IDC FutureScape

IDC FutureScape: Worldwide Data, Integration, and Analytics 2020 Predictions

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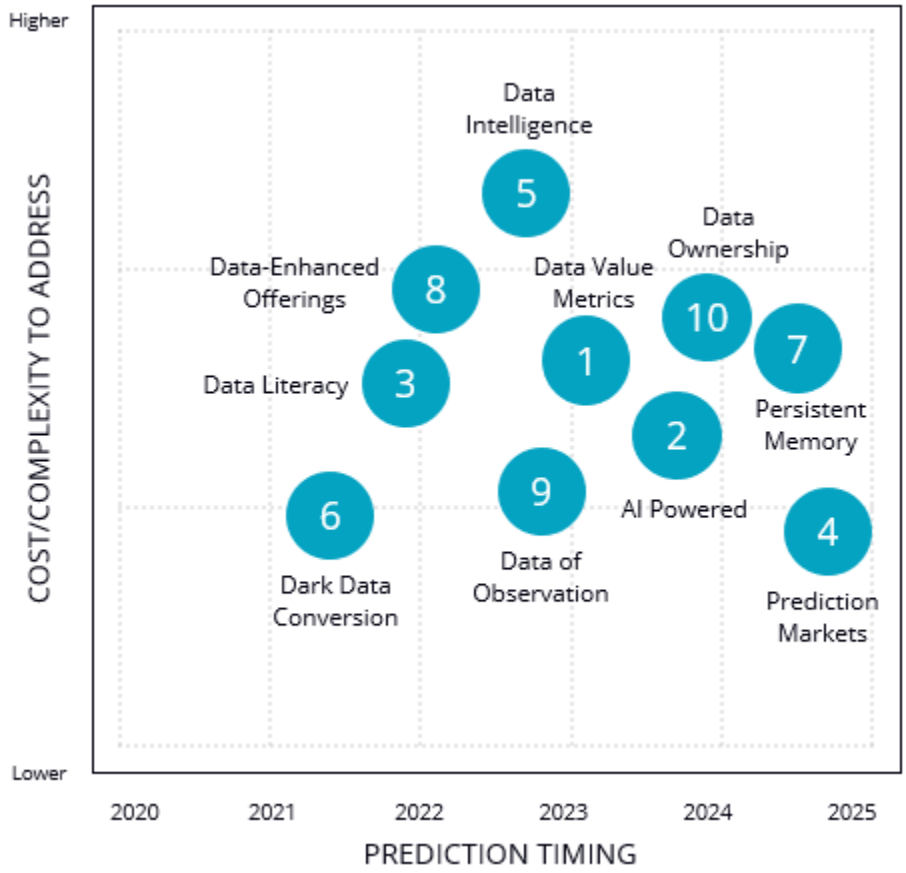
IDC FUTURESCAPE FIGURE

FIGURE 1

IDC FutureScape: Worldwide Data, Integration, and Analytics 2020 Top 10 Predictions



Note: Marker number refers only to the order the prediction appears in the document and does not indicate rank or importance, unless otherwise noted in the Executive Summary.

Source: IDC, 2019

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EXECUTIVE SUMMARY

When almost 100 CEOs were asked by IDC in a study in August 2019 about the importance of various strategic areas to their organization over the next five years, fully 80% of respondents (second only to focus on digital trust) mentioned data (or more specifically, using data in advanced decision models to affect performance and competitive advantage). And these executives are not simply paying homage to the current trendy topics. According to IDC's Worldwide Big Data and Analytics Tracker and Spending Guide, enterprises worldwide spent $169 billion on BDA software, hardware, and services in 2018.

However, most enterprises don't know if they are getting value or how much value they are getting out of data and analytics. Most are not tapping into dark data that is created by sits unused nor are most enterprises even attempting to get a return on their data asset externally. Most have subpar data literacy and incomplete data intelligence. Many are planning under the assumptions of huge potential benefits of artificial intelligence (AI), but lack foundational data, integration, and analytics capabilities that are prerequisites for moving along the AI-based automation evolution path.

Recent IDC research demonstrates that 67% of enterprises prioritize the creation of a data management capability to enable them to turn internal data into insight by organizing, maintaining, and refining data sets and data processes. However, 45% of organizations are still at a low level of maturity for data excellence — either Level 1 or Level 2. Only 19% of organizations reach the highest Level 5 (for more details, see IDC's 2019 *CIO Sentiment Survey* and IDC's 2018 *Digital Transformation Executive Sentiment Survey*). Those enterprises that can achieve this economy of intelligence will have a competitive advantage — just as organizations in the past that achieved economies of scale had an enduring advantage over their peers.

Spending on data, integration, and analytics as well as AI technologies and services must itself become more intelligent and optimized if all the purported benefits of data-driven enterprises are to be achieved. In this study, the global team of IDC analysts describes key drivers affecting information technology (IT) and business decision makers responsible for spending, deployment, and the effective use of data, integration, and analytics solutions and presents the top 10 predictions affecting data, integration, and analytics initiatives through 2025.

Though each prediction stands on its own, the 10 predictions are also intertwined. For example, data catalogs are key to measuring value of data and enabling opportunities in external data monetization, process monitoring can generate data for data as a service (DaaS) and impact prediction markets, and greater intelligence from unstructured data is an enabler of data literacy.

Each prediction is assessed based on its impact and time frame to expected stated adoption level. This study also offers IDC analysts' guidance to IT and business decision makers as they develop or revise their strategies and create resource allocation plans for investment in data and content, integration, analytics, AI, and information management.

The following 10 predictions represent the expected trends with the greatest potential impact on data, integration, and analytics initiatives:

- **Prediction 1:** By 2023, 70% of G2000 companies will have metrics in place to evaluate value realized from data, enabling them to optimize internal resource allocation decisions across the enterprise.
- **Prediction 2:** By 2024, enterprises that deploy ML-powered data management, integration, and analysis solutions will see a doubling of data-centric employees' productivity.
- **Prediction 3:** By 2022, a third of G2000 companies will have formal data literacy improvement initiatives in place to drive insights at scale, create sustainable trusted relationships, and counter misinformation.
- **Prediction 4:** By 2025, 30% of organizations will be using crowdsourcing-based internal or external prediction markets to make important business decisions.
- **Prediction 5:** By 2023, 60% of organizations will use data catalogs to unify data discovery, access, and intelligence and to bring increased transparency and trust in DataOps and business outcomes.
- **Prediction 6:** By 2021, 25% of data-driven organizations will have turned 30% of their unstructured data into repurposed discrete elements that fuel adaptive decision making and automate data-driven workflows.
- **Prediction 7:** By 2025, 100% of memory-optimized DBMSs will use persistent memory, with system performance benefits yielding competitive advantages in areas such as logistics, financial services, and IoT management.
- **Prediction 8:** By 2022, 50% of ICT vendors will use anonymized data collected within their platforms to provide insights and benchmarks, leading to increased value and differentiation for their offerings.
- **Prediction 9:** By 2023, the drive to monitor operations pervasively will have shifted to workers, with 25% of enterprises engaging in detailed digital work monitoring to improve the value of work performed.
- **Prediction 10:** By 2024, 10% of adults in developed economies will manage their personal data via data trusts, with new controls and transparency affecting digital business models and mediating customer relationships.

This IDC study provides IDC's 2020 top 10 predictions for data, integration, and analytics technology trends.

"Predictions highlighted in this IDC FutureScape outline some of the key requirements for the future of intelligence, which addresses an organization's capacity to acquire data combined with its ability to synthesize that data to create the information it needs in order to learn and apply the resulting knowledge across the enterprise at scale," said Dan Vesset, group VP, Analytic and Information Management Advisory Group and global lead of IDC's Future of Intelligence Practice.

IDC FUTURESCAPE PREDICTIONS

Summary of External Drivers

- **Accelerated disruption:** Navigating business challenges as volatility intensifies
- **The platform economy:** Competing at hyperscale
- **Sense, compute, act:** Maximizing data value
- **Intelligence everywhere:** AI's opportunity and implications
- **Rising customer expectations:** More convenience, customization, and control
- **The future of work:** Agile, augmented, borderless, and reconfigurable
- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage

Predictions: Impact on Technology Buyers

Prediction 1: By 2023, 70% of G2000 Companies Will Have Metrics in Place to Evaluate Value Realized from Data, Enabling Them to Optimize Internal Resource Allocation Decisions Across the Enterprise

What's your enterprise's return on investment (ROI) on data (and integration and analytics)? What seems like a basic question masks the complexity of developing, tracking, and communicating KPIs that measure value derived from data. It's no longer enough to hide behind metaphors such as "data is the new oil" or "data is our most valuable asset." Nor is it enough to state that investments in data lead to better decisions without defining this adjective. In one IDC study on the use of analytics, 30% of respondents in the United States stated that they have not measured business results of applying advanced analytics; in another IDC study, 63% of respondents said they have seen benefits from big data and analytics projects but have not quantified them! The lack of discipline and methods for measuring the value of data, in turn, inhibits informed decisions about data, integration, and analytics investments.

To address the well-known adage from management expert Peter Drucker, "What gets measured gets managed," some enterprises have begun to use more structured methods for assessing the value of data through new metrics focused on identifying value from both external data monetization through data-as-a-service offerings and internal value creation to affect decision-making processes within ongoing business operations. Yet many enterprises are falling further behind their industry peers in having this capability.

IDC has identified five key roadblocks to digital transformation, and one of the most pronounced among them is outdated or nonexistent KPIs — especially when it comes to assessing the value of data. Today, not having metrics about realized value from data is no longer an option.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **The future of work:** Agile, augmented, borderless, and reconfigurable
- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage

IT Impact

- The need to start measuring the value of data and information will put additional pressure on IT to have greater intelligence about data assets and data flows with the enterprise.
- IT will be challenged to align to metrics that are meaningful to the lines of business in addition to metrics that track technology utilization, performance, and cost.

Guidance

- Start data impact valuation efforts by considering that different decision-making patterns have different data and technology requirements and metrics associated with their respective value assessment. For example, it's easier to measure value of data in support of well-defined tactical decisions that are amenable to A/B testing.
- Ensure that the value of data and its impact is articulated in the context of business initiatives rather than IT metrics. In other words, this capability is not about knowing that a query can be processed twice as fast as before; rather it's about evaluating how this technical improvement decreases customer churn, improves customer service rates, or optimizes labor allocation.

Prediction 2: By 2024, Enterprises That Deploy ML-Powered Data Management, Integration, and Analysis Solutions Will See a Doubling of Data-Centric Employees' Productivity

The first set of autonomous or "self-driving" databases, integration, and analytics IT solutions are already on the market. Initial references are confirming expected benefits of less need to spend time on previously manual tasks related to database tuning, backup/recovery, data quality assessment and correction, and data visualization and root cause analysis, among others. The automation, using a range of AI/ML and rules-based techniques, of tasks, activities and, ultimately, end-to-end processes associated with these data-centric activities will continue to progress rapidly as enterprises implement ongoing performance and behavioral monitoring, learning, and explanation capabilities to accelerate such automation.

The ability to monitor, learn, and explain all data related to data-centric processes (of systems and people using them) is further enabled by the adoption of cloud data management, integration, and analytics solutions, whereby technology vendors can provide instrumentation capabilities to benefit their own as-a-service offerings and their customer's needs for more granular system performance, user behavior, and process workflow data. In the next few years, upgrades to latest data management, integration, and analytics solutions built on cloud-native architecture will drive deployment, maintenance, and development efforts with the resulting productivity improvements.

Associated Drivers

- **The future of work:** Agile, augmented, borderless, and reconfigurable
- **Intelligence everywhere:** AI's opportunity and implications
- **Accelerated disruption:** Navigating business challenges as volatility intensifies

IT Impact

- Professionals involved today or in the past in activities that involved manual tuning, administration, engineering, or development of various data assets (databases, data flows, data visualizations) will be able to address pent-up internal customer demand for more access to relevant data faster.
- Data professionals will have to shift their ongoing work from manual data engineering and management tasks toward oversight and governance of automated systems to ensure that

machine learning (ML)-based automation remains in compliance with internal policies and external regulations and is consistent with models or frameworks the enterprise has developed to operate in its markets and society at large.

Guidance

- Introduce practices for deeper and more nuanced understanding of internal user requirements. This can happen only if IT is able to step "into the shoes" of its constituents and understand the complex, end-to-end business process flows via process monitoring and context provided by business subject matter experts.
- Begin to retrain existing data professionals to change their scope of responsibility from task-oriented development and administration of data, integration, and analytics systems to one of oversight and governance.

Prediction 3: By 2022, a Third of G2000 Companies Will Have Formal Data Literacy Improvement Initiatives in Place to Drive Insights at Scale, Create Sustainable Trusted Relationships, and Counter Misinformation

Data literacy is more than only the ability to effectively use latest business intelligence (BI), analytics, or artificial intelligence tools. It is the ability to read, work with, analyze, and argue with data. Data literacy is as foundational to an enterprise in today's world of big data and AI as general literacy is to a person's ability to learn. It is a capability that can and should be developed at the level of an individual and for the enterprise as a whole.

Many enterprises' ability to fulfill their goals or to compete effectively is hampered by low levels of data literacy — an IDC study on adoption of BI and analytics showed that only 45% of individuals indicate that they have a strong understanding of data generated outside of their immediate business group and only half of individuals cite that results of data analysis have a strong influence on their decision making and subsequent action (for more details, see *Data Literacy: A Foundation for Succeeding in a Data-Driven World,* IDC #US44930119, March 2019).

Leaders of every enterprise should be asking themselves if their employees are sufficiently data literate to make decisions in today's data- and analytics-driven economy. This question applies not only to top managers but everyone in the enterprise because everyone makes decisions. If the answer to this question is that employees in your enterprise lack enough data literacy, you'll find that you're not alone, and you'll also find that there are steps you can take to improve data literacy. Some enterprises have already initiated formal data literacy efforts, while up to one-third of G2000 are expected to do so by 2022. These enterprises will enjoy the advantage over their competitors in their ability to learn, retain institutional knowledge, and apply that knowledge throughout the enterprise.

Associated Drivers

- **Accelerated disruption:** Navigating business challenges as volatility intensifies
- **Intelligence everywhere:** AI's opportunity and implications
- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage

IT Impact

- Today, spending on software addressing structured data is twice the spending on software to address unstructured on semistructured data. IT will need to aggressively expand its focus from management of structured data to technologies such as knowledge management and

content management solutions to ensure that much of today's dormant — often unstructured — content is available, understood, and used.

- IT will be called to partner more deeply with its internal clients to help develop formal and informal training programs to improve data literacy. Therefore, IT must be ready to engage in data intelligence efforts, including those focused on data lineage, data governance, data cataloging, identification of use cases, and the use of blockchain in enabling trusted data pipelines.

Guidance

- Increase investment technology to derive value from unstructured, untagged, or unorganized data or content. IDC estimates that up to 80% of the data created by enterprises falls into this category and is ripe for harvesting new or enhancing existing insights.
- Help in training employees on the meaning of data as well as where and how to find relevant data. Also, educate employees on how to benefit from latest human-computer interfaces, search, data intelligence, and business intelligence technology as they strive to extract value from data. IDC research indicates that training on the use of data and tools is independently and additively important.
- Engage middle managers in the effort to increase data literacy. IDC research shows that this level of management plays a more significant role in diffusing data literacy throughout the enterprise than executives. Ensure that as these managers interact with their peers throughout the enterprise, they have access to the best available data, analytics, KPIs, and IT support.

Prediction 4: By 2025, 30% of Organizations Will Be Using Crowdsourcing-Based Internal or External Prediction Markets to Make Important Business Decisions

Prediction markets are a form of crowdsourcing where the views of groups of individuals about specific topics of interest are aggregated. This is done by developing market prices that indicate the crowd's belief about the probability of particular unknown future event.

General prediction markets inside and outside the enterprise have long been in use and slowly have developed a reputation for being more accurate and more efficient alternatives to individual decisions or even public or private surveys when dealing with complex events affected by myriad factors. As most large enterprises already use public surveys, the greater use of prediction markets reflects a natural progression to allow attention to focus on operational outcomes rather than general attitudes and preferences. The use of prediction markets for internal decision making is also becoming increasingly important — something that flatters organizations will need to leverage in order to make decisions about evermore complex events.

Prediction markets are therefore necessarily aligned with the near-real-time ethos of digital transformation and ongoing statistical experimentation. Prediction markets are also made progressively pertinent because of the increasing complexity, interconnectedness, and real-time nature of markets, where no one individual or intelligence can hope to assimilate and process the depth and scope of information potentially relevant to a single outcome or decision.

Associated Drivers

- **Accelerated disruption:** Navigating business challenges as volatility intensifies
- **The future of work:** Agile, augmented, borderless, and reconfigurable

- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage

IT Impact

- Historical decisions and predictions will need to be explicitly maintained and reevaluated in order to determine prediction capabilities.
- IT will have to develop and maintain information about ecosystems of interested and informed parties. Such parties will need to have incentives – reputation/prizes/money – to support their ongoing involvement in these prediction markets.

Guidance

- Develop, track, and disseminate measures of respondent skills and confidence – typically based on closeness to the domain or on historical accuracy of their predictions.
- Develop formal financial or nonfinancial incentives for involvement in internal prediction markets.
- Be willing to experiment with specific strategic decisions using prediction markets.

Prediction 5: By 2023, 60% of Organizations Will Use Data Catalogs to Unify Data Discovery, Access, and Intelligence and to Bring Increased Transparency and Trust in DataOps and Business Outcomes

Maximizing success in the digital economy requires organizations to be enabled by data, not restricted by policies and controls that inhibit data exploration and innovation. However, this must be accomplished in compliance with regulations while minimizing data security risks. Data and the environments it exists in are increasingly more complex; distributed across on-premises datacenters, clouds, and edge devices; managed in relational and nonrelational databases; and persisted in file systems, object stores, in memory, and in motion as data is streaming into analytics for near-real-time insights and being used to take real-time actions in operational systems.

The scale of data distribution and complexity in the digital economy prohibits consolidation of all data into central repositories or virtualized in one semantic layer. Successful data enablement within data governance controls requires data intelligence. As a cornerstone of data intelligence, data catalog software can inform professionals with the knowledge they need to find, trust, work with, and protect data in data science, analytics, and business operations being managed iteratively with DataOps methods.

Data catalogs will also become a point of data access and authorization control, so that data protection policies can be applied consistently across the distributed data estate. This will provide IT with comfort of control without compromising data transparency that the business requires to improve its trust in the data and its data literacy to drive better strategic and operational outcomes.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage
- **Intelligence everywhere:** AI's opportunity and implications

IT Impact

- Some IT groups will be challenged to articulate the need to invest more in data discovery, access, and intelligence.

- All data sources in the enterprise will need to be exposed to automated data discovery engines that can capture and maintain data location, definition, lineage, context, and usage metadata.
- Data catalogs will serve as a new point of data access and authorization control, requiring IT to maintain integrations with directory, database, and sign-on services.

Guidance

- Articulate the value of data catalogs, which not only provide the location and transparency intelligence to the enterprise but also improve DataOps — informing decisions about access control and usage policies, encryption, masking, and protection; where to locate data; and how and where replication needs to occur on data assets to maintain business continuity.
- Look for data catalogs that can automate the collection and maintenance of data intelligence while allowing for crowdsourcing knowledge about data. Many data catalogs exist in spreadsheets and centralized knowledge repositories, but manually populated data intelligence becomes obsolete quickly.
- Ensure data catalogs are interoperable with data management and security technologies within the IT environment. Data catalogs gather intelligence from data lineage, ETL/ELT, business glossaries, database logs, data quality measurement, data stewardship, and access management technologies.
- Develop and maintain standard taxonomies for data definitions, business context, analytics artefacts, and provenance to provide consistency of intelligence about data in the organization, contributing to data literacy and trust.

Prediction 6: By 2021, 25% of Data-Driven Organizations Will Have Turned 30% of Their Unstructured Data into Repurposed Discrete Elements That Fuel Adaptive Decision Making and Automate Data-Driven Workflows

IDC's estimates the Global DataSphere will grow at a compound annual growth rate (CAGR) of 28% through 2025 (for more details, see *Worldwide Global DataSphere Forecast, 2019–2023: Consumer Dependence on the Enterprise Widening,* IDC #US44615319, January 2019). In recent years, AI-enabled capture, natural language processing, and computer vision have become enablers that transform unstructured and semistructured content into discrete elements for better insight discovery. Defined tagging mechanisms will aid users in finding and reusing unstructured information faster from creation through ingestion, processing, and consumption. Using a data schema will allow discrete elements derived from unstructured content to form a knowledge base and feed machine learning engines with data context to improve AI models that fuel adaptive decision making.

AI-enabled tools are slowly gaining maturity, helping businesses to tackle increasingly complex data types and unlock the full potential of unstructured data at scale. As applications of AI for intelligent data collection and processing further develop, they will become staples in standard business processes and the customer experience. For example, organizations can reduce the risk during the sales process by automatically analyzing sales contracts as they get generated by flagging specific terms or variations of risky contract language and offering replacement language.

Enterprises will grow increasingly more comfortable with using AI to parse their unstructured data. This is in part due to vendors of content-related technologies moving quickly to embed AI/ML in the form of new features that automate a growing number of tasks and activities in the overall workflow of processing unstructured data (and combining them with structured data). Adoption will unfold in stages, starting with targeted use cases (e.g., contracts management) and progress to more

personalized use cases (e.g., customer onboarding). The AI/ML capabilities to locate and extract data elements from unstructured documents is nearing 95% accuracy with some software today. Training the system on your specific templates and document types can reach higher accuracy rates. With unstructured documents being tagged and processed upon ingestion, the data becomes immediately available for decision making and automated data-driven workflows.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **Intelligence everywhere:** AI's opportunity and implications
- **The future of work:** Agile, augmented, borderless, and reconfigurable

IT Impact

- An organization's ability to extract insight from unstructured documents will increasingly depend on the ability of the organization to harness AI and advanced analytics in the context of the document life cycle. To remain competitive, IT groups need to identify AI and advanced analytics for document management as a core competency.
- To take full advantage of unstructured assets, IT will be expected to adopt the latest AI capabilities from the cloud, obtaining opportunities to optimize infrastructure for more efficient and cost-effective document storage and processing.
- Because demand for data insights has risen, many vendors offer componentized content formats and metadata support in their products. Enterprises that want their operational data to be useful immediately in multiple contexts should evaluate how the unstructured content gets converted and stored for future use in a componentized or XML schema data structure.

Guidance

- Automate nonstandard processes requiring contextual inference and use pattern recognition and/or learning capabilities to gain control over structured and unstructured information. Adopting AI at scale allows real-time data extraction to be immediately used in data-driven decisions that optimize both internal processes and external customer experiences.
- Identify and implement near-term use cases that benefit from automating time-consuming manual tasks associated with creating, managing, and delivering insights, such as contracts management or customer onboarding. Establish mechanisms for measurement to realize a quick return on investment.
- Evaluate vendor technology advancements in AI, component, or metadata-driven technologies that include capabilities to capture and harness the intelligence extracted from unstructured content.

Prediction 7: By 2025, 100% of Memory-Optimized DBMSs Will Use Persistent Memory, with System Performance Benefits Yielding Competitive Advantages in Areas Such as Logistics, Financial Services, and IoT Management

In April of 2019, Intel announced general availability of the Intel Optane DC Persistent Memory Module. This module fits in a standard DIMM socket on an Intel-based motherboard, and unlike standard DRAM, is capable of retaining memory settings without power. This development has massive implications for a wide range of software, including operating systems, data caching technology, and database management systems (DBMSs). For DBMS, in general, and DBMS with memory-optimized capability, in particular, this has significant implications, including faster transaction processing and much faster system restart time. Many memory-optimized systems (including those featuring columnar compressed data in memory and a range of key-value stores that are used for large

memory caches) can reduce their dependency on storage for recoverability. Database systems that write transaction recovery log data to flash will experience an order of magnitude increases in transaction throughput.

This technology is expected to enable DBMS vendors to produce systems that are simpler to operate, easier to tune, and that offer much better performance in both transactional and analytic database operations. Of course, the module is a little more expensive than standard DRAM, and servers will need to be configured to DBMS specifications in order to realize the full benefit of this technology, but it is probable that database servers in the cloud will be preconfigured appropriately by all the major public cloud vendors. The end result for the user is having databases that are easier to tune, run faster, restart faster, and are more stable overall, which represent a good trade-off against the modest hardware cost increase.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **The platform economy:** Competing at hyperscale
- **Accelerated disruption:** Navigating business challenges as volatility intensifies

IT Impact

- Simpler database operations due to a greater reliance on memory rather than storage for operation, which among other benefits, enable far more complex analytic calculations against large amounts of data without resorting to flash, making for a faster analytic database environment.
- The ability to utilize databases that support mixed workloads (OLTP and analytics, including graph, time series, and machine learning) and provide multimodel support, enabling the same database system to handle tables, documents, and graphs often requires more memory than systems that specialize in just one of these data forms.
- Shorter scheduled downtimes when system cycling is required (for patch application or system maintenance). Typically, a memory-optimized database manages all its data in memory and when it starts up, that data must be loaded from storage. With persistent memory, the data remains in memory after shutdown, allowing the database to restart almost instantly.

Guidance

- Check with your technology vendor on its planned support for and use of Intel Optane DC Persistent Memory if you are using DBMSs designed to handle the largest and most demanding database workloads.
- Check with your support vendor or open source community to see if steps are being taken to support this important new technology. Eventually, this persistent memory option will find its way into most DBMSs in some way, even the simpler ones.
- Evaluate this technology's impact on your operations and DBA staff after first consulting your DBMS vendor or, in the case of open source, the support provider on this subject.

Prediction 8: By 2022, 50% of ICT Vendors Will Use Anonymized Data Collected Within Their Platforms to Provide Insights and Benchmarks, Leading to Increased Value and Differentiation for Their Offerings

Data monetization efforts have steadily expanded across industries and regions. However, providing value through data exchanged with external parties goes beyond simply providing data to develop a new revenue stream. Every enterprise that considers data monetization needs to scrutinize the

strategic intent of this effort. It could involve developing a data offering that is sold on its own or one that is part of the bundled value-add with existing technology sales and subscriptions, making the latter "stickier" by raising substitution costs or improving customer experience.

A growing number of IT vendors, particularly those with as-a-service offerings, are capturing usage metrics. While most vendors have been using this data internally to inform new product development and provide customer support, increasingly, vendors are making this type of data available to their customers. Some vendors are providing this data in raw form to end users to detail usage behavior across their installed base. Other vendors have developed reports and benchmarks based on anonymized activity within their platforms, including metrics about business process flows and tasks or process completion times as well as metrics and benchmarks of industry or functional process trends based on data from customers that have chosen to opt in to such initiatives.

Creating data-as-a-service capabilities enables the benchmarking of anonymized user behavior and process monitoring metrics across enterprises. Two common models in place today include one that provides DaaS without charge to companies that opt in to share their data with others on the platform or an alternative where an outside benchmark can be incorporated for a fee. With predefined use cases for the data, many IT vendors have begun to launch some type of value-added data to their portfolios.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **Rising customer expectations:** More convenience, customization, and control
- **The platform economy:** Competing at hyperscale

IT Impact

- Much of the way that solution providers will be able to provide the added DaaS offerings is by shifting any on-premises systems to the cloud. Business users may press IT to migrate.
- The availability of new data and benchmarks can build excitement about more analysis of the data or other closely related internal data. IT should be prepared for additional demand for these tools and/or visualization capabilities.

Guidance

- Encourage your vendors to use their data capture and analytic capabilities to tell you how to be a better user of their software. Beyond software itself, consider what your vendors could do for you to enable your process improvement efforts through comparative benchmarking or other analytics.
- Weigh the benefit of migrating from on-premises solutions to cloud-based offerings in light of new value from DaaS offerings bundled with technology offerings.
- Examine the terms and conditions as you choose to join (or not join) cooperative data efforts (for more details, see *IDC PeerScape: Peer Insights from Introducing Data Monetization and Data as a Service,* IDC #US45303619, July 2019).

Prediction 9: By 2023, the Drive to Monitor Operations Pervasively Will Have Shifted to Workers, with 25% of Enterprises Engaging in Detailed Digital Work Monitoring to Improve the Value of Work Performed

Enterprises that have adopted robotic process automation technology collect data and perform statistical analysis that detail how tasks are performed, aligning the activities with individual workers

and teams. The intent is to support effective automation planning and design. Because this software collects all activities performed on machines equipped with monitoring agents, it also collects data about the percentage of nonwork-related activity an employee does as well as when an employee is idle. The market direction for this type of software is to be able to produce individual worker metrics and monitor work performed digitally on an ongoing basis.

While office-based task monitoring is in its infancy, an emerging set of enterprises over the past few years have started to use technology to precisely dictate and monitor tasks, task duration, travel routes, and breaks for their workers in addition to gig economy labor and contracting firms and their workers to the point where the tone of the articles is about dangerous and abusive behavior.

Directionally, digitally scrutinizing activities at work could impact workers across all industries in all roles. Country regulations vary about whether workers need to be notified that they are being monitored, but all employers have the right to monitor employees at work. The question, then, is how enterprises will adopt this new task monitoring technology and apply it. By 2023, use of process discovery tools that involve statistical analysis of how tasks are performed will be adopted pervasively across businesses to help improve automation planning. Over the next few years, leadership and process owners will have to decide whether they see benefits in monitoring on a broad and continuous basis. There are positive reasons to do this and reasons to be cautious about broader adoption and employee relationship management.

Associated Drivers

- **Accelerated disruption:** Navigating business challenges as volatility intensifies
- **The platform economy:** Competing at hyperscale
- **Economies of intelligence:** AI, human, and organizational learning fuels asymmetrical advantage

IT Impact

- The effort to collect data to feed into process and task discovery will significantly increase.
- With this effort will come the need to embrace a style of building applications that puts decision automation at the heart of the solution. Decision-centric solutions continuously receive and analyze data to predict when decisions need to be made, learn how to automate those decisions, and act on each decision to improve performance.
- As ongoing monitoring rather than project-based or one-time monitoring becomes the norm, the need to support continuous process and behavioral monitoring will increase.

Guidance

- Assess and articulate the value of process monitoring. Monitoring worker tasks is powerful if used in a positive way. Identifying how highly effective workers differ from others can be used to help train and lift performance across the enterprise. Similarly, rapid identification of worker performance problems or resistance to change drives better training and rapid improvements.
- Consider the risks of pervasive process monitoring. Adopting this technology can be abusive and, depending on the use case, dangerous or perceived as abuse of power. HR should be involved with business units engaged in monitoring workers to establish best practices for positive use of this technologies along with guidelines.

Prediction 10: By 2024, 10% of Adults in Developed Economies Will Manage Their Personal Data via Data Trusts, with New Controls and Transparency Affecting Digital Business Models and Mediating Customer Relationships

The introduction of the European Union's (EU's) General Data Protection Regulation (GDPR) in 2018 has kick-started a movement to take the issue of customer data protection much more seriously: California's new privacy law shows that jurisdictions far beyond those within the EU are similarly concerned with ensuring corporate use of citizens' personal data is effectively controlled. Other U.S. states and countries are likely to follow.

With revelations and scandals regarding the inappropriate use, sharing, and control over individuals' data appearing and unfolding on an almost weekly basis, demands from individual citizens and pressure groups for new systems that can help enforce consent-based use of personal data collection and usage will rise significantly over the coming years. Savvy corporate brands are getting ahead of potential shifts in competitive dynamics based on concerns over privacy and are keen to differentiate on this basis.

By contrast, companies that have neglected consumer privacy in the past are at risk of not only paying fines but also losing customers. Organizations that become proactive in transitioning from unchecked data collection to deliberate "privacy first" approaches to data management that embrace the optional use by individuals of third-party personal data and consent management platforms will stand the best chance of remaining relevant and competitive.

Associated Drivers

- **Sense, compute, act:** Maximizing data value
- **Rising customer expectations:** More convenience, customization, and control
- **Accelerated disruption:** Navigating business challenges as volatility intensifies

IT Impact

- Architectural assumptions about where and how customer data is stored and managed, and therefore assumptions about the always-on availability and referenceability of customer data, will need to be revisited.
- The transactional and analytic systems that underpin and drive planning and management for products, services, and experiences will need to be designed to enable tiered approaches (based on availability and usability of customer-related data) to the provision of differentiated features and levels of personalization.

Guidance

- Prioritize transparency and education – both internally within your organization and externally with your customers and wider market – regarding how you are gathering and using individuals' personal data. You should consider the potential for competitive differentiation from being proactive in this area.
- Build on existing work that sustains your compliance with relevant privacy regulation by architecting systems and processes to maximize flexibility in how and where individuals' personal data is stored and the access and usage controls that are applied to that data.
- Reassess designs of systems responsible for managing, accessing, integrating, analyzing, and driving automated recommendations and actions from data about customers and their behavior as well as external data monetization efforts.

ADVICE FOR TECHNOLOGY BUYERS

Data is an asset, but an idle asset that is not generating a return or whose return is not being measured represents instead a liability. IT leaders are in a unique position to affect data-, integration-, and analytics-driven transformation if the focus is on the following key masteries:

- Consider your role as enabling the enterprise along two axes. One is the ability to synthesize information. Second is the capacity to learn. It is, therefore, insufficient to only focus on investing in data management, data integration, and data analysis technology. It's just as necessary for IT to participate in driving an evidence-based culture; DataOps, ModelOps, and AIOps practices; data intelligence; data literacy; decision-centric architecture; decision environments (digital twins); and collective intelligence/knowledge management throughout the enterprise and at scale.
- Take an active role in the development and articulation of a methodology to measure the value of data by following data's path throughout its life cycle from ingestion and management to enabling decision support, data monetization, and learning.
- Balance investments among efforts to capture value from structured and unstructured data as well as data at rest and data in motion. Even though more data exists in unstructured form and a growing number of business process require streaming data, investment tends to be skewed toward technologies addressing structured data at rest.
- Ensure that everything you do with data is aligned with business goals and initiatives. Data management, integration, analytics, and AI are not an end in themselves.
- Be cognizant of the impact automation will have on the IT function and group. Plan for retraining of staff that will be most affected by AI/ML-based automation to ensure experience is not lost but redirected to focus on higher value-added activities such as governance and oversight of machines and communications with colleagues and other stakeholders outside of IT about the value of data, integration, and analytics information technology.

EXTERNAL DRIVERS: DETAIL

Accelerated Disruption: Navigating Business Challenges as Volatility Intensifies

- **Description:** Today, survival of the fittest is linked not to size or strength but to the ability to change — to move quickly, react, adapt, seize opportunities, and be agile. With the increasing uncertainty in economic rules, political stability, climate effects, and disruptive innovations in the marketplace, a sense of urgency pervades companies concerned about their competitiveness and longevity. Beyond that, organizations' ability to navigate the increasingly complex and uncertain business environment has become essential. The new imperative is to keep pace with business change by increasing the speed of business operations, the speed at which changes are delivered, and the speed and scale of innovation. Survival means understanding and adopting these new approaches quickly, throughout the organization.
- **Context:** The best-performing companies are pulling away from the rest, creating a bifurcated and unequal landscape where a few firms exhibit high productivity and profits. The global superstar companies and the unicorn start-ups leverage innovation cultures, agile organizations, and disruptive approaches to everything from machine learning to talent acquisition in order to adapt to complex uncertainty; adjust their products, services, and operations; and seize opportunities.

The Platform Economy: Competing at Hyperscale

- **Description:** Understanding and provisioning the platforms that will sustain, advance, and scale business and operations are essential for every business. The platform is where the future of software, infrastructure, and connectivity will evolve and where edge will be accessed, integrated, and optimized. Megaplatforms compete to own infrastructure, artificial intelligence, and development environments. Application-centric platforms look for the network effect to expand their reach. Industry-specific platforms harness multiplied innovation to build niche ecosystems. Capturing profits will be highly dependent on controlling or participating in the right platform. Every business must incorporate these new realities into its platform strategy.
- **Context:** Today, we are in a platform economy – one in which tools, capabilities, and frameworks based upon the power of information, cognitive computing, and ubiquitous access will frame and channel our economic, business, and social lives. Leading organizations are shifting to platform thinking to evolve their business models and manage their technology architecture. Platform thinking is a fundamental shift in business strategy, moving beyond product differentiation and pricing and toward ecosystem-based value creation. It is also a long-term, sustainable response to new realities in the DX economy, one in which organizations digitally transform themselves into digital-native enterprises.

Sense, Compute, Act: Maximizing Data Value

- **Description:** Today, data and intelligence represent a unique opportunity for creating unimaginable value. Real-time data from IoT, mobile devices, and other devices at the edge – combined with historical data, enterprise systems, and global information – continually sense an environment and put it into new contexts. By combining data with AI and machine learning, organizations are spreading intelligence from the core to the edge to turn data into action and action into value. Automation literally extends beyond decision making and optimization into life-and-death dependencies. Competitiveness is determined by how data is transformed into insight and knowledge to create high-value differentiators for products, customers, and markets and deliver meaningful, value-added learning, predictions, and actions that improve experiential engagement, industrial processes, enterprise decision making, and much more.
- **Context:** In this "data driving action" world, ensuring the veracity of the data and transforming data into insights become a strategic imperative. Sometimes called "decision-centric computing," the need to understand and utilize data goes beyond data integration and governance. What becomes essential is: first, to put data into context to provide meaning; next, to understand it in relationship to other data and events to gain knowledge; and finally, to add judgement and action to achieve the full potential of value realization.

Intelligence Everywhere: AI's Opportunity and Implications

- **Description:** Accelerating progress in AI is impacting experiential engagement, business processes, strategies, and more – autonomously creating a significant portion of new innovations. But, as automation and augmentation increase, so do the ethical issues and opportunities for misuse, surveillance, invasions of privacy, and more. Many future applications will be developed by AI without human supervision. Beyond that, augmented humanity – the fusion of digital technologies and humans – for improved mobility, sensing, and cognition will become routine. There are justifiable concerns and issues around AI-enabled applications, bias, and transparency and the long-term impacts of these on workforce transitions and the essential elements of being human. Social pushback is demanding accountability and rights. Business and governments need to address the ethical and legal issues of AI to realize its opportunities.

- **Context:** AI innovation and application are being driven by massive investments in all kinds of industries. Hospitals are testing how AI can enhance care, school districts are looking at AI-equipped cameras that can spot guns, and human resources departments are using AI to sift through job applications. Government agencies, including law enforcement, are looking for ways to harness this next technological revolution to meet their ends, while others are demanding accountability and an "algorithmic bill of rights." With industries investing aggressively in projects that utilize AI software, IDC forecasts AI systems will more than double from 2018 to 2022 to $79.2 billion, with a CAGR of 38.0%.

Rising Customer Expectations: More Convenience, Customization, and Control

- **Description:** Customers accustomed to the personalization and ease of dealing with digital-native companies such as Google and Amazon now expect the same kind of service from every business in every industry. The changing expectations are most evident in the newest generations of customers, but all customers are demanding more convenience and personalization. At the same time, they want more control of what data is collected and how it is used. Intelligent customer agents will start to intermediate the relationship on the customer's behalf, taking more control from the vendor. Companies that systematically collect, measure, and analyze data to create exceptional, personal, relevant, and compelling experiences can set themselves apart from their competitors.
- **Context:** With new customer expectations being set by thriving companies that disrupt markets, the previous levels of customer service are no longer good enough. New business, operational, and organizational models are required to meet continually growing consumer expectations. 38% of companies that are digital natives report that they are "almost constantly online" through their device of choice, the mobile phone, providing unparalleled access to behaviors and preferences, that they expect to be turned into customized engagement and experience. While there is also backlash, customers seem willing to relinquish some control over their data in exchange for a sufficiently engaging personalized experience.

The Future of Work: Agile, Augmented, Borderless, and Reconfigurable

- **Description:** Technologies are rapidly changing who, or what – and where, or how – work is being done. A new generation of workers have new expectations for work, culture, and space. The future workspace will be a mix of physical and virtual. Work culture will be more collaborative, while the workforce will be a combination of people and machines working together. Organizations are using new contracting models to create an agile, borderless, and reconfigurable workforce. However, the new skills required to thrive in this new era are still in short supply. To bridge the digital talent gap, organizations need to retrain and reskill existing staff, develop access to new talent pools, and attract new resources. Society must equip and educate up-and-coming generations for the future while bringing existing workers up to speed to address current needs. Employees must become lifelong learners.
- **Context:** The demographic shifts led by millennials entering the workforce and technology advances are driving fundamental changes in the workplace. Good pay, positive cultures, diversity, flexibility, and access to leading-edge technology are all important keys to keeping workers happy at work. The short supply of digital talent, particularly in data science, security, and customer experience (CX) design, is forcing organizations to adopt new approaches to work. IDC predicts that by 2021, 60% of G2000 companies will have adopted a future workspace model – a flexible, intelligent, and collaborative virtual/physical work environment – to attract new talent and improve employee experience and productivity.

Economies of Intelligence: AI, Human, and Organizational Learning Fuels Asymmetrical Advantage

- **Description:** Enterprise economies and the nature of competition have changed. While still important, economy of scale has been augmented with economies of scope and economies of learning. Now, leading companies are pursuing "economies of intelligence," the continual improvement, innovation, and variation based on leveraging data and AI technologies to identify and fulfill changing needs to enhance scale, scope, and customer engagement. This is changing the nature of intellectual property, whose value has shifted to where it's created rather than where it's realized and contributing to an asymmetrical accumulation of capital and innovation where an organization's capacity to learn has a distinct competitive advantage.
- **Context:** As enterprises scale their use of modern technologies for complete instrumentation, integration, and insight, they are able to expand their scope by offering a wider variety of experiences that demonstrate increasing value as the organization learns what is most desirable and efficient. This enables the learning organization to capture more knowledge and increase its asymmetrical accumulation of capital and innovation.

LEARN MORE

Related Research

- *IDC FutureScape: Worldwide Artificial Intelligence 2020 Predictions* (IDC #US45576319, October 2019)
- *IDC FutureScape: Worldwide Future of Work 2020 Predictions* (IDC #US44752319, October 2019)
- *Critical External Drivers Shaping Global IT and Business Planning, 2020* (IDC #US45540519, October 2019)
- *Worldwide Big Data and Analytics Software Forecast, 2019-2023* (IDC #US44803719, September 2019)
- *Market Analysis Perspective: Worldwide Data as a Service, 2019* (IDC #US45524519, September 2019)
- *Market Analysis Perspective: Worldwide Intelligent Process Automation, 2019* (IDC #US45412219, September 2019)
- *What Do You Really Know About Your Data?* (IDC #US45445719, August 2019)
- *AI-Based Automation Evolution Framework: Adopting AI in Content-Centric Workflow Use Cases* (IDC #US44170519, August 2019)
- *Usage Patterns – How to Rethink the Requirements Gathering Process for Decision Support and Decision Automation Needs* (IDC #US45164519, June 2019)

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

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