Singularity University

Riding the exponential curve

»A thousand years ago, the only people who could change a nation or a region of the world were kings; a hundred years ago, it was the industrialists. Today, anyone passionate enough can take on one of the world's grand challenges and by leveraging exponential technologies, can solve them.« These were the opening words of Peter Diamandis' speech at the World Economy Forum in 2015.

by Stefan Posch

Peter Diamandis is truly convinced that a dramatic pace of change lies ahead of us. At Singularity University – founded by him and Ray Kurzweil (CTO of Google) in 2007 – they teach entrepreneurs and leaders about their main research topic and core of this dramatic change – exponential technologies.

Exponential technologies are characterized by the fact that their performance improvements typically double with each evolutionary step. Unfortunately, we as human beings cannot conceptually understand this. As linear thinkers, we understand very well where we get if we add up a number of literal steps, which means that with each step, we cover the same distance we had with the step before. We can perfectly predict how far we'll get with e.g. 30 linear steps. With exponential steps, this is very different: with each step, we double the distance covered (1, 2, 4, 8, 16, 32, ...). Adding up 30 exponential steps leads to about one billion kilometers (which equals 26 times around the world).

Let's take the more practical example of the storage capacity of a USB stick. Almost every year, the available capacity of a USB stick doubles, but the price stays the same. The first USB sticks were introduced to the market in 2000 with eight MB; in 2012 it was 256 GB, in 2013 512 GB and in 2014, it was one TB. This is a performance improvement of 130,000 within 14 years!

Today we see many technologies developing at a similar exponential pace, some of them more obvious ►

At Singularity University the engagement with new technologies triggers enthusiasm and excitement.

than others: The performance of digital products increases almost every day. Mobile phones become significantly more powerful with each generation and the Internet stores and provides more and more data. IBM's artificial intelligence computer program Watson was specially developed to answer questions posed in natural language. In 2011 it won the game »Jeopardy« against the former human winners Brad Rutter and Ken Jennings.

Other technologies have followed the same path: Nowadays, 3D printing can be done with more than 300 materials, and drones – considered as fun little toys three years ago – are used in many applications, ranging from carrying cameras for film productions to delivering medicine to people in disaster areas when roads are blocked.

Positive impacts

The team of Singularity University collects all of these developments and researches their implications for our future. Exponential technologies are the tools that can empower a passionate entrepreneur to positively impact the life of one billion people within ten years. It is no longer only nations or very big corporations that have the deep pockets and access to powerful resources to drive world-wide change. Singularity University believes in the potential of entrepreneurship and that by leveraging exponential technologies, every problem can be solved even by a very small group of people. With their approach of supporting especially entrepreneurs, Peter Diamandis and Ray Kurzweil want to tackle what they call the 12 Global Grand Challenges. They group them into two categories: Firstly, the resource needs, which are energy, the environment, food, shelter, space and water; secondly, the societal needs, like disaster resilience, governance, health, learning, prosperity and security. Currently, Singularity University supports about ten startups that have that potential of change impact.

While the power of exponential technologies creates a lot of disruptive opportunities for keen entrepreneurs, at the same time, it will cause disruptive stress for the incumbent players. Still, many are not aware of the technological tsunami that is currently building up. For the leaders of these organizations, Singularity University offers a compact program that allows them to dive into the new technologies and their possible implications. For those who listen carefully, this can be a timely wake-up call.

ExO and the MTP

Singularity University not only researches the exponential technologies themselves, but also the organizations that leverage them in a clever way. They've identified a new type, which they call the exponential organization (ExO). Its main characteristic is that it grows ten times faster than its peers in the industry. These organizations are driven by an MTP – massive transformative purpose. They address one of the world's grand challenges, implicitly preaching the Silicon Valley mantra of »making the world a better place.« Examples are Google – organize the world's information, TED – Ideas worth spreading, or Quirky – making invention accessible. Salim Ismail, Executive Director at Singularity University, explains the importance of an MTP as follows: »It inspires a community to form around the organizations, it helps to attract and maintain talents, it binds collective inspiration, supports a co-operative, nonpolitical culture and enables agility and learning.« In his best-selling book »Exponential Organizations,« Salim describes, besides the MTP as the glue for the organization, ten more elements that many of these companies have in common. To leverage assets of others is one of those similarities. A very prominent example of this is Airbnb, which became the largest hotel chain within a few years without owning a single hotel.

What is next?

Singularity University is different from most other universities in the world because it is not a degree-granting institution. It offers educational programs that fully focus on the future and the unbelievable possibilities that lie ahead of us, due to the rapid development and convergence of exponential technologies. We can expect dramatic changes in the coming years; some even predict that in about 50 years from now, we will have overcome death. All of these developments will also put some pressure on those that hope to linearly extrapolate their currently – often – comfortable situation. Following the arguments of Singularity University, this will not work, because we live in very volatile and uncertain times. For those who embrace this as times full of exciting opportunities, currently, tools are being developed that allow the Global Grand Challenges to be solved.

Exponential Technologies

Robotics

Robotic applications first replaced menial tasks, such as operations on assembly lines, warehouses or cargo bays. With the help of AI and exponential improvements, the relevance of robotic systems increased to being responsible for entire business solutions, such as Amazon logistics services. Despite the automation, this increased use of robotics will generate as many as two million additional jobs between 2017 and 2020.

Additive Manufacturing

It also refers to 3D printing and was invented by Hull in the 1980s. Despite its slow development at the start, 3D Systems' market cap is now more than US$ 3 billion. 3D printing allows creating objects out of more than 750 different materials layer by layer with significantly lower assembly costs and less waste. As this process of manufacturing is capable of handling a wide range of geometric configurations, it additionally opens the door to new manufacturing designs.

Industrial Biology

In the past, high costs have prevented organizations from pursuing genomics as the budget to first sequence the human genome was almost US$ 3 billion. Nowadays, with improved digital technologies and easier access to hardware, scientists may alter genes for less than US$ 1,000.

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