Why do all social robots fail in the market?

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[00:00:00] **Christoph:** Together with Tony, Friederike, Takayuki, Merel and Selma we recently published the first text book on human-robot interaction through Cambridge University Press. I will link the book in the description. While this is an excellent book, it is not the topic of this podcast. Instead, we will focus on an insight that occurred to us when we prepared a timeline of social robots for the book. An observation that either emphasizes the urgent need for our book, or its complete irrelevance. The ugly truth is that almost all social robots failed in the market. Our book had become an obituary. Why do almost all social robots fail?

[00:00:51] **Lundy:** That's Jibo right there and he's speaking up.

[00:00:55] **Christoph:** This is the Human-Robot Interaction Podcasts. I am your host, Christoph Bartneck

[00:01:14] Many start-up companies created social robots and tried to sell them to consumers. This includes, for example, the KeepOn, Cozmo and Pleo robots. Start-up companies are often risky endeavors and we would expect many of them to fail. But even large international companies that already had a strong track record in industrial robots failed to bring their social robots to the consumer market. This includes NEC's PaPeRo, Mitsubishi's Wakamaru and Bosch's Kuri robot. While some were sold to researchers, they never matured to products that could be sold to consumers. The only exception is probably Sony's robotic dog Aibo.

[00:02:09] One of the most spectacular social robot firework has been the Jibo robot and we will use it for a case study on the difficulties of creating and selling a social robot. Jibo is such an interesting example because the Jibo company seemed to have done everything right. They had extremely qualified experts, attracted millions of dollars of investment funding and delivered the

robot to their customers. Still, in 2018 the Jibo company closed its doors. But I am getting ahead of myself.

[00:02:56] The story of Jibo starts with Professor Cynthia Breazeal of the MIT. She was one of the first researchers in the field of human-robot interaction and for her PhD thesis she developed the Kismet robot. She published her thesis in 2000 and based on it the book "Designing Sociable Robots". Kismet had always been a research platform and it eventually retired to the MIT museum where it was on display until 2018. Cynthia authored many articles about social robots and she is widely acknowledged as a leading researcher in the field. My request for an interview with Cynthia remained unanswered. Many journalists had similar experiences with her and hence we have to put the pieces of the puzzle together ourselves. In 2014 Cynthia launched a crowdfunding campaign on Indiegogo to create the Jibo robot. The campaign raised more than three million US dollars. But that was only the beginning. During the next couple of years several venture capitalists injected another 60 million US dollars. It took the Jibo company nearly four years to develop and ship its robot. For 899 US Dollar Jibo could have been yours. The Time magazine put the Jibo robot onto its cover and crowned it one of the best inventions of 2017. The Jibo company did everything right. They had the people, the money and the publicity. Here is an excerpt from their promotion video:

[00:04:49] **Cynthia:** Technology actually treated you like a human being. What if technology helps you to feel closer to the ones you love. What if technology helped you like a partner rather than simply being a tool? That's what Jibo is about. That's why I created this company and I've got the right team to do it. People with a proven track record of bringing innovative technologies and exciting content to market. But now we need your help. To build Jibo to bring it to the world and to grow the community. Let's work together to make Jibo truly great. And together we can humanize technology.

[00:05:24] **Christoph:** Cynthia dedicated her HRI conference keynote to Jibo and she spoke at several other events about the robot.

[00:05:32] **Cynthia:** This next wave of computing which I think is really going to be around emotion. I think emotion is the next way of this humanized high touch engagement with technology, I think is really the next wave. And that's, Jibo is like the first of its kind to bring all that whole new humanized way of relating and experiencing technology.

[00:05:53] **Christoph:** The reviews the robot received, however, were sobering. Linus Tech Tips had backed the Indiegogo campaign and were one of the first to review the robot.

[00:06:06] **Linus:** Now for my part, it was pretty obvious that Jibo was too ambitious to be anything but an enormous belly flop onto a bed of hot coals. But coming off of the success, of my then recent flaying of the Brenton hydrogen reactor, I was looking for a way to up the ante. I was looking for something even dumber to roast. So I bought one. Three and a half years later, my very own Jibo finally showed up. Was it worth the wait, was it worth 900 US dollars? Of course not. Don't be a Jibo.

[00:06:49] **Christoph:** In the time it took the Jibo company to build and promote its robot, other major tech companies had developed voice-based agent systems that run on smart speakers, such as Amazon's Echo or Google's Home speakers.

[00:07:06] **Lundy:** Because Jibo was much like that. So it has what I call web smartness. You ask you the question and they'll go out and look for some kind of answer on the web. And it can do things like add numbers, give definitions of words off the shelf. Once the novelty wears off, you realize that it's sort of a fancy echo dot, but for much more money. The Echo and the Google Home is way, way more advanced than Jibo right now.

[00:07:40] **Christoph:** Voice assistants also arrived on smart phones. You can talk to Siri, Bixby and others. Although this does not always work perfectly.

[00:07:53] **Lundy:** Echo stop. Echo stop. Sorry.

[00:08:01] **Christoph:** So why would you buy a Jibo robot if all its functions could already be accomplished with the phone in your pocket?

[00:08:10] **Linus:** But the fact is, although somehow time missed this, he's almost completely useless. Especially when you consider the pitch from the original crowdfunding video. I mean, yes, he does have some smart home functionality. Thanks to if this, then that integration. But it's very basic and yes, in theory, his abilities could expand with over the air updates and a developer SDK though, it's coming out in the new year. But honestly, what kind of developers would be stupid enough to invest their time in a platform with such

a small user base? When there are an estimated 20 million Amazon echo devices out there with Alexa.

[00:08:55] **Christoph:** Cynthia had argued in her 2015 Web Summit Keynote that:

[00:09:00] **Cynthia:** People seem to be doing better with these social robots, again, with these other kind of a more traditional screen-based interventions. So what's the new story then for robots, when we think about robots today, still the value proposition, often centers around being this sort of physical work technology, but we've been able to see through these studies and more there's actually this aspect of the humanized engagement is kind of the killer skill.

[00:09:25] **Christoph:** In an IEEE Spectrum interview Cynthia explained that:

[00:09:30] **Cynthia:** We'd asked them explicitly, what's the difference between Jibo and, and a tablet computer. And they, you know, they use their own and have tablet computers. They said, well, Jibo Jibo fits in my family Jibo is part of the family.

[00:09:40] **Christoph:** Okay, Jibo might not have fulfilled all the expectations it raised. Maybe it did not fit into our families. But was it completely useless? Several researchers, museums and medical practitioners had purchased Jibo. After all, it could be programmed to exhibit specific behaviors and animations which could be useful.

[00:10:03] **Lundy:** I've actually done three experiments with Jibo one at a museum to compare Jibo with the Nao robot and one at a children's hospital to see if a kid's on the autism spectrum even cared about Jibo. And in that experimental, we had four other robots also. So we had five robots total, including Jibo. And then the third one was that, an art therapy business, a small business. And we tried to do something with Jibo to compare. I mean, to combine or integrate art therapy, music therapy and robot therapy. That third experiment was a failure only because of the very first day, the first session a kiddo knocked Jibo off the table and it stopped working

[00:10:55] **Christoph:** This is professor Lundy Lewis from the Southern New Hampshire University.

[00:11:04] **Lundy:** I programmed Jibo. In fact, I had to program Jibo for the, for that third experiment. And the programming language is a Scratch-like language. Worked nicely. I had to do some integration with, with some more technologies for the third experiment, the integrated therapy experiment, because Jibo is not good with pitch that is, doesn't know how to do pitch so I couldn't program it to sing a melody, for example. So I had to use other software for that.

[00:11:37] **Christoph:** How well did Jibo work for your purpose?

[00:11:40] **Lundy:** For the research platform, there should be some, two improvements. One is this, the Dot, for example, can be programmed with new knowledge. That's good. You can program it. It's the only voice technology that I think that can be programmed and with Jibo you can program it also, but you can't use those two kinds of knowledge side by side, it would be wonderful, wonderful if you could, if one could do that. It should be improved that way. And with the programming language, that's pretty good. I don't mind programming in a Scratch. I mean, it's not Python or anything like that. Yeah. But as long as it has the usage well constructs so that you can implement knowledge and different kinds of AI, that would be great. But the problem is that there are some bugs in the programming language for Jibo that are serious.

[00:12:36] **Christoph:** How well do you think Jibo would work for general consumers?

[00:12:40] **Lundy:** It might not be right, but I don't think that for the general consumer, Jibo is that good. For adults I think that Jibo evolved into something like a party trick and, but it's very, very good at a party trick.

[00:12:56] **Christoph:** How would Jibo need to be changed to be more useful for researchers or consumers?

[00:13:02] **Lundy:** So somebody needs to make another pass over the programming language to improve it. For example, List are very important in programming a robot. You can do some cool things easily with a List, but you can't List are not functional in Jibo. And I'm sure that's a bug.

[00:13:23] **Christoph:** Why do so many social robots fail in the market?

[00:13:27] **Lundy:** I think that the ones that failed are, come to be viewed as expensive toys. Jibo compared to the Dot is an example. People think of Jibo as an expensive toy.

[00:13:45] **Christoph:** Jibo was discontinued in 2018, only one year after sales had started. The Jibo company was shut down and the Boston office closed. SQN Venture Partners purchased the IP and Jibo seemed to have reached the end of its short life.

[00:14:08] Amro Najjar from the University of Luxembourg investigated the fate of not only Jibo, but also of the robots mentioned earlier such as Pleo, Cozmo and Kuri. Amro, why do most social robots fail in the market?

[00:14:24] **Amro:** We have a contradicting expectations. For instance, you have the first of all, the user, the user's expectations are really driven by what the user sees in movies and what they see in advertisements.

[00:14:36] **Tomas:** Along the years in movies with robots and we do have a high desire kinds of robots in our life, intelligent robots that can make our life easier. Now is see that this is something that were a lot of companies and for a lot of us this is a desire as well. Yeah. I am Tomas Concha, and I am leading the Jibo initiative inside NTT Disruption.

[00:15:00] **Amro:** The expectations can be also driven by the how the robot look. So if the robot is a humanoid, the users tend to think that the robot is easily capable of performing those tasks, that a human are very comfortable, and easy to do. For instance, activity recognition and speech recognition. But this is actually an expectation gap because when the user interacts with a robot, it is mostly the case that speech recognition is not perfect.

[00:15:27] So that's a serious exepcation gap and a serious problem generated by false expectations.

[00:15:34] **Frederic:** We are talking about the robot that learns in an open ended manner. And if you look even that Turing's early paper about the evolution of AI, it's clearly that progressive step by step learning, which is the way. Which is going to make the biggest difference. And for doing this, it's much better to start with a dog like system, because many people recognize the intelligence of animal.

[00:15:57] They live with cats and dogs and they have developed very interesting complex relations. They know how successful and efficient they maybe dogs in certain situations, especially because they're based on other type of sensors. So all of this makes you in a state of mind, not because it's less powerful than a human or a child, but because it's actually create the right expectation, an expectation of a different entity that is living in a different world because it perceived the world through different type of sensors.

[00:16:28] And which is developing new behaviors, which are readable, but which are definitely not human. So I always thought it was extremely smart for Sony to start with a dog robot and I'm still thinking this is the way to go. And that if you want to make a small child robot or whatever, you end up always pretending a toy like system.

[00:16:47] I'm Frederic Kaplan I am a professor at the École Polytechnique école EPFL

[00:16:54] **Amro:** Another kind of expectation is the researchers' expectations. Most of new startups, like a robot startups are created by researchers from the university and university atmosphere or environment is quite different than the business environment in which you need to run your startup. And in this case, if you look at your university or university atmosphere, the main expectations or the main goals are typically publications, visibility, tackling a new kind of problems, but when we move from this ecosystem of the university, to industry than it's a totally different story.

[00:17:32] The researchers who used to be successful in the university need to now need to tackle a new set of challenges related to running their startup. And in most of the cases, they lack the entrepreneurial

[00:17:45] training.

[00:17:59] **Christoph:** Jibo is not first that was put to rest in the public eye. Sony had sold its robotic dog Aibo as of 1999 and despite the protest of many fans, Aibo was discontinued in 2006. 11 years later Sony decided to re-start its Aibo line of robots and brought it back to the market in 2018. I talked with Professor Frederic Kaplan of EPFL about his experience with the Aibo robot. Frederic, do you own an Aibo robot?

[00:18:38] **Frederic:** Yeah, I still have a one Aibo from my research at Sony, still using it from time to time especially to do demonstration.

[00:18:48] Because when you show that to people, they really think it's the future. Although,that Aibo is almost 15 year old. That's I think quite interesting about that particular pieces of technology. I mean that it doesn't seem outdated by any means. On the contrary, it seems futuristic. Although it's actually was born at a time where the internet was almost just starting, the web was booming, but nothing like what we have now.

[00:19:16] **Christoph:** What was your role in the Aibo project? Why was a lab in France involved in the development of a Japanese dog robot?

[00:19:24] **Frederic:** I think it was '98, Massaro Fujita, which was leading the development of a new project came to Paris. So I was a researcher at a Sony computer science lab in Paris, which was the only fundamental research unit outside of Japan. So the really was idea of that laboratory was to explore horizons that were not explored by the product team.

[00:19:47] And he came and showed the, a very early stage prototype of the robot. I think it was the written version. In which you had almost no design, but it was so lively, so impressive in the way it was moving that it really triggered our imagination and Luc Steels my boss decided that I should be the person trying to bring one of those prototype to Paris so that we could potentially explore new way of doing artificial intelligence communication, with a robot.

[00:20:17] I went to Japan, which was kind of interesting element because I joined the team of engineers it's were developing the successive prototypes and it was quite hard to actually enter into it because it was all built on another operating system, which was the Aperios operating system.

[00:20:34] The Sony operating system that's only had developed for other purposes. And which was we used for Aibo at that moment. And so little by little by sitting around and trying to ask, about, how the thing was functioning I got enough knowledge to be capable of bringing back one of the prototypes to Paris and we started developing some AI, for the robot in various directions first, in terms of communication, teaching new word to the robot, and then progressively to other dimension like curiosity, artificial curiosity, lifelong learning. And we continued till 2006, even beyond progressively showing, the

potential of the robot then directing quite closely with, with a Japanese team, which we're making, well the product itself and all the hardware part.

[00:21:21] **Christoph:** How many Aibo robots were sold?

[00:21:24] **Frederic:** I don't have the exact figures. I think more or less is 200,000.

[00:21:28] **Christoph:** Who used the Aibo robot and for what purpose?

[00:21:32] **Frederic:** Well, you had a lot of early adopters quite varied, essentially future enthusiastic people, you know, that wanted to have another way of life. It was like a making an experiment of some sort, the robot was quite expensive. it was like a computer plus the motor. So there was no way would that be really a toy it was a piece of luxury in some way, but some people were excited to be among the first. To be part of that new, a new kind of humanity living with robots.

[00:22:00] **Christoph:** What was the key to success for Aibo?

[00:22:02] **Frederic:** Yeah. So for doing this, what you must understand is that, so we were a research lab. There were the product development labs, but most of the effort and the cost comes actually from sales. Then the creation of Sony Entertainment Robots was something quite important in the sense that you had, there were offices in different places of the world. You had all the chain of people organizing event setting the products or doing the distributions so on and so forth. And that makes a big difference between companies that are developing prototypes or showing demonstration, but didn't go to reach the customers and Sony actually did it. They made all possible effort to consider it as the new PlayStation, if you want.

[00:22:50] And paradoxically, one of the issues, was that, well, the other company, which we're kind of following, did not really follow I mean, Sony arrived with full fledged product line and distribution channels and ways and understanding where to sell it, et cetera, et cetera. And the hope would have been that they would have been a real Honda robot. Well maybe a Microsoft robot or whatever, so that it would really create a market. That did not happen for maybe for various reasons we can ask ourselves. but that was one of the main moments. I would say, history bifurcation.

[00:23:26] **Christoph:** But if 200,000 Aibo robots were sold then that in itself could be a financially viable business.

[00:23:32] **Frederic:** You have to compare that with the PlayStation. You have to compare with the real market driving lines of products. One of the thing, which was obviously extremely difficult for a robot in which still is the price of the motor. It's all, you, the computer, they get cheaper, the camera, they get cheaper and of course, with smart phones and all this. This has gone cheaper, cheaper, cheaper, but motors and high quality motors. Like the one you need for a robot like this, all the mechanics are good. These are elements, which do not benefit yet from an economy of scale. And so it's quite difficult, push the price back.

[00:24:09] **Christoph:** How was Aibo different from other unsuccessful social robots?

[00:24:14] **Frederic:** Well, my feeling is that there's nothing matching Aibo really, in the level of design, the robot had the level of complexity adding in the way it would actually behave. And the overall pleasantness of its everyday interaction. The key idea was that it would change significantly over time that some was something that was really pioneered in the research lab that made it to the product to some extent, in particular, I mean that key idea of curiousity the fact that the robot would be capable of understanding its environments, what are the next thing he has to learn. Basically, having mastered that particular type of object being bored about something going to something else. And there were really two types of schools for them to be some which were coming back as a scripted evolution, almost like written. you would ask some behaviours unlocked after some moment of time. So it was essentially just a simulation if you want. And a, and if you, in which direction really counted, and that means that it's how you would have spent with that robot. We made the difference, not because you unlock a new level of the robot, but because your robot is capable of doing things that no other robot is capable of doing.

[00:25:32] And that aspect is absolutely crucial and still is to some extent. And I was permit to develop the first glimpse of that research, which seems then as skyrocket. It's the many, many research now in the world, which are offering some of the principles we actually design for Aibo in that resepct. I used to say that the challenge in terms of product development or vision, we were doing at Sony was that if I would come and offer you a new HiFi, You would just say, okay, as a brand new Sony HiFi and I get rid of the ancient HiFi you have, and

you probably say yes, because it's essentially better in many ways. We want to reach a stage that's if the new Aibo is coming, you don't want the new Aibo because you want the ancient Aibo in which you've been spending so much time in the actual interaction with it. And if you guarantee that it's really that interaction that has changed the behavior and it's not a simulation it's not something that you just unlock a level. Then you have created a completely different value proposition. It's some issues and it's still there. But onece, this would be realized in a very efficient way in practice with varieties of adopted behaviours, which are as exciting as what, an actual living entity can do. I think it's some brand new type of objects that may come into the home with that principle

[00:27:00] **Christoph:** Why was Aibo discontinued in 2006?

[00:27:04] **Frederic:** In 2005, 2006, it became clearer that there were no real engangement that of the big players in the field. There were some prototypes thre were other things, but again, Microsoft, Apple, all these ones, they were not creating new robots. If you compare to what's happening to virtual reality now, the situation is a bit different when you have Facebook investing very large amount in a domain.

[00:27:27] When you guess a very, probably Apple is going to go and do this or that, you have a moment where you think this is really going to make a difference. So that was the situation in 2000, 2005, 2006, that were more the confirmation that this was not happening. There were change in the, in some directions for the first time there used to be in the company it's an American director that arrived. And he made a novel series of a decision, which were raised on more rationality and going into core products. And it cuts in a lot of things that may have seen extravagant that were playing a role in the image, but not necessarily bringing back directly important revenue cause history economic history will tell whether that was a good decision or not.

[00:28:06] And then Sony since 2006, has done better than it was doing before. it's a complex, very complex decision. And so there was that moment of cutting the product line. Again, repeating Sony was the only one really investing in the market.

[00:28:21] **Amro:** In order to understand what happened. We just need to check out when did they stop the earlier project? And it was in 2006. This was a time when the new and current wave of AI has not emerged yet. Which

means deep learning and big data and all of that, all their applications were not widespread yet. So AI was not yet the hype.

[00:28:41] **Christoph:** Why was Aibo restarted in 2018?

[00:28:45] **Frederic:** While there was clear breakthrough in 2014 and then in the coming years with the arrival of deep learning techniques, just to give you an example, I think the year 2000 and 2001, I spent six months teaching Aibo the difference between the, a green cucumber and a red tomato. You have, you have these two toys for the dogs and that was repeating under different lighting conditions.

[00:29:09] I'm teaching the robots how to do name these two object properly. It took me six months to get proper results. We're working in real world scenario, et cetera, et cetera. With the arrival of the deep learning revolution, things changed a lot for us. Then many of these problems got cracked and now an object recognition is not really an issue anymore.

[00:29:29] And in more importantly, you could have AI in the cloud. That means that many of the issues of having a powerful computer capable of responding fast, carrying all the complex side in the robot were not anymore necessary You could just have the robot connected to an Aibo cloud and on that basis get a very powerful AI driven robot.

[00:29:51] And that of course, made the difference. This means that you only need to, some extent to make now the robots is still cheaper and, and you could go on. But I would say absolutely right in some way. The issue is in that respect, not in the product, really, which absolutely even more interesting is again, the fact that Sony may still be alone in having that product out. It's, it's a kind of a vicious again, that is not considered seriously by the other big players in the field, you do not create places to sell the robot. The right position, the department store, the right magazine. To understand about it. And it's again, the future yet to come is always ready.

[00:30:39] **Amro:** This is the time when Sony chose to bring Aibo back from the dead, maybe this helps. The context helps to understand the reasons in 2017, it was a completely different story. At that time yeah you have a deep learning. You have the so called AI revolution. All of this was running. So maybe this, what made Sony move to launch the new generation of the robot, which is capable of exploiting this technological breakthroughs. So here we are, again,

in this opportunistic approach, we have the technology ready and we have a robot. We need to see how we can compose existing technology to make it useful in a robot.

[00:31:17] **Christoph:** Does a social robot need a practical use such as cleaning in order to succeed?

[00:31:24] **Frederic:** No. I, I think a pure social robot will succeed at some point because this is the part which is interesting. If you had something which has a utility, which is essentially most of the use of AI now, you optimize something, you optimize a part of your life. In fact, that's part of the, one of the most, complex, transformation of society in that global AI based optimization.

[00:31:46] The fact that you have useless robot, robots that just there, because you care about the way they develop is starting something which is not changing in terms of relevance. It's a value proposition, which is maybe too early maybe 2000 is not, it's not the right moment. Maybe 2020 is not the right moment but 2040 will be. If you look at history of technology, you have these objects, which are just waiting, waiting at the right ecosystem is there. Maybe other things needs to be solved beforehand. Okay. That technologically is ready. In terms of value proposition it's I think meaningful and it's, it's then, is it a good idea to create a startup now? This that's another question, because we didn't know, people could predict things half the time for waiting for society to be ready, but, but I still think it's very reasonable value proposition.

[00:32:37] And I think that all the other value proposition, which are trying to make some form of utility out of that are in fact different products. They're not the same thing the robots to have to in the hospital or the robots to actually a solve practical matter in your house. It's not the same product. It's something else. Maybe the market is ready for that, but it's something else.

[00:33:05] **Christoph:** What we can learn from this hibernation is that there is still hope for discontinued robots. In 2020 NTT Disruption acquired what remains of Jibo and NTT Disruption is now actively promoting it again. Developing and selling a social robot requires a lot of time and effort. This usually means that the roboticists need to find investors. I have to admit that I am unfamiliar with how investment bankers look at the development of social robots. So I talked to Robert Cheek, Robotics Analyst at Hyundai Motor Company.

[00:33:53] Robb, who invested in Jibo and what did these investors expect?

[00:33:58] **Robert:** The beginning and then there was a follow on. By serious venture capital, including a lot of big companies from East Asia, like DoCoMo, or rather K DDI, LGU +, Dentsu ventures, honestly, I think at the time that this was going on, there was, it was really a fear of missing out kind of phenomenon. You know, there's a lot of hype behind what was happening and basically, they probably just didn't want to be the one VC that didn't put money into something if it became phenomenally successful. So, I think one, they wanted to be, on the front line of something that may be the next big thing.

[00:34:47] And I think two, they're obviously they, sorry, my cat one moment, please. Sorry about that and two the, yeah, obviously they wants to make a massive return on their money. I think that.

[00:35:05] **Christoph:** What did these investors learn from Jibo and what does this mean for future social robots?

[00:35:12] **Robert:** From the beginning, with Jibo, even though it did have a impressive team behind it and a slick marketing campaign, I was issuing warnings about putting money into this, to our clients. And coming back to your question, I think what a lot of investors have learned, whether they're corporate venture or venture capital or different types of investors, robotics, well, I guess like any, any business, there's a lot of hype, in it, there are a lot of, and we all know this coming from the community. There's we need to manage expectations and we need to learn. What value does that technology provide to customers? How are we going to make money on this? And this is very simple.

[00:35:59] Ultimately Jibo took pictures and monitored. And it, and it's spoke with humans. So you really didn't need anything that required actuators. You can do that with a $99 smart speaker. So for the future of social robots, I think, and I'll come to that in a little more detail later. I think that we need to redefine I've I've said this many times, the word social robots, it is important.

[00:36:27] It will grow more important, but not in the form that many people in the field take it, many people in the field look at social robot and they think of Jibo they think of an Aibo or something like this. The core research, the core technologies, the ideas, they will have to be imbued into other applications.

And, yeah, I'm jumping ahead of myself, but so there is a future, but not in that form.

[00:36:53] **Christoph:** Do you think that Sony's Aibo is a financial success?

[00:37:03] **Robert:** Absolutely not. But having said that I think it is a great robot. I think it is fantastic. Part of, and this is my view, part of the reason why Sony is doing this when they killed the first Aibo, I, some, 10 years ago or so. That was viewed by the market as a harbinger of dark days ahead for Sony, because what that signal to the market was, they're not innovating.

[00:37:24] They don't have, there's something going on internally. And then if you look at Sony's performance from the time they killed Jibo not Jibo, I'm sorry, Aibo. The stock was just in the doldrums for years. And then recently when they revived it was just a couple of years ago, Sony didn't unlike many social robotics endeavors they didn't bet the farm on it. In many ways, it was kind of a market it's kind of a marketing spend. And also R & D of course it is a smart spend now for Sony because well, honestly, Sony is making money and they need to be seen as innovative. And these types of projects are important for companies like this.

[00:38:07] **Christoph:** There is a bit of rumor that maybe the Pepper robot from Softbank Robotics has also been predominantely a marketing tool so that Softbank could place these robots in their shops in Japan and sell more phones. Would you see that as a plausible explanation for the existance of Pepper?

[00:38:27] **Robert:** Absolutely. Absolutely and I think there are others in the robotics industry who share my view. Pepper, as the subscriptions have just fallen off a cliff simply because those customers who did jump on board, but the hype train in the beginning realized, okay, what ultimately, what does this robot do for my company, for my business?

[00:38:49] However, having said that, SoftBank did learn quite a bit by dipping their toe into the waters with Pepper. And we see this with their investments in organizations like Brain Corporation, which, is doing work in robotization, which is very interesting. They have their Whiz cleaning robot, which is a robot as a service. I think. A lot of the social functions are the data they've learned from their social robots they will use in these practical moneymaking robots that serve an immediate need for customers.

[00:39:26] **Christoph:** There are still many robotic development companies that are looking for funding. What do you recommend these companies to do to attract investors?

[00:39:37] **Robert:** It would be wise for them to work with people who know the investment side and robotics. They need to start with a map. A clear map of this may be a really cool technology. It's a really cool robot. I like it. It's neat. How am I going to make money? Because ultimately when you're talking to investors, this is ultimately what they're thinking.

[00:39:58] So what? So how am I going to make money? How is this going to disrupt this industry? How are we going to dominate this market? I think it's important for these companies to work with persons who are familiar with that side of the equation and so they can develop a clearer map of how and message them, how they're going to bring their robots or their robotics technologies to the market. And they should do that in the beginning or early on, rather than as an afterthought. So if need be early, they can make a pivot.

[00:40:36] **Christoph:** How much money is necessary to develop a successful social robot and bring it to the market?

[00:40:43] **Robert:** What we do see is it doesn't take, 20, 50, a hundred million dollars. Like we've seen with some of these spectacular burn, crash and burns over the past few years, the bootstrapping is still real. You can still build robots your prototypes that aren't necessarily super polished. You can have a clear business case.

[00:41:03] So it's hard to peg a number onto that, but there are lots of possibilities. There's a wide range. I would say it's a tough question to answer because there's a lot of variables, but a few 100,000 I think is something that would, you can do. You can pull off with the right team. Creative hardworking. I think that's something you could do with a few hundred thousand dollars.

[00:41:40] **Christoph:** While industrial robots have been successful for many years the same cannot be said for universally usable robots that were targeted at non-expert users. Baxter from Rethink Robotics and PR-2 from Willow Garage were supposed to be usable and programmable by non-experts. Both of them have been discontinued. While both have been popular in many research labs, they apparently failed to attract enough customers.

[00:42:14] Robots that are targeted at consumers' home environments are constraint to functions that can be accomplished by today's autonomous systems, such as floor cleaning. In the absence of other functions that a robot could fulfill at home, the only remaining application area is entertainment. But how long is a robot fun? How long are you entertained by its handful of party tricks? For some users, however, this might be less of a problem. People struggling with the loss of short term memory, such as through dementia, might, however, not mind.

[00:42:59] **Lundy:** I was teaching some elderly people. This was four or five years ago and I was pitching this same story to them, a senior education class, and one guy who is like in his eighties or something like that. And, I was just trying to get some, really some, requirements from them, some input about what robots would have to do. And he piped up and said, listen, all you got to do is, and he was serious, all you got to do is program the robot to do or something like this. Every two minutes, just ask the question, tell me again about that trip to Ohio. And that would do it.

[00:43:38] **Christoph:** But this is of course the wrong process. Now we have a solution that is looking for a problem. The problem for robots of how to engage with users long term remains. As for Jibo, the future does seem again to be perfect. All the stars are aligning. NTT is one of the largest Japanese telecommunication companies with a substantial financial backbone. Their Disruption subsidiary has offices around the globe and uses all the right buzzwords. Disruption, change for the good, immersive experience maker, they even have a manifesto. I am not kidding and I could not possibly deprive you of this delightful marketing gem.

[00:44:31] Ok, lets roll the clip. Are you ready?

[00:44:35] **NTT Disruption:** Limits, what a word. To you there's no till where? No, till here impossible. Unthinkable crazy thing. All those words you deal with every day. They don't annoy you. They inspire you. They don't shut you in. They set you free. Listen, you need limits to be who you are to disrupt, to create, to invent you the old rules breaker you, the new rules ruler.

[00:45:05] **Christoph:** I am sorry, I cannot take it. Too many buzz words. I need a pause. Okay, lets go again.

[00:45:15] **NTT Disruption:** You don't live in the real world. Some may say they just ignore this world of theirs is changing and thanks to people like you like us. Like her change is happening for good. We, the people who see things differently, those who say no to no. You are just a few, some may say yes we are. But those few will create today. What really matters tomorrow.

[00:45:44] **Christoph:** What is there to add?

[00:45:45] **Linus:** Don't be a Jibo!

[00:45:47] **Christoph:** No seriously, will Jibo be reduced again to another marketing hype? I reached out to NTT Disruption for an interview. Your company made a manifesto video. Have you seen that one?

[00:46:00] **Tomas:** Yeah Yeah

[00:46:02] **Christoph:** And what is your view of this manifesto video? Do you agree to what is being stated in it?

[00:46:07] **Tomas:** It's a manifesto. It's really inspirational. More than inspirational. Both things at the same time. It kind of were, Yeah. The idea of this is what the company wants to be. I'm Tomas Concha, I'm living Jibo initiative design to NTT Disruption.

[00:46:36] **Christoph:** Why do you think Jibo failed in the market?

[00:46:39] **Tomas:** As I said, the combination of factors, one of them could be a bit over promising when they launched this campaign, they were promising a lot of features that it is really difficult to get into there. The other important factor, at least from my point of view, is that they were targeting the end customer market.

[00:47:00] Which is really wide in scope and they fail everything, covering all the aspects when you are targeting at this end customer market, the number of challenges that you have are really huge, you need to solve things like given the weather or the news report or whatever, any other thing, but at the same time you want that the robot is perfect for your kids. And at the same time you want that it's able to make a reservation at the restaurant. It's really, really a wide in a scope. So I think that was also another factor of failing. The market and the technology were not so mature as maybe nowadays, and now you'll

have a more mature technology for a natural language understanding recognition, and also for vision for a lot of things, you can have better tools now.

[00:47:54] **Christoph:** And why did NTT Disruption purchase Jibo?

[00:47:59] **Tomas:** We indeed had the, some people working directly inside even Jibo Inc with their teams. Know, we knew a lot of the products, features and possibilities, and we really think that time, the product itself has a high potential. That was the main reason having a good knowledge of the product and recognizing that it has a good value. So we think that by shifting or changing some approaches in this strategy, I think we will be able to make it happen, this time.

[00:48:35] **Christoph:** And how are you going to improve Jibo?

[00:48:38] **Tomas:** We are shifting the aproach something from the pure B2C, I mean, final customer world to a more enterprise oriented. So a more B2B world. And I think that will help us on one hand to narrow the scope and be fully focused on the specific enterprise challenges that some companies like hospitals, like health insurances, like education, I mean that they have so not being too wide in scope.

[00:49:09] So that's the first important change that we are doing. The other important thing that we are doing as well, we have already released alpha version is we are now working in having a digital version of Jibo because we believe that Jibo could be a companion for people having these use cases. And sometimes you cannot always have this physical robot with yourself.

[00:49:34] We believe that in many use cases it makes totally sense to have the same kind of persona, but embedded in a mobile device, of course, the engagement is not exactly the same with a physical robot compared with the digital version. But we believe that this is also very important for the future as well.

[00:49:56] **Christoph:** But this means that you are competing in a way directly with something like Siri.

[00:50:02] **Tomas:** We want to position ourselves in a slightly different way of Siri or Alexa you know I think for us we consider those are more transactional

AI. And we want to have something more relational AI. Because of the features that Jibo has as a product, this productivity that has the liveliness, the form factor that has how friendly he is.

[00:50:27] We believe that the engagement that you can have with Jibo has nothing to do with the engagement that you can have with Siri or with Alexa. that's where we see our differential aspect. Other important changes is regards to technology, or we have partnered, strong partnership with Microsoft.

[00:50:46] We are embedding a lot of powerful technologies that they currently have to enhance all the aspects that we have in the robot, jumping from language understanding to face recognition, computer vision, and so on and so forth. And we are shifiting, as I said, from B2C to B2B. So we need to enhance some features that are more linked with the B2B world. So things like having a multilanguage we want to target not only the English market, but also Spanish or Japanese, we are a Japanese company. So our client based in Japan is really huge, even further languages as well you know.

[00:51:32] Another significant factor is in a B2B market is everything related with compliance and security, you have a robot that is capable of listening to you and have cameras, so it can record images. So you need to trust and rely that whatever happens into Jibo will stay in Jibo. On top of that, we are also adding new features as well, that we believe are very good for this new market that we are targeting. It's like Bluetooth compatibility for being able to connect to Bluetooth devices, video conference.

[00:52:05] **Christoph:** Cynthia was originally making the point that they could not offer all the functionality that Jibo was potentially capable of. And they were hoping on and building on a developer community that would grow around Jibo and provide all these extra functions. And if we look at Alexa and others, this worked. So there are a lot of developers who create functions for platform like Alexa, but then Alexa has got already millions of devices out there. So it is an attractive market. Now I hear you say that you are trying to also add new functions, but you are only one developer. How can you compete against a whole community of developers?

[00:52:47] **Tomas:** We are currently also enhancing the tools that were already existing for having kind of App store where new developers can develop a new things and use the core probe. So a similar approach to the one that you are describing.

[00:53:03] **Christoph:** So, is there any hope for researchers or enthusiasts in the future to purchase a new Jibo?

[00:53:11] **Tomas:** We will be starting offering this service to the other companies of the NTT group and also some other companies as well, who knows. I mean, maybe in the future, we will expand also this possibility to the whole community potentially could be also expanded to other researchers. Why not?

[00:53:32] **Christoph:** But again, you need to have a critical mass. So if I'm a developer and I'd say have a choice between developing for a platform that has millions of users that could potentially purchase my development. Or I have only 10 or 20 users then of course, it's going to be much more attractive to be on a more general platform.

[00:53:56] **Tomas:** Initially, we will, we are not focusing on having Jibo as a consumer product and having millions and millions of useres in that sense, right? For the time being, we are focusing on the B2B market and, for the B2B market. There are normally companies that are focused on that market. So it's not the wide community as it could be when you are standing for the consumer market. But it has also a good potential in that sense.

[00:54:28] **Christoph:** The Jibo company made a great effort and failed completely. How will the situation be different for NTT Disruption?

[00:54:37] **Robert:** This is resuscitating a failed high profile, fail of a product that is essentially the butt of many jokes. The end of Aibo was different. It wasn't greeted with sneers and I told you so as the end of Aibo was okay, we're at the end of an era what's going on? Sony stopped. They had this really interesting RND going on in robotics that really no consumer electronics company was doing. I think it's a different case between these two. This is like grasping at straws. When I look at it.

[00:55:14] **Christoph:** But maybe they are not actually interested in solving the problem. The whole company does appear to be one big marketing campaign for the traditional Japanese Telecommunication company. NTT Disruption is planning to slightly upgrade the software of Jibo to the current market standard. Tomas even mentioned some incremental hardware upgrades. This comes at a time when Amazon has its animated digital assistant, the Echo Show 10 already in the market for only 250 US dollars. The Echo Show 10

screen follows you around, just like Jibo did, has cameras and speakers, just like Jibo did, and a powerful developer community to support it, which Jibo did not have.

[00:56:10] NTT Disruption does have plans for a Jibo app store. But since Jibo will be limited to NTT's companies in the first instance, it is unlikely that they will reach the critical mass of developers. But most of all, it seems that NTT Disruption itself does not believe in its own robot. They are also developing a screen based agent. This technology is right where Siri, Cortana or Alexa is already working for years. Whatever the goal of NTT Disruption is it is certainly not going to disrupt the market for social robots.

[00:56:52] **Frederic:** And what is very difficult is that companies should not trust neither the interest of the journalist in that respect because they want stories. Nor really the marketing themselves, because they're not necessarily aware about this future trap. And so there's a big, big thing at stake in making the most futuristic innovation as normal as it should be to be directly sold in your nearby shop.

[00:57:17] Or on the internet, but, as a normal piece of technology, like the microwave stuff that you buy, like something that should make it to the home. That's I think is the key that he needs. You have robots, which do not look like an object coming from the future and should resist in having all the interests of people that wants the object coming from the future to tell a nice story to say, science fiction is here. Be ready. No, no. that's the way not to sell. The moment where something stopped being associated with the future. But is associated with present is the key moment and it's so hard for robots not to be associated with the future. It's vast paradoxical, but I think it's a death sentence. If you have in an article, this is the future,it's coming, that means you never going there.

[00:58:01] **Christoph:** I mentioned the first text book on human-robot interaction in the introduction. While many researchers are enthusiastic about this topic and the book, I do worry about its usefulness for the education of students. If social robots are doomed to fail in the market from the get go, what chances would students have to find a job in the area of human robot interaction outside of research labs? Did we create another ivory tower? Does it look anything like the robot building in Bangkok? Will our human-robot interaction work improve our world? Certainly not before robots would become a commodity. But when is that? When will social robots become

useful enough to justify their existence? A social robot that is nothing but a smartphone on wheels can only hope to be displayed in a museum. The road to robot hell is paved with good intentions.