Beyond bots and robots

Exploring the unrealized potential of cognitive computing in the travel industry

IBM Institute for Business Value

Executive Report

Travel and transportation, Cognitive computing

How IBM can help

To succeed in today's hyper-competitive world, travel and transportation companies need to solve increasingly complex problems and seize new and exciting opportunities faster than their competitors. They must continue to drive operational excellence and enable collaboration across enterprise functions and between members of emerging ecosystems. Above all, industry leaders must run the business well amidst constant change. The IBM Travel and Transportation practice understands these challenges and brings its extensive industry experience, business insight and technical prowess to bear on them. For more information, visit **ibm.com**/industries/traveltransportation.

Delivering on the cognitive promise in travel

Many travel executives understand the power cognitive computing has to transform their industry. However, even the most advanced travel companies are only making initial forays into cognitive computing by experimenting with chat-bots and robots – a good starting point for much greater cognitive opportunities. Based on a survey of travel and transportation executives, we developed a vision for the industry's cognitive future and a set of recommendations for realizing that vision. We found that, after aligning cognitive priorities with core strategic objectives, travel companies can embrace their organizations' data complexities to generate cognitive insights, deliver those insights to frontline staff and apply lessons from cognitive-ready travel leaders. These actions can help travel companies create cognitive programs that improve the travel experience, streamline travel operations – or do both.

Executive summary

When we initiated a survey of global travel executives on the topic of cognitive computing, we expected to find many companies whose cognitive efforts were blazing a trail in the travel industry. Instead, we found an industry that is just starting to explore this transformational technology. For the most part, companies in the travel space are implementing cognitive solutions in the form of chat-bots and robots, neither of which have matured enough to advance crucial strategies in the industry or demonstrate the technology's full capabilities. For now, most of the industry is in a wait-and-see mode, with just a few players conducting fairly small-scale, low-risk cognitive projects.

Fortunately, several travel companies we surveyed have enough experience with cognitive computing to provide useful lessons to others. These companies tend to view cognitive investments as part of a larger strategic agenda. They are also more likely to focus time and energy on both the solution design and data quality associated with their cognitive plans.

Perhaps not surprisingly, cognitive-ready travel leaders favor an iterative approach to solution development, eschewing the big-bang approach to projects that tends to dominate the industry. Finally, cognitive-ready travel leaders believe that success is a function of time-tested project management fundamentals, such as empowering well-motivated teams and using project management metrics that link to desired financial and customer-related outcomes.

36 percent of cognitive-ready travel leaders expect to have four or more cognitive projects underway in the next two years, compared to just 18 percent of all other travel industry survey respondents

63 percent of respondents in our study report frequent use of advanced analytics, which is often a precursor for cognitive technologies

52 percent of travel companies believe operational improvements are the best target for their future cognitive investments

Travel executives ignore cognitive computing at their peril

It is the great ambition of travel leaders the world over to apply cognitive computing to every aspect of their businesses: from inspiration and marketing, to shopping and distribution, to provisioning of services and post-trip traveler engagement.

The promised industry transformation would bring travel providers closer to their customers by exploiting the mysteries locked away in big data. Simultaneously, it would transform current complex operational and business-decision-support mechanisms into more automated, efficient systems, run on and improved by artificial intelligence. Collectively, these are bold claims, and while any one of them may be on the near horizon for a few travel companies, most travel executives feel that the companies they manage are a long way from realizing these lofty ambitions.

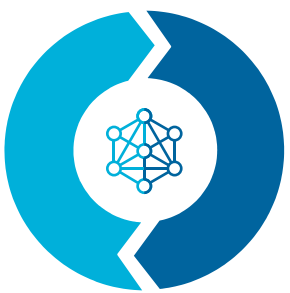
Most of the respondents in our survey believe that industry transformation is possible and that other companies are doing it fairly well today. More precisely, 43 percent of travel executives we surveyed can describe a cognitive project or program that could transform their company or the travel industry in general. What's more, 35 percent of travel executives say they can describe a company in the industry whose cognitive efforts they admire. Clearly, the potential for cognitive computing is now well understood in the travel industry.

The reality about what is taking place in the travel industry is a bit more nuanced. While 63 percent of travel executives report that their companies frequently use advanced analytics to run their businesses, very few leverage true cognitive computing solutions (see Figure 1). In other words, the actual use of cognitive computing is not yet commonplace.

Nevertheless, when the transformational potential of cognitive computing is mixed with optimism about where travel and non-travel industry leaders stand in implementing cognitive solutions, many travel executives feel their companies are behind the curve, even when they are in about the same position as the rest of the travel industry.

Figure 1

What are the differences between advanced analytics and cognitive computing?



Advanced analytics:

- Follow traditional rules-driven systems
- Organize and evaluate structured information
- Apply mathematical rules to the amassed data
- Typically produce forward-looking projections or predicted trends on the basis of prior period results

Cognitive computing:

- Runs on next-generation information systems designed to accelerate, enhance and scale human expertise
- Continually builds knowledge and learning
- Typically understands natural language and is designed to interact more naturally with humans

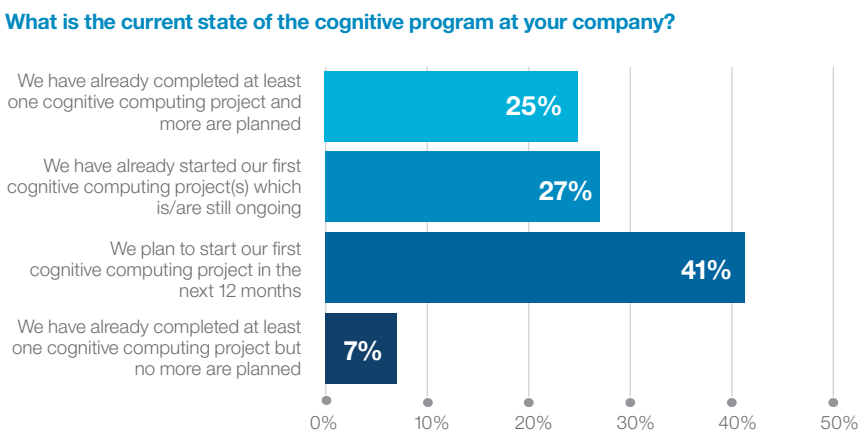
Source: 2016 IBM Cognitive Travel and Transportation Survey.

Still, most now have ambitious plans to jump-start their cognitive efforts, with 41 percent planning to begin their first cognitive projects in the next year. Even if only a fraction of these plans bear fruit, the industry will be far more cognitively enabled by the end of 2017 (see Figure 2).

Of course every class has a few overachievers, and the same is true in the travel industry with respect to cognitive computing. We asked the executives in our survey to consider our definitions of advanced analytics and cognitive computing. We then had them rate the degree of sophistication of the analysis they perform, as well as the degree to which they use the analytic outputs of their systems to actually run their businesses. The few companies that

Figure 2

Most travel companies are eagerly exploring the potential of cognitive computing



Source: 2016 IBM Cognitive Travel and Transportation Survey n=303, Travel only n=200
Q: What is the current state of the cognitive program at your company?

leverage sophisticated forms of analysis – in other words, cognitive computing – to actually run their businesses, we classified as "cognitive-ready travel leaders." The insights and experiences of these cognitive-ready travel leaders form the basis of the findings and suggestions contained in this study (see Figure 3).

Interestingly, cognitive-ready travel leaders also have more ambitious cognitive plans in place. Fully 36 percent expect to have four or more cognitive projects underway in the next two years, compared to just 18 percent of all other respondents. Over time, this significant difference in commitment to cognitive transformation may widen the gap between cognitive leaders and other travel companies.

The travel industry has mostly applied cognitive computing to bots and robots

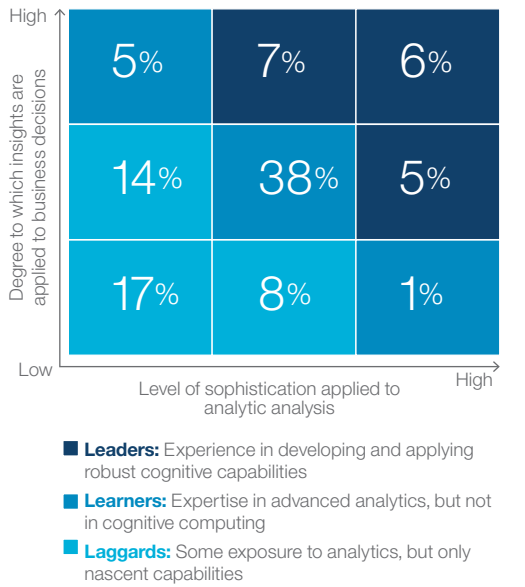
Meaningful examples of cognitive computing in action in the travel industry are getting easier to find. Too often, however, what is described as a cognitive capability or the use of artificial intelligence, is actually advanced analytics presented in a new way, as opposed to systems that truly understand, reason and learn.

But to the extent cognitive computing is being used in the travel industry today, it has mostly been applied to chat-bots and robots. This fact is not surprising; these investments are consistent with the dominant strategies that define the travel industry's last decade or more. Since at least 2001, the travel industry has focused its attention on containing costs and getting the most out of its extensive and often expensive assets. It has also made extensive use of automation and off-shoring to reduce labor costs.

To an industry focused mostly on costs and consistency, chat-bots and robots are logical starting places for developing cognitive solutions. However, most of what is deployed today makes relatively low-value use of these sophisticated technologies that do little to grow revenue or create a competitive advantage in the hyper-competitive travel industry.

Figure 3

Travel companies with experience applying the outputs of cognitive computing to decision making are relatively rare, but their lessons are worth hearing



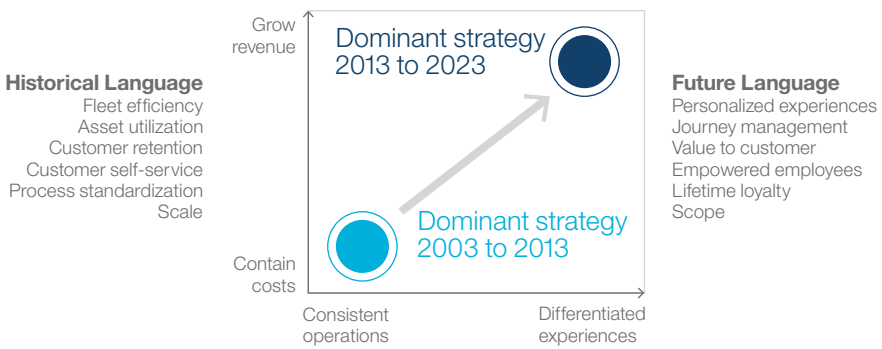
Source: 2016 IBM Cognitive Travel and Transportation Survey n=200 Q: How sophisticated is your company in its analysis of data? Q: How well does your company use the output from the data analysis it performs?

Fortunately, examples of true cognitive computing using bots and robots can be found in many areas of the travel ecosystem. Airlines, such as KLM, are interacting with travelers using robots that scan passenger boarding passes, evaluate airport conditions and offer suggestions about what to do before departure.[1] Expedia is taking chat-bots to the next level by enabling customers to use natural language to conduct complicated travel searches and then returning personalized results based on customer-specific preferences and patterns.[2]

The travel industry's greatest needs at this time are well aligned to the capabilities of cognitive solutions. Whereas the previous decade was all about cost and consistency, the future era will be defined by differentiating traveler experiences and growing revenue (see Figure 4).

Figure 4

The era of cost containment and consistency in the travel industry is giving way to differentiation and revenue-growth-focused strategies, which should inform cognitive investments



Source: IBM Institute for Business Value analysis.

Of course the travel industry does a remarkably good job of delivering unique and highly differentiated experiences, but it only does so for a tiny subset of its total customer base, using highly trained, sometimes expensive and always dedicated staff. Unfortunately, delivering high-touch experiences with frontline staff does not scale well. The industry desperately needs solutions that can help create and deliver differentiated customer experiences in an automated – or at least semi-automated – manner. This, of course, is one of the most tantalizing promises of cognitive computing.

Cognitive computing has the power to accelerate much-needed industry transformation

Predicting the impact that any new technology will have on an industry is difficult, but controlling it may be impossible. The trajectory of a given change is always influenced by the intentions and aspirations of the people who are working most closely with the new technology. Travel executives who know about cognitive computing expect that cognitive projects in the travel industry will focus on either travel personalization or travel operations (see Figure 5).

The majority of travel executives in our survey, 52 percent, and a slightly larger share of cognitive-ready travel leaders, 53 percent, believe that cognitive computing will advance their travel operations objectives. This belief may, in part, be driven by the fact that travel operations are highly complex, have many variables and produce amounts of data that cannot reasonably be processed by humans.

What is more, improvements in operations fit the strategic model that has dominated travel industry thinking for decades, namely that new technologies should be applied to the highest-cost, most asset-intensive areas of the business. Finally, cognitive computing systems perform best when they have been well trained by seasoned experts and have ingested large amounts of data, and both of these conditions are more easily controllable in operations environments.

Figure 5

Travel executives expect cognitive computing to advance their strategic objectives in two areas

Cognitive operations

Planning, scheduling and movement of assets and staff using cognitive computing and/or artificial intelligence

Cognitive personalization

Identification and delivery of customer-specific products and services across the travel journey using cognitive and artificial intelligence

Source: IBM Institute for Business Value analysis.

Korean Air, a large and successful airline in Asia, is proving these assertions by applying cognitive computing solutions to its complex, high-cost but strategically vital maintenance, repair and overhaul (MRO) operation. The new system amplifies human expertise by detecting diagnostic clues in unstructured maintenance data.

Travel executives also plan to use cognitive computing to improve traveler personalization. In fact, although this was a lower priority for many travel companies than operational improvements, the cognitive-ready travel leaders from our study placed more importance on this than other respondents. This is logical because it is an area well suited to cognitive improvements and consistent with the travel industry's strategic objectives in the next decade.

Using cognitive computing to improve travel personalization makes sense for several reasons, all of which will be tested in the near future by cognitive computing travel pioneers. As a result of favorable economic conditions, the industry enjoys a rare and historic opportunity to fund cognitive-enabled travel personalization solutions. Used in the right way, this personalization will lead to travel differentiation, which may prove to be the most essential competitive advantage in the travel industry.

An early example of cognitive-enabled traveler personalization is developing in the airline sector. A large global airline is testing a conversational commerce system that will enable travelers to bypass traditional search engines and travel distribution aggregators by collecting traveler preferences as well as trip plans and profile details using natural language interactions. The system will then generate personalized travel recommendations that will be further refined through ongoing dialogue with the traveler. The system will also leverage insights generated through the analysis of thousands of other traveler interactions, thus improving the system's odds of making the winning suggestion in subsequent interactions. Similar cognitive solutions promise to extend this type of service interaction across the travel value-chain.

Cognitive leaders offer hard-earned, but easily learned lessons

In addition to valuable strategic insights, cognitive-ready travel leaders offer a wealth of experience in making cognitive computing work in the industry. The lessons they provide fit into two broad categories: 1) the development of cognitive plans and 2) the execution of cognitive action (see Figure 6).

Figure 6

Cognitive-ready travel leaders are advancing their transformation agendas by setting the right course for cognitive investments and by completing projects in a disciplined and orderly manner

Source: IBM Institute for Business Value analysis.

Cognitive plan: Apply cognitive solutions to advance core strategy objectives
Cognitive-ready travel leaders know that much of their success is attributable to deliberate and considered program planning. In fact, 91 percent of cognitive-ready travel leaders claim that their companies' cognitive investments are always or almost always linked to a clear corporate strategy. This near-universal desire of executives from leading cognitive travel companies suggests that cognitive projects should be linked to a broader transformation program where possible and, of course, to the strategy of the enterprise.

But a sound strategic plan tightly linked to a well-considered strategy is futile if not supported by equally relevant and robust solutions. Almost all cognitive-ready travel leaders, 94 percent of them, believe that solution design is the most important aspect of a successful cognitive project. This may seem like common sense, but only 76 percent of the other survey respondents share this belief.

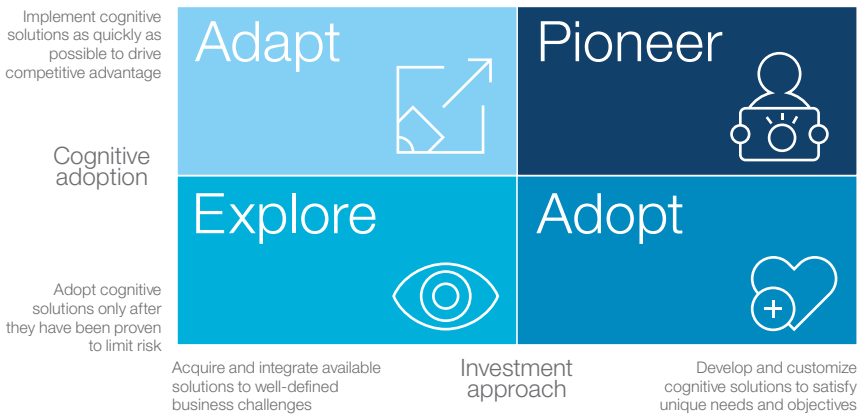
Similarly, 83 percent of cognitive-ready travel leaders and only 58 percent of all other respondents believe having access to more and better data from which to derive improvements is the most important way to advance their company's cognitive objectives. In other words, cognitive leaders understand that cognitive projects are most successful when they are well designed and furnished with the data they need to thrive.

Not all travel companies will want to lead the way in cognitive computing; some will prefer to adopt a wait-and-see approach to this rapidly evolving technology, only implementing proven solutions thoroughly tested by other companies. Striking the right balance between speed of

cognitive adoption and development, and use of unique cognitive solutions will define the strategic path for most travel companies. Will your company achieve its strategic goals as cognitive explorer, or will success be more likely if you adopt the more aggressive posture of a cognitive adapter or a cognitive pioneer (see Figure 7)?

Figure 7

Travel companies need to match their cognitive ambitions with their cognitive investments



Source: IBM Institute for Business Value analysis.

Cognitive action: Execute cognitive projects in accordance with cognitive principles

In our study on millennial travelers and again in our travel loyalty series, we argued that cognitive tools could help travel providers understand and anticipate customer wants and needs, and assist in providing enhanced, highly personalized offerings for individuals and market segments.[3] To execute on this vision of traveler personalization, implement an effective cognitive operational improvement program or advance any other set of strategic cognitive-enabled objectives, travel companies must erect cognitive building blocks. More specifically, travel companies should:

1. *Delight in data complexity* – Recognize that data is the key to cognitive success by embracing all sources of data and incorporating them into your cognitive platform. Travel companies can accomplish this by:
    - *Partnering to acquire and improve data sources* – Travel companies have lots of data, but one unique advantage cognitive computing brings to the data analysis equation is that it can often find relationships between seemingly unrelated data. Travel agent insights about the purpose of a group's trip to Abu Dhabi – going to watch an auto race, for example – would be very valuable to a hotel that wants to personalize the group's stay with race-related promotions and ground-transportation alternatives. These insights might be valuable, and travel companies should therefore seek to extend their data reach beyond the boundaries of their enterprises.
    - *Focusing on improving the context surrounding all data* – Data on its own is valuable, but together with the proper context, that same data can prove invaluable to cognitive technologies. These systems derive insights that relate to not only each individual component (such as each time a hotel guest uses a mobile app to inquire about

additional hotel services), but also several components in aggregate (such as how often within a given year hotel guests asked about additional services while in the lobby, just prior to checkout).

- *Standardizing output formats for insights to maximize consumption* – Travel employees need to apply the data that is analyzed, but most current systems that deliver insights do so using inconsistent and cryptic formats. To maximize the positive impact frontline staff can have on both traveler personalization and operational improvements, the insights provided by cognitive systems must be usable, and standardized formats for customer insights will make it easier for employees to apply these insights to customer interactions.

2. *Drive cognitive program excellence* – Managing a successful cognitive transformation is similar to managing other large-scale enterprise changes. Travel companies can mount successful transformations by:

   - *Executing cognitive programs, not projects* – Each and every cognitive project should be linked to a more strategic program of transformation. These projects and programs should have clearly defined milestones and well-understood metrics for success. As importantly, they should be managed by empowered teams and guided by seasoned managers and executives.
   - *Prioritizing business solutions, not technology* – Cognitive computing offers exciting new possibilities, but successful transformations depend more on business results than on technical innovation. Travel companies should resist the temptation to explore technology for its own sake, and should instead elevate business outcomes and users' needs and interests to the highest priority.

- *Emphasizing efforts that improve the travel experience* – In addition to making a positive impact on the travel business as a whole, cognitive programs should be animated by a passionate desire to improve the travel experience. Too many projects fail to focus on the simple but important truth that the travel company that consistently delivers the best travel experience will outpace its competitors.

3. *Deliver actionable insights* – Cognitive projects and the larger transformation programs they help create are designed to turn raw, unstructured and seemingly unrelated data into insight. But to make that insight useful, it must also be delivered to end users – both employees and customers – in a timely and relevant manner. Travel companies can accomplish this by:

   - *Empowering employees with insights, not just by giving them data* – The explosion of data in all aspects of life is well understood, and has been much discussed in travel and thought-leadership literature. Travel executives should insist that their cognitive projects serve to curate the most relevant and actionable insights from the available data.
   - *Leveraging continuous improvement in the development of apps* – Good apps are created every day, but great apps tend to evolve over time. Travel companies should embrace the philosophy of iterative app development, and recognize that their most useful apps are likely to be those that have incorporated the most diverse input and undergone the most significant revisions over time.
   - *Using cloud to innovate around legacy systems* – The travel industry struggles against monolithic and inflexible legacy IT systems at every turn, but with strategic use of cloud technologies, it can extract data from these systems. It can then deliver the insights derived from cognitive systems directly to end users via mobile apps, wearables and other non-legacy delivery methods.

Are you positioned to lead the cognitive travel revolution?

Travel executives who believe their companies can get more from cognitive computing would do well to work with their teams to ask and answer the following probing questions.

- Does your enterprise have a comprehensive cognitive program in place today?
- Will your cognitive investment go beyond the chat-bots and robots that are increasingly common in the travel industry?
- Are your cognitive investments more likely to bring about a transformation in travel personalization or in operations?
- How well is your company guiding the projects that comprise its cognitive transformation program?
- What actions can you take today to increase the odds that cognitive computing will create a lasting competitive advantage for your company in the future?

For more information

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Methodology: How we conducted our research

To better understand the state of cognitive computing in the travel industry and to learn from cognitive leaders who have experience using the outputs of cognitive systems to improve decisions, the IBM Institute for Business Value and the Economist Intelligence Unit surveyed 200 travel and 103 transportation executives from 14 countries between June and August of 2016. We analyzed survey responses with the intent of learning from the companies that have the most experience using cognitive computing to improve business performance.

Authors

Steve Peterson is the global Travel and Transportation lead for the IBM Institute for Business Value. Steve is the author of numerous industry studies, and has served as a strategy consultant to the industry since 1998. His work has been embraced by IBM clients around the globe and widely praised in the industry and popular press. Steve is based in Denver, and can be reached at steve.peterson@us.ibm.com.

Raimon Christiani is the Travel and Transportation global industry leader for IBM Global Business Services. Raimon has been a respected advisor to industry executives for over two decades and has been a leader in the industry his entire career. Raimon is based in Zurich, and can be reached at raimon.christiani@ch.ibm.com.

Contributors

Brian O'Rourke – IBM Global Segment Leader for Airlines

Greg Land – IBM Global Segment Leader for Travel Related Services

Kanishka Agiwal – Associate Partner, Global Watson Leader

Kristin Fern Johnson – Content Strategist, IBM Digital Services Group

Kristin L. Biron – Visual Designer, IBM Digital Services Group

Notes and sources

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Route 100
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