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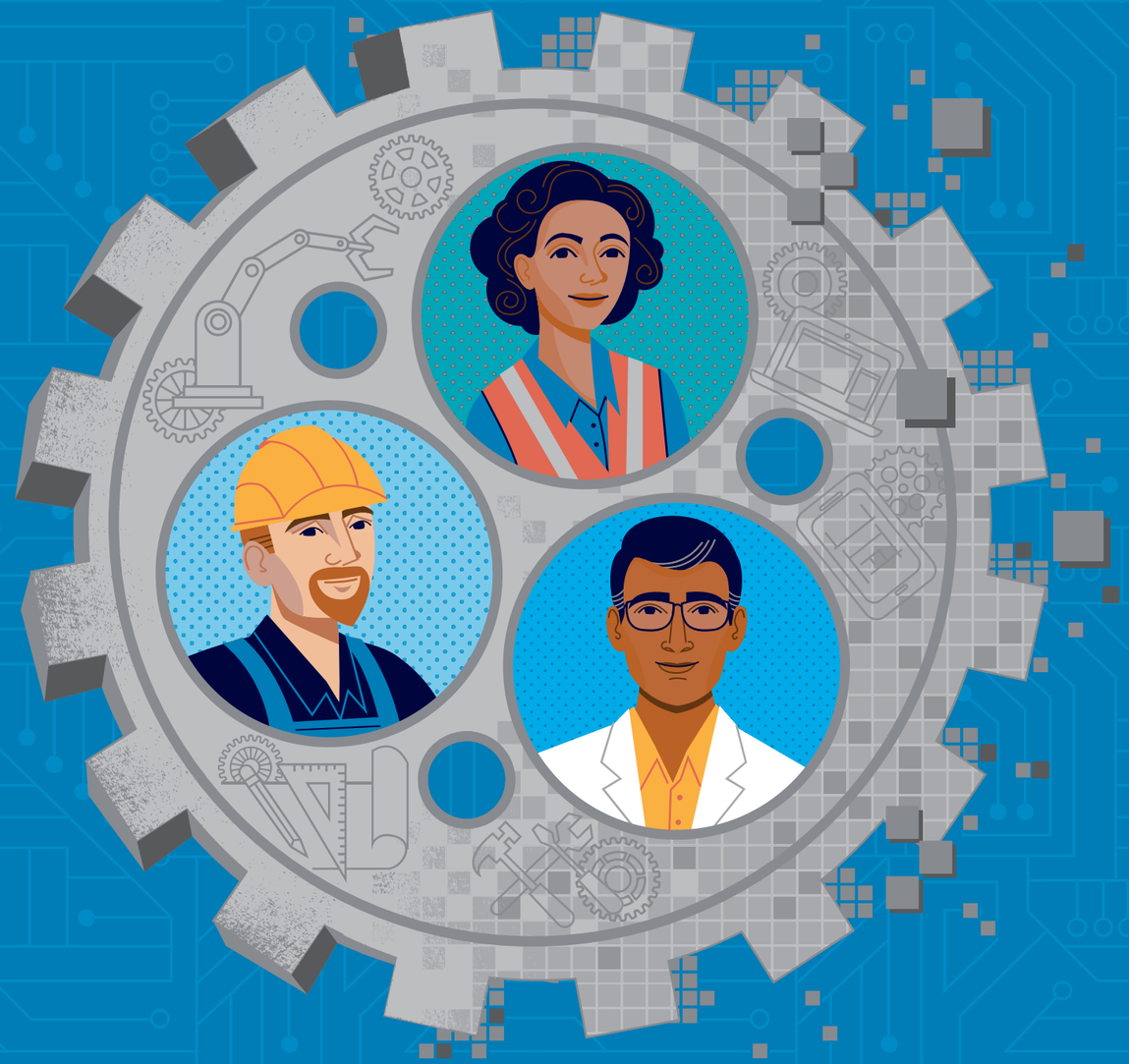
Insights

A DELOITTE SERIES ON THE SKILLS GAP AND
THE FUTURE OF WORK IN MANUFACTURING



The future of work in manufacturing

What will jobs look like in the digital era?

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The United States is experiencing near-historic low unemployment amid an extended period of economic expansion. The skills shortage The Manufacturing Institute and Deloitte have been tracking for the past 17 years continues to swell, threatening to impede the current growth in the US manufacturing industry. This fourth skills gap study explores the depths of today's talent shortage in manufacturing, how jobs are changing due to technology and automation, and what measures manufacturers could take to solve for today's shortage while preparing their future workforce for success.

INTRODUCTION

The manufacturing workforce has been absorbing new technology for more than two centuries. Today, the industry finds itself in the midst of the Fourth Industrial Revolution, which is poised to transform work at an unprecedented pace through exponential technologies such as artificial intelligence, advanced robotics and cognitive automation, advanced analytics, and the Internet of Things (IoT).[1] And, contrary to some predictions, technology is likely to create more jobs than it destroys—as it has done historically.[2] This is evident in the tight manufacturing labor market conditions prevailing both globally as well as in the United States.

Additionally, the Fourth Industrial Revolution is creating a mismatch between available workers and the skills necessary for open jobs. In fact, Deloitte and The Manufacturing Institute anticipate the shortfall in US manufacturing during the next decade to reach the highest levels ever recorded, higher than the earlier estimates of 2 million unfilled jobs during 2015–2025.[3] Part of the challenge the industry faces is understanding how today's jobs and associated skills are morphing into new jobs and career pathways that continue to evolve along with advanced technology. How can the manufacturing industry prepare for this future workplace and ready its workforce to work beside robots and advanced technologies? What are the skills that will become "must-haves" in the future workplace? What are the pathways for training and education to enable these skills? We begin by exploring what's possible for future jobs in manufacturing.

REIMAGINING MANUFACTURING JOBS

To help manufacturing leaders and workers visualize the possibilities of the future, we've developed a series of personas that describe what jobs could look like in 2025. We have chosen to describe these 2025 jobs from the vantage point of the workers themselves, exploring how their work has changed, what kinds of skills and career pathways they have, the types of digital tools that assist them in their work, and what a normal day on the job looks like.

Bringing these future jobs to life can help business leaders, workers, educators, and policymakers shape their vision and spark conversations around what needs to change to make this happen. These future personas represent our ongoing research on skills gaps and the future of work in manufacturing, and reflect several important themes:

- **Putting humans in the loop.** As Deloitte's *2018 Global Human Capital Trends* report explains, leading organizations are working hard to put humans in the loop—rethinking work architecture, retraining people, and rearranging the organization to leverage technology to transform business. The broader aim is not just to eliminate routine tasks and cut costs, but to create value for customers and meaningful work for people.[4]
- **Expanding digital and "soft" skills.** The rise of automation in the workplace has brought with it an interesting corollary for skills needed in human workers. As technology replaces many of the manual or repetitive tasks many jobs entail, it frees up space for skills that are uniquely human, often called "soft" skills. A recent World Economic Forum study found that the top 10 skills for the next decade include essential human skills such as critical thinking, creativity, and people management.[5] Companies need workers that can exhibit these skills as well as the digital skills necessary to work alongside automation.
- **Leveraging the digital toolbox.** Along with the move toward automation, robotics, and artificial intelligence, manufacturing workers are increasingly relying on digital tools to effectively complete their work. As the *2018 Global Human Capital Trends* study shows, tools such as collaboration platforms, work-based social media, and instant messaging can increasingly support the communication necessary for higher productivity.[6] We have created a "digital toolbox" for each of the personas to exemplify the types of tools a future worker can leverage to perform their daily work.

As digital transformation and the Fourth Industrial Revolution continue to redefine manufacturing jobs of the future, leaders and workers alike need to embrace a work environment that is expected to blend advanced technology and digital skills with uniquely human skills, to yield the highest level of productivity. Understanding how work might change can help the industry as a whole prepare for a future that promises to be transformative.

This series is part of Deloitte's fourth skills gap study with The Manufacturing Institute to understand the depths of today's talent shortage in manufacturing, how jobs are changing due to technology and automation, and what measures manufacturers could take to solve today's shortage while preparing their future workforce for success. Through this research, we are engaging with business leaders, educators, and policymakers to explore how the manufacturing industry can prepare for a future that will likely require a markedly different skill set to remain competitive.

DIGITAL TWIN ENGINEER

Summary

Digital twin engineers create a virtual representation of both the physical elements and the dynamics of how an IoT-connected product operates and interacts within its environment, throughout its entire life cycle. Ranging from a jet engine or aircraft to a shop floor, an assembly line, or even an entire factory building, digital twin engineers make it possible to virtually see inside any physical asset, system, or structure that could be located anywhere, thereby helping to optimize its design, monitor its performance, predict its maintenance, and improve the overall experience.

Faster computing power, a proliferation of sensors, and exponential growth in the ability to capture data locally are fueling the rise of digital twins—virtual representations of products created with 3D design software. Digital twin engineers play a crucial role in building the relationships and communication lines across silos to create a network that marries the physical and digital worlds throughout the manufacturing value chain.

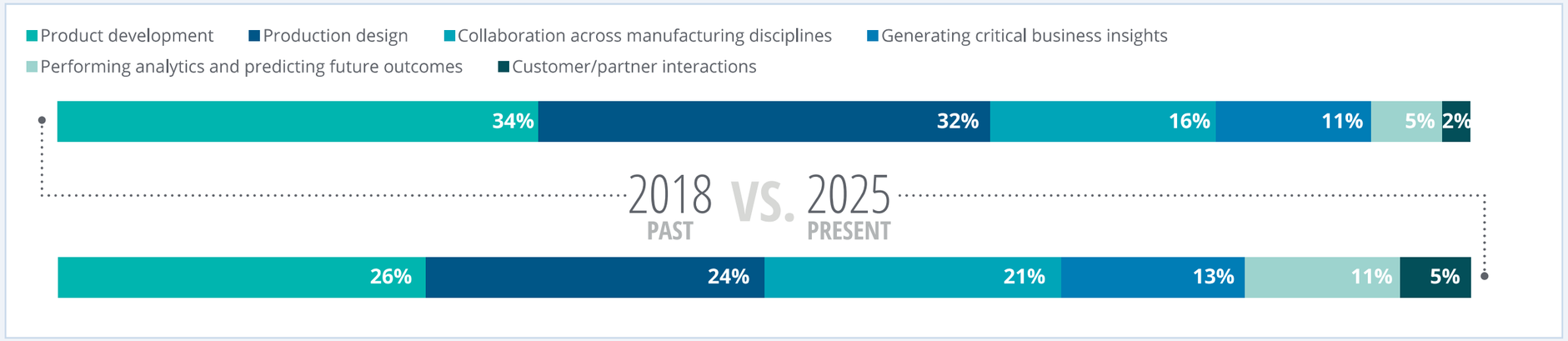
Digital twin engineers leverage engineering tooling along with a product structure (including parts, sub-assemblies, and sub-components) and integrate these with the necessary digital elements (including software, data, and chips) into a single design to produce the highest-quality product. Further, they act as a link between the product twin and the performance twin, revolutionizing how manufacturers work together with asset operators and customers, enhancing collaboration, accelerating innovation, designing smarter products, and creating new services.

By creating virtual models to test in real-world operating environments, digital twin engineers help manufacturers gain an understanding of their product behavior, thereby enabling better performance through enhanced design and predictive maintenance.

Responsibilities

- Create digital twins using 3D software and run simulations to measure product performance in varying conditions
- Draw insights from in-use product data to design new products and business models
- Use machine learning along with real-time usage and performance data to optimize product performance and service
- Work closely with the sales and marketing teams to create data-driven customer insights and go-to-market strategies

Time spent on activities



GINTAS DEFRANK

DIGITAL TWIN ENGINEER
AirTrain Engines and Co. | *Danbury, CT*

Proficient in creating virtual replicas of major industrial products and helping companies predict and respond to customer problems using real-time data analysis and advanced technologies

Experience

Digital twin engineer
AirTrain Engines and Co. *Aug 2022–present | 3 years 8 months*
Work closely with customers to calculate time to failure and the remaining useful life of jet engines so that maintenance is performed on a condition-basis instead of a fixed schedule

eEngineering applications manager
Adein Corp. *Jul 2018–May 2020 | 1 year 11 months*
Developed a product data management system that is used to create engineering design applications and worked with engineering managers to deliver applications for product introduction management and design of Six Sigma

Artificial intelligence systems engineer
MITY Technologies *Jun 2016–Jun 2018 | 2 years 1 month*
Conceived, designed, implemented, and delivered multiple decision support systems based on advanced technologies

Education

Fairfield University
Master of Science, Engineering
2020–2022

Trinity College
Bachelor of Science, Computer Science
2012–2016

Skills and endorsements

Simulations · 108
Endorsed by **Janson** and **Harriet**, who are highly skilled at this

Analytics · 99
Endorsed by **Cabe**, who is highly skilled at this

Sensors · 96
Endorsed by **Melissa** and **Jacob**, who are highly skilled at this

Software Development · 88
Endorsed by **Tina**, who is highly skilled at this

Systems Engineering · 81
Endorsed by **Jacob** and **Tina**, others who are highly skilled at this

Research and Development (R&D) · 76
Endorsed by **Milli**, who is highly skilled at this

Algorithms · 75
Endorsed by **Janson** and **Cabe**, who are highly skilled at this

Image Processing · 75
Endorsed by **Melissa** and **Rajat**, who are highly skilled at this

Cross-functional Team Leadership · 73
Endorsed by **Scott** and **Mary**, who are highly skilled at this

Program Management · 72
Endorsed by **Jackie** and **Nihil**, who are highly skilled at this

TOOLBOX

THE TOOLBOX SUPPORTS THE WORKER AS A WHOLE—IN ACHIEVING EXTERNAL OUTCOMES SUCH AS PRODUCTIVITY AS WELL AS INTERNALLY FOCUSED ONES SUCH AS DECISION-MAKING AND LEARNING.

Productivity

Venus
This artificial intelligence (AI)-powered, voice-enabled digital assistant provides a conversational interface for all productivity-related tasks, from scheduling to finding answers to questions and checking the status of products and projects.

WeAR
It is an augmented reality (AR) wearable device that connects digital twin engineers to IoT devices, and receives work instructions and training. These smart glasses, paired with Bluetooth-enabled scanners and voice guidance, respond to commands and open a pop-up on monocular display, which help boost productivity.

InstaCap
It captures data automatically using digital technologies such as radio frequency identification (RFID) and speech recognition. It helps collect information from machines, images, or even sounds without manual data entry.

Symphony
This software suite runs simulations and connects digital twin engineers with other resources—people, machines, and systems, for data-driven digital manufacturing. Using advanced real-time analytics, it helps digital twin engineers create models and optimize manufacturing production performance.

Share Smart
It is an enterprise social and mobile technology tool that helps in sharing digital 3D designs and images as digital files, to improve the collaboration necessary to build a new product or assembly line right the first time.

Rosetta
It is an AI-based real-time language translator that listens to speech, converts it into text, and then translates that into the desired language, enabling collaboration among different regional markets.

Decision-making

Smart Dash
It is a visual display that presents data, live information, and analysis from multiple sources to facilitate informed decision-making.

Envision
This tool uses machine learning to identify potential problems as well as opportunities to devise solutions that make a positive business impact.

RealConnect
This application enables an engineer to seamlessly interact with suppliers, partners, customers, and the broader ecosystem.

Sixth Sense
It is a tool that incorporates machine learning, cognitive computing, and artificial intelligence to detect macro trends in the broader environment.

Learning

SkillsPro
This smart learning assistant helps digital twin engineers refresh existing skills as well as learn new and emerging skills. Its conversation mode shares tips and tricks about the tools/techniques that an engineer has learned recently. When synced with an engineer's project planner, it shares a list of skills to be learned for implementation in upcoming projects.

SmartLab
It facilitates classroom learning using virtual reality headsets and simulation. It tests trainees on a defined skill framework and measures subjective aspects based on their response style. Each trainee receives customized learning objectives.

A DAY IN THE LIFE

07:30 AM

Gintas begins his work day from his home office and accesses Share Smart to share the digital files of his 3D product prototypes with Carlos, a mechatronics software engineer based in Frankfurt. Gintas puts on WeAR before beginning his working session on a new engine design that his company is developing in collaboration with Carlos' company CAI, a leading cloud services provider specializing in the manufacturing industry.

09:00 AM

As soon as Gintas completes his meeting with Carlos, RealConnect sends out an alert reminding Gintas to update the latest prototype model and all the analyses of mechanical and other engineering systems so that AirTrain's customers can review and provide their feedback by the next morning.

10:30 AM

Gintas logs in into Smart Dash to share live information and analysis with Adam, his senior project manager, as they prepare for their upcoming call at noon with the head of R&D to go over the status of the project.

12:00 PM

Adam and Gintas open the new module of Sixth Sense to discuss the results of all the analytics that ran and they detect a few major challenges identified during the build stage of the new engine prototype.

01:30 PM

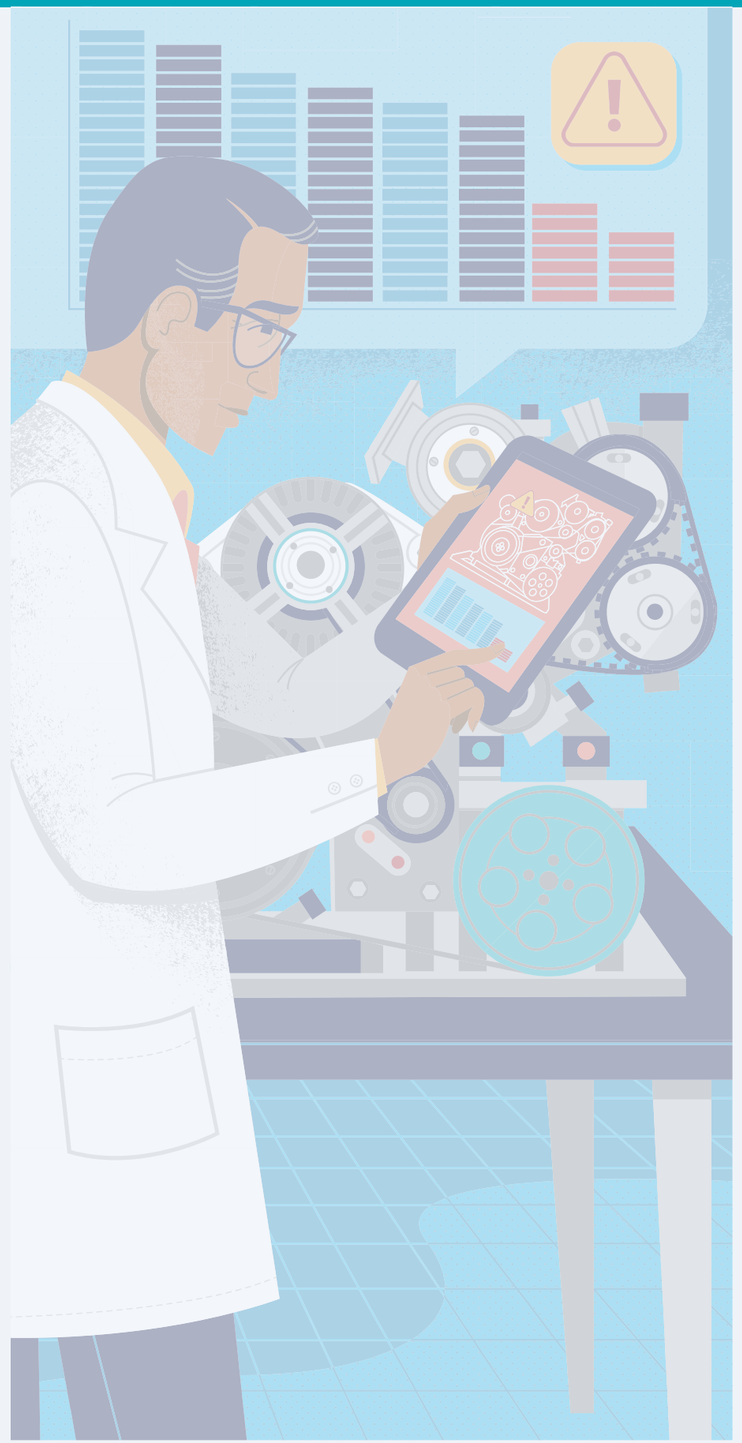
After his review meeting with Adam, Gintas goes for lunch with his wife at a Peruvian restaurant a couple of blocks from his home. On the way, Gintas asks Venus, his AI-powered voice-enabled digital assistant to find out how the latest review results compare with the earlier version of the prototype.

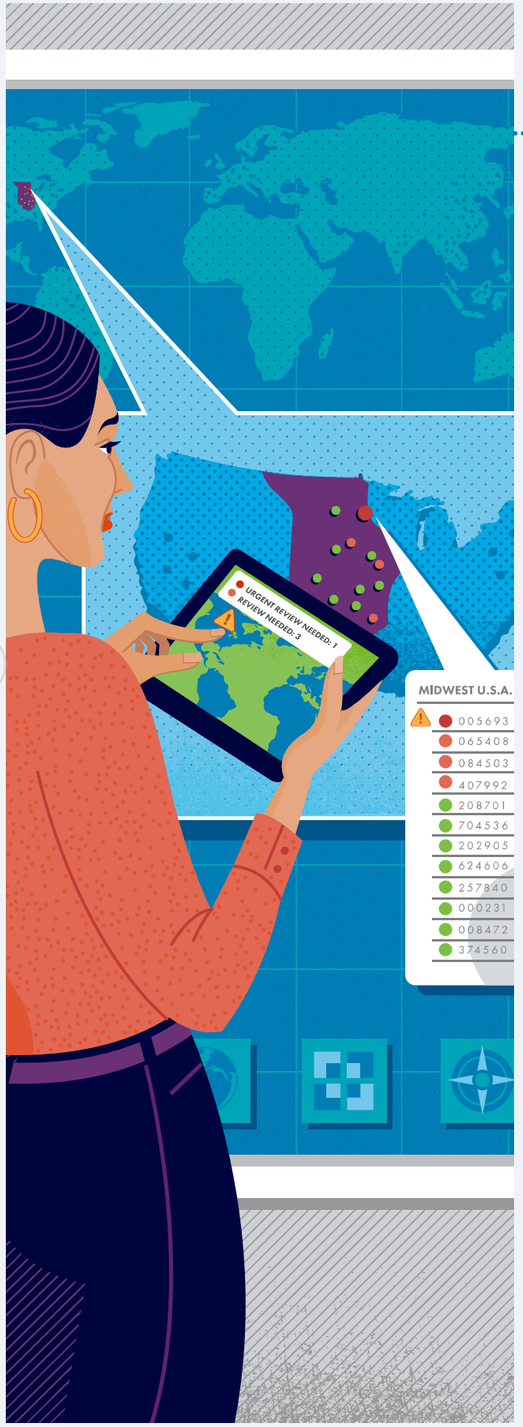
03:00 PM

After returning from lunch, Gintas speaks to Rosetta in English to convert all the key findings from the differences in results of the two versions of the prototypes, provided by Symphony. Rosetta translates them into Japanese and sends it over to Ankari, the head of materials division at Yuna, an Osaka-based supplier of advanced pistons.

04:30 PM

As Gintas begins wrapping up his workday to pick his daughter up from school, he receives a pop-up from SkillsPro suggesting a new course on hardware-in-the-loop (HIL) and software-in-the-loop (SIL) technology is now available. Gintas asks SkillsPro to enroll him into the course, which he plans to take using SmartLab next week.





PREDICTIVE SUPPLY NETWORK ANALYST

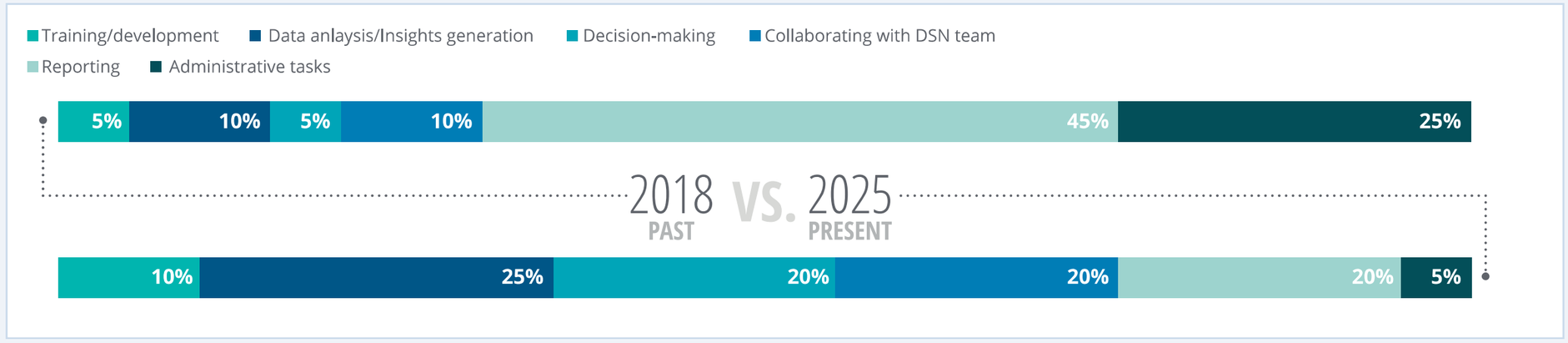
Summary

Predictive supply network analysts play a strategic role in the digital supply network (DSN). With a portfolio of digital tools, these analysts generally rely on machine learning and cognitive computing, instead of "gut feel" and static reports, to identify opportunities for calibrating demand and supply. The results enable them to maximize performance based on metrics, including customer satisfaction, productivity, and margins. Because many day-to-day decisions are automated, these analysts can focus on changing algorithms that reflect exceptions or developing situations. More importantly, they have an eye to the future, making decisions intended to give their business a competitive advantage. The analysts apply enduring human skills such as complex problem-solving, problem sensitivity, creativity, and judgment to make decisions that augment and refine the recommendations of the tools they use. These analysts typically spend more time working with cross-functional teams that, together, power the DSN. To keep refreshing their digital skills as new capabilities emerge, predictive supply network analysts rely on smart learning assistants to help them master exponential technologies.

Responsibilities

- Evaluates recommendations from the predictive system, such as scheduling and material orders, and makes final decisions
- Identifies market opportunities and proposes collaborative forecasts to customers based on analysis and insights from machine learning and artificial intelligence (AI) tools
- Delivers results against key performance indicators, such as out-of-stocks, inventory cycle times, and asset utilization, ensuring that customer service-level agreements have been met
- Works collaboratively with engineering, production, and logistics to calibrate demand and supply, and eliminate any disruptions or delays

Time spent on activities



JAMIE SANCHEZ

PREDICTIVE SUPPLY NETWORK ANALYST
Olsen Pumps & Valves Co. | *Milwaukee, WI*

Predictive supply network analysts are a connected and integrated part of the broader DSN at their organization. Skilled in data sciences and big data modelling techniques, they typically use digital tools along with their innate human skills, such as complex problem-solving, to move materials and finished goods through the DSN for just-in-time deliveries.

Experience

Predictive supply network analyst
Olsen Pumps & Valves Co. *Jan 2024–present | 2 years 6 months*
Develops forecast models; analyzes market demand patterns to maximize material availability, minimize inventory hold-up costs, and meet market demands

Analytics gig worker | Online analytics competition enthusiast
Various online platforms *Jun 2022–Dec 2023 | 1 year 6 months*
As a recent analytics postgraduate, further enhanced knowledge by working on freelance projects and participating in online analytics competitions

Senior supply chain planner
Craft Flow Systems Co. *Jan 2019–May 2022 | 2 years 5 months*
Point of contact for the purchase, production, logistics, and sales department; was the first to use data analytics to predict supply needs

Supply chain planner
AirClean Inc. *Jun 2015–Apr 2021 | 2 years 7 months*
Worked with the procurement function to shortlist material vendors and negotiate contracts; helped the inventory team with manual daily inventory counts and with creating spreadsheets; also helped the sales team analyze current sales data and project customer demand based on historical sales data

Education

University of Wisconsin
Graduate certificate in advanced analytics (online)
2021–2022

University of Wisconsin
Bachelor of science, supply chain
2011–2015

Skills and endorsements

- ERP · 396
  Endorsed by **Jennifer** and **Carter**, who are highly skilled at this
- Demand analytics · 188
  Endorsed by **Lucas**, who is highly skilled at this
- Inventory optimization · 181
  Endorsed by **Jennifer** and **Lucas**, who are highly skilled at this
- Network planning and optimization · 176
  Endorsed by **Melissa**, who is highly skilled at this
- Replenishment analytics · 95
  Endorsed by **Melissa** and **Ryan**, who are highly skilled at this
- Logisitics and warehouse management · 85
  Endorsed by **Hemant**, and **Akkub**, who is highly skilled at this
- Analytics · 79
  Endorsed by **Melissa**, who is highly skilled at this
- General tech fluency · 68
  Endorsed by **Jennifer** and **Ryan**, who are highly skilled at this
- Visualization · 73
  Endorsed by **Akkub** and **Melissa**, who are highly skilled at this

Other certifications

- **EdX**
  Analytics and supply chain
- **OpenLearnOrg**
  Blockchain in supply chain

TOOLBOX

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Productivity

Venus
This AI-powered, voice-enabled digital assistant provides a conversational interface for all productivity-related tasks, from scheduling to finding answers to questions and checking the status of products and projects.

DSN Tower
A primary digital platform for managing the complex and distributed digital supply network. It surfaces relevant information from all the connected supply chain applications across the enterprise and provides a customized interface by role and experience.

CrowdWise
This online dashboard collects textual data from all the social websites a company uses for feedback, complaints, and issues using text mining and web scraping. It then creates word clouds and, with the help of perception mapping, highlights the customer sentiment around the company's products and services.

VirtuMeet
This AR smart-glass conference room with AI capabilities allows global partners to meet and collaborate, overcoming the barriers of physical separation. With built-in AI, AR screens can present short bios or other relevant information about attendees as the user pans across their faces.

Share Smart
An enterprise social and mobile technology tool that helps in sharing digital 3D designs and images as digital files to improve the collaboration necessary to build a new product, supply network configuration, or assembly line right the first time.

Rosetta
An AI-based real-time language translator that listens to speech, converts it into text, and then translates that into the desired language, enabling collaboration among different regional markets.

VizWizard
A visualization tool that can create graphs and infographics with minimal text inputs from the user. It is also capable of creating topline results based on information available in charts.

Decision-making

Smart Dash
A visual display that presents data, live information, and analysis from multiple sources to facilitate informed decision-making.

Envision
This tool uses machine learning to identify potential problems as well as opportunities to devise solutions that make a positive business impact.

RealConnect
This application enables an engineer to seamlessly interact with suppliers, partners, customers, and the broader ecosystem.

Sixth Sense
A tool that incorporates machine learning, cognitive computing, and AI to detect macro trends in the broader environment.

Learning

Career Coach
This personal bot performs strength assessments and understands the broader talent situation at the company. It uses AI to suggest different career pathways and coordinates with the SkillsPro training course to create programs for users to accomplish their pathways. It also links in real time to the talent management system at the company to alert the user of job openings and opportunities for advancement.

SkillsPro
This smart learning assistant helps digital twin engineers refresh existing skills as well as learn new and emerging skills. Its conversation mode shares tips and tricks about the tools/techniques that an engineer has learned recently. When synced with an engineer's project planner, it shares a list of skills to be learned for implementation in upcoming projects.

A DAY IN THE LIFE

07:00 AM

While preparing her breakfast, Jamie says, "Hey Venus, what's on my calendar today?" Jamie's virtual personal assistant reads out her morning schedule and priority tasks that need to be completed, along with a personal reminder of her meeting with Chan, a friend from her analytics certificate course.

07:15 AM

As Jamie picks up her car keys to leave for the office, a pop-up from her wellness manager app reminds her about her fitness goals and, as the office is three miles away, suggests that Jamie cycle there. Eager to meet her goal, she goes for it.

08:00 AM

Jamie reaches the office and asks Venus to check her into her workspace as she exits the elevator. Soon after the check-in, Smart Dash activates, presenting Jamie with live information from all the suppliers, including an inventory of current materials and estimated time to receive additional materials. Smart Dash also flagged some deliveries that might get delayed due to weather disruptions. Jamie starts sorting the deliveries based on the supplier profile her program created from live predictions based on proximity to the disruptive weather conditions. Smart Dash collects all the actions taken by Jamie and sends the inputs to Share Smart, which alerts all the involved stakeholders, helping them plan accordingly.

09:30 AM

As Jamie leaves for a coffee break, Venus informs her about a few calendar invites from suppliers, who want to discuss the current weather delay alerts. Jamie asks Venus to send RealConnect invites to all the partners for an 11 a.m. meeting.

10:00 AM

Jamie opens the Envision app to further analyze and fine tune the information she received from Smart Dash. She uses Envision to make a decision on procurement and the future supplies she will need for the scheduled production runs. With the help of DSN Tower, Jamie shortlists the suppliers she will contact for the immediate demands and the warehouses that will be used for categorizing and storing the products before distribution. She also downloads the final report of all the recent transactions for an upcoming meeting.

11:00 AM

Jamie logs into her VirtuMeet for the global stakeholder meeting. Thanks to Rosetta, her real-time translator, the discussion goes smoothly. She has a productive 90-minute meeting during which all the production- and distribution-related tasks are finalized. With the help of Sixth Sense, deciding the delivery and production dates is seamless. However, a few production plans need to be updated as per the discussion. Share Smart captures all the information and discussion points of the meeting and shares the minutes of the meeting with all the participants.

01:30 PM

Back at her desk, Jamie's virtual career coach presents her with a performance scorecard on how she managed the meeting and lists a few skills that she needs to learn for her career progression. Jamie asks Venus to look for upcoming classes on "stakeholder management" and enroll her in the earliest class as per her calendar.

02:00 PM

Jamie logs into her CrowdWise account to check customer feedback and complaints, and generates a report. She uses VizWizard to perform text analytics and generate the graphs for over 300 messages she received, to share the findings with her manager.

04:00 PM

After her discussion with the manager, Jamie shares the VizWizard report with her team, highlighting all the issues and growth/declines in the trends. The status report helps them to more easily plan and make production-related decisions.

05:00 PM

As Jamie wraps up for the day, her wellness manager flashes the daily stress report and informs her to enjoy the evening and unwind. Venus, taking the hint, books a table for two at Jamie's favorite restaurant for a relaxing dinner with her partner.

ROBOT TEAMING COORDINATOR

Summary

It is 2025. The increasing penetration of robots in manufacturing production and distribution is driving demand for professionals known as robot teaming coordinators (RTCs) who train humans and robots to work together collaboratively. Key enablers of a collaborative human-machine workforce, RTCs oversee robots from all functions that interact with humans to enable human rapport with robots and ensure optimal human-machine interactions.

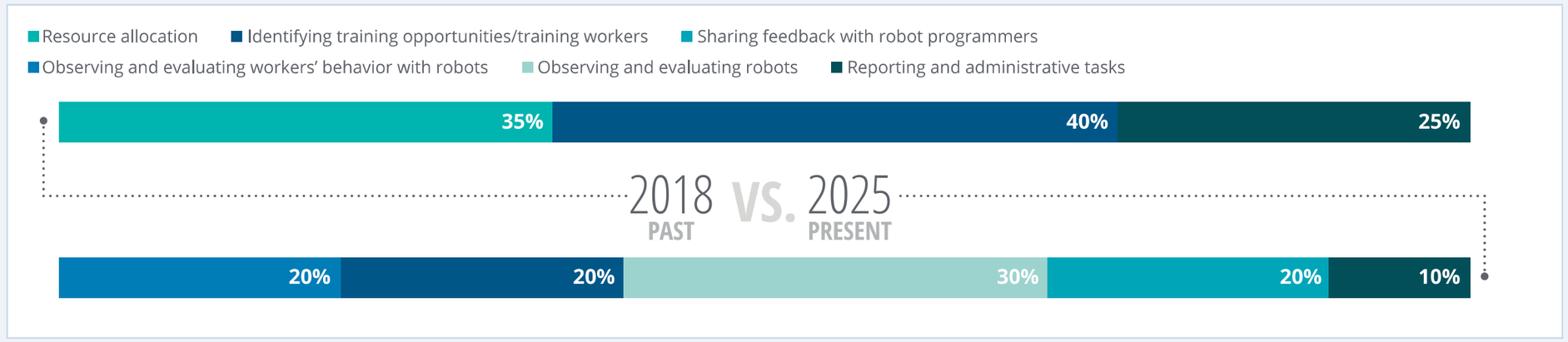
RTCs are an evolution of the typical process engineer and change management experts in manufacturing enterprises. These individuals typically design business processes that integrate robotics into production and distribution operations while also considering the enduring human skills that employees bring to the value stream. They often assist employees in adopting the new, robotically augmented processes. RTCs understand the human elements that are in play at the hand-offs between robots and humans and help create a harmony that optimizes the strengths of both partners in the integrated workstream.

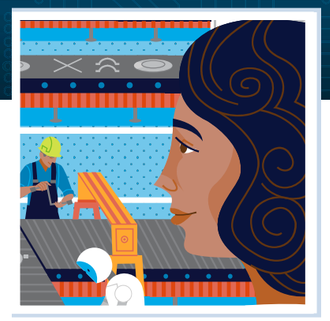
The RTC is generally responsible for monitoring robot performance and providing feedback to programmers to optimize robot value. Unlike robot programmers, RTCs are often not experts in programming languages, but should have the required skills to understand how robots are supposed to behave in work environments.

Responsibilities

- Observes robots and evaluates their performance based on how effectively they can perform predetermined tasks
- Shares feedback with robot programmers on a robot's performance and recommends areas for improvement
- Trains human team members to help them work more collaboratively with robots in a coworking environment
- Works in tandem with robot coordinators from other departments to identify opportunities where robots can be deployed to enhance productivity
- Delivers results against key performance indicators such as enhanced customer experience, human-hours saved, and overall improvements in productivity

Time spent on activities





OLIVIA DAVIS

ROBOT TEAMING COORDINATOR
Breeze Turbines | *Hull, United Kingdom*

Proficient in unlocking growth and productivity by enabling a collaborative human-robot working environment; applies a mix of digital, social, and human skills to enable humans and robots to leverage each other's strengths and help the firm grow.

Experience

Robot teaming coordinator
Breeze Turbines *Oct 2024–present | 1 year 1 month*
Observes and manages robots while they perform live tasks on a factory production line, identifying ways to augment human tasks that are repetitive; works closely with factory workers to pair them with robots in a way that maximizes productivity; handles employee concerns about working with new robots, and builds rapport between humans and machines on the production line

Customer interest representative
AI Robotics Limited *Jun 2022–Sep 2024 | 2 years 4 months*
Interacted with various customers to understand feedback and capture important requirements for the company's robotic products and services; worked with various teams within the company to understand the capabilities of the robots; provided a demonstration of robots to premier clients

Talent facilitator
StarMovies Company LLC *Jun 2020–May 2022 | 2 years*
Helped coordinate directors, artists, and other crew members for many leading TV commercials; in several cases, worked as robot assistant for commercials that included robotic products

Education

University of Illinois
Bachelor of science, psychology
2016–2020

Other certifications

- **EdX**
  Microdegree in human psychology
- **Morgan Community College**
  Certificate in humanities
- **OpenLearnOrg**
  Robot programming for nonprogrammers

Skills and endorsements

- **Behavioral analysis** · 412
  Endorsed by **James**, who is highly skilled at this
- **Human-machine collaborator** · 324
  Endorsed by **Robert** and **Patricia,** who are highly skilled at this
- **Robot management** · 246
  Endorsed by **Sid** and **Byrne**, who are highly skilled at this
- **Administration** · 195
  Endorsed by **Tracy** and **Joe**, who are highly skilled at this
- **Motion capture** · 86
  Endorsed by **Jessica**, who is highly skilled at this
- **Social skills** · 85
  Endorsed by **Elizabeth** and **Susan**, who are highly skilled at this
- **Customer service** · 79
  Endorsed by **Yoanne**, who is highly skilled at this
- **Technical training and orientation** · 68
  Endorsed by **Heather** and **Ryan**, who are highly skilled at this

TOOLBOX

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Productivity

Venus
This AI-powered, voice-enabled digital assistant provides a conversational interface for all productivity-related tasks, from scheduling to finding answers to questions and checking the status of products and projects.

Visually Trainable Robot (VITRO)
This is a personal multipurpose humanoid robot whose size and capabilities make it suitable for individual use. It can be visually programmed by its user through motion capture software and trackers to perform household tasks. VITRO also has cloud-connected artificial intelligence (AI) capabilities that help it to optimize tasks even further.

rMIMIC
This motion-capture AI tracker can scan and track the various sensors placed on a human body and create coordinates in a digital space. The tool then translates the recorded coordinates into a set of commands and shares with the target VITRO to execute.

VirtuMeet
This AR smart-glass conference room with AI capabilities allows global partners to meet and collaborate, overcoming the barriers of physical separation. With built-in AI, AR screens can present short bios or other relevant information about attendees as the user pans across their faces.

Share Smart
An enterprise social and mobile technology tool that helps in sharing digital 3D designs and images as digital files to improve the collaboration necessary to build a new product, supply network configuration, or assembly line right the first time.

Rosetta
An AI-based real-time language translator that listens to speech, converts it into text, and then translates that into the desired language, enabling collaboration among different regional markets.

VizWizard
A visualization tool that can create graphs and infographics with minimal text inputs from the user. It is also capable of creating topline results based on information available in charts.

Decision-making

Smart Dash
A visual display that presents data, live information, and analysis from multiple sources to facilitate informed decision-making.

RealConnect
This application enables an engineer to seamlessly interact with suppliers, partners, customers, and the broader ecosystem.

Learning

LNP
A social media interface run for and by the users. An individual can express their desire to augment a specific skill or post a problem, and other users proficient in that skill can act as a temporary buddy for help. This social learning tool employs gamification, in which both the learners and teachers “win” learning points.

A DAY IN THE LIFE

06:30 AM

Olivia feels a gentle nudge and a vibration on her hand. Through her half-opened eyes, she sees Ardennes—her personal VITRO—waking her up. After days of Olivia teaching the robot through rMIMIC, Ardennes was not only able to correctly identify Olivia's right arm but was also able to nudge and vibrate gently enough to break her sleep. Happy with the results, Olivia gets up from her bed and says, "Hey, Ardennes, can you make the bed, get the laundry ready, and then park yourself in the garage?"

07:30 AM

As Olivia gets on a train to head into her office, Venus—her smart personal assistant—reminds Olivia that she has a 10 a.m. meeting with Lee, a metal panel fabrication plant manager based in Barcelona.

08:30 AM

Once in the office, Olivia asks ShareSmart to connect to the company data repository and download the previous night's video footage and corresponding data metrics for all the robots on several production lines she's been tracking.

10:00 AM

During her meeting with Lee via a Rosetta-enabled VirtuMeet conference room, Olivia learns that the new sheet metal cutting-and-painting robot has been working with zero errors. However, the humanoid robots deployed on the plant floor to move objects around have been having a bit of difficulty navigating through a crowded workspace.

11:00 AM

After the meeting, Olivia calls on Venus to show the humanoid robots' movement on Smart Dash. Olivia's observations and the heat map of the robots' movements reveal that the robots are moving as per the defined guidelines. Realizing that the issue is with the human workers on the floor, Olivia asks Venus to set up a RealConnect meeting with the fabrication manager and the workers on that assembly line.

12:00 PM

After a busy morning, Olivia breaks for lunch at a nearby coworking space. There, she connects over lunch with her other friends who are process engineers at another division of the company. They discuss some interesting case studies and ideas.

02:00 PM

It is time for Olivia's Rosetta-enabled RealConnect meeting with the workers from the Barcelona metal fabrication team. Olivia explains how the humanoid robots are helping everyone enhance productivity and efficiency. She also explains to the workers that the humanoid robots are performing repetitive tasks, creating more opportunities for them to do work where their skills are required. After a lengthy question-and-answer session, Olivia utilizes her human psychology skills to mitigate workers' fears and convince them to work with robots.

04:00 PM

After her meeting, Olivia creates and shares the VizWizard report with her leadership team, highlighting all the process-efficiency improvements across different departments that the factory achieved by creating a congenial human-robot environment, and quickly identifying and fixing anomalies in robot behaviors. The status report helps the senior VP and her team identify areas where efficiency has been achieved.

05:00 PM

Back on the train to her home, Olivia logs in to her LNP portal to post that she is looking for help in managing human-machine conflicts. Soon she finds a Germany-based senior robot coordinator offering her help.

DIGITAL OFFERING MANAGER

Summary

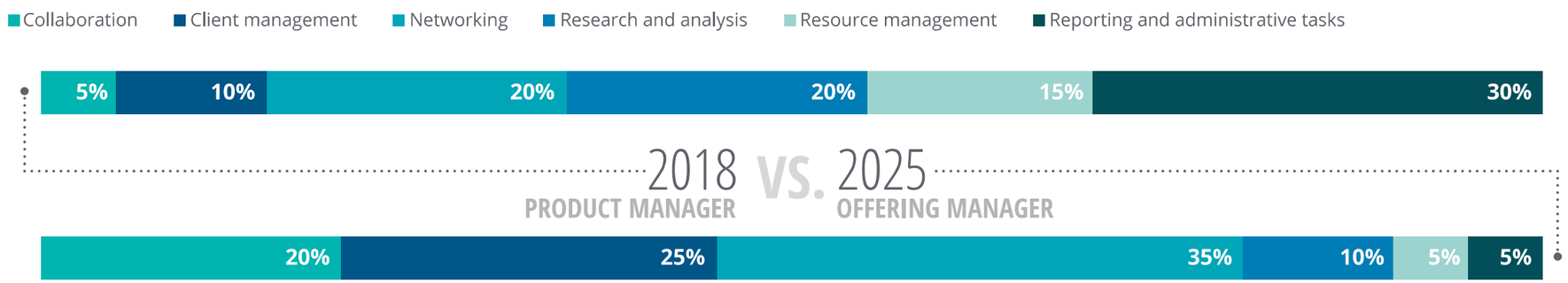
It is 2025. Big data is the new normal and growing exponentially. With a plethora of customer data at their disposal, companies have started using it to create customized data offerings, leading to demand for professionals known as "digital offering managers" (DOMs). DOMs' key responsibilities revolve around identifying and creating new product offerings for companies that are entirely digital—built from data, code, and analysis, and delivered virtually, making them wholly different from the physical products a company traditionally makes.

DOMs have evolved from the product manager career path. They oversee the entire product development life cycle—from the ideation through development, pricing, delivery, and support of the offering in the market. These managers must work closely with experts in data science and user interface (UX) design, and must possess knowledge about pricing and subscription models. Similarly, they need to align their data-centered offerings to the physical products a company makes and delivers to customers, often using data that comes off sensors on the machines themselves. They also track how the offering is being used in the market, and pitch additional features or make changes to the offering to match customers' evolving needs. Senior DOMs are responsible for managing entire portfolios of digital offerings that represent a major source of revenue for their industrial company.

Responsibilities

- Works collaboratively with IT, UX designers, and data science and finance teams to design and standardize digital offerings
- Communicates and builds relationships with clients and external stakeholders
- Translates customer needs, shares inputs, and collaborates with the technical team to develop the offerings
- Collaborates with data science experts to customize the offering, ensuring that service-level agreements have been met
- Collaborates with UX designers to design the digital interface of the offering
- Delivers results against KPIs such as enhanced customer experience, new offerings created, service score, and client acquisitions

Time spent on activities



HARUTO YAMAZAKI

DIGITAL OFFERING MANAGER
Reo Solutions and Services | *Tokyo, Japan*

Proficient in networking and sales, business expansion for new offerings, client management, cross-team collaboration, project management, and problem-solving.

Experience

Digital offering manager
Reo Solutions and Services *Jun 2024–present | 1 year*
Playing a key role in the expansion of new digital offerings in the company's portfolio of smart precision machinery; responsible for generating new data offerings, managing and networking with clients to create new business opportunities for the firm

Pursuits manager
Asahi Consulting Limited *Nov 2022–Jun 2024 | 1 year 8 months*
Guided proposal teams in developing the pursuit strategy, which included acting in a strategic/sales role to identify client needs and win themes, and create compelling messages for the expected audience

Client-experience senior consultant
Asahi Consulting Limited *Apr 2020–Oct 2022 | 2 years 7 months*
Was the direct interface between the client and the production team; responsible for initiating launch meetings, drafting project requirements, resource and capacity planning, and process setup and migration

Education

Yokohama National University
Master of business administration, communications
2019–2020

Tokyo University
Graduate in behavioral science
2016–2019

Other certifications

- **EdX**
  Microdegree in human psychology
- **LinkedIn Learning**
  Certificate in humanities
- **OpenLearnOrg**
  Collaborating for results

Skills and endorsements

Sales and marketing · 430
Endorsed by **Lyra** and **Daromu**, who are highly skilled at this

Behavioral analysis · 412
Endorsed by **Haru**, who is highly skilled at this

Customer experience · 350
Endorsed by **Sonal** and **Chiara**, who are highly skilled at this

Communication · 324
Endorsed by **Ruko** and **Sora**, who are highly skilled at this

Networking · 246
Endorsed by **Lyra** and **Sandy**, who are highly skilled at this

Collaboration · 195
Endorsed by **Lannister** and **Joe**, who are highly skilled at this

Client management · 186
Endorsed by **Daromu**, who is highly skilled at this

Social skills · 85
Endorsed by **Michael** and **Cersei**, who are highly skilled at this

Change management · 79
Endorsed by **Jaona**, who is highly skilled at this

Project management · 68
Endorsed by **Ruhi** and **Aziz**, who are highly skilled at this

TOOLBOX

THE TOOLBOX SUPPORTS THE WORKER AS A WHOLE—IN ACHIEVING EXTERNAL OUTCOMES SUCH AS PRODUCTIVITY AS WELL AS INTERNALLY FOCUSED ONES SUCH AS DECISION-MAKING AND LEARNING.

Productivity

Venus
This AI-powered, voice-enabled digital assistant provides a conversational interface for all productivity-related tasks, from scheduling to finding answers to questions and checking the status of products and projects.

Rosetta
An AI-based real-time language translator that listens to speech, converts it into text, and then translates that into the desired language, enabling collaboration among different regional markets.

Share Smart
An enterprise social and mobile technology tool that helps in sharing digital 3D designs and images as digital files to improve the collaboration necessary to build a new product, supply network configuration, or assembly line right the first time.

Gen4-Conservatory
These are smart meeting rooms for teams that are co-located but are from different functions. Smart-glass boards plugged with AI-enabled devices can pull data from multiple sources and conduct basic data transformation. Voice-activated, these devices can operate with basic sound commands. These capabilities help the data team in ideation and offering formulation.

VizWizard
A visualization tool that can create graphs and infographics with minimal text inputs from the user. It is also capable of creating topline results based on information available in charts.

Decision-making

Smart Dash
A visual display that presents data, live information, and analysis from multiple sources to facilitate informed decision-making.

RealConnect
This application enables an engineer to seamlessly interact with suppliers, partners, customers, and the broader ecosystem.

CuSu—Customer Supporter
An AI and natural-language-processing-enabled client management tool that keeps track of client offerings along with state-of-art data security. More like after-sales services, it monitors the offering's consumption pattern, analyzes these patterns, and proactively suggests what clients expect next or will prefer as a next offering.

Sixth Sense
A tool that incorporates machine learning, cognitive computing, and AI to detect macro trends in the broader environment.

Learning

ELWIE
(**e**nabling **l**earning, **w**ellbeing, (personal) **i**nterest, and (overall) **e**xcellence)
A mobile bot and a personal smart wellbeing assistant that takes care of professional and personal wellbeing. It can suggest new learning opportunities as well as help to plan vacations or leaves based on personal interests.

A DAY IN THE LIFE

06:30 AM

Haruto is surprised when Venus wakes him an hour early to remind him about his breakfast meeting with Kaito, the CIO of Sunriser Group. Venus reads all of Haruto's notes to him about Sunriser Group and reminds Haruto about Kaito's promptness and dislike toward latecomers. Worried about being late, Haruto asks Venus to book a flying taxi for him.

07:30 AM

On his way to the restaurant, Haruto activates VizWizard to connect his mobile app to the company's data repository and update the data source with the previous night's data and metrics. He cross-checks VizWizard, and after seeing the charts, he is quite confident about his meeting with Kaito.

08:00 AM

Once at the restaurant, Kaito informs Haruto that Sunriser Group has recently added Reo's smart injection molding equipment to its production line and is looking for a data offering that can improve the precision of the equipment, including both maximizing output and machine uptime. Haruto directs Venus to synthesize a few of these sources and VizWizard to update the dashboard as per those sources.

10:00 AM

Haruto reaches his office and asks Venus to check him into his workspace as he exits the elevator. Soon after the check-in, Venus sets up a meeting with the data and IT teams for 10:30 a.m. in Gen4-Conservatory. Venus also sets up a RealConnect meeting with the design manager and finance team for 3:00 p.m.

10:30 AM

Using his VizWizard dashboard, Haruto explains the new requirements to the IT and data teams. The data team activates the smart-glass board of the Gen4-Conservatory. The board starts compiling data from all the available sources, highlighting the variables that require transformation. Haruto requests that the IT and data teams fine-tune and finalize the transformation and share their final database with him.

11:00 AM

Haruto rushes to make a Rosetta-enabled RealConnect team meeting. He has to connect with his offshore vendor data team to understand the energy consumption data of urban dwellers. Thanks to Share Smart, he efficiently records all the details so that he can share them with his data team to build customized offering details for his client meeting.

12:00 PM

After a busy morning, Haruto breaks for lunch. As he opens his mobile phone to search for a nice eatery, Elwie suggests a new sushi place across the street, which has a great review for his favorite dish, maguro sashimi.

12:30 PM

Back from lunch, Haruto receives Smart Dash from the IT team, with the data details required for Sunriser Group, which he shares with the design team. He then logs into the CuSu portal dashboard where he finds that another client has shown interest in expanding their services to include additional customizations and data. He asks Venus to schedule a meeting. Venus shares the invite with the data team for Wednesday and schedules a brunch with the client on Friday.

03:00 PM

RealConnect reminds him about his meeting with the finance team and designers; Haruto dials in. The designer presents him the Sixth Sense file with a feasible project timeline. The group discusses various scenarios and runs Sixth Sense simulations on the file. It shortlists the offering version to share with the Sunriser Group team.

04:30 PM

After his meeting, Haruto creates and shares the VizWizard report with Kaito's team, with the initial offering price quotations.

05:00 PM

In the cab on his way home, Haruto asks Venus to brief him about his upcoming meetings for the remaining work week. This week is not going to be easy for him: He has three more clients lined up. Getting the cue, Elwie informs him about a musical event in Ariake Colosseum on Saturday, where he can enjoy an amazing performance by Drum Tao. Venus books the tickets for him.

Endnotes

1. Robert Libbey et al., *Exponential technologies in manufacturing*, Deloitte, 2018.
2. Deloitte, *Technology and people: The great job-creating machine*, August 2015.
3. Craig A. Giffi et al., *The jobs are here, but where are the people? Key findings from the 2018 Deloitte and The Manufacturing Institute skills gap and future of work study*, Deloitte Insights, November 14, 2018.
4. Deloitte, *2018 Deloitte Human Capital Trends*, March 28, 2018.
5. Alex Gray, "The 10 skills you need to thrive in the Fourth Industrial Revolution," World Economic Forum, January 19, 2016.
6. Deloitte, *2018 Deloitte Human Capital Trends*.

About the authors

PAUL WELLENER is a vice chairman with Deloitte LLP and the leader of the US Industrial Products & Construction practice with Deloitte LLP. He has more than three decades of experience in the industrial products and automotive sectors, and drives key sector/industry initiatives to help companies adapt to an environment of rapid change and uncertainty.

BEN DOLLAR is a principal in the Supply Chain practice of Deloitte Consulting LLP. He focuses on organization design, talent management, and process improvement in manufacturing companies. Dollar has helped some of Deloitte's largest defense, automotive, and industrial products manufacturing clients achieve tangible benefits through organization design, process adoption, and human capital management.

HEATHER ASHTON MANOLIAN is the industrial manufacturing research leader with the Deloitte Energy, Resources & Industrials research and insights, and has delivered compelling insights on major enterprise business and technology trends for more than 20 years.

LUKE MONCK is a senior manager in Deloitte's Manufacturing practice. He has over 13 years of experience leading large-scale organizational transformation initiatives for Fortune 100 companies—focusing on automotive, A&D, and chemical manufacturers. Monck designs and delivers the operating model/organizational design, talent, and change management solutions that business transformations require to be successful, and also leads the Women to Watch program for the manufacturing sector. He is based in McLean, Virginia.

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PREDICTIVE SUPPLY NETWORK ANALYST

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ROBOT TEAMING COORDINATOR

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DIGITAL OFFERING MANAGER

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Contacts

Paul Wellener
US Industrial Products & Construction leader
Deloitte LLP
+1 216 589 1300
pwellener@deloitte.com

Luke Monck
Senior manager
Deloitte Consulting LLP
+1 571 512 1617
lmonck@deloitte.com

Benjamin Dollar
Principal
Deloitte Consulting LLP
+1 617 852 9877
bdollar@deloitte.com

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Editorial: Rithu Thomas, Abrar Khan, Nairita Gangopadhyay, Blythe Hurley, and Preetha Devan
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