

Magic Quadrant for Data Integration Tools

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VIEW SUMMARY

The demand for data integration tools emphasizes broad applicable use, a well-integrated portfolio and interoperability with information and application infrastructures. Flexible deployment and scalability are still expected, while interest in business-facing and platform-as-a-service models grows.

Market Definition/Description

The discipline of data integration comprises the practices, architectural techniques and tools for achieving consistent access to, and delivery of, data across the spectrum of data subject areas and data structure types in the enterprise — to meet the data consumption requirements of all applications and business processes.

The market for data integration tools comprises those vendors that offer software products to enable the construction and implementation of data access and data delivery infrastructure for a variety of data integration scenarios, including:

Data acquisition for business intelligence (BI), analytics and data warehousing — Extracting data from operational systems, transforming and merging that data, and delivering it to integrated data structures for analytics purposes. BI and data warehousing remain the mainstays of the demand for data integration tools. The variety of data and context for analytics is expanding as emergent repositories — such as Hadoop distributions for supporting big data, in-memory database management systems (DBMSs), and logical data warehouse architectures — increasingly become parts of the information infrastructure.

Consolidation and delivery of master data in support of master data management (MDM) — Enabling the consolidation and rationalization of the data representing critical business entities such as customers, products and employees. MDM may or may not be subject-based, and data integration tools can be used to build the data consolidation and synchronization processes that are crucial to success.

Data migrations/conversions — Although traditionally addressed most often via the custom coding of conversion programs, data integration tools are increasingly addressing the data movement and transformation challenges inherent in the replacement of legacy applications and consolidation efforts during mergers and acquisitions.

Synchronization of data between operational applications — In a similar concept to each of the previous scenarios, data integration tools provide the ability to ensure database-level consistency across applications, both on an internal and an interenterprise basis (for example, involving data structures for SaaS applications or cloud-resident data sources) and in a bidirectional or unidirectional manner.

Interenterprise data sharing — Organizations are increasingly required to provide data to, and receive data from, external trading partners (customers, suppliers, business partners and others). Data integration tools are relevant in addressing these challenges, which often consist of the same types of data access, transformation and movement components found in other common use cases.

Delivery of data services in a service-oriented architecture (SOA) context — An architectural technique, rather than a use of data integration itself, data services represent an emerging trend for the role and implementation of data integration capabilities within SOAs. Data integration tools will increasingly enable the delivery of many types of data services.

Integration involving cloud-based data — Integrating a combination of data residing on-premises or in SaaS applications and other cloud services, for provisioning data requirements such as cloud service integration.

Big data initiatives — Supporting delivery of data to, and accessing data from, platforms typically associated with big data initiatives, such as Hadoop, NoSQL DBMSs and cloud-based data stores.

Gartner has defined several classes of functional capability that vendors of data integration tools provide to deliver optimal value to organizations in support of a full range of data integration scenarios:

Connectivity/adaptor capabilities (data source and target support). The ability to interact with a range of different types of data structure, including:
Relational databases

ACRONYM KEY AND GLOSSARY TERMS

BI	business intelligence
CDC	change data capture
DBMS	database management system
EIM	enterprise information management
ELT	extraction, loading and transformation
ESB	enterprise service bus
ETL	extraction, transformation and loading
iPaaS	integration platform as a service
LDW	logical data warehouse
MDM	master data management
SOA	service-oriented architecture
TCO	total cost of ownership

EVIDENCE

The analysis in this research is based on information from a number of sources, including, but not limited to:

- Extensive data on functional capabilities, customer-base demographics, financial status, pricing and other quantitative attributes gained via an RFI process engaging vendors in this market. Interactive briefings in which the vendors provided Gartner with updates on their strategy, market positioning, recent key developments and product road map.
- A Web-based survey of reference customers provided by each vendor, which captured data on usage patterns, levels of satisfaction with major product functionality categories, various nontechnology vendor attributes (such as pricing, product support and overall service delivery) and more. In total, 329 organizations across all major world regions provided input on their experiences with vendors and tools in this manner.
- Feedback about tools and vendors captured during conversations with users of Gartner's client inquiry service.
- Market share estimates developed by Gartner's Technology and Service Provider research unit.

EVALUATION CRITERIA DEFINITIONS

- Ability to Execute**
- Product/Service:** Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.
- Overall Viability:** Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.
- Sales Execution/Pricing:** The vendor's capabilities in

Legacy and nonrelational databases
 Various file formats
 XML
 Packaged applications, such as CRM and supply chain management
 SaaS and cloud-based applications and sources
 Industry-standard message formats, such as electronic data interchange (EDI), Health Level Seven International (HL7) and Society for Worldwide Interbank Financial Telecommunication (SWIFT)
 Parallel distributed processing environments such as Hadoop Distributed File System (HDFS) and other NoSQL-type repositories
 Message queues, including those provided by application integration middleware products and standards-based products (such as Java Message Service)
 Data types of a less structured nature, such as social media, Web clickstream, email, websites, office productivity tools and content repositories
 Emergent sources, such as data on in-memory repositories, mobile platforms and spatial applications
 Screen-scraping and/or user interaction simulations (for example, scripts to interact with Web, 3270, VT100 and others)

Data integration tools must support different modes of interaction with this range of data structure types, including:
 Bulk/batch acquisition and delivery
 Granular trickle-feed acquisition and delivery
 Change data capture (CDC) — the ability to identify and extract modified data
 Event-based acquisition (time-based or data-value-based)

Data delivery capabilities. The ability to provide data to consuming applications, processes and databases in a variety of modes, including:
 Physical bulk/batch data movement between data repositories such as processes for extraction, transformation and loading (ETL) or extraction, loading and transformation (ELT)
 Federated/virtualized views formulated in-memory
 Message-oriented movement via encapsulation
 Replication of data between homogeneous or heterogeneous DBMSs and schemas

In addition, support for the delivery of data across the range of latency requirements is important, including:
 Scheduled batch delivery
 Streaming/near-real-time delivery
 Event-driven delivery of data based on identification of a relevant event

Data transformation capabilities. Built-in capabilities for achieving data transformation operations of varying complexity, including:
 Basic transformations, such as data-type conversions, string manipulations and simple calculations
 Transformations of intermediate complexity, such as look-up and replace operations, aggregations, summarizations, deterministic matching and the management of slowly changing dimensions
 Complex transformations, such as sophisticated parsing operations on free-form text and rich media

In addition, the tools must provide facilities for developing custom transformations and extending packaged transformations.

Metadata and data modeling capabilities. As the increasingly important heart of data integration capabilities, metadata management and data modeling requirements include:
 Automated discovery and acquisition of metadata from data sources, applications and other tools
 Discerning relationships between data models and business process models
 Data model creation and maintenance
 Physical-to-logical model mapping and rationalization
 Ability to define model-to-model relationships via graphical attribute-level mapping
 Lineage and impact analysis reporting, via graphical and tabular format
 An open metadata repository, with the ability to share metadata bidirectionally with other tools
 Automated synchronization of metadata across multiple instances of the tools
 Ability to extend the metadata repository with customer-defined metadata attributes and relationships
 Documentation of project/program delivery definitions and design principles in support of requirements definition activities
 Business analyst/end-user interface to view and work with metadata

Design and development environment capabilities. Facilities for enabling the specification and construction of data integration processes, including:
 Graphical representation of repository objects, data models and data flows
 Management of the development process workflow, addressing requirements such as

all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

- approvals and promotions
- Granular, role-based and developer-based security
- Team-based development capabilities, such as version control and collaboration
- Functionality to support reuse across developers and projects, and to facilitate the identification of redundancies
- Support for testing and debugging

Data governance support capabilities (via interoperation with data quality, profiling and mining capabilities). Mechanisms to work with related capabilities to help the understanding and assurance of data quality over time, including interoperability with:

- Data profiling tools (profiling and monitoring the conditions of data quality)
- Data mining tools (relationship discovery)
- Data quality tools (supporting data quality improvements)

Deployment options and runtime platform capabilities. Breadth of support for the hardware and operating systems on which data integration processes may be deployed, and the choices of delivery model; specifically:

- Mainframe environments, such as IBM z/OS and z/Linux
- Midrange environments, such as IBM System i or HP Tandem
- Unix-based environments
- Windows environments
- Linux environments
- On-premises (at the customer site) installation and deployment of software
- Hosted off-premises software deployment (dedicated, single-tenant implementation)
- Integration platform as a service (iPaaS), consumed by the customer completely "as a service" — the vendor provides cloud infrastructure; the customer does not install the software
- Cloud deployment support as a multitenant implementation (requires organizations to deploy software in cloud infrastructure)
- In-memory computing environment (such as flash memory as an additional memory type and solid-state appliances)
- Server virtualization (support for shared, virtualized implementations)
- Parallel distributed processing (such as Hadoop and MapReduce)

Operations and administration capabilities. Facilities for enabling adequate ongoing support, management, monitoring and control of the data integration processes implemented via the tools, such as:

- Error handling functionality, both predefined and customizable
- Monitoring and control of runtime processes, both via functionality in the tools and through interoperability with other IT operations technologies
- Collection of runtime statistics to determine use and efficiency, as well as an application-style interface for visualization and evaluation
- Security controls, for both data in flight and administrator processes
- A runtime architecture that ensures performance and scalability

Architecture and integration capabilities. The degree of commonality, consistency and interoperability between the various components of the data integration toolset, including:

- A minimal number of products (ideally one) supporting all data delivery modes
- Common metadata (a single repository) and/or the ability to share metadata across all components and data delivery modes
- A common design environment to support all data delivery modes
- The ability to switch seamlessly and transparently between delivery modes (bulk/batch versus granular real-time versus federation) with minimal rework
- Interoperability with other integration tools and applications, via certified interfaces and robust APIs
- Efficient support for all data delivery modes, regardless of runtime architecture type (centralized server engine versus distributed runtime)

Service enablement capabilities. As acceptance of data service concepts continues to grow, so data integration tools must exhibit service-oriented characteristics and provide support for SOA deployments, such as:

- The ability to deploy all aspects of runtime functionality as data services (for example, deployed functionality can be called via a Web services interface)
- Management of publication and testing of data services
- Interaction with service repositories and registries
- Service enablement of development and administration environments, so that external tools and applications can dynamically modify and control the runtime behavior of the tools

Magic Quadrant

Figure 1. Magic Quadrant for Data Integration Tools



Source: Gartner (July 2014)

Vendor Strengths and Cautions

Action

Based in Redwood City, California, U.S., Action (www.action.com) offers data integration capabilities via the Action Analytics Platform (which includes Action DataConnect, Action DataFlow and On-Demand Integration, alongside other non-data-integration products for analytics and data persistence). The vendor's customer base for data integration tools is estimated at more than 6,700 organizations.

Strengths

Relevant offerings. Action offers real-time, messaging-style solutions and bulk/batch-oriented data delivery. Customers like the diverse connectivity for data sources and targets and the support for industry-standard message formats. On-Demand Integration, added via the acquisition of ParAccel, enables Action's data federation/virtualization capability.

Long tenure and leveraging market reach. Action has more than two decades of experience in delivering data integration tooling, obtained through its acquisition of Pervasive Software in 2013. Action's relatively large market reach (Action also acquired ParAccel last year) provides leverage to create opportunities for its data integration tools.

Capitalizing cloud and analytics demand. Action enhanced its cloud capabilities with the evolution of its iPaaS offering on Action DataCloud, which capitalizes on the growing interest for a hybrid/distributed environment for data integration.

Cautions

Upgrade complexity and metadata support. Reference customers cited difficulties with version upgrades, the technical complexity of migrating between major releases, and the quality of documentation. Metadata management and modeling functionalities are cited as a relative weakness.

Additional embedding requirements. Usage reflects a reduced satisfaction with embedding Action's data integration functionality within other technology solutions in its current product set — the development effort is, reportedly, not as easy as in the past.

Market messaging and focus. The current emphasis of the product portfolio, where data integration tooling is bundled with the Action Analytics Platform offering, is potentially at odds with the mindset of buyers in the market for data integration use cases that enable infrastructure for any and all information-related initiatives. Action must focus its sales and marketing activities to capture data integration opportunities in its own right.

Adeptia

Based in Chicago, Illinois, U.S., Adeptia (www.adeptia.com) offers the Adeptia Enterprise Business Integration Management (EBIM) Suite. The vendor's customer base for this product set is estimated at

approximately 420 organizations.

Strengths

Relevant capability and integrated tool suite. Adeptia supports the core requirements of connectivity and adapters, bulk/batch data delivery, and granular data capture and propagation. The combination of data integration capability, application integration/enterprise service bus (ESB), B2B integration and trading partner management within a single product, is reported as a value point. It reduces the complexity for buyers and streamlines activities for integrating flows among systems and delivering data between systems and users.

Usability and performance. Reference customers and prospective clients cite ease of use and good performance and throughput — for integrating data to support workflow tasks and long-running transactions. Additional business-facing functionality, to be offered via an iPaaS for interenterprise data sharing, is planned for 2H14 — for self-service publishing and the use of data connectors for B2B integration.

Pricing and value. Customers view Adeptia's tools as attractively priced and delivering good value relative to the cost of tools from Adeptia's major competitors. Reference customers like the tool suite's flexibility — for interoperating the data integration functionality in conjunction with other capabilities for ESB and business process management on the same platform.

Cautions

Breadth of usage. Adoption of Adeptia's toolset heavily reflects bulk/batch, transactional and business process scenarios, but it is not being deployed to exploit the breadth of data integration styles and use cases in this market. Adeptia's partnership with Ataccama (in 2013), for data quality and MDM capability, sets out to expand usage scenarios.

Mind share. While awareness of Adeptia is starting to grow (as reflected in Gartner's survey of this market), there remains a lack of recognition by enterprise buyers. Limited inclination to use this vendor's data integration tools in complex implementations creates a barrier to enterprisewide adoption.

Guidance and support for implementations. Deployments in increasingly complex scenarios are raising customers' expectations of Adeptia's implementation support and guidance best practices. Adeptia has been addressing its "growing pains" through doubling its technical support staff, expanding training options and completely revamping its documentation.

Cisco (Composite Software)

Based in San Jose, California, U.S., Cisco (www.cisco.com) acquired Composite Software on 30 July 2013 and offers the Cisco Information Server. The vendor's customer base for this product set is estimated at more than 250 organizations.

Strengths

Relevant targeted capabilities. Cisco pursues a deliberate and highly targeted market focus on specific functionality and performance for data federation/virtualization, and has a well-established track record for this market requirement, which is in growing demand. Limited bulk/batch data delivery is supported via net-change and full-refresh caching techniques for loading a database.

Growing resources and market reach. Cisco's acquisition of Composite Software provides significantly greater financial resources for further data integration product enhancement, and has increased market access through Cisco's global reach.

Expanding links to related capabilities. Cisco's evolving focus — for enabling the logical data warehouse's (LDW's) extensibility and flexibility to utilize and federate NoSQL data structure — aligns with information infrastructure demand trends. Plans for adding synergies between the Cisco Information Server and its broader portfolio for data center networking, unified computing, and initiatives for a service provider cloud infrastructure (which Cisco calls "InterCloud"), aim to broaden its applicability to cloud-based federation/virtualization and provisioning of data.

Cautions

Breadth of coverage and market resonance. Organizations seeking providers with a comprehensive range of data delivery (beyond federated/virtualized styles) find the product set to be of narrow positioning in this market. In addition, market confidence in Cisco's ownership of Composite Software needs to be cultivated — because Cisco is not an incumbent in the information management technologies market.

Synergy with data management capabilities. Clients' implementation experiences reflect limited satisfaction with this solution's metadata management, which is becoming critical for addressing the distributed sources of the LDW and big data environments that require metadata discovery, modeling and dynamic use of metadata to drive runtime execution of data integration workloads. Deployments that include an extensive governance focus are raising the demand for integrated use of Cisco's data integration capability with comprehensive data quality tooling.

Deployment skills availability. Prospects and users expressed concern that successful deployments heavily depend on a high level of proficiency from both developers and data architects and that the lack of skilled implementers in the market presents challenges. Planned for 4Q14 release, Cisco Business Directory sets out to improve ease of use and access to data and definitions. Future plans, for the underlying logical data modeling capability integrated with data federation/virtualization, aim to enhance business-facing characteristics across functionalities.

IBM

Based in Armonk, New York, U.S., IBM (www.ibm.com) offers the following data integration products: IBM InfoSphere Information Server Enterprise Edition (including InfoSphere Information Server for Data

Integration, InfoSphere Information Server for Data Quality and InfoSphere Business Information Exchange), InfoSphere Federation Server, InfoSphere Data Replication, InfoSphere Information Server Enterprise Hypervisor Edition and WebSphere Cast Iron Cloud Integration. The vendor's customer base for this product set is estimated at more than 10,300 organizations.

Strengths

Breadth and diversity of usage. IBM's data integration tools continue to be deployed in the market for extensive use cases — often of complex scale, spanning a wide number of projects and involving teams of various sizes. Common metadata, development and deployment approaches are favored for enabling consistency of, and support for, all data integration styles.

Mind share and synergy with related markets. IBM continues to gain traction as an enterprise standard for data integration infrastructure, with a strong presence in competitive bids. Linkage of data integration alongside its BigInsights for big data analytics, and positioning data integration in Watson Foundations toward a future era of envisaged smart machines and cognitive capability, are raising the synergy of IBM's data integration tooling with its broader portfolio.

Alignment to information infrastructure and enterprise information management (EIM). IBM continues to focus on enabling modernization of information infrastructures in aligning data integration capabilities with EIM goals including information governance and MDM.

Cautions

General usability challenges. Customers reported difficulty with version upgrades and migrations. IBM has begun mitigating this through in-place upgrades and will continue addressing it by converging the release timing of various InfoSphere products, for better anticipation and alignment of upgrades (as well as regular feature pack releases), such that customers can adopt new features without an upgrade. A longer time to value and the complexity of implementation are cited as challenges (in part due to use cases of complex scale), which IBM is mitigating through self-service data preparation for analytics (using data virtualization and Data Click), integration into Hadoop environments, and iPaaS for data integration.

Pricing. Reference customers identify software costs and perception of the total cost of ownership (TCO) as barriers to broader adoption. IBM's provision of Information Server solutions, Workgroup editions and new monthly licensing options for both on-premises and cloud deployments aims at providing wider procurement and cost choices.

Deployment of multiple components across the portfolio. Reference customers expressed difficulty with integrated use of the various data integration tools with other InfoSphere products and recently added components such as connectors for social media feeds. They also expressed a desire for easier ways to understand the overlapping features among products in order to determine what can be used license-free from the products currently in use. The newly released version of the InfoSphere platform, 11.3, sets out to reduce this complexity.

Informatica

Based in Redwood City, California, U.S., Informatica (www.informatica.com) offers the following data integration products: Informatica Platform (including PowerCenter, PowerExchange, Data Services, Data Replication, Ultra Messaging, Big Data, B2B Data Exchange and Data Integration Hub), Vibe Data Stream, Informatica Cloud Integration and the IronCloud Platform. The vendor's customer base for this product set is estimated at more than 5,500 organizations.

Strengths

Breadth of functionality and usage. Customer implementations reflect a comprehensive mix of data integration styles, latency and deployment scenarios where adoptions are commonly regarded as the enterprise standard for data integration infrastructure. Synergy with Informatica's data quality, MDM, big data and hybrid integration approaches (portability of integration flows between Informatica's iPaaS and on-premises PowerCenter) capitalize on market demand trends.

Market presence and alignment to evolving needs. Informatica's mind share in this market is extensive, with frequent appearances in competitive situations. Provision of a platform-agnostic environment to build capabilities that can be seamlessly executed and reused on many established and emerging platforms (through the architecture Informatica calls Vibe Virtual Data Machine), positions Informatica well with the demand trends of modern information infrastructure.

Appeal to information infrastructure and nontechnical roles. Informatica continues to expand its business-user-facing functionality — in support of self-service validation and prototyping support — by provisioning data virtualization and data profiling functionality to analytics and operational activities. Emphasis on business-user-oriented functionality and the agility of data integration infrastructure as enterprise standards resonates with diverse types and sizes of organization.

Cautions

Pricing. While deployments reflect a reasonable connection between the pricing of Informatica's data integration tool and its anticipated value, customers and prospects often express concerns about its high prices relative to alternatives in this market. The release of Informatica 9.6, in January 2014, simplified product packaging and pricing tiers and was aimed at enabling more flexible procurement choices that vary according to the scale of need and the maturity of organizations.

Administrative complexity. Reference customers expressed concerns for complex version upgrades and migrations, and overlapping functionality in multiple products. Customers cite growing difficulty in knowing what product to use for specific issues — when functionality spans multiple products or features that have been merged.

Ease of integrated deployment across product portfolio. Users of Informatica's data

integration tooling are having their expectations raised — for greater out-of-the-box and simpler integrated deployment — with its other offerings, such as data quality, MDM, B2B and RulePoint products.

Information Builders

Based in New York, New York, U.S., Information Builders (www.informationbuilders.com) offers the following data integration products: iWay Integration Suite (composed of iWay Service Manager, iWay DataMigrator and iWay DataMigrator CDC) and iWay Universal Adapter Suite. The vendor's customer base for this product set is estimated at more than 730 organizations.

Strengths

Relevant capabilities and broad usage. With a history of recognized adapters and connectivity capability, Information Builders offers capabilities in all major data integration styles and supports a broad range of use cases and implementations. Customer feedback favors product reliability, flexibility and consistency as a data integration toolset that works as advertised.

Links to requirements of information infrastructure. Information Builders' product portfolio is broadened by its iWay 7 Information Asset Management Platform, which includes data quality and MDM products alongside data integration tooling to enhance cross-functional synergy.

Customer relationship. Reference customers generally report a positive overall experience with Information Builders in presales, professional services and postimplementation. Selection of the vendor's data integration tools is often influenced by an existing relationship and use of other Information Builders products.

Cautions

Product implementation and documentation. Implementation complexity, a long learning curve and insufficient technical documentation are cited as challenges in deployments — reflecting longer time to value than major competitors. Customers desire easier ways to accomplish upgrades to new major releases and application of patches. Information Builders aims to simplify and ease implementation with the evolving iWay7 Information Asset Management Platform and product documentation (that has been revamped during the past year).

Guidance and support for best practices. The availability of skilled implementers and guidance for common and best practices are growing concerns among customers who desire readily accessible self-help resources for implementation approach and issue resolution. Information Builders continues to build out its partner network, and is providing guidance for best practices through customer engagement using its FocalPoint forum.

Mind share and market positioning. Adoption of Information Builders' data integration tooling continues, although with a relative lack of mainstream recognition. Information Builders plans to extend enterprisewide applicability by evolving the toolset toward a data integration hub approach (what the vendor calls a data integration bus) for integrating master and operational data flows on a common environment supporting metadata model, repository and data delivery for information management use cases.

Microsoft

Based in Redmond, Washington, U.S., Microsoft (www.microsoft.com) offers the following data integration products: SQL Server Integration Services (SSIS, included in its SQL Server DBMS license) and BizTalk Server. The vendor's customer base for this product set is estimated at more than 13,000 organizations.

Strengths

Relevant core capabilities. Microsoft's main data integration tool offering, SSIS, is in broad deployment within the SQL Server customer base. Reference customers cite SSIS's low TCO, speed of implementation and ease of use as its main value points. Microsoft's user-oriented emphasis for provisioning SSIS, in conjunction with business-facing interfaces such as Excel, aligns with the demand for self-service data preparation.

Broadening use cases. Reference customers continue to recognize SSIS as a maturing data integration tool increasingly capable of supporting enterprisewide implementations in Microsoft-centric environments. Deployment scenarios are largely for BI and data warehousing, but usage is broadening in support of MDM, data migration and data consistency between operational applications.

Brand awareness and market presence. Microsoft's size and global presence provides a huge customer base and a wide product distribution model. Broad usage of SSIS within the SQL Server customer base has driven widely available community support, training and third-party documentation on implementation practices and problem resolution approaches.

Cautions

Breadth of functionality. Although Microsoft addresses core data integration requirements, non-bulk/batch data integration styles remain a gap in its offering relative to market demand. Microsoft's product strategy for aligning capabilities to data movement, transformation and orchestration (referred to as "information production") aims to broaden its market positioning.

Platform support. The inability to deploy data integration workloads on non-Windows environments is a limitation for customers wishing to leverage the processing power of diverse hardware and operating system platforms.

Metadata support and integration of portfolio. Customer references cite metadata management capabilities, such as metadata discovery, lineage and dependency reporting, as weaknesses. Adoption experiences indicate that greater ease of integrated deployment is desired

between SSIS and other Microsoft products, with a reduced requirement for custom coding. Microsoft plans to tighten integration of SSIS with Data Quality Services, StreamInsight and Master Data Services.

Oracle

Based in Redwood Shores, California, U.S., Oracle (www.oracle.com) offers the following data integration products: Oracle Data Integrator (ODI), Oracle Data Service Integrator, Oracle GoldenGate and Oracle Warehouse Builder (OWB). The vendor's customer base for this product set is estimated at more than 4,000 organizations.

Strengths

Usability and productivity. Customers using ODI like its ease of use, coverage of core data integration functionality and out-of-the-box artifacts to aid developers' productivity as key value points. Plans for an iPaaS offering and capability for user-driven data preparation are aimed at harnessing cloud deployment trends and business-roles usage.

Leverage wide span of markets. Oracle's corporate brand, as a comprehensive provider for data integration and other data and application-oriented capabilities (spanning data quality, MDM, ESB, analytic appliance and enterprise application), continues to drive its appeal for deployment scenarios.

Time to value. Rapid deployment for mission-critical usage and the ability to flexibly interoperate with diverse technical environments and standards, are reported as strengths for Oracle. Tighter product integration between ODI and Oracle GoldenGate has contributed to integrated use of data integration tooling, which helps to accelerate deployments.

Cautions

Integrated usage of vendor portfolio. To facilitate a seamless ability to expand deployments across use cases, reference customers cited their desire for improvement in metadata management support and simpler interoperability of data integration tooling with Oracle's other products. Oracle has indicated (on its road map) the upcoming availability of a metadata management product for data integration to address these concerns.

Pricing and licensing. Satisfaction with Oracle's pricing method and the perception of value relative to cost are reported as being relatively low when compared with most of its competitors — involving concerns such as price points, target versus source licensing requirements, and extending licensing across virtualized and cloud-based environments.

Skills availability. Finding skilled resources is reported as an increasing challenge in keeping pace with efforts to deploy, interoperate and maintain multiple products when implementation requirements and complexity grow. Oracle has deployed online and instructor-led skills training for continuing to grow the pool of trained ODI and Oracle GoldenGate developers in the market.

SAP

Based in Walldorf, Germany, SAP (www.sap.com) offers the following data integration products: SAP Data Services, SAP Process Orchestration, SAP Replication Server, SAP Landscape Transformation Replication Server and SAP Hana Cloud Integration. The vendor's customer base for this product set is estimated at more than 12,000 organizations.

Strengths

Broad usage and functionality. SAP's data integration products are regularly deployed for many different use cases and across the breadth of functionality of SAP's portfolio. SAP's vision emphasizes virtualized computing performance, an iPaaS delivery model and user-driven data preparation, to capitalize on demands for data integration capability that matches the speed of business.

Synergy with EIM-enabling technologies and SAP applications. Customers value the tight links between the data integration functionality of information-related technologies and SAP's applications. A single runtime platform for SAP Data Services — linked to data quality and the text data processing capabilities complementary to offerings in MDM and business-facing information stewardship — is described by customers as increasingly relevant for supporting EIM goals.

Market presence and growth. As a large and incumbent (in many tens of thousands of enterprises) provider of applications and analytics solutions, SAP can naturally capture significant revenue and growth in this market by leveraging its broader customer base.

Cautions

Market emphasis and perception. Emphasis on Hana in SAP's road map to evolve toward a common environment to provision and consume data generates an uneven perception in organizations seeking agnostic data integration capabilities. Replication and synchronization's connectivity/adapters for heterogeneous databases are reported to have lagged behind other vendors' DBMS releases.

Integration of product components. Making multiple tools work together across all SAP data integration offerings is reported as a challenge, raising concerns about increased effort and cost in achieving integrated usage. SAP plans to simplify its product portfolio and tighten the links between Data Services, Replication Server and PowerDesigner.

Product support and version upgrades. Reference customers' feedback indicates low satisfaction with quality, consistency and response time of processes for assistance in product version upgrades, bug fixes and issue resolution. Through a scheduled quarterly release of data integration products, including Data Services and Hana Cloud Integration, SAP seeks to enhance the availability and timeliness of its product support and upgrades.

SAS

Based in Cary, North Carolina, U.S., SAS (www.sas.com) offers the following data integration products: Data Management Platform, Federation Server, SAS/Access. The vendor's customer base for this product set is estimated at more than 14,000 organizations.

Strengths

Relevant and extensive functionality. Breadth of core functionality and extensive connectivity position SAS well to engage in competing for contemporary data integration tool demand amid larger and more established vendors in this market. An increased focus on balancing physical movements and virtualized delivery of data, distributed runtime optimization (for big data, in-memory and cloud environments), and envisioned user-driven data preparation for exploring patterns using Hadoop environments, capitalizes on the evolving market demands.

Customer relationship excellence. Reference customers report that vendor relationship with SAS, both in presales and postimplementation, is exceptional — contributing to longer-term, recurring engagements.

Integrated product set. Provisioning of functionality, through an integrated portfolio of capabilities that enables synergistic use, is cited as a key value. The recently added lineage repository (linked to data integration tooling) offers richer metadata support for business terms and data relationships.

Cautions

Price point and TCO. Customers' perception of the high price of the licensing model and the complexity of the technology generated concerns regarding value relative to cost, as deployment complexity and a longer learning curve have led to cost escalation. Greater availability of resources with a deep knowledge of SAS tools is desired for wider procurement and cost options outside the vendor's own professional services business.

Links with data quality operations. Although implementations often use SAS tools for both data integration processes and data quality operations, a decline in user satisfaction is exhibited in these deployments — requiring easier administrative operations and performance optimization.

Product messaging. Some prospects, particularly organizations with awareness of individual products that existed before the release of the Data Management Platform, indicate that SAS has not clearly articulated the capabilities of its tools and the benefit of a tool suite approach in response to RFP and the presentation of data integration offerings.

Syncsort

Based in Woodcliff Lake, New Jersey, U.S., Syncsort (www.syncsort.com) offers DMX (Linux, Unix and Windows), DMX-h (Hadoop), Ironcluster Hadoop ETL for Amazon EMR, Ironcluster ETL for Amazon EC2 and Ironcluster ETL, Docker Edition. These products will be rebranded in 2H14 with the Ironcluster brand name replacing DMX and DMX-h. The vendor's customer base for this product set is estimated at approximately 1,400 organizations.

Strengths

Price point and usability of core functionality. Syncsort provides high-performance, bulk/batch data movement capabilities, with an attractive cost of ownership and ease of implementation relative to many competitors. Adoption of Syncsort in the data integration tool market is fueled by demands for targeted functionality, with ETL capabilities at the core. Syncsort has launched free versions of its ETL products in the Amazon Web Services marketplace.

Customer relationship and track record. Syncsort offers a high quality of service and support, and many customers identify product technical support and their overall relationship with the vendor as positives. With an established track record in optimizing ETL processing, a loyal customer base and strategic partnerships (with Splunk, Tableau Software, Amazon, Cloudera, Hortonworks, MapR and Fujitsu), Syncsort has a solid foundation on which to grow its market presence.

Applicability of usage scenarios. Deployments of Syncsort largely reflect support for BI and analytics, while there is growing usage for addressing operational data consistency, data migration, interenterprise data sharing and offloading ELT workloads from data warehouses to Hadoop. Enhanced big data support includes runtime execution on Yarn (cluster resource manager for Hadoop 2.0), connectivity to social data, and ETL deployment on Amazon EMR and Amazon EC2 — which targets opportunities to capitalize on use cases for ETL.

Cautions

Breadth of functionality. The evolution of Syncsort's capability and road map remains focused on bulk/batch data movement. Syncsort faces competitive disadvantages for not addressing a broad range of data integration styles, because requirements for non-bulk/batch-oriented data delivery are increasing in the market.

Metadata support. Reference customers cite metadata management as an area of relative weakness (and Syncsort's limited functionality and vision for metadata) in comparison with key competitors. Syncsort is investing to take advantage of the native metadata capabilities of Hadoop, such as HCatalog, aiming to address the increased distribution of information assets that requires metadata support to drive the execution of data integration processes.

Link to data quality and governance. Syncsort's lack of data quality support represents a gap relative to the demand trend for synergistic deployment of data integration and data quality capabilities. Implementations increasingly require flexible and integrated deployment of data quality capabilities, as part of data integration processes, to improve governance support.

Talend

With dual headquarters in Redwood City, California, U.S. and Suresnes, France, Talend (www.talend.com) offers Talend Open Studio for Data Integration, Talend Open Studio for Big Data, Talend Enterprise Data Integration and Talend Enterprise Big Data. The vendor's customer base for this product portfolio is estimated at more than 3,300 organizations.

Strengths

Core data integration capabilities. Talend offers bulk/batch data integration capabilities that continue to attract strong growth in the market. Support for data integration operations running natively on Hadoop and evolving operational uses cases (Apache Storm and Apache Spark environment), and an iPaaS offering planned for 1Q15, position Talend well in relation to demand trends.

Integrated product set and broad applicability. Talend's portfolio, including data quality, MDM, business process management and ESB, helps Talend deployments to capitalize on data integration use cases that require synergy with these other capabilities.

Cost model and time to value. References express positive perceptions of value relative to cost and developer productivity. Frequently regarded as an attractive low-price option for augmenting implementations of data integration capabilities by budget-constrained customers, Talend is also selected by larger organizations — though not as often as most of its competitors. Reference customers generally report ease of use and speed of deployment as reasons for adopting Talend's technology.

Cautions

Recognition for functionality and environment coverage. While Talend's use cases reflect well in bulk/batch-oriented data delivery, recognition and deployment of other data integration styles remain relatively limited. Difficulty with access to skilled resources and integration with incumbent technical environments and standards are adverse factors expressed by prospects during evaluations.

Metadata support. Deployments using the product set's multiple data integration tool components, and alongside Talend's various other technologies such as MDM and ESB, are raising expectations for deeper out-of-the-box metadata and data lineage support across the portfolio.

Product support services. Reference customers using older versions report challenges with version upgrades and the application of patches and fixes, expressing a desire for automated processes and provisioning of updates and fixes, as Talend continues to address these concerns through evolving the 5.x product portfolio.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants and MarketScopes as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant or MarketScope may change over time. A vendor's appearance in a Magic Quadrant or MarketScope one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

No vendors were added to this Magic Quadrant.

Dropped

No vendors were dropped from this Magic Quadrant.

Composite Software now appears as Cisco (Composite Software).

Actian-Pervasive Software now appears as Actian.

Inclusion and Exclusion Criteria

To be included in this Magic Quadrant, vendors must possess within their technology portfolio the subset of capabilities identified by Gartner as the most critical from within the overall range of capabilities expected of data integration tools. Specifically, vendors must deliver the following functional requirements:

Range of connectivity/adaptor support (sources and targets) — Native access to relational DBMS products, plus access to nonrelational legacy data structures, flat files, XML and message queues

Mode of connectivity/adaptor support (against a range of sources and targets) — Bulk/batch and CDC

Data delivery modes support — At least two modes among bulk/batch (ETL-style) delivery, federated views, message-oriented delivery or data replication

Data transformation support — At a minimum, packaged capabilities for basic transformations (such as data type conversions, string manipulations and calculations)

Metadata and data modeling support — Automated metadata discovery, lineage and impact analysis reporting, ability to synchronize metadata across multiple instances of the tool, and an open metadata repository, including mechanisms for bidirectional sharing of metadata with other tools

Design and development support — Graphical design/development environment and team development capabilities (such as version control and collaboration)

Data governance support — Ability to interoperate at a metadata level with data profiling and/or data quality tools

Runtime platform support — Windows, Unix or Linux operating systems

Service enablement — Ability to deploy functionality as services conforming to SOA principles

In addition, vendors had to satisfy the following quantitative requirements regarding their market penetration and customer base:

They must generate at least \$20 million of their annual software revenue from data integration tools, or maintain at least 300 maintenance-paying customers for their data integration tools.

They must support data integration tool customers in at least two of the major geographic regions (North America, Latin America, Europe, the Middle East and Africa, and Asia/Pacific).

We excluded vendors that focus on only one specific data subject area (for example, the integration of customer data), a single industry, or only their own data models and architectures.

There are many vendors of data integration tools that do not meet the above criteria and are therefore not included in this Magic Quadrant. For example, many vendors provide products to address one very specific style of data delivery (such as data federation/virtualization) and cannot support other styles. Others provide a range of functionality, but operate only in a specific technical environment. Still others operate only in a single region or support only narrow, departmental implementations. Some vendors meet all the functional, deployment and geographic requirements, but are very new to the data integration tool market and therefore have limited revenue and few production customers.

Evaluation Criteria

Ability to Execute

Gartner analysts evaluate technology providers on the quality and efficacy of the processes, systems, methods or procedures that enable IT providers' performance to be competitive, efficient and effective, and to positively affect revenue, retention and reputation. Ultimately, technology providers are judged on their ability to capitalize on their vision and their success in doing so.

We evaluate vendors' Ability to Execute in the data integration tools market using the following criteria:

Product/Service. How well the vendor supports the range of distinguishing data integration functionalities required by the market, the manner (architecture) in which this functionality is delivered, support for established and emerging deployment models, and the overall usability of the tools. Product capabilities are critical to the success of data integration tool deployments and, therefore, receive a high weighting.

Overall Viability. The magnitude of the vendor's financial resources and the continuity of its people and technology, which affect the practical success of the business unit or organization in generating business results.

Sales Execution/Pricing. The effectiveness of the vendor's pricing model in light of current customer demand trends and spending patterns, and the effectiveness of its direct and indirect sales channels. This criterion is weighted high to reflect the major emphasis of buyers on cost models and ROI, and the criticality of consistent sales execution in order to drive a vendor's growth and customer retention.

Market Responsiveness/Record. The degree to which the vendor has demonstrated the ability to respond successfully to market demand for data integration capabilities over an extended period, and how well the vendor has acted on the vision of prior years.

Marketing Execution. The overall effectiveness of the vendor's marketing efforts, which impacts its mind share, market share and account penetration. The ability of the vendor to adapt to changing demands in the market by aligning its product message with new trends and end-user interests.

Customer Experience. The level of satisfaction expressed by customers with the vendor's product support and professional services; their overall relationship with the vendor; and their perceptions of the value of the vendor's data integration tools relative to costs and expectations. This criterion retains a weighting of "high" to reflect buyers' scrutiny of these considerations as they seek to derive optimal value from their investments. Analysis and rating of vendors against this criterion are driven directly by the results of a customer survey executed as part of the Magic Quadrant process.

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting
Product/Service	High
Overall Viability	Medium
Sales Execution/Pricing	High
Market Responsiveness/Record	Medium
Marketing Execution	Medium

Customer Experience	High
Operations	Not Rated

Source: Gartner (July 2014)

Completeness of Vision

Gartner analysts evaluate technology providers on their ability to convincingly articulate logical statements about current and future market direction, innovation, customer needs and competitive forces, as well as how they map to Gartner's position. Ultimately, technology providers are assessed on their understanding of the ways that market forces can be exploited to create opportunities.

We assess vendors' Completeness of Vision for the data integration tools market using the following criteria:

Market Understanding. The degree to which the vendor leads the market in recognizing opportunities represented by trends and new directions (technology, product, services or otherwise), and its ability to adapt to significant market inertia and disruption. Given the dynamic nature of this market, this item receives a weighting of "high."

Marketing Strategy. The degree to which the vendor's marketing approach aligns with and/or exploits emerging trends and the overall direction of the market.

Sales Strategy. The alignment of the vendor's sales model with the ways in which customers' preferred buying approaches will evolve over time.

Offering (Product) Strategy. The degree to which the vendor's product road map reflects demand trends in the market, fills current gaps or weaknesses, and includes developments that create competitive differentiation and increased value for customers. In addition, given the requirement for data integration tools to support diverse environments for data, delivery models, and platform mix, we assess vendors on the degree of openness of their technology and product strategy. Given the intense evolution of both technology and deployment models in this market, this criterion receives a weighting of "high."

Business Model. The overall approach the vendor takes to execute its strategy for the data integration tools market, including diversity of delivery models, packaging and pricing options, and partnership.

Vertical/Industry Strategy. The degree of emphasis the vendor places on vertical solutions, and the vendor's depth of vertical market expertise.

Innovation. The degree to which the vendor demonstrates creative energy in the form of enhancing its practices and product capabilities, as well as introducing thought-leading and differentiating ideas and product plans that have the potential to significantly extend or reshape the market in a way that adds real value for customers. Given the pace of expansion of data integration requirements and the highly competitive nature of the market, this criterion receives a weighting of "high."

Geographic Strategy. The vendor's strategy for expanding its reach into markets beyond its home region/country, and its approach to achieving a global presence (for example, its direct local presence and use of resellers and distributors).

Table 2. Completeness of Vision Evaluation Criteria

Evaluation Criteria	Weighting
Market Understanding	High
Marketing Strategy	Medium
Sales Strategy	Medium
Offering (Product) Strategy	High
Business Model	Medium
Vertical/Industry Strategy	Low
Innovation	High
Geographic Strategy	Medium

Source: Gartner (July 2014)

Quadrant Descriptions

Leaders

Leaders in the data integration tool market are front-runners in the convergence of single-purpose tools into an offering that supports a full range of data delivery styles. They exhibit a clear understanding and vision of where the market is headed, and are strong in establishing data integration infrastructure as an enterprise standard and as a critical component of the modern information infrastructure. They support traditional and newer data integration patterns to capitalize on market demand. Leaders have significant mind share in the market, and resources skilled in their tools are readily available. These vendors establish market trends (to a large degree) by providing new functional capabilities in their products, and by identifying new types of business problems to which data integration tools can bring significant value. Examples of deployments that span multiple projects and types of use case are

common among Leaders' customers. Leaders have an established market presence, significant size and a multinational presence (directly or as a result of a parent company).

Challengers

Challengers are well-positioned in light of the key trends in the data integration tool market, such as the need to support multiple styles of data delivery. However, they may not provide a comprehensive breadth of functionality, or may be limited to specific technical environments or application domains. In addition, their vision may be hampered by the lack of a coordinated strategy across the various products in their data integration tool portfolio. Challengers can vary significantly with regard to their financial strength and global presence. They are often large players in related markets that have only recently placed an emphasis on data integration tools. Challengers generally have substantial customer bases, although implementations are often of a single-project nature, or reflect multiple projects of a single type (for example, predominantly ETL-oriented use cases).

Visionaries

Visionaries have a solid understanding of the emerging technology and business trends, or a position that is well-aligned with current demand, but they lack market awareness or credibility beyond their customer base or a single application domain. Visionaries may also fail to provide a comprehensive set of product capabilities. They may be new entrants lacking the installed base and global presence of larger vendors, although they could also be large, established players in related markets that have only recently placed an emphasis on data integration tools. The growing emphasis on aligning data integration tools with the market's demand for interoperability of delivery styles, integrated deployment of related offerings (such as data integration and data quality tools), metadata modeling, support for emerging analytics environments, and deployment models (among other things), is creating ongoing challenges for which vendors must demonstrate vision.

Niche Players

Niche Players have gaps in both their Completeness of Vision and Ability to Execute, often lacking key aspects of product functionality and/or exhibiting a narrow focus on their own architectures and installed bases. These vendors have little mind share in the market and are not recognized as proven providers of data integration tools for enterprise-class deployments. Many Niche Players have very strong offerings for a specific range of data integration problems (for example, a particular set of technical environments or application domains) and deliver substantial value for their customers in that segment.

Context

The need of enterprises to improve the flexibility of their information infrastructure is intensifying the focus on data integration activities. More information and application managers are realizing that data integration is a critical component of their information infrastructure. They understand that they need to employ data integration capabilities to share data across all organizational and system boundaries.

Pressures grow in this market as vendors are challenged to address demand trends for innovation with the ability to enhance traditional practices and to introduce new models and practices.

Business imperatives to confront new information challenges are driving the need for a realignment of the technology vision in this market. Demand trends in 2014 require vendors to increase their flexibility in approaching comprehensive data integration needs, and to demonstrate alignment to expectations on time to value, breadth of data integration functionality, use cases, sentiment for cost and delivery models, and synergy with information and application infrastructure initiatives.

Meanwhile, IT leaders continue to emphasize the requirement for high-quality customer service and support. Implementations are increasingly extending beyond usage scenarios for analytics and data consistency. In addition, enterprises are seeking to keep pace with emergent opportunities to address cloud-related integration, LDW architectures, the distribution of data integration operations to external parallelized processes, and the use of iPaaS and hybrid deployment architecture that flexibly combines cloud and on-premises environments.

Market Overview

Data integration is central to enterprises' information infrastructure. Enterprises pursuing the frictionless sharing of data are increasingly favoring technology tools that are flexible in regard to time-to-value demands, integration patterns, optimization for cost and delivery models, and synergies with information and application infrastructures.

Gartner estimates that the data integration tool market was slightly over \$2.2 billion in constant currency at the end of 2013, an increase of 9.4% from 2012. The growth rate for this market is above the average for the enterprise software market as a whole, as data integration capability continues to be considered of critical importance in addressing the diversity of problems and emerging requirements. A projected five-year compound annual growth rate of 9.6% will bring the total revenue for this market to just under \$3.6 billion by 2018 (see "Forecast: Enterprise Software Markets, Worldwide, 2011-2018, 2Q14 Update").

The competitive landscape of this market reflects vendors' pursuit of a more comprehensive offering strategy — in support of a broad range of use cases and to capitalize on new demand. Evolving their relevance and competitive positioning requires vendors to extend their vision and deepen their capability to harness market inertia and broaden applicability of data integration offerings. This is in line with buyer expectation for optimal functions, performance and scalability in data integration tools, so that they operate well with the same vendor's technology stack and, increasingly, interoperate across related information and application infrastructures.

Organizations will need to monitor and exploit major themes that are affecting enterprise requirements and vendor offerings in the data integration tools market:

Data integration at the speed of the business. Tool capabilities are extending their focus on flexible latency with a mix of data delivery optimization to meet data availability requirements. IT leaders will need to anticipate and include the real-time characteristics needed in their data integration architectures. Vendors' tools are exhibiting enhanced characteristics in data integration architecture, with deepened integration between bulk/batch delivery, federated/virtualized views, and granular, low-latency data capture and propagation. Demand for data to be delivered or processed in real time (or near real time) to match the speed of a business requires a range of data latencies.

Alignment with information infrastructure. More organizations are selecting data integration tools that provide tight links to data quality tools — to support critical information management and governance initiatives. As MDM programs increase in number and scope, so organizations seek to apply investments in data integration technology to those initiatives — since movement, transformation and federation of master data is a fundamental component.

Synergy between data and application integration. Many organizations are beginning to pursue data integration and application integration in a synergistic way to exploit the intersection of the two disciplines. The expansion of vendors' capabilities into application integration provides opportunities for using tools that exploit common areas of both technologies to deliver shared benefits, such as use of CDC tooling that publishes captured changes into message queues.

Integrated product set. A tightly integrated product set or a single tool suite are increasingly preferred when enterprises seek ease of use among, and between, diverse functionalities. Common metadata across an integrated technology portfolio is critical for the extensive applicability and reusability of data integration capabilities. Effective metadata support is integral to assisting organizations' understanding of the meaning and value of information assets and to exposing and sharing them in a variety of formats and contexts across all parts of the data integration product set. The growing popularity of a data integration hub approach aligns with broader consistency on data formats and semantics and increases the synergy of activities with complementary data and application-oriented integration capabilities.

Business-user-facing data preparation. Demand trends for enterprises to modernize their information infrastructure are fueling enterprise strategies that draw on a comprehensive range of data integration functions and are prompting users to seek data integration tools that meet their evolving requirements. Business-facing or self-service data preparation requirements are attracting vendor interest to provide data integration functionality for direct hands-on usage by business roles (such as a data analyst or data scientist), to enable more flexible ways for accessing and sharing data, and to discover answers or patterns in data that might have been collected from internal sources — as well as less-well-known external (possibly massive) sources. The emerging concept of a "data lake," where data is continuously collected and stored in a lightly structured NoSQL repository, adds data integration challenges and opportunities to assist in applying schema at data read-time, if needed, and to deliver data to business users, processes or applications or to iteratively leverage data.

Distribution of data integration workload to externally optimized parallel-processing environments. Data integration practitioners and technology providers are addressing big data challenges and opportunities, by distributing the required computing workloads to parallelized processes in Hadoop and alternative NoSQL repositories, and in performing complex transformations in a data integration context to mine events for hidden patterns. Providers are working to enhance tools to address trends and satisfy demand. They will continue to evolve the ability of data integration tools to interact with big data sources and to deliver data to — and execute integration tasks in — Hadoop and other NoSQL environments.

Growing momentum for cloud-based integration, LDW and big data support. The use of data integration tools is becoming more diversified as buyers procure tools with the intent of supporting a wide range of projects and initiatives. While the established deployment of data integration tools for BI, analytics, data warehousing and data consistency initiatives remain the most significant use cases, many others have emerged to drive demand. The need to acquire data from the cloud is driving more data integration initiatives than before. The architectural approach of the LDW optimizes the repository styles that employ data federation/virtualization capabilities to enable data services and assimilate data involving a variety of integrated datasets. Big data-related initiatives in enterprises require the use of opportunistic analytics and the exploration of answers to less-well-formed or unexpected business questions. While Hadoop and other NoSQL repositories continue to enable minimal overheads to structure data during collection, flexible and platform-independent approaches to consuming the data will increasingly require data integration support.

PaaS and hybrid models for data integration. Organizations have become more interested in using iPaaS for data integration capabilities. While adoption of on-premises data integration tools remains predominant, diversification of deployment models in organizations is spurring interest in the data integration capabilities available in iPaaS. Some enterprises are harnessing this opportunity to evolve data integration capabilities toward a hybrid architecture that combines on-premises and cloud-based environments. In addition, the use of iPaaS for data integration in many cases also takes advantage of offerings that support both data and application integration within a single toolset.

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