Three Stops on Our Journey to Factory 4.0

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Thank you for the opportunity to speak with you at the Factory 4.0 conference. I'm very happy to be with you this morning. Thank you to Marius Hărătău and my colleagues at CONNECTS for inviting me.

This morning, I want to take you on a journey into the future with three stops along the way.

That's another way of saying that I want to leave you with three points.

Here they are.

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First, when we think about the new technology for our factories, we tend to ignore the major reason why we may not realize the promise of this technology.

Our organizations create the major obstacle.

The biggest challenge of digital disruption little to do with technology.

It is our current organizations and how we manage them.

Now, on to the second point.

Digital transformation requires shifting to a network mindset.

Not just at the top of our organizations, but throughout our organizations.

The transformation in our mindset involves everyone.

We need to move beyond rigid hierarchical thinking and toward a more flexible network mindset.

That will be the second stop in our journey.

A third and final stop will be a surprising one.

It turns out that when we adopt a network mindset, we uncover an important insight.

In order to master our newest technologies, we have to practice and master the skills of our oldest technology: our conversations.

In other words, to move down the path toward digital maturity in our organizations, managers will need to improve their ability to design and guide complex conversations.

So that's our journey into the future this morning.

Three stops. Let's get started.

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What do I mean when I say that the biggest threat the digital disruption is the organization itself?

This insight comes from the differential rates at which we as humans deploy the new technologies we develop.[1]

We develop these technologies at a faster rate than individuals can adopt them.

And individuals adopt technologies faster than organizations can absorb them.

Everyone knows that digital disruption is real and that is happening now.

The future is approaching us faster than we ever imagined.

But few organizations are undergoing the fundamental shifts required to move down the path toward digital maturity.

Digital technologies carry significant implications for organizations.

The structure of jobs is going to shift.

Every organization will need to develop new data skills.

To realize the potential of condition-based maintenance, for example, we need people on the floor capable of understanding how to interpret predictive analytics.

In our work at Purdue University in the past year, we are exploring a host of other challenges organizations must address.

Artificial intelligence raises significant privacy concerns.

The risk of worker surveillance.

How will companies address this challenge?

How will they use data for learning and not control?

How will they develop ethical practices to guide the factory of the future?

Artificial intelligence raises other challenges as well.

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[1] See Kane, G. (2019). The technology fallacy: people are the real key to digital transformation. *Research-Technology Management*, *62*(6), 44-49.

The flood of information flowing through our organizations flattens the power structures within them.

It makes the boundaries of the organization more flexible and porous.

How do we share data? And with whom do we share it?

How do we build new bonds of trust within and across our organizations?

How do we secure data against cyber attacks?

We are learning that the best organizational form to address these challenges might not be the organization at all.

It might be the ecosystem.

So, we are focusing on how to design and guide the platforms on which these ecosystems can grow.

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Let's move on to the second stop on our journey.

In our first stop, we learned that organizational change will be an obstacle for the adoption of new technologies.

In the second stop, we will explore this question: how can managers accelerate the transformation within their organizations?

The answer is embedded in the idea of mindsets, our cognitive frameworks.

How we create meaning from our experiences.

Since the dawn of the industrial revolution in the 19th century, we have managed our organizations hierarchically.

And hierarchical organization worked very well.

Workers in a tight hierarchy don’t need to worry much about what data mean. Routines narrow our focus to a handful of numbers.

But the flood of new data coming at us melts these rigidities.

Data flows through networks, not hierarchies.

If we are to derive meaning from data, we must master organizational networks.

To adapt, survive, and thrive in this new environment, our organizations must move from hierarchies toward networks.

We already know this, but we are moving too slowly.

Why is that?

I suspect that a large part of the answer has to do with fear.

We fear moving away from what we know.

You have seen it before.

Injecting new ideas into old organizations triggers an immune response.

Many people fear the future. They fear change.

They fear the loss of position and power.

Moving toward networks presents this kind of challenge.

It presents us with new ways of thinking, new ways of behaving, and new ways of doing our work together.

Networks are faster -- more agile -- but they are also more ambiguous and less clear.

They are more circular and less linear.

Power is more distributed.

Experiments displace routines.

The future appears less certain, more confusing.

But we need to move toward a more network-based mindset if we are going to transform our organizations and take advantage of the technologies that are so rapidly developing.

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Let's now move on to the third and last stop in our journey.

The paradox in all of this is that in order to take advantage of our newest technologies, we have to master our oldest technology: our conversations.

Why is that?

In 1993, Alan Webber, an editor at the Harvard Business Review wrote an excellent article, called "What's so new about the new economy?"[2]

Webber concluded that the key skill managers must learn in a knowledge economy is to manage conversations.

It's how we generate and distribute our knowledge.

Our conversations also enable us to form the collaborations we need to generate solutions to wicked problems.

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[2] Webber, A. M. (1993). What's so new about the new economy?. *Harvard Business Review*, *71*(1), 24-33. See also, Liedtka, J. M., & Rosenblum, J. W. (1996). Shaping conversations: Making strategy, managing change. *California Management Review*, *39*(1), 141-157.

In the road ahead, we will face many of these wicked problems.

These problems will require us to work together in new in different ways.

Over 20 years ago the Canadian environmental scientist, Thomas Homer-Dixon wrote a book, called The Ingenuity Gap.[3]

He argued that the future is coming at us faster than we can adjust. We are not developing the solutions to the complex, adaptive problems we face.

We are confronting an ingenuity gap.

The only way to overcome our ingenuity gap is to accelerate both the volume and velocity of our collaborations.

Collaboration is a process of recombinant innovation: creating and applying new knowledge to generate new value.[4]

We generate solutions by combining the assets that we already have.

We come together to generate solutions that no individual or organization can develop alone.

Through our collaborations, we create new solutions to wicked challenges.

We can close our ingenuity gap.

It turns out that we now know how to accelerate these collaborations.

Over the last thirty years, we've learned that collaborations emerge from conversations with a very predictable structure.

We can teach the skills of how to design and guide these conversations.

We can increase both the volume and velocity of our collaborations.

And through these collaborations, we can generate solutions to our most difficult challenges.

So that's the third stop in our journey.

It might seem that the journey ahead – – these three stops – – are new.

But they're not.

I know so much about this journey because I started out on this journey in 1993.

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[3] Homer-Dixon, T. F., & Homer-Dixon, T. (2002). The ingenuity gap: Facing the economic, environmental, and other challenges of an increasingly complex and unpredictable world. Vintage.

[4] Schrage, M. (1990). No more teams! mastering the dynamics of creative collaboration, Currency. See also Hargadon, A. (2003). How breakthroughs happen: The surprising truth about how companies innovate. Harvard Business Press.

And it wasn't about Industry 4.0.

It was another, closely related journey through disruption.

In 1993, I was sitting in a restaurant in Singapore, talking with a physicist, the chief technology officer of one of my client companies.

We were discussing the traditional management practice of strategic planning and why it was failing us.

We were not keeping pace with the accelerating challenges of globalization.

Strategic planning, based on hierarchical. thinking, was no longer working.

My physicist friend told me to abandon old thinking.

He told me that the commercial Internet was coming, and that it would change everything.

The Internet, he told me, is our first interactive mass medium.

Then he told me that in order to understand the impact of the Internet – – in order to understand how we humans had to adjust – – that I should study open source software development.

Through open source software development, programmers can do complex work in open networks by following some simple rules.

They innovate in open, loosely joined networks, where nobody can tell anyone else what to do.

He advised me to learn the rules of open source software development and understand how they might apply more broadly to the world of strategy.

In specific terms, he challenged me to develop a new strategy discipline appropriate for networks.

So I started my journey in 1993.[5]

The first experiment: the transformation of the economy in Oklahoma City.

When we started, Oklahoma City's economy had been flattened by a banking collapse and an oil industry that "ran off the cliff".[6]

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[5] Details of my journey can be found in Morrison, E. (2021). *Strategic Doing: A Strategy Model for Open Networks* (Doctoral dissertation, University of the Sunshine Coast, Queensland) and Morrison, E., Hutcheson, S., Nilsen, E., Fadden, J., & Franklin, N. (2019). *Strategic doing: Ten skills for agile leadership*. John Wiley & Sons.

[6] See Nelson, M. (1989). "The 1980s Ten Turbulent Years". The Oklahoman. Available at https://www.oklahoman.com/story/news/1989/12/31/the-1980s-10-turbulent-years/62579739007/

By 2011, following the strategy I laid out in 1993, the economy had become an entrepreneurial hot spot.[7]

Through seven years of work in Kentucky, I learned how networks could help residents in rural economies can adjust to the relentless pressures of globalization.

I also learned how to take the lessons I was learning and transfer them to Charleston, South Carolina.

In 2001, we launched the Charleston Digital Corridor, which is now one of the hottest hubs for digital businesses in the States.

Through these many experiments, I learned that, yes, we can accelerate our capacity to collaborate.

We can accelerate both the volume and velocity of these collaborations by following a discipline of simple rules.

We can generate new solutions to complex challenges.

Working together, we can close our ingenuity gap.

But first, we need to learn more new skills on how to master our oldest technology. Our conversations.

In 2005, after 12 years of experimenting, I went to Purdue University to learn how to teach this new model of collaboration.

I reached an agreement with my colleagues at Purdue that if I was successful, we would open source the underlying intellectual property.

The reason was simple.

As humans, we need to accelerate our capacity to collaborate.

The only way to do that – – following the model of open source software– – was to provide the model freely.

I thought it would take me about three or four years to validate this approach and learn how to teach it.

It turns out that it's much harder to do.

It took over 15 years.

We ran rigorous testbeds with engineers at Lockheed and life scientists in NASA.

With research scientists at Purdue and community leaders in Flint, Michigan.

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[7] Chan, U. (2011) "Oklahoma City lauded as entrepreneurship hotspot". OU Daily. Available at https://www.oudaily.com/news/oklahoma-city-lauded-as-entrepreneurship-hotspot/article_27a3c8c6-ba5b-5397-b854-28be9460aefe.html

We addressed complex problems.

- Can we develop a technology roadmap for condition base maintenance across the Navy's destroyer fleet?
- Can we find new collaborations for life scientists across NASA?
- Can we launch a cluster of freshwater technology companies and create a global hub for these technologies?
- Can we reduce teenage homicides in an inner city neighborhood in Flint, Michigan?
- Can we help communities improve their health outcomes with new solutions for opioid addiction and infant mortality?

The good news is that we can now teach people how to collaborate more effectively by following simple rules.

And not just software engineers.

Everyone.

From elementary school teachers, to high school students, and NASA life scientists.

You can think of Strategic Doing as an open source operating system for human collaboration.

This discipline is now spreading across the world.

We teach it in Spanish, Dutch, French, and Chinese.

We accelerate collaboration among research scientists and community health professionals.

We apply these approaches at small and large scales.

From primary school classrooms to the province of Alberta in Canada.

To understand the possibilities, I will end with a final story.

I met Julio Jose Prado at Purdue in 2017.

Julio was a business professor, who earned his doctorate studying clusters.

He came to Purdue to learn about Strategic Doing.

When I asked him why he flew all the way from Ecuador to Indiana, he told me this.

For years, he said, we have known the importance of clusters.

How collaborations among companies within these clusters accelerate productivity.

But no one has told us how to build these clusters.

Strategic Doing answers the question: How?

In early 2021, President Lasso of Ecuador appointed Julio as the new Minister of Production and Trade.

Julio sent me a LinkedIn message with two simple question: How do we spread Strategic Doing across Ecuador? Could we introduce these skills to twenty clusters in Ecuador?[8]

So, here we are at near the end of my thirty year journey and just at the beginning of yours.

We know that our human organizations and our economic policies have not kept pace with technology.

We know that we face very complex challenges ahead.

But now, unlike 1993, we have an open source operating system that can help us respond. It can accelerate the collaborations we need to generate new solutions to very complex challenges.

We can close our ingenuity gap.

We can build for our children and grandchildren an economy that is more open, more fair, more resilient, and more sustainable.

Julio is doing that in Ecuador. We can do the same in Romania.

But first, we will need to practice and master new skills of our oldest technology: our conversation.

We need to master the skills of Strategic Doing.[9]

[8] See a conversation with Julio here: https://vimeo.com/582779784

[9] Learn more about Strategic Doing at https://strategicdoing.net/