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Digital and Personal: Future-Proofing Airport Operations and Services

By making meaning of the abundant digital data generated by passengers, processes, organizations and devices, airports can create more personalized, "just-in-time" travel services and deepen insights across the value chain.

Executive Summary

Prompted by other industries' efforts, airports are now looking for new ways to enhance the passenger experience. This won't be easy, given that airport operators are already struggling to manage their operations more efficiently and provide exceptional service to passengers – all while seeking new sources of non-aeronautical revenue.

International air passenger traffic is forecasted to grow over 6%[1] year over year in 2015, largely due to less expensive air fares fueled by lower energy costs and a more solid global economy. Not surprisingly, the travel industry is beginning to rethink how to strengthen passenger loyalty. This is a critical task, given that by 2020, 80%[2] of air spend will come from Gen-Xers and millennials – a calculation that is expected to remain steady through 2030.

This white paper explores how airports can apply Code Halo™ thinking and the Internet of Things (IoT) technologies to digitally transform their businesses. By converting raw data or "noise" into actionable information, the industry can operate smarter and with more agility to vastly improve the passenger experience.

Moving Upward

The aviation industry is a core component of the world's financial structure. Having recovered from the economic meltdown of 2008, it has resumed stable growth. Just last year, the International Air Transport Association (IATA) released its first 20-year forecast on passenger growth – projecting that the number of people taking to the skies will reach 7.3 billion[3] by 2034. This represents a 4.1% average annual growth in demand for air connectivity – more than doubling the 3.3 billion passengers who travelled in 2014. Yet as the industry turns a corner, the biggest challenges for airports and airlines will be infrastructure constraints and environmental regulations – making it difficult for them to support such heady growth projections.

As air and passenger traffic increases, all players in the value chain, in every area of airport operations, will have to become more responsive and efficient. These attributes are typically measured by the number of on-time flights; passenger flow; the efficiency of baggage-handling systems; the speed and effectiveness of security clearances; the resourcefulness of lighting and heating systems; and how well airports track, maintain and

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Airport Industry Trends

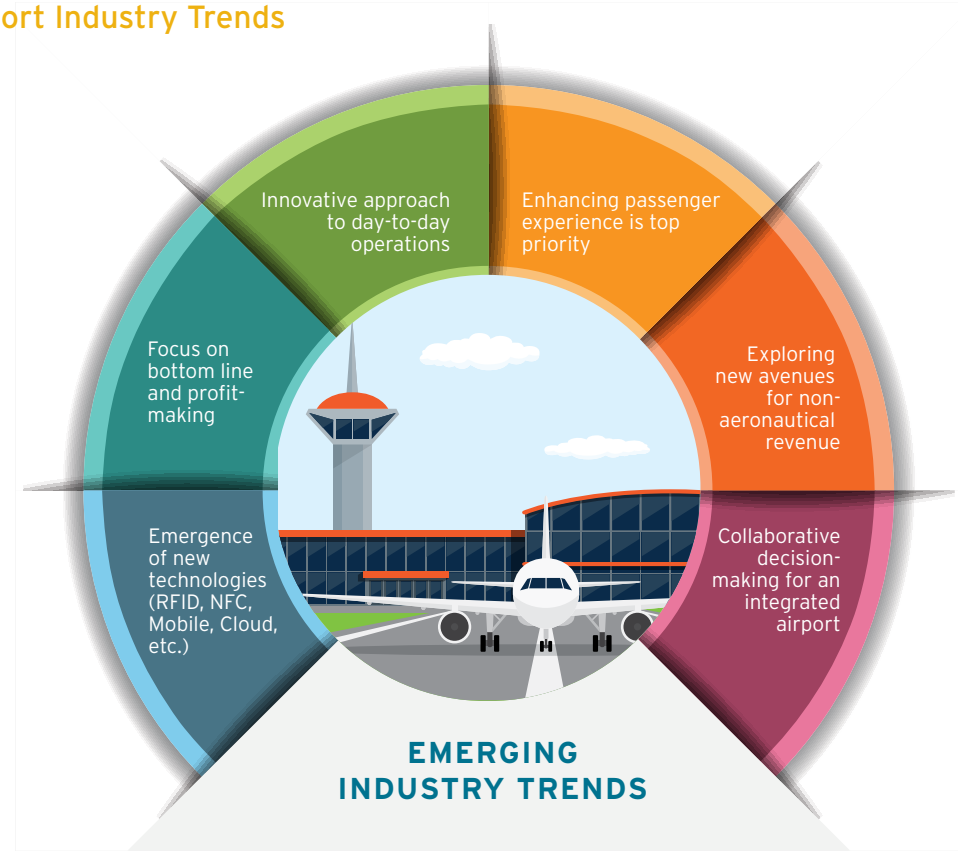

Figure 1

manage their ground-based assets with the least amount of service disruption.

Traditionally, passengers have stronger bonds with airlines than with airports. However, this trend is changing as airlines become more aware of the role airports play in the travel value chain – having evolved from mere infrastructure providers to strategic partners with an entrepreneurial zest for new types of services and support. Since passengers are fundamental to airports' livelihoods, it makes sense that these installations are finding new ways to enhance travelers' experiences and make a positive – and profitable – impact.

The stakes are only going to get steeper. By 2020, millennials are expected to dramatically increase the overall spending on business flights by nearly 50%.[4] Millennials differ from previous generations in that they will continue to engage with brands that use mobile and social technologies to create more personalized and proactive experiences. They have loftier expectations for the aviation industry, and do not shy away from sharing their experiences with friends and colleagues via social media. Therefore, in order to become brand advocates, they must be properly serviced at every touch point.

This has led airports and their partners to re-examine their operating model and utilize their IT assets as the primary lever for driving operational efficiencies, utilizing alternative, non-aeronautical revenue streams, and improving the overall passenger experience. However, to realize tangible results, airports need to tread carefully and respond effectively to the emerging trends that are poised to reshape the airport industry (see Figure 1).

To remain relevant and compete on a scale with airports that were "born digital," older installations need to embrace digital business constructs quickly.

Airports are typically sprawling, crowded and complex; managing them end-to-end can be daunting without the right mix of technologies and workflows. These challenges, coupled with rising passenger expectations, operational and

Quick Take

Getting There from Here

Today's airport operators have a lot of questions on their minds, including:

- How do I understand the condition of my airport's HVAC systems, aero-bridges, baggage carousels, etc., and confirm that they are functioning effectively?
- How do I know that a particular asset or piece of equipment has been inspected, and that regular maintenance activities were performed?
- How can I confirm that my employees are working efficiently?
- How best can I engage with passengers to influence them to comply with security protocols?
- How can I obtain a consolidated visual view of the overall health of the airport and its various facilities?
- How do I find out when passengers using different forms of transportation arrive at the airport?
- How can I ensure that the aircrafts use the right power source when docked at stands?
- How do I ensure that my concessionaires are correctly charged for power, water and gas?
- How can I increase non-aeronautical revenue?

cost concerns and security mandates only exacerbate the situation. Digital technologies – the SMAC Stack (social, mobile, analytics and cloud) and sensors from the "Internet of Things," or IoT (pervasive smart devices that connect and communicate over the Internet) can be the positive tipping point.

Great Expectations

Today's airline passengers expect a wide range of services and support – compelling airports to align *their* thinking and actions with "what passengers think."

Passengers' concerns generally fall into four categories:

- **Before the journey**
  - Is my flight on time?
  - Can I reach the airport on time?
  - What will traffic conditions be on my way to the airport?
  - Will there be parking space available for my car?
- **At the airport**
  - How long will I have to wait at security checkpoints?
  - How long will it take me to reach my gate from the security checkpoint?
  - How do I find my way to the right gate?
  - Is there a restaurant or kiosk that serves nutritious food?
- **During the journey (in transit)**
  - Will I miss my connection flight?
  - What can I buy for my family back home?
  - Will I have time to take a shower before I board the next flight?
  - What are the options for my onward journey?
- **After the journey**
  - Where will my baggage arrive?
  - How long will it take for my baggage to arrive?
  - Will someone pick up my baggage by mistake?
  - How can I lodge a complaint if my baggage is lost or damaged?

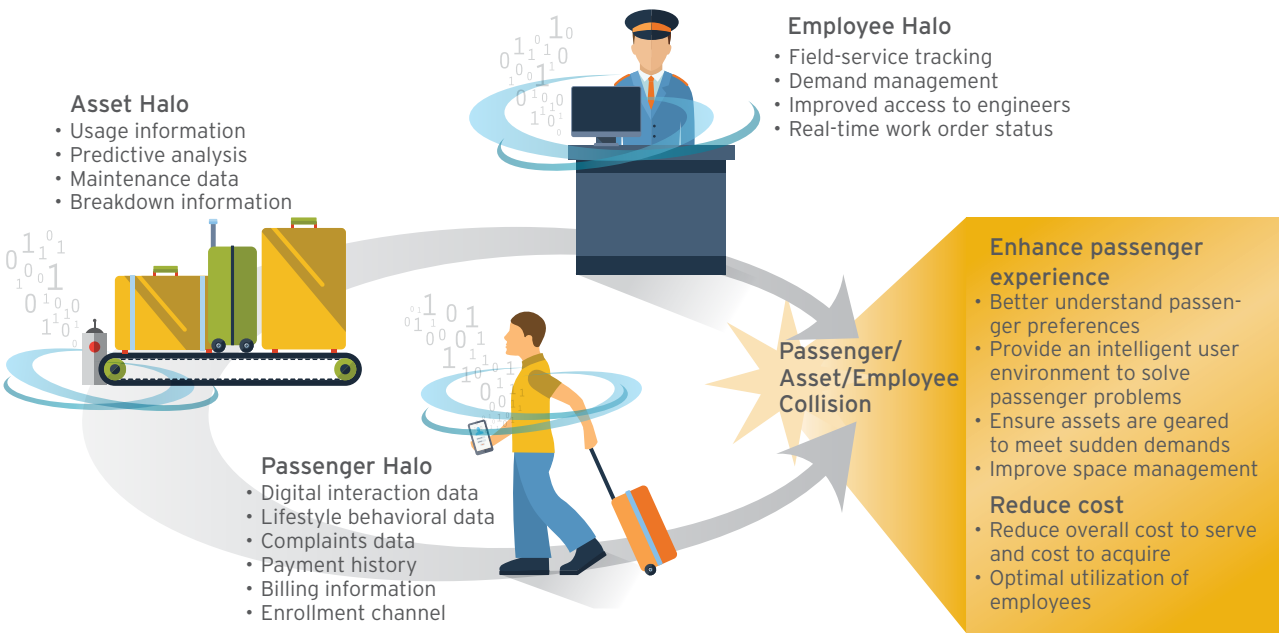

Figure 2

Digital technologies such as SMAC and IoT can help answer these questions faster and with more accuracy – in real time. This allows airports to streamline operations, heighten security and safety, and strengthen connections with passengers, employees and other stakeholders across the airport value chain.

Decoding Airport Transformation

In today's increasingly connected world, millions of lines of code (or digital information) flow through and across computing devices – smartphones, tablets, gadgets, sensors, as well as "things" like cars, televisions and airplanes. Add the power of social media, and one can see how airports can take advantage of the plethora of metadata they accumulate, which can be distilled and applied to deliver premium customer experiences.

Most of today's travelers leave a virtual footprint, or "halo" of digital information, which can be generated from the individual, organizations, processes or devices. Every click, swipe, "like," buy, comment, deposit, jog or search produces data that creates a unique virtual identity – something we call a Code Halo.[5] (See Figure 2.) The application of Code Halo thinking – making meaning from the vast digital fields generated by passengers, processes, organizations and devices – is boundary-less. We have targeted three primary halos: assets, passengers and employees. If properly decoded and applied, each can deliver unprecedented business value to airports.

Asset Code Halos

Airports receive information on passenger numbers and capacity requirements from airlines, as well as government and local agencies, to help them accommodate specific events (festivals, holidays, etc.) that attract huge passenger inflow. Based on this information, airports can assess and accommodate terminal and gate requirements, and meet infrastructure needs for concessionaries, for example. While this data addresses much of airports' planning needs, it is still necessary to understand and prepare for the impact on maintenance and operations.

Airports old and new are responsible for maintaining these assets; even a minor disruption can cause major problems, including terminal congestion, passenger inconvenience, and delays. Therefore, it is critical to identify and avert a potential asset failure up front. That said, airports are asset-intensive, with many spread across a huge area. This makes tracking and maintaining them a daunting task. And this is where Asset Code Halos come into play.

Deriving Value from Asset Halos

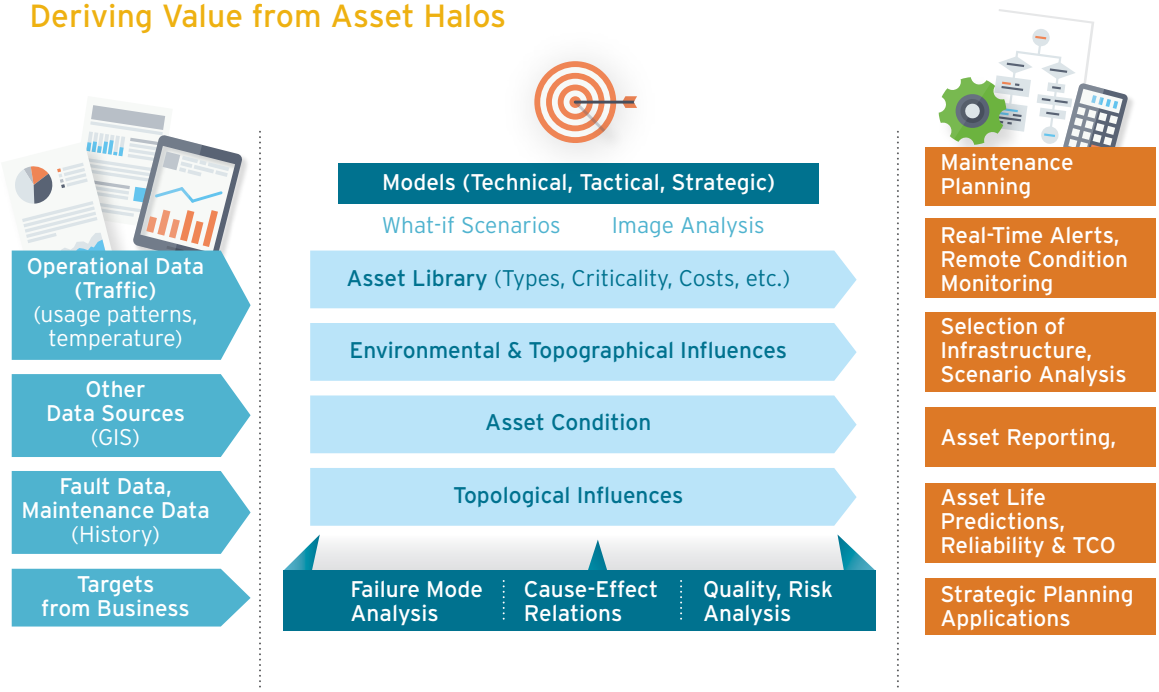

Figure 3

The data collected from air bridges, vehicles, HVAC sensors, device sensors (water coolers, trawlers, etc.), telematics instruments (escalators, etc.) and modern location technologies like GIS/GPS devices can be assembled to create an Asset Halo. This continuous stream of data provides information on usage patterns, as well as the wear and tear on assets, to facilitate near real-time asset status and tracking. With the help of sensors, vital parameters can be continuously monitored and updated – even notifying airport managers if a situation requires immediate action.

Business intelligence generated through the mining of Asset Code Halos is multi-dimensional – the most significant being predictive maintenance. Through the continuous monitoring of an asset's condition, it is possible to calculate the appropriate time for maintenance and inspection activities.

Figure 3 depicts the data streams that flow into various data models and how they can be leveraged to deliver intelligent asset management.

Analytics plays a crucial role in improving the operational efficiency of an airport. The use of modern technologies such as iBeacons to track passengers can help airports make better use of their real estate. iBeacons are low-energy Bluetooth devices that can interact with passengers' mobile phones when they have enabled their Bluetooth. Passengers' movements and the time they take can be measured from point to point. This data can then be analyzed to gain more insights and take remedial actions, such as improving passenger flow, opening another gate, or providing additional security channels. With more visibility into peak-hour traffic and congestion-prone areas, airports can more effectively plan resource deployment – thereby eliminating bottlenecks and easing passenger flow.

Passenger Code Halos

Passengers are among the most valued stakeholders in the airport value chain, and airports worldwide are leaving no stone unturned to ensure their satisfaction. According to SITA's 2014 IT Trends Survey,[6] passenger-processing projects are the main focus of IT investments, with 59%[7] of participating airports rating it a high priority.

Passenger Code Halos can help predict traveler behavior and improve their satisfaction through a timely and contextually appropriate offer or informational transmission.

Based on the SITA survey,[8] more than three-quarters of airport passengers carry smartphones. We see this trend only increasing with the soaring expansion of the smartphone market, which is projected by International Data Corp. to grow at over 28% YoY.[9]

Thanks to the rising use of social media, airports can gather a great deal of interesting and useful information about passengers' likes, dislikes and behaviors. There is huge potential for distilling and applying insights from the metadata – Passenger Code Halos – gleaned from these channels.

Passenger Code Halos are vital for identifying travelers' preferences and choices, and enabling others in the value chain to provide them with more personalized experiences. The data sources that contribute to Passenger Code Halos range from social media applications (e.g., posts on Facebook, Twitter and LinkedIn) to blogs; online forms; tickets; and online shopping transactions and interactions. To separate signals from "noise" and gain meaningful and usable insights into passengers' needs and desires, this enormous amount of structured, unstructured and semi-structured data must be standardized and joined in a single repository. This information can then be used to predict and influence passengers' behavior.

For instance, a passenger walking by a retail store or restaurant inside the airport can receive a personalized notification/offer over his/her smartphone. They can also obtain updates on the nearest check-in counter, baggage drop point and other important information relative to their airport experience.

Essentially, passenger Code Halos can help predict traveler behavior and improve their satisfaction through a timely and contextually appropriate offer or informational transmission.

For example, the baggage management process greatly influences customers' perceptions of their overall airport experience. If this function can be enhanced using advanced digital tools (delivering personal digital "stickers" to alert passengers when their baggage will arrive), travelers' anxieties over lost or mishandled luggage can be alleviated.

While having seamless access to quality data at just the right time is fundamental to effective business intelligence, airports face numerous challenges when collecting and utilizing it. Based on the Airport IT Trends Survey from SITA (cited earlier), less than 10% of airports have fully exploited this capability. The industry also faces attitudinal hurdles. For instance, airlines have only recently recognized the need to collaborate with airports, and remain reluctant to share passenger details with airport operators – creating a major stumbling block to gathering rich business intelligence across the value chain.

Employee Code Halos

Using mobile devices and digitally connected equipment, real-time work orders can be allocated to airport employees. The information from Asset Code Halos can generate maintenance schedules, as well as automated alerts and notifications. Employee Code Halos store information on employees' skills, location and availability. By making meaning from the digital data surrounding Asset Code Halos and Employee Code Halos, airports can help ensure that any and all operational issues that arise will be resolved – at the right place, at the right time and by the right personnel.

Another important application of Employee Code Halos is correctly forecasting workforce demands (skills, numbers, etc., depending on the estimated customer footfall), thereby enhancing the flexibility and reliability of airport services.

Code Halo Business Benefits

By employing Code Halo thinking, airports can:

Enhance passenger experiences

- **Personalize services.** Code Halo thinking enables airports to integrate disparate systems; deliver just-in-time custom notifications; provide the latest flight information; better target marketing and advertising; and employ digital wayfinding signage to help passengers navigate through the airport.
- **Reduce terminal congestion.** Airport operators can have greater visibility into high-traffic and congested areas – allowing them to improve asset and resource planning and reduce wait times.
- **Enhance the retail/food and beverage experience.** Code Halos firmly integrate commercial operations with airports' operational ecosystems. By clearly identifying consumers' preferences and buying patterns,

airports can more accurately endorse and tailor products and services for passengers, which can improve their shopping experience at the terminal and promote spending at the concessionaires.

Improve operational efficiency and resilience

- **Optimize staff and resources.** Passenger tracking, guided by advanced analytics and collaborative decision making, can help airports improve how they utilize personnel and other assets — resulting in better customer service and leaner operations.
- **Enable more informed, real-time decision making.** With fields of digital information flowing across various airport functions, airport operators can make decisions faster, more effectively, and more transparently. With real-time information such as weather data, resource availability and flight status readily accessible via dashboards, airport staff can better execute flight movement and passenger flow.
- **Reduce asset breakdowns.** An advanced asset-monitoring and reporting system allows airport staff to avoid unnecessary snags and delays during rush hours. Code Halo thinking enables predictive analytics to foresee asset breakdowns well before they occur — providing sufficient time for airport staff to take corrective actions.
- **Improve safety and security.** Aided by facial-recognition and emotion-reading tools, ground staff and security personnel can quickly react to compliance challenges and/or safety breaches — alleviating safety concerns among airport employees and passengers.

Improve top- and bottom-line performance

- **Grow aeronautical revenue.** As airports increase their adoption of SMAC and IoT technologies to improve passenger experiences, they stand to win traveler loyalty, which can translate into a larger customer base and a wider geographical spread. A technologically advanced airport can motivate airlines to partner up and establish hub operations to drive more aeronautical revenue for the airports
- **Grow non-aeronautical revenue.** Code Halo thinking can uncover alternative revenue sources from non-aviation activities, such as personalized service offerings (lounge access, Wi-Fi, etc.), smart parking solutions, airport retail outlets, and food and beverage facilities. As fierce competition continues to

Quick Take

Assessing IT Readiness

We believe that Code Halo thinking offers the business and technology insights needed to drive growth beyond more traditional e-commerce. However, there are several business, IT and organizational challenges airports must address before the SMAC stack can be effectively blended into their operations. Cognizant has developed an IoT readiness assessment framework that can help airport operators quickly and effectively review their existing business, IT and organizational issues and get a head start on this exciting journey.

Our IoT framework incorporates the key components that airports can build into an implementation plan:

- An IoT vision for the airport based on need and desire.
- A business case for each Code Halo.
- A reasonable funding plan.
- Development of an organizational structure to advance Code Halo thinking and implementation.
- An assessment of existing sensory architecture and benchmark offerings.
- Sponsorship and leadership to manage change.
- Deployment of governance and accountability teams.
- Creation of a workable model tailored for the airport.

By taking advantage of the vast amounts of rich data produced by passengers, processes, organizations and devices, airports can reap the benefits that come from managing assets more efficiently and serving passengers better across the entire value chain.

keep margins razor-thin, these opportunities provide a much-needed impetus for airport growth and financial independence.

- **Significantly reduce operational expenses.** With the help of analytics-driven asset management, real-estate planning and resource deployment, airports can substantially improve their day-to-day operations, which can directly translate into significant cost efficiencies in terms of resource optimization, faster repair cycles and/or better asset utilization. From our experiences working with airport clients, we estimate that airports have the potential to improve their asset-management efficiency by 15% to 20% in an integrated ecosystem in which information flows seamlessly and resource deployment is performed with speed and agility.

Looking Forward

The most significant outcome of Code Halo thinking is the ability to listen to and address passenger needs, and introduce them to new and more convenient options. Airports are already taking steps to increase their non-aeronautical revenues and provide more customized services to passengers. The use of SMAC technologies can play a crucial role in helping airport operators achieve these objectives, and carve out significant opportunities for growth. Concerns around data privacy are addressed through "opt-in" features embedded in mobile devices and through specified interventions. The purpose is to help passengers understand and feel comfortable that the data being collected about them will be used to improve their overall experience traveling to, through and from the airport.

London's Heathrow and Changi Airport in Singapore, have confirmed that they are queuing up with programs to embrace digital technologies and business strategies to confront these challenges.

At the same time, airports are waking up to the harsh realities of the complex and competitive environment in which they operate. Our engagements and interactions with operators at many airports, including London's Heathrow and Changi Airport in Singapore, confirm that they are embracing digital technologies and business strategies to confront these challenges.

In the age of digital, airports' execution of Code Halo thinking can be the catalyst for significant transformation and growth, and a strong lever for future-proofing their business.

Note: Code Halo™ is a trademark of Cognizant Technology Solutions.

Footnotes

1 http://www.reuters.com/article/2015/06/05/us-boeing-paris-forecast-idUSKBN0OL2E820150605.

2 https://www.bcgperspectives.com/content/articles/transportation_travel_tourism_consumer_insight_traveling_with_millennials/.

3 http://www.iata.org/pressroom/pr/pages/2014-10-16-01.aspx.

4 https://www.bcgperspectives.com/content/articles/transportation_travel_tourism_consumer_insight_traveling_with_millennials/.

5 For more on Code Halos, read "Code Rules: A Playbook for Managing at the Crossroads," Cognizant Technology Solutions, June 2013. http://www.cognizant.com/Futureofwork/Documents/code-rules.pdf, and the book, "Code Halos: How the Digital Lives of People, Things, and Organizations are Changing the Rules of Business," by Malcolm Frank, Paul Roehrig and Ben Pring, published by John Wiley & Sons. April 2014. http://www.wiley.com/WileyCDA/WileyTitle/productCd-1118862074.html.

6 http://www.sita.aero/globalassets/docs/surveys--reports/passenger-it-trends-survey-20141.pdf.

7 https://secure.sita.aero/globalassets/docs/surveys--reports/airport-it-trends-survey-2014.pdf.

8 Ibid.

9 IDC Worldwide Mobile Phone Tracker, April 30, 2014. http://www.idc.com/getdoc.jsp?containerId=prUS24823414.

About the Authors

Chandrasekar Ranganathan is a Director in Cognizant Business Consulting, where he leads the Transportation and Logistics Consulting Practice. He has 20-plus years of experience in business consulting and business transformation, and has worked with large manufacturing clients in automotive, heavy engineering and logistics. He is a Chartered Accountant by qualification. He can be reached at Chandrasekar.vr@cognizant.com | LinkedIn: https://www.linkedin.com/in/chandrasekaranganathan.

Mohit Jain is a Senior Consultant within Cognizant Business Consulting's Manufacturing and Logistics Consulting Practice. He has more than six years of experience in various facets of business transformation, including supply chain management, business analytics and IT strategy and transformation. Mohit holds an engineering degree in electrical engineering from IIT, Roorkee and an M.B.A. from MDI, Gurgaon. He can be reached at Mohit.jain@cognizant.com | LinkedIn: https://www.linkedin.com/pub/mohit-jain/8/a1a/37b.

About Cognizant

Cognizant (NASDAQ: CTSH) is a leading provider of information technology, consulting, and business process outsourcing services, dedicated to helping the world's leading companies build stronger businesses. Headquartered in Teaneck, New Jersey (U.S.), Cognizant combines a passion for client satisfaction, technology innovation, deep industry and business process expertise, and a global, collaborative workforce that embodies the future of work. With over 100 development and delivery centers worldwide and approximately 218,000 employees as of June 30, 2015, Cognizant is a member of the NASDAQ-100, the S&P 500, the Forbes Global 2000, and the Fortune 500 and is ranked among the top performing and fastest growing companies in the world. Visit us online at www.cognizant.com or follow us on Twitter: Cognizant.

World Headquarters
500 Frank W. Burr Blvd.
Teaneck, NJ 07666 USA
Phone: +1 201 801 0233
Fax: +1 201 801 0243
Toll Free: +1 888 937 3277
Email: inquiry@cognizant.com

European Headquarters
1 Kingdom Street
Paddington Central
London W2 6BD
Phone: +44 (0) 20 7297 7600
Fax: +44 (0) 20 7121 0102
Email: infouk@cognizant.com

India Operations Headquarters
#5/535, Old Mahabalipuram Road
Okkiyam Pettai, Thoraipakkam
Chennai, 600 096 India
Phone: +91 (0) 44 4209 6000
Fax: +91 (0) 44 4209 6060
Email: inquiryindia@cognizant.com

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