

29th Bremen University Talks: Cognition-enabled Robotics: Democratizing a Disruptive Technology

Ladies and Gentlemen,

welcome here in the Sparkasse Bremen. We in Bremen know something about good dinners and good red wine. So, enjoy this evening here with good talks! – That could have been my dinner speech, but you are not here for pleasure, I assume!

Let me start with a personal introductory remark: I have been living here in Bremen for fifteen years, serving in the management board of the Sparkasse Bremen with responsibility for Corporate Clients and Treasury. Also, since fifteen years I am working in the board of the Wolfgang-Ritter-Foundation with responsibility for the Bremen University Talks. Part of this responsibility is this yearly dinner speech, perhaps my biggest personal challenge every year.

Since I became older I believe more and more that experience is very important. I admit, I had a different view on this some thirty years ago, but things change. The merit of experience is that you develop a routine in your work that makes you more efficient. So far, so good. But now look at this: Disruption everywhere!

The first disruption this year is that we have two universities organizing the university talks: the University of Bremen and the Jacobs University Bremen. If it only were this disruption, I could have handled it. Then the organizers decided to have the university talks in english! Don't you know that a Sparkasse is a traditional german institution? People who know me might have thought that english would not cause a problem for me since I spent a couple of years working in New York. But don't you know that New York is America and according to Winston Churchill American people and English people have much in common, except their language? Finally this years topic is about disruptive technology. Well, I don't know anything about disruption since I am working in the banking industry and that is a truly boring industry. It is just collecting money from some savers and giving this money as credits to some households and some companies. And if we are lucky, there is a margin for us that pays the bills. That's banking in essence! Luckily for me, we will be talking about technology, too. Technology, as I understand it, has something to do with engineering and we in the finance industry are proud to be financial engineers. Unfortunately, some of the finest financial engineers in the banking industry made some serious mistakes that caused the financial crisis since 2007, but that is another topic.

So, what could you expect from me, a number crunching banker and a pencil pusher? Well, I think I'll tell you something about the consequences of disruption for the society.

What is a disruptive technology?

A **disruptive innovation** is an innovation that creates a new market and value network. Eventually it disrupts an existing market and value network, displacing established market leading firms, products and alliances. The term was defined and analyzed by Clayton M. Christensen beginning in 1995. He describes the term in his book "The Innovator's Dilemma".¹

Not all innovations are disruptive, even if they are revolutionary. For example, the first automobiles in the late 19th century were not a disruptive innovation, because early automobiles were expensive luxury items that did not disrupt the market for horse-drawn vehicles. The market for transportation essentially remained intact until the debut of the lower-priced Ford Model T in 1908. The mass-produced automobile was a disruptive innovation, because it changed the transportation market, whereas the first thirty years of automobiles did not.

We try to keep in with the insight, what matters economically is the business model, not the technological sophistication itself. Christensen's theory explains why many disruptive innovations are not "advanced technologies", which the technology mudslide hypothesis would lead one to expect. Rather, they are often novel combinations of existing off-the-shelf components, applied cleverly to a small value network. "New market disruption" occurs when a product fits a new or emerging market segment that is not being served by existing incumbents in the industry.

So far, the disruptive innovations.

What are the results of the technological change today?

Now, look at this: **We live in a time of unprecedented prosperity.** We have had a great run. The world has never been more prosperous than it is today.² People around the world live longer, healthier lives than ever before.³ But we still have problems. As often in life, they have to do with facts and fiction.

Let me start with the **fiction** part. Here I have a small story to tell: A few years ago, at the last Friday evening in February, I was again lucky to attend the annual "Stiftungsfest" of the East Asian Society in the upper city hall of Bremen. I was especially thankful that I was sitting next to a BASF senior representative for China. Although I am traveling to China and East Asia since 1988 and almost yearly over the past twelve years, I was eager to talk to someone who has access to the real senior Chinese politicians. I wanted to learn from him, what they thought to be the biggest challenges for China for the years to come. Expecting topics like demographics and the build up of a social security system, environmental problems or the transformation of the Chinese economy from export orientation to a well balanced, sustainable economy, I was surprised by the answer: **Expectation management!**

For the Chinese government it was perceived to be the biggest problem that the older Chinese people still remember, what it meant to be very poor, and therefore they are more than happy with the economic progress they have seen over the past thirty years. I can only confirm that they are right, because I know (a little bit of) the China of 1988 and (of) the China of today. These are two extre-

mely different worlds. But the younger Chinese people, privileged as they already are in an one child family environment, have only seen yearly double digit increases of the Chinese Gross Domestic Product in their lifetime. So, they think it's kind of a law of nature and they **expect** this progress to last for the foreseeable future. In this situation every government would have a problem, so I had sympathy with the Chinese government.

When preparing this dinner speech, I asked myself, whether we too should work on our expectation management, when we expect never ending growth and feel it's a disaster, when there is more than six months without growth, a situation we call a recession. And then the only aim of government and business is to get out of the recession!

And here is the **facts** part: Sometimes a little knowledge about history helps, but – maybe – economic history is one of the most overlooked topics in economics. In his marvelous book "A Farewell to Alms – A brief economic history of the world" Gregory Clark⁴ showed us that "before 1800 income per person – the food, clothing, heat, light, and housing available per head – varied across society and epochs. But there was no upward trend. A simple but powerful mechanism ..., the *Malthusian Trap*, ensured that short-term gains in income through technological advances were inevitably lost through population growth. Thus the average person in the world of 1800 was no better off than the average person of 100,000 BC. Indeed in 1800 the bulk of the world's population was poorer than their remote ancestors."⁵

Over the past two hundred years, especially over the past seventy years, we were witnessing a dramatic improve of the standard of living in our world. In emerging markets billions of people have moved out of extreme poverty. In the developed world we enjoy better medicines, education, information, connectivity, and mobility than most of us could have imagined a quarter century ago. These achievements have many fathers and mothers. Human inventiveness, political leadership, social activism, and entrepreneurship have all contributed to what my most admired philosopher Nobel Prize winner Amartya Sen described as **human freedom**⁶. The march of technology – among others – has played an essential role. These forces have increased productivity, opened up markets, and created opportunities for billions of people to improve their lives.

Now, my question is: Would it be a disaster, if our economy would not grow forever and we would simply defend our standard of living of today? I really think this is a relevant question, since we just learned that stagnation, not growth, was the standard in human life over the centuries.

If we look at the innovations, we see that there are **winners and losers**. We already heard about the **winners**, for example in China and East Asia. And we should be grateful, because we always wanted the world to be less poor. And just now exactly this is happening.

Now, we are talking about the **losers** of disruptive technology. As a consequence of such disruptive technologies people feel their jobs are in danger or they are actually losing their jobs. The dispute about technological unemployment is almost as old as the industrialization itself. Today we have robotics as our topic, and there is the famous conversation in the fifties between Henry Ford II and the famous union leader Walter Reuther. Nobody knows, whether this conversation really took

place. The union leader has been shown the new production robots and subsequently he asked: "All fair enough. But who should buy your cars, if my people don't get any salary no more?"⁷ This question is still valid today, because technology is wonderful when it's useful, but less so when it puts an end to your usefulness. Disruption has delivered all kinds of new freedoms and options to people. But disruption has also pushed millions out of work.

In the past, almost always the loss of jobs in one place has been compensated or even overcompensated by new jobs in other places. But will this also be true for our future? In a recent study of 2013 Carl Benedict Frey and Michael A. Osborne⁸ examine how susceptible jobs are to computerization. According to their estimates, "around 47 percent of total US employment is in the high risk category."⁹ They believe "advanced robots are gaining enhanced senses and dexterity, allowing them to perform a broader scope of manual tasks. ... This is likely to change the nature of work across industries and occupations. ... Additional support for this finding is provided by the recent growth in the market for service robots ... and the gradual diminishment of the comparative advantage of human labour in tasks involving mobility and dexterity"¹⁰.

Another famous quote concerning this problem goes like this: "We are suffering just now from a bad attack of economic pessimism. ... We are suffering, not from the rheumatics of old age, but from the growing-pains of over-rapid changes, from the painfulness of readjustment between one economic period and another. The increase of technical efficiency has been taken place faster than we can deal with the problem of labour absorption"¹¹. What do you think, how new is this quote? Well, it sounds like pretty new, but it's a quote from 1930, from the famous economist John Maynard Keynes from his essay "Economic Possibilities for Our Grandchildren".

Keynes was optimistic that the *economic problem* may be solved, or be at least within sight of solution, within a hundred years. He foresaw that "three hour shifts or a fifteen-hour week may put off the problem for a great while. For three hours a day is quite enough to satisfy the old Adam in most of us!"¹² Nobody can be sure about the future, but I believe that Keynes is right: The world won't go under and we have the opportunity of a great future.

If technological unemployment might be exaggerated, where is the problem?

Maybe, now is a good time to look for answers of the question, to what extent a more and more complex technology is increasing the differences of qualification on the labour market. There seems to be a widening gap between those who are able to meet the requirements of the technological world and those who can't for whatever reason. Maybe, the emergence of a low-wage sector has less to do with political decisions but with growing differences in qualifications which result in growing differences in wages.

This is not only a problem because of a too low pay and because jobs usually help to make ends meet. Work is also important because according to Voltaire work keeps away three big evils: boredom, vice and poverty. And jobs are important to people because they give us acknowledgement. The needs of human beings "fall into two classes – those needs which are absolute in the sense that we feel them whatever the situation of our fellow human beings may be, and those which are relati-

ve in the sense that we feel them only if their satisfaction lifts us above, makes us feel superior to, our fellows. Needs of the second class, those which satisfy the desire for superiority, may indeed be insatiable".¹³

Therefore technological change not only increases economic differences but also differences in status. The division between those who have captured the vast majority of the benefits from global integration and technological progress and those who haven't runs between major cities and smaller communities, between young and old, and between people with different levels of education. Seventy per cent of the US workforce has experienced no real wage increase in the past four decades.¹⁴ Similar patterns can be observed in Canada and European countries.

In short, it appears that many are so dissatisfied with the current game that they are threatening to end it, even at significant cost to themselves. They are thereby jeopardizing the major drivers of global economic prosperity: technological progress among others.

Wealth creation does not automatically result in a fair distribution of rewards. The advent of new technology creates winners and losers. Popular support for new technology has always rested on the premise that most would benefit, many could succeed through their own efforts, and a social safety net would protect temporary losers. Traditionally, it has been government's role to provide equality of opportunity (particularly through education), an effective safety net, societal balance, and political and economic stability. Meanwhile, business could focus on generating growth, productivity, innovation, and, ultimately, societal wealth. But governments now find it harder and harder to play their role.

The cracks are beginning to show. Many people now think the game is biased (two-thirds of Americans say that the economic system is "not fair"¹⁵). Some conveniently blame immigrants and foreigners for their woes. Others appeal to moral notions of fairness and demand distributive justice.

What needs to be done?

Moral questions aside, addressing the challenges in our societies is in our best interest. It is hard to imagine that anyone has anything to win from ending today's game and replacing it with one characterized by restricted trade and access to talent, a backlash against technology, and persistent political and economic uncertainty. So, we have to fight for success!

Sure, there are some preconditions to our success. According to Keynes those are among others "our power to control population, our determination to avoid wars and civil dissensions, (and) our willingness to entrust to science the direction of those matters which are properly the concern of science"¹⁶.

I believe that there are three answers: first, maybe we have to conclude with what we started: with **expectation management**. We should primarily work on the real economic problems of the world: making sure that as many people as possible enjoy human freedom. And we should try to accept that we can't solve the problem of relative needs. If we would be able to build a sustainable society

on a sustainable economy without significant growth rates and defend the living standard of today we should be more than happy.

Second, luckily people are born very diverse¹⁷, so we have a vast variety of **talents**. Those talents should be properly managed in a way that people should work on their strengths to become superior performers in their fields, whatever they are, for that society will benefit from their achievements. If we just work on our weaknesses we all will become mediocre. The outcome not only will be boring but also result in a weaker economy – weaker also in its ability to support the not so well offs.

Third, I would like to add that science surely will bring us technological innovations, even disruptive innovations like in the field of robotics. These innovations will solve some problems, but probably create some new problems which cannot be solved by new technological innovations but by **societal innovations**. Maybe, the old fashioned welfare state might have reached its limits, because it can only solve the problem of differences of income and wealth, but it fails, if we look at the problems of differences in status. So we have to work on new answers to our new technologies that create new societal problems. The societal innovations might become equally important than the former innovations. Let's start working on them today!

¹ Clayton M. Christensen: "The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail", Cambridge, MA 1997.

² See IMF: "World Economic Outlook", January 2016.

³ See United Nations: "Human Development Report" 2015.

⁴ Gregory Clark: "A Farewell to Alms – A brief economic history of the world", Princeton and Oxford 2007.

⁵ Clark (2007), page 1.

⁶ See Amartya Sen: "Development as Freedom", Oxford University Press, 1999.

⁷ Quotation after "brand eins: Wirtschaftsmagazin", Hamburg, July 2016, page 41.

⁸ Carl Benedict Frey and Michael A. Osborne: "The Future of Employment: How susceptible are Jobs to Computerisation?", 2013, (http://www.oxfordmartin.ox.uk/downloads/academic/The_Future_of_Employment.pdf)

⁹ Frey/ Osborne (2013), page 44.

¹⁰ Frey/ Osborne (2013), page 45.

¹¹ John Maynard Keynes: "Economic Possibilities for Our Grandchildren", in: John Maynard Keynes: "Essays in Persuasion", Norton, New York 1963, pages 358-373, page 358.

A helpful real recent study on this topic is the book "The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies" by Brynjolfsson and McAfee, New York 2014.

See also Jeremy Rifkin: "The End of Work. The Decline of the Global Labor Force and the Dawn of the Post-Market Era", New York 1995.

¹² Keynes (1930), page 369.

¹³ Keynes (1930), page 365.

¹⁴ See Rich Lesser, Martin Reeves, and Johann Harnoss: "Saving Globalization and Technology from Themselves: Imperatives for Corporate Leaders", bcg perspectives July 2016 (<https://www.bcgperspectives.com/content/articles/strategy-globalization-saving-globalization-technology-from-themselves/>). See also Branko Milanovic: "Global Inequality: A New Approach for the Age of Globalization", The Belknap Press of Harvard University Press, Cambridge, MA and London 2016 with further details.

¹⁵ Hannah Fingerhut, "Most Americans say US Economic System Is Unfair, but High-Income Republicans Disagree," Pew Research, February 2016.

¹⁶ Keynes (1930), page 373.

¹⁷ See Amartya Sen: "Identity and Violence: The Illusion of Destiny", New York and London 2006.