Thinking Autonomous

The foundation for driving innovation

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Introduction

For the majority of companies, data is their most important business asset besides people. This is especially true as enterprises look to monetize their data by adopting technologies such as artificial intelligence (AI) and machine learning to gain insight and apply it to mission-critical business goals.

Forward-thinking enterprises understand what it takes to be successful in this data-rich, increasingly automated economy. According to the Harvard Business Review Analytic Services research report The Rise of Intelligent Automation: Turning Complexity into Profit, sponsored by Oracle, at least 7 in 10 executives understand that predictive analytics (80%) and AI and machine learning (68%) are important for the future of the business.

Even as executives recognize the vital role data plays in their businesses, many are unable to take advantage of the value residing in their data. The old ways of collecting, managing, storing, and analyzing data are no longer effective, and are preventing businesses from extracting potential value. Many simply can't execute on a data-driven vision.

Only one in five of the executives in the Harvard Business Review Analytic Services survey feels they are successfully utilizing data and insight for business value, and slightly more than half (58%) report just a middling ability to do so. These businesses are challenged by a lack of understanding of how to incorporate data effectively into their business strategies.

Intelligent automation is the key to building a strategy to manage data and uncover useful insight from it. By improving processes, freeing up valuable IT staff from mundane and reactive tasks, and ensuring the data is secure, automated solutions enable companies to focus on the data itself and what they can learn from it. To remain competitive in this data-fueled economy, businesses that change how they think about technology and build strategies for incorporating analytics-driven intelligence into everything they do will come out ahead.

Market Driver

The explosion of data makes it impossible for companies to stay competitive without deploying cutting-edge intelligent technologies—AI, machine learning, and automation—to manage and analyze it.

Yet, IT departments still devote much of their time to low-level and manual tasks. As IDC reports, most of IT budgets is spent on keeping the lights on and maintaining existing platforms. This means that IT departments can't channel resources to higher-value work such as insight generation, strategy, and innovation.

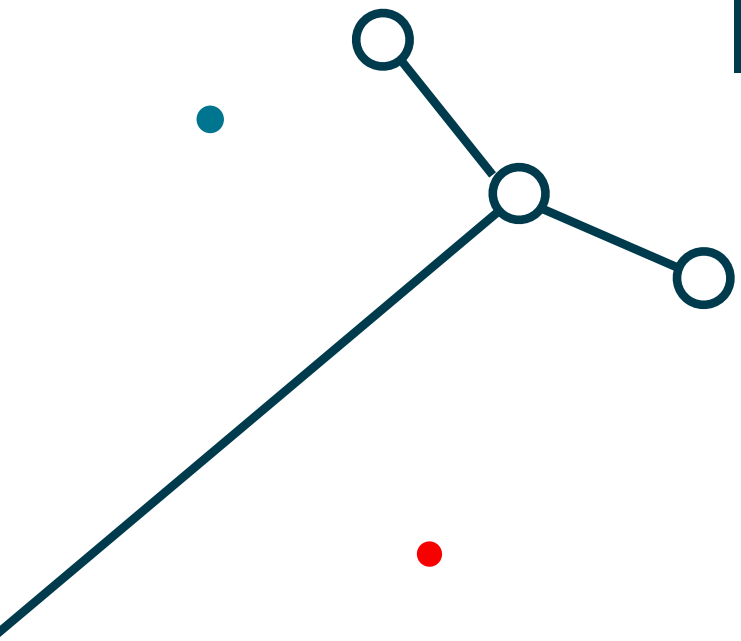
Automation is one way that enterprises can redress the balance between low-value and high-value tasks. This hands-off management and processing enables companies to use data to drive their business forward by increasing productivity, gaining better understanding of customer needs, and then improving service and engagement.

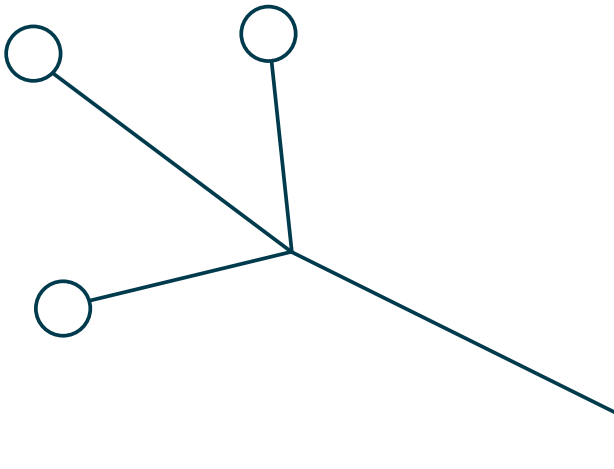
> *"A lot of the early success of use cases is businesses capitalizing on the fact they have data, how they can introspect that data, and discover data-driven decision-making."*
>
> **Robert Greene, Senior Director, Product Management, Oracle.**

Some industries are affected more directly by the ability to utilize data. Retailers and those that interact heavily with consumers are taking advantage of how data enables them to reach new and existing customers, build relationships, and provide the exact product or service desired. One example is the taxi industry, which was upended by Uber's use of data to predict supply and demand, set fares, and identify nearby available drivers to pick up passengers. The healthcare industry is another area where data is making a difference: Experts can predict problems such as disease outbreaks, using data from sources such as social media and medical and insurance records.

"All industries may benefit... ...It really depends on the size of the organization and the technology savviness of their database administrator (DBA). It will also depend on how much data they have."

Jim Czuprynski, Consultant, Zero Defect Computing.





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Turning Acceptance Into Implementation

Intelligent automated technologies affect each company uniquely, but at the core these tools remove low-level support work from the hands of humans, and enable mission-critical analytics.

Technology buys employee freedom

Even knowing the value of automation for sorting data, companies are slow to make this shift and are still using manual processes for management and analysis. Only 10% of the executives in the Harvard Business Review Analytic Services research report survey currently have sophisticated applications of AI and automation across the business.

The other 90% are dealing with employees who spend much of their time doing repetitive, nonstrategic work; the kind that could be done more efficiently by algorithms—such as financial analysts creating reports in Excel, managers manually tracking shipments, or customer service representatives spending more time on the phone—that could otherwise be channeled to chatbots or an AI solution.

Companies that are implementing automated solutions are rolling out or refining their use of three powerful intelligent automation technologies: Internet of Things (IoT), which is the source of much data for enterprises; cloud computing, which enables companies to take advantage of third-party providers and avoid the need to house and support IT services on premises; and predictive analytics, which derive useful business insight from the data.

Intelligent insights

This is no longer the day of the relational database with easy-to-organize, structured data to query. Enterprises are now gathering data in more forms and from more sources—such as videos, sensors, click streams, search indexes, and social media. Handling this unstructured data, at high volumes and in real time, is proving difficult for those managing data as they've always done.

Almost all (95%) of the IT professionals surveyed by CIO Research reported that legacy data warehouses required manual involvement, and about a third (38%) complained that the warehouses were too costly to acquire and maintain.

> *"You've been hearing that data is the new oil, the new currency. Truthfully, it's really processed data, data that's been analyzed and massaged, that is the new oil."*
>
> **Jim Czuprynski, Consultant, Zero Defect Computing.**

It's still true that to conduct analysis, many IT teams deploy a database, throw a business intelligence application on top, and hope for the best. This is precisely why so many companies are challenged to use their data effectively. They're unable to access and analyze all types of data, meaning the results may be distorted because of the absence of key inputs.

If IT departments remain in charge of databases and analytics systems, it means companies are limited in who can use this valuable data to support new processes, discover trends, and make predictions. The current setup also means those who most need the insights generated from the data—executives and business users in areas such as customer experience, human resources, and finance—are unable to analyze this complex data quickly. This lack of access results in a company incapable of making smarter business decisions in real time in response to customers and market forces.

All of this technology underlying critical business operations means that companies are devoting a lot of time to provisioning and managing hardware and applications, and spending money and resources to acquire, maintain, and staff them.

"The primary concern for businesses is understanding how data can inform them about something new that is contextually relevant to their business," says Oracle's Greene.

> *"They don't really care about the technologies, the things they need to do to stand up a bunch of physical servers, with processing power and enough storage. They just want to not lose their data, to know it's secure and backed up, and that they can use it when needed."*
>
> **Robert Greene, Senior Director, Product Management, Database Cloud**

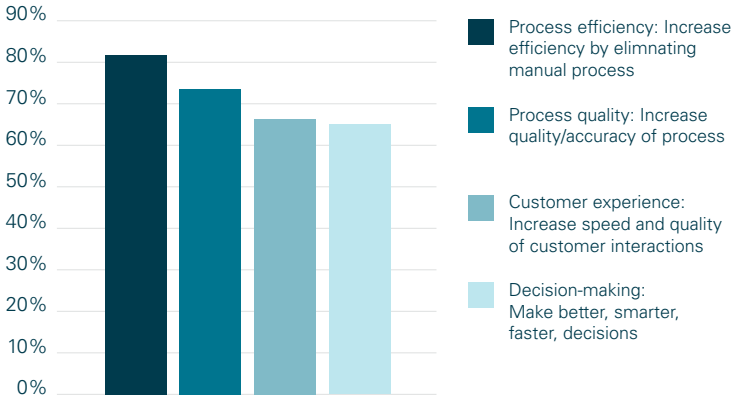

Chart 1. Top Goals of AI and Automation

Source: The Rise of Intelligent Automation: Turning Complexity into Profit, Harvard Business Review Analytic Services.

An Intelligent Solution to AI Challenges

Where to Start?

Though automation is not a new concept in business, the high-level roadblock to using AI and machine learning is that companies are simply unsure how to incorporate these technologies into their business model, or how they will benefit if they do so. Almost half (44%) of the executives in the Harvard Business Review Analytic Services survey cite a lack of understanding about how to apply AI or automation to their business as the biggest barrier. And only about a third (29%) say they're very clear on the cost/benefit equation for building automation into their operations.

"Making things more automatic has been the mainstay of business software for decades," says Brian McKenna, business applications editor at Computer Weekly. "That's what it's about, really. IT gets used to that, and nobody wants to do something that's boring and mechanical. Big data can be messy; it's often unstructured. You don't want to hang around getting the information from a transactional database into the data warehouse and out to the business intelligence tools, as you used to have to do. The answer is to bring more, less-traditional data under management."

Intelligent automation is not synonymous with cloud computing, but could not exist without it. And executives recognize the importance of the cloud—78% of those surveyed by Harvard Business Review Analytic Services identify cloud services as critical to the future of their business.

> *"It's not just a technology and platform move. Moving to the cloud also impacts the way you operate your business. A practical step is to assess how ready you are to do that and how much knowledge you have internally to make that transition."*
>
> **Jim Czuprynski, Consultant, Zero Defect Computing.**

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The wide-ranging implications of moving to the cloud are what causes some businesses to hesitate. "It's not just a technology and platform move," says Oracle's Greene. "Moving to the cloud also impacts the way you operate your business. A practical step is to assess how ready you are to do that and how much knowledge you have internally to make that transition."

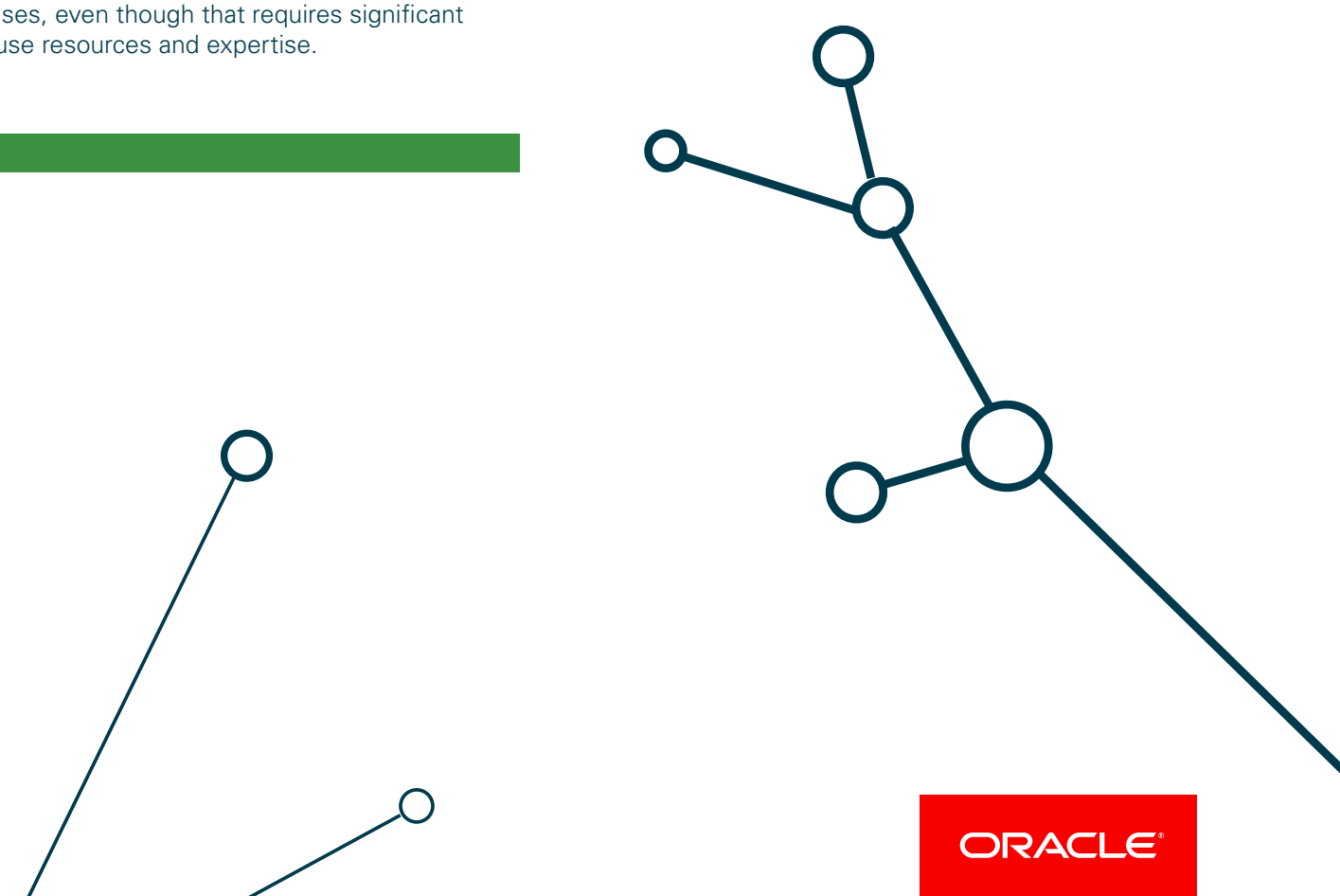
Even when convinced of the value of cloud services and intelligent automation, there is a fundamental issue holding companies back from making these critical investments: concerns about data security and employees.

Data security

Thinking about the loss of data, brand, and reputation that can result from breaches keeps CIOs and CEOs up at night. An intelligent, cloud-based data management solution that is inherently more secure than anything the company could implement on premises could help calm those fears. Yet, many enterprises remain wary of the cloud and third-party providers. They remain more comfortable storing and securing their data on premises, even though that requires significant in-house resources and expertise.

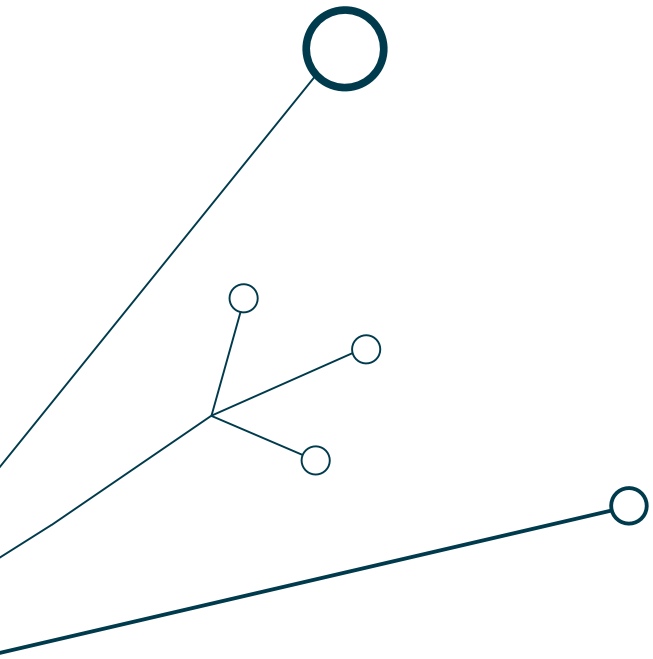
"There is the ever-present concern about security and data privacy when you push it into the cloud," says Miles Oustad, manager of the data integration team at Minnesota State. "These are hurdles for many businesses, because they deal with a lot of private information, like credit card numbers and addresses. Historically, that information has been stored on premises. In order to protect your data on premises, you need a lot of resources—expertise and a fair amount of money. It's a paradigm shift to trust somebody else with your data."

Most companies generally understand the importance of security, yet many are not implementing data security measures in a timely manner. This comes back to the manual nature of many security solutions and the fact that companies often lack resources or the ability to schedule downtime to run security patches. And most simply can't implement their patches fast enough, causing serious problems. According to a Verizon study, 85% of successful breaches resulted from vulnerabilities where patches were available up to a year before the attack occurred.



A database built with intelligent automation has two specific advantages that reduce risk for enterprises: It is self-patching and all of the data is encrypted. Self-patching eliminates the hurdle of keeping security up to date. The IT team no longer needs to find time to run the patch or schedule downtime to do so. An intelligent database applies patches while the system is running and online. This is critical to businesses with 24/7 operations, yet brings to all businesses the benefit of increased security against continual threats. Businesses no longer need to cross their fingers and hope the system will be OK until they can deploy IT staff to address a vulnerability, schedule downtime, and deploy a patch.

Data encryption is the other key security benefit of an intelligent automated database solution. The database doesn't give users the choice to encrypt or not. Taking away the extra step of turning on encryption and setting up firewalls when provisioning a database, which many companies simply do not take because of the time and effort involved, makes the data inherently more secure.



"Threats don't always come from outside the walls of the enterprise, either. Much of the time, bad actors are an inside job. Automatic encryption means that no unauthorized users can see the data, no matter where they are, including people within your organization or the database or cloud provider's company."

Robert Greene,
Senior Director, Product Management, Database Cloud

Employees

Even when innovative technology solutions are available, many businesses are concerned about implementing them because of how it changes the workplace. Businesses want to ensure employees are engaged in their work and productive, and increasing use of intelligent automation can impact how employees view their role within the company—in both the IT department and lines of business.

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There are real concerns that intelligent automation is a threat to the people who work in IT, especially DBAs, whose jobs are directly altered by the use of autonomous technology. DBAs are highly specialized talent who spend much of their time, by some estimates 75–80%, on administrative tasks and manual processing. Changes to their roles can feel threatening to these individuals, who may not see where else they can add value to the organization.

Yet, intelligent automation is not the threat it's feared to be. It does change the role of IT staff—for the better. Intelligent automation, such as an autonomous database, enables IT and DBAs to put key maintenance tasks, such as patching and updating, on autopilot, making data administration as low-effort as possible. This frees them up to focus on more-strategic tasks.

"We are going to see a shift from the traditional DBA role," says Zero Defect Computing's Czuprynski. "It's going to be something like an enterprise data architect. To really leverage the data, the DBAs know where the holes in the data are and, more importantly, where the data is—like outside data that you have to tie back into your customer data, your orders, and your enterprise systems."

> *"The key thing for CIOs from an economic point of view, is that you can free up DBAs, who are expensive staff, from doing manual things like security patches, and redeploy them to do something else to get more value from your data. That might be redeploying them to become data scientists or data engineers. You save money on database administration if you automate it."*
>
> **Brian McKenna, Business Applications Editor, Computer Weekly**

Line-of-business employees are affected very differently by the rise of intelligent automation. Technology that enables them to more easily capture and analyze data doesn't take away existing tasks, as it does in the IT department. Instead, it can make their jobs easier, empower more innovation and deeper engagement, or open up new job opportunities.

Providing easy access, intelligent automation removes a step in the analytics process—the IT department. That frees up line-of-business employees to analyze and visualize data on their own, whenever needed. With this flexibility they're able to develop and test hypotheses and make more knowledgeable predictions and decisions.

On the finance team, for example, increased ability to visualize purchase data on demand, and overlay that with web search data, can help predict trends and forecast sales, ensuring the team is more effective in their roles. Marketers can analyze real-time customer behavior and create targeted, personalized offers as customers shop online or in a store, giving the marketer the ability to become more creative and innovative in their outreach. Human resources professionals may identify a new job role for themselves, for example, by analyzing data to identify skill gaps and then create new training solutions to address them.

The increase in skills is something professionals are looking for.

According to Forrester, 35% of data and analytics decision-makers say it's a critical priority to improve the use of data insights in making business decisions. And about half (54%) recognize it needs to be at least a moderate priority.[1]

Despite these challenges and opportunities, and a reluctance on the part of many organizations to make critical operational changes that would propel the business forward, companies are keenly aware of what they're missing by not deploying AI and intelligent automated solutions—it makes them less competitive in their market (see sidebar).

The Consequences Of Not Pursuing AI Or Machine Learning In Our Business

- "Loss of business and customers from lack of agility to respond to business threats, needs, and opportunities."
- "An ability to use data effectively. Weak long-term growth prospects."
- "Speed to market for new products would decrease. would remain high compared to peers and we would eventually be financially unstable."

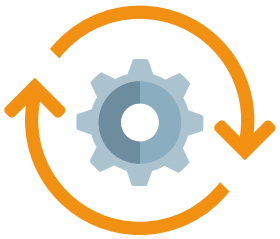
Source: The Rise of Intelligent Automation: Turning Complexity into Profit, Harvard Business Review Analytic Services

[1] *Forrester: Business Technographics Data and Analytics Survey, 2018.*

The benefits of an automated intelligent database solution include:

Security

Security. These solutions automatically take care of tasks such as encrypting the data, monitoring workloads and keeping track of who is accessing the data, scanning for security threats, and repairing itself in real time.

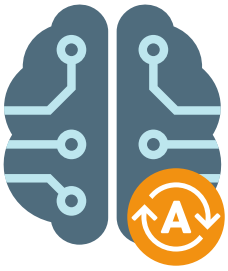


Flexibility

Flexibility. Intelligent automation enables companies to scale as they grow, delivering only as much compute power as needed, with the ability to add capacity at any time.

Speed

Speed. By eliminating manual processes of installation and analysis, intelligent automation saves time and enables companies to meet customer needs faster than ever before.



Efficiency

Efficiency. Automated databases continually review their own performance, to ensure they are operating optimally.

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The future of intelligent automation

Intelligent automation technologies could give companies the competitive edge, yet can be seen as risky. "It basically means a company has to be on the latest and greatest technologies and they can be seen as risky," says Oracle's Greene.

Most companies (four out of five) recognize the value AI-driven automation brings to modernizing the IT environment, and three out of five organizations in the Harvard Business Review Analytic Services survey expect to build a sophisticated level of use of AI and automation in the next three years.

Indeed, Oracle research shows that, by 2025, 70% of IT functions will be completely automated. And more than 50% of data will be managed autonomously. This shift will bring enormous changes to the operations and processes of enterprises around the world.

This frees up IT staff from these repetitive tasks and lets them focus on using the data and bringing value to the business through new roles. All of this automation is expected to create new jobs—as Oracle CEO Mark Hurd predicts, roughly 60% of all IT jobs that will exist in 2025 haven't been invented yet.

It will be industries with real-time needs, such as retail and financial services, that drive adoption of intelligent automation in the short term. Driven by the desire to serve their customers better, these sectors will lead the pack on innovation and insights derived from automated solutions.

"Intelligent automation like an autonomous database is going to explode in the future," says Minnesota State's Oustad. "Because of the benefits it brings to organizations like cost savings, not having to have as much physical infrastructure, not having to know everything about security. All of those tactical costs go away as industries get used to being able to trust cloud providers. Assuming successful implementation and no big failures, the sky's the limit. Because who would want to manage all that in your own data center when you can just pay for space?"

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Oracle's Innovative Solution: Autonomous Database

Oracle's entry into the intelligent automation space is Oracle Autonomous Database, the first totally automated intelligent database solution, with a guaranteed 99.995% reliability and availability on Oracle Cloud. Oracle devoted thousands of hours over the last two decades, investing in expert systems and innovative data management to build this self-driving, self-securing, self-repairing database and deploy it in the next-generation cloud (see sidebar).

Autonomy

- **Self-driving:** Automatically provision, secure, monitor, back up, recover, tune, and upgrade
- **Self-securing:** Automatically apply security patches, with no downtime
- **Self-repairing:** 99.995% availability, less than 2.5 minutes of downtime (planned and unplanned) per month

Analytics

Oracle Autonomous Database opens up a new world for analyzing critical business data. Companies no longer have to implement data warehouses, establish data lakes to make a broad range of data available for users, build applications to analyze data, or create analytical sandboxes to foster creation of new data products. Oracle has created a platform to enable IT, or end users, to access all of this functionality with a touch of a button. With the power of automation, companies can analyze all types of data, increase the speed of production, pivot with market fluctuations, and redefine the way they do business.

Speed

Oracle Autonomous Database enables companies to analyze data quickly and test the validity of business ideas. Companies can test the end-to-end business value of new ideas and see results in days, rather than months (as used to be the case).

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They can also gain predictive insights that enable them to deliver faster service to their customers.

"It's about keeping the business up and running. Internal customers can see into sales and finance systems faster, and be more productive. Externally, this means companies can create offers for customers much faster, by providing access to information to sales people in real time."

Robert Greene, Senior Director, Product Management, Database Cloud

QMP Health is an example of how autonomous is improving speed of delivery to customers, lowering business costs, and providing useful information to patients in near real time (see sidebar).

Security

Autonomous and cloud go hand in hand. Powerful machine learning and AI is deployed to protect users of Oracle Autonomous Database on Oracle Cloud. In addition to directly securing the data within the database, Oracle rearchitected cloud technology to better protect the cloud. This second-generation cloud secures the perimeter of each individual customer's cloud, minimizing vulnerabilities to outside threats or between customer clouds. Using machine learning and AI, robots search the cloud for vulnerabilities and repair them, without downtime, making this cloud technology a critical aspect of how Oracle secures its autonomous database.

QMP

QMP Case Study

- **Problem**
  Manual processing of lab results and blood tests was taking weeks. It was also costly to pay for lab analysts' time.
- **Solution**
  Oracle Autonomous Data Warehouse to process the tests.
- **Results**
  Processing time was reduced to hours, enabling patients to be diagnosed and treated much sooner. QMP saved money by reducing the need for lab analysts. The time and cost savings enabled the company to increase its service offering and accelerate business growth ninefold.

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Flexibility

"All you have to do, if you see lower performance, is turn the knob to add more CPU," says Czuprynski. "You can add more CPU while the application workload is running. So, companies can scale up when needed, and ramp down later."

Drop Tank took advantage of this flexibility inherent in Oracle Autonomous Data Warehouse to support existing programs and add more as their business grew (see sidebar).

With Oracle's 30 years of experience as a database leader, this database solution is designed and optimized to support mix workloads from data warehousing to transactional applications. Intelligent data management with Oracle Autonomous Database enables businesses to instantly access data-driven analytics to extract even more value from their most valuable asset—their data.

Drop Tank Case Study

- **Problem**
  Require an efficient and secure way to capture, manage, and analyze data for more than 3,500 gas station locations for operators' customer loyalty programs.

- **Solution**
  Oracle Autonomous Data Warehouse, with Oracle Cloud Infrastructure as the underlying platform, to store data and provide analytics.

- **Results**
  Oracle Autonomous Data Warehouse enabled Drop Tank to scale to address new business needs, including adding a new rewards campaign with only hours' notice; and support 30x more retail locations, with an expected 50-fold increase in sales by the end of 2019.

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Conclusion

Organizations planning for the future are including cutting-edge intelligent technologies—artificial intelligence, machine learning, and automation—to manage and analyze their data. They are automating routine and manual activities to free up their IT talent and cut the time from analysis to insight.

Moving to autonomous intelligence requires a cultural shift in many enterprises, from looking at data as transactional to finding insight and seeing data as the business-value generator it can be. Businesses of all sizes are already collecting data, from IoT devices to internal business systems,to customer information, to data generated by suppliers, advertisers, and other third-party sources.

These intelligent solutions build on the data enterprises already have, accelerating what they already know. They give companies the ability to analyze more data in real time and extract more targeted, essential insights; this means that less work is required to use the data, so companies can use more of it. These autonomous databases free up IT staff from the manual tasks of writing interfaces and building apps, so they can more effectively and efficiently manage the transactional side of their data management role. And this frees them up to be more strategic and innovative and become true partners in reaching the company's goals.

Utilizing intelligent automation enables companies to operate with a higher degree of agility and focus on the business, rather than spending time solving technology problems, thereby competing more effectively in the market. Data is one of the commodities most valuable to an organization; consequently, working with a third-party provider requires trust and finding a solution provider capable of securely handling your mission-critical information.

"Data can be a very strong differentiator if it's built and used right. You need clear goals and requirements for what you need to get from the data. Having that and charting a path to building that can yield great value."

Robert Greene, Senior Director, Product Management, Database Cloud

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Build a roadmap

Follow these three steps to invest in a technology strategy underpinned by autonomous data management:

1. Assess your current state

- How much data do you currently manage?
- What are your manual processes? How much time do they take?
- What is the volume of data growth you currently expect?
- How many databases do you manage?
- What is your current infrastructure and management budget?
- What is the cost of downtime due to errors and manual tasks?

2. Understand your security profile

- What are your known risks?
- Who has access to your databases?
- How can you make your IT more secure?

3. Understand your operational needs

- What are your core competencies?
- What are your mission-critical operations?
- Where are they lacking in delivering on your business goals?
- What are the applications and systems you can move to the cloud and to autonomous? Which ones need to stay on premises?
- How do you drive more efficiencies to improve customer satisfaction?

Sources

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Doan Nguyen, Senior Principal Product Marketing Director, Database, Oracle

Miles Oustad, Manager, Data Integration Team, Minnesota State Colleges and Universities

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