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The 7 Laws of Universal Data

Create A Road Map For A Real-Time, Agile, Self-Service Data Platform

The 7 Laws of Universal Data

Organizations today not only have to grow incrementally, they also have to be able to grow exponentially. The key to both is the ability to access data as a single data set regardless of the demands expected from it.

INTRODUCTION

What do organizations want to do that they can't do today? They know that data is the currency of their digital transformation. They know that data is everywhere. They also know that new sources of data appear continually, and many times these new data sources look nothing like anything they have seen or dealt with in the past. Companies know they need to combine their existing and new data into a single data universe, otherwise all the new demands that business is expecting from their data will fail.

Organizations today not only have to grow incrementally, they also have to be able to grow exponentially, and sometimes take quantum leaps to get ahead of their market. They can't have two sets of data for transactions and analytics, or two sets of data for incremental vs. exponential growth – they need one universal data set. Creating a future-ready digital business of tomorrow means companies must first modernize their data strategy today.

UNIVERSAL DATA – ONE INTERFACE, ONE DATA SET

To achieve business growth and goals, it has never been more important to have a single enterprise wide data set that can return the right answers on the latest data. This concept of Universal data has seven defining laws:

1. **Performance –** The data must handle any data volume and deliver the data in real-time.

2. **Freedom –** The data cannot be constrained, it must have the freedom to flow between cloud, hybrid, and on premise applications, systems, and networks.

3. **Models –** The data must be integrated for a 360-degree business view. The ability to find and understand all the data an organization needs helps to best model it to business goals.

7 LAWS OF UNIVERSAL **DATA**

Performance	Freedom	Models	Independence	Low Latency	Governance	Frictionless
To handle all types of needs	Cloud, hybrid or on-premises	Integrated for 360º business view	Of Data & Compute for right-place decisions	Immediate response	Security, auditing, and compliance	Sharing & enrichment for thorough understanding

4. **Independence -** The computing power should not limit data, and data should not limit computing power – they must be independent and elastic for right-place decisions.

5. **Low Latency –** The data must be timely and ready for action. Yesterday's data isn't good enough any longer – the data must get where it is needed as soon as it is created.

6. **Governance –** The data must be secure, auditable, and meet all compliance requirements to deliver data at the speed of business demands.

7. **Frictionless –** The data cannot limit itself – organizations must bring down data barriers and allow sharing and enrichment of data to drive better collaboration and understanding.

BENEFITS OF DEPLOYING A MODERN DATA STRATEGY

An organization's digital journey starts by rapidly transforming data, the currency of a digital enterprise, into insight so people can act in the moment and innovate without constraints. There are many benefits of deploying a modern data strategy based on a unified, intelligent, flexible data platform.

Transform Data into Insight – If organizations can harness the full potential of enterprise data, they can transform it into business insight and differentiate themselves in the market. By dramatically increasing the accuracy of data, organizations will be able to make better and faster business decisions with greater confidence than ever before.

Act in the Moment – In the digital economy, information needs to be processed immediately. With timely insight from live data, organizations can adapt business processes and act quickly with confidence. Additional benefits include simplified IT processes, optimized hardware utilization, and dramatic reduction in administrative overhead.

Innovate Without Constraints – Some of the most exciting opportunities within the digital economy focus on new business models that deliver better experiences and higher value to customers. By unifying data management and analysis within a single landscape and beyond, organizations can benefit from a single version of the truth and a simplified data landscape ready for innovation. The result is better understanding customer needs and delivering new products and services.

In the end, if organizations apply the 7 laws of universal data to create a modern data strategy, they will maximize the value of data in ways that drive productivity and help innovate new business models. This will help satisfy more customer and capture market share in a world where data is the new currency that helps differentiate a company from the competition.

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FOR ENTERPRISE ARCHITECTURE PROFESSIONALS

Create A Road Map For A Real-Time, Agile, Self-Service Data Platform

Road Map: The Data Management Playbook

by Michele Goetz and Noel Yuhanna
December 19, 2016 | Updated: December 28, 2016

Why Read This Report

Data bottlenecks create business bottlenecks. The days of provisioning data to simply meet the requirements of systems of record are over. Business stakeholders at the executive and line-of-business levels need data faster to keep up with customers, competitors, and partners. Information from the past won't support the insights of the future — businesses need real-time data. This report shows enterprise architects how they can use data to transform their organization from turtle to hare and keep pace with the speed of business.

This is an update to a previously published report; Forrester reviews and revises it periodically for continued relevance and accuracy.

Key Takeaways

Take The Long View To Identify Bottlenecks That Slow Down Data
Data management road maps need to extend beyond systems of record and address bottlenecks up to the edge of data consumption. Don't ignore manual data preparation or additional workarounds created in business intelligence and process applications — fix them.

Invest In The Building Blocks To Speed Data
Enterprise architects must revise their data architecture to meet the demand for fast data. In-memory data grids, data virtualization, and NoSQL data sources are must-have technologies to effect the transition from data museums to a world of contextual data services.

Plan Road Map And Development Process On Value
Adoption of Agile development and DevOps will align development with business outcomes and deliver capabilities faster. This ensures that data technology has a business purpose at the point of release rather than using it to search for a problem. Optimize development resources toward business solutions, not just technology solutions.

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with Gene Leganza and Jun Lee
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Table Of Contents

Notes & Resources

Forrester based this research on more than 300 data management client inquiries and vendor briefings over the past year.

Related Research Documents

Design Tomorrow's Data Management For Agility In Context

Fix The Data Problems That Destroy Your Customer Effectiveness

Stretch Your Data Management Capabilities

Journey Toward A Real-Time, Self-Service Data Platform

Fifty-nine percent of data and analytics decision-makers that Forrester surveyed indicated that it takes months to years for technology management to implement and support new business intelligence (BI) and advanced analytics technologies, and 43% say this is true even for creating simple BI content from existing data.[1] That isn't good enough to compete, let alone stay relevant to customers; lack of insight leads to business blindness. Enterprise architects need to change their approach to road map creation. Road maps must cover the entire data supply chain, from back-office data management to front-office data consumption. Business partners depend on access to diverse, complex data to make decisions. But the limits of your data systems might be constraining your ability to provide that access. Watch for key indicators where dams are holding back data and insights:
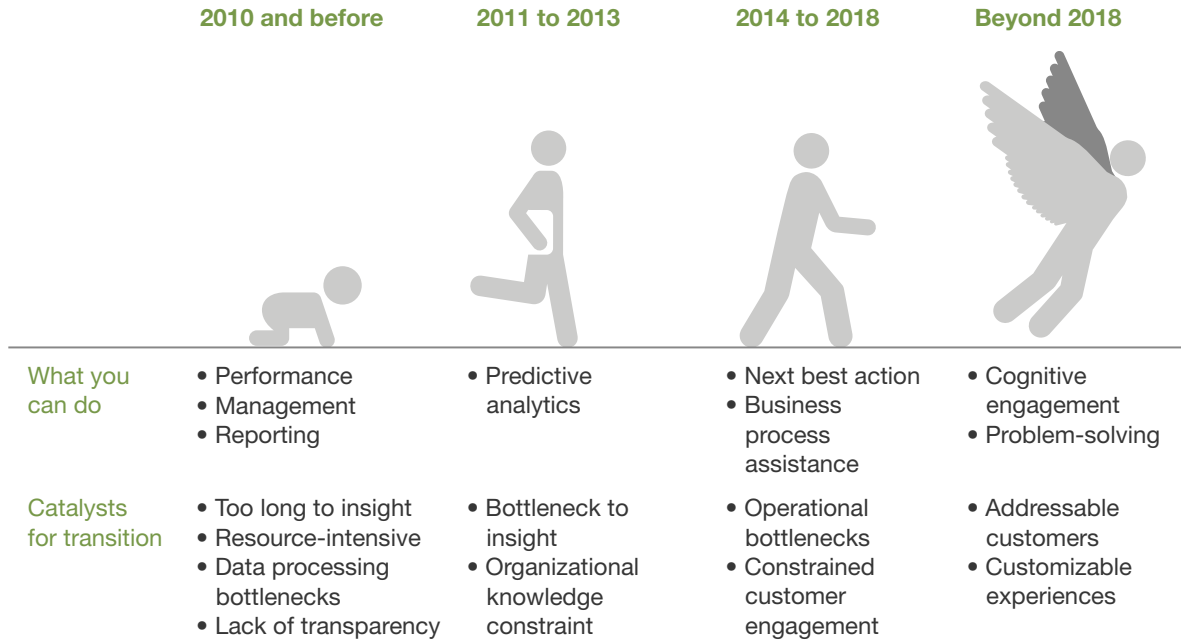
› **It takes too long to measure business performance.** Data warehouse (DW) environments were built for a limited set of uses, including providing answers to known questions. While DWs have performed these tasks well, the process doesn't scale well when you introduce ambiguity or add questions. Enterprise data hubs need to accommodate more data and an infinite set of queries.

› **It takes too long to provide insights for strategic and operational decision-making.** When executives need to determine why something is happening or what the best course of action is, they can't wait for a new data system. Analysts need to be able to aggregate and prepare data sets without tech management's involvement.

› **It takes too long to get intelligence into business processes and push it to employees.** Insights and intelligence sit with select analysts and managers, but employees need those insights to be more effective and efficient in their jobs. Data systems need to quickly get insights into services and systems that automate processes and guide employee actions.

› **Unstructured data is untapped, and human analysis can't scale efficiently.** Workers can't easily spot patterns and trends in content such as documents, email, images, audio, and social media. Artificial intelligence and machine learning aid in sifting through these sources so you can incorporate them into your data management and BI strategy.

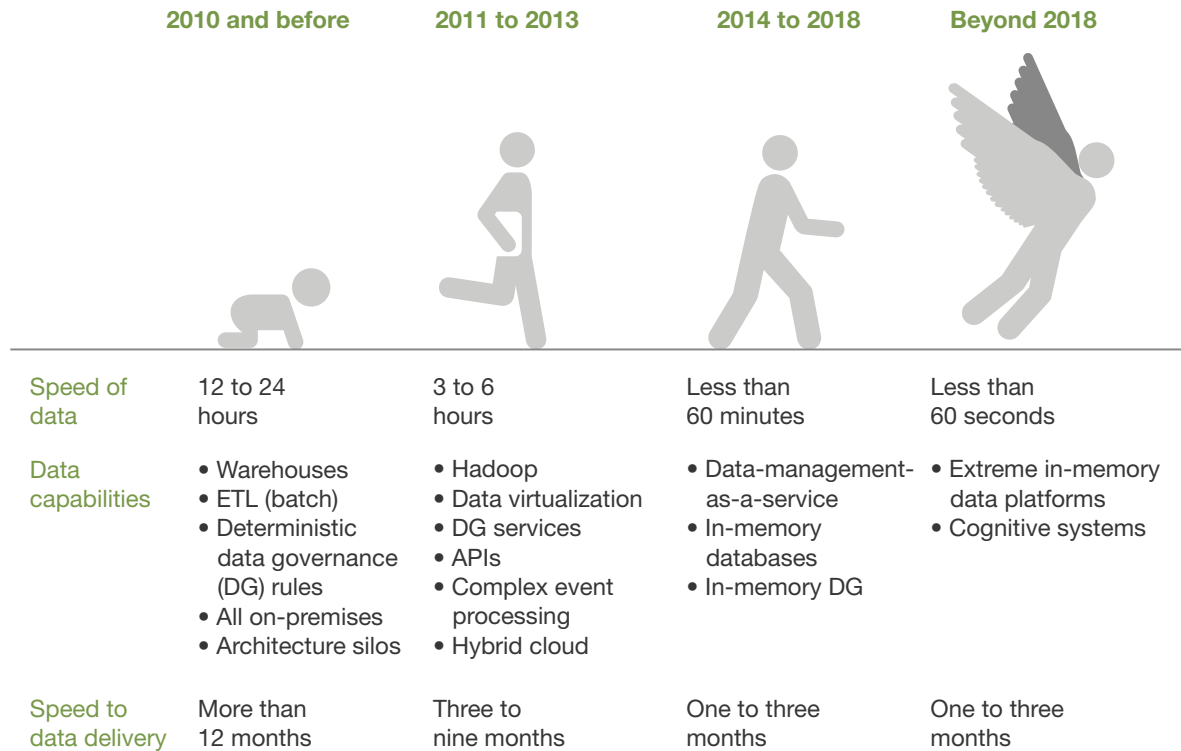### CREATE A FOUR-PHASE ROAD MAP THAT GETS YOU TO YOUR DESTINATION

A fast data strategy not only supports big data, which Forrester defines as technologies and techniques to close the gap between the available data and the ability to turn that data into business insight.[2] It also supports systems of engagement that quickly access diverse data, and it lowers data management costs by eliminating extraneous hardware and software licenses. Enterprise architects can realize a real-time self-service platform through four stages of technology capability development. Your job isn't complete when you've optimized system processes and delivery performance. Instead, you must also measure the value of your investments by how well they improve the efficiency and effectiveness of business technologists, business stakeholders, and customers. Create a four-stage road map as follows (see Figure 1):

› **Phase 1: Remove insight bottlenecks.** Migrate away from slow-moving batch and semibatch data loading and processing for BI and analytics. The information fabric — a reference architecture for data virtualization and caching to in-memory databases and data platforms — speeds data delivery and ensures the freshest trusted data set. Semantic data models, data quality, and data security processes become service-oriented. This minimizes complexity and hides heterogeneity by embodying a coherent data model that reflects business requirements rather than the details of underlying systems and sources.[3] Finally, Hadoop makes all data accessible by ingesting and provisioning big data.[4]

› **Phase 2: Remove operational bottlenecks to scale linearly.** Transition from near-real time to an on-demand data management platform in operational environments such as enterprise resource planning, customer relationship management, mobile, and the web. Tie streaming and embedded analytics to data management services and link data with analytic validation to certify in-flight insights that affect areas such as next best actions for call center case management and automated personalization of eCommerce experiences. Map business processes to data processes to identify access, delivery, quality, and security gaps in data that inhibit decision points and handoffs.[5]

› **Phase 3: Enable the data management platform for on-demand self-service.** Adjust data governance and data management policies to coincide with degrees of trust. Allow unfettered access to data with self-service tools and APIs in lower-risk consumption areas such as data science workbenches. Push production-ready data governance business rules and processes to higher-risk customer intelligence and application development environments in consumable formats to shrink development time for self-service BI applications and business or customer engagement applications.[6]

› **Phase 4: Link all investments for a full real-time self-service and scalable platform.** The result of completing the first three phases is a platform that is in the moment, dynamic, agile, consumable, and intelligent. The service-oriented foundation, combined with in-memory, scales for immediate and future data demands. The business will obtain more value faster with each implementation (see Figure 2).

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FIGURE 1 Recognize Data Bottlenecks As Catalysts For Transition

	2010 and before	2011 to 2013	2014 to 2018	Beyond 2018
What you can do	• Performance • Management • Reporting	• Predictive analytics	• Next best action • Business process assistance	• Cognitive engagement • Problem-solving
Catalysts for transition	• Too long to insight • Resource-intensive • Data processing bottlenecks • Lack of transparency	• Bottleneck to insight • Organizational knowledge constraint	• Operational bottlenecks • Constrained customer engagement	• Addressable customers • Customizable experiences

FIGURE 2 Mature Your Data Platform For Real-Time Business

|	2010 and before	2011 to 2013	2014 to 2018	Beyond 2018
Speed of data	12 to 24 hours	3 to 6 hours	Less than 60 minutes	Less than 60 seconds
Data capabilities	• Warehouses • ETL (batch) • Deterministic data governance (DG) rules • All on-premises • Architecture silos	• Hadoop • Data virtualization • DG services • APIs • Complex event processing • Hybrid cloud	• Data-management-as-a-service • In-memory databases • In-memory DG	• Extreme in-memory data platforms • Cognitive systems
Speed to data delivery	More than 12 months	Three to nine months	One to three months	One to three months

Adopt The Building Blocks Of A Real-Time Data Platform

A real-time data platform is designed to anticipate change; new technologies underpin the architecture to enable the agile development of dynamically changing data requirements. Your next-generation data management platform needs (see Figure 3):

› **An in-memory data platform to deliver data at the speed of thought.** Firms need in-memory data to support the new generation of business applications; it's critical to enabling real-time data access, processing big data quickly, offering new customer experiences, and serving customers in all of their mobile moments.[7] Data stored in-memory can be accessed orders of magnitude faster than that stored on traditional disks. Top vendors that support in-memory technologies for customer data management platforms include GigaSpaces, IBM, Oracle, SAP, SAS, Software AG, and VMware.

› **Data virtualization to enable real-time integration of disparate sources.** Data virtualization integrates disparate data sources in real time or near real time to meet demands for analytics and transactional data.[8] Data virtualization integrates internal and external data sources such as Hadoop, NoSQL, and enterprise DW platforms; packaged, custom, mainframe, and legacy apps; and social platforms. Leading vendors supporting data virtualization solutions include Cisco, Denodo Technologies, IBM, Informatica, Oracle, and SAP.

› **Hadoop to store and process large data sets.** Hadoop, an open source initiative under version 2.0 of the Apache license, delivers a distributed and scalable data processing platform to support big data.[9] It supports the batch processing of analytics by parallel-processing very large sets of data, which can run into the hundreds of terabytes or even petabytes, using clusters on commodity servers.

› **The integration of disparate big data sources.** Big data integration delivers a comprehensive, unified view of the business and its customers, employees, and products. Apache projects such as Camel, Flume, Forrest, HCatalog, Pig, and Sqoop help with big data integration based upon open source projects. In addition, traditional data integration vendors such as IBM, Informatica, Pentaho, SAP, SAS, and Talend extend their existing data integration platforms to support big data sources.

› **A semantic layer to maintain the context and business language of data.** Semantic technologies shape and orchestrate data, continuously remodeling master data and metadata for relevant customer and business views. Graph and triple-store technologies from MarkLogic and Neo Technology (Neo4j) and open source projects such as Apache Giraph and GitHub Titan maintain data relationships. Data profiling tools such as Cambridge Semantics help explore and model data semantically.[10]

FIGURE 3 Five Building Blocks Deliver A Real-Time, Self-Service Data Platform
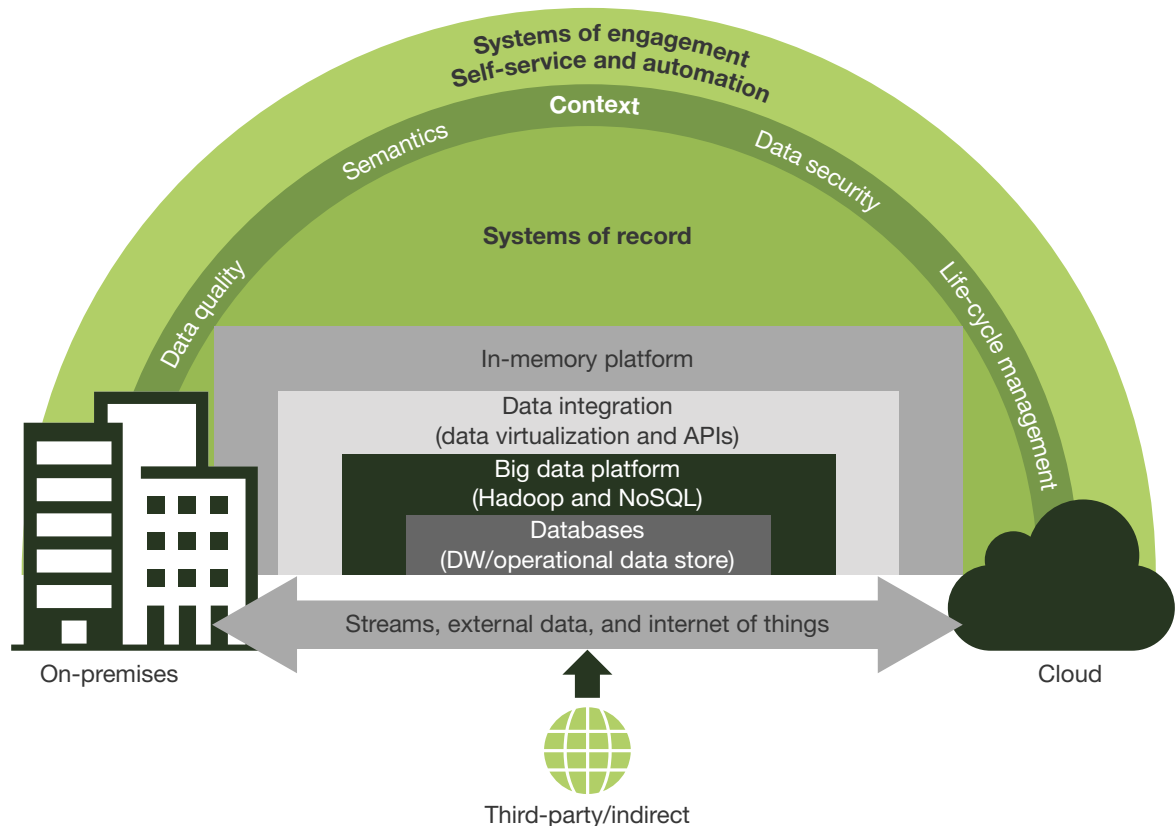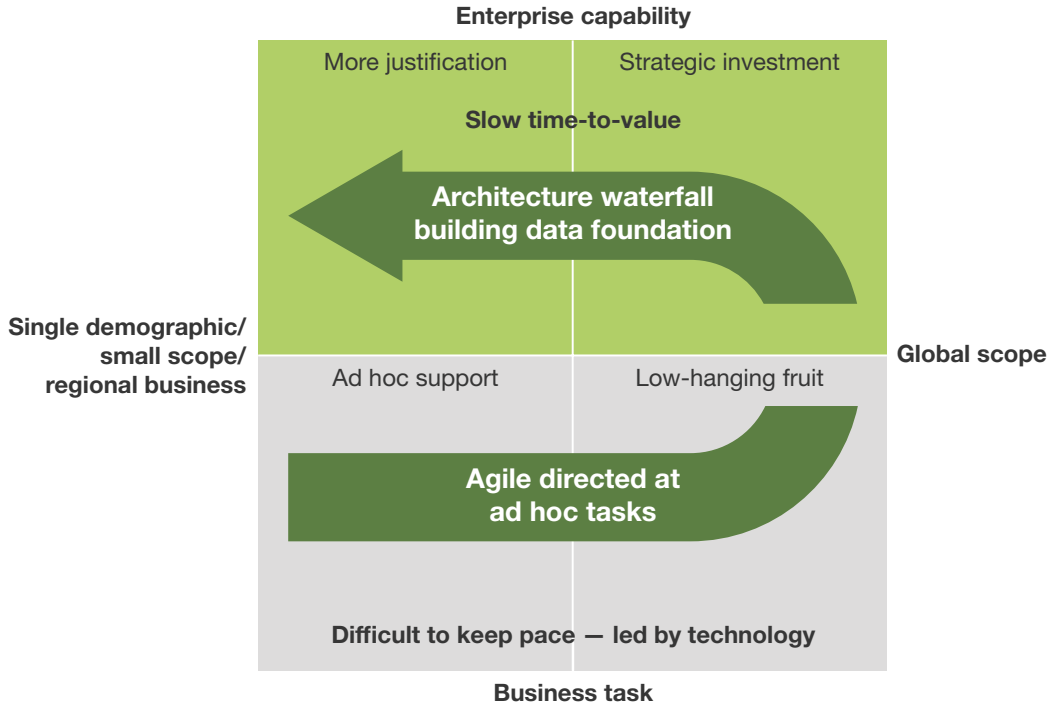
Adapt Development For Real-Time Self-Service

Enterprise architects must revisit decades-old data management best practice frameworks to support new business initiatives and drive innovation. Dama's DMBOK and enterprise architecture TOGAF for information management provide solid foundations for discrete data management frameworks and business capability maps. But business capabilities can be defined too broadly, and data capabilities are defined by technology. Architects must focus attention on time-to-value, the definition of value itself, and designs for dynamic, interactive ecosystems. The nature of real-time data management platforms makes this possible through fast data access, collaborative capabilities, and data management analytics.

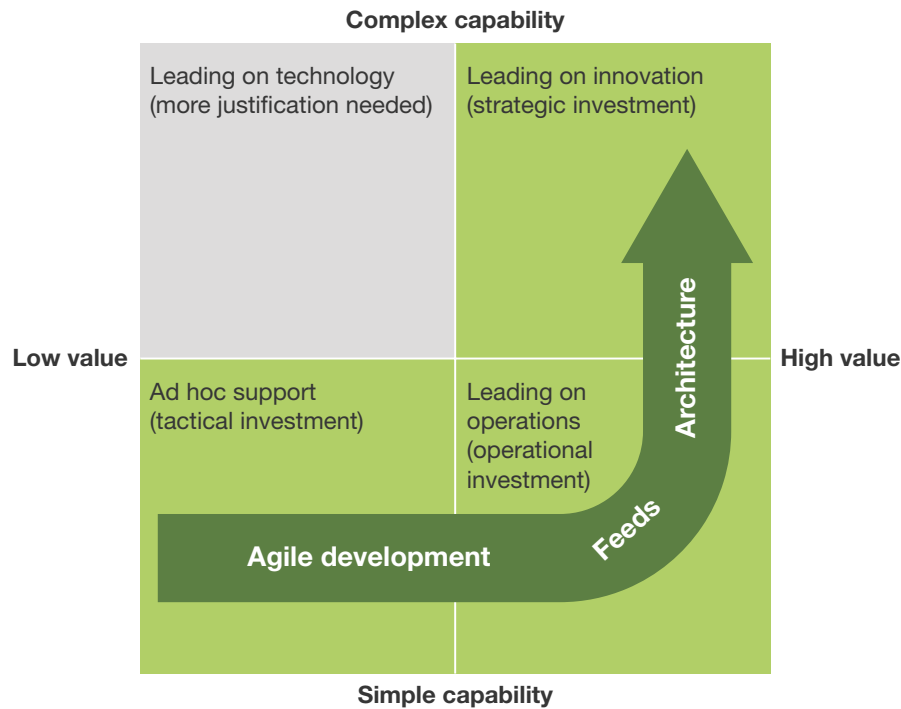### STRIKE THE RIGHT BALANCE BETWEEN AGILE DEVELOPMENT AND ARCHITECTURE

The Agile development trend has reached data management, but not without stumbles. For example, a leading manufacturer of agricultural equipment transitioned from waterfall development to Agile development for BI. For too long, tech management's response to business data needs was "We'll slot you in." The CIO's organization favored large architectural investments over time-sensitive needs. However, the initial transition to Agile had the effect of pushing off much-needed architectural building blocks and data governance requirements that were a drag on the value delivered. In the end, the tech management team had to adapt Agile development processes to account for both ad hoc and architectural requirements to again lower time-to-value for tactical projects and deliver faster on foundational platform investments.

› **Avoid "demographic" road maps that are an all-or-nothing proposition.** Typical data management road maps emphasize who does what to which system. When the main goal of the project is the creation of a data platform, resources are overwhelmed and technical debt accrues. The hidden cost of thinking of the new solution as the final road map milestone is that data remains in silos and business insights remain inconsistent (see Figure 4).

› **Adopt value-based road maps to satisfy immediate and future business gains.** One global airline is taking a different approach to data investment. The head of customer intelligence and optimization established a framework that assessed how the type of analysis influenced the value realized and evaluated the impact of the analytics capabilities' level of complexity on the insights received. The goal is to develop technical data capabilities that deliver more valuable insights faster while reducing the complexity needed for the team to gain those insights. This gives the customer data management team a better idea of how to prioritize investment and development and align operationally and strategically. If the strategy and road map don't meet the customer intelligence and optimization team's expectations, the project is further evaluated or scrapped before it starts (see Figure 5).

FIGURE 4 Development Road Maps Tied To Organizational Scale Drive Technology Strategy

Enterprise capability

More justification | Strategic investment

Slow time-to-value

Architecture waterfall building data foundation

Single demographic/ small scope/ regional business | Global scope

Ad hoc support | Low-hanging fruit

Agile directed at ad hoc tasks

Difficult to keep pace — led by technology

Business task

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FIGURE 5 Development Road Maps Tied To Value Respond To Business Demand

Complex capability

Leading on technology
(more justification needed)

Leading on innovation
(strategic investment)

Low value   **High value**

Ad hoc support
(tactical investment)

Leading on
operations
(operational
investment)

Architecture

Agile development

Feeds

Simple capability

Recommendations

Ensure That Your Road Map Fulfills Five Design Principles

Data management frameworks have existed for decades but need to change to enable real-time data, real-time integration, on-demand scale, predictive analytics, and self-service data platforms. To define a data management road map, enterprise architects must:

› **Understand their business data.** Forrester clients struggle to know what data they have, where it's located, where it came from, how it's managed, what dependencies it has, and how it integrates with other systems. So start by tackling slow-moving data management frameworks to understand their metadata, interfaces, and application requirements and modernize them by moving them with new data management technologies such as in-memory, Hadoop, NoSQL, and data virtualization.

› **Separate applications from the data management tier.** Applications should focus only on the application logic and user interface, not on data management or data integration functions. Decoupling the two helps move to a real-time data management platform faster and with less effort. Applications should focus on making generic data access calls to retrieve data from the real-time data management platform rather than hard-coding data access to diverse data sets. Consider deploying all new applications with such decoupled architecture.

› **Use distributed in-memory technology for performance and scale.** Look at using distributed in-memory to achieve extreme high performance and scale for applications that need real-time data or faster access to critical data. Use memory cache across physical servers to support distributed scale-out. Focus on distributed in-memory that supports all kinds of data — structured, semistructured, and unstructured — and offers a unified scale-out cache. Supplement the cache with disk-based protection for persistence to support data recoverability and long-term retention.

› **Consider vendor solutions that help achieve faster time-to-value.** Data management solutions can help reduce time-to-value by automating and simplifying various data management functions and implementation steps. Look at those that support broader solutions and can support your business data and applications. Ask your vendor how it plans to provide the real-time data management vision; review the various components that the vendor has integrated and ask how it plans to fill any gaps.

› **Leverage service offerings to lower platform and tool costs and scale dimensionally.** Cloud is increasingly becoming a strategic launch pad for data capabilities, not just a lower-cost storage environment. Cloud is already a backbone for retailers, which use it for commerce and advertising to create best-in-class customer experiences and engagement — but companies that have traditionally lagged in direct buyer engagement are now using this model as a template to jump-start their data management competencies. The automotive, durable goods, pharmaceutical, and consumer packaged goods verticals can buy data management and platform-as-a-service to scale out data services and customer intelligence across an omnichannel landscape in a fraction of the time and cost to build the capability on-premises.

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Supplemental Material

SURVEY METHODOLOGY

Forrester's Global Business Technographics® Data And Analytics Survey, 2016 was fielded in March 2016. This online survey included 3,343 respondents in Australia, Brazil, Canada, China, France, Germany, India, New Zealand, the UK, and the US from companies with 100 or more employees.

Forrester's Business Technographics ensures that the final survey population contains only those with significant involvement in the planning, funding, and purchasing of business and technology products and services. ResearchNow fielded this survey on behalf of Forrester. Survey respondent incentives include points redeemable for gift certificates.

Please note that the brand questions included in this survey should not be used to measure market share. The purpose of Forrester's Business Technographics brand questions is to show usage of a brand by a specific target audience at one point in time.

Endnotes

[1] Source: Forrester's Global Business Technographics Data And Analytics Survey, 2016.

[2] To learn more about how to find, test, and codify digital insights in software, see the Forrester report "Digital Insights Are The New Currency Of Business."

[3] The information fabric can adapt to changing business policies and rules while delivering trusted data. It allows for centralized administration of its distributed in-memory resources, metadata repositories, storage, policies, access, and processing functions. Data preparation is reduced as access, delivery, context, trust, and protection are linked to point of consumption rather than the integration path. For more information, see the Forrester report "Information Fabric 3.0."

[4] Given its economics, performance, and flexibility, Hadoop will become an essential piece of every company's business technology (BT) agenda. Application development and delivery professionals will build smart applications on Hadoop that not only use analytics but also become an integral part of many of their applications. For more information, see the Forrester report "Predictions 2015: Hadoop Will Become A Cornerstone Of Your Business Technology Agenda."

[5] High-quality customer data supports every point in the customer journey. To learn more about the impact of poor CRM data on business outcomes, see the Forrester report "Better Customer Relationships Require Trusted Data."

[6] As if organizations weren't already challenged by data quality, here comes big data. To learn more about data certification as a best practice to address big data quality, see the Forrester report "Big Data Quality: Garbage In, Gold Out."

[7] For more information on in-memory data platforms, see the Forrester report "Brief: In-Memory Data Platform Is No Longer An Option — It's A Necessity!" and see the Forrester report "Market Overview: In-Memory Data Platforms."

[8] Data virtualization is a virtualized data layer that integrates heterogeneous data and content repositories in real time. For more information on the current vendor landscape when it comes to data virtualization, see the Forrester report "The Forrester Wave™: Enterprise Data Virtualization, Q1 2015."

[9] Hadoop is unstoppable as its open source roots grow wildly and deeply into enterprise data management architectures. Enterprise architects must recognize Hadoop implementation is complex and requires more digging and planning than other technologies. To deconstruct the major pieces of the Hadoop ecosystem and make decisions regarding Hadoop as part of a big data platform strategy, see the Forrester report "Hadoop Ecosystem Overview, Q4 2014."

[10] To learn more about how organizations area benefiting from semantic data management approaches, see the Forrester report "Compose Digital Data To Create A Symphony Of Insight."

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