Coller Venture Review 2022

Coller School of Management
Tel Aviv University

Bridging Theory and Practice in Venture

Coller School of Management
Tel Aviv University

Letter from the Editor

We introduce this year's *Coller Venture Review* with grateful appreciation to our contributors and stakeholders around the world. In a year during which the COVID-19 Pandemic seemed to drag on endlessly, the imagination and vision of our contributing scholars and practitioners appears to have continued unabated.

This year, a dozen contributors have elucidated key trends and milestones in technology-enabled new venture creation. They have addressed areas that include Artificial Intelligence in Healthcare Analytics; Sustainability in Smart Mobility; and Cybernetics in integrating Design, Engineering, and Business Ethics. Together they have written from global innovation hubs in Australia, Germany, the U.K., Hong Kong, the U.S., and Israel. And they have generously contributed their perspectives as CEOs, Deans, Founders, Professors, and Practitioners.

As meaningful as the individual depth and range, the coalescence of the above supports three critical conclusions with regards to new venture creation: First, boundaries that once seemed nearly impermeable are now regularly crossed as teams, technologies, and their application become as multi-disciplinary as once previously imagined. Second, concepts such as sustainability and research bias associated with social good – once only thinly acknowledged – are now becoming part and parcel of multi-year strategies in both large corporates and their academic analogs. And finally, it is becoming clear that our collective stewardship is more than ever before peering explicitly into the complexity of the path ahead. If we are not necessarily getting smarter, we are at least becoming more mindful.

Our Advisory Board members have contributed similarly and once again to highlighting research in relevant areas such as Entrepreneurial Team Formation, Success and Leadership in New Venture Creation, and associated elements of Public Policy. Their shared intellectual capital serves as the bedrock for a global community of interest where complex research and game-changing ideas increasingly can be productively exchanged. Consistent with the contribution of our authors, the year's "best reads" suggested by our Advisory Board addresses three consistent underlying trends: The increase of truly multi-disciplinary teams and technologies; social good as an integral part of visioning, building, scaling, and funding new ventures; and a mindful eye to future implications.

As we grow, our goals continue to develop apace. We remain as always focused on our mission bridging theory and practice in venture, with our momentum now focused on giving a more interactive and robust voice to the knowledge we are helping to generate and the impact it may have.

Special thanks this year to Prof. Gary Dushnitsky in particular for his leadership of our virtual roundtable. Many thanks as well to Dr. Leslie Broudo, our Managing Editor. Together we invite our colleagues to follow us on our new website, where we update our content., https://collerventurereview.tau.ac.il.
We welcome any comments and suggestions from our readers that will help us improve the value of *Coller Venture Review* to its readership.

We trust this Review and the next steps it represents continue to help guide a bright future ahead.

Sincerely,

Moshe Zviran
Editor-in-Chief

This Editions' Contributors

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Cambridge Judge Business School

Prof. Mauro Guillén, Dean

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Australian National University College of Engineering and Computer Science

Prof. Genevieve Bell, Distinguished Professor of the Australian National University College of Engineering and Computer Science

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Ola Källenius, Chairman of Daimler AG, Head of Mercedes-Benz

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Diagnostic Robotics

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Venture Policy and Management
Bridging the New Tech Frontier

Overview

Our *Venture Policy and Management* section frames questions associated with new venture creation and policy globally. In this issue, we address both how digital businesses scale, and how we scale our mindsets to assimilate new intellectual paradigms.

Mauro Guillén, Dean of the Cambridge Judge Business School, addresses paradoxes associated with the possibilities and limits to global expansion. His work compares companies which adapted to the COVID-19 pandemic (Airbnb) to platforms like Tinder which drew on local advantages to grow in different countries, to traditional companies like Lego which transformed themselves into digital platforms. The challenges and incongruities suggest opportunities for huge wins, but also help explain why there are few true global digital platforms.

In an interview with the *Coller Venture Review*, Australia National University's Prof. Genevieve Bell discusses the history of cybernetics and its application into practice at The School of Cybernetics, based in the College of Engineering and Computer Science. Bell emphasizes a transdisciplinary approach that ultimately assimilates divergent voices and perspectives. The challenge, she suggests, is to ask "What is the future that is being imagined here? How is that data being used? What are the inherent biases and limitations of that data and other worlds we're imagining with it?" "At some point," she says, "We need to create people who are better equipped to handle those conversations. Because it's not just the AI piece of the puzzle. It's the whole system."

Together, these articles combine theory and practice to help us consider how seemingly micro level changes become aggregated and amplified and, similarly, how micro level data must be considered in a connected system-wide context. Looking forward, future discussions in the *Venture Policy and Management* section will continue to raise important policy questions in keeping with trends in innovation and new venture creation globally.

Can Entrepreneurs Leverage the Platform Paradox to Drive Growth?

Professor Mauro Guillén
Dean, University of Cambridge
Judge Business School

Amazon and Uber are global platforms with millions of users. With their vast reach and resources, they should in theory dominate every market they serve. But they do not…

Amazon, for example, is a behemoth that was worth (at the end of 2020) $1.6 trillion, had annual revenues of almost $350 billion, and more than 1 million employees worldwide.

And yet, despite its size and scale, the company gets 60% of its revenues from the U.S., representing less than 20% of the global economy. The same fact holds true for Uber. For all its seeming global ubiquity, the ride-hailing platform operates in just 700 cities, while the world has some 10,000 cities with more than 100,000 residents.

What explains this paradox – of global platforms that are not truly global when you peer under the surface? Mauro Guillén, a longtime Wharton professor of management who is now the Director (Dean) of the Cambridge Judge Business School, deals with this puzzle in his new book, The Platform Paradox: How Digital Businesses Succeed in an Ever-Changing Global Marketplace (Wharton School Press, May 2021).

How can entrepreneurs leverage their understanding of the paradox to drive their growth strategies? What are its implications for angel investors, venture capitalists, and private equity firms? Guillén discussed these questions and more in a conversation with Coller Venture Review. An edited version of the interview appears over the following pages.

Coller Venture Review —

What is the platform paradox? How did you discover it? Why did you decide to write about it?

Mauro Guillén —

The platform paradox has to do with something that I think is counterintuitive. When you think about digital platforms like Uber, Facebook, or Netflix, one tends to think that the technology is the same, the internet is a global medium, and therefore these successful platforms should take over the entire world market. They should have the largest market share everywhere. And yet, the paradox is that it is extremely rare for a platform to be No. 1 everywhere in the world. The only platform I can think of that way is Google. As a search engine, it is No. 1 pretty much everywhere except for a couple of countries. Of course, it is banned in China. Facebook has major competitors such as WeChat in China and several more in other countries.

The same goes for Uber. It only has a presence in 700 cities in the world. There are more than 10,000 cities in the world with more than 100,000 people, so Uber is far from being a global platform. But we think of Uber as this force of nature.

That is the paradox. The paradox is how come these digital platforms, although the internet is a global medium, and although they take advantage of economies of scale and network effects – why don't they have the No. 1 market share everywhere?

CVR —

The question is why.

Guillén —

The observation, I think, is relatively straightforward; the book delves into the "why" aspect. The reason essentially has to do with the nature of network effects. As you know, the network effect is that the more users a platform has, the more people want to use it because it is advantageous. The platform's value increases with the number of users. The value of a platform to you increases if I also join the platform, and if our friends also join the platform. That's the network effect.

The problem is that network effects are not all the same. We assume they are, but they are not. The key distinction here that helps us answer that question – and therefore explains the paradox – is the geographical level at which the network effects take place.

At one extreme, consider Google as a search engine. Everybody benefits from more people using Google and from more advertisers using Google. When you're searching, you want to have access to the widest and deepest amount of information. At the other end, consider Uber. If you get out of your house today because you want to get to the train station, and it's raining and you want to get an Uber, you don't care as a user how many Uber drivers there are in New York or San Francisco or Sydney, Australia. You care about how many there are within two or three miles of your home.

The same goes for users on the other side of the platform, the drivers. They also couldn't care less about how many people like yourself have been looking for an Uber hundreds or thousands of miles away. They only care about how many people want to get an Uber within two, three or four miles from where they are. So, the network effect is extremely local in Uber's case.

Let me finish the argument. If that's the case, Uber may start in the United States, but there's nothing preventing DiDi from starting in China to serve Chinese cities, or Grab in Southeast Asia, or Cabify in Spain and Latin America. In other words, no platform, unless it enters all the possible local markets in the world at the same time – no platform stands to have the upper hand in each of those local markets. That is because of the nature of the network effects.

> "When you think about digital platforms like Uber, Facebook, or Netflix, one tends to think that the technology is the same, the internet is a global medium, and therefore these successful platforms should take over the entire world market. That is the paradox"

Between the two extremes of Uber and Google, you have various shades of gray. You have national network effects, regional network effects, and so on. It's as simple as that. Very few network effects are truly global. What we observe is this paradox that the platforms don't have 'number one' market shares everywhere in the world. It's as simple as that.

CVR —

A fascinating point you make in your book is that the nature of the network effect can change with the user's intentions. You write about dating apps that depend on local network effects. But instead of a casual date, if you want to get married, you might cast a wider net that is regional, national, or even global. How does that process work?

Guillén —

It depends on what people are looking for. If they are looking for just a one-night stand, they care about the local network effect [to find local matches], right? But if people are using an app for matchmaking, or to find a spouse, then they may be willing to search more broadly so the network effect is at a higher level.

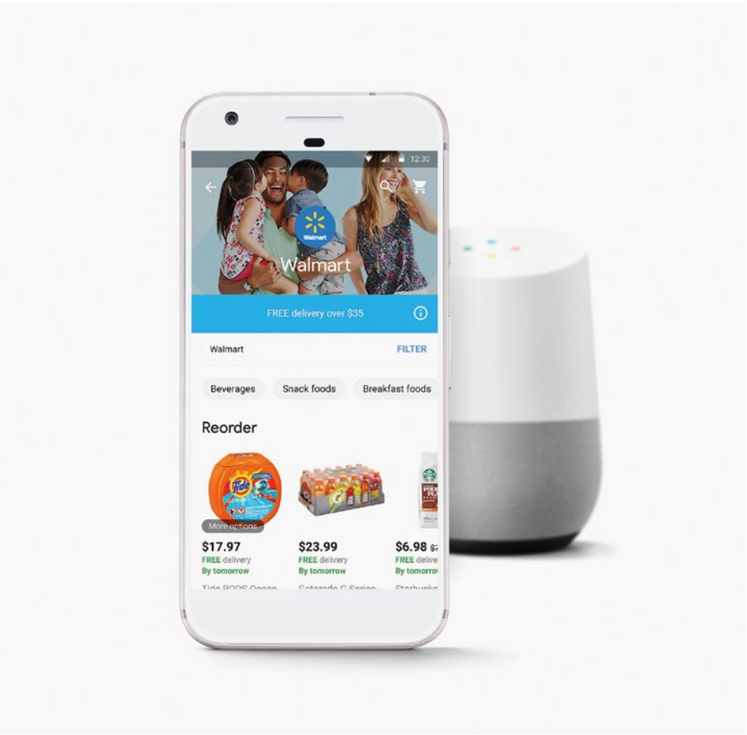
CVR —

What are the implications of local, regional, national, and global network effects for entrepreneurs? How can entrepreneurs leverage these effects to devise their own growth strategies?

Guillén —

The key here is that entrepreneurs want to launch an idea obviously that is successful. They need to understand the network effects in terms of prioritizing how they allocate their resources. It makes a big difference whether you, as a platform, are essentially taking advantage of local network effects as opposed to regional or global ones. You would allocate resources in terms of your expansion around the world in a very different way. If you don't carefully analyze the nature of the network effects, you are bound to make mistakes.

> "It makes a big difference whether you, as a platform, are essentially taking advantage of local network effects as opposed to regional or global ones. What we observe is this paradox that the platforms don't have 'number one' market shares everywhere in the world. It's as simple as that."



This analysis is useful not just for entrepreneurs. It is also helpful for venture capitalists or angel investors who are trying to decide whether to give money to an entrepreneur. They need to understand before they commit any money what is the growth potential and what is the time frame for that growth.

A third issue – by the way, which I don't discuss in the book – in which this analysis is very important is for antitrust regulators. Obviously, they need to understand the nature of network effects from the point of view of competition and antitrust, the same way that prior to the digital age, the key was to understand economies of scale and whether any companies were becoming natural monopolies. This analysis has implications for several different kinds of people: entrepreneurs, venture capitalists, angel investors and also government antitrust authorities.

CVR —

You write that some traditional companies have jumped on the bandwagon by creating their own platforms. Is it better for entrepreneurs to try and build their own platforms or leverage existing platforms such as Amazon, Facebook, Google, or Apple?

Guillén —

It's hard to answer that question in the abstract universally for all types of situations. In reality, we see that companies are both creating their own platforms, but in certain circumstances they also rely on existing platforms. The reason is that obviously if they rely on existing platforms, they have to share profits [with those platforms]. They would prefer to avoid that. But sometimes it's very difficult because they don't understand the market, they lack familiarity with it, and it's culturally very different.

Take Walmart, for example. Walmart, as you know, is keen on moving away from physical stores and using online channels. In fact, Walmart's most important competitor now is Amazon. There is no question about it. So, Walmart has created its own websites, apps, platforms, even marketplaces, where they invite some of the companies whose products they sell to establish their own stores. They have done that in the United States and in other markets.

But in China and India – places where the local competition is fierce, and Walmart doesn't really understand the market well – it has set up joint ventures or collaborations with existing platforms. In China, they have tied up with JD.com, which is one of the largest marketplaces, as you know. In India, Walmart decided that instead of collaborating, they decided to acquire. They acquired Flipkart.

In these cases, we are still talking about the same kinds of things that we were discussing in the pre-digital age. Companies, if they can, prefer to operate by themselves, with 100% owned operations, because then they don't have to share profits with anybody. But if that's difficult or impossible, then they collaborate. If they collaborate, they must share profits. They also have the option of acquiring. In Walmart's case, we see that they have done each of these things, depending on the market.

CVR —

Some companies have learned that when they offer products and services off platforms such as Facebook or Amazon, it helps build awareness or leads that enable them to find new customers. But these benefits can vanish overnight if the platform changes its rules.

Guillén —

Yes, that is the danger.

CVR —

How can entrepreneurs protect themselves against such vulnerability? Any suggestions?

Guillén —

This takes us back to the same kind of question that companies often face: Should I go alone, or shouldn't I? Of course, the decision that they need to make for specific markets is reversible. They can start one way, and then they can change, depending on the circumstances.

One thing is you only want to collaborate when you feel that you lack a resource. Once again, this is because you have to share the profits, right? But sometimes you start collaborating and then you realize, as you said, that maybe the platform has changed the rules. Or, if things have changed, you may feel more comfortable operating by yourself. It could also be that the other party that you have been collaborating with has been abusing your good will. This also happens very often, as you know.

What happens in those cases is that companies decide to either set up their own operations or they decide to acquire. In India, for example, Walmart started out by collaborating with Flipkart first, and then they acquired the company. What we need to remember is that all these decisions are dynamic. Companies change their minds all the time. You can also start in a given place by collaborating, and then, as you acquire more experience, you may decide to stop collaborating and run things yourself.

That, I think, is the key. It is not a decision that once you make it, you have to stick with it. No, you can change that decision later. Very often companies do precisely that. Mostly, what I've seen is the opposite. Companies that thought they were all-powerful, when they failed, when they encountered obstacles, then they decided to collaborate. That has been more frequent in my assessment than the other way around.

CVR —

What are the main takeaways of The Platform Paradox for entrepreneurs?

> **The key thing is to do your homework and understand the network effects before you start allocating resources, before you come up with a strategy to plan for growth and you make decisions about prioritizing**

Are its lessons relevant mainly for large companies or also for startups and small firms?

Guillén —

Let me first answer the second part of the question. Absolutely every kind of company, even an entrepreneur who doesn't yet have a company but just has an idea, can benefit from these insights. In fact, the book uses examples and has different sections to address specific challenges faced by different kinds of companies.

We've already spoken about what I believe are the two key takeaways. The first is that not all network effects are equal. They come in many shapes and sizes. It matters whether the network effects of the platform are local or all the way global. It also matters whether a platform is one-sided or two-sided. By a two-sided platform, I mean one like Uber where passengers who need rides and drivers who need passengers must come together, so you have two different types of users. So, the situation becomes a little bit more complicated. That's the first takeaway, I think, from the book.

The second takeaway is that it's all about prioritizing. Here I'm not saying that platforms cannot possibly succeed all over the world. They can. But in order to do that, they have to prioritize the allocation of resources – their time, their money, and so on – in such a way that they build up the network effects in the right sequence.

I illustrate that dynamic in the book with the case of Airbnb. I think Airbnb got it right big time. They really succeeded. They expanded from the United States in concentric circles around the world, following the wave of tourism and people looking for alternative accommodations. They were extremely, extremely smart when it came to prioritizing markets.

CVR —

What are the implications of your book for angel investors, venture capitalists, private equity firms, and other investors? What mistakes can they avoid by heeding the lessons of The Platform Paradox?

Guillén —

Venture capitalists and angel investors often have this approach of essentially investing in 100 ventures, hoping that one or two would make it, and then that will more than compensate for all the other money they have invested. The book offers a methodology for thinking, especially in the case of these platforms, for thinking before you invest, about which ones have the greatest potential and how far they can go.

It is the same for entrepreneurs. Entrepreneurs want to grow their ventures. That is their goal, and then they want to either go IPO with it or sell the company. In this business of digital platforms, you need to pay a lot of attention to the network effects.

CVR —

What surprised you most as you were working on this book?

Guillén —

I started working on this research maybe four years ago or so. I just couldn't at first understand why these platforms didn't take over the entire world, why there were so many other competitors, some of which, by the way, eventually became bigger than the pioneers. For example, DiDi is bigger than Uber. That was very surprising to me. And then, I started doing research on this and eventually wrote a book in response to that surprise.

After having written the book, another thing I still find puzzling is something that perhaps I might address in a future project. That is to study how economies of scale and network effects interact with one another. They are very different. Economies of scale are about how the number of users that you have, or the number of products that you sell – how that helps you reduce costs. That has to do with the production side. Network effects have to do in principle with demand, not with supply, not with production. That's something I'm still trying to figure out.

CVR —

What advice would you offer entrepreneurs about how to deploy digital strategies to scale their businesses locally, regionally, nationally and globally using the principles in your book?

Guillén —

The key thing is to do your homework and understand the network effects before you start allocating resources, before you come up with a strategy to plan for growth and you make decisions about prioritizing. That is the key takeaway. You must do your homework. You must really understand the network effects well. Entrepreneurs who manage to understand these issues very well are the ones who can then succeed.

CVR —

Any final comments?

Guillén —

I think perhaps two things may be worth adding there. One is we have been talking primarily about entrepreneurs who are in the for-profit business. They want to make money. But these principles, although I don't get into that in detail, also apply to nonprofit organizations. Service organizations that are essentially trying to help people also need to pay attention to network effects. I discuss one case in the book which is OLIO, the food-sharing company at the local level. That's a non-profit. I didn't get into more specifics about this, but I think these principles also apply to these types of platforms.

The other aspect I would mention is about education platforms. I don't discuss that in the book explicitly, but as you know, we are in the midst of what I think is only the beginning of a huge revolution in education. The pandemic has shown that there are immense possibilities, that online education is not a second-best alternative, and that a hybrid or a blended education approach may be very attractive in the future. I think these principles are also applicable in the field of education. ■

About

Professor Mauro F. Guillén is a Spanish/American sociologist, political economist, management educator. In March 2021, he was announced as the new Dean of the Cambridge Judge Business School, and a Fellow of Queen's College at the University of Cambridge. Until July 2021, Professor Guillén was the Zandman Professor at the Wharton School of the University of Pennsylvania, and Director of the Penn Lauder Center for International Business Education and Research. He was the Anthony L. Davis Director of the Joseph H. Lauder Institute of Management and International Studies from 2007 to 2019. He is the Wall Street Journal bestselling author of *2030: How Today's Biggest Trends Will Collide and Reshape the Future of Everything.*

The New Cybernetics: Systems Thinking for the 21st Century

Prof. Genevieve Bell
Distinguished Professor of the Australian National University College of Engineering and Computer Science

In this interview with Leslie Broudo, Australia National University's Prof. Genevieve Bell discusses the history of cybernetics and how she is leading the challenge of reimagining the possibilities of the field for the 21st Century and beyond. As Head of The School of Cybernetics, based in the College of Engineering and Computer Science, Bell emphasizes a transdisciplinary approach that considers people, technology, and the environment in order to ultimately help build products that ultimately assimilate divergent voices and perspectives.

Coller Venture Review —
You are off to an audacious next part of your journey. Tell us first, how did you get your start?

Genevieve Bell —
When I was a child we spent a lot of time moving around. My mom told us we had to make the world a better place, more fair and more just. She told us we had a moral obligation, to get in the room where the decisions were being made. She told us that if you have a voice, you have to make it count for others – it was a sense of service – again, the notion of a moral obligation. "Do work that matters," she said. "And not just good for you but good for others, including others that don't have the access you do."

I've been lucky and I've worked really hard to make that luck. If you're in those rooms, you have to make a difference….to ensure that the technologies we build don't stop us from being who we are. We have to make sure that the technology we build is not technology built with just one view of the world.

CVR —
Can you tell us about the new School of Cybernetics, and your view on how it fits within the changing technology, business, and social context globally?

Bell —

Over the last 23 years, I've been in and out of Silicon Valley, where people have been actively building the future, the world we now live in. As I have been in those conversations, and those imaginations of the world, it's always been clear to me that we need a more contested, messy vision of the future, that the vision should not feel so neat and tidy.

The Media Lab did well for a long time, and I feel I have a responsibility now to tell stories about the future, and to do things in the present that cause that future. So over the last 4–10 years, the conversations we had about big data became the conversation about the cloud and then about AI. The energy has been the same for the last decade. And a lot of it is the view of the future. And a set of technologies that will change the world. But then you also have to actively disrupt the present to make those stories possible.

> "I feel I have a responsibility now to tell stories about the future, but to do things in the present that cause that future"

At the School of Cybernetics, we don't want to intervene exactly, but to contain some of the energy, to ask what is the future that is being imagined here? How is that data being used? What are the inherent biases and limitations of that data and other worlds we're imagining with it?

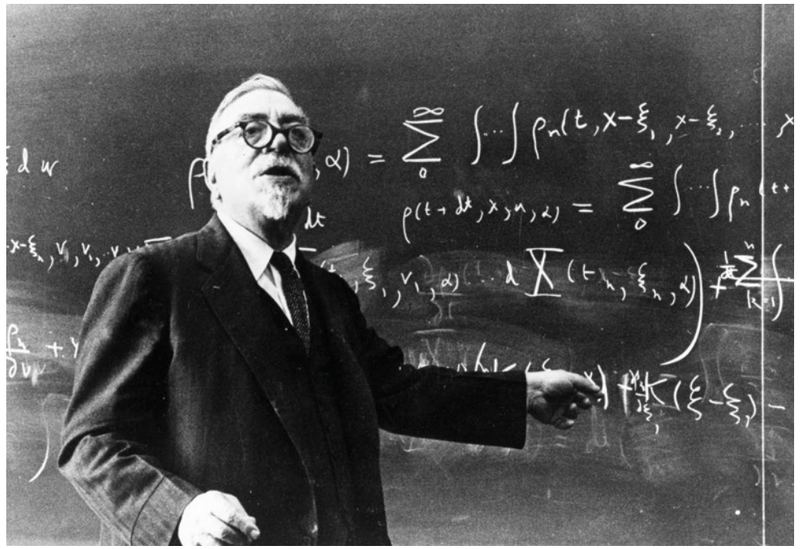
At some point, we also need to create people who are better equipped to handle those conversations. Because it's not just the AI piece of the puzzle. It's the whole system. And it's what happens when AI starts to get inside things – whether it's elevators, or trains, or the electrical grid, or our bodies. I don't think it's computer scientists or electrical engineers only.

CVR —

What is your approach to tackling such big questions?

Bell —

I feel critically aware that the whole system feels like a unit of analysis, like a critical theoretical unit by which we should make sense of things. As part of this sense making, I have found my way back to a set of conversations that took place in the 1940s and 1950s, including the Macy Conferences that started in 1946. This gathering brought together a group of thinkers from all over the world regularly over the next several years. They debated the future and tried to work out how the power of computing could be managed in such a way that it wasn't used to create more of the destruction that had been witnessed in World War II. They wanted to build a different future than the present they found themselves in. They had a series of conversations about what the future might be like, about what it meant to have humans and computers co-exist, what the relationship between them might be. And that whole conversation unfolded under the banner of cybernetics, which was at that point the theory of control and communication of computing and humanity and the broader ecological systems. These turned out to be the most



Norbert Wiener, considered to be the originator of cybernetics.
Credit: Courtesy MIT Museum

generative conversations of the 21st century. They were conversations that spawned artificial intelligence because the same practitioners who were in the cybernetics conversation eventually spin off and go build the AI discourse. A bunch of the other practitioners go off and build out most of Silicon Valley. Others go off and create most of the work around organizational development in Britain while go on to create computational art. It turns out if you scratch the surface of the most interesting people in the second half of the 20th century, underneath you will find a founding cybernetician.

CVR —

You've talked a lot about power in a diversity of voices. Can you tell us a bit more?

Bell —

History tells us that among the many lessons we can draw from cybernetics aren't just about a theory, it's also about the power there is in a diversity of voices – it gets you to productive discomfort. There is power in a conversation that unfolds over weeks and months and years, not hours. As it takes a while to get to good idea – thinking that we're going to get it done in an afternoon is foolish actually. I think there's power in ideas that have a certain kind of grace to them – that they hold their form enough that people can find their way, but they're not so structurally set that people can't go and reinterpret them.

The people in 1946 who gathered together over many years to discuss cybernetics helped shape our future. They created an idea that would endure. It didn't have to be so rigidly determined that other people couldn't take it and do something interesting with it. And for me, that's about a certain idea having grace – an idea that holds but not so much that it excludes other people from it.

CVR —

What keywords do you want us to think about when we talk about data science? What changes as a result?

Bell —

The thing about data is that it's always retrospective – you're looking at what has already happened, not what will happen. And it is, as a result, in some ways, both conservative and confining. If data is always in the past, and always retrospective, and you are modeling the future, based on that, it creates some really interesting challenges. So it is about how do we think about information and asking ourselves a whole series of questions. How do we think about information architecture? How do we think about both the way data is created and managed? Now the thing about statistics is that if you look at its history you will find that eugenics is tied up very tightly with it, which is deeply troubling. But how do we teach people to recognize what is data? How data is created? How data can then be managed and manipulated? Not in the cynical sense but, ultimately, how you extract value out of data – whether that value is in terms of sense making, or prescriptive activities. Ultimately, we have to start to ask better questions about what gets made into data and what doesn't.

CVR —

You talk about teaching your students to ask questions that probe "a step up." What do you mean by this?

Bell —

Taking a step up is about pushing further on the 'why' and asking questions on the intentionality of something. If I give an example where you're developing an app that will help me buy a sweater to go with my pants, I want to know what the intention of the app is. And sometimes we're not good at pausing to really answer that question. Asking the right questions it about imagining a world of fast fashion and a world of just-in-time supply chain. You are imagining a world of credit cards, you are imagining a world of data trails, you are imagining a world of multiple other systems, you're imagining a

world of desire, you're imagining a world where matching makes sense.

And so I think one of the things we aren't good at is pausing to ask the question, what is this world? And what is the world that this object, in its making, will help bring into existence? And is that a world we really think is a good idea? And it's very hard sometimes for people to stop and think about that and about what the consequences will be of this app coming to fruition.

CVR —
What does it mean to think about the kind of the nonhuman piece of the world that is also still biological?

Bell —
I grew up in a world of psycho-demographic segmentation and behavioral-based segmentation. And I often wonder if, in our desire to put everything into little neat, tidy boxes, we're also missing something. So it is not just a more robust discourse about a bigger world, Our conversational landscape and worldview needs to be slightly more expansive. It's simply the fact that we know we need to have other conversations about the world that we inhabit that isn't just us and the walls. We have to make a more complicated space for ourselves.

CVR —
You talk about helping to lead the future by bringing technology and people together in new ways. Can you comment on your underlying optimism?

Bell —
I think a lot of it is about how do we do a better job of telling stories about the future. We tell these ridiculous stories about how everything's going to be different. And then it really isn't. Starting with Frankenstein about 200 years ago we have told really compelling stories about what happens when humans use technology to do the work of gods – generally nothing good will come of it. And those narratives have a very particular kind of resonance – it's easy to tell stories about how things will go badly. It's easily to tell the dystopian science fiction stories where AI is this singular monolithic thing that takes over. I feel like part of the work we have to do is tell more complicated stories about technology, where they're not singular in their valence, i.e., no technology is going to be universally good or bad – there are going to be complications.

And yes, we're going to have to think about regulation. And yes, we're going to have to think about how we manage the supply chain. And we're going to have to do this inside some constraints. But can I imagine a world in which there are a range of technical possibilities, some of which are excellent for us?

Well, of course, I can. But I tend to be less interested in that than I am about how we need to build the future we want to live in. So for me, sitting now inside a university, my imagination goes to how do I educate the next generation of citizens and develop a new type of engineer – so that they know how to ask the right questions, ones that I hope are richer, to help shape our future.

CVR —
What advice do you give your students when they graduate?

Bell —
I quote one of my bosses. I tell them that curiosity is the greatest form of insubordination. I tell them that being the person that asks all the questions all the time is never easy and that you have to be willing to be brave. I tell them, they're taking on a life where you are going to be the person who convenes conversations that don't end easily. But that it's good work. I tell them that it will sometimes be exhausting. I tell them that it will sometimes be really fun. I tell them there'll be days where they think I just can't do it anymore. All they want to do is eat chocolate, watch bad TV and buy shoes on the internet.

> It turns out if you scratch the surface of the most interesting people in the second half of the 20th century, underneath you will find a founding cybernetician

> It's simply the fact that we know we need to have other conversations about the world that we inhabit that isn't just us and the walls. We have to make a more complicated space for ourselves

And I tell them, that's all okay. I tell them that the reason we built the program was that they never have to feel like they were alone in our journey, that there's always going to be someone else who came to this program with them. And that, you know, all they have to do is find a way to find that other person and be reminded that, yeah, it's hard, but it's still the right thing to be doing.

And I tell them that every day is going to be different than the one before. I remind them that it's hugely important to celebrate the wins and create rituals for that, that they need to periodically find time to catch up to themselves. And that they also have an obligation to go build more places where the conversation is possible. And then I tell them, they're always welcome back in the building wherever I am. ■

About

Prof. Genevieve Bell is an anthropologist best known for her work at the intersection of cultural practice and technology development. Bell is the director of the Autonomy, Agency and Assurance Innovation Institute (3Ai), and a Distinguished Professor of the ANU College of Engineering and Computer Science. She holds the university's inaugural Florence Violet McKenzie Chair and is the first SRI International Engelbart Distinguished Fellow.

Bell is a Senior Fellow at Intel, where she was formerly a vice president directing the company's Corporate Sensing & Insights group. From 1996 to 1998, Bell taught anthropology and Native American Studies at Stanford University, in both the department of anthropology and department of anthropological sciences. She is widely published, and holds 13 patents.

Deep Innovation
In Praise of Applied Analytics

Overview

Our *Deep Innovation* section frames questions related to technology-led transformation. In this issue, we address artificial intelligence, and dig deep into its application by two leaders in the field, one in healthcare one in smart mobility.

In a series of interviews, we are joined by Chairman of Daimler AG and Head of Mercedes-Benz Ola Källenius, who discusses the transformation and opportunities facing the automobile industry from new forays into software-hardware integration, new expressions of globalization, and a wide-ranging commitment to sustainability. Källenius helps us appreciate how one of the oldest brands is transforming not just itself, but a shifting industry.

We are also joined by Co-Founder and CEO of Diagnostic Robotics Dr. Kira Radinsky, who addresses how the field of artificial intelligence is being harnessed to make healthcare better, cheaper, and more widely available. As one example, Radinsky describes how access to 60 billion visits with primary care physicians and emergency department physicians resulted in an AI system reading all the texts and extracting answers to clinical triage questions, eventually leading to a AI-driven ability to approximate what one should do with any particular patient.

Together, our contributors clarify an important emerging technology, the advantages it promises, the challenges to implementation, and the reality in practice. Looking forward, it seems clear that the tension between reality and practice, between reality and future promise, are related to many independent and interdependent factors. Future versions of *Deep Innovation* will continue to bring together varied perspectives on such new technologies, with the aim of promoting new syntheses and insights.

Smart Mobility Meets Sustainability

Ola Källenius
Chairman of Daimler AG, Head of Mercedes-Benz

Ed Frank
CEO, Axis Innovation

In this interview developed in partnership with CEO Ed Frank of Axis Innovation, Chairman of Daimler AG and Head of Mercedes-Benz Ola Källenius discusses the transformation and opportunities facing the automobile industry. From new forays into software-hardware integration, new expressions of globalization, and a wide-ranging commitment to sustainability, Källenius helps us appreciate how one of the oldest brands is transforming not just itself, but a shifting industry.

> We have increased our level of vertical integration. We have specifically focused increasingly on telematics, i.e., the user interface to the customer. It is important to note that we have taken software development in-house – this includes writing software for autonomous driving assistance systems

Coller Venture Review —
Let's begin with the qualitative transformation that is clearly going on in the auto industry. How would you suggest we think about it, and what do you think the core changes are likely to be?

Ola Källenius —
To start with, the auto industry will not look the same 10 years from now. But this is a transformation that has already been going on for a few years.

The two major tends driving transformation are digitization and decarbonization. In terms of digitization, this refers to digitization of the product – making the car an embedded thing in the Internet of Things. This also includes the digitization of how we make the product – how we change the way we work in our company.

As for transformation related to decarbonization, there are no two ways about it, it is part of the core of our strategy to define what the future of sustainable mobility looks like.

As we think about this, let us keep in mind that the connected car is not something that's just happened recently. More than 10 years ago, engineers were thinking about how we can introduce modern technologies into a vehicle and how can we make the vehicle something substantively more than a rolling office.

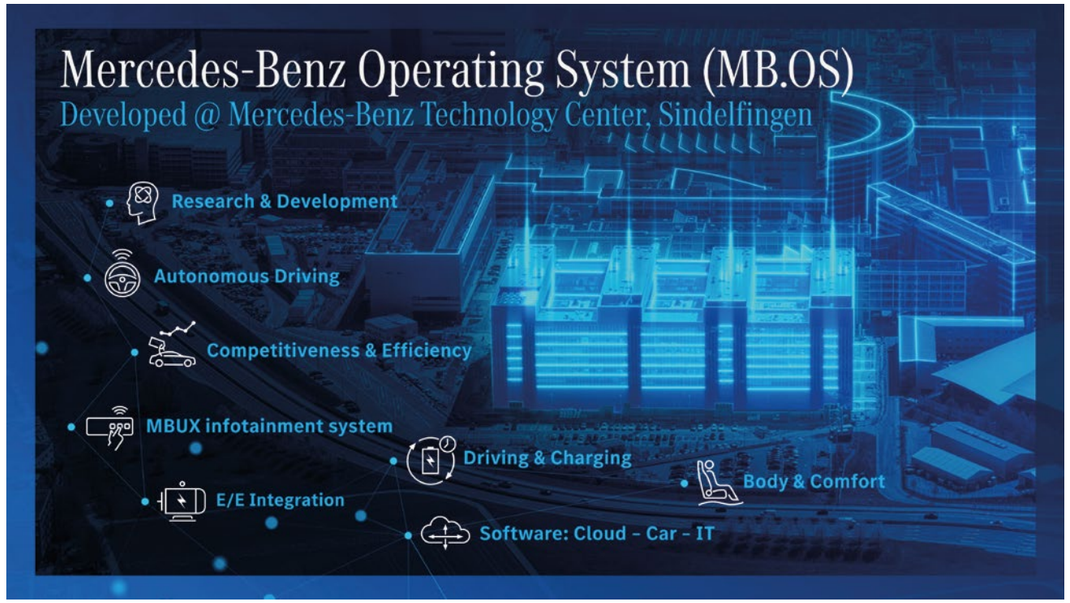
CVR —
What about the functionality of the software that supports this transformation?

Källenius —
Clearly, software is key and mastering the software stack is essential. As testament to this, we have increased our level of vertical integration. We have specifically focused increasingly on telematics, i.e., the user interface to the customer. And even though we are a "car" company, it is finally important to note that we have taken software development in-house. This includes writing software for autonomous driving assistance systems.

CVR —
Let's talk about autonomous driving assistance systems. Where does it fit within the grander scheme?

Källenius —
Autonomous driving assistance systems are not just going to make driving a lot safer. Ultimately, they are going to take the driver out of the picture. Electrification efficiency is also going to be the name of the game, – energy is even more precious in an electric vehicle than in combustion-based vehicles, so we know that relevant innovations like battery management systems will be crucial for competitiveness.

CVR —
I've read about so-called "level three" systems. Can you explain this please?



Above: Mercedes-Benz Operating System (MB.OS) developed @ Mercedes-Benz Technology Center, Sindelfingen.

Källenius —
As far as Mercedes is concerned, we are moving to production at scale at a level three system. Why is it such a big deal? It is because if you move from level two to level three, the liability moves from the human to the computer. This means the company becomes fully responsible for everything that happens – because the car is driving. It is not just a technological challenge. We have to consider it also from a legal and product liability point of view. It changes everything.

Related to this is the first full-level parking system. This then moves to the combination between technology in the car and technology in the infrastructure. This is something we are developing together with Bosch. We have pilots running where you can literally step out of the vehicle, into the parking garage, and the vehicle parks itself. The car literally can guide itself through the parking garage infrastructure.

> Related to this is the first full-level parking system. This then moves to the combination between technology in the car and technology in the parking garage... The car literally can guide itself through the infrastructure. This is a convenience feature that I foresee may be become standard operating procedure one day

This is a convenience feature that I foresee may be become standard operating procedure one day.

CVR —
It's been written elsewhere that you are building a "supercomputer on wheels." Can you explain please?

Källenius —
If you take a holistic view of what this means, the brain and the central nervous system of the car are completely linked…. This includes the software stack I mentioned, literally going to go through the whole car ultimately to infotainment and a direct link with the customer. Our customer interface includes a Mercedes "me ID" that you log into when you log into your car – very much the logic of a smartphone.

CVR —
How does globalization fit, from the perspective of your software engineering future?

Källenius —
As you know, we are significantly increasing our resources in software engineering. In fact, our team in Tel Aviv is playing a crucial role in this – they are now like an integral part of our overall engineering organization.

Our technology team in Bangalore is also large, the largest outside Germany. They are also addressing vehicle engineering. And every time I go there, I'm just flabbergasted by the speed of development and the enthusiasm that we see there to contribute to our technical future.

We are also investing in startups, including in Berlin. Why Berlin? Berlin is a little bit like Tel Aviv in terms of a magnet for young talent. And when you walk into the office in Berlin, you hear I don't know how many languages. All in all, I believe there are individuals from 30 nations working there. English is the standard language in our Berlin office.

Finally, I will just add that, from a marketing perspective, our biggest market is in China of course.

> **"Much of the innovation happens inside Mercedes and we do it ourselves. But we have always been a good integrator of technologies"**

CVR —
How do joint ventures and strategic partnerships figure into your plans for continued globalization?

Källenius —
As one example, we have made a strategic partnership with Nvidia. In our assessment, they have the highest computing standards relative to the next generation of driving assistance systems. But clearly it's not the only partnership. We have several. Some of them we make public, some of them we keep to ourselves. And the message here is co-innovation. We're open minded and we're always looking for people that share our vision of pioneering innovation. So the shop is open for business.

CVR —
Can you enlighten us as to the future of electric mobility more generally?

Källenius —
We are connected today to more than 500,000 public charging points. No matter what trip you take, the computer will calculate the smartest trip for you where you should charge. There are also artificial intelligence systems being developed that will be able to make suggestions based on the behavior of the driver. These are things that are already reality today but will play an even bigger role tomorrow.

CVR —
You mentioned decarbonization earlier. What specifically are your views on the Paris Climate Agreement?

Källenius —
About two years ago, we had made a very clear strategic decision. Humanity needs to solve the CO_2 problem. We signed up to the Paris Climate Agreement, not because we have to, but because we want to.

> **"About two years ago, we had made a very clear strategic decision. Humanity needs to solve the CO_2 problem. We signed up to the Paris Climate Agreement, not because we have to, but because we want to"**

We know that this is going to be a gigantic task for humanity to solve to eventually go to net zero. It is engineering problem but it is also multi-dimensional. And I think maybe the financial aspects of this and how we transform our industrial footprint more broadly are perhaps even bigger challenges than, let's say, just the engineering challenge.

But we're committed to it. And it's so much more than just looking at making an electric car, that would be too one dimensional. We know we have to look at the upstream and downstream supply chain, take a 360-degree approach towards carbon neutrality. We can see that there is momentum, there's very strong political momentum in Europe. One can also see that the ambition is high in the U.S., and that China too has made it part of its strategic goal to go carbon neutral and push so-called "new energy" vehicles.

CVR —
Does decarbonization apply just to your passenger cars? And what about fuel cells, how does this fit?

Källenius —
It's not just a passenger car thing – it is every form of mobility, from a 40-ton truck all the way down to a small, two-seater city car.

Whether the trucking people or the bus people, they are all working on the exact same thing.

And while the electric battery is the name of the game for shorter to medium distances, we're also putting another horse into the race for the 40-ton truck that needs to go maybe up to 1000 kilometers a day. And this is where the fuel cell could come into its own and be the technology of choice. And that's why we have kicked off a major project on fuel cells for heavy trucks, together with one of our competitors. We're hopeful because the trucking industry is very sensitive to cost, and this is a business that could switch over relatively quickly once regulation and variable costs set in. We are excited that we are in a leading position here, but not something where we should rest on our laurels by any means.

I also want to add that we are looking not just in terms of reducing CO_2 in the vehicles themselves, we are also looking at waste management, beginning with our newest factory.

CVR —
Can you talk to us a little about your particular strategic vision?

Källenius —
There is a master strategy behind what's going on at Mercedes at the moment. We're now in a paradigm shift into a new philosophy where we believe we have to be the architect of the master software stack. Of course, it still needs to be open and speak to everything else out there and include all elements of the ecosystem we are used to from the smartphone world.

We stay focused on believing in Mercedes as a potential winner in this transformation. We work in an interactive way with big and small companies alike. But you can't take anything for granted. We know that when there is an industry that's going through transformation or disruption, new players come in. Some of the incumbents are successful, and some struggle – so we will have an upheaval in the auto industry in the next 10 years or more. We intend to tackle the challenge.

CVR —
With all the demands of competition, changing technology, and changing imperative – how do you keep your spirit of innovation alive?

Källenius —
The customer expects perfection from somebody with our brand promise, and it can lead to being more conservative. And we constantly have this balancing act between perfection, but also doing crazy things that are really out there. And so we try to keep that balance.

We don't have time today to talk about all of those things. But we literally write down all that you could possibly be done with the vehicle. And then as we go through vehicle engineering, and we select the winners, the ones that we think are going to have the most value for the customer – and also create the most value for us. We seek quality and try to not be too conservative. We got to be a brand that delivers on this pioneering spirit from our founding fathers. And I think most of the time, we get that balance right.

The customer expects perfection from somebody with our brand promise, and it can lead to being more conservative. And we constantly have this balancing act between perfection, but also doing crazy things that are really out there. And so we try to keep that balance. And I think most of the time, we get that balance right.

CVR —
With all this progress, what is keeping you up at night?

Källenius —
Well, as I said, I think the whole topic of CO_2 should keep us all awake. It's one of the defining tasks that we have ahead of us in the next decade. And I believe if everybody pulls together, it's a problem that can be solved. While we have made a plan, we now have to execute that plan. And that's going to be a lot of hard work.

I am also hugely excited about the whole notion of how everything gets connected with everything else from the vehicle as its own island to the vehicle being a smart thing in the internet of things. It's going to improve safety, it's going to improve traffic flows, it's going to make your trip so much more pleasurable. We are truly at the center of huge innovation and new expressions of software-hardware integration. ■

> **“While the electric battery is the name of the game for shorter to medium distances, we're also putting another horse into the race. And this is where the fuel cell could become the technology of choice. We're hopeful because the trucking industry, which is sensitive to cost and incentives, is a business that could switch over relatively quickly”**

About

Ola Källenius is the Chairman of the Board of Management of Daimler AG, and Head of Mercedes-Benz. He is the first non-German in both positions.

In 2010, he took over the chairmanship of the management of Mercedes-AMG GmbH. He was appointed to the board of management of Daimler AG on 1 January 2015.

Källenius began his career in 1993 at the former Daimler-Benz AG.

Ed Frank is the Founder and CEO of Axis Innovation, a Tel Aviv- based open innovation consultancy which focuses on bringing cutting edge technologies to its clients to create growth, solve problems or invest. Prior to Axis, Ed was CEO of IDT Ventures. With over 20 years of tech experience, Ed has been involved in technology as an entrepreneur, industry expert, investor and deal maker. Ed has an MBA and BS in engineering, both from Columbia University.

Transformation in Patient Care through Applied Analytics

Dr. Kira Radinsky
Co-Founder and CEO, Diagnostic Robotics

Saul Orbach
Founder, The Elul Fund

In this interview with the *Coller Venture Review*, Co-Founder and CEO of Diagnostic Robotics Dr. Kira Radinsky addresses how the field of artificial intelligence is being harnessed to make healthcare better, cheaper, and more widely available. Perhaps as fascinating is the window into the process behind how one of our leading thinkers and voices actually thinks.

Coller Venture Review —
You have a very special perspective on innovation in AI. Where did the idea for Diagnostic Robotics come from?

Kira Radinsky —
Well, I would say that a lot of ideas just come from other ideas, right? At the beginning of my career, we'd predict large events. Epidemics now sound small given the fact that we now have pandemics, but at that time epidemics were big. And as I thought more and more about healthcare, I decided that maybe it would be really a good idea to focus on a much smaller area where it would be possible to make a bigger impact.

When I actually started dealing with healthcare, I wanted to take all the text written in healthcare, pharma etc.… all of the publications ever available …and build a system that would build a human simulator of the body. That was my dream, and I started building a lot of prototypes. Of course, once we started building them and they didn't work, we developed something completely different. But eventually, I think the associations between different things I was doing were sparking new ideas.

CVR —
Can you tell us please about Diagnostic Robotics – how it got started more specifically?

Radinsky —
One of my master's students, Jonathan Amir, was an Olympic sportsman. He was spending all of his time inside emergency departments and was very keen about how we can reduce the time inside those departments. I said if we can get all the information physicians have ever written in the emergency departments, we could actually simulate what they're doing, and maybe add automation. So we started building. This is how Diagnostics Robotics was born.

> We eventually got access to 60 billion visits with primary care physicians, emergency department physicians, etc. And we built an AI system reading all the texts and extracting answers to clinical triage questions, eventually leading to figuring out approximately what one should do with any particular patient

CVR —
Many innovators focus on technology but not necessarily the practical implementation of that technology. Do you recall your earliest views about bringing practice into theory?

Radinsky —
Very quickly, we had to see this from a business perspective. Selling into hospitals is not easy. Furthermore, emergency departments are flooded not because of the need for automation but, as we found, because many cases could have been avoided and treated in primary care. We began to think we were solving the wrong problem. We began to think we could take the same core technology, and port it to primary care. And of course, once we looked more deeply, we understood that physicians were generally treating small problems quite differently from one another. We realized it was an entire new universe, and that we really had to listen carefully.

CVR —
It is so easy when one is starting a company to get seduced by the wrong data, or to read the right data in the wrong way. Does this resonate with your experience at all?

Radinsky —
I started to see that we needed to break up our system into two. One is what we call chronic. The other we call the episodic – you have the flu, and the medical team is trying to treat the small episode that you have right now. For the simple patients, the episodic, we could do automation. We found that we could delve into the rules physicians already had in their heads. We eventually got access to 60 billion visits with primary care physicians, emergency department physicians, etc. And we built an AI system reading all the texts and extracting answers to clinical triage questions, eventually leading to figuring out approximately what one should do with any particular such patient.

> Emergency departments are flooded not because of the need for automation but, as we found, because many cases could have been avoided and treated in primary care

CVR —
So you knew what you were building all along?

Radinsky —
No, not at all. In fact, when I started Diagnostic Robotics with Jonathan (Amir) and Professor Moshe Shoham, I felt we were going to build a diagnostic system – that is why the company was named as it was. But with time, I began to think that "diagnostics" was perhaps overshooting or at least misconceived. Why? Because the idea in episodic care is actually not the diagnosis. It's the actual treatment, based on physicians anticipating what will be needed and their giving proactive care. And when I understood this, I began to understand the challenges of enhancing – enhancing, not replacing – the physician, specifically to help avoid a surfeit of proactive care that can often be misdirected. This translates directly into reducing the burden on physicians – whether it's the 2,000 patients annually a primary care physician has annually in Israel, or the 5,000 patients annually the primary care physician has in the U.S.

Let me say it another way – To provide real leverage, we needed to travel all the way back in the workstream. I think the key is always to listen. Even if one has a really amazing vision – if one sees the star and wants to travel in that direction – one still has to change the path all the time. It's really hard to anticipate what's ahead, especially if it's a new creative idea that nobody has tried before.

And again, it's not in the superficial observation of "what is wrong," but in tunnelling through practically to the root cause. In China, for example, the observation of the problem is that people wait 8 days for appointments. We don't need an algorithm to realize increasing volume with population growth will not be sustainable if we continue with the same approach.

> **"I think the key is always to listen. Even if one has a really amazing vision – if one sees the star and wants to travel in that direction – one still has to change the path all the time. It's really hard to anticipate what's ahead, especially if it's a new creative idea that nobody has tried before"**

CVR —
What is the role of AI in this?

Radinsky —
AI-Human collaboration begins by recognizing that humans usually have a much larger amount of information than AI systems usually receive. For example, when we asked patients in emergency rooms, 25% said their chest pain radiated to the left. But in only 5% of the cases did the physician agree. Because what does it mean to radiate to the left? The physician's work (and the physician-patient collaboration) is not simply "question-answer," but understanding.

So, bottom line, AI has an advantage because it has historical medical data. It sees billions of visits and is able to calculate mathematically and objectively. We have to draw on this to build profiles that will allow us to serve and support a radically growing population. At the same time, we cannot trade away the relationship or trade away care. The system may ultimately tell you what to do, but eventually somebody needs to call that person, understand their needs.

Finally, I'll just quickly add – there are no robotics in our company. Robotics was an initial idea when we started the company, when we thought the robotic system would take a lot of healthcare vitals. Over time, as I've said, we shifted and we shifted to an emphasis on proactively predicting, making sure we have identified the right problem to solve.

We've been working for 7 years for now and we've been improving our ROI, both clinically and financially, based on work with two different health care systems. We have dozens of millions of patients, and several published papers. We can not only predict more than 80% of congestive heart failure related to diabetes but, in addition, we have also found that we can reduce 15%–20% of those events if we intervene in time.

Evaluation of the system in a clinical trial setting yielded a

30%

reduction in routine task burden,

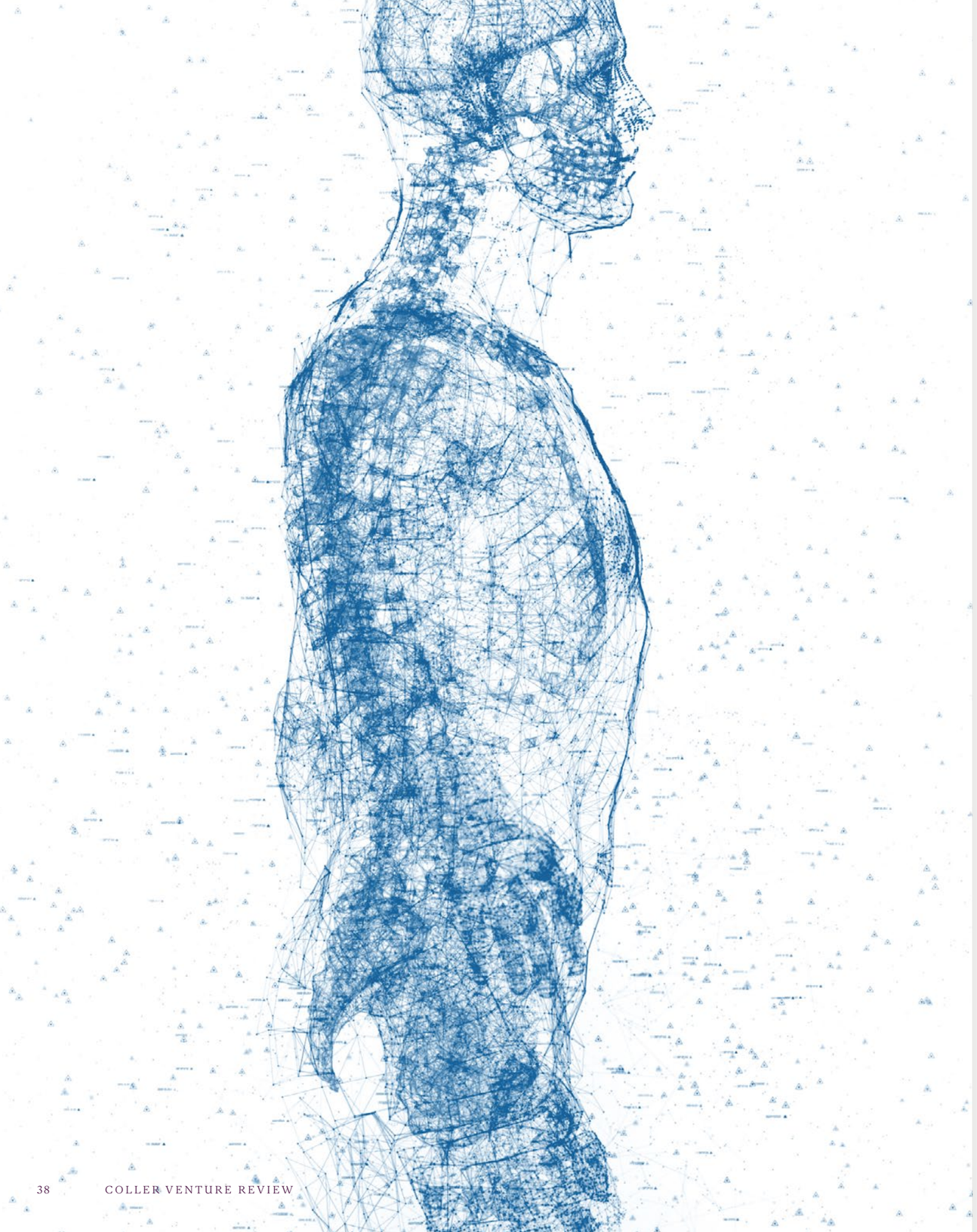
86%

provider satisfaction, and

93%

patient satisfaction

> **"The accuracy Diagnostic Robotics achieved in the emergency department is impressive. The company's most important innovation, however, is using this system to drive patient navigation before they make it to the hospital in the first place – this is how AI can truly reduce physician burden and cost of care"**



> Eventually you need to say this is the amount of money that we can allocate and the associated number of people we can save. I am addressing these and related questions because I am focused on making a big impact. I live on the boundary between economics and health care because they are completely intertwined

These are nice results, they are very promising. And I think with time it's just going to be the standard.

CVR —
In addition to the current patient data you are collecting, you are also addressing how to predict the unpredictable in healthcare, correct?

Radinsky —
In healthcare, we are trying to find the sub population, and their associated characteristics, that reduces the potential pool of applicable knowledge as much as possible. There are already a lot of algorithms based on this. I think the question is about can you predict the unpredictable. There's so much chaos and entropy

In my opinion, eventually it's all about the data. If you have the data, it will eventually have some correlation with what you're trying to predict. For many things that we consider chaos, I suggest that it is just because we do not understand the mechanism relative to how to divide the data. It doesn't make sense that things just randomly happen. If they appear to randomly happen, there's still a mechanism that makes them happen. A series of events, a biological system that we just do not understand.

The question eventually is how much data is needed in order to predict different things. Here there are no answers. I am an empirical scientist rather than theoretical. So, we are measuring the amount of needed data empirically. I'm testing whether my data has something to do with physical theories. Sometimes we will fail. Sometimes we succeed.

CVR —
What are some of the ethical issues you are confronting?

Radinsky —
Well for one thing, we're predicting who is going to deteriorate. If there are 20,000 people who are deteriorating, who are you going to treat if you don't have time for all of them and don't have the personnel to call all of them much less treat them? Eventually you need to say this is the amount of money that we can allocate and the associated number of people we can save.

We are already applying this logic in Israel when we're identifying different Pharma drugs that are going to be subsidized by the government. We are asking ourselves how many people we can save, and who is the right person to save given a certain amount of money. These are very difficult questions. I am addressing these and related questions because I am focused on making a big impact. I live on the boundary between economics and health care because they are completely intertwined.

CVR —
How do we develop more unbiased data?

Radinsky —
We have to ensure that the algorithms are not based on biased data. Until 1993, you may know that women were almost not included in clinical trials. So, everything that we know today and at least until 1993 are discoveries made for white men, from the age of 35 to 45.

Today, one of my graduate students, as an example, is unbiasing the data related to identifying heart attacks in women. It is hard but important, because women experience upper abdominal pain and not chest pain with heart attacks. My student is finding that she can predict a lot of clinical tasks – readmission, length of stay, clinical outcomes – in a much better way, giving the unbiasing of data.

Having said that, I would just make two points – first, the ethical issues

regarding bias in the data apply not just to women. And second, we must remember that there are many good reasons an algorithm is biased. It's not necessarily bad, we just have to be conscious. Super intuitively, we're trying to give bigger weight to studies which were done correctly.

CVR —

Based on some of your research, what are your views on the so called "data-monopolists"?

Radinsky —

I think in general, we need to understand who owns the data. One the one hand, if everybody owns the data and does not share, we cannot find the next terrorist, we cannot find the drug to repurpose. I believe the greater good lies with our being able to connect all the data globally and in a way where everybody can run algorithms and identify new insights, I think that would make an impact.

However, given all of this, we still need to understand about how people can maintain their privacy.

CVR —

How about best practices in terms of sharing the data generated by predictive analytics?

> "I believe that the person who is going to live 200 years has already been born. In the boundaries and overlapping spaces between chemistry AI, and healthcare, I believe we can begin to see how everything interconnects and to understand how to extend people's lives in a manner where they're happy"

Radinsky —

The entire thing hangs around exploitability in AI, which is a very hot topic right now. As you know, what we've been trying to do is not only predict what's going to happen but also be able to explain it in a reasonable way for the person who's making the decision. Otherwise, there is no trust.

So, for example, in healthcare, when I'm predicting which patients are deteriorating, I can point out that they have actually gone to the emergency room for three different things that only appeared unconnected. I can use research papers and articles to suggest an undiagnosed overall health problem. I think a lot about offering supportive evidence, giving more explanations. We are getting the person who's actually making the decisions to what I call the "aha moment." AI then just becomes a way to encourage us to be innovative and look differently at the same and different data. It's part of the collaboration I was speaking about earlier, between new ways of thinking about the relationship between people and machines.

One of our studies, for example, shows that if you tell an individual physician that all the other physicians would never have done a particular thing, it changes their decision making. The message "Maybe you should rethink what you're doing" is quite powerful when backed by empirical data. You can really change the way people think and make decisions – that's the whole idea on a certain level – by giving them more input. You can actually train them to think in different ways.

CVR —

One of our areas of emphasis here at the Coller Institute of Venture is the merging of theory and practice. Can you share with us how your academic and private sector lives inform one another?

Radinsky —

At Diagnostic Robotics, I am doing something very concrete and proactively predicting which patients are deteriorating and how to stop/reduce this directly and through a triage system. In my academic life, I am working on the boundaries between chemistry and AI, and trying to learn how we can improve molecules. This includes everything from green energy to drug development. I have a lot of collaborations with chemists, which is extremely exciting. For example, I have a collaboration with Professor Avi Schroeder who is creating the molecules our AI system is generating, so we're generating them there on the screen, and eventually he has an entire robotic system generating those molecules and testing them for cancer, for example.

CVR —

I want to begin to end our conversation by asking your insights about corporate innovation. What insights and best practice can you share?

Radinsky —

This is a hard question so let's talk about building an innovation inside of eBay, which I know. I believe that sometimes you have to start small, show the value in small things, and eventually start replacing part by part. This has usually been shown to be extremely valuable – even for example, when we apply this logic to just focusing on small populations. It's not the fastest way for innovation but it allows for testing the innovation in a measured way.

CVR —

You have done so much already in your career. What's next?

Radinsky —

Eventually, my end goal is longevity. In the boundaries and overlapping spaces between chemistry AI, and healthcare, I believe we can begin to see how everything interconnects and to understand how to extend people's lives in a manner where they're happy for more and more years. I believe that the person who is going to live 200 years has already been born. I don't see that the science part behind it is so far away that we cannot create it. I think we've done so much, and that really everybody is doing something a little bit incremental. Connecting all of those pieces is and will continue to create a wave of innovation forward. ■

About

Dr. Kira Radinsky is a pioneer in the field of medical data mining and the Co-Founder and CEO of Diagnostic Robotics. Kadinsky previously co-founded SalesPredict, which was acquired by eBay in 2016, and where she served as eBay Director of Data Science and Chief Scientist. Radinsky first gained international recognition for her work at Microsoft Research, where she developed predictive algorithms.

In 2013, Radinsky was named to the MIT Technology Review's 35 Young Innovators Under 35. She was subsequently elected to the Forbes 30 under 30 Rising Stars in Enterprise Technology, and selected as "Woman of the Year" by Globes. Radinsky serves as visiting professor at the Technion. She has co-authored over 10 patents and generated more than 40 peer-reviewed articles.

Radinsky serves as a board member for the Israel Securities Authority, the Maccabi Research Institute, and the Technology Board of HSBC.

Saul Orbach is a highly accomplished Venture Capitalist, Serial Entrepreneur, and Executive, with 33 years of extensive experience building and exiting startup and growth companies. Saul is the founder of the Elul Fund, a venture fund that invests in global market opportunities. Saul is a Senior Adjunct Lecturer at the Sofaer Global MBA at Tel Aviv University.

Virtual Roundtable
New Evidence on Valuations

Overview

Our *Virtual Roundtable* brings together global leaders and thinkers from law firms, funds, and industry to address an area of significant change in venture, innovation, and entrepreneurship.

In this discussion, we bring together Prof. Gary Dushnitsky from the London Business School along with Tehila Levi-Lati, a partner based in Hong Kong with Sullivan and Worcester and Marc Chaikin, Founder of Chaikin Analytics. As they consider pending regulations, they also bring us an applied perspective to the on-the-ground implications for existing and emerging ventures seeking to sell, invest, raise capital, and/or diversify across economic borders.

The Venture Capital Ecosystem – Regulatory Change, Scale-Ups, and Start-Ups

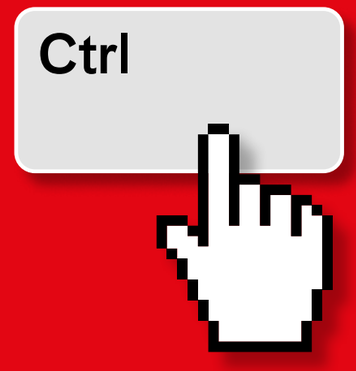
Prof. Gary Dushnitsky
Associate Professor of Strategy and Entrepreneurship, London Business School

Tehila Levi-Lati
Partner, Sullivan & Worcester

Marc Chaikin
Founder, Chaikin Analytics

"In recent research, Prof. Dushnitsky and co-author have discussed issues related to regulatory change on technology corporations and start-ups in the context of the U.S. (https://nvca.org/dont-hurt-startups-when-reining-in-big-tech-four-lessons-from-a-new-academic-report/). In this Roundtable led by our managing editor Leslie Broudo, Dushnitsky and guests extend the discussion. Their work underscores the important role of M&A to the keeping a vibrant ecosystem of start-ups and VC investors. It further discusses the less-explored implications of impeding M&A activity on the venture capital ecosystem; including impact on deals, valuations as well as inclusion and diversity."

The global trend to regulate large technology and internet companies has been distinguished globally. While in the US the aim is purportedly to introduce legislation to appear to level the playing field, the stated aim in China, by contrast, is to increase what is referred to as the "Common Prosperity." In this article, Prof. Gary Dushnitsky of the London Business School has a conversation with two expert observers: Tehila Levi-Lati, Hong Kong -based Partner in law firm Sullivan and Worcester, where she heads the firm's China desk; and Marc Chaikin, Founder of quantitative platform Chaikin Analytics, which was acquired in 2021 by MarketWise and recently went public via a SPAC (MKTW).



Dushnitsky —
How would you describe the changing nature of tech legislation in your respective markets – China and the U.S.?

Levi-Lati —
The technology and internet sectors grew quickly in China in the last decade, however, in the past year, China issued new regulations, policies and made some changes regarding the enforcement which influenced this sector. The main legislation included, interestingly enough, the Anti-Monopoly Law, the Data Privacy Rules, and the regulation draft for governing Chinese companies listing abroad.

The bottom line is that the recent legislation provides China with more control and supervision over its large internet and technology sector, in what is generally seen as an effort to curb the power of this sector in China.

Let me be more specific: In 2021, anti-monopoly law enforcement for large Internet and technology companies in China was unprecedented. In 2021, China's antitrust regulator punished and fined a number of domestic technology companies – mainly in the internet field – for misconduct committed years ago. Then in October 2021, the amended Anti-Monopoly law of China (Draft) was published. According to the draft, operators shall not abuse data and algorithms, technology, capital advantages and platform rules to exclude and restrict competition.

China's New Data Security and Personal Information Protection Laws, which also came into force in the fall of 2021, provided a framework of largely high-level data privacy obligations. The laws classify data collected and stored in China based on the potential impact on the national security of China; they also regulate the data transfer. The new rules are a source of concern for Chinese companies listed in the US; an example is the case of "Didi," whereby Chinese regulators have asked Didi to delist from its U.S. Exchange, due to concerns about leakage of sensitive data.

Finally, relative to the tightening of rules governing Chinese companies seeking to list abroad, China In December 2021 issued a regulation draft which supervises offshore listings of Chinese companies with the so-called VIE structure, which refers to offshore companies that control the given Chinese company. The structure is widely used by most Chinese large technology companies listing abroad. The aim of the legislation is to improve the supervision over these companies.

Chaikin —
There has recently been an explosion of venture capital money chasing startups and early-stage ventures in the U.S. which has changed the venture capital landscape, including the acquisition of startups. While there is talk of legislative and regulatory change to supposedly affect the power of "big tech," legislative and regulatory change in the U.S. has been talked about for years. These issues have gained some traction but mainly in the press and the progressive blogosphere – not in the Congress.

As long as America remains a capitalist democracy entrepreneurship will be rewarded unimpeded by mandated restraints. Pro-business interests have a history of stopping legislative changes dead in their tracks.

Dushnitsky —
In this context, how would you further describe the trajectory of technology development and funding in the U.S., and by contrast in China?

> "Among the outcomes may be that the Chinese technology and internet companies will turn more inward rather than globally, and/or will increase their businesses in countries considered "friendly to China."

Chaikin —
As I said, I doubt that there will be any serious legislative changes regarding M&A. But I do thank that the broader issue in the U.S. is about three or four companies controlling personal data, social media interactions and transactional data.

In this regard the harsh media and legislative spotlight on Meta Platforms, formerly Facebook, Alphabet, and to a lesser degree Apple and Microsoft has actually led not to legislation but to an embracing of new technologies like Blockchain and the Metaverse.

Levi-Lati —
Among the lessons I think we learned from the West is that mega companies can in some ways usurp a particular country's influence. In China, the government is trying to be ahead of the curve and be involved in ways that might more easily control the high-tech ecosystem in order, one could say, to make for a more balanced and well-equilibrated tech ecosystem.

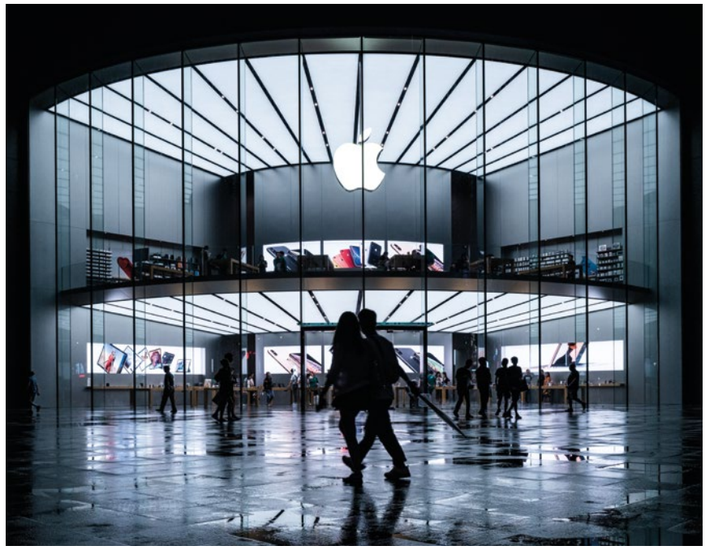
It is also important to recognize that, as part of legislation addressing the seeming growing power of the technology companies, the U.S. is also trying to restrict the activities of large Chinese technology and internet companies abroad. An element of the restrictions has been adding more Chinese companies to the U.S. blacklist. This restricts those companies from receiving US investment, and forces them to delist from the U.S. stock exchange. Among the outcomes may be that the Chinese technology and internet companies will turn more inward rather than globally, and/or will increase their businesses in countries considered "friendly to China."

Dushnitsky —
What do you think are the root causes of this type of the changes we are seeing?

Levi-Lati —
One could say that the Chinese government has targeted the technology and internet sector as the sector which has accumulated vast wealth in a short time, in part by operating on the gray area of the law. The wealth gap is being addressed and momentum supported with the stated goal of increasing "common prosperity." At the same time, of China is turning more inward and seeking to establish more equilibrium and control over the technology and internet sector. The language speaks to the people; the underlying policy is part of a long-term move to gain greater control.

Chaikin —
At a root cause level, I tend to believe that when it comes to investment trends as affected by regulation in the U.S., there is a growing sense that in the areas where the Chinese have made the biggest strides – such as in solar panels and artificial intelligence – we must become relatively self-sufficient…thus the Biden initiatives in solar and in new rare earth companies like MP Materials.

> "At a root cause level, I tend to believe that when it comes to investment trends … there is a growing sense that in the areas where the Chinese have made the biggest strides – such as in solar panels and artificial intelligence – we must become relatively self-sufficient…thus the Biden initiatives in solar and in new rare earth companies like MP Materials



> Under the core concept of promoting common prosperity...capital and technology giants will reduce their acquisitions in start-ups, which may affect early-stage start-ups valuation

More particularly in the semiconductor space, the recent supply chain shortages have spurred "made in America" initiatives so that potential political upheaval literally anywhere won't hurt American manufacturing capabilities.

Dushnitsky —
How are companies in the technology sector responding, and are they rethinking some aspects of their strategy?

Levi-Lati —
As we see more government control over the tech and internet sector in China, we also see more cooperation with state-owned companies. We also see that giant technology and internet companies will sell part of shares to state-owned companies.

We will also see more giant technology and internet companies contributing back to society. The technology giants Alibaba and Tencent, which in recent years has been on global rise, have already committed to promote common prosperity initiatives in China and contributed financially to this cause.

Chaikin —
There has been a wave of smaller technology acquisitions by companies like Alphabet, Apple, Amazon and Meta Platforms over the past five years. But unless there is significant legislation, which I deem to be unlikely, these acquisitions will continue.

It is also well to realize that in many cases the big four tech giants are buying technology and people not revenue and profits…it's been a seller's market in many regards and that's likely to continue.

Dushnitsky —
What do you imagine will be the likely outcome on start-up valuations and M&A activity in the public sector, given the increased regulatory pressure you've described?

Chaikin —
There has recently been an explosion of venture capital money chasing startups and early-stage ventures in the U.S. which has changed the venture capital landscape. The recent SPAC boom in the U.S. has created a new pool of buyers and thus liquidity at an earlier stage for many mid to late-stage startups.

With so much money chasing deals, valuations have actually been boosted not squashed…. and capital raises are no longer dependent on IPOs. There has been ample investment capital at attractive valuations so companies have been staying private longer… although that may change if interest rates in the U.S. continue to rise and price to earnings multiples for publicly traded technology companies compress. So I think we need to look at monetary policy, not even or just legislation which may not materialize.

Levi-Lati —
Under the core concept of promoting common prosperity, attention is clearly being paid to efforts that are antimonopoly and to prevent what might seem like the disorderly expansion of capital. Therefore, capital and technology giants will reduce their acquisitions in start-ups, which may affect early-stage start-ups valuation.

> [In the U.S.] I think we need to look at monetary policy, not even or just legislation or regulation which may not ultimately materialize

However, certain areas will continue to have high valuation. This mainly involves areas related to high-quality development of China's economy and strategic emerging industries, such as new generation information technology, new energy, new materials, bio med and pharma etc. This will also include key core technology breakthroughs likely to strengthen the national strategic scientific and technological future, including new generation artificial intelligence, quantum information, integrated circuit, aerospace etc...

In addition, the criteria of evaluation will change from the traditional PE to the new and evolving concept under Common Prosperity referred to as ESG (Environment, Society and Governance). When selecting investment targets, the valuation shall likely include the consideration of the long-term environmental, social and governance aspects.

Dushnitsky —
What is the likely outcome of the changes and the downstream reactions, say 3–5 years hence?

Chaikin —
In the U.S. I think it's going to be business as usual with the caveat the typical boom/bust cycles in the technology space will always be with us. At some point in the current bull market in the U.S. either because of a drying up of liquidity or an economic recession, or both, capital will dry up and the IPO/SPAC window will close as it always has.

While we are likely 12–24 months from that scenario in is more or less inevitable…that's the biggest worry for startups, in my view, not regulatory and legislative changes.

Levi-Lati —
Giant technology and internet companies may have challenging times in the coming years in China. Those companies that will cooperate with the government and comply with the new legislations and reforms will be stable and prosper under Government instruction, which may lead to more balanced and common high-tech ecosystem.

On the other hand, frequent legislative changes may lead to uncertainty and may affect the global growth and presence of Chinese technology and internet companies worldwide. ■

About

Professor Gary Dushnitsky is an Associate Professor of Strategy & Entrepreneurship at the London Business School. He serves as a Senior Fellow at The Mack Institute for Innovation Management at the Wharton School, University of Pennsylvania.

Marc Chaikin is the founder of Bomar Securities LP, which was sold to Instinet Corp. in 1992. He then went on to become Senior Vice President and Director at Instinet when owned by Reuters.com. Chaikin Analytics was acquired in 2021 by MarketWise and recently went public via a SPAC (MKTW).

Tehila Levi-Lati is a partner at Sullivan & Worcester and heads the firm's China desk, managing the long-term cooperation with leading Chinese law firms. She routinely provides legal services to companies in the high-tech, technology, and life sciences sectors. Key highlights include her representation of: HAM-LET (Israel-Canada) Ltd. in its acquisition of Jiangsu Xinghe Valve Ltd. at a company value of USD18.4 million; and Telit Wireless Solutions Hong Kong Ltd. in the M&A transaction with Shanghai Stollmann Communication Technology Co., Ltd.

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Trends in Venture
Parables of Entrepreneurial Growth

Overview

Our *Trends in Venture* section addresses change and challenges in new venture creation. This issue considers opportunities for new entrants among individual entrepreneurs and across sectors.

Yair Friedman addresses change from the gig to the sharing economy, which he describes a newer approach, which does not necessarily see one side as a "winner" and the other as a "loser." Moran Lazar and Advisory Board member Ella Miron-Spektor summarize research suggesting that teams which form based on assimilating members with both close relations and diverse knowledge have the highest potential to learn and succeed as they encounter early milestones. Finally, writing as the former head of an innovation education, Bobbi Kurshan suggests the ways in which, to achieve real system change in education ecosystems, we need to propel a shift in mindset from the individual to the collective.

Together, these contributors combine theory and practice to help us consider what is changing in establishing and evaluating entrepreneurial success. Looking forward, future discussions in the *Trends in Venture* section will continue to compare and contrast thematic change, including the practical implications of specific innovations at a macro and micro level.

The Gig Economy is Dead – Long Live the Sharing Economy!

Dr. Yair Friedman
Co-CEO & CINO, WEconomize
Adjunct Lecturer, Coller School of Management

In March of 2021, the UK Supreme Court unanimously rejected Uber's appeal after countless hearings and statements, ruling that Uber drivers working in the UK are definitely "workers" and entitled to a minimum wage, holiday pay and cannot be fired or harmed if they complain against the Ride-hailing giant. This is a serious and significant decision, not only for Uber drivers, but for anyone involved in the sharing economy.

The term "Sharing Economy" is increasingly used in recent years, mainly with reference to platforms and marketplaces that derive most of their value from the various users and communities that utilize them. In its digital form, it is a relatively new phenomenon that has already altered significant industries (including mobility, tourism and commerce, to name only a few) and introduced numerous tech giants and unicorns including Uber, Lyft, Facebook, Airbnb, LinkedIn and YouTube. Its competitive advantage is mostly derived by the ability to use the crowds' existing and underutilized assets and capabilities (instead of utilizing its own) and the flexibility that today's connectivity allows. As such, until today, users that created value and supplied services on a given platform weren't considered "employees" as they weren't actually interlinked or committed to the platform (hence the term "gig-workers"). On the other hand, they were value creators for the platform, were the main source of income (platform gains are a function of user value creation) and thus played a significant role (and cannot be so simply considered as by-standing "freelancers"). ➲

> "The term "Sharing Economy" is increasingly used in recent years, mainly with reference to platforms and marketplaces that derive most of their value from the various users and communities that utilize them"

Will sharing economy companies have to adapt their business models now that different courts have decided that their "workers" should be classified as employees and not as independent contractors or freelancers? As mentioned, the UK was the last to determine that Uber drivers are entitled to a minimum wage and other benefits, but the EU also considers expanding the rights of platforms' value producers. In the past year, courts in France, Spain, the Netherlands, and California have come to the same conclusion: workers in a sharing economy are not given enough independence to classify them as freelancers. It is tempting to see the UK Supreme Court decision against Uber as the end of a sustainable sharing economy.

It seems, according to the decision, that platforms will be forced to give their employees more control (a problematic decision as it may be difficult in such a way to provide an efficient and orderly service) or employment rights such as minimum wage and benefits, which will probably lead to higher prices. Employers will also have to pay more taxes. On the other hand, it is not at all clear that consumer demand for platform services will continue to increase if these do not continue to be a cheap alternative.

But it is not certain that this is where the story ends. When your business model proves to be illegal, do you change the model, or do you change the law? Uber and the rest of the platforms (not just ride-hailing, every for-profit peer-to-peer platform is in the same position…) are now aiming to change the law. If they succeed, they will change the future of employment in ways that affect us all.

On the one hand, UK courts have made a clear decision that Uber drivers

> **When your business model proves to be illegal, do you change the model, or do you change the law?**

> **Will sharing economy companies have to adapt their business models now that different courts have decided that their "workers" should be classified as employees and not as independent contractors or freelancers?**

are employees and must receive the benefits that come with that status. But this is not to say that all freelancers are now considered employees; the decision only applies to the case of companies that have significant control over their employees (as Uber imposes on its drivers). Still, this is an important legal milestone as the world increasingly adopts the freelance model and sharing economy. With the economic downturn that accompanied the COVID crisis there are increasingly more people who seek part-time jobs as freelancers but on the other hand need more employment protection than ever.

On the other hand, instead of adapting their business models to the new legal situation, platforms may try to change the law to fit their business models. They have already been successful in California, where they have spent about $200 million to persuade voters to support Proposition 22, a proposal that allows platforms to continue and treat their value producers as freelancers with some upgraded benefits and protections. Countless lobbyists on their behalf are now pushing Proposition 22 as a national model in the U.S. At the same time, lobbyists are trying to close deals with unions that will provide some representation to service providers on platforms while maintaining their status as independent contractors (freelancers).

Platforms are trying a similar approach in Europe, so far without success. A few months ago, Uber released a letter of intent proposing to "work hand in hand" with EU policymakers to create "new industry standards". At the same time, Uber is making efforts to push the UK government to bring in new legislation that will redefine the status of temporary workers. While pushing for new legislation, platforms are seeking new ways to circumvent the new laws, either by adopting flexible interpretations (Uber, for example, initially claimed that the decision only affects a small group of drivers using the app in 2016) or by introducing strategies to circumvent labor laws (for instance, in Germany and Poland Uber sub-contracted drivers through an opaque system of transport intermediaries).

The situation is even worse in "graying" economies such as Singapore. Older workers have more medical needs. Unlike Israel, which is both young and has a high-level basic health insurance, in such countries freelancers and self-employed may not have the financial resources to obtain insurance or medical coverage if they are unable to work due to health reasons. This is a growing problem, and it seems that governments may now need to promote an insurance system or provide safety nets to make the new model sustainable.

Freelancers in the Labor Market

There is no doubt that the labor market needs updating and upgrading in the 21st century. The status of self-employed service providers, temporary workers and freelancers should be regulated so that, for example, they can benefit from flexible and all-encompassing pension funds, provident funds and other benefits, that are not restricted to any specific employer but are open to any employer or platform with which they decide to work. At the same time, the lack of flexibility and the inability to secure an employment horizon need urgent regulatory attention.

In contrast to these two approaches – on the one hand – the perception of value producers as employees, and on the other – viewing them simply as gig-workers or freelancers (according to those who refer to a "gig economy" that only has temporary workers, hired for temporary and short-term work) – there is also a newer approach, which does not necessarily see one side as a "winner" and the other as a "loser". More and more companies are seeking more decentralized systems, sometimes using blockchain technology and backed by a socio-economic concept that allows the value producers to be more involved in management, development and decision-making – and get rewarded accordingly. For example, the Israeli ride-hailing startup Juno (which was sold to Gett for $200M) promised to distribute shares and / or profits to its drivers and in addition charged significantly lower fees than competitors, in an attempt to align drivers' incentives with those of the platform.

The number of service providers and freelancers is expected to increase significantly in the upcoming years. What will employment look like in this situation? On the one hand, countless services are expected to be cheaper and more efficient. Flexibility will allow a significant portion of the middle class to enjoy comfort levels that are currently only available to affluent populations. But if at the same time we hurt government revenues from taxes and create sub-workers without rights, the sharing economy will not be sustainable. If companies use the "Uber-ian model" to compete only by curbing service-providers while eliminating their benefits, we will not be able to sustain it as a society in the long run.

On the other hand, we will probably not go back to the days when employers provided full employment security and automatic wage increases. Rapid changes and disruptions in employment trends are also expected in the coming years, in parallel to disruption that is expected by increased automation and technological adoption by companies that is bound to transform tasks, jobs and required skills.

So what will change? It seems that it may be possible to define employment contracts according to the degree to which there is dependence on a specific employer. The future of work may very well entail a number of degrees of employer-worker interdependence, and it seems that employers will also need to be responsible for human resource development, otherwise it will not be a sustainable model. Sustainable human resource development will necessarily include learning, skills acquisition, mobility at work and personal career development. Neither employees nor freelancers will join platforms if they will not see a future and opportunities to develop in one way or another.

There is more than just the Gig Economy

While most platforms indeed focus on shared utilization of assets (such as apartments, cars and various utilities) and capabilities (knowledge, skills etc.) to produce value, there are also non-profit schemes, social platforms and various for-profit marketplaces and platforms that utilize the overarching concepts behind the sharing economy but refrain from depending on one-time "Gig" workers and instead focus on communities, their members and their stable interactions.

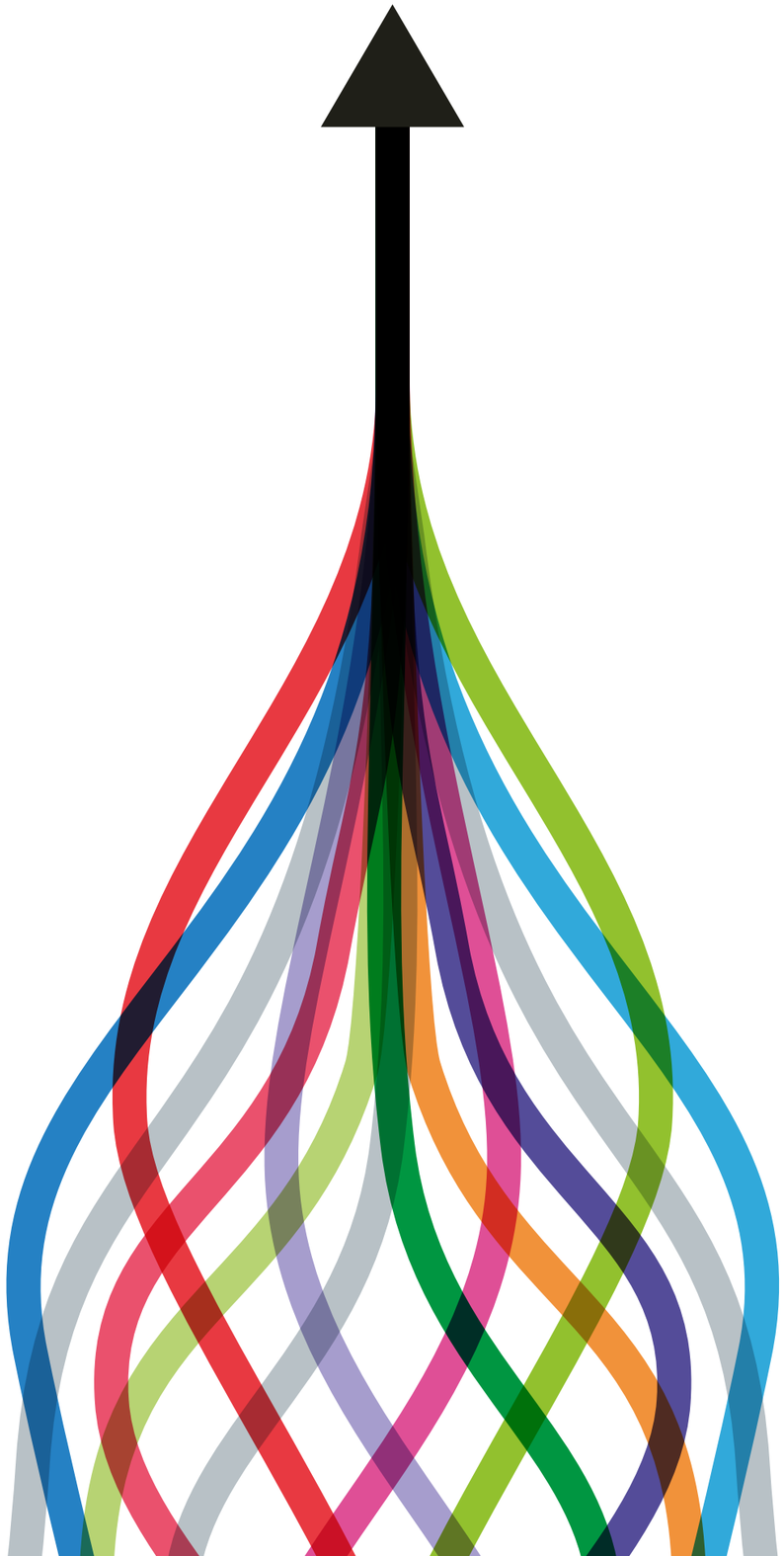
This allows companies, organizations and municipalities to utilize the sharing economy to produce unique and sustainable value, simply by increasing efficiencies internally (within the various organizations and communities). By focusing on long-term interactions between platform members rather than on one-time "gig" service providers, platforms not only produce value and profit financially for themselves but also strengthen their user communities (by increasing efficiencies but also by strengthening the relationships among the various members and stakeholders).

> Viewing those who provide most of the value to the platforms as "one-time users", "Gig workers", "freelancers" and "independent contractors" results in a short-sighted strategy that includes a degrading (not to say abusive) business. Eventually, it caused preventive regulation, legislation and rulings. In contrast, understanding that value creators are, in fact, a community that should be nurtured, cherished and compensated – is bound to promote loyalty, contribution and ultimately attract even more value creators to join. ■

"The future of work may very well entail a number of degrees of employer-worker interdependence, and it seems that employers will also need to be responsible for human resource development, otherwise it will not be a sustainable model"

About

Dr. Yair Friedman is a veteran Strategic and Innovation Consultant. As co-founder of WEconomize, a one-stop-shop sharing economy hub, he helps leading start-ups, companies, NGOs and municipalities solve critical challenges using Behavioral Economics, Sharing Economy, Frugal Innovation and Tokenization. Prior to establishing WEconomize, he worked, co-founded and led numerous consulting companies and Private Equity / Investment bodies. Yair holds a doctorate in Strategic Decision Making and Innovation from the Recanati Graduate School of Business Administration. His research focuses on Behavioral Strategy.



Mixing Business and Pleasure – Lessons for Optimizing Entrepreneurial Team Success

Moran Lazar
Behavioral Science and Management, Technion – Israel Institute of Technology

Ella Miron-Spektor
Associate Professor of Organizational Behavior, INSEAD

Successfully navigating through critical uncertainties during the incipient stages requires new ventures to develop learning systems. Clearly, building the right team is a key in this process. In a new study, together with Gilad Chen, Brent Goldfarb, Miriam Erez and Rajshree Agarwal, we draw on prior research to suggest that a dual formation strategy in building the team may be critical.

> **“[Success]...depends on three things: the general qualities of the founders, their specific expertise in this domain, and the relationship between them”**

An Opportunity to Improve New Venture Success

We draw on prior research to suggest that a dual formation strategy in building the team may be critical. This suggests a combination of two underlying strategies: First, an interpersonal-attraction strategy, meaning relationships with similar others in a close network; and second, a resource-seeking strategy, meaning instrumental focus on complementary skills.

While a dual formation strategy may be challenging to execute, such a strategy facilitates smooth coordination among founders specializing in complementary tasks, or so-called transactive memory systems. Transactive memory systems refer specifically to a shared system for encoding, storing, and retrieving information, which includes the knowledge of ‘who knows and does what on the team’ (Ren & Argote, 2011; Wegner, 1987). We posit that the emergence of such systems to navigate uncertainties experienced by new ventures is a key reason why teams using dual formation strategies from the onset achieve superior performance.

Findings from two field observational studies and a field intervention study

> We draw on prior research to suggest that a dual formation strategy in building the team may be critical – an interpersonal-attraction strategy, meaning relationships with similar others in a close network; and second, a resource-seeking strategy, meaning instrumental focus on complementary skills

support our theory. As described fully in our upcoming paper, teams formed based on a dual strategy raised greater seed funding on Kickstarter, were more successful in a prestigious entrepreneurial competition including by more effectively accessing mentorship, and gained more profits from selling their initial products.

We further incorporate insights from team-learning theory into entrepreneurial team formation research to posit that the initial formation strategy shapes team learning repertoires, and that these, in turn, impact early entrepreneurial success.

The Importance of Forming New Venture Teams for Success

Scholars increasingly acknowledge the importance of the initial phase of team formation, in which founders select partners and build their teams (Lazar et al., 2020). This decision is particularly important because the founding team is the unit of individuals who pursue the new business idea, are involved in its subsequent management, and share ownership over the business from its initial to later stages (Bird, 1989). The initial partners define their roles in the new venture and establish communication systems that determine subsequent ability to learn, adapt, and navigate within a dynamic entrepreneurial environment (Cohen, 2013).

In this highly uncertain phase, new venture teams invest significant efforts in achieving initial milestones – each critical for their early success and survival – such as raising initial funds (Jiang, Yin, & Liu, 2019), winning entrepreneurial competitions and entering prestigious accelerator programs (Cohen & Hochberg, 2014), and cumulating initial profits from sales of their product (Camuffo et al., 2020; Shah et al., 2019). These milestones are not only critical for providing new ventures access to scarce resources during their nascent stage – they also serve as signals of legitimacy to facilitate scaling up for growth (Cohen et al., 2019).

> Transactive memory systems include both a structural component reflecting the links between individual memories which create a collective knowledge network, and transactive processes to enable encoding, storing, and retrieving of team members' memories

To achieve these milestones, recent literature review notes that most studies identified one formation strategy or the other – interpersonal-attraction or resource-seeking – implicitly assuming that founders utilize a singular strategy without articulating reasons why (Lazar et al., 2020). We build on resource scarcity and bounded rationality to develop the theoretical rationale for why founders may engage in a singular strategy. We begin by noting that team formation faces challenges including the fact that it occurs within a highly uncertain setting that is fraught with resource scarcity even as resource needs and stakes are high (Wasserman, 2012).

Pursuing the dual formation strategy exacerbates the challenges because of inherent differences in network search and use of criteria in each component strategy. First, potential cofounders who embody strong pre-existing relationships and also possess requisite complementary resources may be rare, particularly if searching in a homogenous and/or limited network. Hence, a dual strategy is not necessarily feasible for all entrepreneurs if individuals with the best complementary skills are not present in their close network or they do not have access to such potential cofounders.

Second, founders may search for partners in both their immediate and distributed networks simultaneously; yet, when resources are limited, allocating resources toward achieving one strategy reduces available resources for pursuing the other strategy (Kanfer & Ackerman, 1989). Aspiring founders may simply not have the needed cognitive attention, time, and funding to search for and identify cofounders with attention to both interpersonal attraction and resource seeking. In these situations, inherent differences in goals and criteria involved in pursuing both strategies create competing demands.

Despite the above challenges, the use of dual formation strategies may be advantageous because it is more likely to ensure both interpersonal and complementary fit among founding members from the onset (Lazar et al., 2020). For example, Shah et al. (2019) documented potential benefits for employee spinouts (new ventures where founding teams draw from the established firms in the same industry) in the disk drive industry whose cofounders aligned on both workplace values and knowledge complementarities.

By contrast, compromise solutions – e.g., when new ventures switch strategies and eventually optimize their team composition – is a risky path that may impair success. Starting with one strategy alone may lead to group faultlines and deficiencies (Vohora et al., 2004). For example, when founding teams were initially formed using an interpersonal attraction strategy, they failed when experiencing crisis during critical milestones (Clarysse & Moray, 2004; Vohora et al., 2004).

Switching strategies additionally entails costs associated with redefining structural features (e.g., roles), work practices and processes, and socialization of new members into the shared system (Weber & Camerer, 2003), all of which have been documented to undermine performance within the teams literature (Rao & Argote, 2005). Thus, cofounder selection based on both demands is rare, difficult, and costly to achieve, and yet it is likely to be advantageous relative to relying solely on interpersonal attraction or complementary skills.

If instead founders consider both the instrumental and relational aspects when forming their team, the team will have a significant advantage from the onset. Related research outside of entrepreneurial contexts supports this premise. For example, scientific teams where members had prior collaborative relationships were better able to harness the benefits of their intellectual diversity, leading to higher acceptance rates of grant

applications (Snellman, Dahlander, Askin, & Solal, 2020). This resonates with findings that multiplex ties in the workplace (i.e., capturing both mutual relations and unique expertise) can benefit performance (Methot, Lepine, Podsakoff, & Christian, 2016).

More broadly, team studies suggest that engaging in seemingly opposing strategies improves performance (Gebert, Boerner, & Kearney, 2010; Miron-Spektor & Paletz, 2020). For instance, teams that developed specialized roles and shared language from the initial work together outperformed teams that advanced one of these elements alone (Reagans, Miron-Spektor, & Argote, 2016). Building on these insights in the teams literature and extending work on entrepreneurial team formation (Lazar et al., 2020), we argue that combining both strategies early on will enhance entrepreneurial success relative to relying on one strategy alone. The dual strategy provides value, is rare and difficult to imitate (if not adopted at the onset), and thus a source of early competitive advantage.

Developing Transactive Memory Systems

While the above rationale suggests that the initial formation strategy is crucial to early performance, it does not fully develop the micro-mechanisms at play. Here, entrepreneurship scholars have recognized that new ventures have to learn and adapt to meet stakeholder needs for entrepreneurial success (Ott et al., 2017; Pillai et al., 2020). However, the literature is silent on how ventures helmed by teams (rather than solo founders) create learning systems to orchestrate their performance under conditions of resource scarcity and bounded rationality. We address this by explicitly linking the initial formation strategies to the development of team learning systems.

Within the team-learning literature, scholars have highlighted transactive memory systems as a key driver for team learning. A specific type of team mental models, transactive memory systems include both a structural component reflecting the links between individual memories which create a collective knowledge network, and transactive processes to enable encoding, storing, and retrieving of team members' memories (Wegner, Giuliano, & Hertel, 1985).

These systems enable members to recognize their different expertise, accurately search for and locate required knowledge, and solve problems efficiently by matching tasks to members with relevant expertise (Moreland & Myaskovsky, 2000). They also permit members to develop deeper expertise in their specified areas so that as a collective, the team gains a larger pool of information for performing their various tasks (Lewis, 2003).

> **"Interpersonal attraction allows team members to share unique information, while resource seeking leverages expertise of the various team members for improved accuracy. Thus, interpersonal attraction and resource seeking become mutually reinforcing, leading to a virtuous spiral in initial experiences ultimately linked to opportunities for early entrepreneurial success"**

Existing research on transactive memory systems notes that it emerges through the initial shared experience of working together as a team. Here, scholars have documented that initial experience allows members to determine the fit of expertise and ascertain how to work as a collective unit (Reagans et al., 2016). When trained together from initial stages, teams can learn from observing each other and develop communication channels to share different perspectives and knowledge. These allow them to specialize, trust each other's expertise, and coordinate their activities effectively (Liang, Moreland, & Argote, 1995).

We therefore argue that engaging in the dual formation strategy enables founders to leverage the selection criteria of each strategy in their initial interactions to create stronger structural and process components of transactive memory systems. When both interpersonal attraction and resource seeking strategies are used from the onset, initial experiences that are critical for transactive memory systems are jointly facilitated by complementary expertise and familiarity and shared understanding. During their initial experiences as a newly created founding team, members can leverage their knowledge of proximate close others who bring complementary expertise to quickly establish the role structure and fruitful relationships, and develop processes that facilitate trust and coordination (Lewis, 2004).

Interpersonal attraction allows team members to share unique information and resolve potential conflicts in an environment of safety and trust, while resource seeking leverages expertise of the various team members for improved accuracy of knowledge identification and development of capabilities. Thus, interpersonal attraction and resource seeking become mutually reinforcing, leading to a virtuous spiral in initial experiences for the swift creation of stronger transactive memory systems. Based on the above reasoning, we posit that forming teams based on the dual strategy facilitates the emergence of stronger transactive memory systems.

Transactive memory systems enable teams to form distinct roles and accumulate deeper and broader knowledge, but also to integrate across members and tasks more effectively. This enables teams to better match members with tasks, thus utilizing members' unique contributions more effectively (Reagans et al., 2016). Teams with stronger transactive memory systems make fewer errors and better decisions, work faster, and find more creative solutions (Ren & Argote, 2011). Taken together, we suggest that teams with stronger transactive memory systems better utilize team members' expertise and coordinate their activities. As such, stronger transactive memory systems enable founding teams to strategize through an iteration between doing and thinking (Ott et al., 2017), so they can address challenges and leverage opportunities for early entrepreneurial success.

Finally, a dual formation strategy further accelerates the emergence of stronger transactive memory systems. The speed and efficiency through which stronger transactive memories are created in turn enhance success of entrepreneurial teams, given that they operate in a context fraught with uncertainty and resource scarcity. Specifically, early development of stronger transactive memory systems through use of dual strategy enables founding teams to create legitimacy and garner support from critical stakeholders to acquire initial financing, as well as position themselves favorably for entry into and performance in accelerators (Mosey & Wright, 2007). Relative to founding teams that utilize *either* interpersonal attraction *or* resource seeking that spend costly time and effort responding to crisis, those formed with a dual strategy can capitalize on their transactive memory systems to evolve rapidly through the various stages of new venture development (Vohora et al., 2004).

Practical Implications

Even though new ventures represent engines of technological disruption and economic growth, they are also more likely to fail prematurely. Accordingly, our study of how and why formation strategies impact early entrepreneurial success has important practical implications. First, our study highlights that *aspiring entrepreneurs* must pay early and close attention to team assembly, rather than assuming that the benefits of attending to this issue at a later time will outweigh its costs. In doing so, founders need to overcome the tendency to engage in either a relational or a rational search for partners, and proactively address limitations in their existing networks to identify others who match both criteria. By combining the strategies, founders can facilitate learning and performance early on.

Second, we also inform practice for *educational programs* and *entrepreneurial platforms*, such as pre-seed hackathons and accelerators.

> **“Investors should carefully consider the way teams form, and prioritize those wherein members have both close relations and diverse knowledge, because these teams have the highest potential to learn and succeed as they encounter early milestones”**

Here, we suggest that in addition to traditional training that focuses on business models and customer discovery, programs should educate new venture teams about the process of partner selection, and integrate it with existing relevant endeavors, such as cofounder pair-up events. Such programs should also facilitate the development of learning processes.

Lastly, we offer insights to *investors* who wish to identify promising new ventures. Above and beyond the attention aimed at recognizing high-potential ideas, investors should carefully consider the way teams form, and prioritize those wherein members have both close relations and diverse knowledge, because these teams have the highest potential to learn and succeed as they encounter early milestones.

Theoretical Implications

Our research makes several meaningful contributions to the literature. First, we extend a recent framework proposed by Lazar et al. (2020) by developing and testing new theory on the challenges of new venture teams pursuing the dual vs. singular strategy, and the benefits of doing so for team learning. We suggest that although initially combining both formation strategies may be difficult to execute, the benefits of doing so are significant, as they allow for the emergence of team learning systems that foster early success. Importantly, by linking early formation strategies and venture performance, we answer a call for research (Agarwal, 2019) to address the limitations of prior work that primarily examined entrepreneurial team formation retrospectively, and thus may be subject to a significant selection and survivor bias.

Second, while extensive work has focused on strategic and resource-related factors influencing new venture performance (Camuffo et al., 2020; Pillai et al., 2020), budding research stresses the role of startup team dynamics and their effect on entrepreneurial success (Knight et al., 2020).

Here, we embrace the integration of micro and macro lenses to provide a novel explanation: we suggest that selecting cofounders using the dual strategy facilitates the emergence of transactive memory systems early on in the team's lifespan, which are crucial for early entrepreneurial success.

Lastly, we contribute to the broader research on the developmental process of new venture teams (Vohora, Wright, & Lockett, 2004). We establish that the benefits of the dual strategy to the emergence of transactive memory systems generate a competitive advantage in terms of critical milestones associated with early entrepreneurial success vis-a-vis other teams who use a singular strategy. We also show that transactive memory systems contribute to entrepreneurial success above and beyond affective and structural alternative mechanisms (i.e., entrepreneurial passion and power structure). Relatedly, our investigation suggests that although teams may switch from one formation strategy to another over time, the initial use of dual strategies matters for transactive memory systems and performance.

Conclusion

New ventures operate like an 'orchestra. They require an integrative system of specialized knowledge, skills, and capabilities coordinated and synthesized across multiple cofounders. While forming teams using the dual strategy was very rare, doing so had a significant impact on early venture success. In Kickstarter, only 17% of teams used the dual strategy, but these teams more than doubled their seed-funding. In the entrepreneurial competition, only 10% of teams were formed using the dual strategy, but these teams doubled their chance to enter the competition and had a four-times greater chance to survive the competition throughout elimination rounds.

Earlier research provides rather limited insights on how using single versus dual formation strategies may accelerate or impede the team's initial ability to develop learning systems for superior performance. Building on our understanding, we find that forming teams with attention to both interpersonal attraction and resource-seeking facilitated the development of transactive memory systems within the team, which enables continuous entrepreneurial success. Extending prior research, we illuminate the importance of the initial member-selection process to subsequent team learning and entrepreneurial performance. ■

About

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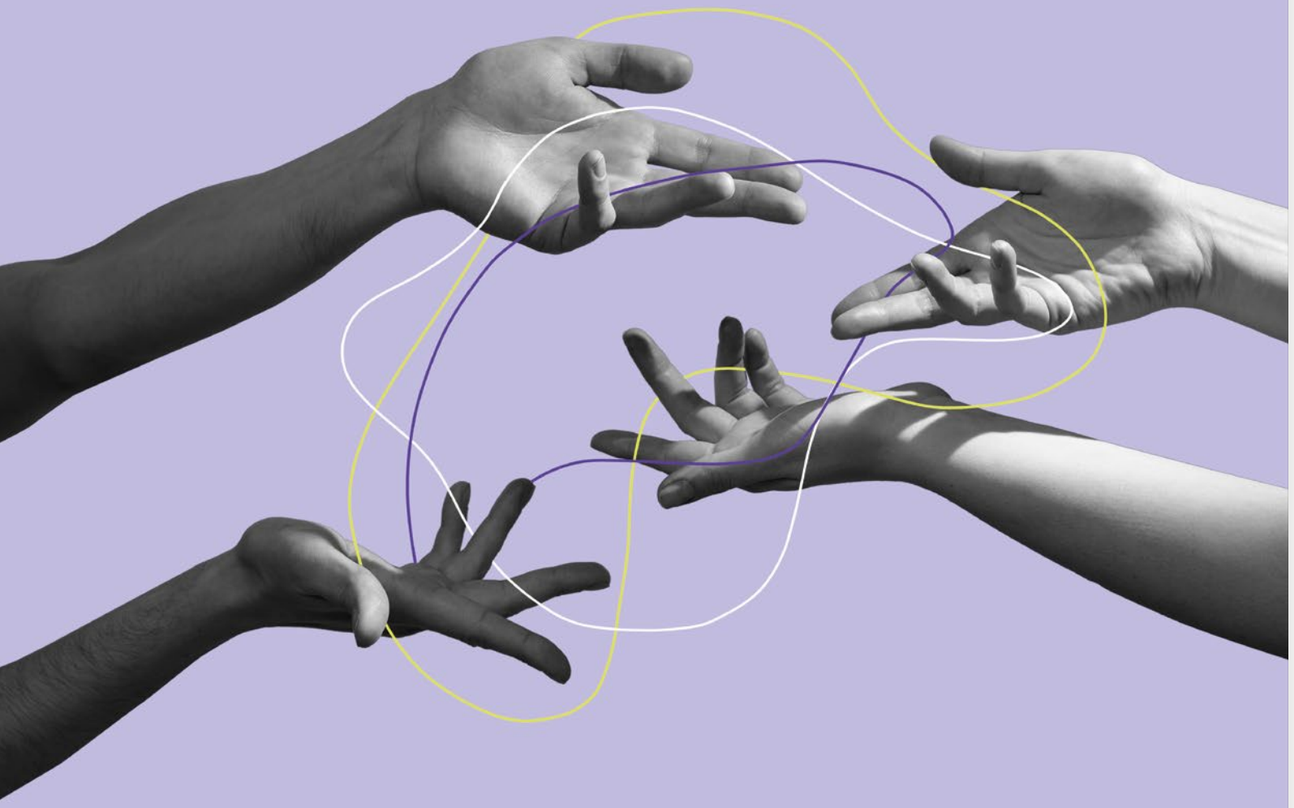


Innovation Ecosystems: Can we Scale What We've Learned?

Barbara Kurshan
President, Educorp Consultants Corporation and Innovation Advisor, Graduate School of Education, University of Pennsylvania

In the University setting, an *innovation ecosystem* refers to the collaborative efforts of key stakeholders—including students, practitioners, entrepreneurs, investors, and researchers—to develop, adopt, and scale new processes, products, and services intended to improve teaching and learning. This paper, adapted from a larger research study, reflects on the application of theory to practice specifically in relation to the introduction of new technologies and the development of new ventures.

The late 20th-century shift toward a knowledge economy laid the groundwork for the emergence of greater interaction among universities, industry, and the government, with the effect that "universities and industry, up to now relatively separate and distinct institutional spheres, [were] each assuming tasks that were formerly largely the province of the other" (Etzkowitz & Leydesdorff, 1997, p. 2). Universities began to take on business and governance functions, while industry began to do research and to conduct training (education) in addition to providing its traditional goods and services. Government, previously responsible only for supplying the operating rules of the game, began providing capital for the launch of new ventures. This blurring of lines between university, government, and industry forms the basis of the triple helix model (Etzkowitz, 2008; Etzkowitz & Leydesdorff, 1997; Ranga & Etzkowitz, 2013).

The relationships and activities among university, government, and industry include, but are not limited to, collaboration, conflict moderation, collaborative leadership, networking, and substitution of functions across the three domains. Generally speaking, the triple helix seeks to generate knowledge, support innovative and/or entrepreneurial activity, and evaluate and advance new ideas.

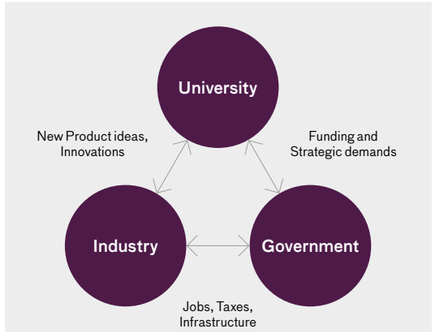
As the three separate functions of government, industry, and university begin to merge over time, Ranga and Etzkowitz (2013) conceptualize new organizational configurations: the knowledge space, the innovation space, and the consensus space, which are defined by the collaborative activities that occur within them rather than by the institutional players involved.

- The *knowledge space* serves as the locus of research and new knowledge production. Combined research efforts lead to increased efficiency and productivity by decreasing the likelihood of duplication.
- The *innovation space* consists of activities orchestrated by thought leaders and by hybrid organizations (e.g., some combination of government, university, and industry) to create, develop, and advance entrepreneurial efforts to accelerate the competitive advantage of a region or country.
- Finally, the *consensus space* is where the members of the different spheres of the helix come together to collaborate, to share perspectives, and to challenge one another to generate ideas that will lead to innovation. As Ranga and Etzkowitz (2013) explain, "organizations in the Consensus Space are interdependent: rather than seeing themselves as isolated entities, firms, universities and local government actors begin to see themselves as part of a larger whole" (p. 21). In short, the consensus space serves to facilitate interaction, connection, and collaboration between the knowledge space and the innovation space.

Within the triple helix, one of the three primary spheres (industry, government, or university) usually plays a dominant role and serves as the organizer of cross-institutional collaborative activities. Political factors, such as the extent to which the government is hands-on or *laissez-faire*, or economic factors such as the availability of capital, influence which of the three key spheres assumes the leadership position (Etzkowitz, 2008; Ranga & Etzkowitz, 2013).

The university ecosystem. Curley and Formica (2013) define an *ecosystem* as "a network of interdependent organizations or people in a specific environment with partly shared perspectives, resources, aspirations and directions" (p. 9). Building on the concept of the entrepreneurial university proposed by Etzkowitz (2004) and Andersson et al (2010), Curley and Formica (2013) describe a new set of collaborative relationships and forms of engagement in the university ecosystem (UE). In the UE, the university's purpose is no longer to produce knowledge solely for its own sake but to produce *information that can be used to address significant problems in practice*. The end goal of the university ecosystem is to convert new knowledge into innovations that can be brought successfully to market. Over time, a continuous improvement loop develops between research and practice, and the distinction between researcher and entrepreneur begins to blur (Curley & Formica, 2013).

The triple helix



The function of the university ecosystem is thus the sharing, communicating, and leasing of new ideas and innovations in multiple ways, including as research projects and papers, conferences, patent exchanges, partnerships, shared copyrights, blueprints, intellectual brands, and cross-licensing agreements. This global spread of knowledge, in turn, facilitates greater economic growth and development throughout the world.

The purpose of the ecosystem is not only to produce and share knowledge but also to collaborate in new ways to create new ventures that will contribute to the economic growth and societal well-being of the region surrounding the university. Curley and Formica note that a key determinant in the success of a university ecosystem is "visible promotion, recognition and support for collaboration and entrepreneurship" (2013, p. 12). In other words, the university, as the heart of the ecosystem, needs to make a concerted effort and devote material and nonmaterial resources to promote the value of this type of network and collaboration

Innovation Ecosystems in Education Using Technology: Toward a Working Definition

An education innovation ecosystem refers to the collaborative efforts of key stakeholders to develop, adopt, and implement new products and services intended to improve teaching and learning. The individuals and organizations engaged in these joint efforts—including students, practitioners, entrepreneurs, investors, and researchers—represent a variety of skill sets and priorities, and their roles are often fluid. A classroom teacher or university professor, for example, might capitalize on an insight gained from teaching or from research and start a new venture; an entrepreneur will engage in multiple forms of research, including market research and beta testing, to advance her business; and a funder might also do research in order to guide investment decisions. In the ecosystem, research, is done in conjunction with other stakeholders in the environment. As a result, innovative ideas and new offerings are understood within the broader context of the education market rather than viewed in isolation.

By definition, an innovation ecosystem cannot be a single entity. It cannot be a stand-alone venture, nor can it be a nonprofit or for-profit entity that facilitates the larger ecosystem. The ecosystem is an entity that transcends individual organizations or institutions and yet is constituted by the individuals in those institutions, their ties to one another, and the resources they exchange.

"The purpose of the ecosystem is not only to produce and share knowledge but also to collaborate in new ways to create new ventures that will contribute to the economic growth and societal well-being of the region surrounding the university"

Figure 1. The EdTech Innovation Ecosystem

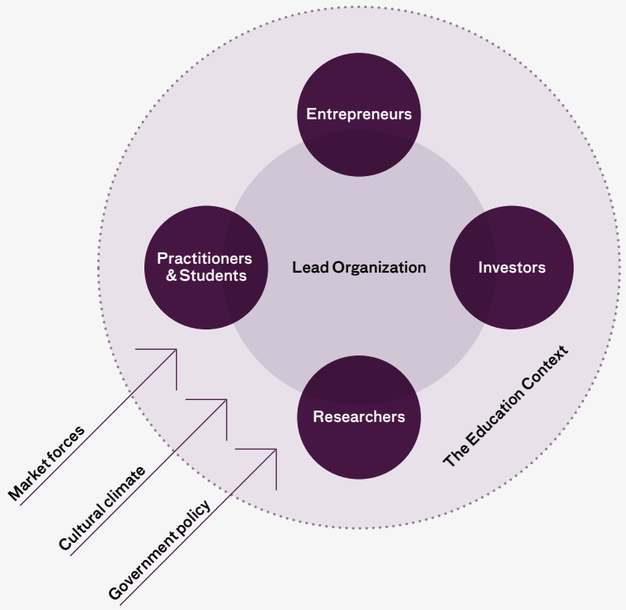


Figure 1 illustrates the interconnected relationship of key stakeholder groups. Market forces, including the economic stability of the surrounding region, impact the ecosystem. Examples of market forces include the availability of capital for research and innovation; local, state and national budgetary decisions; and the state of the stock market. Government policies also play a role: a highly regulatory environment, for example, might make it more difficult for organizations to innovate and to collaborate across operational boundaries or educational infrastructures such as the divide between private and public institutions. Lastly, the cultural climate and education context in which the ecosystem operates also influence stakeholders' willingness and ability to cross organizational silos in order to work together. For example, a regional culture that encourages experimentation and the tolerance of failure is more likely to support an innovation ecosystem than one which favors maintaining the status quo.

Similarly, local, regional, and national policies on issues such as funding, curriculum, and accountability will also influence the focus of stakeholder collaboration and the resultant outputs.

While education ecosystems may vary from one another in terms of context and key strategies, a focus on facilitating connections among multiple stakeholders in the pursuit of innovation remains a function common to all such systems. As in innovation ecosystems from other disciplines, trust, respect, and a willingness to collaborate serve as key components of the underlying culture and mindset of participants (Curley & Formica, 2013; Estrin, 2009; Hwang & Mabogunje, 2013; Jackson, 2011). Similarly, an education ecosystem includes a certain density of interactions among stakeholders, including planned meetings (in person or via telecommunications) to accomplish specific goals, as well as chance encounters and casual exchanges that lead to serendipitous discoveries (Hwang & Mabogunje, 2013; Jackson, 2011).

As in the triple helix model, a facilitating or "lead" organization such as a university, an incubator, a local government agency, or a corporation, often plays the critical role of connecting key stakeholders with each other and with the knowledge, resources, and opportunities needed to experiment with new ideas in order to find and bring to market the most promising technologies. The lead organization might act as a hub, serving to connect various stakeholders; it might act as the director, issuing orders and assigning responsibilities; it might serve as a cheerleader, offering encouragement and moral support; it might act as a coach, providing technical assistance; or it might act as a combination of any or all of the above.

By assuming these various responsibilities, the lead organization of the ecosystem is able to foster collaboration and communication among a diverse array of stakeholders; catalyze education-specific innovations; improve the efficacy of these new designs; and support the growth, development, and implementation of these products and processes in the education space (Curley & Formica, 2013).

How Education Innovation Ecosystems Develop

The existence of and need for innovation opportunities is of critical importance. For example, specific efficiency conditions, such as local, state, and national budget shortfalls facilitate the creation of edtech innovation ecosystems by forcing districts and state systems to innovate around economic constraints. Ecosystems are also a response to an increasing awareness that collaborations may not only be a more effective way of tackling complex problems but also a more efficient way (Austin & Seitanidi, 2012b; Googins & Rochlin, 2000; Selsky & Parker, 2005; Siegel, 2010). Coupled with a growing "engagement imperative," particularly for higher education institutions, education innovation ecosystems are likely to increase in prominence (Siegel, 2010, p. 29).

The rise of ecosystems in education often results from specific policies or resource flows propagated by a lead organization. In other words, a lead organization has made a concerted effort to bring the disparate stakeholder groups into meaningful and productive conversation. For example, in New York City's iZone, the NYC Department of Education served as the convener, with primary oversight carried out by the DOE's Office of Innovation. In the case of ecosystems involving incubators or accelerators, like Emerge in London or StartEd in New York, the incubator or accelerator play the key role of initiating dialogue between disparate players. In this case, they also take primary responsibility for distributing strategic resources, like capital, mentoring, and technical support.

Characteristics of an Innovation Ecosystem in Education

Despite contextual and structural differences resulting from the type of organization at the helm, stakeholders' priorities, and the size and maturity of the network, education ecosystems have several commonalities, including resources required, desired outcomes, metrics of success, and the role of research. In the following section, we examine these areas in more detail.

Inputs. To function, an innovation ecosystem in edtech requires several key resources, including funding, human capital, and material goods such as hardware and software technology. The creation of platforms that enable stakeholder interaction, such as collaborative workspaces, live forums, or communication vehicles (e.g., social media, newsletters, and electronic mailing lists) also plays an important role. Pilot sites are essential because they give entrepreneurs the opportunity to test minimum viable products, allowing them to iterate and go to market more quickly. Additional inputs that facilitate the growth of entrepreneurial ventures include a favorable regulatory climate and available and affordable professional services (e.g., legal, accounting etc.). Lastly, along with material resources, an innovation ecosystem requires an environment that rewards creativity, experimentation, and risk-taking. The act of failure needs to be an accepted element of the individual and collective cultures of the organizations involved whether they are schools, tech startups, incubators, not-for-profits or government agencies.

Outcomes. The goal of an ecosystem is to facilitate the creation of products, processes, or services that will improve teaching and learning. An ecosystem can do this directly, by helping students or practitioners, and indirectly, by facilitating the processes, delivery, logistics, and data management involved in education. In addition to developing a viable technology product or service that effectively accomplishes its stated purpose, entrepreneurs and developers in the edtech ecosystem also need to consider elements of instructional design specific to their target market or end user. Examples of these criteria might include developmental appropriateness, and the need to interface with the operating systems that a school, district, or university already has in place.

Metrics of effectiveness. Metrics of ecosystem effectiveness include the efficacy of products or services developed, the degree to which they are adopted by individuals or by educational institutions, as well as the density of cross-sectoral interactions and collaborations fostered by participation in the ecosystem.

Generally speaking, the goal of most new ventures nurtured by an innovation ecosystem is to achieve some measure of stability and in the case of for-profit organizations, growth and profitability, *and* to create a positive impact on teaching and learning (i.e., a "double bottom line"). In reality, most companies likely exist somewhere along a continuum of the two. In an ecosystem, technologies that have been implemented but that fail to produce a significant impact on teaching and learning or fail to be profitable can be improved when the major constituent groups (e.g., investors, practitioners, entrepreneurs, researchers, and students) re-engage to reinvent or redesign initial offerings.

Ideally, ecosystems also function by helping to winnow out ventures that are not viable, either because the product is ineffective, there is no market for the offering, or the market is too hard to access. In reality, it can be difficult to determine why a company fails and whether the fault lies within the company or is due to insufficient support and resources in the ecosystem.

A less tangible but equally critical output of education innovation ecosystems is the creation of ongoing, meaningful interactions between and among stakeholders of the ecosystem (e.g., practitioners, entrepreneurs, researchers, students, and investors) who might not normally interact with each other during a typical business day. This cross-pollination can generate greater value for participants than groups could or would be able to create alone (Adner 1996; Austin & Seitanidi, 2012b). Further, these cross-sector conversations strengthen the ecosystem by exposing stakeholders to novel ways of thinking and by giving them access to additional resources.

The role of research. Research serves as both an input and an output of the ecosystem and can be construed in multiple ways, including academic research, market research, and applied research related to product development and efficacy.

The knowledge created and exchanged between constituents in the ecosystem can include experiential knowledge, knowledge gained from traditional academic research, and knowledge directly related to consumer demand and product performance. Within entrepreneurship and business studies, market research, which emphasizes understanding the market for a particular product or service, understanding who the consumer is and how he/she will use a product and for how long, and how much he/she is willing to pay for it, is also a form of research. In an education ecosystem, this type of research plays an important role in helping ventures achieve both scale and profitability.

Relatedly, the constantly changing nature of technology and the current use of rapid validation as a design process conflict with the often lengthy timeframes necessary for proposed interventions to demonstrate results. Gaining access to beta testing can be time consuming and complicated due to the involvement of minors and the myriad parties, including school officials, building administrators, teachers, parents, and students, all of whom might need to grant permission before testing can begin.

> "The goal of an ecosystem is to facilitate the creation of products, processes, or services that will improve teaching and learning. An ecosystem can do this directly, by helping students or practitioners, and indirectly, by facilitating the processes, delivery, logistics, and data management involved in education"

Conclusion

In this paper we explore the concept of an innovation ecosystem as a metaphor for conceptualizing and organizing innovation in education, including technology in education. We define an ecosystem as the collaborative efforts of key constituents, who, with access to the necessary resources and conditions, collectively enable and accelerate innovation. We explore several key components of an education ecosystem, including basic resources required, primary outcomes produced, general metrics for success, and the strategic role of research.

Clearly, more research is needed to understand how ecosystems in education are born and evolve and the steps that are needed to facilitate the process. Future empirical work should also consider contextual factors, such as local, state, and national policies that influence how innovation ecosystems operate in edtech, including the distribution of resources, the functions performed, and the decision-making processes of constituents. Further work is also needed to examine which resources and/or inputs are most important to stakeholders and have the biggest impact on productivity. ■

About

Dr. Barbara (Bobbi) Kurshan has honed her vision of "what can be" using technology while supporting education companies and developing innovative products. Dr. Kurshan currently serves as a Senior Innovation Advisor at the Graduate School of Education at Penn where she builds and advises education innovation ecosystems. As the President of ECC, she provides strategic consulting in the areas of investment, digital transformation, entrepreneurship, and innovation. As the past Executive Director of Curriki, Bobbi helped to build one of the most innovative global open-source education communities.

Dr. Kurshan has previously served as the Co-CEO of Core Learning, an education investment fund, and the Chief Academic Officer of bigchalk. She currently serves on the board of American Public Education and invests and advises several edtech companies. Dr. Kurshan is the author of several books, articles and regularly blogs for Forbes.com. Her new book will be released in January, *InnovateHERs – Why Purpose-Driven Entrepreneurial Women Rise to the Top.*

Contributions by Rachel Ebby-Rosin, Ph.D., and Cat McManus, Ed.D.

V

Industry Analysis
Why Social Media Needs a Rethink

Overview

Our *Industry Analysis* section this year takes a critical look at social media platforms and their likely evolution as blockchain technologies are introduced.

As data architect and CEO Arnon Zangvil writes, social media has been examined from psychological, sociological, political, and market force perspectives, but not been widely understood through the lens of its platform architecture and associated underlying subjectivities. And while regulators might try to affect change, it is not quite a root-cause solution to the unevaluated and subconscious assumptions made during the design process. Further, as generation of "decentralized" block-chain based alternatives are built, potential blind spots in design related to instrumental information transfer, content ranking, and personalization may become even harder to decipher and predict, Which of the many proposals being floated will address the root causes of the current conundrum? Perhaps most importantly: Is a radical reckoning required?

Looking forward, the *Industry Analysis* section in future issues will similarly be written by industry leaders addressing technology-driven innovation.

The Great Social Media Experiment

Lessons learned? Is Crypto-based "Decentralization" the Solution or a Bigger Problem?

Arnon Zangvil
Founder and Managing Director, Physical Web Ltd

> **Among the conclusions is that, if we continue down the path of cryptobased "decentralization,", there may not be a single vendor to point to, or an "off switch" to which we can turn**

We have learned a lot in the last decade when it comes to social media; it is increasingly the space where individual identity is shaped, and where we practice social constitution, and political determination. However, not much of this is seen through the lens of the platform architecture. In fact, while examinations from psychological, sociological, political, and market force perspectives have proven essential to uncovering hidden effects, an understanding of platform architecture – and specifically its latent subjectivities – remains relatively less considered. This paper begins to address those subjectivities to help chart a path forward. This paper also addresses the next generation of "decentralized" block-chain based alternatives, being built now at blazing speeds and massive budgets, in which blind spots in design have potentially only grown bigger. Among the conclusions is that, if we continue down the path of crypto-based "decentralization,", there may not be a single vendor to point to, or an "off switch" to which we can turn.

Conceptualizations of Social Relations

One way to understand how a platform affects its users is to examine its various features. In the case of social media, the features are the various conceptualizations of human relations. For example, Twitter conceptualizes a network of Followers and Tweets; Facebook conceptualizes Friends and Personalized News Feed (also, Pages, Groups, etc.), while Foursquare conceptualizes gamified social relations tied to places, including the conceptualization of a Mayor of a place (e.g. I could be the Mayor of my local coffee shop). Functionally, these conceptualizations are product features that can be assessed for their attractiveness and usefulness to users. This is what product managers have developed methodologies and tools for, and end up doing on a daily basis, both qualitatively and also empirically by testing changes to the platform on small populations.

While there is an aspect of the conceptualization that is visible to the users, there are hidden aspects as well. For example, a product conceptualization such as Personalized News Feed, is in fact quite complex in terms of the functionality that it provides, based as it is on AI-based ➔

> As we spend more time online within any platform, the platform's social logic starts pushing aside other potential conceptualizations

ranking algorithms that examine social interactions and predict behavior. The content, of course, may also have profound effects, affecting both social relations, and altering users' views on various topics in the world at large. While the hidden functionality may be designed to serve the users, we know it is also used to serve vendors and advertisers. An example demonstrating the conflicting interests includes, among others, Facebook's refusal to allow users to turn the newsfeed ranking algorithm off, despite continuous user backlash since the first day it launched in 2006. To date, an updated feature that sorts the news feed by recent posts works for only 12 hours until the ranking algorithm resumes full control once again.

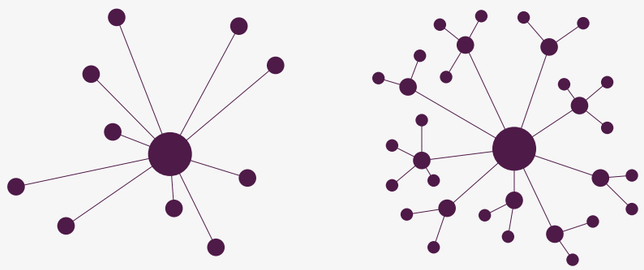
Most conceptualizations also have a semantic and/or ideological dimensions, which further affect users. Even as the Personalized News Feed offers up a world that is "just right" for me, resonating with a highly individual-focused worldview, it is still also "News". All at once it therefore resonates equally with traditional conceptualizations of "News" as a shared space, which facilitates the constitution of shared worldviews.

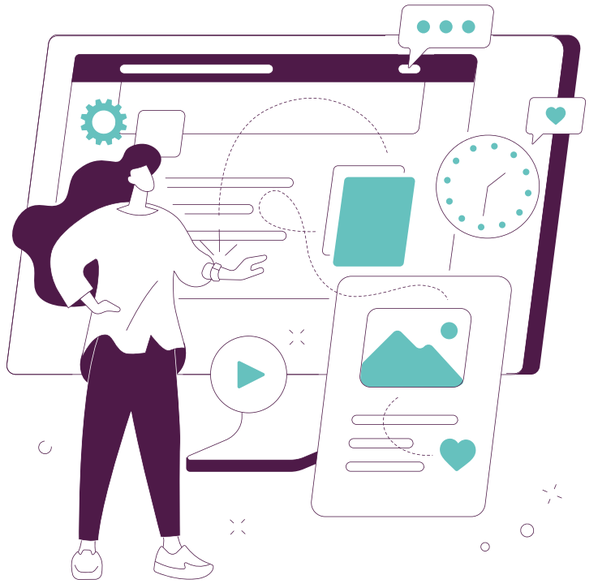
As we spend more time online within any platform, the platform's social logic starts pushing aside other potential conceptualizations. This is already well understood: As AI is harnessed towards growth and profitability, alternative conceptualizations that have not been codified begin to disappear. What is less well understood is that the platform architecture design process is as varied as the individuals engaged in it. And while regulators might try to affect change, it is not quite a root-cause solution to the unevaluated and subconscious assumptions made during the design process, which in turn are important to understanding platform effects.

Existing Blindspots

Underlying assumptions can generally be gleamed through the semantic choices made by the designers, such as 'Friends', 'Like', or 'Group.' Others may be identified through a user's own self-reflection. As powerfully, we have become accustomed to rating and being rated. Many of us are also aware of some lurking excitement or angst in anticipation of a post going 'viral. We may have also experienced tremendous life changing experiences online. At times it seems as though any form of human expression or interaction can take place online. The reality, however, is that there is a uniform, strict, and often hidden, logic.

Centralized vs Decentralized networks





What is this and how does it happen? How does the software architecture process shed light on the loss of shared space, the loss of a sense of place? First, it begins with platforms that share a common conceptualization of human relations as an act of information transfer, or content that's sent or posted. While developers naturally think of communication as sending packets across the network, human relations so conceptualized as information transfer becomes content that calls to be ranked. Ranking then becomes the key to operating an 'economy of content'. Ranking provides measurability and metrics, becoming the force justifying its own market economy. These same metrics become success indicators optimizing a company's growth.

Personalization is another common conceptualization that informs the experience on the platform, one which has been a theme running through the software industry for the last two decades. This relates to software's ability to sort through the world of information, and pick and choose information that's relevant for a specific user, for a specific need or in a specific context. In addition to offering users a view of the world unique to them, it also drives a tension between engagement-associated revenue and a meaningful social experience instantiated in shared space.

An additional limitation based on the underlying architecture is the overall uniformity of any given platform. This again has to do with monetization, and the imperative to set standards for content, format, and placement. This was evident in the earlier days of social media, as beloved platforms which offered customization like MySpace nevertheless failed to monetize effectively. It is also exemplified in Facebook's global terms of service, which fails constituents by banning forms of nudity considered normative in their societies.

In summary, seen from the perspective of software design, social media has become forged in the caldron of instrumental information transfer, content ranking, and personalization. This together has been delimited both by the single or multiple software architect's conscious intent, and by unconscious assumptions about the world, reflecting and amplifying the specific slice of society in which it was conceived. Regulatory change may be useful, but the root cause of any fix lies at least in part at the level of platform development.

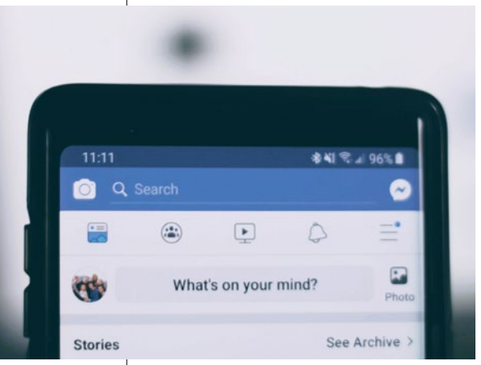
Future Blindspots

The big question for the next generation of platform technologies is how and to what extent they address the blindspots of today's social media? While there are many alternatives and often contradictory visions being discussed and pursued, a common theme is that of "decentralization". The other is virtual reality (VR) and augmented reality (AR).

Decentralization refers to the use of blockchain, often in conjunction with a cryptocurrency. These are constructs of computer code, that when executed

> By peeling off the semantic and ideological layers of the system components, what emerges veers towards an instrumental socio-economic system based on market or monetary logic

on multiple networked machines result in a single distributed shared undisputable repository of information. When used in conjunction with a cryptocurrency, the distributed shared ledger is used to maintain the list of undisputed transactions, and the currency is used to organize people and resources to ensure the system works.



What is important from a design perspective is that this new class of technologies can be thought of as a technologically-enabled socio-economic construct able to codify social and economic relations. In this they follow from past challenges in carrying a semantic and ideological component, even as increased complexity means they may be harder to decipher. For example, the algorithms employed are referred to as "consensus algorithms", which are then justified by being the logic which forges agreement. At the core, therefore, a technical process relying on distributed nodes to prevent the hacking or hijacking of a system becomes its own self-validating way to create meaning.

Another semantic and ideological component used to describe these systems is that of 'trustless', or 'zero trust'. When thought of instrumentally to achieve economic goals such as moving money around, or technological goals such as establishing a truly distributed computing environment, 'trustless' or 'zero-trust' is a powerful feature with desirable outcomes. While the blockchain is not a trustless system, it does distribute trust amongst many participants, so that the trust and agency required of any one individual is very low and the functionality is without what we think of as centralized control. In this techno-utopian dream of an individual-centered, instrumental, self-regulating life, 'trustless' decentralization of payments can be just the first step towards no government at all, including potentially no need for social constitution, or political deliberation.

By peeling off the semantic and ideological layers of the system components, what emerges veers towards an instrumental socio-economic system based on market or monetary logic. The same decentralization that may shift power away from the cloud vendors towards individual computer nodes may in parallel ultimately centralize control into the hands of the code writers and vendors that control that same powershift. The utopia falls apart very quickly when a software update of a blockchain-based system is required. Who is making the decisions then? Will an update focusing on reducing energy consumption? Or reducing transaction costs to enable micro-payments? Who will be making these policy decisions? A coder able to reply with something akin to "in code we trust" is clearly not an acceptable outcome.

Conclusion

If social media was a great social experiment designed to warn us of the dangers of the economization of the social and political realm, it worked. Addressed from the perspective of a software developer, this paper points to aspects of the economization of social media that are only visible when viewed from the perspective of software design.

From the perspective of the design process, we've seen how social media platforms reproduce the conceptualizations of the social world that are codified into them, onto the world of their users. We've seen how that includes both explicit intents, but also the latent subjectivities of the creators, including their many unevaluated assumptions about the world. We've also seen how a conceptualization may have one 'face' for the users, and another hidden 'face' to serve the vendor or advertisers, often at odds with one another. Lastly, we've seen how encryption-enabled constructs such as the blockchain and cryptocurrencies represent a leap forward in both complexity and power, with their effects on society paradoxically even harder to decipher and predict.

All of the above may indicate that a remedy that does not lead to a rethinking of the design process itself will necessarily be incomplete. Regulatory bodies such as the FTC and others around the world can offer only a partial remedy if they continue apace. However, structural change that would allow a multitude of designs to materialize within the context of the of societies, communities, age groups, political orientation, or special needs that the designs serve could be a potential remedy. This means opening up the platform and its business model so that other entities (both private and public sector) that can create their own modules, experimenting with different forms of social organization, monetization, governance, markets, commons, and so on. This would allow society at large to gradually regain its agency, while confining instrumentality and market logic to where it's needed.

If we fail to do this, our world risks becoming ever more homogenous with economic and financial instrumentality reigning supreme. Otherwise, the rush of new massively funded social media developments promising to save the day through "decentralization" and virtual or augmented reality will only shift power while ultimately recentralizing it. In such a scenario, the codified world view which will get reproduced will likely be an even more anti-social anti-democratic version of the previous generation. ■

About

Arnon Zangvil is the founder and managing director of Physical Web Ltd. where he performs platform architecture and design for data-driven medical device companies. He is an expert in cybersecurity, patient privacy, and big-data analytics. Previously, Arnon was founder and CEO of Menta Software Ltd., makers of remote work software. The company was acquired by publicly traded GraphOn Corp. He has 30 years of experience founding and managing software development organizations and practices a multidisciplinary approach to software architecture, influenced by fields such as phenomenology and sociology.

Coller Venture Digest

Our *Venture Digest* refers our readers to some of the year's best reads in venture, as suggested by the members of our Advisory Board.

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Entrepreneurial Team Formation

Venture Capital's "Me Too" Moment

Sophie Calder-Wang; Paul Gompers; Patrick Sweeney
NBER Working Paper Series, Working Paper 28679

http://www.nber.org/papers/w28679

It is well known that historically, women are hired at an incredibly low rate in the venture capital sector. The authors explore the impact of a famous and high-profile "Me Too" incident of Ellen Pao (a former partner at Kleiner Perkins, and later the CEO of Reddit) versus Kleiner Perkins. They found that following the lawsuit, the rate of hiring female venture capitalists increased substantially, and the hiring was more pronounced in states that were more receptive to the exposure. Moreover, they find that the fraction of founders who are female increases after the Pao Trial, but that the increase is driven entirely by the hiring of female venture capitalists. At the same time there is no increase in the propensity of male venture capitalists to invest in female founders in the post-Pao Trial period.

Recommended by Prof. Shai Bernstein, Harvard Business School

Large Teams Develop and Small Teams Disrupt Science and Technology

Lingfei Wu; Dashun Wang; James A. Evans
Nature volume 566, pages 378–382 (2019)

https://www.nature.com/articles/s41586-019-0941-9

One of the most universal trends in science and technology today is the growth of large teams in all areas, as solitary researchers and small teams diminish in prevalence. In this paper the authors analyze more than 65 million papers, patents and software products that span the period 1954–2014, and demonstrate that across this period smaller teams have tended to disrupt science and technology with new ideas and opportunities, whereas larger teams have tended to develop existing ones. Observed differences between small and large teams are magnified for higher-impact work, with small teams known for disruptive work and large teams for developing work. The results demonstrate that both small and large teams are essential to a flourishing ecology of science and technology, and suggest that, to achieve this, science policies should aim to support a diversity of team sizes.

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Entrepreneurial Team Formation

Forming Entrepreneurial Teams: Mixing Business and Friendship to Create Transactive Memory Systems for Enhanced Success

Moran Lazar; Ella Miron-Spektor; Gilad Chen, Brent Goldfarb; Mia Erez; Rajshree Agarwal

https://doi.org/10.5465/amj.2020.0393

Every aspiring entrepreneur weighs the costs and benefits of forming a team with friends or strangers. In this study, the authors focus on the entrepreneurial team and their learning capacity. They highlight a fundamental tension; form a team with friends and you are likely to have deep understanding but overlapping skills, or form with strangers and you'll likely bring complementary skills but do not enjoy shared understanding. Successfully navigating the incipient stages requires new ventures to meld together an interpersonal-attraction strategy (relationships with similar others in a close network) or a resource-seeking strategy (instrumental focus on complementary skills). Findings from two field observational studies and a field intervention study support their predictions: teams formed based on a dual strategy raised greater seed funding on Kickstarter – a leading crowdfunding platform (Study 1), were more successful in a prestigious entrepreneurial competition (Study 2), and gained more profits from selling their initial products (Study 3).

Recommended by Prof. Gary Dushnitsky, London Business School

Sizing Up Entrepreneurial Potential: Gender Differences in Communication and Investor Perceptions of Long-Term Growth and Scalability

Laura Huang; Priyanka Joshi; Cheryl Wakslak; Andy Wu

Academy of Management Annals, 2021, Vol. 64, No. 3, 716–740.

https://doi.org/10.5465/amj.2018.1417

Female entrepreneurs have been found to face disadvantages when compared with male entrepreneurs, especially in acquiring the financial resources needed to sustain and grow their ventures. Across three studies, we examine how disparities in funding outcomes may be due to differences in how entrepreneurs communicate their ventures, whereby female entrepreneurs have a tendency to use more concrete language when describing their ventures than their male counterparts. We find that the use of abstract speech affects investors' perceptions of which ventures are oriented toward long-term growth and scalability, which in turn affects the likelihood that a venture will receive investment. We conclude with a discussion of the important role of communication style as a key mediating mechanism in influencing investor cognition.

Recommended by Prof. Ella Miron-Spektor, INSEAD

Funding New Ventures

Reputation Spillovers in Venture Capital: Evidence from a Randomized Field Experiment

Shai Bernstein; Kunal Mehta; Richard Townsend; Ting Xu

November 19, 2021

Does the reputation of venture capitalists improve the success rates of their portfolio companies? Theoretically, this might be the case, particularly at the earlier stages of the firm, when its own brand name and reputation is not well established yet. To explore this hypothesis, the authors analyze a field experiment conducted on AngelList Talent, a large online search platform for startup jobs and explore whether investors' reputation affect the ability of startups to attract talent. In the experiment, whether a startup was funded by a top tier VC is randomly highlighted in job search results. The authors find that the same startup receives significantly more interest from job seekers when the fact that it was funded by a top-tier VC is highlighted. The effect of highlighting top-tier VCs is not driven by low-quality candidates and is stronger for earlier-stage startups as hypothesized. The results provide the first direct evidence that VCs can add value to startups passively, simply by attaching their names to their portfolio companies.

Recommended by Prof. Shai Bernstein, Harvard Business School

Hacking the venture industry: An Early-stage Startups Investment framework for data-driven investors

Francesco Corea; Giorgio Bertinetti; Enrico Maria Cervellati

https://doi.org/10.1016/j.mlwa.2021.100062

Much of the recent surge in venture capital is attributed to – as Marc Andreessen of A16Z notes – the fact that "Software is eating the world." The advat of software tools have brought about new business models and value-add offerings that have changed many industries. But what about the venture capital industry? Has it been affected by the availability of data, computing power and artificial intelligence. This article is an example works by groups of scholars and venture capitalists who aim to address this question. The article introduces a data-driven framework to help investors be more effective in selecting companies with a higher probability of success. To that end, the authors analyse over 600,000 startups and point to 21 relevant features that investors should heed when selecting startups.

Recommended by Prof. Gary Dushnitsky, London Business School

Venture Capital Contracts

Michael Ewens; Alexander Gorbenko; Arthur Korteweg

Journal of Financial Economics, Forthcoming

The authors find that there is an optimal equity split between VCs and startups, and that VCs use their bargaining power to receive more investor-friendly terms than would be optimal for startup valuations.

Recommended by Prof. Joshua Lerner, Harvard Business School

Funding New Ventures

Are Angel Investors More Likely than Venture Capitalists to Drive Entrepreneurial Experimentation?

Amir Sariri*
November 5, 2021

http://www.zmetro.com/?p=9122

Although angel investors and venture capitalists both participate in the supply side of the same market providing capital and advice to early-stage companies, they are distinct in several ways. While the differences in when they choose to deploy capital are well studied, the differences in when they choose to provide advice are not. The author finds that angels are more likely than VCs to choose to provide advice on the design and execution of experiments (e.g., will customers buy this product at this price), whereas angels are less likely than VCs to choose to provide advice on analysis (e.g., what is the size of the total addressable market). Using a sample of 7,980 mentoring decisions by seed-stage investors, the author finds that angels are more likely to choose to provide advice on the design and execution of experiments because they have a skill advantage in that domain due to operational experience.

Recommended by Prof. Scott Stern,
MIT Sloan School

Leadership in Venture

"I Put in Effort, Therefore I am Passionate:" Investigating the Path from Effort to Passion in Entrepreneurship

Michael Gielnik; Matthias Spitzmuller; Antje Schmitt; and D. Katharina Klemann, Michael Frese
Academy of Management Journal 2015, Vol. 58, No. 4, 1012–1031.

http://dx.doi.org/10.5465/amj.2011.0727

The research examines the relationship between passion and entrepreneurship. Most theoretical frameworks in entrepreneurship emphasize that entrepreneurial passion drives entrepreneurial effort. We hypothesize that the reverse effect is also true, and investigate changes in passion as an outcome of effort. Based on theories of self-regulation and self-perception, we hypothesize that making new venture progress and free choice are two factors that help to explain why and under which conditions entrepreneurial effort affects entrepreneurial passion. We undertook two studies to investigate our hypotheses. First, we conducted a weekly field study with 54 entrepreneurs who reported entrepreneurial effort and passion over 8 weeks (341 observations). The results showed that entrepreneurial effort predicted changes in entrepreneurial passion. Second, we conducted an experiment (n = 136) to investigate the effect of effort on passion and the underlying psychological processes in a laboratory setting. The results revealed that new venture progress mediated the effect of entrepreneurial effort on passion, and that free choice moderated the mediated effect. Overall, our findings provide a new theoretical perspective on the relationship between entrepreneurial effort and passion.

Recommended by Prof. Ella Miron-Spektor,
INSEAD

Public Policy and Entrepreneurship

Investor Tax Credits and Entrepreneurship: Evidence from U.S. States

Matthew Denes; Sabrina T. Howell, Filippo Mezzanotti; Xinxin Wang; Ting Xu
October 7, 2021

https://www.kellogg.northwestern.edu/faculty/mezzanotti/documents/tax_credit_DHMWX.pdf

Angel investor tax credits are used globally to spur high-growth entrepreneurship. Exploiting their staggered implementation in 31 U.S. states, the authors find that they increase angel investment yet have no significant impact on entrepreneurial activity. Two mechanisms explain these results: Crowding out of alternative financing and low sensitivity of professional investors to tax credits. The results contrast with evidence that direct subsidies to firms have positive effects, raising concerns about promoting entrepreneurship with investor subsidies.

Recommended by Prof. Francesca Cornelli,
Kellogg School of Management at Northwestern University

Success in Venture Creation

Here Comes the Sun: The Impact of Incidental Contextual Factors on Entrepreneurial Resource Acquisition

Gary Dushnitsky; Sayan Sarkar

https://doi.org/10.5465/amj.2019.0128

Analysis of 1,335 startups graduating from European accelerators reveals that graduating on a 'sunnier' Demo Day increases the likelihood of investment. This findings inform the entrepreneurship literature which, in recent years, informed us about the factors and frictions associated with early-stage financing. There literature shows that these are a function of the investor-startup pair; some studies underscore startup characteristics (e.g., gender, ethnicity, etc.), while others focus on investor traits (e.g., gut feel, etc.). The current study complements extant work by studying factors beyond the investor-startup pair; namely, incidental contextual factors such as changes in the physical environment. Not only is sunshine associated with early-stage funding success, but also the 'sunnier' effect is stronger under intense uncertainty; i.e., when startups (a) are nascent, or (b) the founders have limited human-capital.

Recommended by Prof. Gary Dushnitsky,
London Business School

Success in Venture Creation

A Scientific Approach to Entrepreneurial Decision Making: Evidence from a Randomized Control Trial

Arnaldo Camuffo; Alessandro Cordova; Alfonso Gambardella; Chiara Spina
Management Science 66(2):564–586.

https://doi.org/10.1287/mnsc.2018.3249

This paper develops a framework for exploring the implications of a more scientific approach to entrepreneurial decision making. The authors find that entrepreneurs who behave like scientists perform better, are more likely to pivot to a different idea, and are not more likely to drop out than the control group in the early stages of the startup. These results are consistent with the main prediction: a scientific approach improves precision—it reduces the odds of pursuing projects with false positive returns and increases the odds of pursuing projects with false negative returns.

Recommended by Prof. Scott Stern, MIT Sloan School

Foundations of Entrepreneurial Strategy

Joshua S. Gans; Scott Stern; Jane Wu
Strategic Management Journal. 2019; 1–21.

wileyonlinelibrary.com/journal/smj

The central strategic challenge for an entrepreneur is how to choose: entrepreneurs often face multiple potential strategies for commercializing their idea but due to the constraint of limited resources, cannot pursue them all at once. At the same time, entrepreneurs are venturing into new domains and as such, must choose under conditions of high uncertainty with only noisy learning available. This paper explores the interplay between these unique conditions that shape the entrepreneurial choice process, finding that often, the process will not yield a single best strategy but instead several equally attractive strategic alternatives. A key implication is that entrepreneurs cannot simply choose what not to do, but instead must proactively decide which equally viable alternatives to leave behind when choosing an entrepreneurial strategy.

Recommended by Prof. Scott Stern, MIT Sloan School

Biased Sampling of Early Users and the Direction of Startup Innovation

Ruiqing Cao; Rembrand Koning; Ramana Nanda
May 25, 2021
Harvard Business School, Working Paper

https://www.hbs.edu/ris/Publication%20Files/21-059_0ec587e4-4b74-4f21-9f8c-3f8920649ab9.pdf

Using data from a prominent online platform for launching new digital products, the authors document that the composition of the platform's 'beta testers' on the day a new product is launched has a systematic and persistent impact on the venture's success. Overall, findings suggest that the composition of early users can induce systematic biases in the signals of startup potential, with consequential effects (including a shortage of innovations aimed at consumers who are underrepresented among early users).

Recommended by Prof. Scott Stern, MIT Sloan School

Success in Venture Creation

Enabling Entrepreneurial Choice

Ajay Agrawal; Joshua S. Gans; Scott Stern
Management Science 67(9):5510–5524.

https://doi.org/10.1287/mnsc.2020.3920

https://pubsonline.informs.org/Publications/Librarians-Portal

Entrepreneurs must choose between alternative strategies for bringing their idea to market. They face uncertainty regarding both the quality of their idea as well as the efficacy of each strategy. The authors in this article suggest this creates a role for judgment that may be provided by trusted third parties such as mentors and investors. They hypothesize that institutions that lower the cost of transmitting and aggregating judgment spur entrepreneurial performance.

Recommended by Prof. Scott Stern, MIT Sloan School

Systematic Change in Private Equity

Local Ownership Under Private Equity Ownership

Michael Ewens; Arpit Gupta; and Sabrina T. Howell
October 9, 2021

https://ssrn.com/abstract=3939405

The authors analyse PE ownership in the newspaper industry, where local newspapers have been struggling to compete with online outlets. They find that while PE ownership increases the survival rate of local newspapers and leads higher digital circulation, there is substitution of news concerning local governance issues to national topics. They further document real effects of this substitution – in the form of lower local civic engagement.

Recommended by Prof. Joshua Lerner, Harvard Business School

Does Private Equity Investment in Healthcare Benefit Patients? Evidence from Nursing Homes

Atul Gupta; Sabrina T. Howell; Constantine Yannelis; Abhinav Gupta
NBER Working Paper 28474
February 2021

https://www.nber.org/papers/w28474

Using a dataset of over 18,000 nursing homes, 1,674 of which were matched to PE deals, the authors find that PE ownership increases mortality of Medicare patients significantly. They estimate the equivalent life-years lost as a result of PE ownership, as well as the cost to the taxpayer.

Recommended by Prof. Joshua Lerner, Harvard Business School

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Professor Gad Allon is the Jeffrey A. Keswin Professor and Professor of Operations, Information and Decisions, and the Director of the Management and Technology Program at the University of Pennsylvania.

Professor Allon's research interests include operations management in general, and service operations and operations strategy in particular. He has been studying models of information sharing among firms and customers both in service and retail settings, as well as competition models in the service industry. His articles have appeared in Management Science, Manufacturing and Service Operations Management and Operations Research. Professor Allon won the 2011 "Wickham Skinner Early-Career Research Award" of the Production and Operations Management Society. He is the Operations Management Department Editor of Management Science and serves on the editorial board of several journals.

Professor Allon is the Co-founder of ForClass, a platform that enables professors to drive higher student engagement and accountability in their classrooms. He regularly consults firms both on service strategy and operations strategy.

Professor Allon holds a Ph.D. in Management Science from Columbia Business School in New York and holds a B.A. and M.A. from the Technion—Israel Institute of Technology. ■

Prof. Shai Bernstein

Associate Professor in Entrepreneurial Management, Harvard Business School

Professor Shai Bernstein is an Associate Professor in Entrepreneurial Management at Harvard Business School and a Faculty Research Fellow at the National Bureau of Economic Research (NBER). His research focuses on financial issues related to startups and high growth firms, and their interaction with innovation and entrepreneurial activity. Prior to joining Harvard Business School, he was a faculty member at Stanford Graduate School of Business.

Some of his latest research includes: *Does Venture Attract Human Capital and The Creation of Evolution of Entrepreneurial Public Markets*

Professor Bernstein holds a Ph.D. in Business Economics from Harvard University. ■

Prof. Francesca Cornelli

Dean, Kellogg School of Management, Northwestern University

Professor Francesca Cornelli is the Dean of Northwestern University's Kellogg School of Management. She is also a Professor of Finance and holds the Donald P. Jacobs Chair of Finance.

Previously, she was Professor of finance and Deputy Dean at the London Business School. She directed and advanced the Private Equity Institute of London Business School, building a bridge between academia and practice by partnering with private equity leaders in London, alumni and top academics in the field.

Professor Cornelli's research interests include corporate governance, private equity, privatization, bankruptcy, IPOs and innovation policy. She has been an editor of the Review of Financial Studies, and previously served on the board of editors of the Review of Economic Studies and as an associate editor at the Journal of Finance. She is a research fellow at the Center for Economic and Policy Research, and previously served as a director of the American Finance Association.

In January 2016 Professor Cornelli helped create and became a board member of AFFECT, a committee of the American Finance Association designed to promote the advancement of women academics in the field of finance.

Professor Cornelli holds an M.A. and Ph.D. in Economics from Harvard University and a B.A in Economics, *summa cum laude,* from Università Commerciale Bocconi. ■

Prof. Gary Dushnitsky

Associate Professor of Strategy & Entrepreneurship, London Business School

Professor Gary Dushnitsky is an Associate Professor of Strategy & Entrepreneurship at the London Business School. He serves as a Senior Fellow at The Mack Institute for Innovation Management at the Wharton School, University of Pennsylvania.

Professor Dushnitsky's work focuses on the economics of entrepreneurship and innovation, and he advises corporations in the Financial Industry, FMCG, Clean Tech, and Pharma sectors. He explores the shifting landscape of entrepreneurial finance, exploring such topics as corporate venture capital, crowdfunding, and accelerators. His research appeared in leading academic journals, including *Organization Science*, *Strategic Management Journal*, *Strategic Entrepreneurship Journal*, and *Nature Biotechnology*.

Professor Dushnitsky serves as the Co-Editor of the *Strategic Entrepreneurship Journal*. He received academic distinctions including the 2013 SMS Emerging Scholar Award and the 2009 Kauffmann Junior Faculty Fellowship, has been featured in Business Week, CNBC, Dow Jones News, Entrepreneur Magazine, Financial Times, and has participated at the YPO, World Economic Forum, OECD, EVCA, and BVCA.

Professor Dushnitsky holds a Ph.D. in Strategy from New York University and a B.A. and M.Sc. from Tel Aviv University. ■

Prof. Joshua Lerner

Jacob H. Schiff Professor., Entrepreneurial Management, Harvard Business School

Professor Joshua Lerner is the Jacob H. Schiff Professor in Entrepreneurial Management at Harvard Business School. His research focuses on venture capital and private equity organizations, particularly policies on innovation and how they impact firm strategies. He has authored several books and publications including *The Architecture of Innovation*, *The Comingled Code*, *Innovation and Its Discontents*, *Boulevard of Broken Dreams*, *The Money of Invention*, *Patent Capital*, and *The Venture Capital Cycle*.

Professor Lerner co-directs the National Bureau of Economic Research's Productivity, Innovation, and Entrepreneurship Program and serves as co-editor of their publication, *Innovation Policy and the Economy*. He founded and runs the Private Capital Research Institute, a nonprofit devoted to encouraging access to data and research, and has been a frequent leader of and participant in the World Economic Forum projects and events.

He is the winner of Sweden's Global Entrepreneurship Research Award and the Cheng Siwei Award for Venture Capital Research.

Professor Lerner holds a Ph.D. in Economics from Harvard University and graduated from Yale College with a special divisional major. ■

Prof. Ella Miron-Spektor

Associate Professor of Organizational Behavior, INSEAD

Professor Ella Miron-Spektor is an Associate Professor of Organizational Behavior at INSEAD. Her research focuses on personal and organizational factors that promote creativity, learning, and entrepreneurial success. She studies team characteristics that contribute to innovation and learning, the formation of entrepreneurial teams, strategies that enable leaders to cope with competing demands at work, and the influence of cultural diversity on creativity.

Professor Miron-Spektor's award-winning research studying factors that contribute to team innovation and learning has been published in top management journals, including the *Academy of Management Journal*, *Organization Science*, *Organizational Behavior and Human Decision Processes*, and *Journal of Applied Psychology*.

Her work has been profiled in media outlets such as Harvard Business Review, Forbes, CBS, and NBS news. She co-organized several international conferences, including the Academy of Management Specialized Conference: From-Start-up to Scale-Up in 2018. She serves on the Editorial Review Board of Organization Science and as Guest Editor for Organizational Behavior and Human Decision Processes and Academy of Management Discoveries.

Professor Miron-Spektor holds a Ph.D. in Organizational Psychology from the Technion—Israel Institute of Technology and completed a Postdoctoral Fellowship at Carnegie Mellon University. ■

Prof. Scott Stern

David Sarnoff Professor of Management, MIT Sloan School of Management

Professor Scott Stern is the David Sarnoff Professor of Management at the MIT Sloan School of Management and a Professor of Technological Innovation, Entrepreneurship, and Strategic Management. He was previously a Professor at the Kellogg School of Management and Non-Resident Senior Fellow at the Brookings Institution.

Professor Stern's research explores how innovation and entrepreneurship differ from traditional economic activities, and the consequences of these differences for strategy and policy. His research in the economics of innovation and entrepreneurship focuses on entrepreneurial strategy, innovation-driven entrepreneurial ecosystems, and innovation policy and management.

In 2005 he was awarded the Kauffman Prize Medal for Distinguished Research in Entrepreneurship.

Professor Stern works with practitioners in bridging the gap between academic research and the practice of innovation and entrepreneurship through advising startups and other growth firms in the area of entrepreneurial strategy, as well as working with governments and other stakeholders on policy issues related to competitiveness and regional performance. He is the director and co-founder of the Innovation Policy Working Group at the National Bureau of Economic Research.

Professor Stern holds a Ph.D. in Economics from Stanford University and a B.A. in Economics from New York University. ■

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Professor Zviran's research interests include entrepreneurship and innovation, information and cyber security, and information systems planning and policy. He has published numerous articles and authored two books on Information Systems. He is a consultant for leading organizations in Israel and serves as a board member in several companies and organizations.

Professor Zviran held academic positions at the Naval Postgraduate School, The Claremont Graduate University, and Ben-Gurion University.

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Dr. Broudo holds an MBA from the Wharton School of the University of Pennsylvania in Management and Operations, a Ph.D. in Anthropology from the University of Pennsylvania, and a B.A. in Political Science and Economics from Bryn Mawr College. ■

In theory, theory and practice are the same. In practice, they are not.

Albert Einstein

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