



**IN-MEMORY COMPUTING:
A NEW ENGINE FOR ACCELERATING
THE DATA BEHIND DIGITAL BUSINESS
AND THE CUSTOMER EXPERIENCE**

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April 18, 2018



In-Memory Computing: A New Engine for Accelerating the Data Behind Digital Business and the Customer Experience

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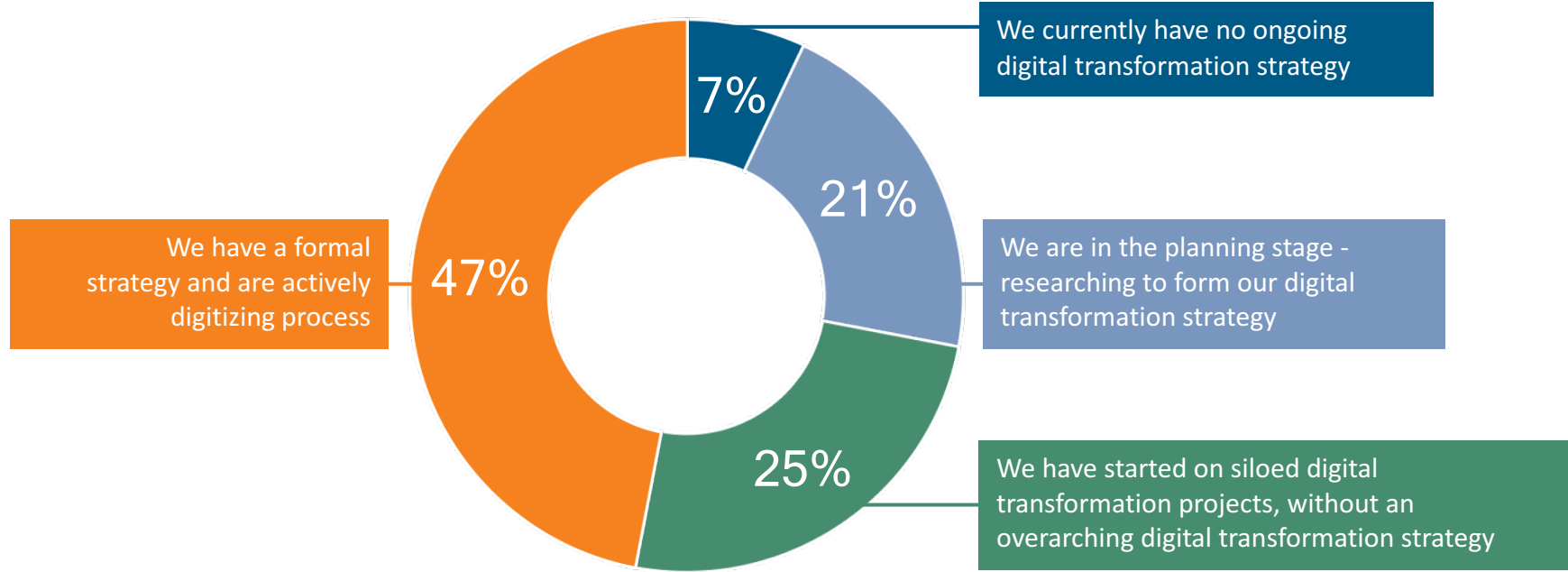
MORE THAN 30% OF NEW DATABASE REVENUE WILL BE ASSOCIATED WITH HYBRID OPERATIONAL AND ANALYTIC PROCESSING (HOAP*) BY 2021, DRIVEN (IN PART) BY IN-MEMORY COMPUTING AND INTELLIGENT APPLICATIONS TO SUPPORT IMPROVED CUSTOMER ENGAGEMENT.

451 RESEARCH



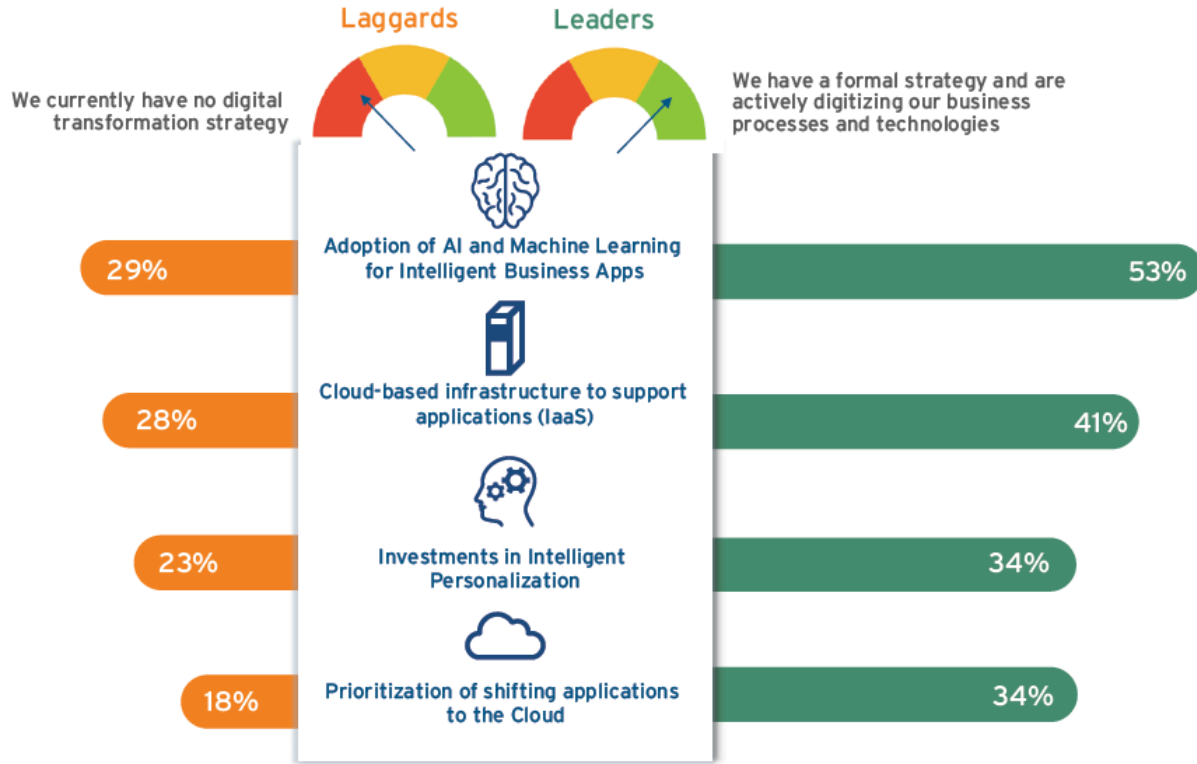
Becoming Data Driven

Digital transformation in real and happening now



Source: 451 Research Digital Transformation survey March/April 2017.
Q. Which of the following best describes your organization's status with regards to digital transformation? n=405

Leaders are investing in AI, ML and personalization

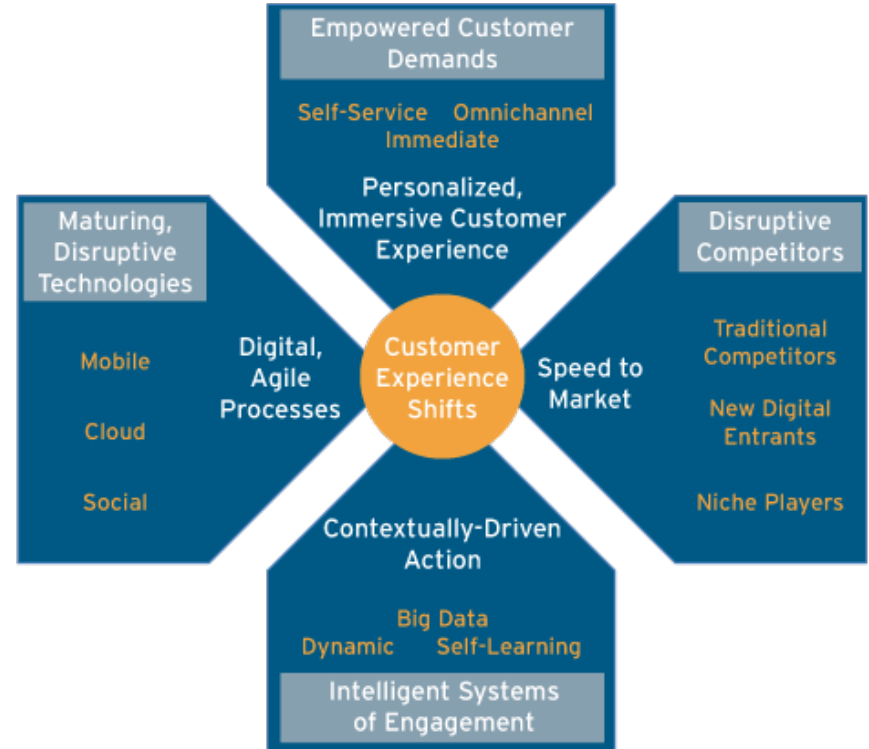


Improving customer experience is a key focus

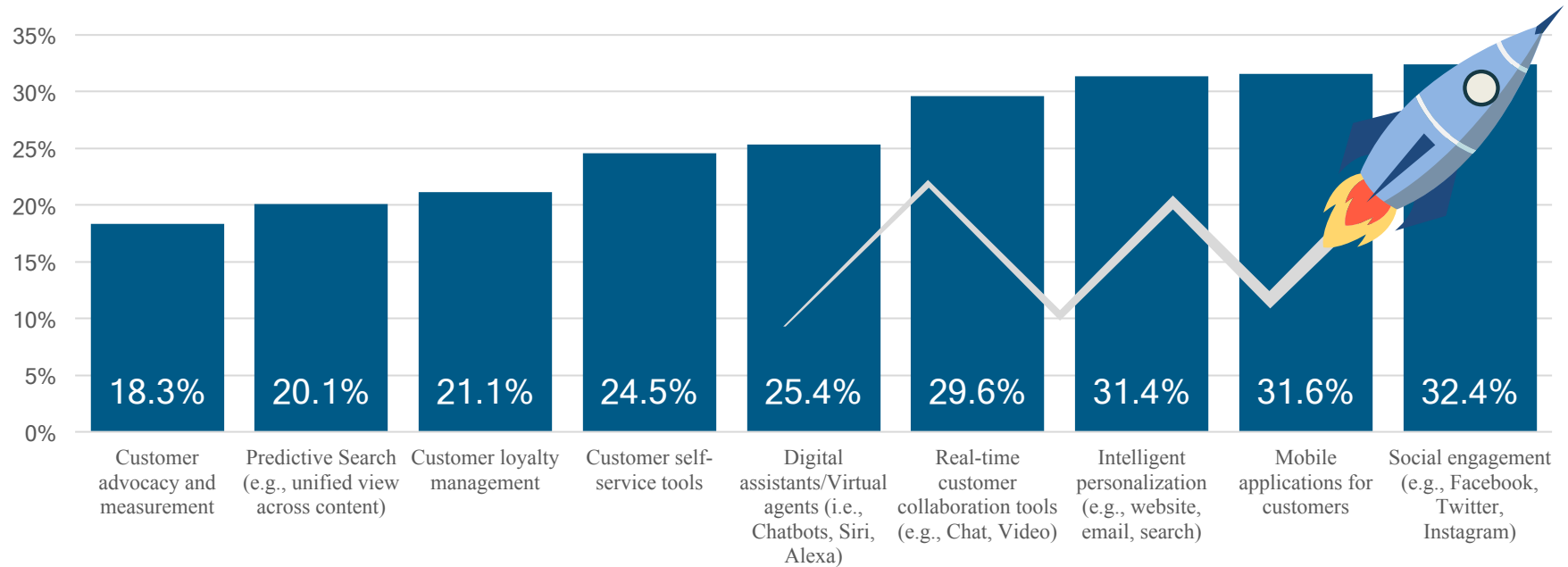


Customer Experience Shifts Drive Digital Transformation

- Meeting demands of empowered customer
- Stop asking customers to adapt to company processes or technology constraint
- New competitive threats demand speed to market
- Analytics and data critical component to delivering contextually-driven engagement.



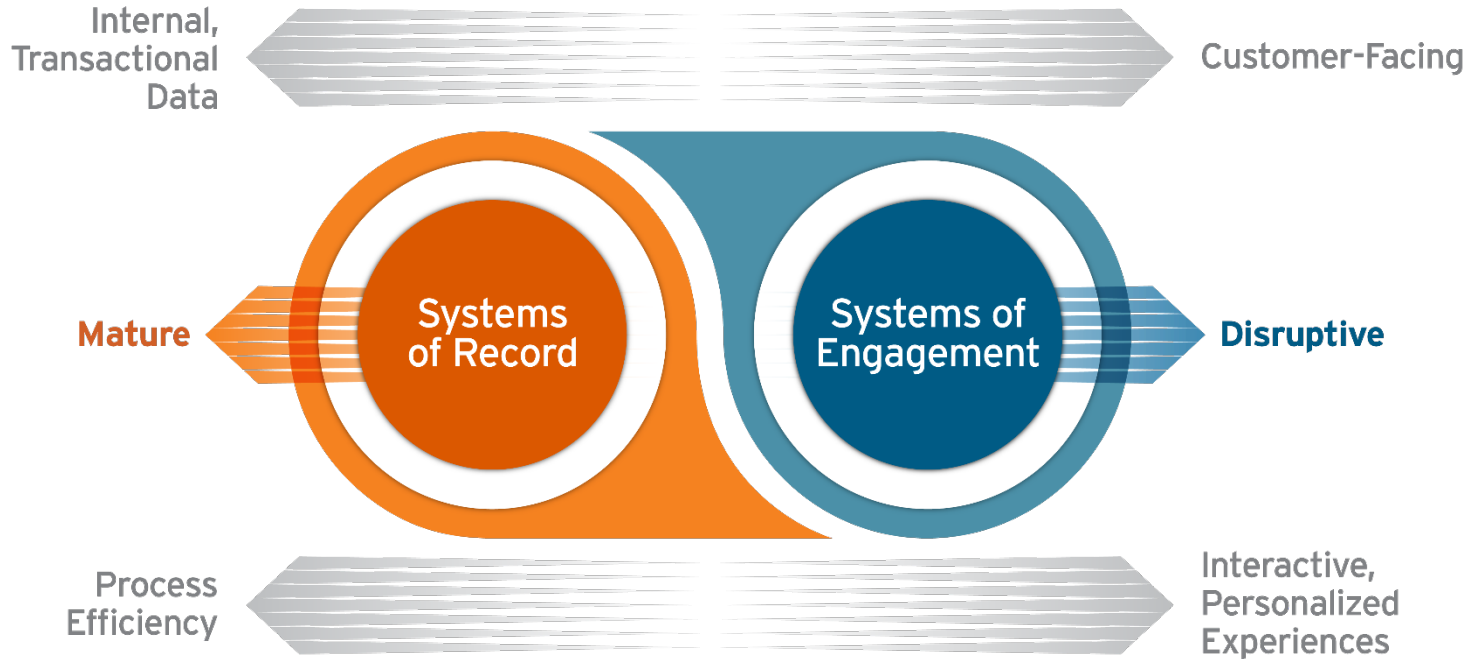
Real-Time Customer Engagement Tools expected to have biggest transformational impact over the next 12 months



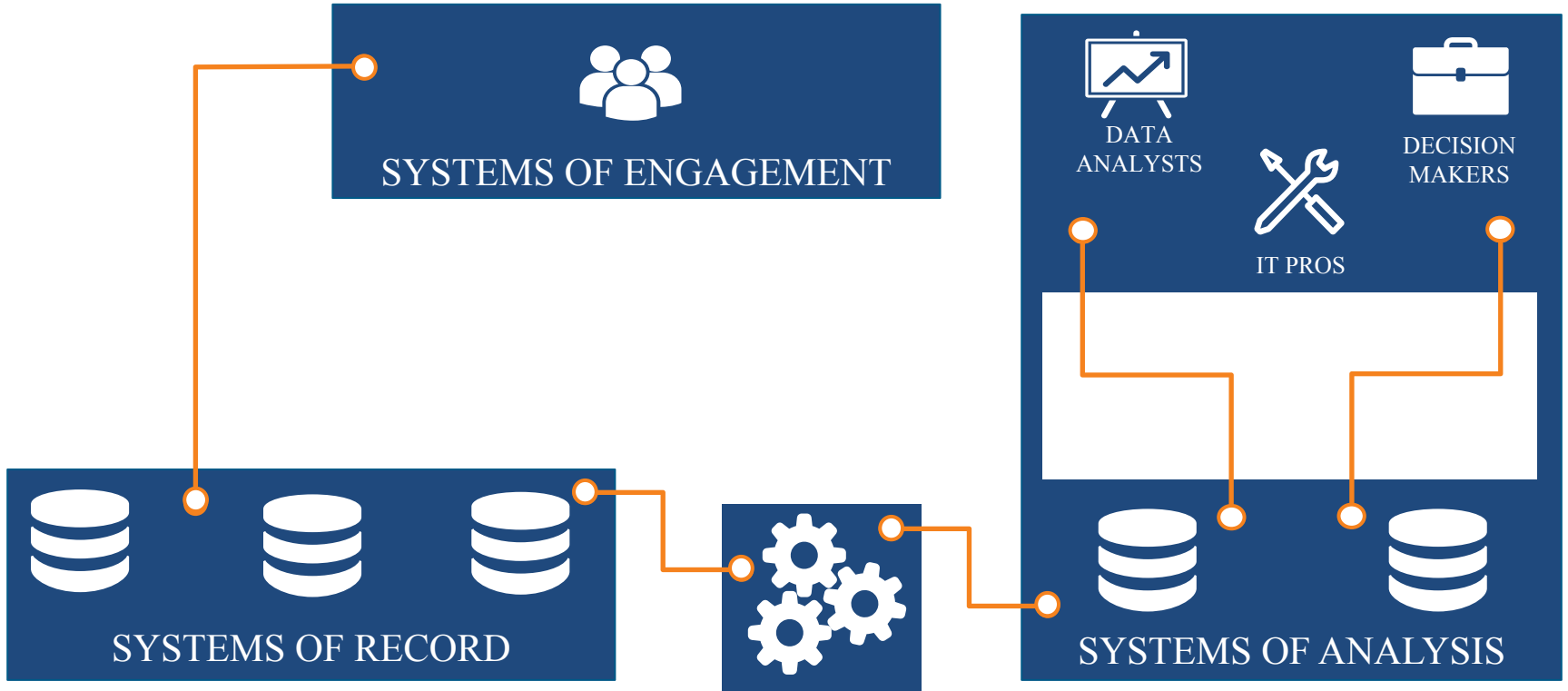
Digital and Physical Worlds Collide



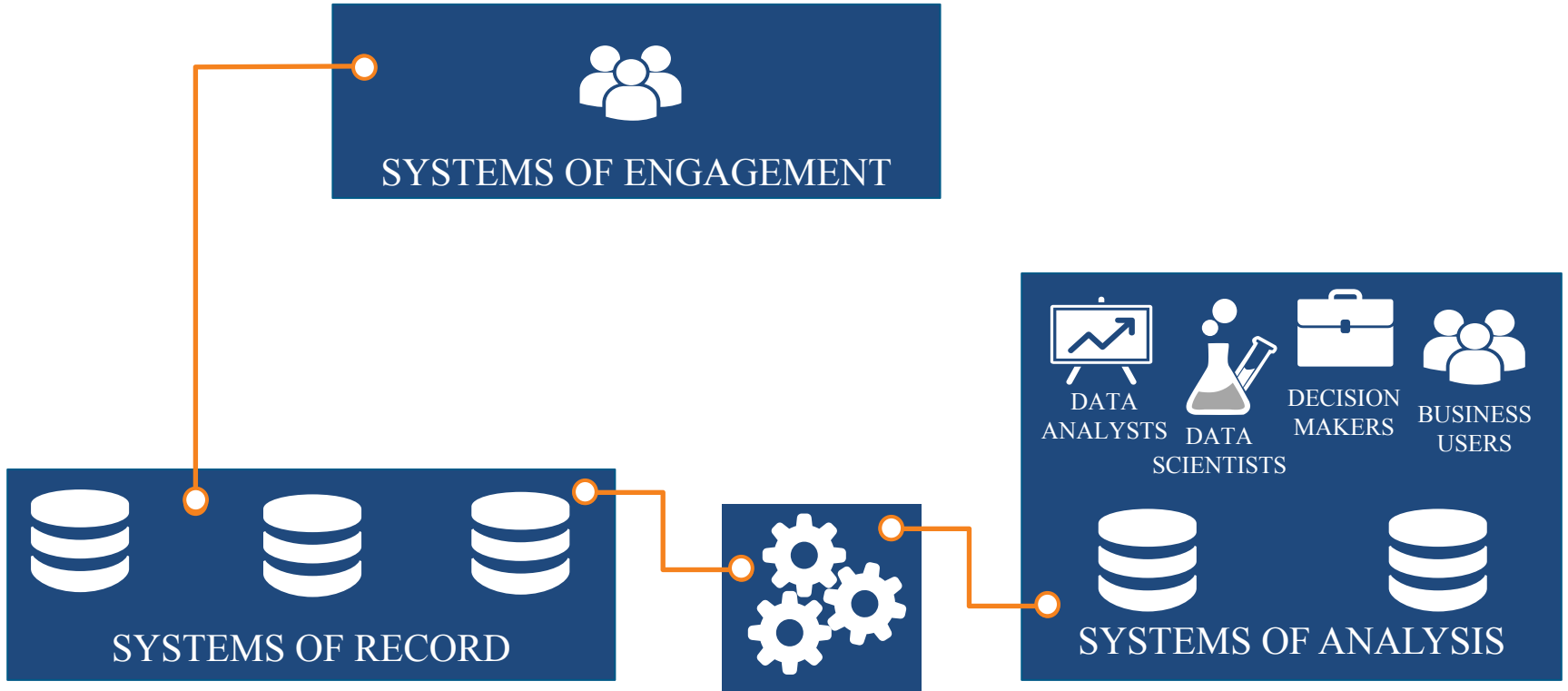
Investments Are Shifting to Systems of Engagement



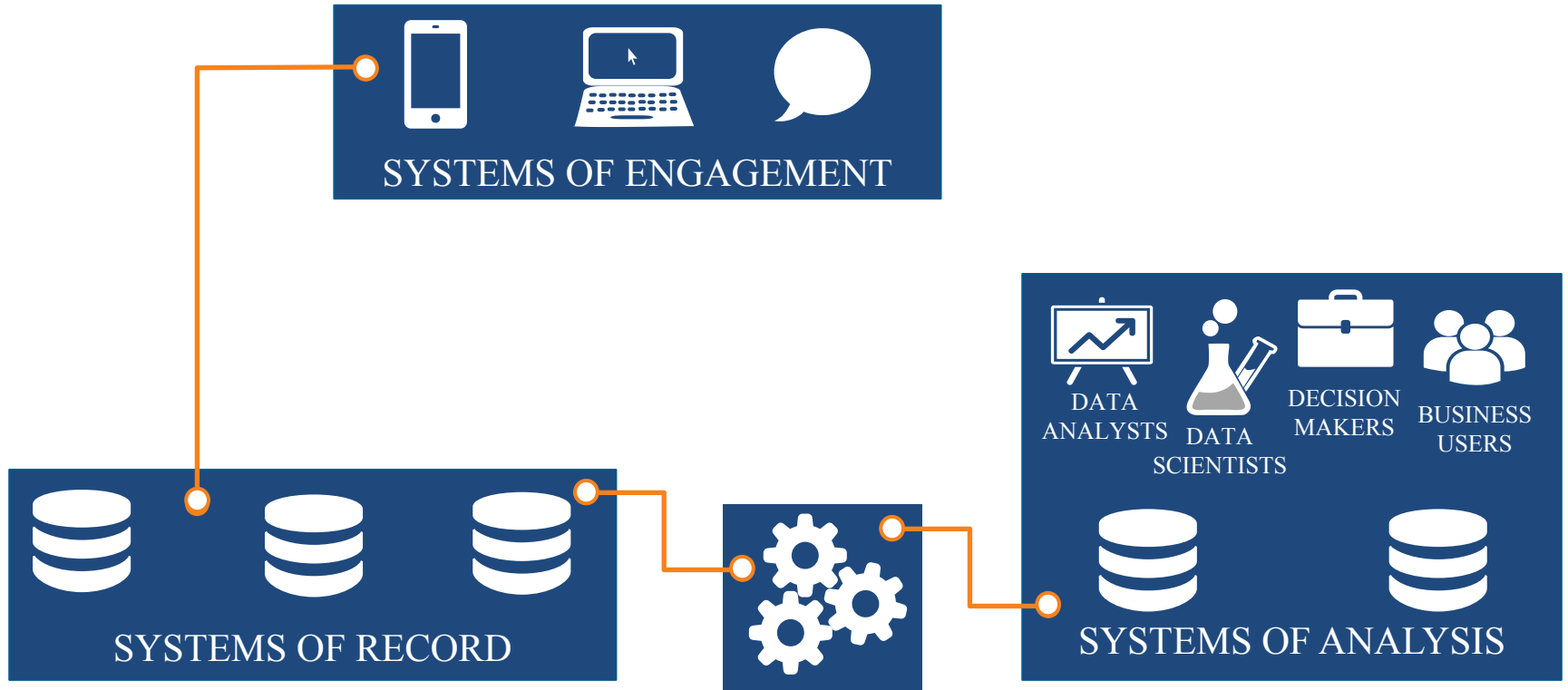
Systems of engagement: retail example



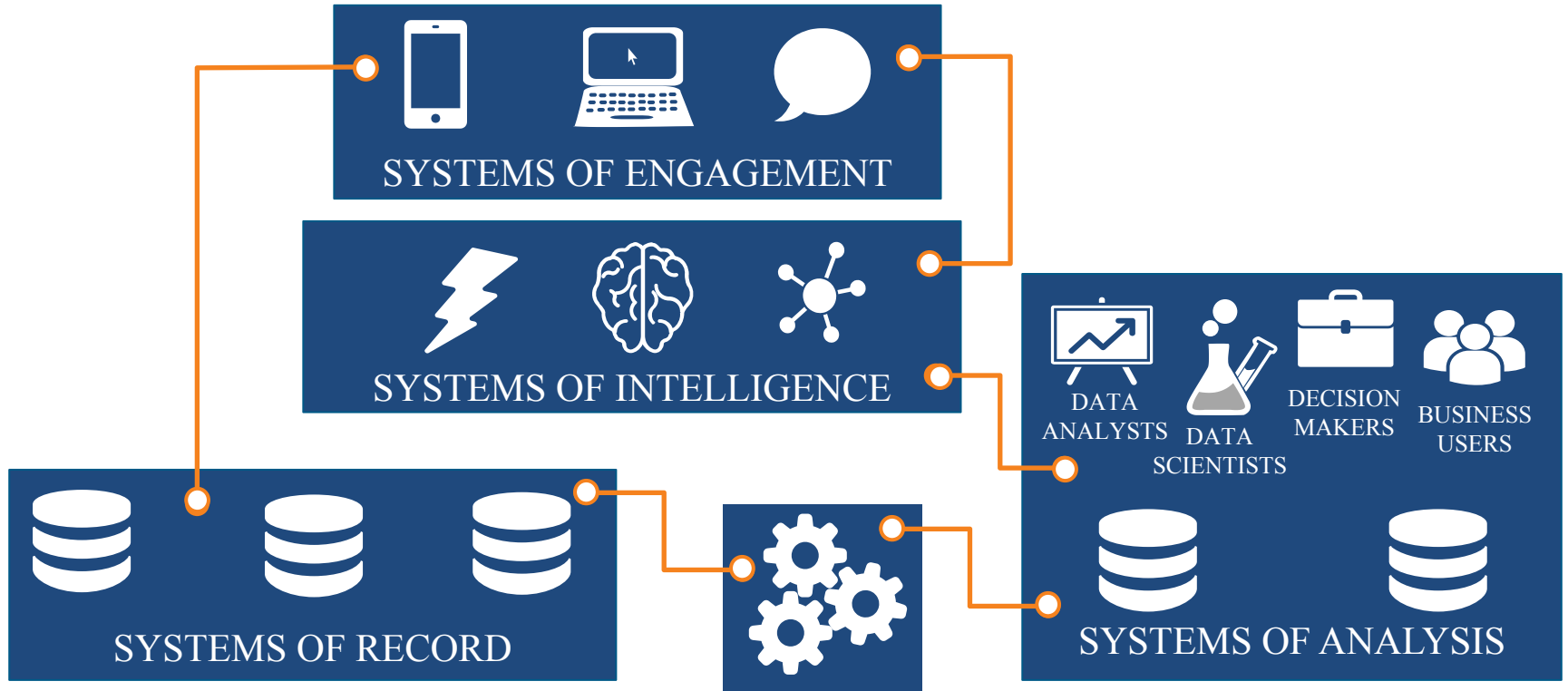
Systems of engagement: retail example



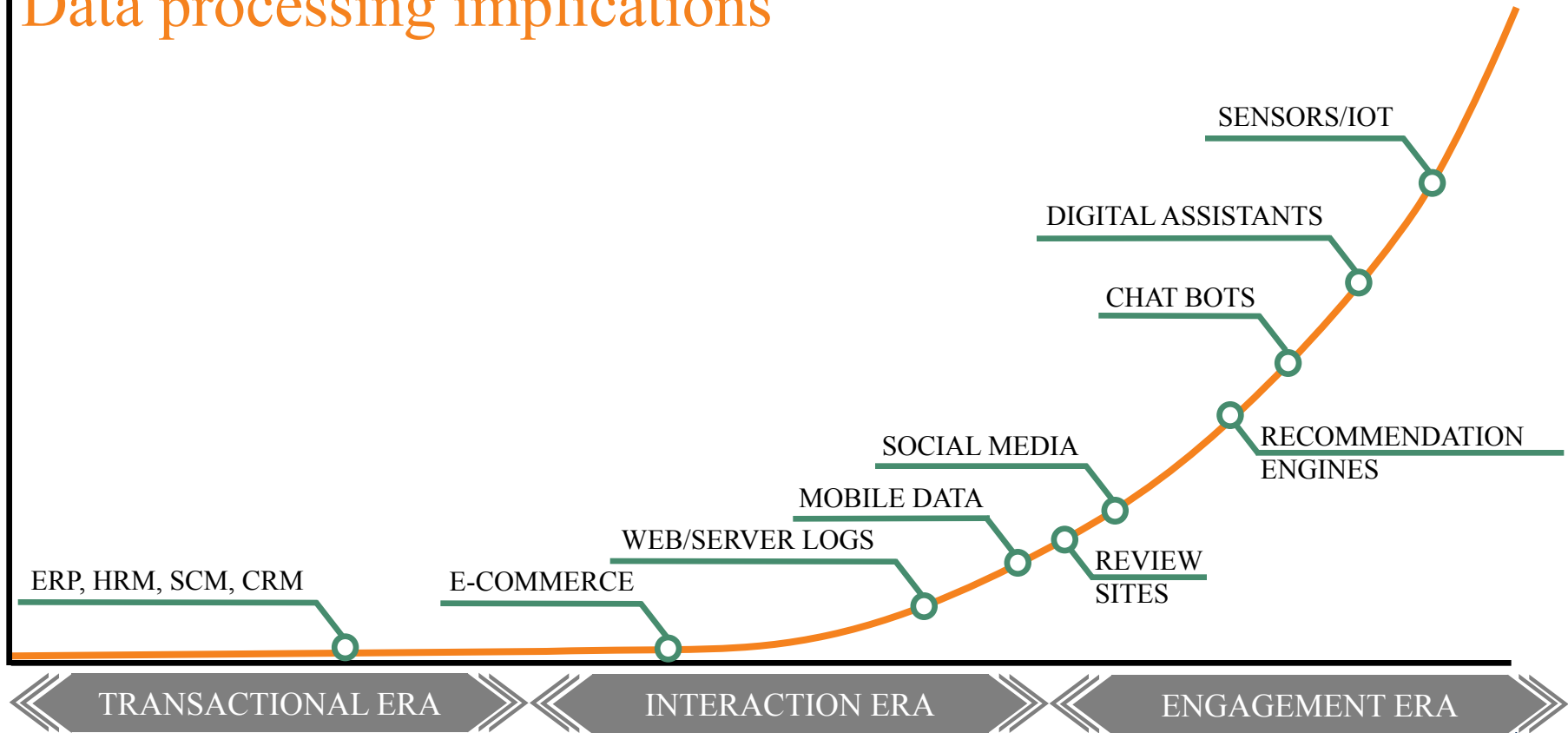
Systems of engagement: retail example



Systems of engagement: retail example



Data processing implications



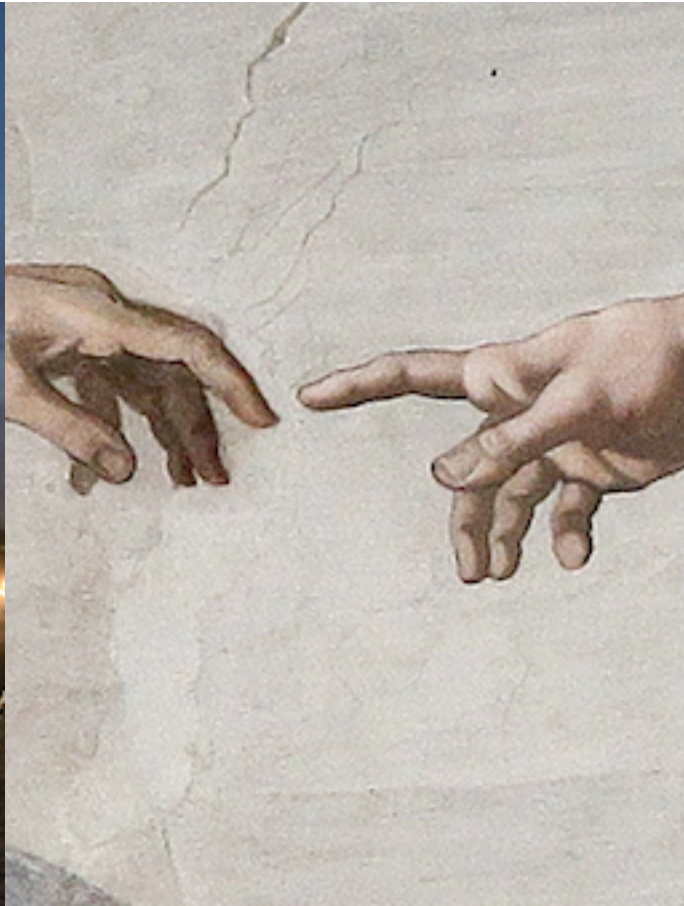
Data velocity



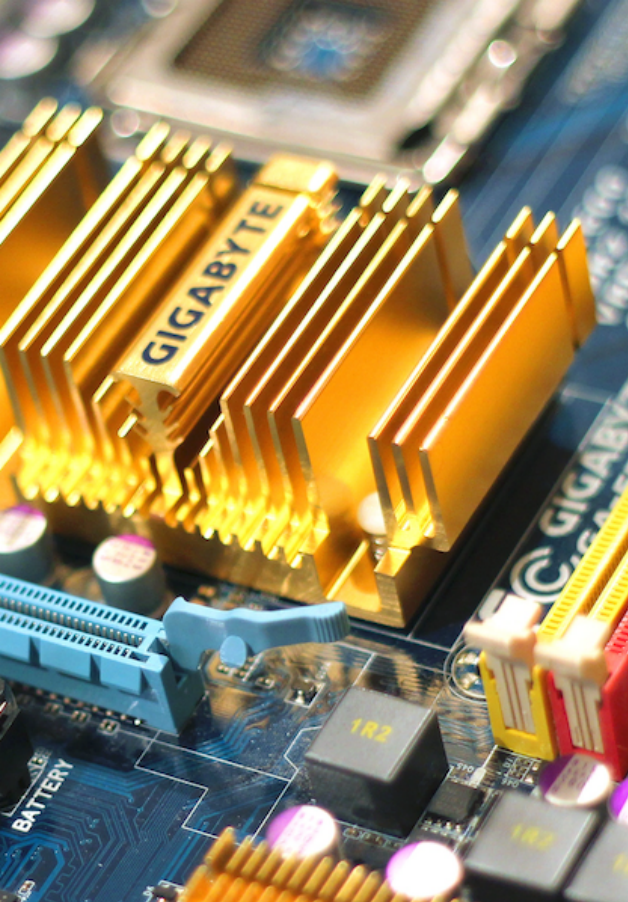
Query frequency



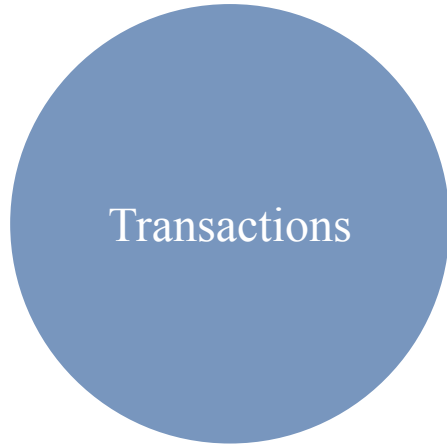
Data processing implications



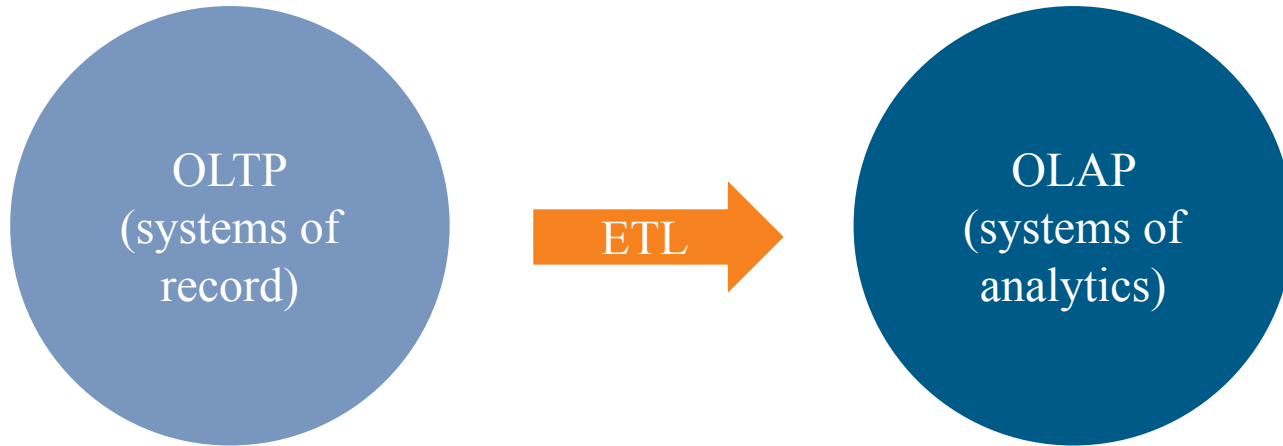
Data processing requirements



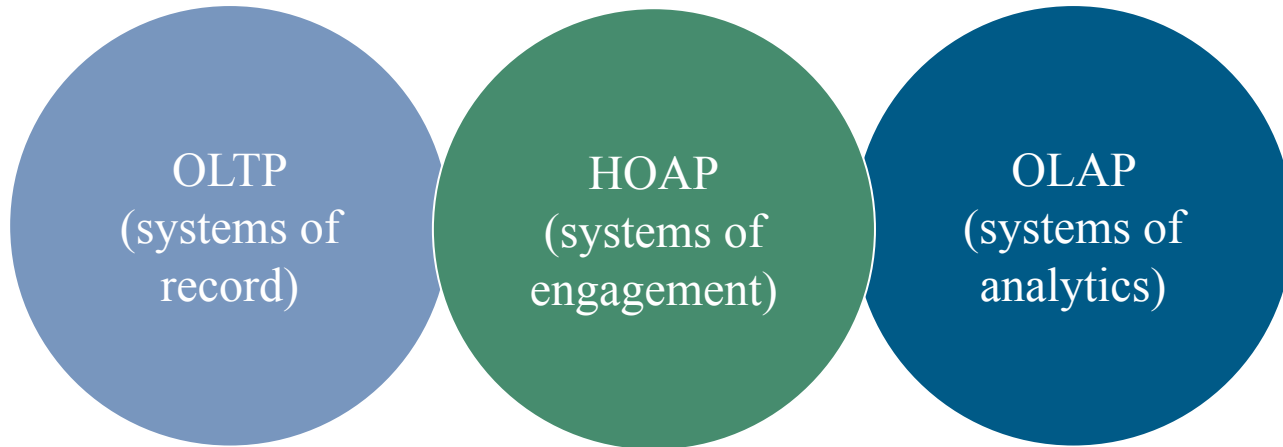
Hybrid operational and analytic processing



Hybrid operational and analytic processing



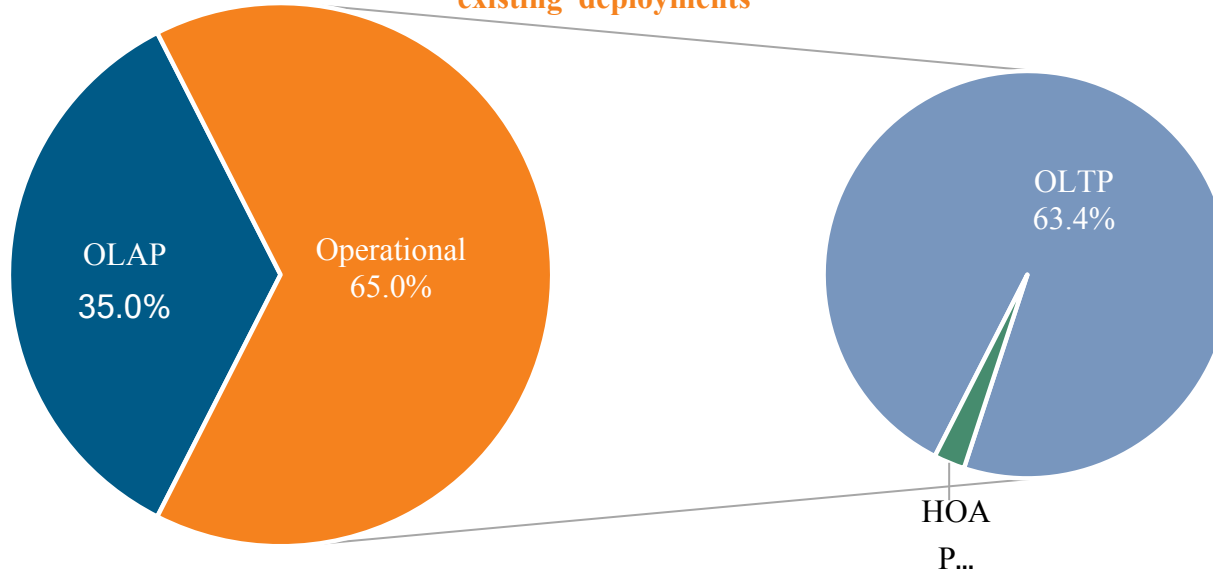
Hybrid operational and analytic processing



The Combined Database Market

2016 – Total Revenue

Includes maintenance revenue for existing deployments

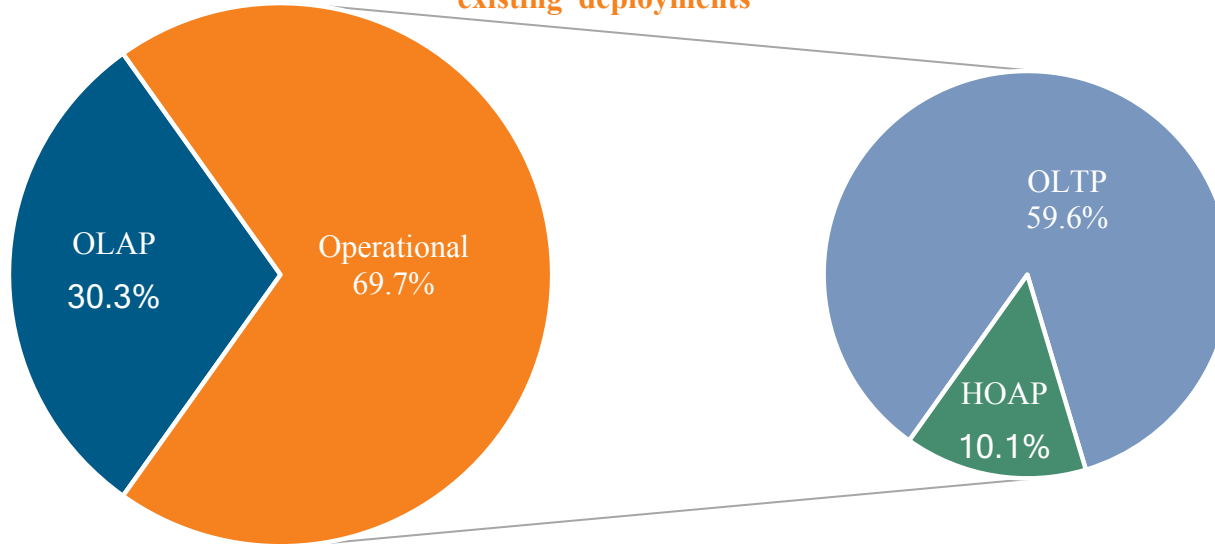


Source: 451 Research Total Data Market Monitor

The Combined Database Market

2016 – Incremental Revenue

Excludes maintenance revenue for existing deployments

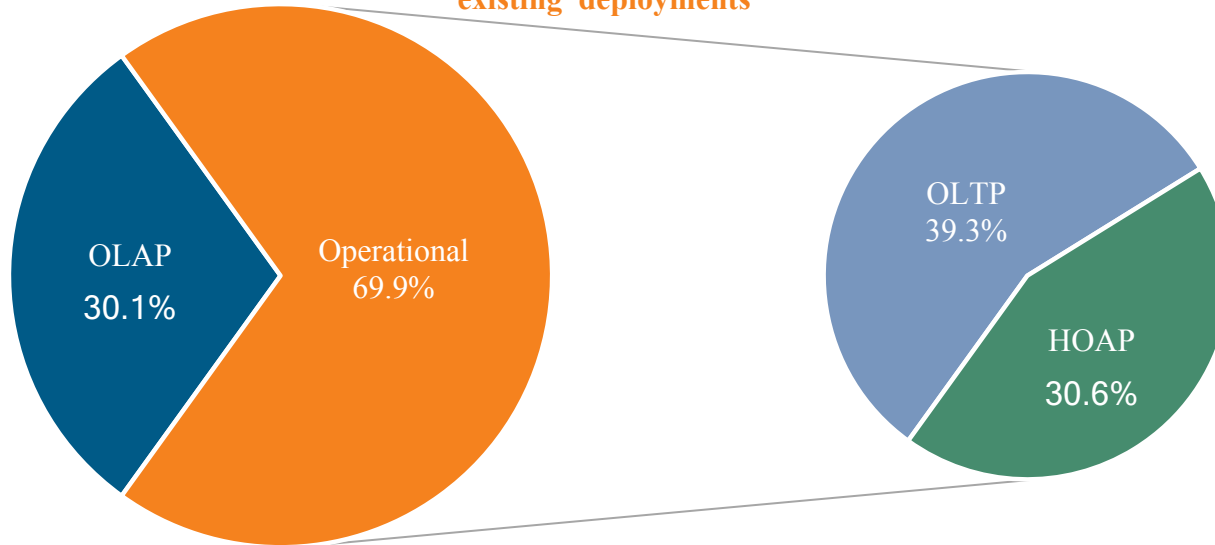


Source: 451 Research Total Data Market Monitor

The Combined Database Market

2021 – Incremental Revenue

Excludes maintenance revenue for existing deployments



Source: 451 Research Total Data Market Monitor

HOAP data processing is just the foundation



Primary use-cases

OLTP

Systems of record.

Traditional enterprise operational applications

- ERP
- CRM
- SCM
- HRM

Processing operational data

HOAP

Systems of engagement.

Emerging enterprise operational applications

- Recommendations
- Personalized content
- Personalized offers
- Real-time fraud analysis

Analyzing operational data

OLAP

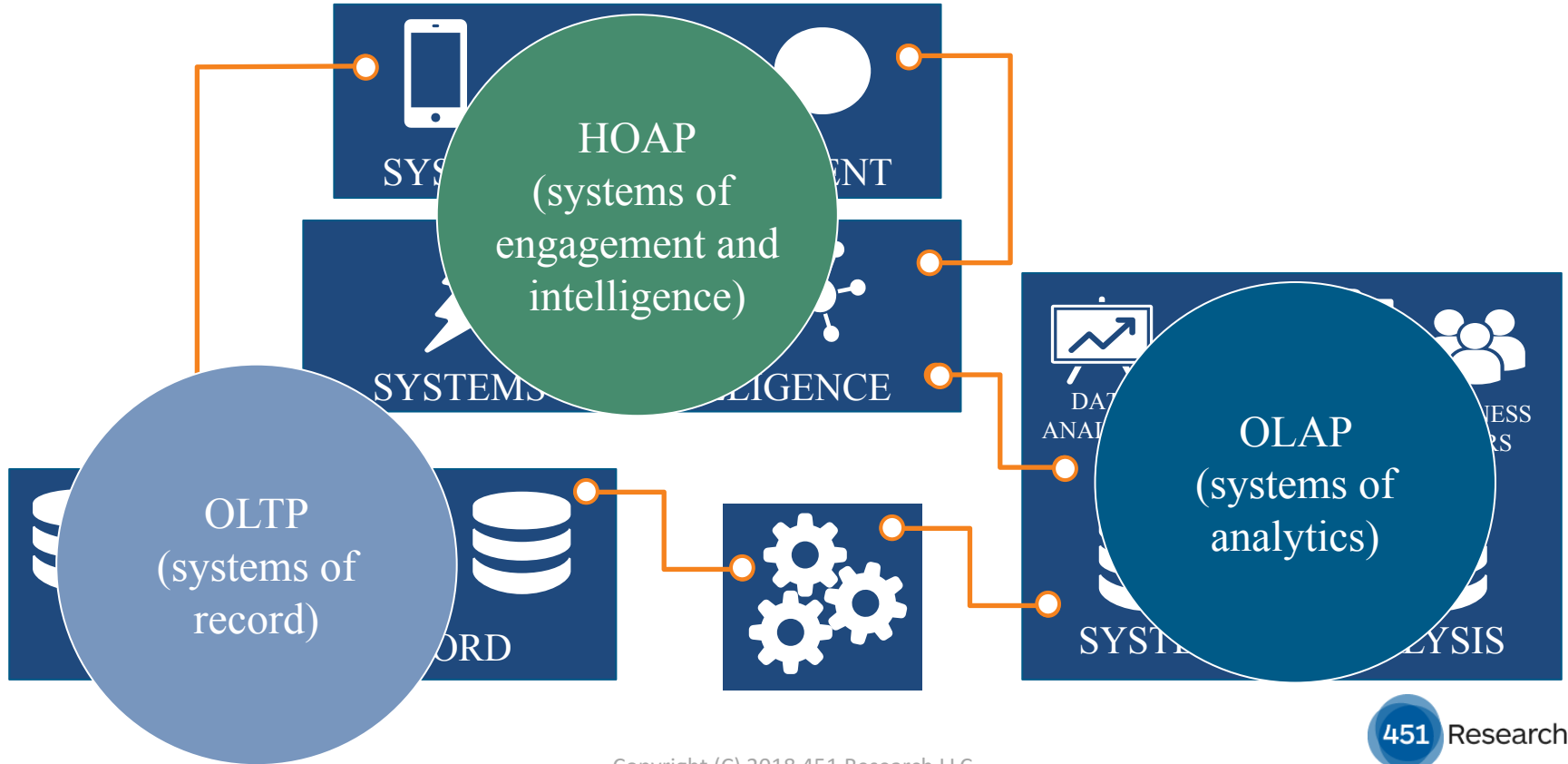
Systems of analysis.

Traditional enterprise analytic applications

- Data warehousing
- Data marts
- BI and reporting
- Data science

Analyzing historical data

Retail example



Becoming data-driven also requires cultural and organizational change

The companies that are the most successful in their data-driven transformational change initiatives are those that have a CDO (or similar).

The CDO (or similar) needs to be empowered by the C-suite to drive business change and alter attitudes to the ways data and analytics are used across a company.

The CDO (or similar) needs to articulate the company's strategic vision to business users, but also the data and analytics needs of the business users to senior executives.

Part of the function is to encourage people to separate the ownership of data from the ownership of data processing and analytics technologies.

The business must generate a culture that embraces data at the heart of the decision-making process – that includes the C-suite itself.

DataOps, and the shift towards a federated model with distributed data analytics and data science expertise, along with a central office of the CDO or analytics center of excellence.

Key Takeaways



Catering to users' preferred ways of consuming information, engaging with brands is becoming an increasingly critical part of businesses strategic value proposition and competitive differentiation.

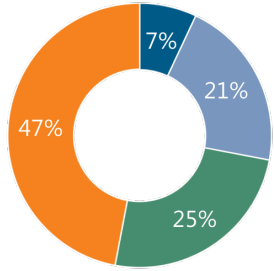


Hybrid operational and analytic processing database workloads are set to grow significantly for new database deployments, driven by the delivery of automated systems of engagement and the underlying systems of intelligence, in part to support improved customer engagement.



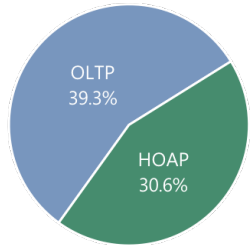
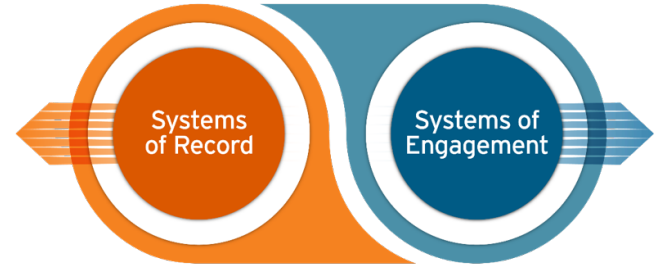
The development of new enterprise operational applications reliant on recommendations, personalized content, personalized offers and real-time fraud analysis, for example, will drive the adoption and use of in-memory, hybrid operational and analytic processing.

Recommendations



Don't be part of the 7% - or even the 53%. If you haven't started on digital transformation, start now, or face the consequences.

Explore the opportunities for new systems of engagement to improve customer experience, across multiple channels.



Invest in data processing technologies capable of supporting HOAP workloads – including in-memory data processing, stream processing, machine learning and intelligent personalization – as well as the all important applications to take advantage of that functionality.



BEST PRACTICES FOR DIGITAL BUSINESS AND IMPROVING THE CUSTOMER EXPERIENCE

With In-Memory Computing

Rob Meyer (rob.meyer@gridgain.com)

April 18, 2018

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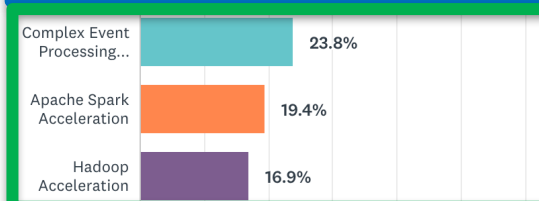
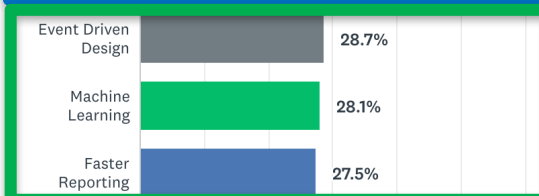
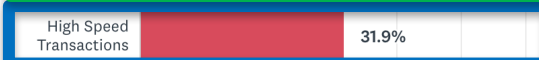
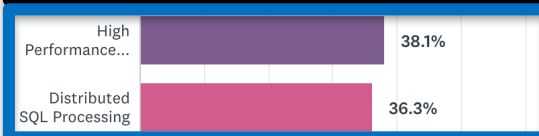
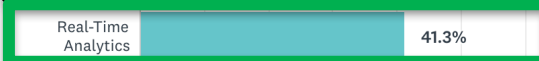


AdTech



Current Uses of In-Memory Computing

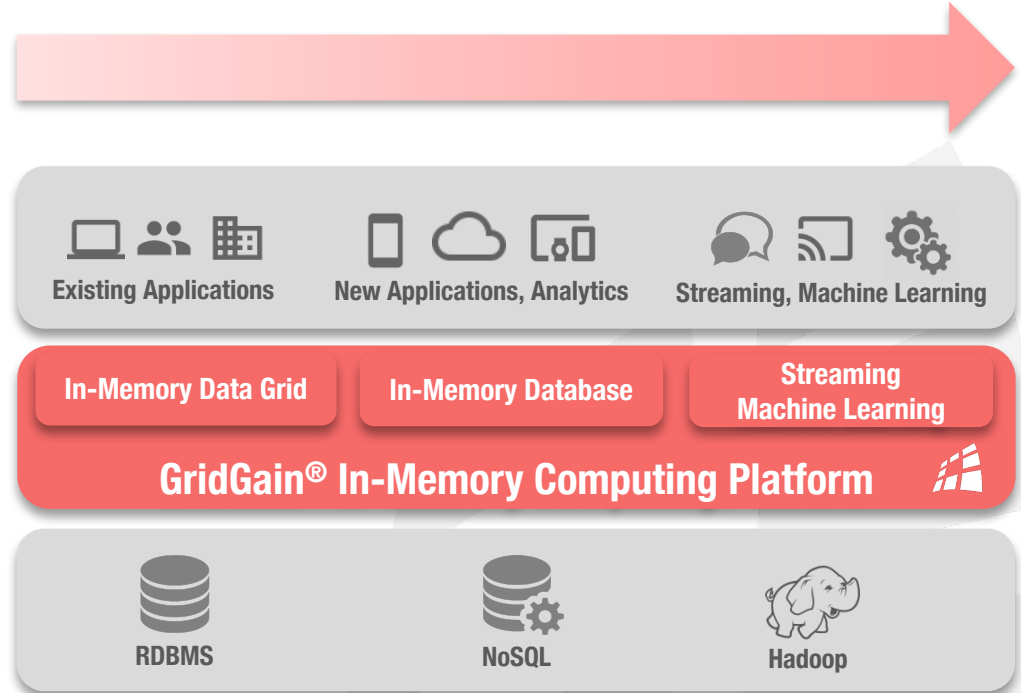
- Adding speed and scalability to existing applications
- Building new applications (with high transaction rates)
- Building streaming analytics, machine and deep learning



2017 GridGain/Apache Ignite User Survey: What uses were you considering for an in-memory computing solution (select all that apply)? (n=160)

Adopting In-Memory Computing – Best Practices

- **Adding Speed and Scalability to Existing Applications**
 - Web, Mobile (MBaaS)
- **Building new applications**
 - Data Services for Digital Business
 - Big Data (e.g. Personalization)
 - SaaS and Cloud computing
 - Internet of Things (IoT)
- **Building streaming analytics, machine and deep learning**
 - Ingestion, computing, analytics
 - Real-time compliance
 - Spark acceleration
 - Continuous model training, automation





- Accelerate Digital Banking

The ING Group is a Dutch multinational banking and financial services corporation headquartered in Amsterdam. Its primary businesses are retail banking, direct banking, commercial banking, investment banking, asset management, and insurance services.

Problem

- To deliver new competitive customer services fast
- High cost of running on mainframe infrastructure
- Transaction consistency over multiple geo-locations

GridGain Solution

- Powers the core solution for delivering new services
- Data aggregation across multiple sources
- Reduces infrastructure costs



Front-End APIs

Payments

Accounts

Credits

Clients

Securities

GridGain In-Memory Computing Platform



Multi-datacenter Infrastructure



SBERBANK - Innovate with New Banking Services

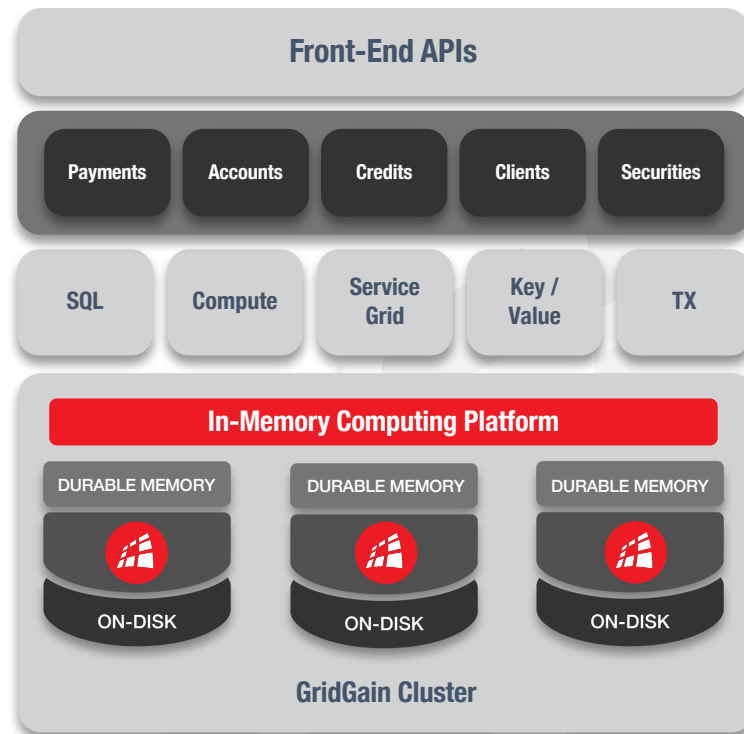
One of the top 20 banks worldwide, and the top bank in Russia with over 16,000 branches in all 83 constituent entities of the Russian Federation traversing 11 time zones and serving 70% of the Russian population

Problem

- Transaction load increased 100x (online and mobile banking)
- Needed common storage layer across the bank
- High cost of traditional RDBMS systems

GridGain Solution

- Benchmarked at 1 billion transactions/sec on 10 nodes
- Five 9s availability
- Scale-out across 2,000 servers in 3 data centers
- 1.5 Petabytes of data in memory
- Within 3 minutes (Immediate) availability, restart from disk
- Data foundation for new core banking systems



- Next Generation, Real-time IBOR

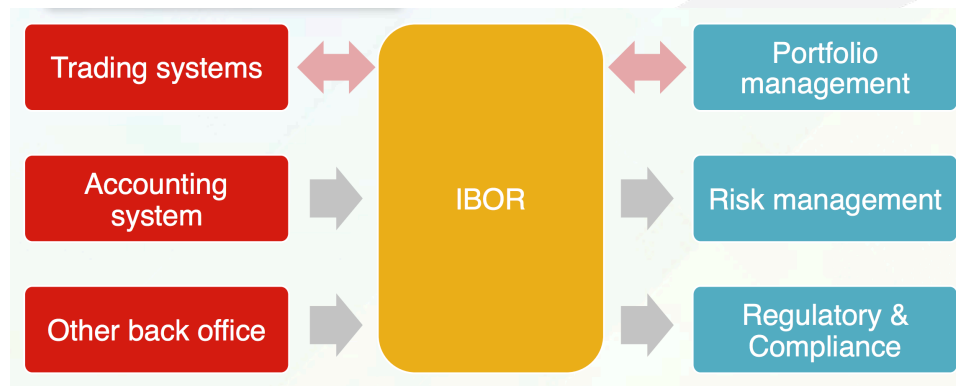
Wellington Management Company is one of the top 20 asset management firms in the world, headquartered in New York, with over \$1 Trillion under management.

Problem

- Current systems no longer scaling to handle the volumes
- Comply with new regulations following financial crisis
- Introduce new asset classes faster

GridGain Solution

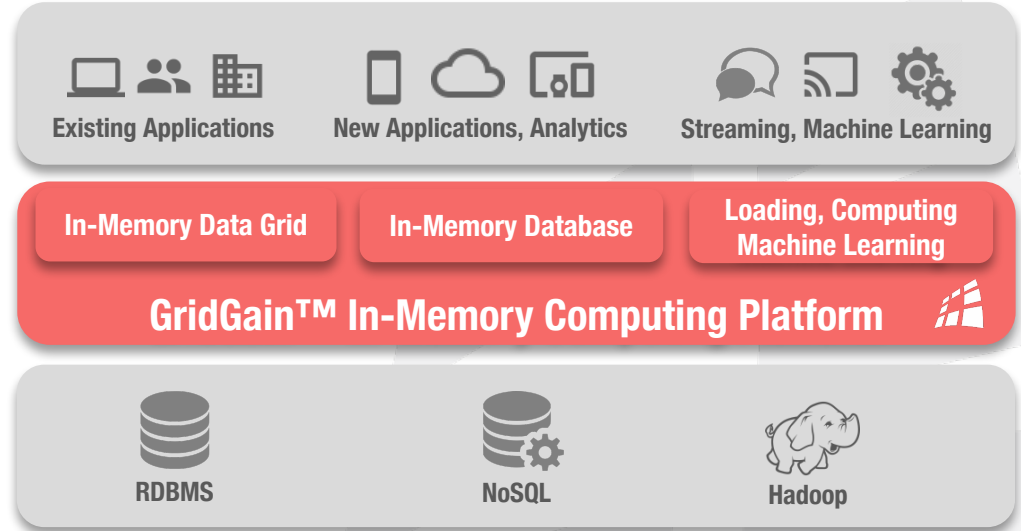
- The Investment Book of Record (IBOR), a single real-time version of the truth
- 10x faster, linear horizontal scalability
- SQL + ACID supports existing systems and skillsets
- Transactions + analytics on a single platform
- MPP for real-time calculations + analytics
- Leverage Spark to populate IBOR



Next Steps with In-Memory Computing

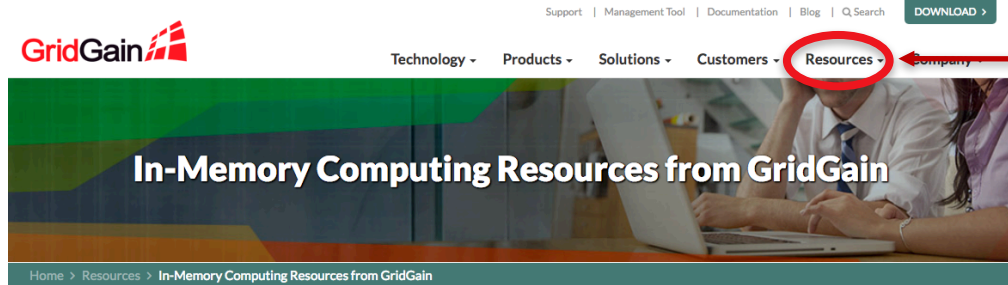
The Path Towards a New HOAP/HTAP

1. Accelerate existing customer-facing applications and services (APIs)
2. Innovate with new transactional, big data applications
3. Automate decisions with analytics, streaming analytics
4. Get ready for machine learning



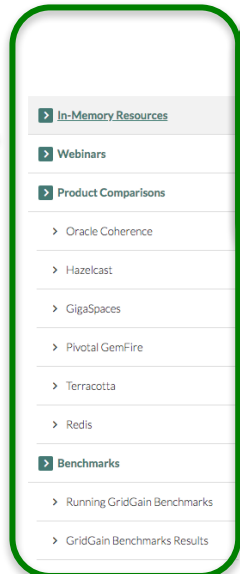
Questions?

Visit <https://www.gridgain.com/resources/in-memory-computing-resources>



Click Here!

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GridGain and Apache Ignite Information

GridGain® Systems offers a variety of in-memory computing resources which include information on the GridGain in-memory computing platform and Apache Ignite™. Use the search fields below to identify the best resources for your needs or browse our extensive library of webinars, white papers and more using the navigation to the left.

Resource Type: Search Term: Your Role:

Featured In-Memory Computing Resources



Choosing the Right In-Memory Computing Technology for Your App

Webinar

The need for real-time computing has resulted in the growth of many different in-memory computing technologies including caches, in-memory data grids, in-memory databases, streaming technologies and broader in-memory computing platforms. But what are the best technologies for each type of project? Learn about your options from one of the leading in-memory computing veterans.

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