00:01

In this research lab, I discovered a story that is swiftly changing our world. A story that has the power to change the way we produce material, the way we eat and the way we heal. It is the story of deep tech.

00:22

Deep tech is a new chapter in the innovation story, bringing together science, engineering and design thinking. Imagine if another global pandemic happens and the drug to combat it was developed and approved not in decades or years, but in months or even in weeks. Deep tech offers this potential. Imagine technologies like robotics, synthetic biology, nanomaterial, blockchain, quantum computing and many others -- when combined with each other and blended with engineering and design science, are making what's seemingly impossible possible.

01:16

So what is deep tech? I've spent the last 18 months visiting 100 research labs and start-ups from Shenzhen in China to Haifa in Israel, and this is what I learned about deep tech ventures. They focus on fundamental issues, identifying physical constraints of industries not solved for decades. For example, in energy, nuclear fusion; in mobility, air robotaxi. They work as a close hub of emerging technologies. Like synthetic biology, quantum programming, artificial intelligence and many others, they focus on physical product using data and digital platform to accelerate the test-and-run phase. They rely on an ecosystem to accelerate the innovation cycle, including the build-and-test phase. Too many disciplines are necessary to master for one venture to go alone. It is about cooperation, not competition. Deep tech is ultimately transforming discovery into a design and engineering exercise.

02:45

So ... why does it matter? It matters because it is happening now, all around us, ongoing. This approach is changing what was once considered impossible into something actively possible today.

03:07

Take SpaceX, a deep tech pioneer who disrupted the aerospace industry by producing reusable rockets and spaceships, reducing the cost of going to space by a factor of 10. They achieved this by combining advanced materials and chemicals developed in the last 20 years with vertical integration and the modular approach of modern software engineering.

03:38

Or PASQAL, the start-up founded by several students of my friend, Alain Aspect, creatively using fundamental physics combined with software engineering and data science to create an analog quantum processor.

03:54

Or take Boston-based Ginkgo Bioworks founded by internet pioneer Tom Knight and a group of MIT scientists. A visit to Ginkgo showed me a lab I had never seen before. I saw a fully automated bioworks lab with the latest robotic techniques, allowing to test thousands of biological designs. They achieved this by building the largest internal metagenomics database of cells, enzymes and genetic programming by combining robotics, protein design, both in microorganism and mammalian cells and data science. They have built a cell programming platform able to create nearly any organism they want by converging science, technology and data and digital platform then to become the Amazon web services of biology, letting start-ups and other companies use their facilities. This is a perfect example of the ecosystem operating.

05:11

So right now many of you may be thinking, how do we manage the technological risk? Will investors be ready to play the deep tech game? Yes, there is a technological risk. And developing deep tech requires to rethink our innovation approach. I have seen that four rules govern successful deep tech ventures.

05:43

Rule number one: be problem oriented, not technology focused. This is very important. Many deep tech ventures start with a solution in search of a problem. Ginkgo partnered with Bayer to solve the nitrogen fertilizer issue. Nitrogen is the most-used fertilizer in the world today. But it produces three percent of greenhouse gases and it pollutes water. Many start-ups today are trying to solve this issue by applying their solutions. Ginkgo tried to solve it by asking the question in another way: what if instead of producing nitrogen, we create a bacteria that use existing nitrogen to fixate it on the roots of the plants, just like nature does?

06:41

Rule number two: it is about combining, intersecting, converging. So you need to bring a cross-disciplinary team early on and play the ecosystem. What does that mean concretely? Take Commonwealth Fusion Systems, an energy venture focusing on nuclear fusion. They achieved their breakthrough in nuclear fusion by combining advances in material and data science that

enabled them to do calculation and simulation that was simply not doable a few years back. And they play the ecosystem very well. Corporates like ENI and Equinor have invested early on. Universities like the MIT Plasma Science and Fusion Centers are actively collaborating with them. VCs like Breakthrough Energy Ventures and others, are supporting them, and the US government seems interested in working with them.

07:49

Rule number three: adopt a design thinking approach powered by deep tech. Identify assumptions early on to be tested to reduce the risk up front. Get to a working prototype as quickly as possible. Anticipate friction points at each stage of the innovation cycle. Use a data and digital platform to reduce the cost of testing them. Lilium Aviation, a deep tech start-up building all-electric air taxi, aiming at solving urban air mobility, has started by developing a two-seater prototype, then a five-seater using real-time data of every flight to design the next version.

08:40

Rule number four: adopt a design-to-cost approach. Merging science with engineering requires to have the economics in mind all the time. Zymergen, another synthetic biology lighthouse, whenever they design a product, use a ruthless design-to-cost approach. In the design phase, even before production starts, they look for the right products at the right costs with the right parameters. Zymergen developed Hyaline a transparent, printable circuit for electronics, produced by fermentation. And this biobased film is cheaper and has better properties than the existing one, petroleum-based.

09:33

Deep tech is maturing quickly now. In 2019, there were more than 5,000 deep tech ventures fueled by 50 billion dollars of investors and their money. Ventures coming out of research labs have the power to solve our most pressing issues. Think what you would like to grow in your world. Consider how might deep tech help you cultivate that thing, maybe by accelerating a drug development or by eliminating greenhouse gases or perhaps by solving the congestion problem plaguing your city.

10:22

Deep tech is an ever-growing opportunity in front of us, waiting to be scaled for this world and more. It is the next chapter in the innovation story, and today I invite all of you to join me in its creation.

10:43

Thank you.