

The image shows the header for a podcast episode. At the top, the 'RAILWAY AGE' logo is displayed in large, bold, white letters on a red background. Below this is a black navigation bar with white text for categories: NEWS, FREIGHT, PASSENGER, MECHANICAL, M/W, C&S/IT, FINANCE, and REGULATORY. Underneath the navigation bar is a white banner with the 'RAIL GROUP ON AIR' logo, which features a stylized train icon. To the right of the logo, it says 'A JOINT PODCAST BY RAILWAY AGE, RT&S and IRJ'. Below the banner are four portrait photos of the podcast hosts: Sonia Bot, Sheppard Narkier, David Sherr, and William C. Vantuono. Each photo is set within a red-bordered frame, and their names are printed in white text directly below each respective photo.

**PODCAST:** <https://www.railwayage.com/podcasts/notch-8-to-the-golden-run-part-2-the-business-environment-as-a-service-platform-rail-group-on-air/>

## Notch 8 to the Golden Run: Right Decisions, Right Time, Right Authority Part 2, The Business Environment as a Service Platform

Sonia Bot, Sheppard Narkier, David Sherr, William C. Vantuono

### **William C. Vantuono:**

Welcome to this edition of Rail Group on Air, the podcast series, brought to you by Railway Age, Railway Track & Structures, and International Railway Journal. I'm William C. Vantuono, Editor-in-Chief of Railway Age. This is part two of three of a special series, Notch Eight to the Golden Run. It is based on a book called *Dynamic Multi-Level Decisioning Architecture: Making the Right Decisions, at the Right Time, with the Right Authority for Sustained Competitiveness and Relevance*.

And once again, we have the authors with us. We have Sonia Bot, the Chief Executive of The BOT Consulting Group, Incorporated. Sonia is familiar to us as a Railway Age Contributing Editor and is one of the more accomplished women in our industry. Sheppard Narkier is the Chief Enterprise Architect and founder of Candelwall LLC. He is also familiar to us as he co-authored with Sonia Bot *Anticipating and Avoiding Unintended Consequences in Digitalization* back in May 2021. David Sherr is the CEO of Evolved Supply Chain, headquartered in the San Francisco Bay area, and he made his Railway Age debut in Part 1 of this series.

Part 2 is about the Business Environment as a Service (BEaaS) platform. Now, you folks mentioned this in Part 1. So what exactly is the Business Environment as a Service platform? Would you describe that?

**Sonia Bot:**

Sure, Bill! I'll start, and I bet that Sheppard and David are also going to pipe in on this.

First of all, let's set some context. The Business Environment as a Service platform can be viewed as the end product of our decisioning architecture. It's what the stakeholders and users can see, touch and experience.

A Business Environment as a Service platform represents a digital meeting place for various stakeholders in the market. We can say that it's a natural meeting place for buyers and sellers of products and services. So, these stakeholders or participants, are consumers and providers of products and services.

What makes this environment special is that stakeholders can be on any side of the market. It will make sense for some niche players to be providers to a larger provider who consume a custom offering to provide a richer service that neither provider could offer by themselves.

A great example is transloading. Here we have several rail freight ecosystem participants such as operators for rail, trucking, boats; shipping-freight senders and receivers; and trade financiers. These ecosystem participants come together in a neutral meeting place, and they all have the incentive and the accountability to make sure they all benefit from smooth operations.

**Sheppard Narkier:**

Those are good points, Sonia. At its core, the Business Environment as a Service is a platform that supports onboarding, updating, discovery and orchestration of sets of industry related services, which are mostly supplied by the ecosystem partners.

The platform creates a digital marketplace where newer services are less expensive to start up and maintain because the basic digital infrastructure is in place. The platform enables services to be changed faster and more frequently, a necessity in an age of constant disruption. The power of this marketplace emanates from the platform providing easy access to well-established services.

A good example for rail is dynamic GPS maps. Just think of the time and investment saved from leveraging such a rich offering of basic services. One timely example would be experimenting with a dynamic rail car allocation model using a variable number of cars for specific runs based upon real-time assessment of incoming loads at key transfer points. So, imagine, , greatly improve fuel efficiency and make better use of car allocations. It should enable railroads to be more responsive to unexpected events with better flexibility and responsiveness that tends to improve the brand.

I want to elaborate further on Sonia's point regarding platform services that are provided by the Business Environment as a Service. The foundation of any IT service is provided in terms of messaging, data delivery, service discovery, and maintenance to name just a few. The goal is to easily integrate these services from different providers in order to deliver value faster with less startup investment exposure. This is the true value proposition that, tends to create the kind of attraction that you want in a platform and in an ecosystem.

In the case of any type of machine learning such as for digital twins, it is possible to have statistically aligned synthetic data available for secure model test runs, allowing, for faster modeling and experimentation.

And that's really the key: faster decision-making. If time to market and investment burdens are reduced, then innovation can accelerate, attracting more providers and consumers to the platform, which in turn

creates the incentive to provide more services. It becomes a virtuous cycle. This will help all stakeholders build a sustainable competitive advantage faster in a more cost-effective manner for themselves and the platform as well.

An example would be rail car and locomotive maintenance. Imagine a repair service operating at key depots in transfer points along a major railroad line, which typically covers over a thousand miles with different requirements. The service requirements at every maintenance site would be slightly different, and that would include both parts and expertise. Now imagine that as a result of real time feedback on a run, a set of services and parts were projected in real time to a service center in advance of the train, getting there with perhaps two to 12 hours warning. Parts and personnel could be ready. This would save time and improve service.

**Sonia Bot:**

That's right Sheppard. And I'd really like to emphasize that a platform, as we have described, has enormous competitive advantages for the platform builders as well, but it will take a while to figure out how to best build it. A familiar example includes Apple and Android platforms, which allow many small niche players to operate on those platforms. The providers and consumers win, but so do the platform owners as they get to leverage the ingenuity of hundreds of thousands of providers. You get what is known as a viral effect of attracting more users.

**Sheppard Narkier:**

Yes, this viral effect has been in the news a lot. So, to elaborate on your point, Sonia, the viral effect can only work properly when it relies on integrity, and quality being consistently held as a high priority. This is especially important as platform builders are never guaranteed a perpetual advantage.

The platform builders need to be thoughtful about how strictly they control and manage providers. That's really important. Control can be overdone. Instead, platform builders should focus on the following two areas: First, orchestrate all stakeholder services to participate within reasonable well-defined guidelines. Second altering the platform as needed using knowledge gained from the real-time realities.

The rail industry exhibits some characteristics of this Business Environment as a Service platform. Today, these platform owners need to expand their services that they currently provide so that stealthy adjacent niche competitors are invited in, as opposed to deciding to directly compete. Niche players should be shown to have two advantages. One, how the value they bring will make a positive impact to them, and second, incurring less cost and risk while preserving their nimbleness.

An example of this Business Environment as a Service model for railroads, is the fact that they are natural gathering point of vehicles involving transloading freight that attracts maintenance, rental and personnel services. Today, this can be a launching point for sustainable expansion at intermodal sites, such as marine ports and inland terminals. Rail plays a main role in in terminal operations today but think of the competitive advantage real-time decision making can have in extending the brand of a railroad.

If railroads can operate all these adjacent facilities more effectively with quicker, more proactive responses such as pivoting to meet the needs as they change due to extremes of weather or geopolitics or just seasonal fluctuations, then railroad mindshare as the "get it done" service would increase across the ecosystem of vendors and other participants. A brand is all about keeping promises more effectively and efficiently and consistently. The brand and the promise are intertwined. The rail industry brand would greatly improve with such an increased value proposition.

**David Sherr:**

Nice example, Sheppard. I'd like to augment comments on something railroaders are concerned with all the time. I speak of maintenance that you mentioned earlier.

Things wear out in the universe even without use. Nicola Tesla's insight painted a great big picture when he said, "If you want to find a secret of the universe, think in terms of energy, frequency and vibration."

Energy, frequency and vibration put substantial stress on moving parts of rail freight equipment and beds and rails. We've all heard the wheels of the railroad track, especially with the wheel tread flat spots. This rhythmic clacking sound vocalizes Tesla's point and greatly impacts maintenance. It's like a sledgehammer hitting the rails. This is some serious wear and tear. As you might know, seasoned engineers can tell something is wrong when the sound of the wheels changes.

Continuing with the big picture and expanding on Sonia's point, look at the business environment ecosystems. Many participants, the rail transport operators, other transporters shippers and receivers, unions, equipment manufacturers, third party service providers, third party parts suppliers, leasers, insurers, trade financiers, and soon digital twin repositories and digital twin ownership verifiers, more on this later.

Continuing further with the big picture, include the resources available to the ecosystem participants. There's infrastructure, equipment, asset base and ancillary assets, signals and switches, power lines. We also have order books and of course capital. And last but not least, labor.

Let's drill down on the rail freight transport, maintenance, repair operations. Everyone has been touched with rail freight transport while sitting at a crossing waiting for the 10,000-foot freight train powered by multiple locomotives to clear. These locomotives are composed of three major subsystems. One is a diesel engine, one is a traction alternator, and the other is the electric traction motor on the axles. Much of the repair and refurbish activities are in these systems. Of course, rail bed maintenance as well as power line switches and signals also consume a large part of the budget. Timely and proper maintenance underpins the performance of PSR, which improves vastly in a smoothly running system. And so decisioning on maintenance is critical.

**William C. Vantuono:**

So, I think we're off to a good start on this discussion. Let's go under the hood a bit. Okay, what is a decisioning architecture? Would you please describe it to us?

**Sonia Bot:**

Sure, Bill. Let's start with what decisioning means. Decisioning is a term that will soon become mainstream in business jargon. Decisioning is the systematic discovery definition and management of decisions for design automation, AI, machine learning and secure digital twin technologies. They help reveal new insights. However, it's a decisioning architecture with the convergence of Operational Technology, OT, and Information Technology, IT, as the cornerstone that enables making the right decision, at the right time, with the right level of authority and scope.

The decisioning process starts with how people assess value. Value is in the eyes of the beholder and each person has a value lens based on their role, the implied scope of their decision making and the risk reward calculation they make at the time of the decision. For example, a brakeman would ask, "Could I lose my job, my life, or have a bodily injury?" Meanwhile, a CEO would ask, "Could I cause a massive operational failure at a critical time that devastates my company and my reputation?" Both these roles have very legitimate concerns. The difference centers on impact, physical abstraction and timeframe.

**David Sherr:**

And putting a finer point on Sonia's timeframe. Another key aspect is the time a decision **must** be made. A brakeman might have less than a minute. A railroad manager might have less than five minutes. A logistics dispatcher might have a day. The C-suite might need to make a key decision in less than a month for a critical matter.

Also, we need to consider the scope of the impact if a decision is not made. On a moving railroad, that impact could be massive. The principle is to limit the downside of not acting. In the near chaos we need near continuous mishap-hedging against likely potential faults and failures.

Just as important are the kinds of information needed to make this key decision; to act or not. Is it plain text read out or is it a sophisticated dashboard with blaring alert levels? Is it data in multiple pages and formats? Does it need vigorous discussion? What is the level of wisdom needed?

**Sheppard Narkier:**

So, with the context that David and Sonia provided, here's the answer to your question, Bill. You asked what a decisioning architecture is.

Let's start with architecture. An architecture defines meaningful components at certain levels of detail, then describes how these components interact with each other. It might also include whether some components are nested inside other components, much like a locomotive architecture. There are varying levels of details and views such as mechanical and electrical, et cetera.

Let's explore this architecture as it relates to decisions. We advocate re-organizing how events, data, information, and knowledge are collected, refined, and presented so that the various levels of wisdom can be applied at the right time. That meant looking at processing flows of all these components that go into decision making and re-designing those flows so that they are closed loops. They need to be closed loops at each level while providing enough information movement up and down to all decision-making levels.

A closed loop means that the information is gathered, refined and distributed to the original providers of the data. The original providers can then consume the commands or knowledge that were derived from the original output and adjust their operations as needed. This enables the agency of any person, component, or process to make the right decisions at the right time, at the right level of scope and impact. It is self-reinforcing, the basis for a system to learn.

We started with some first principles in order to be able to arrive at this model. Let's go through them. The convergence of Operational Technology and Information Technology stacks is fundamental to the success of the decision-making architecture. This convergence is critical to building a successful digital twin driven decision-making system. A digital twin is less useful if the insights are just buried in reports.

There is a clear tree of added value to data as it gets refined. Starting with events and ending up with applied wisdom. It is a fuel for a learning-based decision-making system. We show this value tree in the book with some helpful analogies.

Once a decision is made, it can be sent in real time to those affected, but more importantly, the effects of those decisions can be measured so that the decision makers can assess their impact in a short amount of time and adjust accordingly. In essence, create a learning system that self-heals over time.

**William C. Vantuono:**

Now in the first podcast in this series you mentioned that OT- IT convergence is the goal. In your book, you state that “Of all the strategies and approaches to consider as a mechanism to remain viably competitive, the convergence of OT, and IT stands out as the most promising for a sustainable success.” So, I’d really like to explore this, but let’s do this in steps. First, why don’t you explain what OT-IT convergence is?

**Sonia Bot:**

Sure, Bill. So before diving in, I’d like to quickly describe what OT, Operational Technology, and IT, Information Technology, are, as I find that many people are quite familiar with what IT is, yet OT is not as well known.

Colloquially OT is often referred to as the non-carpeted areas of IT.

So, let’s just dig in a little deeper here. Both OT and IT involve computing, networking and storage technologies. However, these technologies are used for different purposes. OT, Operational Technology, is a category of computing and communication systems to manage, monitor and control the operations with the focus on the physical devices and the operating processes they use. Meanwhile, IT, Information Technology, focuses on business support and business enablement by using technology to collect, manipulate, analyze, and generate insights from data.

What’s interesting is that both OT and IT have been around since at least the 1970s and they’ve been existing separately and independently since that time. And since that time, OT and IT teams each have managed different technology on different networks for completely different purposes.

OT, Operational Technology, has a deeper frontline focus as it’s more intimately engaged in the direct functioning of the operation and of the business. Meanwhile, IT, Information Technology, is generally more focused on the productivity of the organization. The processes and cultures have evolved independently through generations of business model changes. While the historically siloed technological foundations are now starting to blur. The current rate of disruptive change necessitates senior executives to have a holistic view that includes both worlds as it’s vital to sustainable competitive advantage.

So now, what is OT-IT convergence? In its most basic form OT-IT convergence connects OT systems and IT systems. Again, in its most basic form. Connection of these two allows these two systems to transmit data to each other.

The goal of OT-IT convergence is to use this connectivity to enhance the value these systems deliver. For example, being able to collect, manipulate, and analyze data from OT systems enables organizations to better use their IT systems to streamline business processes and generate insights that can be used to foster innovation or introduce new services. And with OT systems that can be updated or optimized with data from IT systems organizations can improve how these OT systems manage various physical operations.

Let me bring this to life for you with some really simple examples. Imagine an IT system connecting to a shipping container’s OT system and say, perishables such as fresh produce or pharmaceuticals, are being shipped. When the temperature crosses a buffer threshold, an alert is sent, and proper corrective action can be taken before the shipment spoils. Another example, imagine that by collecting OT maintenance data for locomotives or trucks or other machinery and then analyzing it with the IT systems, insights can be garnered on what kind of modifications or innovations can be made to improve dwell times. What’s really exciting is that we can keep on imagining application scenarios! The possibilities are endless!

**Sheppard Narkier:**

Those are good points Sonia, and I'd like to add another viewpoint on what OT-IT convergence is.

This convergence is achieved when we align the types of data, information, and knowledge between these two stacks to create integration paths between appropriate layers of each stack.

The concept of a stack is well defined in the book, but the brief definition is that a stack is a set of layered processes that have clear boundaries of responsibilities to gather and process data and then take action.

We define this OT-IT convergence by designing capabilities in layers of the IT stack to aggregate, cleanse, normalize, and then interpret events from the corresponding layers of the OT stack.

We must also design IT capabilities that ensure security measures are embedded in all layers of the IT and OT stack. This is actually quite challenging because sensors must remain inexpensive in the foreseeable future to be cost effective, and that means they will continue to be vulnerable.

We also need to design capabilities that can convert insights into controls that the OT stack can unambiguously interpret and act upon correctly and quickly. This convergence not only defines data gathering and control flow, but also has flows that move information upwards through many different layers of decision making. This is the essence of creating a self-learning and self-healing system that can act with the right authority, at the right time and right scope. It builds confidence for real-time decision making.

**William C. Vantuono:**

Now let's get to the meat of my question. In the first podcast in this series, you mentioned that OT-IT convergence is the goal. In your book, you state that *<quote> "Of all the strategies and approaches to consider as a mechanism to remain viably competitive, the convergence of OT, and IT stands out as the most promising for a sustainable success." <end quote>*

Would you please describe the role that OT IT convergence plays in your architecture? Sonia, I'll start with you

**Sonia Bot:**

OT-IT convergence is driven by top level business objectives, which are continuously managed and governed under an overarching executive level authority. Common processes are the foundation while standard technologies and people competencies are the fuel. The payload is the knowledge that travels through the processes in the two worlds of OT and IT and this knowledge can be refined to uncover latent needs and to uncover business value. The software connects transports and shares the data throughout the converged system.

We can also say that OT-IT convergence is not just about industry, and IoT, Internet of Things, plays a substantial role. The scope of OT-IT convergence can be as narrow or wide, or as simple or complex, as it needs to be. It can be tied to a specific operational area in an organization, or across an entire organization, or throughout an industry, or across ecosystems of collaborating industries.

**William C. Vantuono:**

You mentioned that you use secure digital twins in your approach. Let's explore this. We hear a lot about digital twins, but can you tell us what secure digital twins are, David?

**David Sherr:**

Sure, Bill. Let's start with what a digital twin is.

A digital twin is an intelligent agent that is a virtual representation that serves as the real-time digital counterpart of a physical object or process. We build them with intelligent agent tools. Digital twins mediate data and information between OT and the counterpart, IT; ergo the convergence. They are built by gathering data and information about anything you want to make it a copy of, and then recreating it in a digital space.

As an intelligent agent, a digital twin is out of sight, but certainly not unfelt. They are centrally situated in our decisioning architecture. The digital twin uses AI and machine learning, mostly to simulate the effects that change in a design process or conditions would have, all without subjecting the real world object to those same changes. For example, suppose a management team is wondering if changing the maintenance schedule of the fleet of rail cars and locomotives as well as other vehicles would positively or negatively affect the delivery of freight at their sites in the collective supply chain.

The same can be said of passenger routes and running these trains close to schedule for a great rider experience. If a digital twin of these operations is in place, then simply change the schedule there and find out without necessarily disrupting and putting the ongoing operations at risk.

The use cases in our book explore the example of how digital twins can assist extracting value from supply chain business operations by being the nexus of OT-IT convergence for the physical asset. We start with key business processes, as Sonia has said, drilling down to keeping assets and working order so that goods and processes flow smoothly and efficiently.

**Sonia Bot:**

Thanks, David. Thanks for queuing up what a digital twin is. Now that we have this context, I'll talk about secure digital twins.

We start with, why do we need secure digital twins? We are seeing that real-time or near real-time input is becoming part of the managerial understanding that will change approaches to operational tactics and overall strategy. And this is a shift that digital disruption and IoT are driving.

Inexpensive sensors and advances in network access are making this possible. These sensors, and they are intentionally designed to be low cost, are pervasive and will intentionally remain low cost, since the economies of scale require these sensors to be low cost and easy to use. Because these sensors are designed to be inexpensive, these sensors are more susceptible to hacking by external entities outside the firewalls.

So now we have low-cost sensors, more distributed data and more diverse network traffic. And all this provides opportunities for system compromises at all levels of the organization. We need to design around this constraint upfront. This is where secure digital twins come into the picture.

Secure digital twins have several layers of protection built in. Data is scrubbed well before it is placed in the data repositories and the data has strong role-based access controls.

**William C. Vantuono:**

Well, David and Sonia, thanks so much for the context you just provided. I'd like to explore this a little more. Would you describe how secure digital twins fit into your decisioning architecture? Sheppard, why don't you kick this off here?

**Sheppard Narkier:**

Sure, Bill. Secure digital twins provide levels of predictability regarding how an operating device will respond to varying stress points from simple wear and tear to a significant breakdown. They can predict the need for maintenance well before the physical component fails. They can predict the impact of the components wear and tear on the operating mode of the entire machine. They can predict changes in real time; and if structured properly, can work with an operations dashboard to alert of impending changes or even send the data to an operational control component to change the operating mode of the machine in real time.

It's a game changer in terms of safer, more effective, more efficient operations.

Sensor data needs to be carefully orchestrated, remembering that sensors themselves are devices that will have simple digital twin model.

**William C. Vantuono:**

So far, you've described the key components of the decisioning architecture. Can you explain how this all fits together, Sheppard?

**Sheppard Narkier:**

Sure. The Business Environment as a Service platform has infrastructure to support decision maker actions. We call it the decisioning architecture.

The Business Environment as a Service platform provides a Platform as a Service. I know that sounds weird, but it's Platform as a Service. And what that is, is an architecture with tools to develop multi-tenant Software as a Service instances that are consistent with that reference architecture. And it's interoperable within and among other Infrastructure as a Service offerings.

**David Sherr:**

Yeah. In my domain, thinking on a forklift example. Warehouse automation is in its infancy, except for some big players. In a recent Industrial Trucking Association study, 62% of fleets contain fewer than 15 forklifts, and so could benefit immensely with decisioning on dispatching and repairing a forklift, which is reactive. Generally, there is no time to gather more data to develop necessary information to decide and evaluate the outcome.

In our decisioning architecture, there is an orderly data flow from instrumented equipment, pallets and workloads upon those pallets. Data are quarantined, cleansed, and transformed into readily usable blocks to use directly or to ingest into a machine learning analytic.

**Sheppard Narkier:**

That's an important example David, and I'd like to be able to talk a little bit more about security and privacy in that regard.

Security and privacy are table stakes for a Business Environment as a Service platform. As a service platform which operates over a cloaked network. Only market regulators can expect that activity without limit.

Now, as we realign and converge OT with IT, the digital twin is the IT connection to the OT device. The digital twin is an image in a mirror world. Essentially a metaphor.

It it's an actual image of an intelligent agent that discovers insights but also can act upon those insights. It continually updates the state of the device through the stream of sensor data. It exclusively mediates messages between IT services. And the OT device is one of the very few cases where something is hard

coded due to sensor limitations that we discussed before. The digital twin notifies a device of state change requests and contains and runs analytic measures for the behavior of the device.

**David Sherr:**

To Sheppard's point about the digital twin operating and the importance of security, the digital twin operates in a cloaked network. The digital twin inherits from this network, the digital and some physical security and privacy levels. And here we have the digitally private and secured digital twins certified by the Business Environment as a Service security

Physical security is an important consideration as well. The digital twin *<air quote>* "knows" any instruments used by the device to promote that physical security. This is called physical surveillance. Regulators dictate operational safety surveillance. Operators act, regulators surveil. These regulators can be inside the enterprise or outside the enterprise in governments like OSHA, FRA or NHTSA or in nonprofit industry groups like the previously mentioned Industrial Trucking Association.

**William C. Vantuono:**

All right, well thank you, David.

Sonia, I'd like you to kick off the next topic here. Would you tell us how decisioning architecture helps with investment decisions?

**Sonia Bot:**

For decisions that are not blatantly straightforward, there's always some ambiguity involved. That's reality.

What we find is that people typically make investment decisions based on information that is incomplete and aged while the forces that we talked about in our first podcast in this series... and examples of the forces are market, technological, economic, regulatory, weather, environmental and , so on and so forth, it's a long list... These forces and events around us continue to change and their rate of change gets faster and faster. And then the ambiguity tends to increase.

Now let's also add in another layer to this: incomplete and aged information, and this continuous influence of external forces. We find that most decision makers don't really understand the technical debt and the overall enterprise drag that already exists in their span of influence and control. This is notably true of the systems they own... and especially in systems with lots of legacy, whether that legacy is technology, processes, skillsets, policies, regulations or products and services.

So, what happens is that investment decisions are made all over the map. For example, typical investment decisions that we see involve doing nothing, continuing as is; or tinkering, which is spending effort and resources on low or no return or irrelevant initiatives; or big bang transformations filled with hope; or tiptoeing forward by underfunding; and so forth.

Oftentimes we see the most effective options and the most powerful options and the sustainable options, the win-win win options, were not taken because they were not properly discovered. Or from the flip side, the proper vetting of options ended up being improperly biased. And enterprise drag and technical debt , keep piling on and on and on and on.

We designed our decisioning architecture so that there is traceability and visibility throughout the system with all the dots connecting. So once a set of forces, uncontrolled chaos, are discovered, the rest is a closed loop system and more specifically a control system with a feedback loop that is active.

This feedback loop presents the opportunity to control the chaos. Within this closed loop, organizations can assign their varying levels of authority to effectively execute what needs to be done to sustain their competitiveness.

The staged investments in these new technologies can be strategically introduced so that subsequent phases can be paid for by savings obtained in prior phases. In our book, we describe this in detail with the actual connection of the dots across the various components and views of the architecture. You can pick a thread and follow the dots.

So, for strategic investment decisions, you pick the item of interest and follow the thread to see the impacts of possible decisions at every level. From sensors on the ground to data, information, knowledge, wisdom and insights. And as we talked about in our first podcast in this series, most organizations are stopping short at the information and knowledge levels in their strategies and in their designs.

**William C. Vantuono:**

Well, Sonia, thank you so much for that.

Now I'd like to give you a preview of part three of our series. Sonia, Sheppard and David will talk about the success factors that lead to the sustainable evolution of a decisioning architecture, an architecture that provides agility for sustainable advantage and relevance.

David, Sheppard and Sonia, how about some parting words for part two here?

**David Sherr:**

We have shown in this podcast that there is a way to have a more confidence in the data to make more effective decisions. I strongly encourage people to overcome the inertia of their organization. That is the bias to status quo. This is important because the next disruptor may not be obvious before it's too late and you are left behind irrelevant and unprofitable. Digital twins can deliver demonstrable value. These digital twins mediate OT-IT convergence and can transform an organization away from a status quo.

What is your take Sheppard?

**Sheppard Narkier:**

I'd like to build on that, David. OT-IT convergence is the foundation to creating new value for all participants in an ecosystem. It creates levels of feedback loops that enable systems to act upon the data they initially sent because other components refined and analyzed that data to provide real-time knowledge for automated actions or for a human to apply wisdom.

It ties the big picture to the small picture in a way that we have never been able to do before. It is the key to building a self-learning, self-healing system. It provides the basis for a cultural shift where change can be embraced because the impacts can be understood faster.

**Sonia Bot:**

For my parting words, one thing that I'd like to reinforce is if there's only one thing that a company needs to master, then learn to master decision making.

And in this podcast, we talked about mechanisms that make decision-making easier and more powerful at all levels of an organization and ecosystem. Starting with OT and IT convergence, which leads to effectively building secure digital twins and building multi-sided platforms such as the Business

Environment as a Service platform, where providers and consumers of data and services can meet and add their unprecedented value.

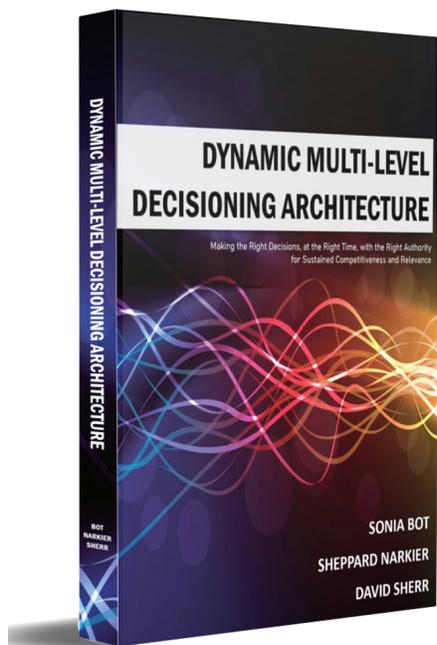
It's about making the right decisions, at the right time, with the right scope and the right level of authority.

**William C. Vantuono:**

Thank you Sonia. And I'd like to conclude this podcast by just mentioning the book again. *Dynamic Multi-Level Decisioning Architecture: Making the Right Decisions, at the Right Time, with the Right Authority for Sustained Competitiveness and Relevance*. For a limited time, the electronic version is free to friends of the authors. A Railway Age audience is always a friend of our authors today. And I mean that sincerely. So, all you need to do is go to the website, <https://botgroupinc.com/featured-content> to download. And there are no forms to fill out. We keep it very, very simple.

Sonia and Sheppard and David, thanks so much for joining us. We'll see you back here for part three and uh, have a safe day.

**ARTICLE:** <https://www.railwayage.com/cs/notch-8-to-the-golden-run-part-2-the-business-environment-as-a-service-platform/>



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