Future of Health Technology Symposium

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Renata Bushko:
I just want to tell you that in this room today I feel the energy and the power to change our health care system and to improve human life greatly. We all share a common goal of saving lives and reducing suffering. With this, I would like to share with you a couple of thoughts on future of health technology, share some information about meeting of European ministers of health when I was invited to represent the U.S., a very interesting perspective from there and eventually I would like to show you the two examples of technologies that are very important, I believe, in the form of media clips.

The most important trend that health technology is experiencing now is convergence of life sciences and computer sciences. This merger, in the near future or I guess long-term future, given objectives of your organization, will evolve into some kind of new life form. Professor Warwick will tell you more about it later and Professor Minsky will have his own opinions on it. But we have to get ready. It's not science fiction. Machines we're creating will have greater intelligence than we do, multiple dimensions while we humans have some limitations in our cognitive capacities. So we should think about less introducing teachers in the software that we create that would say, explain this in human terms. This way we insure the human race is not behind. We also should emphasize the computer science of the equation. Since life sciences, from the first patent on living organism in 1971 if you measure progress and innovation in the number of patents, increased to about 500,000 applications for that kind of patent by 1995. Computer science side of the equation is I believe underestimated. That's the real bottleneck of our progress. We have capacity all the exponential growth grafts are on that side but in software development we do need new methodologies for software development. We need a way to overcome complexity and we need to change software industry so computer errors are not a feature. We now expect that in all computer problems, it's called a bug. We do need a lot of investment in that part of the equation.

To tell you about the Malaga meeting in Spain which was called e-health high-level meeting, looking at the convergence of the two. European research and development is putting a lot of emphasis between the years 2007 and 13, so the next seven years on development of what they call human, which is digital human, simulation of digital human, a model of human body. So we can not only extract patterns and trends from massive amounts of health information but we now also test hypotheses and theories on that artificial digital human being. So that's the R&D research trend in Europe. To summarize, global understood broadly is as important to human health in the 21st century as microbiology was in the 19th century and genetics in the 20th century. To start with e-health today, the major goal is actually 100% penetration of technologies that are tested, established and available. Health information that works online health, tele-

medicine, automatic speech recognition, data mining population held databases, wireless technologies and even simple electronic data interchange. I spent 15 years working with the health care organizations around the world trying to implement those technologies and the progress was really slow so I started to organize summits to hopefully introduce breakthrough ideas and to thinking about the future may actually change the way we perceive today, and many organized health care providers organizations, once you share the vision of possible future, they get excited about implementing technologies that are available today. So that's the plan. Those technologies, I believe, are very important. They are life saving, they decrease cost and improve efficiency but they are incremental in nature. To get to something I call intelligent and extelligent health environment, we need to grasp some of the ideas that today speakers will be talking about. Effective intelligent caring creatures, flexible mobile displays that will allow creating a healing environment with programmable walls that would make people feel relaxed or at home in the hospital room, for example. Humanoids and cyborgs are at this point implantable devices are part of technologies that will create that intelligent and extelligent health environment. Eventually of course genomics and bio informatics will play a big role.

That will create a health care world where a nurse will be capitalized as you see on the slide here, and it will stand for a New Unifying Research Engineer. That's the new acronym for capitalized nurse, and that nurse will have a computer science background and she or he will be responsible for maintenance and development of caring machines, not necessarily taking care directly of the patients, this will be delegated to robots. A doctor of the future will actually be effective intelligent caring machine or in the less futuristic scenario that will be the aide that physician could be using on a daily basis. It will have knowledge of many best physicians from around the world. It would be empathetic and available at all times whenever you need it, helping with those decisions that we heard this morning. The hospital of the future I would like to call intelligent caring continue. It won't be just one place, it will be a dynamically assembled set of resources that are personalized and available as we need it. And eventually I created this new term, "healthmatician," you might help me to find a better word, but we need a new role, a new job description for a new profession closing the gap between acute care of physicians and nurses and social services. Healthmatician because of the massive amounts of data that pretty soon we'll be able to collect on humans in the sick and well states. So healthmaticians will have to be equipped in computational skills and models that will allow to learn from all the data we collect about our life.

Well, it's all great, but which ideas are actually worth investing in? How to give ideas with biggest impact a chance, how to evaluate impact of those ideas for the future, how can we invest a couple of billions to save hundreds of billions and many human lives? That's the question I hope to – that's the answer to this question – I hope to hear from you. You are in charge, we are just helpers here. I started to think about that with the help of my mentor, Professor Martin Minsky, with whom I studied at MIT and since 1996 will bring together creative minds to annual Future of Health Technology Summit, and to answer that question mark, we need to have a very strong goal created, so I express it in this form. Stop disease before it even begins. Stop suffering before tears occur. Stop symptoms before they hurt. Stop medical errors before they kill. Stop cyborgs before they control us. Future of Health Technology Institute tries to achieve this by beginning

to think about long-term global future on an ongoing basis. It's a kind of socio-technological process, not a one-time event, and I encourage you to – you're doing it already - but maybe we can do something interesting together beginning to manage health technology and creation and adoption process, beginning to address health crisis as a national and international emergency. And it is an emergency, people are dying today because of lack of use of those technologies. Beginning to design intelligent and extelligent health environment with caring machines. Our judges are actually now babies, they are not grown ups. Little Johnny who experienced miracle robotic surgery and you see that little cat on his chest, it would have been huge if it wasn't done by the robot. He's already enjoying the benefits of well made health care allocation decisions.

Now what I'm proposing here also is introducing a new definition of medical error. Not focusing on how many people would hurt but how many people we're not helping with what we have. So inter-generational error where the younger generation will be judging us in maybe 50 years or so. It's as follows - error occurs if we could have had a positive impact on the population's health but we failed to do so because of inappropriate allocation, and we're here now in this room we're thinking about the answer to that question is what is most important. Individual error occurs when we could have had a positive impact on a person's life under current state of medical science, knowledge and resources but we failed to do so. So the assumption would be that we already have errorless health care occurrence understanding of the word error. We do not …. and hurt people by mistakes. At summits we spent some time brainstorming and in the two publications you saw, the two book covers on the previous slide, we outlined unsolved health problems and health challenges and there are many of them. I would like to focus just on two today and show you how two specific technologies can help with those challenges. So monitoring and early detection of depression in mental disease which is leading cause of disability and major problem by 2020 is one of them and aging population with cognitive decline. I have the second problem addressed here, so Memory Glass is a project by Professor Picard from MIT Media Laboratory and you will see a video clip that shows the tool that basically prolongs and give a humane way of dealing with memory loss.

That's an example of technology that is non-obtrusive, helps and it has to be further developed. Decisions have to be made how to use ideas like that and to develop them further or not and very important problem how to make them affordable, how to make them available to populations, not just keeping them in the lab as a research project. The second example of the project deals with depression.

This type of technology Professor Pendlum extends to social interactions, too. And that technology has great potential for early detection of even epidemics like SARS based on preconditions, not necessarily people showing up in the emergency room. So if we use technologies like that we can collect data about preconditions of diseases that will hopefully stop disease before it occurs.