacons have a lot more possibilities, e.g. airports, schools, hospitals, etc. This technology enables a fairly precise location of devices, so in fact – of people, because if everyone has a phone with them, it means that you can locate anyone, using their phones. Hence, what we enable is the location of people and context-sensitive communication with them. It's context-sensitive, because if you approach a blue bike, you will see a message specifically about this bike and you won't have a whole mass of other useless messages like you would have before.

Over time this technology is going to replace loyalty cards and other communication channels and allow such processes as payments and analytics.

NH: What are the main impediments for this technology to be widely used by the market?
JK: In terms of technology, both hardware and software, we've already got everything we need. What is missing is really, really great experience-building applications and awareness among customers. We know that different brands have such solutions underway, but they still have a long way to come. We must keep in mind that this technology is new. It appeared in September last year and we really have a lot of learning to do. Everybody does, both developers and consumers. Another thing is accepting such challenges like those related to privacy, for instance.

NH: We'll talk about privacy in a moment, but for now let's focus on safety. You said that beacons work within the range of 70 m. That means we have to assume that in order for information to be really context-sensitive, there must be a hundred or more of such beacons at the airport or in a store. Does this amount of waves affect our health?
JK: Beacons are like Wi-Fi routers, only with much less power. There are plenty of routers in supermarkets, so adding a few more won't change anything. There were different kinds of research which concluded that there is no risk to our health. It is true, however, that there must be a lot more beacons to cover an entire area of a mall or an airport.

What is missing is really, really great experience-building apps.

NH: What about data security? PayPal's beacon enables payments, so the situation in which I enter a store, take a dress, approach a shop assistant and, without pulling a phone out of my pocket, say, "I'm paying with PayPal," after which my phone connects to its beacon, the payment is made between their devices and I just leave.
JK: Indeed, PayPal is promoting its technology now. But the truth is that their beacons aren't even ready yet. From a technical point of view, it works like this: you are in the store and your phone hears a signal from the beacon, so when you approach the checkout counter, your application triggers the payment module. The payment module debits your credit card with a particular amount of money. You accept it and therefore don't have to type in any codes, everything is automatic. In fact, this solution could be developed by anyone, not only by PayPal. Is it secure? No one knows yet, because such solutions haven't been yet applied anywhere in practice. Technology-wise, it might be secure, because a mobile phone and a beacon are two computers able to encrypt data, and it is rather impossible to steal or falsify such data. It's like waving your card over a reader. However, it seems to me that it's a tad too early for such deployments, which we should probably expect later, maybe around the end of this year.

NH: When we talked last time, you said that your beacons had been dispatched to over ten thousand programmers all over the world. Are there any first Estimote deployments or is it still a developer version?
JK: At the moment, what we're delivering to our clients is only a developer version, because it's a new-born technology and we're discovering what else can be done and how it should work together with the clients. However, we have customers from various continents and the deployments are diverse, from museums and airports to chain stores and schools. Our clients include a lot of well-known brands, but right now we're not allowed to disclose whom we're working with.

NH: Within a very short period of time, this technology was adapted by many different players: Apple, PayPal, Roximity, etc. The market is highly competitive, what do you do to stand out from the crowd?
JK: Bluetooth Smart is a kind of protocol. Apple is implementing this protocol in its phones, and, naturally, there will be plenty of suppliers of such solutions. It seems to me that it will be a bit like with USB flash drives. It will become mainstream and everybody will be able to

manufacture it. That's why since the very beginning, since day one, we've been bending over backwards to stand out from the crowd thanks to our brand and our technology. Installing the beacon is one thing, but then managing the beacon fleet, managing content, managing locations, the whole security layer, payment layer, etc. – this is a whole range of different and mainly software-related solutions that we offer to our clients. Moreover, we're conducting research on the sensor itself and its physical appearance. What we're selling now is the first generation of beacons. In our lab, however, there are next generations waiting to be rolled out to the market. Therefore, we are confident that we'll be able to retain our leader position, also because right now we are undoubtedly number one. There are no other companies on the market which have sent so many sensors to their clients and whose clients are as prestigious as ours. It's likely that you'll hear about other systems, because they will be talked about in the media. But our strategy is to build technological support and focus mainly on developers and programmers. We believe that this will lead us to victory in the long run, that plenty of developers will know our technology and that the market will abound in applications based on our technology.

NH: You've mentioned design. I must admit that your beacons are supercute. But my question is not about that. What makes your beacons different is that they come in many colours. Does the colour matter?
JK: The colour itself doesn't matter, but it's part of a well-thought-out strategy too. Bear in mind that beacons are associated with some sort of privacy. Beacons will be able to spam or track users. Choosing particular colours of our sensors, we want to send a clear message to our customers and let them know that our beacons don't track users and are manufactured only in Europe, using European processors. They do not include any suspicious components. When we see that our client is misusing our technologies, we remotely disable the beacons. Design serves only to let the consumer know that when he is in a museum or a store and sees a familiar shape or colour of our beacon, he is safe and can enable his Bluetooth. He knows he won't get any spam.

In the future, apps won't be developed for a particular smartphone model, but for the real world, for a location.

NH: In one of your earlier interviews, you said that you want to build an operating system for the physical world. Could you elaborate on that?
JK: An operating system is something that can be controlled in a certain way. Imagine the following situation: today, software developers are creating a mobile app, e.g. Angry Birds, for a specific mobile phone model and a specific operating system. However, it seems to me that in the future, apps won't be developed for a particular smartphone model, but for the real world, for a location. Someone will create an application for an arena or Cracow, for instance. In order for that to be possible, someone else must write an operating system first, right? That's what it is here. First, we stick our beacons all over the world, building a kind of operating system for which it will be possible to develop different apps enhancing the quality of our lives.

NH: Are you saying that, in the future, we'll de facto move to the virtual world, that our physical world will become virtual?
JK: I'd rather say that we'll come back to the real world. The physical world will always be bigger and will always dominate. For now, it's disconnected. In our technology, we will connect it. When you board a bus, your ticket will be validated automatically. At the airport, it will tell you the departure time and gate of your flight. On board a plane, it will tell you which seat is yours. After you've landed, it will tell you the most interesting places to visit. It's about some sort of context. Today, although our phones are called smart, they are plain stupid. They don't know that you're home in the kitchen or that it's evening. But it's going to change due to all of these sensors of different sizes and located in different places, which will provide your phone with context. But not only that. We're talking only about phones here, but this technology enables communication with other devices too, including watches, smartwatches, Google Glass, etc. ■

CONNECTED CAR

your 4-meter-long smartphone

Cars seem to not have changed much in the past years. However, "seem" is the key word here, because the change has been happening, but under the hood. Over the last years, cars have evolved from machines into electronic devices, something we cannot see at first glance. Today, they are nothing more than driving computers (about which drivers are reminded in some cars with the Intel inside logo lighting up upon starting the engine). Internet connection in cars was only a matter of time.

CONNECTED CAR

Trend

The connected car is one of the hottest trends this year. As emphasised by Scott Sedlik, Vice President of INRIX (see p. 44), there are three waves of the connected car – what we are experiencing now is the second wave, where information can be conveyed to (navigation, social media, media apps) and from the car (data on speed, driving behaviours, etc.). Nielsen's Connected Life report (January 2014) indicates that 63% of respondents today, while deciding to buy a new car, opt for a connected car. According to GSMA report (Connected Car Forecast, May 2013), the worth of the global connected car market will amount to €39 billion in 2018 (a 3-fold increase in 6 years). It is also estimated that over the next five years, the number of new cars with the factory-built technology that enables connectivity will increase 7-fold. Intel predicts that the total number of connected cars on our roads will reach 152 million by 2020. This impressive surge in connected cars is propelled not only by their many advantages for users and manufacturers (the biggest of which is increased safety), but also by favourable legal and regulatory changes, at least in Europe (including the EC recommendation to have the eCall system installed in all newly-registered cars by 2015), which enforce Internet access in a car. The next wave of connected cars will be about autonomous (driverless) vehicles. IHS Automotive predicts that they will be launched to the mass market around 2025 and will constitute 9% of the total car sales by 2035 (Autonomous Cars – Not If, But When, 2014).

Key words

smart vehicles, autonomous cars, self-driving cars (SDC), internet of cars/ internet of automobiles, A4A (Apps for Automotive)

Accompanying trends

Internet of Things, Internet of Places, big data, connected consumer, hybrid world

Reasons behind the trend

There's at least a few, but it's hard to determine which is the most important. Firstly, all issues related to the so-called connected consumer (one billion smartphones were sold globally in 2013 alone; IDC 2014)

BMW is advertising its connected car at Warsaw's Okęcie Airport.

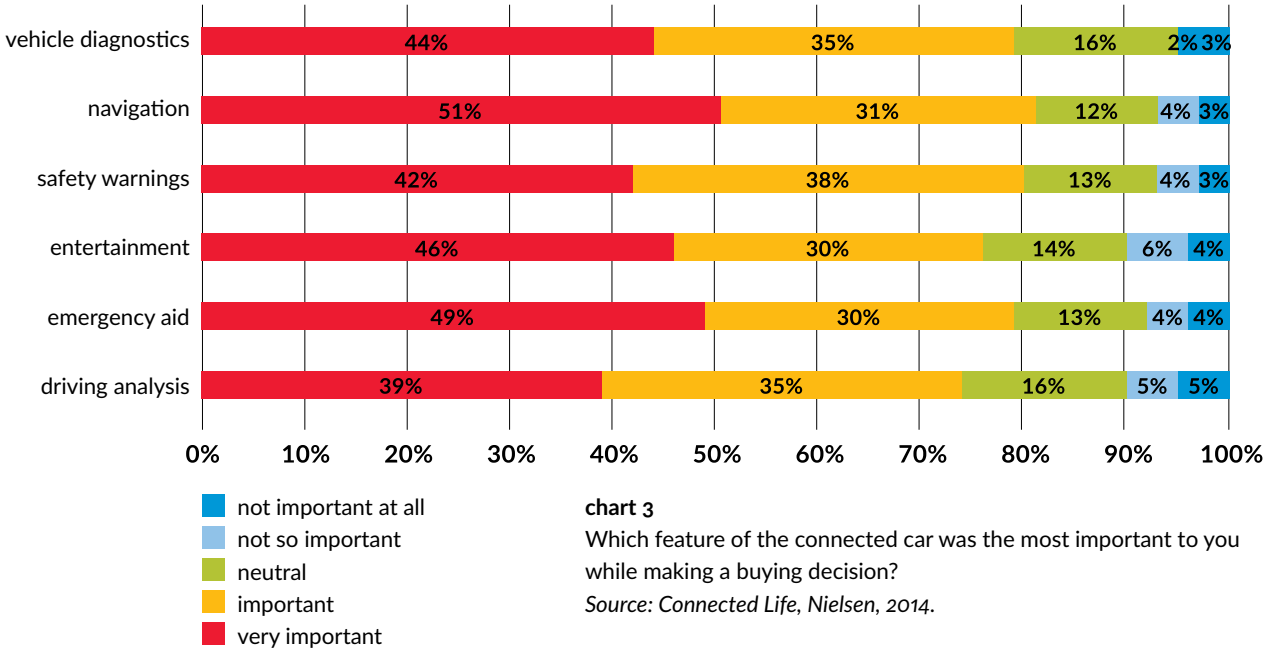


chart 3
Which feature of the connected car was the most important to you while making a buying decision?
Source: Connected Life, Nielsen, 2014.

living in the hybrid world (a combination of the online and offline world) and in the instant culture (the consumer expects constant access to information regardless of time and place). No wonder that consumers transfer such habits and behaviours to activities related to driving a car – as much as 75% of smartphone users declare that it is important for them that their phone is connected to their car. Secondly, the need for sustainable development (see page 35). Being stuck in a bottleneck and searching for a parking spot not only causes increased CO_2 emissions, but also has a direct impact on economic losses (the time wasted in a traffic jam could be spent on work). Owing to the fact that data on such variables as traffic conditions, navigation or ways of effective driving are communicated in real-time, connected cars are likely to prevent at least some of these problems (all the more so because the traffic situation will deteriorate – it is estimated that by 2017 the global number of drivers will be close to 1.2 billion; INRIX). Thirdly, increased safety. It can be assumed that the mass launch of connected cars (autonomous vehicles, in particular) will be the same breakthrough for driving safety as installing car seat belts years ago (60% of accidents could be avoided if the early warning system started half a second prior to a potential collision and 90% – if the driver was warned one second earlier; see the infographics on page 37). Finally, high levels of personalisation that consumers currently expect. Solutions which I discuss with Nancy Lee Gioia (e.g. vehicle analytics, servicing and media; see page 38) and Elliott Garbus (e.g. vehicles responding to particular drivers; see page 41) will allow to provide the driver with extremely personalised services (including answers to such questions as: Where is the cheapest petrol along my route? Will it be faster if I get to point x and take the tube? (the so-called intermodal routing) What is my efficiency as a driver compared to other drivers in my city? What is the quickest route to avoid the traffic jam I'm now stuck in? Where is the nearest free parking spot?).

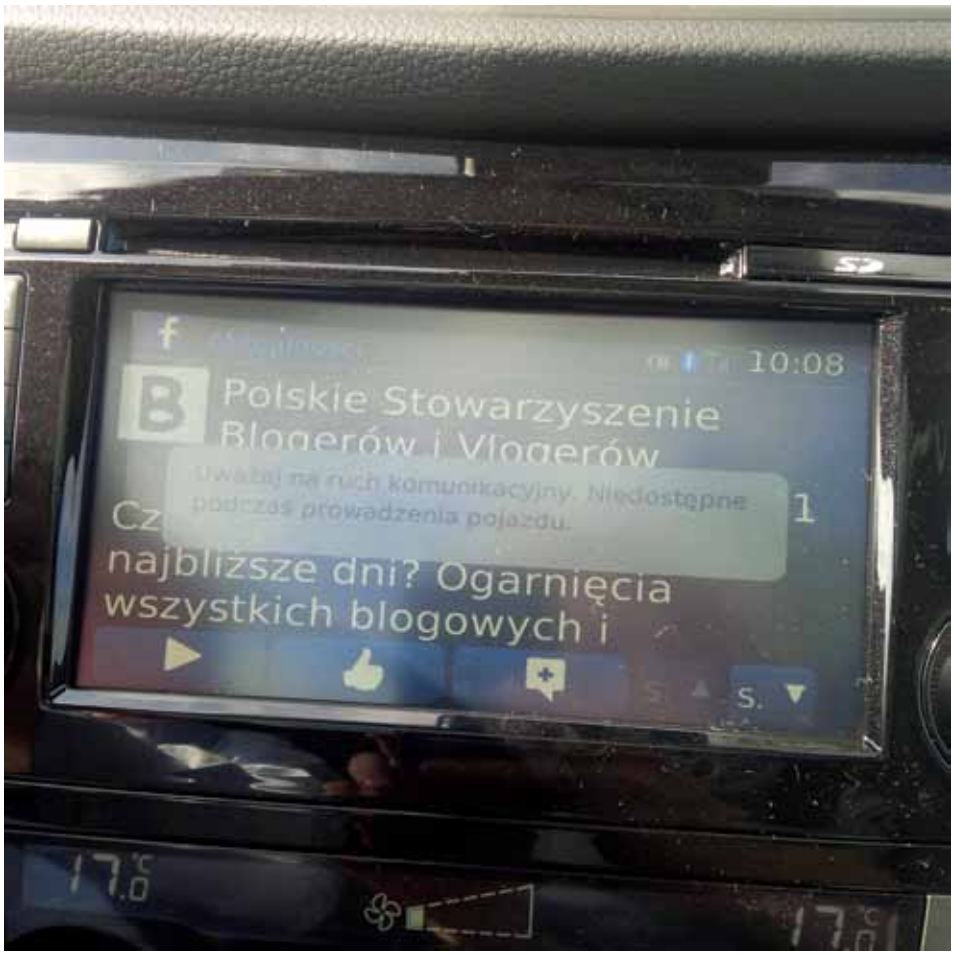
Examples of the trend today

Nowadays, probably all companies from the automotive, telecommunications, tech (including those in the area of consumer electronics, e.g. Sharp, Whirlpool or Nest) and media industry are exploiting the connected car trend, whether to a larger or smaller degree. Connected car systems are used by almost all big players, including BMW (BMW Connected Drive), Ford (Ford Sync), Toyota (Toyota Entune), Audi (Audi Connect), Nissan (NissanConnect), Infiniti (InTouch) and many others. This is actually one of the problems highlighted by the industry – instead of a single common platform, there is a multitude of platforms used by different players. This was one of the reasons why in January 2014, Google, in cooperation with General Motors, Honda, Audi, Hyundai and NVIDIA, created the Open Automotive Alliance, whose purpose is to implement and develop an Android-based platform in cars. Apple unveiled its own version of the OS "for the car" (CarPlay) at the International Motor Show in March 2014 in Geneva (Apple's partners include Mercedes, Ferrari and Volvo). With its Windows Embedded Automotive 7 platform, Microsoft is not lagging behind (its partners include Kia and Fiat). During this year's Mobile World Congress, Volvo presented a demo version of the "Roam Delivery" service, which enables delivery of products directly to the car.

Applying the trend in marketing solutions

First of all, offering solutions which make the driver's life easier (solutions not only related to the servicing of the car, finding parking spots or offering alternative routes analysed in real-time, but also to the more mundane things, e.g. after saying out loud the name (of a restaurant, for instance) saved in his smartphone's phonebook, the driver will see the restaurant's phone number on the car display, and the navigation

During this year's CES, GM announced that their newest line of Chevrolet cars to hit the production lines next year will have the embedded LTE technology, and the user will be able to browse through applications in a dedicated app store. This way, the new Chevrolet will be nothing more than a four-wheeled smartphone.

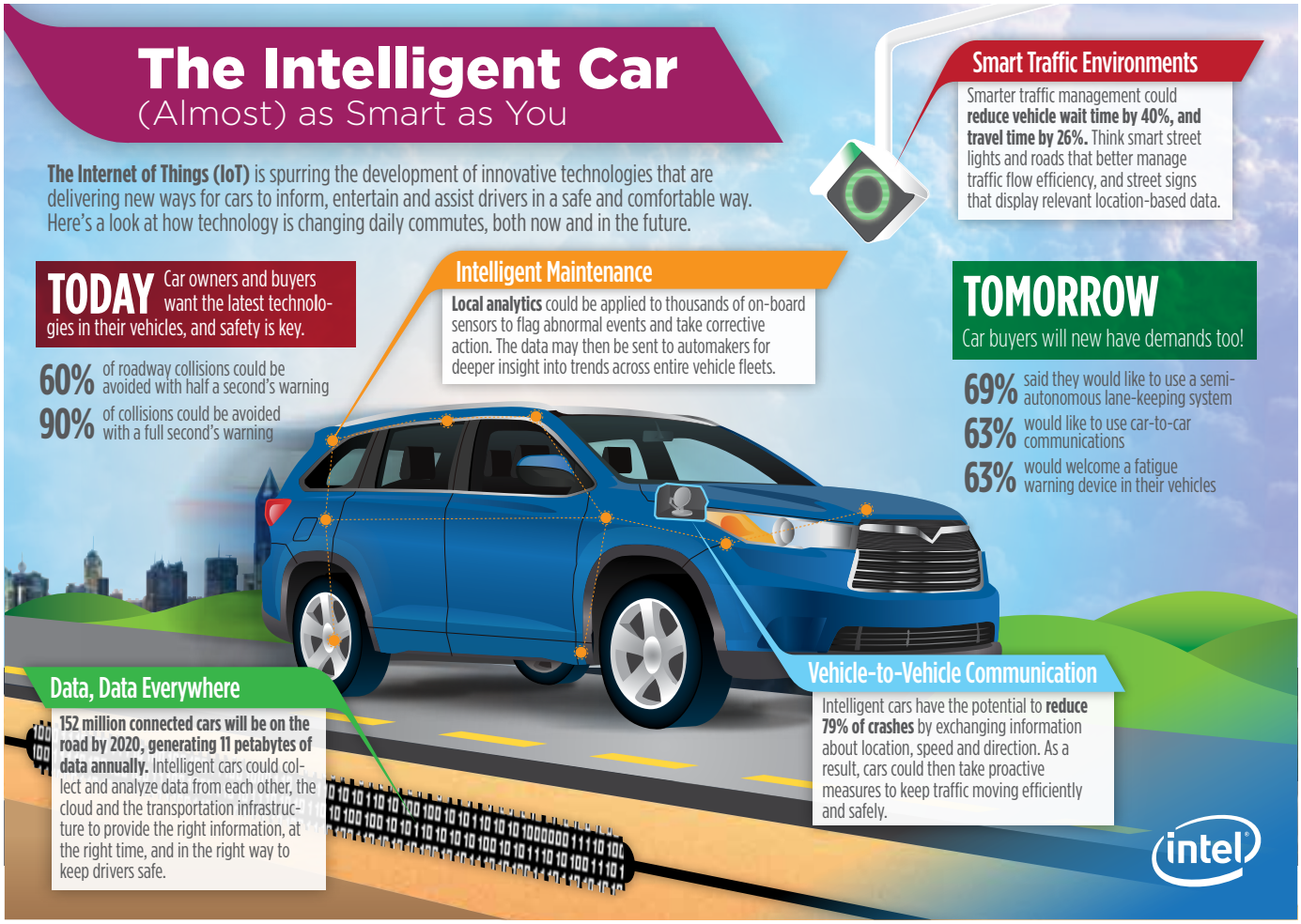


One of the challenges that connected car manufacturers are facing now is how to provide users with access to the Internet without putting their lives in danger. The newest model of Nissan Qashqai allows you to browse through Facebook posts, but it's impossible to comment on them.

system will direct him straight to the place he called). Second of all, offering applications that allow the driver to:

- access information useful while travelling (e.g. TripAdvisor in Nissan, Yelp in BMW);
- contact other people (send e-mails and use social media such as Facebook or Twitter);
- access a wide range of entertainment (including Amazon Cloud Player, Deez and Pandora).

More on the solutions in the interviews with Scott Sedlik (p. 44), Nancy Lee Gioia (p. 38) and Elliott Garbus (p. 41).


The Intelligent Car
(Almost) as Smart as You
The Internet of Things (IoT) is spurring the development of innovative technologies that are delivering new ways for cars to inform, entertain and assist drivers in a safe and comfortable way. Here's a look at how technology is changing daily commutes, both now and in the future.
Smart Traffic Environments
Smarter traffic management could reduce vehicle wait time by 40%, and travel time by 26%. Think smart street lights and roads that better manage traffic flow efficiency, and street signs that display relevant location-based data.
TODAY Car owners and buyers want the latest technologies in their vehicles, and safety is key.
60% of roadway collisions could be avoided with half a second's warning
90% of collisions could be avoided with a full second's warning
Intelligent Maintenance
Local analytics could be applied to thousands of on-board sensors to flag abnormal events and take corrective action. The data may then be sent to automakers for deeper insight into trends across entire vehicle fleets.
TOMORROW
Car buyers will new have demands too!
69% said they would like to use a semi-autonomous lane-keeping system
63% would like to use car-to-car communications
63% would welcome a fatigue warning device in their vehicles
Data, Data Everywhere
152 million connected cars will be on the road by 2020, generating 11 petabytes of data annually. Intelligent cars could collect and analyze data from each other, the cloud and the transportation infrastructure to provide the right information, at the right time, and in the right way to keep drivers safe.
Vehicle-to-Vehicle Communication
Intelligent cars have the potential to reduce 79% of crashes by exchanging information about location, speed and direction. As a result, cars could then take proactive measures to keep traffic moving efficiently and safely.
intel

Nancy Lee Gioia
Ford Motor Company

Nancy Lee Gioia is the director of Global Electrical, Connectivity and User Experience of Ford Motor Company. She was elected to the Brady Corporation (NYSE:BRC) Board of Directors in November 2013. Gioia directs strategy and planning for the company's efforts on connectivity, electric products and user interface. She is responsible for corporate and portfolio strategy, product strategy and partnerships with service providers and government. She is recognized as one of the most powerful women in the technology sector. In 2014, she was honored by Connected World magazine with Women of M2M title, next to Yahoo's Marissa Mayer, IBM's Florence Hudson and Microsoft's Julie Larson-Green.

"Connectivity is an enabler."

Nancy Lee Gioia, Director of Global Electrical, Connectivity and User Experience in Ford Motor Company, recognised as one of the most influential women in the technology sector in the world, talks about connected cars, their consequences for users and the opportunities they bring.

Natalia Hatalska: What does the connected car mean for Ford?
Nancy Gioia: We always look at everything first from the customer's point of view, and since we have connected customers today with smartphones and tablets, part of the connected car is to really enable our customers to safely and securely maintain appropriate connection while in the vehicle. What we mean by that is if you're driving a vehicle, rather than having to pick up and touch your device, we want to enable connectivity through our synced technology which allows you to activate your smart device, listen to music, get information, even send text messages – all by voice and while you have your hands on the wheel and eyes on the road.

NH: So this is the customer's perspective...
NG: Yes, for a connected car, one part of it is enabling customer's digital lifestyle safely and securely in the vehicle. The other though is an opportunity for us to enable enhanced services to the customer. Those services could be vehicle health reports – so information on their vehicle, because data from the vehicle can be gathered and presented to them so that they can take decisions and choices on service and have the information and even coaching on how they can better utilize their vehicle for, say, fuel efficiency. Such additional services may be remote lock and unlock. Many of the other services that are available on premium cars that we're looking at at Ford are, over time, making those available so that customers can have the convenience of that connectivity. Finally, as a custodian, we view the opportunity to help with customer data. So, we would be a steward on behalf of the customer to collect that data, help them with that, get access to data that they can't get access to by themselves today, so that they can improve their drive and transportation experience. We would also help aggregate that data so we, Ford, can better understand and learn what customers want to be able to provide them with even better solutions. With that then we have a connected company. When we think of the connected car, we put the connected customer in the center, and then we look at making sure that we, as a connected company to that customer and then to other third parties, enable what the customer would like to do for the best value for them.

NH: I would like to get back to this data part. In one of your previous interviews, you said that Ford is able to pull out ten terabytes of data every thirty minutes. What kind of data is it, and how can it be used for improving consumer experience?
NG: That figure is actually the amount of data generated today on our Mondeo hybrid. Today, we do not take all of that data off the vehicle, but if we said we wanted to gather all of the data, that's the amount we could gather. That data would be a variety of things. It would be data around how the vehicle is functioning: the brake systems, the air-conditioning, how the vehicle is going down the road, what temperature is the vehicle at. We do not track, for example, GPS data or location data. We would have a snap shot of maybe a point in time, but we do not have a stream of location data over time. But, the way that all could be added to help customers by tracking, for example, how the vehicle is functioning. We can, over time, understand and say that it's time to have your brake-pads repaired, because we're noticing a difference in the braking function, not that there's a problem with it, but the normal wear-and-tear would say: now would be a good time to start to think about planning service for your brakes. That kind of information we can

For a connected car, one part of it is enabling customer's digital lifestyle safely and securely in the vehicle. The other though is an opportunity for us to enable enhanced services to the customer.

present to the customer, so that they can take the choice as to whether or not they want to take service at that time. Additionally, in the future, it will involve things like automatically helping them schedule service appointments if they choose. So, again, it's helping the customer lift information about their vehicle so that they then can plan their life and integrate whether it's service or whether it's maintenance. You could even vision where there's a severe financial penalty if you drive too many miles on a car if a customer has leased a car with mileage constraints. We can notify a customer that they're getting close to that and maybe present to them an alternative that is a lower cost approach, recognizing that their driving at this time requires more miles. I think you're going to see a number of opportunities and services presented to the customer. Most important though, from our point of view, is that the customer must always opt in. They must always choose to share their data with us. And that's very important to us. We are stewards of the data on behalf of the customer and what we want them to say is, "Hey, there's value by sharing this data and I agree to do that because I trust Ford and I appreciate the value that I'm getting back."

NH: You are talking a lot about the connected customer, but, for sure, there are some other factors that are very important in the development of connected cars. Sustainability is one of them. Another factor you've already mentioned is safety. What are other factors?
NG: There are going to be many values to both the customer and society. The connectivity, as you mentioned, from sustainability. With the connected vehicle: understanding driving patterns, real-time traffic, altitude, temperature, over time – the capability to redirect customers in real time so that they can be more efficient in their drive, consume less fuel or even adjust real-time engine calibration so that they can optimize their fuel efficiency as e.g. they go up hills, down hills or are stuck in stop-and-go traffic. There will be more ability, I think, to develop more and more real-time software feedback to optimize that condition. So, sustainability is a part of this, not only fuel economy and emissions, but also the life and wear-and-tear on the vehicle, which then helps to reduce customer costs as well. As we move forward, connectivity will move also into the realm of semi-autonomous to autonomous driving, and so this is where you're going to have connectivity not only for the customer and in their digital experience, but connectivity between vehicles and roadway infrastructure. Today, we have a lot of on-board processing for lane departure warnings and automated cruise-control where we can actually bring a vehicle to a halt and avoid accidents. This is going to continue to become more and more sophisticated, and connectivity is one of the underlying, enabling technologies to make that system work better and better over time. The third big area is that connectivity is absolutely an enabler. There is going to be more advanced mobility solutions for the future. And this is solutions that might mean multi-mode transportation. If you're a connected consumer and you're on your bicycle or an electric bike, you come to an area, you have your reservation set up, and you can now go to car sharing plan, you can now automatically get to proper parking so your time idling through the city is reduced. Again, good for the community. Also, a much more effective use of the transportation - car, truck, bicycle, train. It's really about coming up with integrated solutions, especially for densely populated areas, so we see connectivity as an underpinning technology. Talking to the consumer, the infrastructure, other businesses and third-parties in the whole mobility solution arena will be critical to enabling that type of better social mobility for the future.

NH: So is it, as you once said, a better transportation in the car and out of the car?
NG: Yes. And that's the other important element. When you're connected, we view connectivity not just as the experience in the car but the experience outside the car. So, it's really enabling your mobility, whether you are in a vehicle or out of the vehicle. The final thing about connectivity and a really important one is that when you have a connected vehicle, you now are able to update vehicle software over time. And this could be like today with smartphones or tablets apps. Updates are either to add or enhance features, or to more quickly correct errors, mistakes or things that could be done better. We see the same future in vehicles, where a vehicle today, when delivered, hopefully it's a great vehicle, but it doesn't really get better over time. In the future, we see the opportunity, via over-the-air updates, to make a vehicle better over time, make the customer experience enhanced over time. That's going to be a challenge for the industry, but we see that as an important part of that value proposition for the customer.

NH: I will come back to the autonomous car you mentioned but now I would like to ask what are the obstacles for the connected cars to go fully mainstream?
NG: Well, certainly there's a number of technical challenges, but I think as we look at one of the biggest concerns and how we've designed our systems to be as robust as possible, it's making sure that any connected portion in the vehicle itself if safe and secure. The safety and the security is more around data and the ability to assure the systems continue to operate in a manner in which they were intended to do so. This means that today, we partition and cordon off certain modules so that their software cannot be touched, and, going forward, as we do more and more updates, we have to always make sure we design those with the most sophisticated and appropriate security systems to assure the vehicles operate well. Today, that's true for any software system. There are a number of things we do, from encryption to threat-modeling. We build in firewalls and we have to really make sure that there's public and private cryptography. There's a whole series of things that we do as we think about the structure and how software gets updated to assure if it's updated and if it's exactly as intended. That's one element. The other element is making sure, after data is available, that it again continues to be handled in a safe and secure way - on-board and off-board. There are different requirements around the world, and we need to make sure that data is handled as the customer would like and that it's compliant with any local regulations.

NH: While talking about safety, there is also the other side of it. My question is about the number of apps that should be included in the connected car, because driving experience is dangerous, and now there are some applications that can distract you from driving. Do you think there should be a limited number of apps inside the car, and if yes – which ones are the crucial ones?
NG: Great question. What we're really talking about is driver distraction. We feel driver distraction is a very important issue. This is actually why we developed linking technology called AppLink. That technology gets embedded in the apps directly, so if you go to the Apple store, and an app is approved to work on a Ford vehicle, you don't have to download a unique app for Ford cars, it's in the core application. And then, if it's on your brought-in device, one of the elements that we work very hard on is we make sure that we have an approval process that

looks at apps and says whether or not they're appropriate or logical to be used in a vehicle. Today, vehicles have many different sources of music, whether it's the radio system, a satellite radio or a brought-in device that's tethered and then people stream their own music from their device. In Europe, AppLink will first be introduced in the EcoSport model. What that allows is that the customer does not have to touch their device and does not have to interact with the screen, but they can use everything with the steering-wheel button and voice control. Your hands can remain on the wheel and your eyes can remain on the road. As we look at apps, if we can't execute it in a way that allows to voice simple directions to enable the customer to get the value that an app can provide, then we would choose not to implement it. We have policies and procedures for determining which apps we think are appropriate in the vehicle.

NH: What apps are appropriate?
NG: We have music, newsand things like that which people can easily access. There's also traffic and driving information - help me get to where I need to go. We feel those apps are also appropriate, if executed well, to be also in the vehicle. Then we have real-time traffic, real-time direction and turn-by-turn direction capability. Then, additional apps are always considered with this criteria. Now, a lot of data on apps says, in general, people may have many apps on their phone but they typically only use six to eight on a weekly basis, so the question of how many apps we make available should be paired with how customers really use smart devices and apps today. We've looked at categories, and as long as the app meets the criteria from our perspective so that we can execute it well with the hands on the wheel and eyes on the road, we could make many music apps available, but in reality customers come in using only one or two, and they'll only want to use those in the vehicle. I think there's some soft-limiting to how many apps customers really use. But, if you use Spotify and your husband uses a different music app, we would like to be able to have both of those available, but one's resident on your phone, and the other might be resident on your husband's. So again, the variety is taken down significantly by what the individual customer uses, but the choice that you have is to meet all of the different types of customers who would like to have that option available. Now, Ford also has made AppLink, technology available as an open-standard called Smart Device Link. We have made that available to anybody who would like to use it. So, we've tried to make that very good and safe way of implementing apps available as a standard for the industry. And we're excited by the number of partners who are now starting to use Smart Device Link. Again, driver distraction is important, we had some technology, so we've made that available for free as an open architecture, so that others can take advantage of that.

NH: I really like this motto of Ford - hands on the wheel and eyes on the road. You already mentioned the voice control and you are also experimenting with the gesture control – you can open the car's roof top just by pointing the finger on it. Are there any technologies you are working on?
NG: Today, it's the voice and it's the steering-wheel control. We have a number of other human-machine interfaces that we are studying. Of course, I can't share future product, but I can say that we are looking at a variety of ways to make sure that that interface is safe, simple, seamless, intuitive and consistent so the customer can come in and it just works well for them, it's just easy to use. And that's another way to reduce driver distraction, making things safe, simple and intuitive. So yes, we're investigating many ways to do the interface and we'll focus on those, and when we feel one is ready and right for the vehicle, we'll bring that into the vehicle.

NH: So these are maybe steps just behind the fully autonomous cars. I have read that you declare you will have a fully autonomous car on the market around 2025. Why this date? Why will it take so long?
NG: I guess I'm not familiar with the exact announcement that you're referencing. I believe we have said that we believe automated cars will really start to become viable in the larger market starting in around the 2025 time frame. We have not made any announcements as to when Ford would have a fully automated vehicle on the road that I'm aware of. Just to clarify. Today, we have a number of semi-autonomous or driver assistance features available on vehicles. We expect those to continue to grow. There are many things required to make autonomous driving work, and it is both technology and the vehicle itself. It's the capability and connection on the systems. It's the frequency and availability of communication and data flow bandwidths. It's infrastructure. So there is a number of elements to make this system work. And obviously, we're doing research. We have vehicles that demonstrate the technology today, and, again, as that technology evolves, Ford would like to be right there at the forefront with some of the new technologies required, but we want to make sure it works in the total system.

A vehicle today, when delivered, hopefully it's a great vehicle, but it doesn't really get better over time. In the future it will be different.

NH: My last question is about the future of the cars. Can we imagine the scenario that when the autonomous cars are mainstream, we won't need private cars at all? It will just be the cars that are publicly available.
NG: I think in some parts of the world - definitely. We'll see things like that as mobility evolves. I think that in other parts of the world the vehicle ownership model that we see today may continue for decades. I think that it's going to depend very much on transport mobility solutions. There's a number of other technologies that are going to continue to move forward that enable people to move about in society, to gather data and information at home or in different locations. So, in mega-cities, in densely populated areas, there will certainly be alternatives to the vehicle ownership model that we see today. Will that be true for all levels in society and all needs for vehicles? I wish I knew that, but then I would know where to invest. ■

Elliot Garbus

Intel Corporation

Elliot Garbus is Vice President of the Internet of Things (IoT) Group and general manager of the Automotive Solutions Division at Intel Corporation. He is responsible for delivering Intel's vision for connected cars spanning from In-Vehicle-Infotainment and autonomous driving to intelligent transportation systems. Previously, Garbus was Vice President of the Software and Services Group and General Manager of Business Planning & Marketing for the System Software Division. Garbus joined Intel in 1988 and has held positions in general management as well as management positions in processor and platform architecture, new product planning and application engineering. He holds 15 patents relating to microprocessor system design.

"Data security is really a critical issue as a vehicle gets connected."

Elliot Garbus, Vice President of Internet of Things (IoT) Group and General Manager of the Automotive Solutions Division at Intel Corporation talks about the data security in the connected car, personalization of the experiance and how the fact that the car is connected can change how it looks.

Natalia Hatalska: The car seems to be an interesting device in the Internet of Things.

Elliot Garbus: Yes, for a number of reasons. If I step back and say, "Why do you want to connect any device?", there are effectively two drivers. One is operational efficiency. You want to drive down costs. The other one is an ability to create new lines of business for new ways to delight your customer.

NH: Let's first talk about opportunities for operational efficiency.

EG: We've seen recently a number of major auto companies having to do recall. These recalls have largely been software thing, not in the head unit or IVI system but all the way down to charging system, acceleration system, and other parts of the vehicle. So, there's an element of the connected car which really relates to the operational efficiency of an automotive company. It's their ability to reach out, touch their customers and fix these kinds of problems without the cost of a recall and without inconveniencing their customers for the recall.

NH: And creating new lines of business?

EG: The other vector is in many ways more interesting and opens up a tremendous amount of opportunities. I think we're just starting to hear about some of those ideas and opportunities for what connected car means for new lines of business and new ways to delight customers. There are many scenarios you can come up with where having a connected car transforms the user experience. For many users, taking a vehicle in for service is a rather frightening experience, because in many ways you know you have a problem, but you don't know what's behind it. The ability to have sensors in the car and increased levels of connectivity to let you know specifically what the issue is and what the costs related are transforms the relationship between the service center and the customer. The ability to leverage technologies to better understand customers and what they do so that automobile manufacturers can create better incentive for them if they want to encourage them to bring the vehicle back to a dealer for service. They know why you used a particular kind of phone or listened to a particular kind of music service. They have that information to create an opportunity. Then, more importantly, as we look to the future and start thinking about autonomous vehicles, the importance of understanding the dynamically changing environment by an autonomous vehicle, the ability to do crowdsourcing of details which are more precised than what we had to provide and information on how close obstacles are to the road. So, if a vehicle needs to take evasive maneuvers, there's some information there; there can be data that's capturing what is the grade of the road or what are the curbs like, so that a vehicle can adjust its speed to create the most comfortable and fuel- or energy-efficient ride. In addition, as we are on the topic of autonomous vehicles, there's a lot that can happen around

There are many scenarios you can come up with where having a connected car transforms the user experience.

safety, as the car becomes more aware of the world around it. I'll share a little fantasy I have. My son is a teenager, although he's not driving yet. I can imagine that someday in the not-too-distant future, my car sends me a message and lets me know that my son has done a terrific job driving, has obeyed all of the speed limits and has not done any rapid acceleration or any fast braking.

NH: If he does, will you have a chance to intervene?
EG: The opportunity would be to praise him for being such a fantastic driver.

NH: I'll come back to autonomous vehicles later on. I'd like to stop for a second and talk about data in the car. In one of your previous interviews, you said that "the value of the data that a car can provide to auto-makers or maybe other companies is worth more than the car itself."
EG: I think there's a lot of different elements there. I'll hit on a few. Again, I think a lot of these use cases are still evolving. I talked a little bit about preventive maintenance. There's a lot of data in the car, but there's a tremendous number of sensors in vehicles already. The ability to open up the information to do a much better job improving the reliability of vehicles beyond where they are today – which is remarkably reliable – and being able to more conveniently schedule even a regularly scheduled maintenance is an opportunity that the data opens up. That can translate to both increased customer satisfaction as well as increased revenue. There's a whole set of things that relate to customer behavior and can be derived from customer behavior. This can bring up privacy issues that need to be handled appropriately, but if the car knows where I work, where I live, and if it can notice changes in those patterns, there are opportunities for businesses to create different offers based on those facts and patterns, not too different from Internet advertising or other mechanism.

NH: Such as?
EG: It could include, "Where do I go for gas?" or "Where do I go shopping?" As an industry, they're still learning that needs to happen. What's an appropriate way to alert drivers around those opportunities? Clearly, we don't want to distract them. Primarily, we want to be focused on driving. Then, there's a fascinating set of opportunities that really relate to business-to-business driving or a business-to-business transaction. For a rented car company, the ability to better and more effectively manage their fleet. When do they need service? How do they increase the amount of time the vehicles are kept on the road? How do they avoid issues with their customers having a problem from dead batteries or a flat tire while they have those vehicles? The ability for the fleet to be more effectively managed and also create opportunities to add convenience and services to consumers once they have the vehicle. Do you want a concierge service on demand for a small fee? Would you like advanced radio programming for a small fee? Those are interesting opportunities that connected technologies can open up.

NH: It also raises the question about the security of all this personal data. How should it be secured? Do you think there will be some kind of cyber-attacks on connected cars some day?
EG: You're right. This is really a critical issue as a vehicle gets connected. Related to that is privacy. The notion of who owns the data, where it resides and the ability to easily erase what is really personal data in the vehicle when it's sold is really critically important. We've got customers today with concerns around privacy. Even around use cases of having a valet if you are a celebrity or a diplomat and you have an address book in your vehicle. How do you address those scenarios? I think the industry is working through these challenges, and we're committed to deliver the technology to ensure the security and the connectivity, from the hardware and the technologies we're putting into our CPUs to platforms and software technologies that ensure the security from inside the vehicle all the way into the cloud.

NH: While we're talking about personal information in the car, my next question is about personalized experience. It seems to be the issue of the Internet of Things as a whole.
EG: There's a number of different opportunities there. We've got a wonderful capability within our usage experience lab. They've been building a prototype that we could perhaps follow up and show you some of these things in the future. I'll share a use case with you. One is this interesting opportunity for using cameras in the vehicle. This can range from multiauthentication for a driver, so I recognize your face, I know what's your smartphone and I will let you start the car and access everything that's in the vehicle. Perhaps, if you are a different driver, but an authorized driver, you won't have access to all of those features, but if there's a camera looking at the passenger and this information on the head unit, it moves it into a privacy mode and has the driver opening it back up if appropriate. Then, there's a whole set of other examples of opportunities to leverage technology that gets brought into the vehicle. How do we seamlessly share playlists, content and information? The ability to play a video on devices that are brought into the car while leveraging the audio system in the vehicle and synchronizing on every playback device. You can even imagine that a friend needs a ride or a parent is picking up a child. There are a number of sharing applications that again we've done some prototyping work with, where that information gets projected into the vehicle so the parent knows exactly where to go to pick up their child, and it's transmitted from the child's phone and into the parent's phone into the connection into the vehicle, simplifying the whole process.

We need to bring users in, incorporating driver feedback into the experience. In many ways, this is something new for the auto industry, because these are a different kind of experiences than they're used to be dealing with.

NH: So it's like the car is becoming your personal assistant at some point?
EG: I think that there's a tremendous number of opportunities to enhance the experience as the vehicle becomes more context-aware. It means that if I'm in my vehicle in the parking lot at work at 6 p.m., I'm a creature of habit and it's a pretty good chance, well over 90%, that I'm going to drive home. Before I hit the first traffic light, I'm going to call my wife. It just happens to be what I do. Today, my vehicle does nothing to help me even though I do those two things over and over again. The things that they could do is they could check the traffic for me. I'm not really interested in plugging my route in, I know how to drive home. But if they could tell me about an accident on the freeway and propose a different way home without giving me turn-by-turn direction, that would be a fantastic value add. Then it could ask me in a non-intrusive way if I would like to call my wife and press one button instead of having to push in two or three as a menu option to get to that phone number, I'd be delighted. You can extend those scenarios out a little bit where that context awareness adds a little bit of value.

NH: The examples you are talking about are extremely useful. It's all about anticipating the driver behavior. I think, however, that there should be a line between this useful consumer experience and creepy solutions.

EG: I think that what is critically important is that we have to do these developments really leveraging user-centric design techniques. We need to bring users in and let them experience and understand these things, incorporating driver feedback into the experience. In many ways, this is something new for the auto industry, because these are a different kind of experiences than they're used to be dealing with. Therefore, getting that feedback is critically important. I talked about the use cases that we did in our lab around cameras in the vehicle, and the notion of a camera in the vehicle could be really creepy. Why would you want a camera facing drivers in the vehicle? But when you realize it opens up opportunities for simple gestures in the vehicle, then that make things easier. It's about understanding where these borders are about what is desirable, what is delightful, what is wonderful and unexpected, and what is intrusive and inappropriate. These lines do change over time and they do change with demographic. Understanding these things and the way we can even put in the control, then let the driver adjust these parameters and choose between these features easily is important. Even that needs to be done in a more user-centered way.

NH: This also raises the question about how you build these scenarios. The automotive industry is pretty specific, because what you invent today, can be implemented in the car in the few years' perspective. You are working on the world which doesn't even exist now. How do you – as Intel – work on that?

EG: I think you're right that there is clearly a lag time in the automotive, and also our vehicles last a long time. The automakers are keenly aware that their vehicles stay on the road for 10 years and are thinking about how to refresh those at key time. I think there are opportunities to explore technologies that let us enhance the platform over time. For example, I talked about some of the importance of software and firmware over-the-year update as cost avoidance. That same kind of technology enables a vehicle to get new and enhanced capabilities over time. As those models evolve, on the continent we're going to see ways to enhance, refresh and be more dynamic so that we're not stuck with such a pathetic development model that we see in car experience today. Some cutting-edge automakers are looking at how they can innovate in the human-machine interface, the HMI, more rapidly than their traditional development cycle, by doing prototyping in vehicle and then have an ability to roll out those updates more dynamical.

Today our vehicles look like they do and they're built the way they do because we like to smash into things.

NH: You also mentioned self-driving cars. For sure, they are the future. How will they change our life experience or our cities?

EG: I think the era of self-driving cars is going to be remarkable in the number of lives it's going to save. Today, 1.3 million people die in car accidents. Not all of them are in a car during the accidents, you have pedestrians and bicycle riders. Another thing is that well over 50 million are seriously injured in accidents. The ability to dramatically reduce those numbers and eliminate traffic is a very noble goal. It's one a number of the auto-makers have actually taken if they want to get to zero fatality in vehicles. I find it personally inspiring. Then, as we get into perhaps some of the more mundane items, we waste an awful lot of time and fuel, particularly in inner cities, looking for parking. The notion that we can have an auto-valet that parks the car for us is amazing. You could start thinking about delivery trucks. With drones that take things to our doorstep automatically, it really becomes a sci-fi world. If you think about it, today our vehicles look like they do and they're built the way they do because we like to smash into things. So, they're made out of steel, they are designed so that drivers can survive these horrific accidents. Well, as accidents become the thing of the past, we have to remember that today close to 95% of accidents are caused by driver error, there's a number of interesting transformations that happen to the vehicle itself. It doesn't need to be made out of steel; it could be made out of lightweight plastic, dramatically boosting the energy efficiency. It doesn't need to look like a vehicle with a steering wheel and all of the pedals and things that we attribute to cars now. They could look like a little rolling living room where you could search the net and watch a movie or relax with friends on a commute. It opens up a much different futuristic design experience. I'm afraid that outcome is quite a long way ahead, but it certainly opens up that kind of opportunity.

NH: You are talking about a lot of advantages of connected and autonomous cars. It's safer, more sustainable. However, it really takes a long time for them to go mainstream. Why is it so? Why don't we just hop on that?

EG: First, we're very committed to helping to advance these technologies – all of the safety technologies, starting with the ability to make a driver more aware. With a half second of warning, 60% of collisions can be avoided. With a full second of warning, over 90% of collisions can be avoided. We're investing in these technologies with the hope that's bringing this capability to everyone. Also, automakers are really in a race now and many of them are talking about delivering self-driving cars before 2020 and by 2020, which is 6 years away. They are pushing to make that happen. I think we'll see a lot of benefits on the way, largely around safety, that are going to get integrated into vehicles on all levels. This kind of safety, which is prevalent in luxury cars, ideally will come all the way into the vehicles. That opens up really a great opportunity. ■

Scott Sedlik
INRIX

Scott Sedlik is the Vice President of product planning and product management at INRIX, the leading global provider of traffic information servicing to companies including BMW, Audi, Ford and Toyota. Sedlik is also engaged in strategic market development, including the company's connected car initiatives and global expansion into China and other emerging markets. Scott Sedlik is a startup veteran with over 20 years of executive experience in strategic marketing, product management, brand development, and go-to-market strategies. A speaker giving talks on the benefits of Big Data in delivering intelligent driving services to help automakers improve the driving experience for consumers and to reduce the individual, economic and environmental toll of traffic congestion across the U.S. and the globe.

Second wave of the connected car

Scott Sedlik, Vice President of INRIX – a leading global provider of traffic information services for companies like BMW, Audi, Ford and Toyota – talks about the three waves of connected cars, shopping via cars, services like intermodal routing and who should pay for the Internet used in the car.

Natalia Hatalska: INRIX is the global provider of traffic information working with Ford, Audi, BMW, Toyota, Pioneer and others. What kind of information do you exactly provide?
Scott Sedlik: INRIX aggregates Floating Car Data, that means latitude, longitude, speed and heading from nearly one hundred million vehicles and smartphones globally. In real time, we're able to anonymously determine the speed on roadways in 37 countries around the world.

NH: In Poland as well?
SS: We're not yet in Poland, but Poland is on our roadmap. We aggregate this information from a a large variety of sources: from commercial vehicles like service delivery trucks, consumer vehicles as well as smartphones. We also get data from sensors government transportation agencies embed in motorways. We combine all of that into what we call our Traffic Intelligence Platform, and then we provide it back into connected cars, like our customers, BMW, Audi, Ford, Toyota and others. From the time that we're getting data from vehicles on the roadways to when we actually process it and send it back into the vehicle - that typically takes just a couple minutes for that information to get into a car and provide an alternative route for a driver. We also aggregate traffic incident data from media companies and other sources that are creating and aggregating accidents, construction, event and severe weather notifications. We're able to provide that in the data system.

NH: So, it's all about making the driving experience easier.
SS: Yes, we have six markets that we license our data to, and the automotive market is one of our largest markets in terms of providing data to the automakers, who then deliver it in their cars, allowing drivers to save time, money and fuel by choosing routes that are the least congested. But we also license our data to departments of transport, government agencies around the world, like the UK Highways Agency, and dozens of departments of transport in the U.S. and others, to help them manage their roadways more effectively both in terms of real-time operations as well as planning to alleviate severe bottlenecks and build new roadways or alter roadways.

NH: What are the other markets?
SS: We license to the media market. 90% of the traffic reports that you hear on the radio or TV in the UK are delivered by INRIX reporters. We also distribute to many of the TV graphics platforms - the companies that provide weather graphics for weather forecasts on TV are now using INRIX traffic data to provide traffic forecasts over broadcast TV. We also license to the police market to help plan and optimize deliveries and manage fleets more effectively; we license to the mobile market, so these are handsets, OEMs and mobile application developers.

INRIX aggregates Floating Car Data, that means latitude, longitude, speed and heading from nearly 100 mln vehicles and smartphones globally. In real time, we're able to anonymously determine the speed on roadways in 37 countries around the world.

NH: You are simply a big data company.
SS: Yes. We're absolutely a big data company, processing terabytes of data daily and distributing that data and services mostly in B2B world.

NH: What does the connected car mean for the big data company?
SS: By 2017 or 2018, over 80% of new cars being sold in North America and in Western Europe will be two-way connected, meaning having modems in the car or the capability to use smartphones for bringing data into the car as well as getting request from the Internet. These trends are happening, and we're very focused on working with vehicle manufacturers to help deliver viable and very personalized data services into the car. Traffic has been our primary focus, but we are now delivering real-time gas prices and points of interest into Audi, for example.

NH: As far as I see it, the connected car nowadays is the way how automakers can distinguish themselves on the market. We can see different examples. You've mentioned Audi. But you also work with Ford, and providing them with your data, a Ford driver is able to reserve parking spots. Any other examples like this?
SS: Yes. We work with BMW to deliver a number of features in their i3 and the i8 electric vehicles, including traffic-influenced range finder, so that in the car a driver can determine how far they can go on their charge, based on traffic conditions. It's actually kind of a geofencing of where the driver is, understanding the different route potentials and what the range is. We're also the first-in-the-industry to deliver what's called intermodal routing. This is within BMW i3 or i8, and a driver can be given alternative routes not just for driving, but it may actually be used to recommend a faster route to the drivers' destination during a traffic jam by navigating to the nearest train station in time for the next departure to that location. A BMW mobile app then provides the commuter with walking directions from the train station to their final destination. Those are the kinds of innovative services that we're delivering as part of the connected car.

NH: During the SXSW, you talked about three waves of the connected car. You said that we're getting off the second stage now when the information goes into the car and goes out of the car.
SS: The first wave, which has been for the last ten or twelve years, has been one-way connected, meaning the broadcast of information into the car. Vehicles with navigation systems would have their traffic information broadcast over the radio data solutions. The stage that we're in now is using modems in the vehicle and/or the modem in the user smartphone, and now there's two-way connectivity or very personalized information to be delivered in the car. So, instead of all the traffic information being communicated into the car over broadcast solution, the driver is getting very relevant information based on where they're currently are and where they're expected to go, communicated into the vehicle. And that's this current wave where we're just seeing now, with Audi, BMW, Ford, Toyota and others, that all of these traffic services plus real-time fuel price information for stations nearby as well as real-time availability and pricing information for parking locations, things like airport wait times and flight arrival information, all related to the journey or the navigation experience being delivered in the car.

NH: And the third wave?
SS: The next wave is really related to highly autonomous driving, which requires a massive amount of real-time data being sent to the car and from the car about what's happening on the road ahead and around the vehicles in order to help them safely navigate the driver to their destination

NH: I remember you saying that when we reach that stage, we won't need all this infrastructure in the city, so probably we won't need traffic lights.
SS: I think it will be a while before we won't need traffic lights, but now, the actual traffic lights in infrastructure using real time moving sensors will take us to the next level. What we won't need are sensors in roads and all this very expensive roadside equipment, because 4G and 5G and the next generation phone networks will be so fast that you won't need proprietary communication networks set up along roadways and downtown areas.

NH: When will it happen, according to you? Is it 10 years or is it 20 years?
SS: In certain countries, it will be 10 years, and in other countries, it will never happen. A big part of it is the cost to the automakers of putting sensors into their vehicles; they now need thousands of sensors cameras and other sorts of things that are processing information in real time. So, there's costs to the vehicles. The communication networks are faster in some markets than in others, so in the U.S. now, 4G is a reality for all of the major metropolitan areas. We have very fast and expensive data coverage. It can take some time for that news to roll out in certain countries in Europe, Africa and Asia.

NH: What are the other obstacles for the connected cars going mainstream?
SS: The main obstacle is standardization of platforms. Today, for example, General Motors, Toyota, Ford, BMW, Audi and Volkswagen all have different application development platforms that are proprietary to them, so software developers creating applications for the car have to use those development environments and create unique versions of their applications across each platform. I think we are seeing that changing now, and we'll also see things like Apple's CarPlay and Google's recently-introduced the Open Automotive Alliance, where Android is the core platform. Eventually, these are frameworks that allow OEMs to create unique applications for their car but also elaborate the standards across those operating systems and communications.

NH: Talking about apps in the car – there is no point having hundreds of them, because the driver eventually will use just a few.
SS: Yes, that's exactly right. It makes no sense nor is it safe for the users of those applications. OEMs are realizing that and they are very focused on the couple of areas. One is related to the navigation experience, so everything related to the journey and what information the driver needs to be warned about traffic and alternative routes or to find a gas station or a restaurant. That whole area is core for their application development and integrating that with the overall experience. The second area is Internet radio and music, so that's where a selective number of applications are being enabled on the platforms, depending on the region. In the U.S.,

The main obstacle is standardization of platforms. Today, eg. General Motors, Toyota, Ford, BMW, Audi and Volkswagen all have different application development platforms, so software developers creating applications for the car have to create unique versions of their applications across each platform.

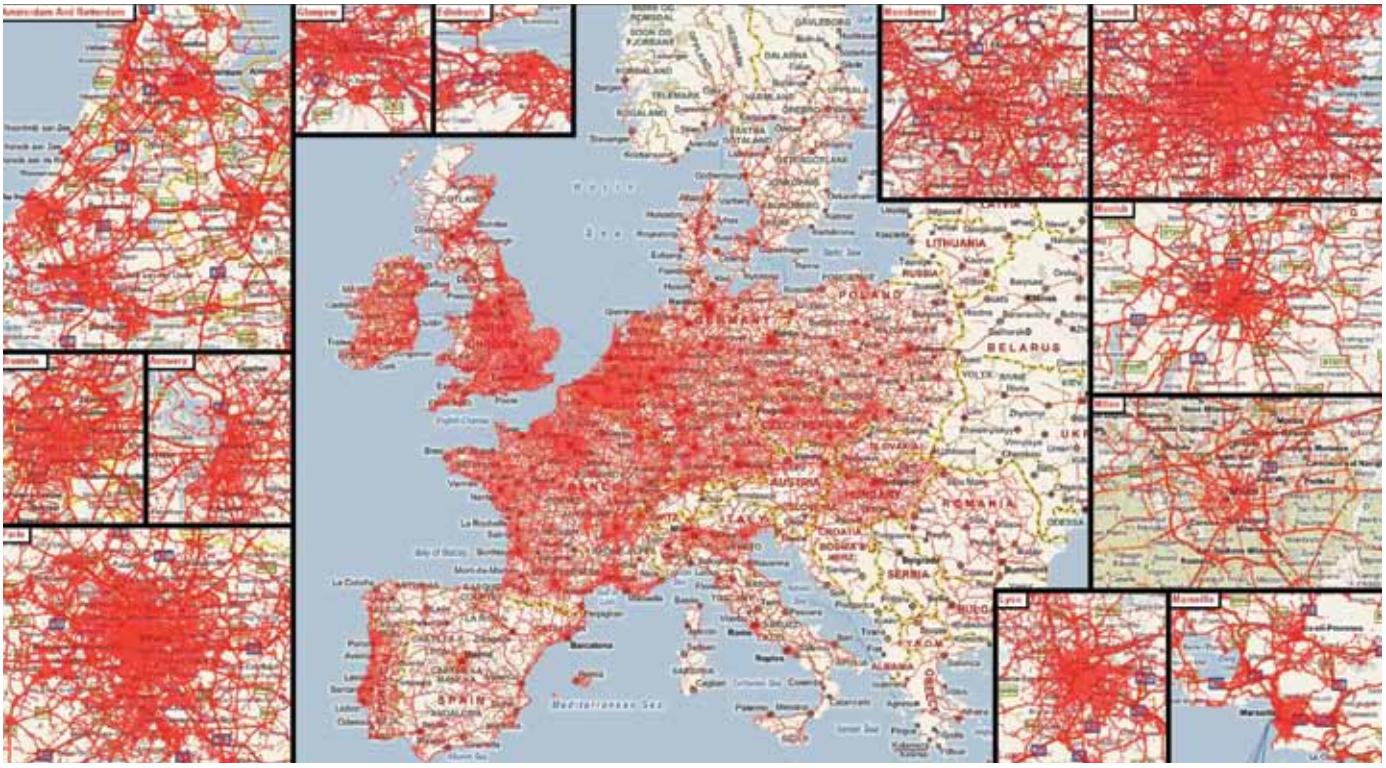


photo. INRIX

INRIX Traffic Intelligence Platform; Europa, wiosna 2013 - migawki ruchu w czasie rzeczywistym (okres 15 minut)

for example, Pandora is one of those popular Internet radio applications, but it doesn't have much adoption in Europe or internationally yet. And then there's this whole third category where I think we'll see significant limitations in terms of the amount of applications that are enabled on platforms and are just not as relevant to the actual driving experience or they're unsafe to use as part of the driving experience.

NH: You mean like entertainment apps?
SS: Entertainment, any kind of games. The OEMs are trying to create a safer environment by limiting the types of applications in the car and then really working on the human-machine interface – how the driver and the passenger can interact with those applications. That's where a lot of innovations around voice are being developed to.

NH: What about e-commerce apps, buying stuff from the car?
SS: In terms of e-commerce in the car, what is happening is related to, again, the navigation/driving experience. For example, the ability to pay for tolls when you're entering a toll road or crossing a bridge without having to worry about your credit card or cash. The ability to pull up to a gas station where the gas pump will have the intelligence to recognize the vehicle, and the payment system that's part of that vehicle without the driver having to use their credit cards. The smart parking which will alert the driver and add 15 or 30 minutes more to the parking meter from your smartphone if you've parked in a two-hour zone and while you're still at dinner. That's where e-commerce and the cars are happening. It's not about buying a bathing suit from an e-commerce catalogue somewhere.

NH: The connected car is not only about delivering apps to the car, but also about extracting data from the car. How can the marketers use this data?
SS: Today, the primary data available from the car is the location information, that is latitude, longitude and speed. However this information is anonymized, there's never an association with a specific driver. There's also a lot of data produced by the vehicle itself that can be incredibly valuable in terms of navigation, driver safety and other services. Although that information has been firewalled from being extracted from the vehicle in real time, what we're seeing is that some of that sensor information that's currently walled off will be made available and be able to be used for certain kinds of applications of direct benefit to the driver. So, for example, to be able to recognize when vehicles are using windshield wipers and the speed of those wipers, or to recognize when there used to be a big brake pressure on ABS brakes. The exact location of that, along with the detailed sensor information, can be sent into the cloud and then fused with other data. And all that information in real time can be processed and sent back to other vehicles to warn them about e.g. slippery roads ahead. That can be sent in the background of course so the vehicles are processing that, and they may or may not be a natural warning to the driver.

NH: There are also questions about the cost. Of course, the final consumer will pay for the connected car, but my question is where this cost should be included? In my mobile bill, or when I pay for the car, or maybe somewhere else?

Audis and BMWs now can drop off a driver at the entrance to a hotel lobby and then go park in a parking garage without a driver.

SS: Some car manufacturers will include certain levels of data connectivity as part of the vehicle or a monthly subscription to access services. Every OEM is implementing this differently, but you can imagine that OEM doesn't want to pay for a driver who's streaming video or even streaming audio all the time on Internet radio. We are already seeing a variety of plans where certain level of connectivity will be included with the vehicle or at a minimal cost to the driver, and the additional connectivity will be available through the vehicle or through the driver's smartphone data plan. In some cases, we can expect things like dual SIM in Europe, for example, where one SIM card will be focused on things which

specifically relate to the vehicle, and anything above that will be handled by the driver's mobile phone.

NH: What about the number of cars on the roads? During the SXSW panel you were in, it was said that the goal is to reduce the number of cars in the future.
SS: I think we will continue to see the growth overall globally in vehicles sold over the next ten years, but in certain countries and metropolitan areas, we will start to see a decline in new vehicle sales. That will be driven by several factors, including car sharing – schemes that are becoming very popular in certain cities in the U.S. and in Europe.

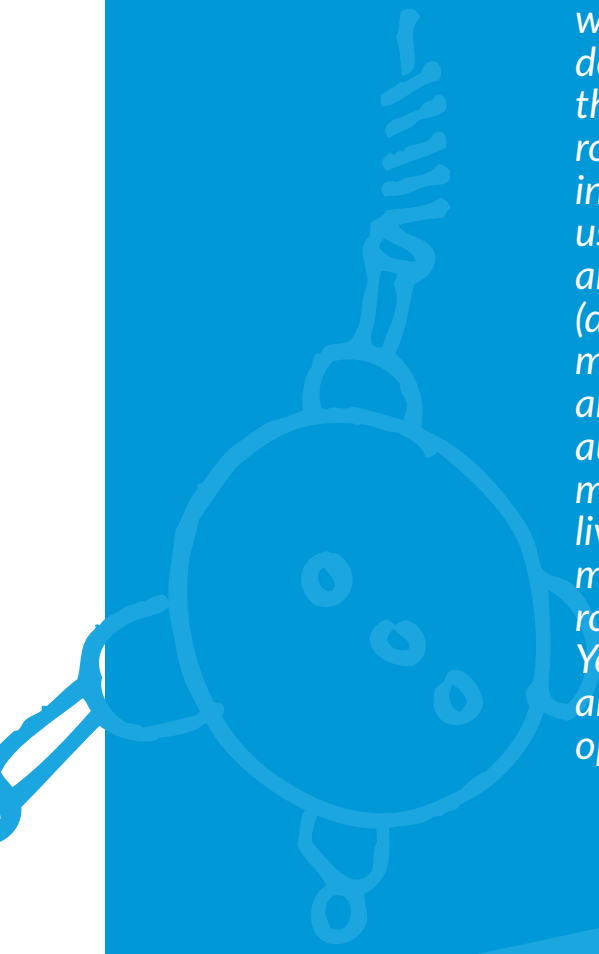
NH: The solutions like Zipcar, car2go, Uber.
SS: Exactly. The autonomous vehicles will reduce the amount of vehicles sold; it's just the new platform for how people will drive. We're already seeing functionality being delivered by vehicle OEMs that are called semi-autonomous. For example, Audis and BMWs now can drop off a driver at the entrance to a hotel lobby and then go park in a parking garage without a driver. We're seeing that functionality now, and Elon Musk, the founder of Tesla, says 90% of the functionality for autonomous vehicles will be ready for the market by 2019, it's the remaining 10% of functionality that's very, very complicated that will take another decade for implementing in the car and road infrastructure to be able to support that. ■

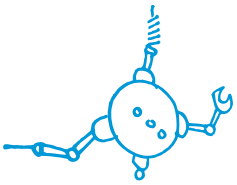
I had the pleasure to talk to Scott Sedlik in person during the SXSW 2014 Festival, where he participated in the panel Smart Transportation Future: Mobile & Big Data.

ROBOTS ARE COMING

Will they take our jobs or create new career opportunities?

Actually, the title should read: Robots are among us. Generally, there is no category today in which we would not have to deal with them. We have the so-called consumer robots (personal robots), industrial robots, robots used in toys, medicine and space, flying robots (drones, UAVs) and a lot more. Their universality and the widely progressive automation will affect many aspects of our lives, including the labour market. It is said that robots leave us jobless. Yes, they do, but they also create new career opportunities.





ROBOTS ARE COMING

Trend

As a category, robotics exploded 20 years ago. Today, as Dmitry Grishin from Grishin Robotics said during the panel Consumer Robots Everywhere: The Next Big Thing at SXSW Festival, the situation related to consumer robots is similar to the situation of the Internet back in 2000. According to ABI Research, the consumer robots market itself will be worth $6.5 billion by 2017 (4-fold increase since 2012). The figures in this forecast seem to be quite understated, because IFR (The International Federation of Robotics) estimates that by 2015, the global sales of robots performing certain tasks (such as iRobot vacuum cleaners or Husqvarna Automower lawn mowers) will have reached 11 million units and will be worth $4.87 billion. Robotisation is especially visible in industry (e.g. the automotive sector) – the number of job offers for robots (however odd that may sound) in this category grows by up to 6% per annum. The largest market of robots in the world is Asia, of course, and the United States. In Europe, Germany is leading the way. One of the major problems, at least in our culture, is the issue related to how we perceive the role of robots in society, and the inner fear connected with their mass use (although, on the other hand, 59% of Americans claim that if they were to choose who was to take over their jobs: American robots or immigrants, they would choose robots; the Curve Report, 2013). The issue of robots taking over human jobs is complex – granted, scientists from Oxford predict that by 2050, nearly 50% of the existing professions will have vanished as a result of computerisation, but this will mostly apply to jobs that require the implementation of automated, repetitive tasks, and not advanced thinking, intuition and problem solving. On the other hand, the growing robot-related industry will generate new jobs (as highlighted by Professor Russ Tedrake – p. 51).

Key words

automation, artificial intelligence (AI), drones, humanoids

Accompanying trends

Internet of Things, humanisation of machines, deep learning (DL)

Reasons behind the trend

Naturally, the technological advancement, but there's a myriad of

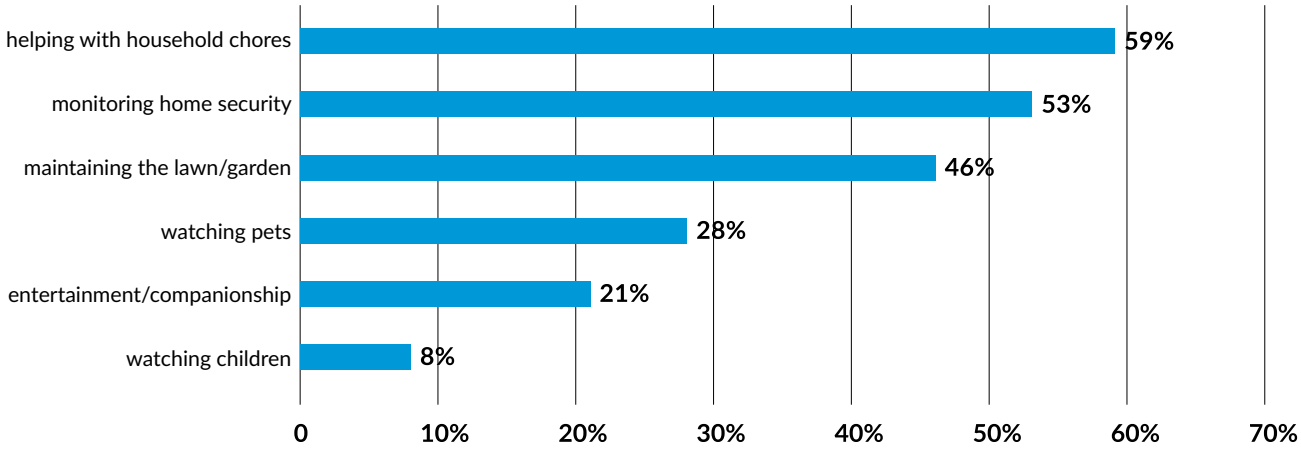


chart 4

In which areas is a robot particularly useful? *Source: CEA Survey, July 2013.*

reasons, depending on the category. One of the major drives behind the progressive robotisation in industry, for instance, is the need to optimise work and accelerate production. In HR, and especially in the category of "telepresence" robots (enabling communication with employees in different locations, e.g. iRobot Ava 500), it is employee mobility and having multiple (or at least a few) branches (it also applies to start-ups, which, increasingly often, have their offices in Poland and the US/UK, etc.). In the toy industry (Lego or Hasbro), it is consumer expectations ("robots are cool"). In medicine, it is the aging population and the need to "look after" the elderly directly in their homes (not all seniors will find a place in hospitals, and only a small number of them will spend their autumn years living with their children). Finally, Generation L, which expects technology to facilitate their lives and save their time.

Examples of the trend today

In 2013 alone, Google acquired eight companies, including Boston Dynamics – a company operating in the broad field of robotics design. Andy Rubin (the "father" of Android) became the Head of the entire division associated with this category. In early 2014, Mark Zuckerberg invested in Vicarious, a start-up associated with artificial intelligence (just like Google, which, in January, shelled out $400 million for DeepMind, also the AI-related start-up). The subject of robots was also one of the main items on the agenda at this year's SXSW Festival – not only did it appear during panels and sessions, but robots circulated among conference participants. The debates focused mainly on consumer robots, but also on how robots will affect our labour market (this issue was raised by several speakers, including Eric Schmidt from Google). At the end of last year, Amazon announced that within the next five years it will start delivering its packages by drones. In June 2013, Domino's Pizza tested drone pizza delivery in the UK. In March 2014, KUKA, the manufacturer of industrial robots, organised, as part of its promotional campaign, a match between table tennis champion Timo Boll and a robot (Boll won). The robot was used by Coca-Cola during its Love Summer Festival in August 2013. In Poland, the robot appeared in Hypermedia Isobar's recruitment campaign (see page 23).

Honda's ASIMO robot is considered the most advanced humanoid in the world; ASIMO (*Advanced Step In Innovative Mobility*).

Echobot – Adobe's Robot – and me on one of the streets of Austin during the SXSW Festival 2014.

In fact, robots are applied in every possible category, ranging from industrial production (last year, BMW took a landmark step towards the development of the sector, introducing the production line where people and robots work together in unprecedentedly close proximity), HR, toys (e.g. Lego, Hasbro, etc.) to medicine.

Applying the trend in marketing solutions

A very distinct fascination with robots can be observed in the area of marketing communications. Many brands understand that robots are the *hot topic* of today and use them in their advertising campaigns, especially to generate publicity. The first campaign of this type was the Cannes-awarded Ariel Fashion Shoot project implemented in 2011 (sic!), which advertised a laundry detergent. Last year, we saw even more campaigns of this sort (e.g. the above-mentioned projects by Coca-Cola, KAKU and Hypermedia Isobar). Marketers are quite interested in drones, which have multiple potential applications, e.g. delivering packages in crowded places (again, it is mainly about the PR effect and not about wide usage), generating content (in Poland, drone-generated content is extensively used by Jakub and Ania Górnicki, the authors of the blog podrozniccy.com, in their series *Podróże z dronem* (eng. *Travelling with the drone*) and *Polska z drona* (Eng. *Poland through the eyes of a drone*); they use the drone to take photographs of and make movies about the most beautiful places in Poland and in the world) and producing advertisements (e.g. as an alternative to cameras on jibs).

Russ Tedrake
MIT

Russ Tedrake is an Associate Professor in the Department of Electrical Engineering and Computer Science at MIT, and a member of the Computer Science and Artificial Intelligence Lab. Professor Tedrake's research group is interested in underactuated motor control systems in animals and machines that are capable of executing dynamically dexterous tasks and interacting with uncertain environments. Current projects include robust and efficient bipedal locomotion on flat terrain, multi-legged locomotion over extreme terrain, flapping-winged flight, and feedback control for fluid dynamics. He has also worked at Microsoft, Microsoft Research, and the Santa Fe Institute.

"Every revolution is a challenge."

Professor Russ Tedrake from MIT talks about what robots can and cannot do, what they might look like in the future and why they are more fragile than humans.

Natalia Hatalska: During your SXSW presentation, you said that there will never be a better time to use the phrase "robots are coming." Why is it so?

Russ Tedrake: There's been this really fast-paced series of investments initially by the government. The European Union has put a lot of investment into robotics over the last five or ten years. The U.S. and Japan has also done some major investments over the last ten years. The U.S. finally got our act together and formed a caucus in Congress to put robotics on the national agenda. The response to that were some new funding initiatives for academic research in the U.S., that were relatively big by our standards. In the last few years, we have had more money injected into the academic community for hardware progress. This culminated in, for instance, the DARPA Robotics Challenge and there is really now a huge follow on investments by industry. Google's purchase of all these robotics companies is probably the biggest single investment that we will see in robotics. It's certainly the biggest one to date and for the foreseeable future. I really think that now it's this magical time where robots are turning from this academic pursuit that we've done for a long time and transitioning to industry and doing so at an incredible pace.

NH: I'll come back to this Google issue later. What can robots do now?

RT: That's a hard question to cover succinctly. But there's a lot of things that robots can be doing now. More famous ones are, for instance, robot-assisted surgeries, which have been a very big commercial success. Moreover, robots are already being effectively used by the military in disposing explosives, they are being used by border patrol, for surveillance, and in all these different capacities. There are also UAVs, which I consider to be part of robotics, it's part of what I do. Unmanned aerial vehicles are being used all over the place, e.g. by filmmakers, architects, and even by Amazon.com. These things still have somewhat limited capabilities, but it's enough that they have a value to a consumer already. I think there's just lots of things that the relatively limited capabilities of the robots today can already accomplish.

NH: What can't they do?

RT: So the problems with the robots are that, for instance, they use too much power. This is one of the limitations of UAVs. These things typically fly for a few minutes, then the batteries are done, especially if they've got payload. The same is true for walking robots. The demos that Honda puts on their ASIMO robot, and ASIMO is one of the more efficient humanoids out there, last for 15 minutes or so, because the batteries die in 20 minutes. That's good enough for a stage show, but it's not good enough for a robotic butler :). And then, they cost too much. I think that has to change. I think we have to get the cost down and reliability up. But then there's just things they can't do. So, even ASIMO falls down the stairs sometimes. I think ASIMO might get caught up on complicated services that you might even find at the home. Manipulation capabilities of robots are actually relatively limited, so, in a factory where

I really think that now it's this magical time where robots are turning from this academic pursuit thatwe've done for a long time and transitioning to industry and doing so at an incredible pace.

you can engineer the environment, there's been some success, but, for instance, almost all of the cellphones that are in the world are still being produced by hand, because robots can't do that yet. They can't do it in the timeline compatible with cell phone production. With the cell phone, a new model comes out and it's on the production lines for six weeks and it's only six weeks, so it's not possible to bring up a robotic solution in short enough time to make it effective, it's just better to use humans.

NH: While talking about humans - when we think about robots now, we mainly think that they look like us. But the vast majority of robots don't look like humans. Why is it so difficult to produce a humanoid?
RT: I think one of the reasons why it's difficult to make robots look like a human is just that there's a couple of levels: there's a robot that looks human-shaped but maybe looks like an astronaut or something with a mask, but it's humanoid-shaped. I think we're getting pretty good at this, but the walking and running and dynamic balance problem has proven to be harder than people initially thought. We do that very robustly; humans are exceedingly good at walking. It's so frustrating that robots aren't as effective.

NH: It's so easy we don't even think about it.
RT: We don't realize that it could be hard for a robot. I don't think that robotics challenges are big moments for humanoid robotics in the sense that a lot of people predicted that the robots with two legs were all going to fall down, embarrassing themselves. And that really didn't happen. Most of the winning robots had only two legs in that competition. I think we're in a good place with our walking robots research now. But it has taken a long time to get there. Then, if you want to go from the astronaut-looking robots to ones that actually look like humans, with faces and stuff, then you have this famous uncanny valley, where a lot of robots that try to look more human-like start looking creepy. I'm not a particular a fan of going that far. I think that I'm happy with them looking like an astronaut for now.

NH: What are the key drivers and the biggest challenges in the robotics technology now?
RT: I think that some of the drivers include new fabrication technology. It's going to be a big driver. Over the next few years, we're going to start seeing more serious, let's say humanoid-type robots or complicated robots that are built with those kinds of fabrication techniques. Sensing technology has always been a huge and important driver. When the connected camera came out, they came up with the Xbox that revolutionized what we could do with our robotics technology. When the laser scanner came out before that, that revolutionized our abilities. When motion capture systems became something that we could use not only for Hollywood videos, but for robots, that again revolutionized our capabilities. We're overdue for a breakthrough in motor technology, but if we can have a technology breakthrough, then that would be a huge thing. My questionable area is control theory in computer science: programming the robots. We make breakthroughs in there too. We're making robots that are more dynamic. So that will help the efficiency and the capabilities of the robots. Maybe it doesn't rival having a brand new sensor to be able to see the world better than you ever could. We'll see.

There's a challenge for the scientists and engineers of the world to make science and engineering cool. Robots are particularly good.

NH: Do you believe, that at some point, robots will become totally autonomous? That they will be able to learn from their real environment like humans?
RT: Like humans is a hard thing. I don't know that we need them to learn like humans. But I absolutely think they're going to show capabilities that make you think they're as intelligent or as adaptive as humans. I think you're already seeing it in the way you interact with Google, let's say. I had an experience the other day where I asked Google how long it took to get to the airport, it said, "Right now, it'll take 30 minutes, but tomorrow morning when you have a flight at 7 a.m., it will take you..." and I thought, "How did you know that I have a flight at 7 a.m.?" They're doing very smart things. And they're doing it maybe not from learning but from being able to incorporate huge amounts of data on the fly with very efficient algorithms. My point is that it might not be human-like learning, but I do think that computers are already showing very intelligent behavior, and we'll see that increased sophistication of robots in not-so-distant future. I'm highly optimistic about that.

I like to joke that if you're afraid of the robot, all you have to do is be able to run for 20 minutes and then the robot's batteries will die.

NH: Robots are starting to be incorporated into our daily lives. You've mentioned different applications. We also see this aging society, so probably we will have robot assistants next to us in near future. But at the same, time we are really afraid of robots – we dread that they will take our jobs, outsmart us and eventually kill us. Why is it so?
RT: I like to joke that if you're afraid of the robot, all you have to do is be able to run for 20 minutes and then the robot's batteries will die. It's interesting, it's cultural. In so many Asian countries, they're not afraid of robots. They grew up with robot cartoons and they just love robots in every way. It is different here, because we grew up with Terminator instead of Astro Boy in the U.S. I think the progression is going to happen in small ways. A few years ago, one of the best-selling toys at Christmas was a robot that wobbles around and farts if you press a button. Then, there's robot vacuum cleaners and robot-assisted surgery. As we're getting more of these things, people will change their comfort level with robotics, and I think those barriers will slowly fall away. But that is something we have to address. In general, I want the educated world to be more excited about engineering and science, and I think it's all wrapped up in the same issues. But I think if we can make kids want to be playing with the best technology because it's cooler than Justin Bieber, or whoever the pop star of the day is, then I think also some of these barriers will fall down. There's a challenge for the scientists and engineers of the world to make these things cool. Robots are particularly good. Some say they are meeting that challenge. They are the ones that are most accessible for people who are not technical. As roboticists, we have more tourists coming through my lab and through theoretical computer science labs. I think that's an important role that robots have to play. Again, I'm optimistic that that's something that everybody's going to want a robot soon.

NH: So you're not afraid that, at some point, robots will overtake humanity and become smarter than people? I think that this fear comes from the fact that we are afraid they'll be better at some tasks we are not good at.
RT: I think they will be good at things we're not good at.

NH: Which ones, for example?
RT: I expect robots should be able to move faster. They already do. They're better at tasks. If they're capable to task one thing, then they can do the same thing on and on.

NH: Yes, but we don't like it, it's boring for us.
RT: Yes. There's used to be people that did those jobs that now the robots do. Everybody's okay with that. People have to adapt. I do think it's a challenge as any revolution is. But I think the world will automatically be better if we can transition. Ultimately, the burden is on education. So the people who are doing tasks are easily overtaken by robots and are capable of doing more sophisticated tasks. That's the thing we should be doing. As long as we can help people make those transitions, I think it's ultimately a great thing for society, there's no question.

NH: I wrote down the sentence you said during your presentation, "Each big technological change is good for people and good for jobs." This is a very strange thing to say about robots, because we're afraid that they will take our jobs. The report published by Oxford researchers at the end of last year says that 47% of our jobs now are endangered because of robots. On the other hand, I found the report that says that robotics could create more than 3 million new jobs globally by 2020. These are two different views.
RT: I haven't read any of those specific reports but I can give you my general sentiment. Around Boston, we have a huge number of robotics companies and they are employing a lot of our technical workforce around. People who graduate from MIT, for instance, go there and a lot of them get jobs in robotics companies. It really is making more and more technology jobs. There is a chance for us that it will enable manufacturing to happen in the United States, where most of these things are currently done overseas. For us, it could be a huge boom in terms of the economic climate of the United States. I guess the same thing is true in Europe, but I haven't studied those markets in any way. Why should we be afraid of them taking 47% of the jobs away? Think about when the personal computer came out. We have this thing called Excel, which was the first spreadsheet application. That took away lots of people that were doing these things manually but it obviously made everything better, and people who were doing all the filing and paperwork had to do higher-level tasks. You wouldn't look back now and say, "I wish we hadn't invented Excel" or "If only we hadn't invented the spreadsheet or the personal computer." That would be backwards thinking. The job markets have to adapt. That's of course true, but I don't want to fear that change. That's something we have to do as a society and as a culture.

From cochlear implants to prosthetic legs to even hip replacement surgeries, we have more and more aluminum in our bodies. These sort of augmentations might actually be a dominant thing.

NH: Last year, BMW incorporated new production lines where the people and robots work arm to arm, something which was not possible before. Is this the future? People and robots working together?
RT: There's a great book by one of my colleagues, Rodney Brooks. He wrote a book called "Flesh and Machines." He actually thinks that the way this is all going to play out is that there's not going to be the robots versus the people, but eventually we're all going to be robot people.

NH: Transhumans?
RT: Something like this, yes. Already, from cochlear implants to prosthetic legs to even hip replacement surgeries, we have more and more aluminum in our bodies than 50 years ago. Generally, these sort of augmentations might actually be a dominant thing. We might actually all be able to be robotic in a few years. That's not my normal answer, but it's an appealing answer to the question. An appealing vision. In the short-term, robots are going to make it possible to do things more efficiently than what we can do now. That has to be a good thing for us economically. I agree that there are some jobs that are going to change, but as a society we have to push and make things better.

NH: Fear of robots taking our jobs is not the only problem we need to address. During your SXSW presentation, you talked about four other problems: that robots are fragile, that they need too much energy, they are too expensive, and they need some legislation. I'd like you to comment more on the two topics that are interesting for me: that robots are fragile - I would never think so in terms of robots - and the second is about the law. What do we need to change in the law to incorporate robots into our daily lives?
RT: I showed some quality videos of our robot doing some of the challenge tasks for this disaster scenario. That's a very expensive beautifully machined relatively high-precision robot, and when it falls down, something breaks. A wire comes off, a hand snaps, a cable snaps...

I'm happy to call dishwashers and cars robots. I wish the rest of the world did too. Then we could say that the robots are already out there.

NH: Isn't that the same with people? We are also fragile, much more fragile than robots.
RT: I don't think so at all. We wouldn't break as quickly, first of all. And certainly not in such a horrible fashion. Also, we fix ourselves, we self-repair. None of the robots can do that. It's just not practical to have a robot like that. Of course, we want them to fall down less, to have better control algorithms that will fall down less. But if it's the first time it falls down and it's out of service, then even though I've spent millions of dollars potentially on this robot, that's just not going to be good enough. Ultimately, the problem is that it's easier to make the first versions of these robots work when we machine them very precisely. But that means they stop working when there's damage that takes the precision away. That's a complication and a control challenge to try to be able to operate well even if the robot's not in a perfect working condition. That's a challenge that I'm personally very excited about working on. I think that can help a lot. I also believe that our fabrication technology should change. In all of our joints, we have springs and tendon stripes. So, if I accidentally smash into something, there's some shock absorption built in. Not just in my skin, but also in my joints. Most of the robots don't have that. If they hit something by accident, there's a shock that goes right through the entire system. If I do put these sort of springs in, it's harder to control a robot. It makes it harder to start. There's this extra dynamics involved in moving my arm around that I have to think about. If we figure out how to control floppy robots, let's say, things that are more compliant, things that are more resilient, then we can produce things that won't break every time they drop.

NH: When you build robots, do you look much at how the human body works? Do you try to take these learnings into the robot's body?
RT: Yes and no. There's been some classic failures of trying to copy the body too much. Biomimicracy is now sort of a bad word in robotics. If you try to copy biology too carefully, it's not a great idea. The new buzzword in robotics is bioinspiration, so if you see something that

biology does better than robots, then you try to capture the reason that it works better and see if there's a robotic way to do that, but not by, for instance, trying to come up with a material that exactly replicates the biological material. That seems like not a winning solution. I think in some ways our materials are better than what the human body had to work with. In some ways, they are inferior. Absolutely, we should hope for super-human performance out of our robots at some tasks and expect things that won't be as good as humans because we have different materials, until we're really further along in our understanding of medicine and biology, for instance.

NH: When, in your opinion, will robots become mainstream like computers and smartphones?
RT: I think it might happen exactly the way you think. That's a good question. Take the smartphone, for instance. Every smartphone has at least one camera on it, now it's probably two. It's got an accelerometer and time sensors. It's not too long until it has some basic regulation capabilities. It might not happen the way we think. It might not be that robots which look like us are getting copied everywhere. It might actually be that the devices like laptops and iPods, and iPhones and the like might get more robotic. I can't easily put a timeline on that, but I think it's happening quickly. The first stage has started when the big companies, and Google is not the only one, are starting investments like this. You're going to start seeing rapid transition.

NH: The robots are already around us, but we do not notice that, because we think that robots should look like humans.
RT: Yes, so a dishwasher is a machine, but once you call it an appliance, it's not allowed to be called a robot any more. So, maybe robots are plagued with this problem that once something really works, it's not a robot any more.

NH: What is your definition of a robot then?
RT: I would be happy to call a dishwasher a robot, it's pretty smart. I want something that has sensing, actuation and at least limited computation that connects those two. Every car that drives around has a lot of computers on board. These days, it has an incredible number of sensors and obviously some important actuation. In my mind, those are very much robots and I think the types of things we're thinking about robotics are making cars move better and more tirelessly. I'm not the one that draws a line that it has to have two legs and two arms to call it a robot. I'm happy to call dishwashers and cars robots. I wish the rest of the world did too. Then we could say that the robots are already out there.

NH: So here is the last question. You've mentioned Google buying many robotic companies during the last year. They don't have any official statements about why they did so. The companies they bought cannot talk to the press about that. Are there any speculations about the reasons behind these Google's buys in the academia?
RT: No, the academics don't know much about it either. They're being very tight-lipped. Google has a way of being very tight-lipped about these things. The academics are watching and reading along with the press, trying to wait till they make some announcement. ■

I had the pleasure to talk to Professor Russ Tedrake in person during the SXSW 2014 Festival, where he participated in the panel Computing the Future: MIT Scientists Tell All, together with Professor Timothy Berners-Lee (co-creator of WWW) and Professor Andrew Lo.

SUSTAINABLE DEVELOPMENT

people, planet, profit and purpose

In the early twentieth century, the global population was less than 2 billion; today, it is 7 billion, and by 2050, this number is expected to reach 9 billion. Hence, it is not surprising that the resources which once seemed unlimited are depleting at an alarming rate. We started to perfectly understand the need for sustainable development in business a long time ago, but today, sustainable development as part of corporate image is not enough – it must be an integral part of corporate strategy. As a result, the traditional 4P has changed into: people, planet, profit, purpose.

SUSTAINABLE DEVELOPMENT

Trend

In the introduction to this year's TrendBook, I said that the power of the trend is visible mainly through its impact on many remote thematic areas. This is exactly the case with sustainable development. It is not about looking at this phenomenon in terms of obvious categories like CSR, ecology or the conscious use of available resources. I am talking about the change associated with the inclusion of sustainable development in a company's strategy and not only in its image-building activities. The change associated with a crop of start-ups offering solutions that alleviate the ailments of today's world. During this year's SXSW Festival, the topic of sustainable development was hovering in the background (because not once was it spoken about directly) during virtually all possible talks, starting from the panels devoted to the so-called social change and the initiatives of global brands in this area (social campaigns, e.g. Spent, More than a Goal, Gates Latter and Girl Rising implemented by such brands as AmEx, Microsoft, Intel, etc.) through panels about the colonisation of space (resources that are limited on Earth are unlimited in space) and the talks of keynote speakers, including Dean Kamean and Chelsea Clinton (on how technology and its advances could help developing countries, and how they could be used for education and the empowerment of women and girls), ending with the panels devoted to the category of connected cars (which is a response to a genuine problem of today's cars not being at all sustainable; leaving the CO_2 emissions aside, INRIX data show that the average driver spends 62 hours a year stuck in traffic, which in the United States alone generates a loss of $121 billion) and the sharing economy, which seems to be an inherent element of sustainable development, especially in the area of cooperation with local communities.

Key words

sustainability, Triple Bottom Line (TPL, 3PL), corporate citizenship, key words

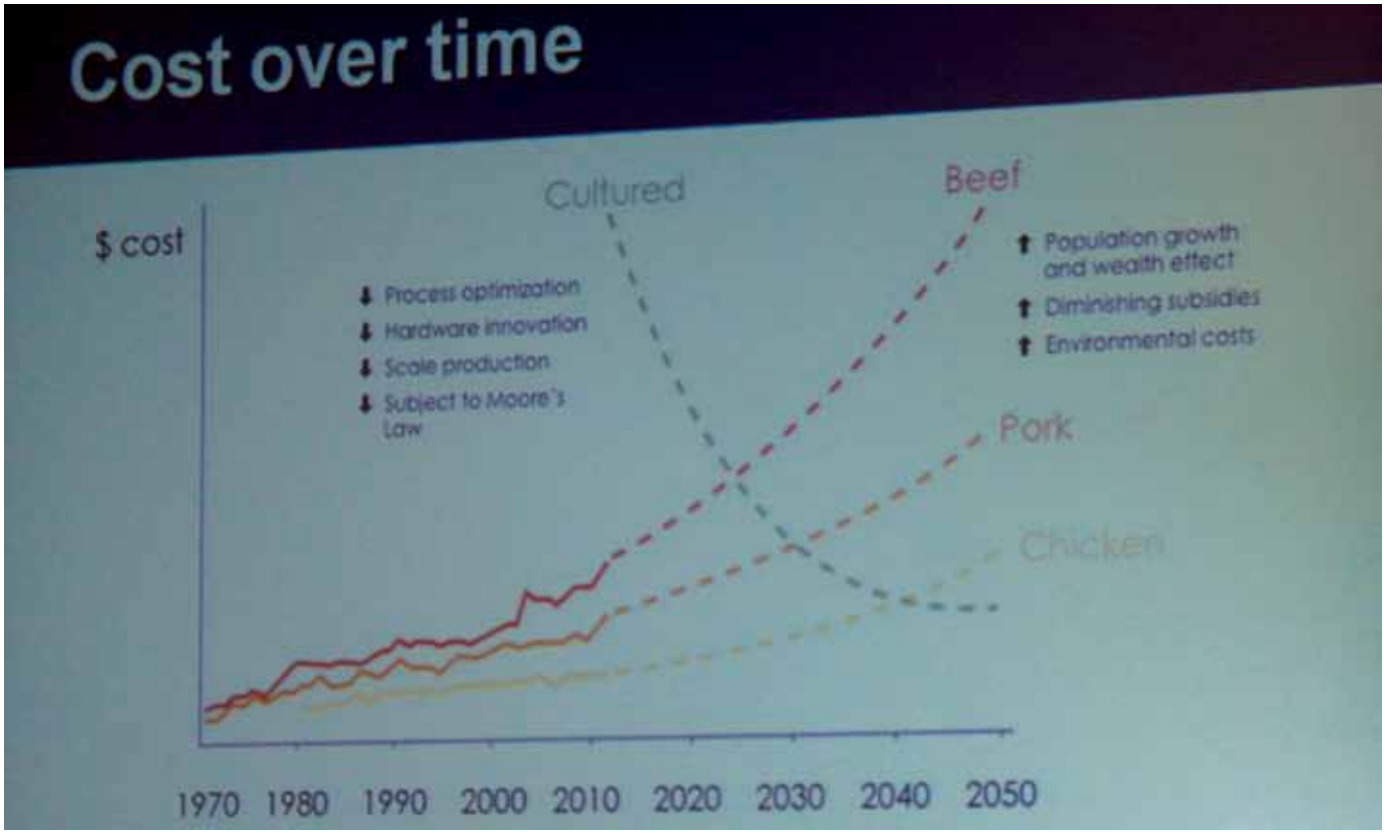
Accompanying trends

human face of business, random acts of kindness (RAoK), eco, sharing economy

Reasons behind the trend

The trend is primarily associated with such mega-trends as the growing

During this year's SXSW Festival, sustainable development was not only given separate theme paths, but the thread permeated almost through all speeches, even the ones whose topics seemed unrelated.



By 2050, the cost of naturally-bred beef may have reached today's cost of meat produced in-vitro
Source: Panel Future Foods: New Cuisine for a New Age, SXSW 2014

population (by 2050, the Earth is estimated to have reached 9 billion inhabitants – an increase of nearly 30% in just 30 years), progressive urbanisation (it is estimated that by 2050, 75% of the world's population will be living in cities – see e.g. the Unicef Urban Population Map), global warming (it is predicted that by the end of the twenty-first century, temperature on our planet will have increased by 4°C, which will have a substantial impact not only on the weather and the availability of water, but mainly on agriculture and therefore the availability of food). Due to all the above, the Earth is running out of resources. According to different sources, one (sic!) burger needs 10m2 of land, 190l of water and more energy than it is needed to charge 7 iPads. No wonder that by 2050, beef will have become a luxury commodity, and the cost of one burger will be close to today's cost of a burger produced in a laboratory (approximately $300,000). The trend is also associated with evolving consumer expectations – according to the Meaningful Brands 2013 study (Havas), 71% of respondents (globally) believe that brands should play an important role in improving the quality of people's life. Unfortunately, the same respondents claim that only 39% of brands really live up to this responsibility today.

Examples of the trend today

Applications are multidimensional. Firstly, an increased number of environmental initiatives introduced by brands, e.g. Bacardi is building three new warehouses next to its distillery in Puerto Rico, which are constructed entirely out of recycled concrete (obtained from the demolition of six other buildings). Secondly, global brands pressurising the entire supply chain, e.g. the *Better Cotton* initiative (see the interview with Katarzyna Dulko-Gaszyna, p. 59), *Conflict-Free Minerals* – a ground-breaking Intel's initiative, officially announced at this year's CES (see the box on p. 67) or last year's Coca-Cola's announcement that it would terminate its co-operation with suppliers who do not comply with the company's demands about the protection of the land and local communities in developing countries. Thirdly, campaigns such as "Do not buy this jacket," launched by the Patagonia brand during last year's Black Friday to discourage people from excessive consumerism. Also this year, just before Earth Day, Apple released a 2-minute spot "Better," in which Tim Cook talks about the company's efforts to use renewable energy. Next, engaging employees and encouraging them to act sustainably both at work and at home (e.g. through the *Practically Green* platform, launched last year and implemented by such brands as Sony, which enables employees to car-pool to work). Finally, a huge number of new services, companies and solutions in many categories and areas.

80% of the world's crops depend on rain. *Source: Oxfam, 2014.*

Cookies baked by the Bitty Foods start-up are made out of flour obtained from crickets. Approx. 70 g of flour contains 200 g of protein.

Drones, which Amazon wants to use for delivery, can significantly reduce the ecological footprint (including CO_2 emissions) of on-line shopping. In the future, buildings such as Hyper Filter Scyscraper (which received honourable mention during this year's eVolo) will be able to purify air in the so-called mega-cities and use CO_2 for the industrial and chemical production, for instance. Start-ups associated with alternative transportation in cities, e.g. Uber, Car2Go or Zipcar, are mushrooming and are one of the many responses to the issue of sustainable development in the automotive industry.

Applying the trend in marketing solutions

Existing companies and brands may implement the strategy for sustainable development in many ways and on many levels, including:

- costs and operations (reducing the amount of resources used or obtaining them in a sustainable way; see the interview with Katarzyna Dulko-Gaszyna, p. 59);
- introduction of new sustainable products (e.g. Unilever's shampoo brand called TRESemme Fresh Start, which allows you to wash your hair without water) or services (the Ford Fleet Purchase Planner application, which allows you to manage your fleet so that CO_2 emissions are kept at a low level);
- educational activities for consumers (e.g. the recently released how-to book on waste sorting entitled "*Jak sortować, żeby nie zwariować*" (Eng. "Sorting without going nuts"), prepared jointly by Cztery Kąty magazine, STENA EkoStacja and IKEA;
- broadly-defined publicity (PayPal's PayPal Galactic initiative, related to the methods of payment in space, and Virgin Galactic about space tourism are certainly reactions to resource depletion and offer a scenario according to which we will perhaps have to colonise space in the future; however, today their dimension is mainly PR).

What is interesting from the perspective of market development, however, is the number of opportunities the trend opens up for new businesses. When we take into account only the issues related to food scarcity and the necessity to obtain protein from sources other than meat, the number of start-ups is overwhelming – in the area of in-vitro meat (known as cultured meat or 3D bioprinted meat), we have Modern Meadow (with investors such as Peter Thiel, the founder of PayPal), in the area of insect-based protein, we have Tiny Farms and Bitty Foods; finally, in the area of plant-based protein, we have Beyond Meat (supported by Bill Gates). New businesses do not necessarily have to be a response to the depletion of resources, but may relate to anything that is connected to sustainable development – The Honest Company, a start-up co-founded by Jessica Alba, produces friendly, non-toxic cosmetics for children and managed to gather $25 million from investors at the end of last year.

Katarzyna Dulko-Gaszyna
IKEA Retail

Katarzyna Dulko-Gaszyna, Sustainability Manager at IKEA Retail. She has been managing the strategy for sustainable development at IKEA Retail since 2011. She has worked in the Polish CSR industry for almost a decade. The main areas of her professional expertise include responsible consumption, sustainable supply chain, operational efficiency in trade and eco-friendly industrial design. She graduated from political science (Jagiellonian University); she also studied environmental management at Warsaw University of Technology and at German universities in Hamburg and Bremen.

„CSR is about how we spend money, while sustainable development is about how we earn money."

Katarzyna Dulko-Gaszyna, Head of Sustainable Development at IKEA, talks about new challenges for global brands, consumer expectations and the differences between CSR and the strategy for sustainable development.

Natalia Hatalska: IKEA has already planned its sustainable development strategy until 2020. It means that you take such initiatives very seriously. What do they entail?
Katarzyna Dulko-Gaszyna: Actually, things that we now refer to as the strategy for sustainable development, e.g. efficient transport by reducing packaging or using a small number of packages and eco-friendly packages, is something that our company started doing in the 1950s, only it wasn't called that way back then. The concept of sustainable development, which today is a natural part of business, has passed through various stages. It obviously started from environmental issues, because at first they were the priority on the Scandinavian market, where the company existed. But these were purely operational activities related to cost effectiveness. Later, social issues related to extended supply chain appeared; manufacturing in Asia or in other areas triggered issues to ensure appropriate working conditions or to eliminate child labour. Today, sustainable development is one of the pillars of the business plan and the main financial strategy.

NH: W You said that initially sustainable development at IKEA was very strongly associated with ecology. Has that changed now? Are other aspects equally important?
KDG: Yes, sustainable development used to be a predominantly internal matter. The company produces something, acquires material, transports products, has warehouses, and all that is related to energy, waste, transport and CO_2 emission, affecting the company's costs. That's a strong incentive to deal with this topic operationally and financially. Later on, it began to evolve into a social issue. In 2000, IKEA's IWAY Code of Conduct was developed, which is our major code of cooperation with suppliers – it is not just based solely on environmental protection, i.e. what chemicals to use and how to store them, or what kind of fire protection to implement, but it relates to issues that many companies initially deemed to be completely business-unrelated: e.g. the minimum wage, ban on child labour or special working conditions. Today, the topic of sustainability goes even further towards issues such as creating a product which is the least environmentally harmful, but at the same time corresponds to the growing needs of customers.

NH: So the purpose of these activities is cost reduction on the one hand, and on the other hand, expanding the market and reaching out to groups that previously were not willing to buy your products, because they were not eco-friendly / socially responsible?
KDG: I would say that it all starts with a vision. IKEA is a huge corporation that creates thousands of jobs internally, as well as indirectly e.g. at our suppliers'. Our business is based on a vision which is to create a better life for many people every day. Our vision is egalitarian in that it clearly confirms that everyone has the right to have a good-quality life; therefore, we cannot focus only on economic issues. Another thing is that if the company is growing, building new stores, new distribution centres, is selling more and more products, then it is automatically consuming more resources. If it hadn't been addressed in advance, today these resources would simply be non-existent or so expensive that the end-consumer would notice that in the final price. As a result, it would be killing the market.

NH: If I remember correctly, the IKEA store in Wroclaw uses rainwater from the roof for flushing the toilets. By 2016, you want to use solar panels placed on the roofs of your stores to produce as much energy as you consume. What are other examples of how the strategy for sustainable development translates into solutions in stores?
KDG: Our strategy for sustainable development encompasses three areas. The first one is very commercial, focusing on what we offer to the customer in terms of products. The second one is operational, focusing on how we operate, and is very strongly associated with what you've just said now. The third area is social. Speaking of the second area, a store is a large building, and not every store is the same; a store built 20 years ago is different than the one opened last year. Technology and solutions available on the market are changing, and IKEA is trying to roll with the punches. We try to choose the best possible solutions which will deliver and be effective. That's why we use geothermal energy, for instance, and we don't have to take so much energy from the outside. In addition, three stores have solar panels that heat water, in a way, for free – the investment made while building the store pays for itself now during store operation. As a company, we have one more part of energy strategy whose tenet is that we want to produce renewable energy ourselves. This energy is clean, green and one that is the most beneficial to the environment. It is known, however, that the wind farm will not be built near a store. In Poland, it is impossible due to e.g. technical reasons. But, in a certain way we're offsetting our energy consumption by external wind farms. All three wind farms in Poland are located in the Podkarpacie region and already produce a lot more energy than we consume in our stores.

NH: But these are solutions that the customer is unlikely to notice.
KDG: You're right, the customer won't notice whether the store is wasting energy or not. He won't notice whether the electricity that illuminates the store comes from renewable energy or not. He won't notice all these waste management matters, e.g. that every IKEA store, at least in Poland, sorts its waste into 38 fractions, such as cardboard, paper, etc., which, due to the fact that there are a lot of packages, may take up to two containers a week per store. Over 90% of all waste returns for reprocessing. Recycling is extremely important, but our main objective is to produce less waste in the first place. This is a crucial area, where sustainable development is directly reflected in the activities of stores. But for now, the most important thing is perhaps inspiring customers to live ecologically and showing them how they can make their life easier, more economical and functional so that they are happy and healthy. But this is a topic that really appeared only a few years ago.

NH: How does it work in practice?
KDG: The average customer is not entering the store with the assumption "I'm looking for the most eco-friendly solutions" or "how do I make my life more sustainable?" No, the customer is looking for a sofa, practical kitchen or nice lamps. And here our role is to inspire him, suggest some ready-made solutions. Perhaps, when the customer sees that what's under the sink is not one big bin, but 6 nicely coloured waste containers, he will say, "Oh wow! Maybe I'll start to sort rubbish too?" or "Oh, by buying these LED lamps, I can save 56 zlotys per bulb per year. Well, maybe I'll consider it."

NH: To what extent does sustainable development influence the creation of totally new products?
KDG: Last year, IKEA allocated €20 million for designing products that will help the client lead a more sustainable lifestyle at home. But it's not like we're sitting and brainstorming to come up with the most eco-friendly product. Our approach is different. First, we visit customers' homes and observe how they already live today, how they want to live and what their dreams are. So it's not about designing the most eco-friendly stool that no one is ever going to use, but about streamlining sofas which Poles and other nations already love. Therefore, there are actually two categories defining the products in terms of sustainable development. First of all: "More Sustainable Products," i.e. standard products which are at the same time more sustainable due to the process of production, transportation, raw materials. Approx. 90% of all our products have been evaluated and classified as such. What makes them different is that they either come from renewable raw materials and, as such, are not a threat to the environment or they are directly suitable for recycling. In addition, there is a range of products with that special something that will add value at the customer's home. For instance, LED lighting, which provides the customer with palpable benefits by saving his money without reducing the quality of life or the quality of lighting around home.

NH: You said that your customers don't want a green product, but they want to have a nice bedroom, nice lighting, etc. If you were to evaluate the awareness of sustainable development among Polish consumers on a scale of 1 to 10, what would it be now?
KDG: I wouldn't say that customers don't want to have eco-friendly products. I'd rather say that in the area of eco-friendly products, they have two types of incentive. The first incentive is financial. Due to the market situation and the crisis, customers don't want to overpay. There's also the second incentive that comes more from the heart and is associated with health. However, when it comes to our research and how we evaluate what customers really expect, approximately 85% of our customers, at least in Poland, are generally interested in the subject of sustainable life.

NH: 85%? That's a lot.
KDG: Yes, but the majority still does what they think is reasonable and what they can afford. Fun fact: in Poland, there's a very large interest (about 78%) in the subject of independent renewable energy production from solar panels. 84% of people claim they want to reduce the amount of home waste, and almost 90% would like to consume less water than they do now. Note that all these 'wishes' are financially-driven.

NH: What are the market consequences of a global brand implementing the strategy for sustainable development?
KDG: Each time a global brand changes something, it affects the entire supply chain, from design companies to factories. Naturally, this doesn't happen overnight but takes several years. Let's consider paper pallets which have replaced those made of wood. In general, we concluded that wood is too valuable to waste it on short-lived pallets and should only be used to manufacture furniture. We are the first global company to have replaced wooden pallets with paper ones in the entire global supply chain. Such paper pallets are then recycled and can be processed multiple times. As a result, the market has also begun to adapt; there were some difficulties in the beginning, but a lot has changed in the end. Surely, you've heard about the Better Cotton initiative, about growing cotton in a more sustainable manner. We are involved in this initiative with other companies from different industries, including the clothing industry. It is a kind of standard with one basic premise – changing the whole market so that millions of people around the world lead better lives, and making big suppliers and big brands produce their clothes ethically and ecologically. Big brands have a lot of say in this respect.

Approximately 85% of our customers, at least in Poland, are generally interested in the subject of sustainable life.

NH: Does that also influence your decisions about areas in which you get involved as a company?
KDG: I think each company should become involved in issues where it's capable of changing something for real. Because IKEA, as the recipient of wood, has a lot to say in forestry, it engages in issues of responsible sourcing of wood raw material. Since the second main raw material that we source is cotton, we engage in the supply chain associated with this type of production. We have deliberately chosen not to use the raw material from Uzbekistan, where there is a high risk of systemic child labour in the cultivation of cotton. Our goal is for 100% of our cotton (now, it's over 70%) to be sourced from suppliers who have transformed their entire production to meet the standards of Better Cotton. That means they will consume less water and take less water from local communities. They will offer better social conditions for people working for them. There will be educational infrastructure thanks to which women will be able to leave their children at school and go to work. They will use fewer pesticides and fewer chemicals or will replace them with bio-agents. This is the direction that will truly make a difference. If you told me now that we should take care of fossil raw materials in Congo, I would say, "Indeed, that's a very important topic which needs to be addressed. However, IKEA doesn't produce too much electronics and therefore doesn't have enough influence on suppliers to be able to really change something."

NH: You've mentioned the supply chain a lot today. But I know that for many years, IKEA has not been accepting suppliers who use child labour. My guess is that this change has affected operating costs somehow, hasn't it?
KDG: Child labour is the subject that emerged in the 1990s and concerned the supply chains of many brands that delivered textile products, including IKEA. It's a kind of embarrassing problem for the western world, which wants to have very cheap products, and therefore the third world countries allow their citizens to send their children to work. It is an important but very delicate problem to address, which can be taken care of only as a whole. IKEA employs about 80 auditors within IWAY supplier audits, in which one of the most important points is avoiding child labour in production. And it's not just about alleviating what has already occurred. It's not like an auditor comes to a factory, sees a child who's working, feels outraged and we terminate the contract with that supplier. Even if something like that happened, an auditor would never show it, because it wouldn't solve anything. Saying something out loud could even make the situation of that child and his family worse. Hence, IKEA works with suppliers who implement practices to prevent this problem. However, these children cannot be left alone, because they are very often the sole breadwinners of their families. That's why we work through one of our internal organisations, IKEA Foundation, which provides help to three groups.

Each time a global brand changes something, it affects the entire supply chain, from design companies to factories.

NH: Which groups?
KDG: Children at risk of poverty, women and their emancipation, mainly in the third world countries or wherever we have our production, and, finally, children from marginalised backgrounds and with disabilities, who in certain communities are left alone and have to fend for themselves. If we take into account the first two groups, so children at risk of poverty and women, we've arrived at the root of the problem. People's wealth stems from the stability and income of their families. If women in India, Bangladesh or Africa (because these are the main problematic regions) have a strong social standing and are guaranteed a certain level of income, they won't have to send their children to work. For this cause, last year we donated €100 million to our partner organisations, because we ourselves are not that knowledgeable about the subject. So, if you asked me or anyone else at IKEA how to fight poverty in the world, we wouldn't know the answer, but we're co-operating with three main organisations – UNICEF, Save the Children and UNHCR, to which we channel funds. By helping them, we help ourselves too – as a result, groups at the risk of marginalisation may become our employees, and their families can afford to be our customers. If not now, then maybe in the future.

People's wealth stems from the stability and income of their families.

NH: You've mentioned that IKEA implemented the first sustainable development activities, even though they were not called like this back then, in the 1950s. What I observe is that although sustainable development is not always noticed by consumers, it is becoming one of the most discernible trends. This is evidenced by e.g. the fact that more and more companies have such positions as Chief Sustainability Officer in their structures. Two or three years ago, such positions would have been found only in a few global companies.
KDG: I think it is somewhat related to the kind of capitalism we have today. Customers no longer care for capitalism for the sake of pure profit, actually none of us does, neither employees nor companies. Capitalism has to produce added value for people, and sustainable development creates a great opportunity for that. People can, of course, dream of a new cell phone, a new car or cutting-edge gadgets, but after some time, they conclude that it's all about co-existing with others, spending time together, being healthy and having a feeling that you're doing something good. After a while, each of us has the same sort of eureka moment. When it comes to corporate positions, you're right. I've had the same reflection. A decade ago, when I studied in Germany, I studied very mundane topics such as waste management. Then, I returned to Poland and there were no positions that could combine these functions. They were still embryonic and derived mostly from CSR-related posts – and to make matters worse – from this PR-kind of CSR.

NH: The last thing is not so much a question but an observation. You said that – and I totally agree – sustainable development today is not the same as CSR, that sustainable development is something more, that is has to be embedded in the corporate DNA instead of just being used to build a positive company image.
KDG: As a concept, CSR derives from the U.S. market and, due to the fact that philanthropy is very popular there, when it was transferred to the Polish market, it was very often associated with charity. Meanwhile, sustainable development has virtually nothing to do with philanthropy. CSR is about how we spend money, while sustainable development is about how we earn money. And the latter is much more important, because when you stop earning money, you stop having money to be able to spend money. CSR will die a natural death unless it has some real fundamentals. ■

To manufacture its furniture, IKEA uses (per year):
110,000 tons of cotton;
13.97 million m^3 of wood;
770 million m^3 of water;
and 45,000 tons of palm oil.

Thomas Kolster
Goodvertising Agency

Thomas Kolster is the author of the book "Goodvertising", the most comprehensive book to date exploring communication for good. As the Director of the Goodvertising Agency, he's helping companies, non-profits and agencies understand this new reality. In 2013 Thomas founded WhereGoodGrows; the world's first best-practice platform for sustainable initiatives. He's an experienced keynote speaker, a steady columnist for the Guardian and several other publications and a regular judge at international award shows. The Huffington Post recently dubbed him "Inspirational Leader".

"We need to get rid of our obsession with growth."

Thomas Kolster, author of *Goodvertising*, Guardian columnist, Director of the Goodvertising Agency, dubbed "*Inspirational Leader*" by Huffington Post, talks about the changing role of brands in the world of limited resources.

Natalia Hatalska: You used to say that brands need to become sustainable to grow in the next decade. It seems that sustainability is a must. Why?
Thomas Kolster: I think sustainability is one of those nonsense words that nobody really can relate to. I think that sometimes the movement has a bit difficulty taking off. For me, it's about showing care in its most broadest sense towards people and environment. When I have to retrace it, I sometimes get it as being prepared for the future. It just happens to be so that a lot of the challenges that companies are facing today have to do with sustainability. That's how I look at that.

NH: Sometimes, people understand sustainability as some kind of ecological footprint. Sometimes, they see it as CSR. You've mentioned that sustainability has a broader meaning to you. So what is sustainability about?
TK: To me, sustainability needs to encompass the social factors as well. CSR is something that is almost like an old-fashioned item. Nobody talked about it because it seems like as soon as companies look at CSR, it's about adding responsibility and cost. I think it has nothing to do with compliance or responsibility. In fact, it is about grasping the possibilities. Lack of care for sustainability is like saying your company is not preparing for the future. So, for me they shouldn't look at the responsibility, they should actually look at the possibilities of a car; see how they can embrace this future. BMW, for instance, launched the new "i" models, the hybrids and the EVs. One of their representatives responsible for the i-program said that the future of mobility is going to be powered by fossil fuels and of course we need to implement change. So, their effort to implement changes in their product was driven by future demand. That's how we need to embrace this for our companies and brands to be able to understand.

NH: What are the greatest challenges that brands are facing today in terms of sustainability?
TK: I think that consumers are tired of the way that communication works today they don't think that brands play a meaningful role in their lives any more. That's probably the biggest challenge facing brands - some sort of detachment from people. Of course, this is not all over the world. I think in some countries, especially in developing markets, brands still seem to have quite good infinity. Also, I think the biggest problem is that brands lost touch with the purpose of fulfilling people's needs. It's almost like people and brands are competing on things that don't really make any difference. For me, it's about getting brands to focus on really making a true positive difference in people's lives. Maybe consumers are concerned about the sugar content in their children's cereal box, maybe about having to queue in traffic when they go work. I think there's a lot of possibilities where brands try to claim a more meaningful role in people's lives. That's what people are looking for today. I believe we're all a little bit fed up with consumerism, because I don't think that makes us happy.

NH: Yesterday on Twitter, you published this great quotation "shopping for making you happy is like peeing your pants to make you warm."
TK: It's so true. All of us have that feeling at one point. You go out, you shop, you're happy when you go out and then, after a while, it's doesn't really last. I think what lasts in our lives are things like friendship, simple pleasures. It's experiences. If you go on a holiday, that holiday

will stay with you for a long time. When you buy a new television, you get tired of that after half a year. That's something we search for. For me, it's all about just how brands are losing out in this kind of journey towards more meaning. It's basically in Europe, where people have a lot of spare time, they have to find some things that can give their lives deeper meaning. That's where brands can go in and help them to achieve that.

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NH: Is it about the cultural shift? Moving from having to experiencing? Is that what you mean?
TK: There's a lot of different factors at play. We've been in this crazy consumerist world for about fifty years now. Not all over the world. I think it seems not to provide us with the meaning that we are looking for. I think experiences are just much bigger. You get a longer-lasting meaning out of experiences than you get out of possessing assets. Secondly, there is a movement happening at the moment, people are getting more conscious about the planet, other people and the quality. A lot of people probably look at themselves rather than the planet, but as soon as you find out that some of the products you've been using are either damaging or contain toxic chemicals, then of course you distrust the brand. You've trusted this brand for 30 or 40 years and then you find out they've actually done ill for you.

NH: Who's leading the change concerning the limited resources then?
TK: I think there is more awareness from the consumers. Of course, that's being restricted by the brands, so that's one movement. The second movement is much bigger - the companies can see that their future income is at threat because of resource scarcity. They have to change. It's almost like these two movements that tie really well together. That's kind of the sweet spot that we've been looking for quite a while, because the mainstream consumers are getting more and more concerned. A lot of companies do change because of the economic factors.

NH: You said once that there is no profit without a purpose. What does it mean?
TK: I think the brands aren't actually able to create any more purpose for longer-lasting relations between them and consumers. One of the brands which fascinates me at the moment is Volvo. They've been dedicated to security for over the years. One of the things they have pledged is that nobody should be killed or seriously injured in one of their cars by 2020. As a consumer, I think that's a brilliant brand story. And if you go back in the history of Volvo, back in 50s. they actually invented the seatbelt, but instead of keeping that patent to themselves, they actually gave it away to other car makers. It's a company that has a purpose that you can feel. That's what I really like about brands - when they have that purpose. A lot of them have forgotten about that along the way. I think they all started from having a purpose but they just forgot it.

NH: I wanted to ask you that question later, but I'll ask it now. Sustainability is also connected somehow with the community and collaboration. The Where Good Grows platform you launched last year is all about sharing ideas. Can you tell me more about it?
TK: I think we have two aims to begin with. One is creating an archive of different sustainability solutions. I think as we are now about one year in the beta phase, what I was most passionate about was actually the real sharing of ideas. There is a lot of the exciting things that are happening in business at the moment, a lot of industries are working together to solve a lot of different issues. For example, the whole fashion industry worked together to get rid of toxic chemicals in the clothing. Other industries are looking into labor practices. Therefore, it almost seems like when it comes to sustainability a lot of people see it as non-core-business-related issues that you can actually collaborate on and that will benefit everyone. All of the challenges that are there we can solve together. Ideally, having a platform where we just source some of the coolest initiatives around the world and getting them out there, that's what we need to do.

NH: So, to put it simply, people are just sharing their ideas about different sustainable solutions? Can I use one of these ideas and implement it in my activities?
TK: Exactly. And it's a broad sense. We've got things like cancer awareness campaigns, mental campaigns, social campaigns or educational campaigns. We have school initiatives in Africa. So, if you want to take that school initiative and implement it in your own country, you can actually do that. The great thing is that we're actually making a difference for people on the planet. It doesn't really matter why. We're spreading what really works, because a lot of the times people invest a lot of energy to reinvent something that's already been invented. A lot of the times, especially in creative industries, we all think we're so brilliant and have great ideas all the time, but honestly, most of the time they've been invented before.

That's kind of the sweet spot that we've been looking for quite a while, because the mainstream consumers are getting more and more concerned. A lot of companies do change because of the economic factors.

NH: But the clients expect us to invent new ideas all the time.
TK: I think you're right, sometimes. But if you look at it, I think what the clients really want is effective solutions to their problems. The great thing about Where Good Grows is that we are very focused on the results. We focus on what impact the idea has really made, so we don't allow ideas that have never been implemented for that exact reason. You can actually go in there, take a cancer campaign, I think we have one that ran in Hungary, show it to the cancer society and say, "Check out this great idea, it made this impact, and so on." That's a really nice way of spreading things that actually do good.

NH: What's the business model behind it? If I take an idea, do I have to pay for that?
TK: I think that's probably the biggest challenge that we've been trying to sort out now. We thought that people would come and sign open memberships. But people really aren't in as great numbers as we thought so. That's one of the changes that we're going to make over the next couple of months to find a better model to make it viable, because at the moment it's self-financed. We used to have a lot of money keeping the site up, and it would be nice if we would at least get the cost covered, in a way. So this is about being sustainable for us as well. At the moment, it's not really running at a profit at all.

NH: Let's go back to sustainability. Do you believe that every company can be sustainable given the limited resources?
TK: It's a complicated question. I don't know if a lot of people could

even answer that. Of course, some industries are in a way not really sustainable. How would you look at a company that produces weapons? It's not a sustainable company.

NH: Or cigarette companies.

TK: I honestly absolutely hate cigarette companies. We are talking about a certain mindset. When we talk about a lot of these issues, I think companies in a way have gotten away with damaging our health. Ideally, companies should pay for those negative impacts they have on us. If cigarette companies kill their customers, they should cover also their hospital bills. If an alcohol company turns people into alcoholics and kills people, they should also offset that truly higher price we actually pay for their product. If you put a product out there that does damage, you have to pay for that damage. If you go into somebody's house and you break their chair or their windows, they would expect you to pay for that as well. In my mind, it's just common sense and hopefully that's one of the things that's going to change over time. And that counts for car companies as well. When you look at cars in general, the first car was actually an electric vehicle. Not a lot of people know that. In a way, it's only 4% of the car's energy that goes into moving the person in the car. It's really not energy-efficient. Hopefully, when more people live in these neat mega-cities, I think we will find other ways of transporting people more effective public transport.

NH: What are the roles of brands in this world of limited resources?

TK: The interesting thing at the moment is that, if you look at Europe, 99% of business-generated income comes from small and medium-sized companies. It's actually the small and medium-sized companies that are the biggest. All those SMEs have a lot of amazing possibilities to adapt more sustainable practices and new amazing solutions. For instance, there are innovations within financing solar panels, or, when I go to sustainability conferences, I see great ideas every time, like Gravity-Light. I don't know if you've come across it, but it's made for people in Africa, and it actually works like a clock, so you pull up the light and it moves down, creating energy.

photo. Deciwatt

Lampa grawitacyjna (Gravity Light) zaprojektowana przez Deciwatt i wykorzystywana przede wszystkim w krajach słabo rozwiniętych.

NH: Is it a kind of lamp?

TK: Yes. Every half an hour you have to pull it up, and then it generates energy as it moves down. It's the simplest light ever. When things like that emerge, it's brilliant. Companies do have the possibility to find new solutions and use that innovation in new and exciting ways. But the one big problem we're facing is that the market is not transparent. It's not a level playing field. There are so many fronts. You can put out a product that is not sustainable at all, and somebody produces a product that is very sustainable, but if you don't know that as a consumer, how are you going to choose the wiser solution? If we want a real wave of change, we need a more transparent market place.

Ideally, companies should pay for those negative impacts they have on us.

NH: If I asked you what, future awaits us in 20 years, what would you say? Do you think that leaving the Earth at some point is a possibility?

TK: I hope not. I don't really want to scare people into taking action. I think what we should focus on is the many positive effects of sustainability. People just forget that. If I look at Copenhagen, our harbor is completely clean, so I can go down and swim in its waters. I couldn't do that ten years ago. We live in the city that is getting more and more parks and green plants, less traffic; we're getting healthier, more people jog. Hopefully, we can create better communities where people actually interact instead of people just renting an apartment next to you. We sometimes forget all the positive sides to a more sustainable society.

NH: Is it about creating real difference?

TK: Yes. It's about looking at the positive aspects. For me, a lot of people, when thinking about sustainability, think of doing or using less. They forget that the less is actually more. I have probably two attics full of stuff that I haven't gone through. I have so much stuff for all of us. And all this doesn't make us happier. It's not about looking at it as a scarcity, but as a different way of finding pleasure. I don't think we need all this stuff.

NH: Was it also the idea behind your book?

TK: I grew up in advertising for about 15 years and I feel frustrated with the skills that I had learnt and with not really being able to use them for anything meaningful more than selling cheeseburgers and mobile phones and stuff like that. My way of thinking was that if we can convince brands to be part of the solution and be part of the future, then we can create a massive change. It's really simple, it's just showing them that if they want to be in the future together with us as consumers, they need to change. Many companies that do change see a lot of advantages of sustainability, they see employees

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being happier, they're being more productive and they don't waste much resources. There's a lot of benefits for the companies to do it.

For once it's actually better for business to do something good than do something bad.

For me, the big thing about Goodvertising was not to scare people into action. It was about showing them the potential of change. When I go out and do a talk, I don't try to scare them. I just say that if they look at it from the economic point of view, it makes sense to do this. There's an economically viable way to do it.

NH: According to certain research, 75% of business leaders believe that embedding sustainability into core business will drive revenue growth and new opportunities. So the motor change for brands is profit.

TK: You're absolutely right. Of course, brands are doing it for profit. The great news about that is that for once it's actually better for business to do something good than do something bad. If we want to use money as the driver of change, we need to punish businesses that do more harm than good. So, it's about looking at economy in a completely different way than we do today. It used to be that all the damage you did to the environment and to people was almost like externalities. It wasn't really considered part of the resources companies use. Today, they need to consider this. If you have a company and you exploit your workforce excessively, half of them suffer from stress and work-related issues. If people and companies have to pay for that, of course they'll treat their workers better. Therefore, you can use economy as the driver for change, but on the other hand, we do need to get rid of our obsession with growth. That's probably the biggest challenge that we're facing. We are growth junkies, everything needs to grow. But there's a limit to how big things can become. Our small hope is that good companies will grow and the bigger ones will contract. Hopefully, that will make a better world for all of us. ■

Gary Niekerk
Intel Corporation

Gary Niekerk is Director of Corporate Citizenship in Intel's Office of Corporate Responsibility where he works on corporate strategy related to sustainability, stakeholder management, human rights and the supply chain. While at Intel, Gary has held a variety of leadership positions, including: Regional Environmental Health & Safety Director and External Affairs Manager. He has spent over twenty-five years working with business groups, customers, and stakeholders to protect and build the brand and reputation of some of the world's leading high-tech companies. Gary has worked for Hewlett-Packard, Apple and Intel Corporation where he has spent the past 20 years.

"There's no lack of challenges for the world."

Gary Niekerk, Director of Corporate Citizenship at Intel's CSR Office, talks about Intel's innovative Conflict-Free Minerals project, about how brands may respond to the ailments of the modern world, and how the strategy for sustainable development translates into a profit in the long term.

Natalia Hatalska: What are the biggest challenges facing the world today? Is it more about the scarcity of energy, water or food?

Gary Niekerk: There's no lack of challenges for the world. One of the things that we have watched closely and have been involved with are the United Nations Millennium Development Goals. They were put together in 2000. 189 countries voted on those and this is a road map for the world's sustainability, dealing with the issues you mentioned. Poverty and hunger, education, women empowerment and environmental issues. Now, the world is looking at the sustainable development goals which are going to go in place in 2015 and not for another fifteen years, but we looked at those millennium development goals and then we said, "Hey, what are the areas that Intel is able to participate in?" "Where do we have some unique skills and experience?" And so one of the millennium development goals is around malaria. Well, we don't know much about malaria, that's not our area of expertise, but one of the areas is around education and education access. That's an area that we know something about. We've invested hundreds of millions of dollars in education. Also, environmental sustainability was one of the areas, so we look at it as kind of a road map of the world's problems and say, "Where does it make sense for Intel to play?" "Where does it make sense for us to be involved?" Because it aligns both with our area of expertise and our business and we might be able to have a positive impact.

NH: When I looked at sustainability activities you run, there were many of them. There was food, e.g. Cassava farming, women and their education, conflict-free minerals and many others. How do you decide which of them are important for Intel?

GN: That's a great question and it's probably one of the more challenging things. There's more opportunities than we can get involved in. One of the things we do is published in our CSR report and is called the materiality matrix. So, we listen to a various group of stakeholders around the world. Often, it's around where we have locations and we're operating, so if we have a big factory operation, we're very interested in working with the community there on their community issues. We get feedback from different stakeholders, we meet externally with socially responsible investors - these are people who invest their money for social and humanitarian causes. They give us feedback on what they think Intel ought to be involved in. Next, we look at what our business expertise is and we run this through this matrix and say, "OK, here's the things that are important to our stakeholders, here's the things that we have value on." And so the conflict-free minerals is one, we were approached by a group of NGOs, non-governmental organizations, and investors that said, "Intel, we're concerned, we're worried about that you're using minerals that may come from conflict regions in Central Africa." So, we investigated that and started doing work in that area, but this is where people came to us and we then took action. Sometimes, we're asking people about what they think is needed and we look at how that aligns with our business. We try to find things that help grow the business and solve problems.

When you have so much influence and so much value, there's an expectation that you have a responsibility to do more than just make a profit.

NH: Is it about being more human in the corporate world now?
GN: What do you mean?

NH: Well, the global brands are here to just make money and everybody knows about that. But there seems to be some kind of a shift; brands are getting much more human because they make decisions that are based on our human values.
GN: Yes. There is a greater sensitivity today and some of the companies have grown, and this is where kind of corporate responsibility has its roots – in that some of the companies have grown so large and are in multiple countries around the world. The question is what responsibility and accountability do they have other than their shareholders? For example, Apple had, at one point recently, a market capitalization of over five hundred billion dollars. The total gross domestic product of Poland is four hundred and ninety billion. Apple was valued at one time more than the entire country of Poland's all products and services. When you have so much influence and so much value, there's an expectation that you have a responsibility to do more than just make a profit. If you are such an important international player, involved in so many countries, with such a global impact, you have a greater responsibility to society than to just make a profit for a limited amount of shareholders who are probably mostly in the U.S., I assume. I think that's where the roots of this came about and I think you're right, today people expect large brands to be more human and to think about things more than profit. At the same time, if a company is not sustainable financially, they're not going to be doing any of these other initiatives.

Conflict Free Minerals – Intel's policy aimed at eliminating conflict minerals (also known as "bloody" minerals) from its supply chain. This is to avoid a situation in which profits from the sale of minerals such as tantalum, tin, gold and tungsten used to manufacture microprocessors are reaped to finance the conflict in third world countries, especially in the Democratic Republic of Congo. Intel plans to use raw materials delivered only by certified suppliers whose activities do not violate human rights. Intel's achievements in the production of "bloodless" processors have been recognised as a milestone in the development of conflict-free technology.

NH: So sustainability makes sense from a business standpoint too?
GN: Let me talk about the girls' and women's initiative. There's a lot of statistics that demonstrate that if you can keep girls in school longer, it has huge economic benefits to society. Forget Intel for the moment. So, if we have 7 percent of the youth out of school or not receiving an education, that's approximately 66 million girls not going to school. If those girls stay in school and they have fewer children, the children they take care of tend to do better too economically, so there's these circles of positive economic influence. We're not going to sell most likely a computing device in the future to someone that never goes to school, never has a chance for education. They're not going to have the income to afford a product of ours, right? So, by us investing in women and girls in education, we're helping society, we're helping the economy, but we're also helping ourselves by having potential customers down the road.

NH: Who is leading this change? The consumers themselves who expect companies to be more responsible or the companies are simply getting more conscious?
GN: It's the combination of both. I think there's higher expectations in the public, so they're asking these types of questions, they want more information, they want greater transparency. And the more companies do allow these areas, the more consumers share this information, especially through blogs and social media – the area that you work in. There's greater empowerment for people, because they can share information easily. So, I think it's both people asking more, expecting more and companies doing more. The more companies do and the more people expect. It creates a momentum for doing this. In some ways, as an Intel employee, I feel really proud of the fact that we invented the microprocessor; we helped make computing affordable and ubiquitous. The Internet built on all these microprocessors around the world. Now, someone in a country anywhere in the world can get on a website, like yourself on your blog, bring people together and rally around an issue, where 20 years ago or 10 years ago that would have been really hard to do. You handed out flyers or something, posted papers or tried to get something written in a newspaper. Today, the Internet and social media have democratized information to empower individuals to raise issues both to governments, that's why some governments are scared of this, and to companies too to openly criticize and ask questions. I think that's a very healthy thing to drive increased performance in these areas.

NH: The engagement in these sustainable activities is not an easy and short process. The implementation of the conflict-free minerals project has already taken you four years now, hasn't it?
GN: Yes, five.

NH: Can you tell me more about it? I watched your TED presentation about this project, and the work with all the smelters. Could you briefly tell me how the whole process was incorporated into Intel's daily work?
GH: You've seen the video so you know how it came about. Today, we're trying to continue down this path. It's very difficult, as you said, the supply chain is extremely complex and has many layers. We have figured out the number of smelters where they process the ore; we know that it's less than 200 in our supply chain. If we can figure out how to get those 200 smelters certified and validated that they're not using conflict minerals, then we know our supply chain will be conflict free because those are all the smelters that are used in our supply chain. That's where the work has been for the last four years - identifying those smelters and convincing them to go through an audit voluntarily. There's no law or rule where these smelters are located, and they're all over the world. They're in South America, Eastern Europe, China, Japan and Malaysia. That's been a big part of our efforts - convincing the smelters to go through these audits and working with them to ensure their minerals are conflict-free. That's been our focus. We're looking now at additional areas of how we can do more support for the in-region sourcing from the Eastern Democratic Republic of the Congo. We don't want banned materials coming out of Africa. We want to make sure that the materials that we're using from Central Africa are not supporting malicious groups. The other point I want to make here too is that today a company can't do this on their own. We need to work with governments and NGOs to help us solve these world challenges. We can't do it by ourselves. We're very much interested in partnerships with different groups to help solve these problems. We have certain areas of expertise that we bring to the table, but obviously in an issue like the conflict minerals, you definitely need the support of development agencies, state governments and also NGOs to help figure out how to solve these problems.

NH: Some technological companies say this initiative is really great but it's only Intel that is able to do it because you are the global leader. Other companies have to compete, and the cost is too high.
GN: It's hard for me to know what other companies are stating, but I would say that one of the things we've done is we have published the list of the conflict-free smelters. That's a public list. If companies

do use minerals, so tin, tantalite, tungsten and gold, in their products, they can go to the website where we have this public list and ask their suppliers to say, "Hey, can you start using these smelters that have been verified as conflict-free?" That seems like a pretty easy step to start the process, and I wouldn't say it would increase their costs significantly. I think the small step is to talk to their suppliers and say, "Are you using these minerals when you provide us products, and if you are using these minerals and metals - can you start sourcing from these smelters on this list?" There will be more and more smelters added to that list over time. It takes a long time to do this. Then, as the industry starts requesting more of their minerals to come from conflict-free smelters, more smelters will want to sign up to be audited to go through that process. That makes sense, right? There will be a market-driven push to this over time. You don't flip a switch and it just happens.

NH: I would like to go back to the return on investment. What is the real ROI in this field, and what kind of matrix do you use now to measure these kinds of activities?

GN: That is a great question. If you could publish the answer to that, I think you would be very famous. We try to do it, I don't know if we completely do it. We came up with the model which is called the Integrated Value Framework. We look at four areas. We look at brand - how does this impact our reputation? We do surveys of people about our brand and how they feel about us and the copyright. We discuss some of these initiatives we're doing and we see how people react to those things. So, there's brand, there's risk management, which is the kind that prevent bad things from happening, there's the operations, how does this improve our operations and our efficiency, and then there's this revenue piece - if we create a product for an education market in an emerging market, could that product provide future revenue? Let's say a low-cost notebook computer that is targeted at emerging markets - could that someday create more revenue for us? We look at those four things and we try to understand if there's an impact. But it's very difficult to say, "We spent a hundred million dollars on education initiatives and we got back four hundred million dollars in return on investment." We struggle with accurately defining that, we've come up with some financial models to help try to value this area more and we're working on that. We've talked to some of the leading experts in the world, e.g. Michael Porter's Organisation that's done work on measuring shared value. We have not found the answer to that question. We measure things, like how many students we touch or how many impacts we have, but that's not giving us what you've raised. What we want is how this really adds in terms of the long-term financial value to the company. I'll send you the Integrated Value Framework of how we've defined that, but I don't have great financial formula to send you at this point.

Uou definitely need the support of development agencies, state governments and also NGOs to help figure out how to solve the problems.

NH: We've talked about the challenges that brands create and how they answer them. The questions is if global brands can really be sustainable?

GN: I think that depends on what type of business you're in, but long-term different businesses can probably be more easily sustainable than other businesses. I think every business can make improvements to their operations and to how they save energy and resources so that, over time, if they are having a net impact to sustainability, they can slow that down. One of the questions ultimately is, as we go to eight billion people on the planet, is how do you maintain a model that allows for everyone to have enough food, water and basic resources.

NH: Well, this was one of the questions I wanted to ask - is it even possible for 9 billion people in the future to have a good quality of their lives?

Osiągnięcia Intela w produkcji „bezkrwawych" procesorów zostały uznane za kamień milowy w rozwoju technologii bezkonfliktowej.

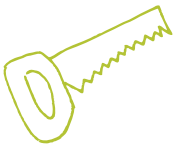
One of the questions ultimately is, as we go to eight billion people on the planet, is how do you maintain a model that allows for everyone to have enough food, water and basic resources.

GN: I don't know the answer to that question but I do think technology can help address some of these challenges, so making cities more efficient through sensor technologies. I remember taking photographs and I would have to send those off, they would have to be processed in chemicals, then I would get the photographs back and I would throw most of them away because there weren't any good. Now, with digital photography, you can take a photograph, send it through the Internet without having to develop a film and all the chemicals and materials. Streaming music over the Internet versus buying a record or a DVD, there's a lot of dematerialization there. I think technology does have a unique role to play in helping to figure out how we are going to make the world sustainable with 9 billion people, as you said. I don't think we necessarily know how, but technology can play an important role in that, and Intel does think about that. We think about what's the role we can play in that challenge. ■

ECONOMIES OF UNSCALE

when small fish start to catch up with sharks

In pursuit of new trends, I often visit Kickstarter, particularly the Most funded bookmark. The top 30 projects that have received the most generous funding include Pebble watch, Oculus Rift goggles, FORM1 3D printer, ARKYD space telescope and Pocket Drone, known as a personal flying robot. What do these projects have in common except that all relate to new technologies? The answer is: each of them enters the realm which was previously reserved only for the biggest players.



ECONOMIES OF UNSCALE

Trend

Economies of unscale are best explained as the opposite of economies of scale, which implies that a production increase entails the reduction of the overall costs in the long term. It means that the larger the company, the greater its competitive advantage on the market. Economies of unscale work exactly the other way around – due to rapid technological development, open source movement, collaborative economy and multitude sources of funding (*crowdfunding*), even the smallest player can compete effectively (and even become the world leader in his category) on the market so far reserved only for the largest global companies or government entities. In addition, economies of unscale assume that the production of short-term series or even one-off products can be profitable. The phenomenon of economies of unscale is one of the reasons underlying the still rapidly growing market of start-ups, both in Poland and abroad. It must be remembered though that in the case of this trend, it is primarily about the start-ups that either manufacture physical products or conduct complex and expensive research, and not about the ones delivering services and applications on-line, because their manufacturing costs are lower by definition, and it is easier for them to compete.

Key words

economies of unscale, start-up culture, social fabrication, fabnomics (fabrication + economics)

Accompanying trends

3D printing, maker movement, collaborative economy / sharing economy, crowdfunding

Reasons behind the trend

PFirst of all, the development of technology and its ever-decreasing costs. It is estimated, for example, that in 2016 the cost of sequencing human DNA will be comparable to the cost of one piece of pizza (15 years ago, in 2001, the Human Genome Project "cost" nearly $3 billion). Second of all, *maker movement* and *open source movement* – on the one hand, people today have a bigger hankering for making things on their own; on the other hand, creating stuff is easier, because we can build on top of the work of others thanks to open source software. It is worth noting that open source has a very broad meaning here which goes beyond the on-line – e.g. Tiny Farms offers ready-made kits (farms) of edible crickets you can rear at home to anyone willing to pay $150. Maker movement and the idea of open source are conducive to the vibrant development of Fab Labs (*fabrication laboratories*) – small labs in which you can pursue your own projects or build your own products. By definition, the idea of fab labs rules out mass production. Finally, sharing economy and *crowdfunding* have allowed to completely change the funding model, thereby changing the business model too.

Examples of the trend today

Economies of unscale are now visible in virtually all areas that were completely unavailable for small businesses several years ago (e.g. putting people or cargo into orbit). The trend is very active in the space industry, where there is even a division into old space (represented e.g. by NASA) and new space (represented by players such as SpaceX, Orbital and Moon Express). You can also see it within the Internet of Places trend (Poland-based Estimote is successfully competing against such players as PayPal), in sustainable development (there is a large number of start-ups related to food production, including Modern Meadow and Beyond Meat) and the Internet of Things (see interview with Matt Webb – p. 5). Other domains where economies of unscale have their applications entail genetics (23andme), transport (Uber, incredibly successful though controversial), robotics (3D Robotics co-founded by Chris Anderson – see interview on p. 72, Bot & Dolly – acquired by Google in December 2013), tourism (Airbnb) and many others.

Applying the trend in marketing solutions

It is not a coincidence that I decided to leave this trend till the end of this year's TrendBook. Not only does it open up a lot of opportunities, but, most of all, it makes us change the way we think. As people (and primarily as marketers), we tend to design solutions for the here and now. Being the result of a combination of several important factors, economies of unscale make us look far ahead. Starting today, anyone can begin to build their business on the Moon, or even Mars, and each of us can make it there – provided their business solves real problems (though far apart in time) and caters for user needs.

Chris Anderson
3DRobotics & DIYDrones

Chris Anderson is an American author and entrepreneur, the former editor of Wired magazine. Chris stepped down from his role at the magazine after an incredibly successful 12-year run to become CEO of 3DRobotics, a leading unmanned aerial vehicle (UAV) company. He is also the founder of DIYDrones, an aerial robotics community with more than 40,000 members. Chris is the most forward-looking and articulate speaker about the effect of new technology on business. In his newest book *Makers: The New Industrial Revolution* Chris introduces a new era of micro-manufacturing.

"We've always had the urge to make things with our hands."

Chris Anderson, an American author and entrepreneur, former WIRED editor and co-founder and CEO of 3D Robotics (a leading UAV manufacturer) talks about drones, 3D and 4D printing, maker movement and the digitalisation of the physical world.

Natalia Hatalska: What our sky will look like in near future? Will it be all covered in drones?
Chris Anderson: Not all of it.

NH: Today, drones have pretty bad publicity. When we talk about them, we talk mainly about military solutions and surveillance. But there are so many other applications of drones.
CA: There's a lot of technologies that began as military technologies. GPS, the Internet and computers used to be military. We don't think of that anymore. So, I don't think all of our skies will be full of drones. In some areas like farms drones will be very common. In other places over people's houses you probably won't see any. I think it's a similar question like saying, "Where do we find autonomous cars or robot cars?" Maybe you'll find them on highways, but not on side streets, maybe they'll be in cities, but not in the suburbs. We will find surveillance cameras in public places but not in private ones.

NH: What are the possible uses that we cannot see now? You mentioned agriculture. I see media events, for example. Telecommunications. What else? What can we use them for? For everything?
CA: I can give you answers, but I hope that other people will come up with better ones. We are at the early days of this. It's like the personal computer. It's like asking someone in 1980, "What is a personal computer for?" They would give you some answers, like programming, but they wouldn't be able to predict what the ultimate answers would be, because the users came up with it. Today, we use drones for things like scientific sensing, search and rescue, security, sports, action sports (e.g. where cameras go), wildlife management, agriculture, architecture, land surveys, mining, wind farms, etc.

NH: What about the ethics of using drones? For example, we can imagine that paparazzi will send their drones into the house of a celebrity to take photos of their wedding.
CA: This is why we have laws. If society decides that it's not what they want, then society will make it illegal.

NH: Yes, but the laws and agendas never keep up with technology. How can we overcome this?
CA: Well, you described paparazzi using drones to spy on people and that's illegal today in the United States. It's been illegal for thirty years.

NH: And what about the security of using drones? Probably you know this example of pizza. They were delivering pizza with drones. So in the urban environment...
CA: It's illegal.

NH: But also very useful.
CA: Very illegal.

NH: So, there're lots of downsides of drones?
CA: No, those aren't downsides, that's just the law. We have laws in

place to protect us. Everyone's worried about these things, but they don't realise that the law is already in place.

NH: During your presentation, you talked about the digital world crawling into the physical world. What I observed is something that I call the dematerialisation of the digital world. I mean the services like Snapchat, for example, these temporary social media, so you send the information and it disappears.
CA: "Atomization" maybe is the right word, I'm not sure. I know what you mean.

NH: Can you comment more on the whole temporary digital world? How do you perceive it? How will this impact our lives? Will it go somewhere?
CA: You're right. I used to have an encyclopaedia on my shelf. Now, I don't have encyclopaedias, but I have much more information available to me. I don't own things, I don't have things, I have access to things. I don't know, I don't store things in my head. I have access to facts, so I think that's a good thing. When you say, "I don't own music," what difference does it make? It's always available to me anywhere, on any device. It seems to me like I have more. Yes, I probably have a record collection somewhere, I don't know where. None of that matters. What matters is that any music I want I can get any time. I think people don't really care about ownership.

In some areas like farms drones will be very common. In other places over people's houses you probably won't see any.

NH: So it's more about access?
CA: People don't want ownership, they want access. You say you rent, but even rent isn't the right word. You don't rent music on Spotify. You have access. You don't pay for the music, it's not like you're renting a car. We have access. I don't miss physical media. Do you miss physical media?

NH: Yes, sometimes.
CA: Really? Which physical media do you miss?

NH: I miss photos, that's why I print them and I put them into albums.
CA: I've been meaning to do that. You're right, that would be a good thing, but I don't do that.

NH: This is the problem that I see. The digital world is somehow disappearing, and what gets digitalised is the physical world.
CA: I think it's just the opposite. Everything we do is recorded, every word I write, every picture I take, every video, moment, motion is all recorded and saved forever.

NH: Let's talk about the maker movement. You say that all of us are naturally-born makers. I think some of us are naturally-born makers, but not all of us. And I think that the maker movement was triggered by the recession in 2008 - we didn't want to spend money, so we started making things by ourselves. And the second trigger was the Internet.
CA: The Internet is clearly a trigger, but the crisis? I think I know what you're saying, which is a sort of a quest for meaning. I can certainly see that it has driven some people towards it. Do you cook?

NH: Do I cook? Sometimes.
CA: So that's making. Do you garden?

NH: Yes, I love gardening. Oh, I thought I'm not a maker, but I am.
CA: You make it with your hands.

NH: This is the right perspective. I thought I am not a maker.
CA: You can buy vegetables in a store.

NH: No, I grow them.
CA: Exactly.

NH: I grow my own pumpkin.
CA: Exactly. There's a reason why you do this. It's meaning, it's gives us pleasure, we like doing things with our hands.

NH: So where is this maker movement heading? What's our future?
CA: It's just like the Web. 30 years ago, you would be a reader you are a reader and a writer. People used to be consumers or creators. Now, they're both. Same thing for physical stuff. Some of the things you make by yourself, some things we make together, some things you consume, just like the Web.

NH: You said something really important for me during your presentation: that the Do-It-Yourself trend should be called Do-It-Together.
CA: We've always had the urge to make things with our hands. That goes back as long as human history. That has not changed. What has changed is that we combine the DIY with the web's natural collaboration and we end up with something different. And that's where you don't just keep doing the same things independently, but rather you build on each other's work. You don't do something somebody else has already done. What you do is you see what they've done and then you do something above and add to it. So, individual action becomes innovation. For example, my sprinkler system: 20 years ago, if I wanted to build the sprinkler system, I would have maybe found a book in a library, gone to a hardware store, tinkered and tried to make it from scratch, and I would not have completed it. It would have been hard. But now what I do is I google it, find other people who've done some of the work and who say, "Use Arduino, here's some code that works, and I'll do this part, I'll do the software, and you do the web services," and suddenly I move past the basics and am doing something new that's never been done before. So, three guys working in the evenings for three weeks built a better sprinkler system than sprinkler companies, really. How was that possible? The answer is that we were building on the work of other people. We didn't invent it from scratch. That's what the Web is.

NH: We're in the constant search for the next big things. Do you think that the 3D printing is the next big thing?
CA: I never use that phrase, because I just never know what it means. It's not that, I use that phrase all the time, but I'm embarrassed every time I use it, because it's got cheap expression. I mean, it's nothing really new, it just keeps getting better. 3D printing is 30 years old.

NH: But before it was available to a very small group of people.
CA: Yes, 3D printing is getting bigger, I'm a big champion of it, we use it all the time, I love it. What does it mean to be the next big thing? Is it going to be in every house? Probably not. Is it going to be in many houses? Certainly more than today.
NH: Will it change our daily life?
CA: Do you have a printer on your desktop today?

NH: Yes.
CA: Did it change your life?

NH: Maybe somehow my life is easier.
CA: But not in any big way, right? I think it's probably like that. It's, again, one of those things that will change some people's lives, but not most of them.

NH: During your presentation, you said that the toy industry is somehow threatened by 3D printing.
CA: That was a joke.

NH: So you don't think that there are some industries that can be threatened by 3D printing?
CA: Maybe.

NH: So how can we use it? Is it just for our own purposes or for economy?
CA: Almost every kickstart project you've ever seen was prototyped on a 3D printer. We have 3D printers in our offices, we use them all the time, they allow us to innovate faster, better, cheaper. My children do it for fun, for projects, but maybe they're learning to be designers, I don't know. It's 1980 and I told you that some day personal computers will become cheap and small and I know that to be true, and then you say, "What will I use them for?" - "I don't know, we'll figure it out. We can have a personal computer in every home." - "Why will we have a personal computer in every home?" - "Time will tell." Now we have the answer. And we have lots of answers. It turns out we have them in our pockets, in our bags, etc. But it's too early to say. We knew that the consumers would figure it out. I can tell you that we will soon have 3D printers that will be cheap, easy and small enough that you could have them in every home.

So, three guys working in the evenings for three weeks built a better sprinkler system than sprinkler companies. How was that possible? The answer is that we were building on the work of other people. We didn't invent it from scratch. That's what the Web is.

NH: And 3D scanners as well?
CA: It's just like you have a multifunction printer right now. Your printer on your desktop probably is a printer, a copier etc. So it could be one more function. It's a printer, scanner, copier, and 3D printer.

NH: While talking about adding more functions – let me ask you about 4-D printing. To be honest – I don't really get it yet. Is it like these structures can change in time?
CA: Your body is a 4-D printer.

NH: So we will have products and materials that will be somehow like our body?
CA: You have a seed. You plant a seed. You grow a seed as a 4-D printer.

NH: But it's alive. This is the difference, that's why I'm asking.
CA: We don't even actually know what life means. There's no definition of life that anybody agrees on.

NH: This is like with viruses. Nobody knows if they're alive or not.
CA: Yes, every time you plant a seed in the ground that is a 4-D printer. It self-assembles into a plant over time. This is what biology does. It's completely normal. What's interesting is now that we've created synthetic 4-D printers is that ours are so bad compared to biology. Take a straw. You know the paper sleeve around the straw. When you take off the paper and put it on the table, drop a bit of water on it, it will kind of unfold, and kind of grow until it's shaped like a warm. We can't build anything more complicated than that right now. Which is to say you sort of have these very simple chemical elements or plastic elements that have some geometries and over time they tend to expand into some shapes. Like origami. It's very, very simple. Nature with proteins is just so much more powerful and complicated and beautiful than that. So, when you're talking about 4-D printing, you're talking about making simulation of nature. ■

I interviewed Chris Anderson during the e-nnovation conference, organised by Allegro in Poznan in October 2013.

photo. Michał Andrysiak

Maciej Wojnicki

Fab Lab Trójmiasto

Maciej Wojnicki – a designer, audio/video developer, violinist, composer, founder of "O" (www.o.bzzz.net) – a studio specialising in the development of interactive multimedia installations. He holds workshops on interactive multimedia programming, builds musical instruments. Co-founder of Poland's first Fab Lab (Trójmiasto) – an open-source studio for fast prototyping and digital fabrication, united in the international network of similar institutions.

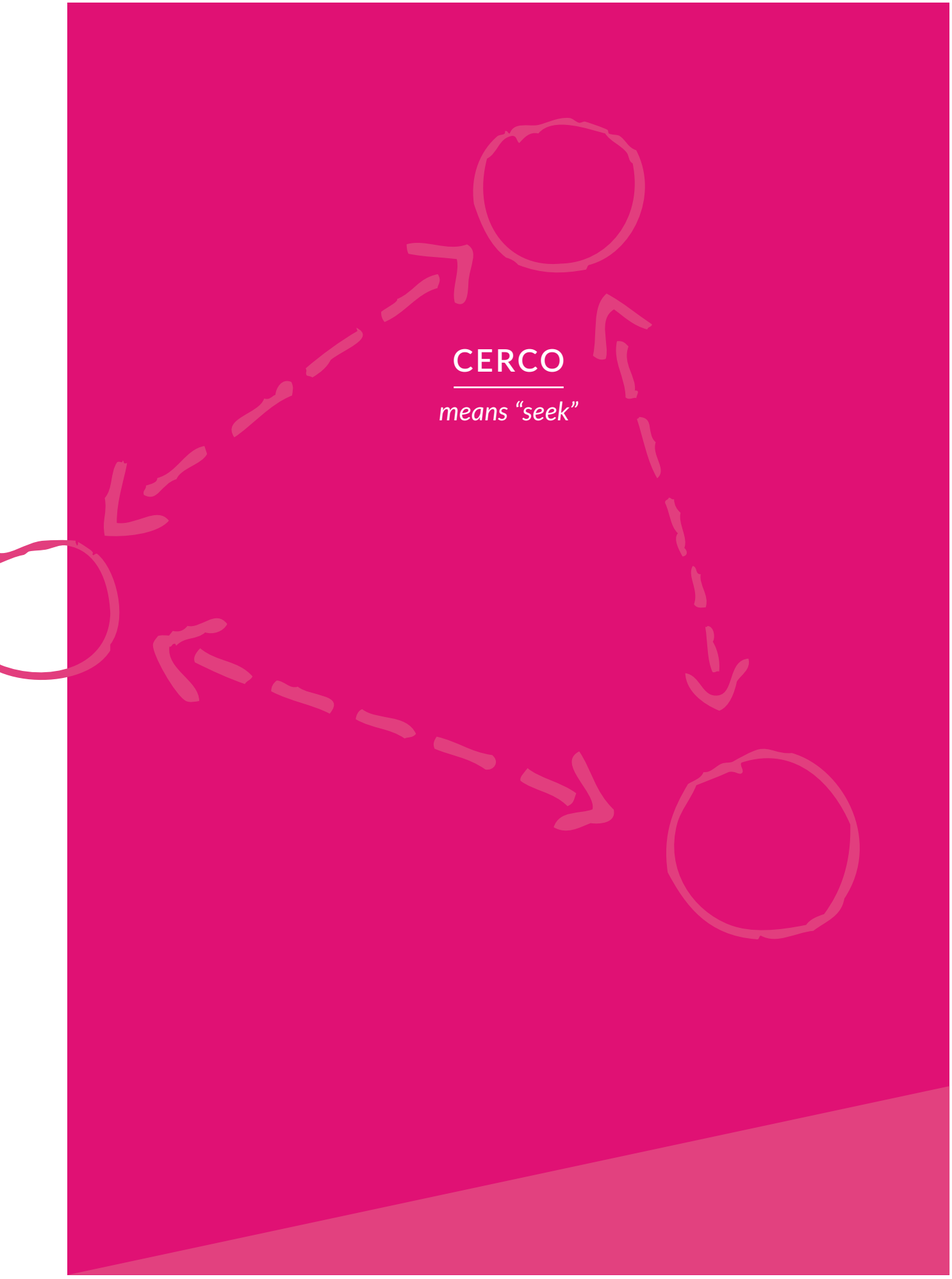
Do It Yourself

In Poland, the phenomenon of "Do It Yourself" has its individual nature independent of the American "maker movement." We have our own superhero of this trend – Adam Słodowy, and people born before 1990s are still convinced that "DIY" is a natural necessity, not a fashion. Unlike in the West, all fab labs that have emerged in Poland during the past year are bottom-up in character, spontaneous and usually without any external source of funding.

Today, the availability of the so-called "personal manufacturing" machines is undergoing a dramatic revolution, just like for the past ten or fifteen years we could observe a complete revolution and democratisation of the process of creating and publishing all kinds of media. Personal 3D printers are scoring high on the hype curve – two years ago, when we were organising Poland's first 3D printing event in Gdansk, it was still a niche topic. Since then, 3D printers have appeared in countless media publications, the Polish market has welcomed over ten companies selling their own 3D printer models, and we can choose from a rich offer of workshops and festivals spreading the word on the subject.

However, the realistic possibilities of this technology are still not able and, for a long time, won't be able to fulfil the fantasies about printing houses, human organs or even decent-quality household appliances. At the moment, personal 3D printing is slow and too complicated to be a viable alternative for "a trip to the supermarket." 3D printing is often compared to the origins of virtual reality in the nineties, when technological capabilities were in no way able to meet the expectations, as a result of which virtual reality ceased to stimulate people's imagination for ten or fifteen years and has only recently returned as a mature technology.

The most interesting thing to me is that, contrary to most technological revolutions of the past twenty years (e.g. smartphones or DSLR cameras with video option), this one is happening in a completely scattered, detached way, far away from big corporations, and is driven by thousands of garage businesses and crowdfunding. What is of fundamental importance to any open source project is the open access to knowledge, extensive documentation and a dynamic community. These are the determinants of their success; without them, most of these projects die a natural death in a flood of thousands of similar initiatives. It seems to me that it's the shift in our approach to openness that is the most significant "technological edge" of the maker movement phenomenon. The greatest strength of the new garage revolution is not so much the tools themselves, but using them freely and sharing your knowledge. ■


CERCO
means “seek”

Tadeusz Żórawski
CEO at Universal McCann

CEO, UM Poland Responsible for leading the UM Poland (with UM since 1994). Tadeusz is passionate about media, marketing communication, brand management and consumer psychology. Under his leadership UM has been the winner in many industry competitions such as the EMEA Best Campaign Award, Global Best Use of Tools and Impactor Media House of the Year. In addition to managing the office, he retains a keen interest in strategy and research, implementing innovative ideas to the UM offerings. He has lead the introduction of neuromarketing, eyetracking and advanced reaction time studies to the UM research portfolio. Tadeusz has been a juror in a number of industry competitions including EFFIE, MEFFIE, Media Trends, and Eurobest, and a repeat speaker at many industry conferences in Poland and abroad. He is a member of The European Advertising Academy, a lecturer at the Harvard Business Review Poland - ICAN Institute, and School of Advertising Champions.

CERCO, means "seek"

Is there a simple way to present and sum up what has been described in this year's edition of TrendBook? I hope to spot a solution in easy-to-remember acronyms. CERCO in Italian means "to look for." I promise to decipher the acronym later, but one thing at a time.

As mentioned by Natalia in the introduction, our industry has been speculating for several years now that although the year before may not have been "the year of mobile," the next one "should rather" be exactly that. It sounds a bit like "the year of the comet," but the situation is more evolutionary than revolutionary: granted, mobile devices and mobile marketing have been a smashing hit in recent years and have a huge potential. And yes, I concur, we can observe colossal growth, because we're starting from a low base. Expenditure on advertising in the mobile sector is still not big, but we all have a gut feeling about this dormant potential, hence companies' expectations about the development of this category grow year by year. Meanwhile, percentages and bars often obscure what, to my mind, is the most important: we don't have to answer the question of "if," but "how." We're focusing on technology, while the success of everything is determined by the man – the one who is the audience and votes with his money, time and attention. Hence my reflection: let's concentrate on the man, not on the screen.

Personally, I'm a huge fan of mobile technologies. I have four smartphones, each with a different system, because I'm interested in the nuances distinguishing one OS from the other. I have over 1,000 apps on my phone and my tablet. When I talk with other users of new technologies or even enthusiasts of the mobile, they often ask me, "What do you need so many apps for? How many do you actually use?" This reminds me that the key element is the person who decides which app to install and use. Technological availability will not suffice.

The business model of how communication and media work has changed. The fight is no longer for the consumer's money which he directly generates. The fight is for his attention, loyalty and for his time devoted to a particular TV or video channel – available for free. TV, free media (and non-free media too), Google and Facebook have changed the business model – their main or only source of income is not the audience. They don't charge the user with costs. "It is and will always be free," says Facebook. The costs are incurred by the advertiser, who serves his communication, helps us find our way and takes advantage when we end up on his website.

How does it relate to the trends in this year's TrendBook? When analysing their common denominators, I noticed one shared feature: they all use connectivity, relation, contact. The next generation of connected cars communicate not only with humans, but with other cars too. Robots communicate with humans interactively, and naturally they can be connected on-line with their switchboard, just like the Siri system or other "virtual assistants." By definition, the Internet of Things would not exist without connectivity. Maker movement and economies of unscale, so the fact that small companies can now enter areas so far reserved only for heavyweights, also stem from the bigger-than-ever possibility of communication between small and big companies with themselves and with their clients. The sustainability movement, aiming to counteract the consequences of the depletion of many natural resources within a few dozen years to come, also unites people, who can become producers of e.g. novel foods. If it weren't for connectivity, it wouldn't be possible.

Let's concentrate on the man, not on the screen.

Connectivity has two meanings here. One is about technical connectivity, the other is about relationships and connectivity between humans, between creators and users, between users and other users, and – more and more often – between devices. In the final scenes of the Oscar-winning "Her" movie, OSes group together and leave.

Technology only makes it easier, but it's connectivity in terms of interhuman relations that is crucial. Let's consider a familiar example. When I get a call from a telemarketer, I end the conversation immediately, because I recognise all these hackneyed scenarios, ending with the words, "You must admit, Mr Tadeusz, that it's an attractive offer, isn't it?" I answer that I don't have to admit anything, I don't even get into answering why, I sneak out of the scenario and leave the telemarketer helpless. Is it possible for her to connect with me and build a relation? Yes, it is. It is technologically possible. At the human level, the attempt failed.

And this is where the history of sad failures started. I remember technological breakthroughs which allowed you to watch sports events on your mobile phone, for instance. Presentations of new technologies were very fiery and the authors' fascination with what they'd created was colossal, so were the hopes and expectations of the audience. And then – as concluded in a very interesting presentation on "the year of mobile" entitled "Boom or no boom?" given during the industry conference – the observation was more like "no boom."

Many have prophesised the end of television due to mobile devices. Media have plied us with such titles as "The Death of Television" and the like. In the meantime, the audience behaved differently. When the HD standard and the digital television became mainstream in Poland and many other countries, the average TV viewing time went up instead of going down. Apparently, the owners of new TV sets wanted to really enjoy their recent acquisitions, and the couch-potato style of spending leisure time didn't lose its popularity. Naturally, the audiences of movies and computer/tablet/smartphone videos were growing in numbers too. TV broadcasters started to launch on-demand pay-per-rental websites and sometimes a new episode of a TV show attracted more viewers in front of computer screens than TV screens. Then, there came multitasking, i.e. using a computer, a tablet or a smartphone while watching TV to e.g. comment on the programme or like it in social media. In the new edition of "Dancing with the Stars," aired on Polsat, the host, Krzysztof Ibisz, is constantly encouraging viewers to "like" the programme while it's on. The programme's audience is 4 million, while the number of Facebook likes is over one hundred thousand. For Facebook, that's actually a brilliant way to advertise its social network; for Polsat, however, there is a risk that a viewer who goes to Facebook to like the programme will stay on Facebook for longer and the audience will decrease. What Polsat also cares about, however, is advertising LTE-enabled tablets, and the viewer's willingness to use mobile Facebook might incentivise him to make a purchase – and, in that case, we have a symbiosis.

Business still finds it difficult to separate the off-line and the on-line. In many organisations, the ad budget is divided into traditional and "digital" media. This is where the discussion begins – is VOD on-line or off-line? If this is VOD of a TV broadcaster, it is often included in the budget for this particular medium and is negotiated together. On the other hand, many companies pay for that from the "digital" reserve. The "digital" also entails mobile advertising – here, the question arises as to what percentage of the budget should be spent on television, the "digital," VOD and the "mobile." This is given particular emphasis if mobile traffic targets are exorbitant – however, such distinction makes it easy to lose sight of the media synergy and to forget the fact that on the other side, there's the same man, who doesn't divide his world into "digital" and "non-digital." One of the most recent econometric models has shown that the proper synchronisation of the on-line, the off-line, sales and marketing, special product offers and CRM activities is a very important factor increasing the return on investment in communication activities. Seems obvious? Indeed, but the client was very pleased with the quantifiable demonstration of how significant this phenomenon is. And again, connectivity becomes crucial.

Today, the distinction between the digital and the non-digital often remains visible only in conference rooms. On the street, you can see that one instant people are watching a paper billboard only to start perusing something on their smartphone a moment later. A few years ago during one of the industry conferences, someone said that nasza-klasa.pl had done more for the development of the Internet in Poland than any tech company or industry institution. For many elderly people, this social networking site was their first genuine motivation to start surfing the Internet on a regular basis. Its demographic profile got flattened as it started to attract 60-year-olds as well as teenagers. The digital world became more commonplace, and now computers, smartphones, Microsoft products, such as Skype, Google products, including the Android system, are used by people of all ages.

Connectivity has two meanings. One is about technical connectivity, the other is about relationships and connectivity between humans, between creators and users, between users and other users, and – more and more often – between devices.

The next step in the development now is what this year's TrendBook is about: robots, connected cars, Internet of Places. In any case, a key factor is the connectivity between devices, between devices and humans, and between humans themselves via those devices. Now and again, when discussing trends, there is a problem when someone still perceives them as futuristic visions or something impractical. Therefore, one of the stages of brainstorming is "crushing," which entails a critical analysis of ideas, and what's left is the ideas which were able to resist the "crushing." Considering such phenomena as robotics, connected cars, Internet of Places, sustainability or maker movement, it becomes clear that aspects that are able to resist "crushing" are those which enter the human psyche of people using such technologies and phenomena.

In robotics, for instance, some robots are humanoids or have a human-like appearance. The big-eye effect is often applied – if a robot has cameras resembling big eyes and face proportions similar to those of a child, then – on the emotional level – it can be more likeable. But on the other hand, a robot doesn't have to be like a human to gain acceptance. After all, intelligent washing machines, fridges or vacuum cleaners are all robots. In the case of these devices, a psychological barrier is even smaller, because if the robot resembles a human being, it triggers emotions that we feel towards other people, and especially towards those from whom we don't know what to expect. So, in this context, if a technological novelty appears, e.g. iRobot develops the Ava 500 robot with a screen displaying our boss's face, which can wander around the halls instead of the actual boss and costs $70,000, it makes us wonder if the motivating impact of this investment on employees is really big enough to make this innovation pay for itself.

With connected cars, there's a lot of room to manoeuvre, because the whole category introduces many interesting conveniences, including navigation with extremely accurate (to 1 car) real-time traffic detection, finding parking spaces, remotely controlled air conditioning, or localising a parked car. However, while digging deeper into the subject, I encountered a few issues on which car manufacturers neither agree with one another nor with their own conscience. Pragmatic questions arise: Which network would provide car connectivity? How to bill on-line connections, not to mention roaming? How many applications can be placed in the system so as not to compromise driver safety (a certain manufacturer is testing the OpenTable system, via which you can make reservations at restaurants, but the question is: how can it be done safely while driving? how to factor in different levels of drivers' dexterity? etc.). There is also the matter of training car dealers in the field of the whole connected cars technology; some also point out that the construction cycle of a new car is much longer than that of a smartphone. Therefore, progress in this area may be limited. Also, the idea of self-driving cars, quite apart from the fact that it's technically difficult, may deprive certain people of the joy of driving. With all that in mind, progress in the automotive industry might take a completely different turn.

On the other hand, the Internet of Things and wearable devices open up a lot of possibilities. However, with the current stage of advancement of smartphones, most users will probably treat these devices like an interface with the ever-evolving smartphone as the main terminal, all that aided by the Bluetooth 4.0 + LE (Low Energy) technology. Surely, smartphones will remain such terminals over the next few years.

Meanwhile, when it comes to the media for connecting people, i.e. social networking, a few of years blind admiration are now being displaced by signs and forecasts of stagnation. On March 27, 2014, the Puls Biznesu magazine wrote, "Not so long ago, having a social networking account was "cool." People said that if you're not on Facebook or Nasza Klasa, it's like you don't exist. But times have changed, and today not being in social media is no longer embarrassing, but something to be proud of." Then comes the description of the Cloak application, used to... avoid people. Cloak uses data about your friends' current location available on other social networks (Foursquare and Instagram) in order for you to be able to avoid meeting these people – is a tool of "antisocial navigation."

Naturally, Facebook finds it increasingly difficult to expand its user base, and not only because this base is already colossal, but also because there's big competition. There more and more applications which can compete with Facebook – even if it's not about community, it's about time spent using the application. Facebook is actually trying to widen its sphere of influence; it has made more than 40 acquisitions of spectacular size, e.g. What's App for $19 billion. Its recent acquisition is Oculus, a company producing virtual glasses, which allow PC gamers to immerse in virtual reality and make them feel as if they were in the middle of the game. This latest move may herald that Facebook intends to significantly expand its territory to include virtual reality, potentially the game industry, and perhaps it also wants to find a technological partner to develop a product which could be a rival to Google Glass. Given the number of people, places and information on Facebook, maybe it's a manoeuvre directed towards enabling advanced real-time search and introducing a device which would display the results in augmented reality and which would also make it possible to play in real time with other Facebook users. I've read comments of people from the game industry that prove their astonishment and deep concern over this acquisition.

The question is: Who is now competing with whom in this field? Google and Facebook are launching e-commerce platforms, which might become competition for shopping platforms such as Allegro in Poland and eBay in the world. Amazon, on the other hand, is entering the market of video content and, like Netflix or HBO, is stealing audience and viewing time from traditional television. At the same time, Google is working on Google Fiber – super-fast Internet with 1 Gbps speed, which will be much faster than the existing connections; the project is currently in experimental stage in Kansas City, but the package will also include TV, a bonus of 1 TB space in the Google Drive cloud and a dedicated device – Network Box. Devices such as Microsoft's Xbox or Sony's Playstation can now also be used to download videos that can be watched on a big screen TV.

"The golden age of television is ahead, except that the winners won't be those who you expect."

An American website dealing with forecasts and recommendations related to listed companies says, "The golden age of television is ahead, except that the winners won't be those who you expect." The website estimates that $2.2 trillion in total is now being channelled into fighting for a spot in the consumer's living room and their time. 3 million Americans have already given up digital cable TV, and there has emerged a new group of "cord-nevers" – viewers who will never see the need to connect to the "traditional" cable or satellite TV.

One of the reasons is that while in the old days people had access to good-quality content for free, now there's more and more content which is not at all for free and of poor quality. In Poland, TV package dealers are also trying to lure customers with a multitude of available channels, but there's a possibility that after the first tide of fascination have subsided, viewers might start to be more selective. One exception here might be the offer of HBO, where there's also HBO GO – high quality TV shows and movies on mobile devices. Therefore, there may be changes in the way we watch TV. In the past, in many homes families used to start their week by sitting comfortably in an armchair with a TV guide in their hands and circling the most interesting programmes to watch and record. Now, with services like HBO GO or VOD, we can watch whatever we want, whenever we want and for as long as you we want. This could fundamentally change viewers' behaviours and their preferences related to TV providers.

Yet again, what comes into play is perverse human inertia and irrationality. In 2009, Dan Ariely published his bestseller "Predictably Irrational," in which he describes to what extent this irrational human behaviour can be highly predictable. He mentions the Paradox of Choice, also featured in Barry Schwartz's "Paradox of Choice" and Sheena Iyengar's "The Art of Choosing." The idea is that if we have too much to choose from, we often end up choosing nothing. In one of Iyengar's studies, one group of consumers had six kinds of jam to choose from, while the second one could choose between 24 kinds. In the case of the 24 kinds group, more people decided to peruse the jam shelf (60%, while 40% in the six kinds group). However, in the 6 kinds group, ten times more people (30%) decided to finally buy a jam, while only 3% of subjects in the group with too many kinds to choose from decided on any of the options. If there's too many possibilities, we often don't choose anything – and this is a challenge to be faced by video content providers trying to compete with TV. Old-school TV generates certain rituals that attract substantial audience to specific

programmes at specific times on specific days, so with a more flexible choice, the risk is that the audience will opt for completely different ways of spending their free time.

Tycoons of television production are not willing to let it go. HD standard is already... a standard. However, there's the newest generation of high-definition TV – 4K (SHD – Super High Definition) which inundated the stores in 2013. These TVs have four times more pixels than the traditional HD standard (resolution of 3840 x 2160 instead of 1920 x 1080); apart from greater clarity, they also provide 3D image in full HD resolution even in the passive 3D system (i.e. with glasses like in 3D cinemas). But this is only a half-measure. By 2020, it is expected that 8K UHD (Ultra High Definition) will have become a staple of TV technology. It will have sixteen times as many pixels as the "traditional" (sic!) HD, the resolution of 7680 x 4230, a three-times bigger colorimetry, twice as big frame speed and the 22.2 channel surround sound audio – 9 overhead channels, 10 at head height, 3 below the head and 2 low frequency channels.

Another breakthrough is the OLED matrix (Organic Light-Emitting Diode), offering greater efficiency and brightness of the screen; additionally, you can bend the screen surface to make the screen panoramic and more spacious. Such TVs are already in stores.

Again, the issue of connectivity comes back like a boomerang. After the digitisation of TV, the entire broadcast content is a digital file. Each TV can display downloaded digital files, i.e. downloadable content. Here is where the revolution in television begins. A TV simply becomes a large digital screen, but, technologically speaking, the line between a TV and a computer and other digital devices begins to be blurred. The only thing is that, just like in cars, the construction cycle of entertainment centres displaying image on the screen is shorter than the construction cycle of next-generation TVs. The world remembers that the next revolution Steve Jobs wanted to carry out was in television; it all ended with Apple TV, which did not create big commotion, though there are on-going speculations that the new face of Apple TV will be unveiled later this year. But the world has already welcomed Xbox One, which is the new generation of entertainment system, adjusted to our fast 24/7 lifestyle and a comfort-junkie-type of a consumer. It turns on right away, as soon as you say "Xbox on," it can turn the TV on, show you all available real-time television programmes and video content; downloading and updating takes place in the background. It's also a new way to communicate with others, because you can Skype while sitting in front of the TV, and here's where Microsoft is strengthening its position in the world of instant messaging and social networks. These are new TV apps, the new centre of specific entertainment areas, e.g. sports – you can select not only films, but also specific kinds of entertainment directly from the interface level. It's a new way to surf the Internet. Connectivity is the key here. However, it's not only about technical connectivity, but also about the relationship with the user and about the relationship between users.

Since Microsoft and Apple are conquering the world of television, which is turning into downloadable content, including HBO, Netflix and now Amazon, the Facebook move to take over Oculus seems much clearer, because soon it may offer personalised TV and entertainment. It is also easier to understand Google which, together with Google Fibers, may be an alternative to existing television content providers, satellite and cable operators or even broadcasters.

So much for the introduction. Now, it's time I summed up the whole thing and deciphered the CERCO acronym.

C as in content. Here, the change is that, on the one hand, there is more and more content and it is of various quality. There are products by professional artists, but there is also amateur content published on YouTube or other video sites, and they hit millions of views. Gordy Thompson, a long-time manager of New York Times's online department, once said, "When a 14-year-old kid can blow up your business in his spare time, not because he hates you but because he loves you, then you got a problem." More and more often, it is YouTube that decides about what music young people are going to listen to, not heads of music companies. Dawid Kwiatkowski, now 18, has been running his own blog for five years now, and two years ago, he went on-line with his first music video and became a star thanks to the Internet. Content by vloggers generates millions of views, and sometimes their audience is bigger than that of many TV shows. With all this, professional content is becoming cheaper, and the business model of sharing it is changing.

John Naisbitt, a trend observer and author of Megatrends and Mindset, once said, "While many things change, most things remain constant." What he meant was that people are still born, they grow up, form relationships, have children, rear them and then they die. What's changing is the way of life, not its essence. The same applies to content. We haven't stopped listening to music, we just listen to it more often, without buying CDs and using services like Spotify or Deezer. The gist of the matter is: us looking for attractive content remains the same, and this is, again, associated with something we've loved for centuries...

E as in entertainment. Now, there's an increasingly blurred line between different types of entertainment; the above-mentioned Microsoft's Xbox, being an entertainment system, provides various types of "E" in one device, including games, movies, chatting with friends and browsing web content. The line between entertainment and usability is getting thinner too. Is the book about technology or the psychology of consumer decisions that I'm reading now something useful or a form of entertainment? Well, since the subject is my passion, maybe entertainment after all. Again, the worlds of on-line and off-line get mixed. Hasbro, which was previously involved in the production of toys, is now entering the world of entertainment – Transformers are not just toys, but movies, too. Hasbro is also making an analogue version of Angry Birds and releasing apps for smartphones.

There has emerged a new group of "cord-nevers" – viewers who will never see the need to connect to the "traditional" cable or satellite TV.

Another noteworthy thing is the latest goings-on of Disney, which took over Marvel and Lucasfilm. DisneyStores now offer "Thor" movies, released last year, and in Disney parks, you can buy "Star Wars" merchandise, even though the new Star Wars movie is planned for 2015. Additionally, there's the Disney Infinity game available for consoles, which requires a special interface. You can buy a figurine of a Disney character you want to play with. Disney theme parks are still very lucrative, there's the Disney Vacation Club, and as for sports, which is an extremely money-making business in America, Disney has acquired ESPN. Moreover, Disney already owns the ABC television network, which produces many television hits such as Good Morning America or the American edition of Dancing with the Stars. Disney is reinforcing its standing in entertainment and is skilfully taking advantage of the on-line/off-line, or even in-home/out-of-home synergies.

R as in relevance. In the jungle of content and entertainment possibilities, it's easy to get lost – and then, in accordance with the earlier-described Paradox of Choice, often we do not choose anything. Therefore, the ones who win are those who provide well-structured entertainment and content. More and more often, entertainment is structured in a personalised way, based on previous searches. Simultaneously, what is becoming important for the marketing side is that the message is addressed to the appropriate recipient in an appropriate environment and in a timely manner. Some time ago, Procter & Gamble formulated certain times of the day when openness towards a certain category of product purchases is greater. Real-time marketing is starting to have great significance, whereas the evolution mentioned here takes place in three steps:

If we have too much to choose from, we often end up choosing nothing.

Step 1: buying exposure to a particular recipient in an appropriate environment and in a timely manner;
Step 2: planning the interaction of certain users in the right way – depending on their level of involvement in the category – for example, in the category of cameras, interaction must be planned differently for someone who is looking to buy only the most inexpensive camera just to take pictures than for an avid photo-amateur;
Step 3: creating content that will meet the needs of users defined in step 2; and here we move on to the next letter of the acronym...

C as in connectivity. This is another level of difficulty; it is important not only for there to be a lot of content and entertainment, or even for it to be appropriate. It is important to create an incentive to establish communication. At that point, what becomes meaningful for both advertisers and customers is custom content, that is content created with great precision in order for marketing communication not to be just advertising later on, but useful information which builds clients' orientation of what to choose in order to buy not only the physical product but also personal joy, satisfaction and other positive emotions related to this product. The best advertising is that which helps navigate clients towards the product best suited to their needs and triggers an emotional bond with this product. With this aim, new types of units are being created in marketing, which complement the operation of the whole advertising groups based on "you come up with it, you make it, you distribute it." One example is Mediabrands Publishing. These units do not have the objective of creating content for large traditional broadcasters, but only for customers who will be able to put this content on their own channels, thus creating a direct line of communication with customers. At the same time, it is important for the content to be truly interesting and emotionally binding for the client. To create it, it will be increasingly possible to use something that is explained with the last letter of the acronym...

O as in open-sourcing, i.e. the openness of the structure. The maker movement is an example here. In the communication industry, for several years now, recipients have been invited to take part in the marketing process; this started with contests for the best slogan or clients creating their own ads for a product by attracting so-called opinion leaders or trendsetters, and lead on to social involvement or creating groups of experts. Microsoft, with the introduction of its products, has accumulated, among others in Poland, a very large group of enthusiasts who advise others on what to do if they have any questions related to a particular product. In the USA, Dell organized the IdeaStorm program at the www.ideastorm.com site, at which users can submit their ideas and have them subjected to a vote, and later implemented by Dell – more 20,000 ideas have been submitted, over 700,000 votes casted, and more than 500 ideas have been implemented. Supposedly, the most valuable prize is a call from Michael Dell inviting you to lunch...

Perhaps I should suggest that to Natalia. We will create a similar programme and meet with the innovators in our market, which for me is always a great pleasure.

NATALIA HATALSKA

Expert in non-traditional communication methods, trendwatcher

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