

Frans Johansson on the Medici Effect

*By exploring the intersections between different disciplines and cultures,
one may discover the next groundbreaking ideas.*

Frans Johansson is a consultant and author of the new book, "The Medici Effect," published by Harvard Business School Press. He was previously a cofounder and CEO of Inka.net, a Boston-based enterprise software company, and vice president of business development of Dola Health Systems, a company operating in Baltimore and Sweden. Born and raised in Sweden, he currently resides in New York City.

UBIQUITY: Let's start at the beginning: what is this "Medici Effect" you write about?

JOHANSSON: The book talks about the fact that we have the greatest chance of coming up with ground-breaking insights at the intersection of different disciplines or cultures. The Medici Effect refers to the exponential increase in ideas that you can generate when you combine two different fields.

UBIQUITY: Give us an example or two.

JOHANSSON: Let's take an example I'm particularly fond of -- the example of ants and truck drivers, which I talk about in one of the chapters. So there is this telecommunications engineer that has been trying to figure out how to efficiently route telecom messages through a haphazard routing system. And one day the communications engineer met an ecologist, who studies social insects, like wasps and ants. And they started talking, and the ecologist described how ants search for food. As it turned out, the ant's search strategy turned out to be very applicable to the routing of telecom message packets. Once the engineer realized this, he decided to explore this particular intersection between ant ecology and computer search algorithms, so he spent three years looking at the connection between the way social insects behave and the way you can use computers to optimize particular types of search algorithms. And that has now led to an entirely new field called swarm intelligence, which essentially came out of the intersection of the study of social insects and computer search algorithms. This methodology has been used in everything from helping truck drivers find their way around the Swiss Alps to helping unmanned aerial vehicles search for terrorists in Afghanistan.

UBIQUITY: And you called it the "Medici Effect" for what reason?

JOHANSSON: The title alludes to what the Medici family accomplished in Florence during the 1500s: they sponsored people from lots of different disciplines -- architects, painters, sculptors, philosophers, scientists -- from all over Europe, even actually as far away as China, and brought them all together in Florence. And it's through their interactions that Florence essentially became the epicenter of one of the most creative eras in Europe's history, the Renaissance. One of the most famous innovators they sponsored was, of course, Leonardo Da Vinci, but there were many others in Florence who found connections between their various crafts, which ultimately allowed them to set off the creative explosion.

UBIQUITY: Tell us about your own education.

JOHANSSON: Undergraduate work at Brown University. Then I started a company and ran it for a couple of years, before going to Harvard Business School for an MBA.

UBIQUITY: Would it be accurate to say that Brown University -- or any number of other universities -- are attempts to emulate the Medici Effect?

JOHANSSON: Well, yes, Brown University is a particularly interesting example, I think. When I was there, I got the feeling that they were going out of their way to try to get their students to explore a field outside of their majors. Cornell University does a very good job of the same thing, and so do a lot of the other universities. It's sort of at the heart, if you will, of the philosophy for a Liberal Arts education -- although things have changed greatly during this century. I mean if you really wanted to succeed in academia beyond an undergraduate education, you had to specialize in many ways. But at Brown, they gave you room to do things differently. And actually, while I was there, I started an interdisciplinary science magazine called *The Catalyst*, which became quite successful, and it's still around, very much so. I think the latest issue was sent to all the incoming students at the university, and I know one of the Deans said it's one of the things that best expresses the idea of Brown, because it essentially bridges the various sciences and also bridges the gap between the sciences and humanities.

UBIQUITY: Congratulations. That's quite a success.

JOHANSSON: Thank you. Actually, I look at that magazine today, and I think it has had a far greater impact than the software company I co-founded. Because people that have worked on that magazine -- former editors, lay-out editors, or contributors -- have gone on to work at places like *Science* magazine, the Discovery Channel, and so on. So in that sense, the influence extends further than it did with my years of heading up the software company.

UBIQUITY: Thinking for a moment not about the students, but about the faculty, is it not true that interdisciplinary collaboration can often be very difficult because of the way that universities are organized in terms of tenure systems that reward specialization?

JOHANSSON: Yes, I agree whole-heartedly. You have a system where in order to succeed, professors have to publish x number of papers. In order to do that, they publish in an ever-increasing plethora of hyper-specialized journals to satisfy this particular tenure demand. And also the way the funding system has worked in the past, a lot of it has been very specialized. But things are changing. Look at the NIH or NSF, for instance, how they are setting up their funding requirements. A lot of the new grants have to do with interdisciplinary work. And I think that over time, this is going to filter through to the academic world as well. It would have to, essentially, because universities need their professors to pull in money. And so if they have to work across fields to do it they will. This has already started to happen at an undergraduate level. I mentioned in the book that one of the big differences between a course catalog today and say thirty years ago, is that today it has many more hyphens. Undergraduates can major in not just physics, or applied math, or psychology, they can major in applied math-psychology, they can major in applied math-economics, they can major in geology-physics. These hyphens can even extend in to three-word combinations. So undergraduate programs have been leading the way, in that sense.

UBIQUITY: What was your own undergraduate major?

JOHANSSON: Environmental science, which is obviously a very interdisciplinary major. But when I came in, I was thinking I was going to major in fictional writing, actually.

UBIQUITY: Really.

JOHANSSON: Yeah, I had written a novel in high school. It got sold, but never got published, which just made me very sad. But it gave me the hunger to continue writing. But once at college I wanted to focus on something that leveraged the capabilities Brown had in the sciences, so I chose environmental science mostly because of my passion for fishing.

UBIQUITY: What kind of fishing?

JOHANSSON: All kinds. Fly fishing, deep sea fishing, even fishing in lakes and rivers. Eels at midnight and that type of stuff. There hasn't been much time to do that as of late, but yes, all kinds of fishing. I've always enjoyed it. So, I used to write articles on the science of fishing: there was a gap between scientists doing research and people interested in that research actually hearing about the results. I wanted to fill that gap.

UBIQUITY: Do you think that your interest in fishing has made any contributions to your ideas on innovation?

JOHANSSON: Oh, good question. Probably in the sense that it has allowed me to understand the importance of community. I think it's very easy when you're in business to disregard certain aspects of the community around you. But with an interest in fishing and environmental issues, you develop a sense that certain things clearly happen through grassroots activities -- certain things can spread in that type of way doesn't necessarily happen in a planned corporate way. And so I think that has added to the ways I look at how to spread an idea.

UBIQUITY: You talk in the book about three driving forces for innovation. What are they? Start with computational power as a driving force for innovation. What does that add to the equation?

JOHANSSON: Computational power adds two things. One is that it has enabled us to communicate a lot more easily with people who are far away -- and across disciplines. So you can connect with somebody that's on the other side of the world and you can work with them. If you're talking about a discovery that happened in a particular field, then within hours, if it's enticing enough, a lot more people can know about it than in the past -- not just those around you or those within your field. This makes it possible for people to access

ideas across disciplines and cultures and increases the possibilities of combining different concepts. So that's an obvious effect of increased computational power.

Another effect that's a little bit less obvious has to do with how computational power enables us to do things differently. The example I used in the book comes from the animation industry, where they use computers to draw the figures, for instance in movies like Shrek or in Finding Nemo. The interesting thing about this technology is that it has allowed these companies to hire animators that are not necessarily experts at drawing but that are great at acting. These new types of animators take acting lessons, rather than drawing classes.

Of course, you see such computational leaps in other fields as well -- in biotechnology for instance, where people who couldn't have entered this field before can now be part of a team that explores new drug combinations. Computational power has essentially not just enabled us to do things faster, but to also to do things differently.

UBIQUITY: Talk about how it's possible for the actor to take over the role of the artist. How does it work?

JOHANSSON: Because of the added computational power, it's far, far easier for Pixar to create 3-D figures. Not only does that decrease the need for animators to continuously draw frame after frame since the computers can do some of that, but, these 3D characters have a much, much greater ability to display emotion. So in the case of Shrek, for instance, you're literally looking at a figure with feelings. You can follow the figure's eyeballs, eye wrinkles, you could follow the person's facial movements far more easily than in the 2-D animation. Computation has made it possible for these animators to add an acting quality to the animation, because they essentially draw this figure more realistically. And they do it far fewer times than was necessary in the traditional 2-D movie, and so what the animators focus on is: How can I make an impression with this figure? How can I enable this animated figure to display a truly human emotion?

UBIQUITY: Let's move on to the other two driving forces of innovation.

JOHANSSON: Yes. Another driving force is the convergence of science. In many ways traditional scientific fields have run their course where new discoveries now require huge resources or incredible specialization. Most physicists, for instance, find that it's essentially impossible for them to work without a huge team, sometimes hundreds of people, and to go

in and explore a particular, very narrow aspect within their field . But those scientists who intersect physics with something else, let's say biology or psychology, have a far better chance of generating a new insight: they can become leaders in a new field that emerges from this intersection. And so scientists that want to lead the way are essentially going to have to merge or establish science fields with another one. Alan Leshner, the CEO of AAAS, says in the book that disciplinary science has died. Single-author papers are rare today. It's almost always multiple authors from different fields.

UBIQUITY: And your third driving force for innovation is the movement of people.

JOHANSSON: The movement of people has increased to a level where it was maybe about 100 years ago. And essentially, by doing that, it is creating diverse communities all over the world. And diverse communities provide huge opportunities for businesses and artists to tap in to whole new markets. And not just that -- clever companies like L'Oreal or MTV make sure that their product innovations literally come from exploring the intersections between different cultures. You may not think that there are any connections between Latin music and country music. But instruments and the role of vocals play very similar roles in both types of music. What if one explored such an intersection? There could be something interesting coming out of it. The same with L'Oreal and how they go about launching new products where they bring very diverse teams together to try to come up with radically new ideas.

UBIQUITY: As the author of "The Medici Effect," how do you think you can help an individual reader see the world differently -- or him- or herself differently? After reading the book, the person wakes up the next day and goes out the door and does, well, what?

JOHANSSON: That was probably one of the biggest things that I tried to make sure that this book did. I wanted to explain why stepping in to these intersections is effective. First, I think that the insight that stepping into an intersection between different fields can increase the chances of generating a groundbreaking idea is very important and affects a reader's way to view the world. Second, there's the question of how to execute these intersectional ideas. You have to prepare for failure, you have to be able to break away from your established networks, and you have to manage risks differently. The book talks about this in great detail. And then finally the third piece of the puzzle is to explain why all this works, so that when you wake up the next morning after you finish the book, ideally you will be

thinking about the world a little bit differently. When you come in to the office, for instance, you will be more aware of the potentials of how other fields or other cultures could relate towards what you're doing -- and if you saw an opportunity, you would have a better chance of executing it.

UBIQUITY: Let's do a thought experiment, and maybe an imagination experiment, and ask you to think of any 100 people that you can either pick from people you know or that you've known in the past, and then try to rate these people in terms of their ability to do the kinds of things you're recommending. How would they rate?

JOHANSSON: Also a very good question. I would be speculating here, so I'll just go with the flow on this one. This is not exactly from my research. But I think that the book deals with two types of recommendations, those that are more long-term in nature and those that are short-term. I think people's ability to do the things I recommend are related to how well they can stay committed to these two types of strategies. You can easily decide to go "intersection hunting", for instance, which is a tactic that can be done almost immediately upon reading the book. But will you go intersection hunting next month or the next year? Even if you were very successful you may forget such a tactic until you reread the book. On the other hand, long-term strategies such as broadening your cultural experience or learning differently require more forethought, but once you get into that mode of thinking you will probably stick with it since it becomes a way of life instead of an afternoon tactic to solve a specific problem.

UBIQUITY: Say something about execution issues.

JOHANSSON: I talk a lot about how you have to plan failure, and I do that to help the reader understand that it's okay for an idea not to work. But here again, people are different, just innately. Some people will become very depressed if they fail, whereas others will instead see it as a learning experience and move on. And I'm not sure, I think the jury's out on how easy it is to change that particular tendency -- whether or not you're going to view a failure as a learning experience or are you going to view it as a depressing aspect of your life. My hope is that most people will view it as a learning experience and the book certainly makes that case very vividly. It also looks at how one should manage risks differently at the intersection of fields compared to within fields and what you need to do to

break away from an established field. Readers that take these ideas to heart and consider the recommendations will have a better chance to execute intersectional ideas.

UBIQUITY: And having asked how the book will change the reader, let's end with this question: has the writing of the book changed the author?

JOHANSSON: Yes, it has, substantially. It's done a number of things. First of all, writing the book has been an individual effort but has helped me appreciate the differences in approach between individual and group efforts. I think that writing the book has just given me a lot better understanding of what that means. The second thing it has done for me is it has made me very interested in writing more books. I found the process of writing fascinating -- I really enjoyed it, and I'm going to continue that. Finally, and most importantly, it has given me an incredible number of new ideas. I woke up one morning and realized that I've just always taken it as a truth that when you step into intersections and combine different cultures or disciplines, you have a greater chance of an insight. I wondered: is that really true? And so that was the whole reason for starting this project. I just wanted to know if it was true, and I did a lot of research for it, I did a lot of interviews. And yeah, it is true, that was my unabashed conclusion -- it is absolutely, most positively true. And so with that, it has meant that the Medici Effect is in almost every aspect of my life now. I can't help but to see intersections everywhere -- and that's pretty cool.

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