

REPORT: PRODUCT OVERVIEW

HOLMES Puts Wipro in the Forefront of Cognitive Computing

**Wipro HOLMES Delivers Next-Generation Services
Built on Cognitive Computing Capabilities**



R "Ray" Wang
Founder and Principal Analyst

Copy Editor: Maria Shao
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TABLE OF CONTENTS

EXECUTIVE SUMMARY 3

**CATEGORY OVERVIEW: COGNITIVE COMPUTING PLATFORMS
AND SOLUTIONS. 4**

PRODUCT/SOLUTION FOOTPRINT 5

CORPORATE DIRECTION 12

RECOMMENDED SHORT LIST SCENARIOS 14

ANALYST BIO 15

ABOUT CONSTELLATION RESEARCH 16



EXECUTIVE SUMMARY

Wipro is an information technology, consulting, and outsourcing firm serving more than 900 clients from the Fortune 1000. Wipro operates in more than 175 cities worldwide and generated \$7.7 billion in revenue in its 2015-16 fiscal year. Its global workforce has more than 170,000 individuals.

The company operates in two segments: IT Services and IT Products. IT Services include consulting, development, re-engineering and maintenance, systems integration, packaged implementation, global infrastructure services, digital, business process services, and custom application design. IT Products include computing, storage, networking, security and software.

As technology services vendors gear up to tap into the \$100.7 billion Digital Transformation Services business, Wipro is quietly but steadily emerging as one of the major players. Constellation believes that service providers that have an early edge in building platforms will have the opportunity to emerge as new leaders in the marketplace.

Wipro's HOLMES platform represents a software and services offering in the cognitive computing platforms and solutions category. This artificial intelligence-based



Wipro Ltd.

- **Headquarters:** Bangalore, India
- **Founded:** December 29, 1945
- **Type:** Public company (NYSE: WIT)
- **2015-16 Revenue:** \$7.7 billion (year ended March 31, 2016)
- **No. Employees:** 170,000+
- **Website:** www.wipro.com
- **Twitter:** @wipro

Business Themes



Data to Decisions



Next-Gen Customer Experience



Technology Optimization

platform allows Wipro to provide clients with a differentiated and disruptive offering among the classical IT services firms.

Constellation's Data to Decisions framework (see Figure 1).

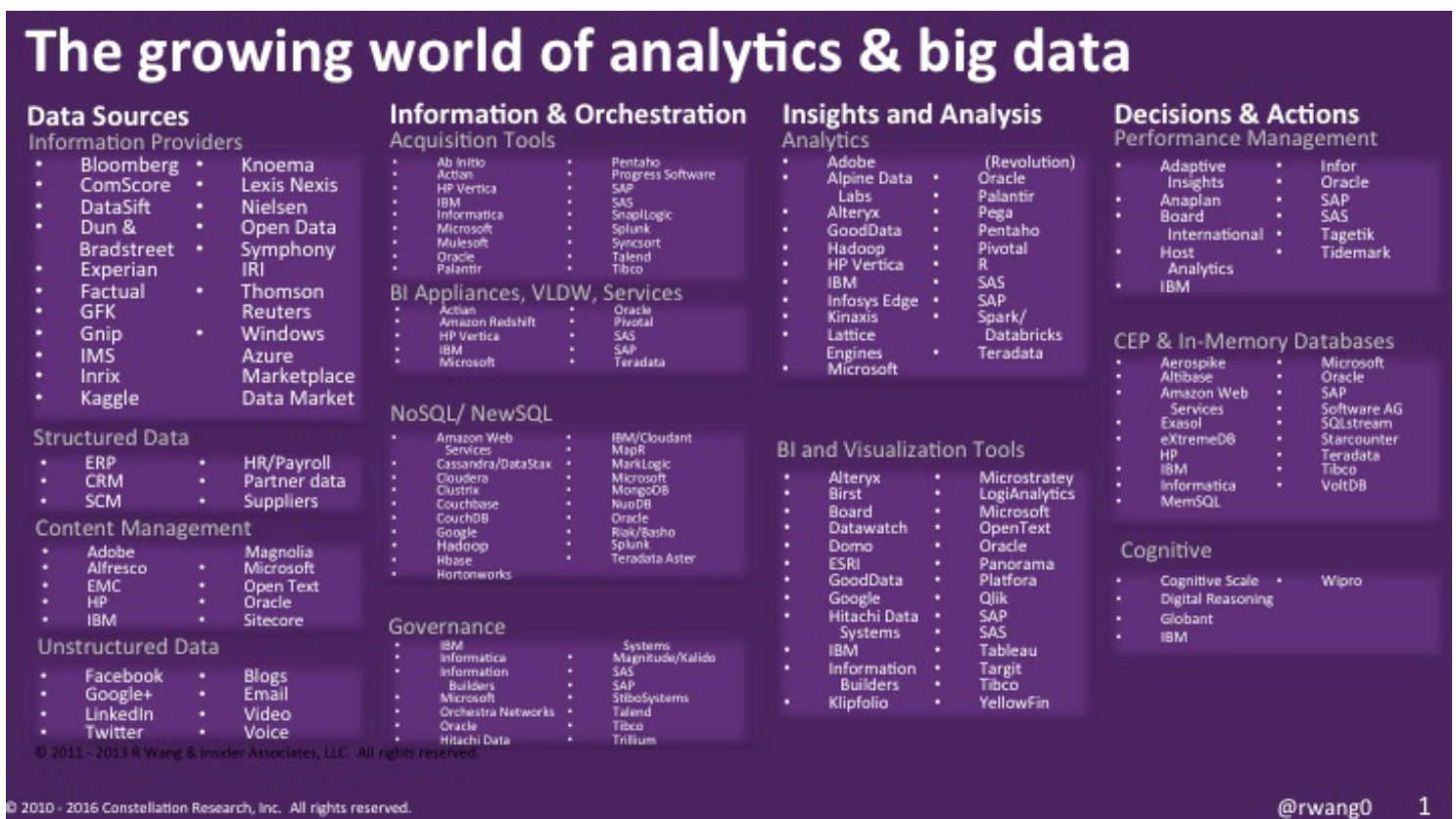
CATEGORY OVERVIEW: COGNITIVE COMPUTING PLATFORMS AND SOLUTIONS

Cognitive computing solutions are part of the Decisions and Actions category within

Data to Decisions Drives the Democratization of Insight

The goal of cognitive computing is to enable Data to Decisions, otherwise known as the enablement of data-driven decisions across the entire organization. To achieve this, organizations must prepare for the use of all

Figure 1. Cognitive Solutions Are Part of the Decisions and Actions Category of Data to Decisions



Source: Constellation Research



types of data. However, the data will come from different sources, show up in different formats, and require different approaches to process. Once the data is prepared, context is applied to provide the orchestration of information. This information aligns with upstream and downstream business processes. Over time, insight into the information is gained as algorithms are applied to identify patterns. These patterns then guide the decisions and actions based on the data (see Figure 2).

Holistic, data-informed decisions require a multi-disciplinary approach that incorporates

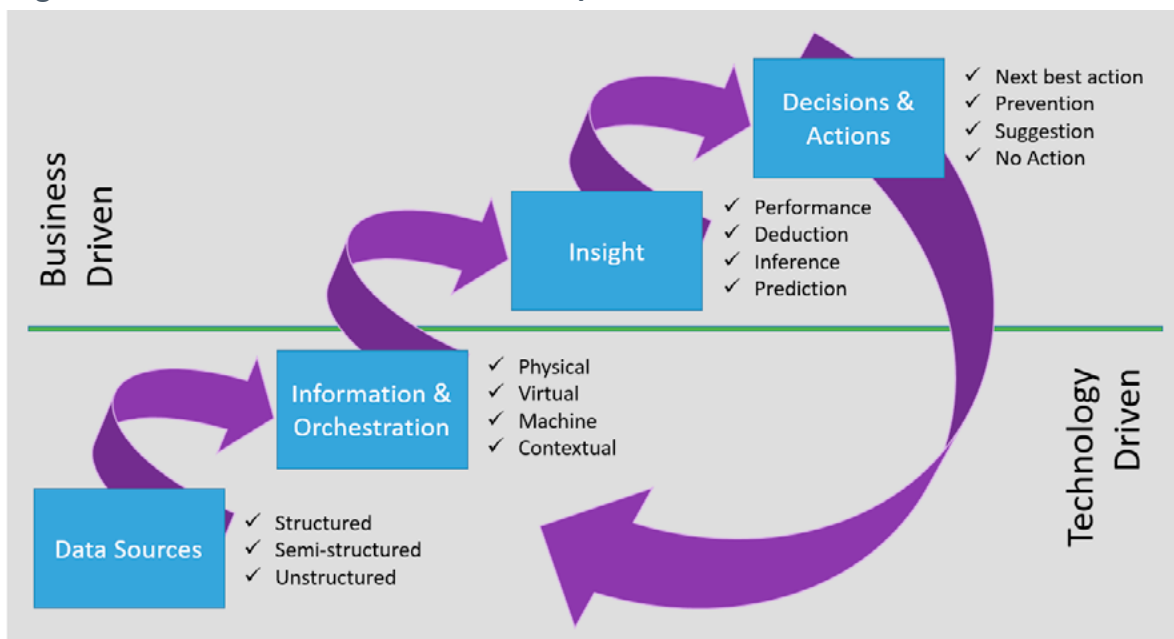
performance monitoring with traditional business intelligence technologies. Decisions and actions paired with recommendation engines drive the ability to make right-time decisions.

PRODUCT/SOLUTION FOOTPRINT

Competitive Positioning

The Wipro HOLMES Artificial Intelligence Platform provides a general-purpose cognitive computing platform for the development of artificial intelligence-based applications.

Figure 2. The Data to Decisions Pathway

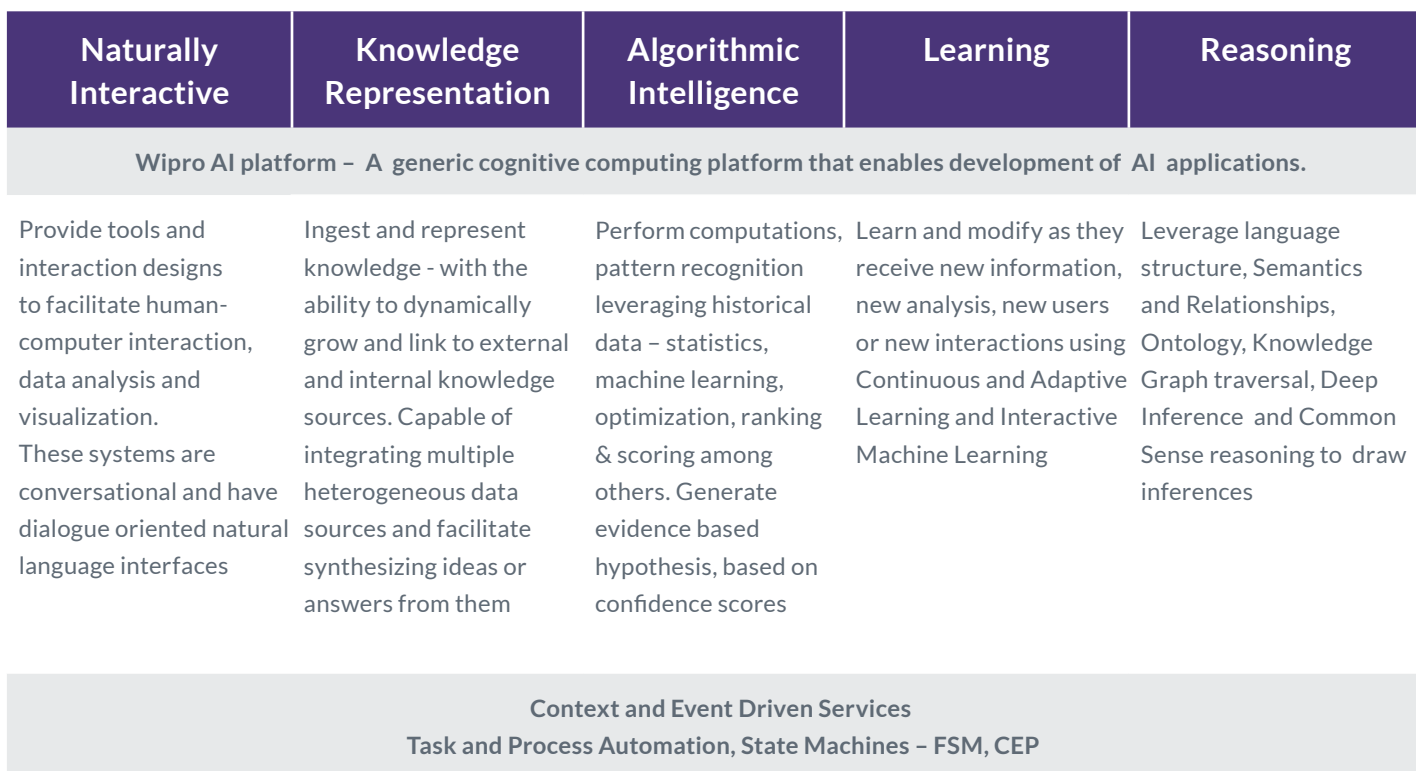


Source: Constellation Research

Cognitive computing platforms address complex situations involving high degrees of ambiguity and uncertainty. Data is both structured and unstructured. In mimicking human decision-making, these systems identify and extract contextual factors such as time, location, identity, weather, and relationship to continuously learn, recommend solutions, deliver right-time information to augment human decisions, and support subscribing systems (see Figure 3).

Constellation’s analysis: Wipro enters a burgeoning market that includes IBM’s Watson, Intel’s Saffron, and PTC’s ThingWorx. Constellation believes Wipro brings key advantages to the market, including sensory processing, sentient spaces, and the ability to visually learn. Wipro has applied key features of HOLMES to existing operations and customer pilots. The result – an ability to improve accuracy rates by 70 percent in 90 days and by 90 percent in 180 days while reducing workloads by 30 percent. Wipro’s

Figure 3. Inside the HOLMES architecture



Source: Wipro Ltd.

partnership with IBM Watson will show customers which use cases can be optimized by HOLMES versus Watson. As Wipro adds more publicly available APIs and services, it has the opportunity to open up the platform to support more partnerships.

Product Offering

HOLMES delivers five core artificial intelligence services that make use of cognitive capabilities:

- 1. Natural human interaction:** HOLMES uses conversational, dialogue-oriented, and visual recognition technologies to engage with humans. Dialogue takes advantage of natural language user interfaces and blended realities to mimic human interaction.
- 2. Knowledge representation and meaning:** The system grows through the ingestion of information and the representation of that knowledge. The system applies semantic mapping to create automated ontologies in order to automate knowledge model construction. More importantly, the system can identify and link to related internal and external data sources.
- 3. Algorithmic intelligence and hypothesis generation:** Through pattern recognition algorithms, stochastic

The Technologies

- Natural language processing, blended reality
- Semantic mapping, automated ontology and knowledge model construction
- Probabilistic algorithmic models, automated hypothesis generation and validation, scenario modeling
- Applied machine learning, interactive machine learning, adaptive and continuous machine learning
- Common sense reasoning, knowledge mining, ontology-based reasoning

computations, probabilistic models, the system takes the heavy lifting out of data science to automatically generate hypotheses and validate potential solutions. The result – rich scenario simulations and anticipatory models that can be refined over time with historical data. Techniques include machine learning, ranking and scoring, soft filtering and statistics.

- 4. Continuous and adaptive learning:** Using applied machine learning, interactive machine learning, and neural networks, HOLMES can identify relevant new information sources and expand the corpus of knowledge.
- 5. Reasoning:** Common sense reasoning provides the ability to simulate formal reasoning. Mining the knowledge graph through traversal and deep inference results in the beginnings of ontology-based reasoning.

Constellation’s analysis: Constellation believes that the platform supports the foundation required for the first wave of

cognitive computing. With logarithmic growth in data sources from the Internet of Things (IoT), advancements in synaptic neural networks, and improved algorithmic intelligence, HOLMES has the capability to deliver on core scenarios that support augmented decision making to the Holy Grail of situational awareness. HOLMES’ challenge will be to secure large data sources to refine the overall corpus of knowledge by industry, region, and domain expertise.

Data and Ontology

HOLMES provides both a development and deployment environment that allows users to manage data and ontology:

- 1. Bot Studio.** Developers create and assemble more than 20 types of bots, enabling automation of IT processes and industry-specific business processes. The studio provides a full life cycle environment for creation, assembly, monitoring, retraining and deployment of bots. Developers can curate the data, train the model and package the intelligence into bots.

2. Bot Services Framework. This container-based framework provides a scalable, secure and high availability deployment environment. Customers can deploy the framework on-premises in an enterprise network, on the private cloud, or in a public cloud environment. Users can manage versioning and dynamic deployment of services.

Constellation's analysis: HOLMES provides key tools for managing a rich set of ontologies and refined data in specific business process areas like Know Your Customer (KYC) and infrastructure and application management. The data and ontology bring experiential learning and best practices, enabling rapid development of AI applications. Early adopters prefer having a development and deployment environment over the black box model that requires a services-driven instead of software-driven approach.

Key Use Cases

While few public customer references are available, Constellation sees three high

potential cognitive computing use cases in the HOLMES pilot implementation with customers (see Figure 4 on page 11):

1. Reducing open tickets through an intelligent service desk. By ingesting a corpus of tickets, examining resolutions, studying assignments, and using other historical information, HOLMES starts by creating Machine Learning Models. The Wipro team then creates bots that can deliver natural interaction capabilities to process tickets and collaborate with help desk systems. When a ticket is processed via the natural language interface, a bot uses an automated ontology to categorize the incident and assign it to the right resource. Relevant virtual agents take the ticket and are also provided with a preferred solution or a series of suggestions to augment decision making. The results are then researched and studied from every interaction and feedback into the machine learning models.

Constellation's analysis: Through the automated ontologies, identification of

duplicate tickets for closure, and self-resolution via virtual agents, HOLMES can reduce the number of open tickets. In fact, with 500,000 tickets, HOLMES has created more than 3,500 categories, reduced transaction times by 10 percent, delivered 95 percent accuracy in ticket handling, and processed 12,000 tickets per day. Moreover, the solution can provide automatic resolution of tickets with automatic script execution. Constellation sees huge potential in reducing costs and improving productivity for service desks. Moreover, there exists an opportunity to build a dynamically self-learning knowledge base that improves accuracy and speed with each interaction.

2. Delivering virtual interviews and recruiting with the Wipro Intelligent Recruitment Agent. Using machine learning and visual recognition, HOLMES can validate behaviors and deliver on precision profiling. Non-verbal cue capture occurs during pre-interview screening. During the interview, the multi-modal human interaction can assess mood and temperament, nine basic emotional responses to questions, and

apply a cognitive load detector, which is a technique used to determine lying. Using smart furniture with multi-sensor interfaces, HOLMES can augment an interviewer's data collection for posture-based confidence measures and analyze conversations for spatial thinking and response analysis

Constellation's analysis: The integration with key sensors from Mics, HS Camera, Keyboards, GDV Sensor, Smart Pen & Paper, and Smart Furniture show the broad capabilities of HOLMES to move beyond the basics of just natural language processing seen in other cognitive systems. Organizations seeking recruitment at scale will benefit from the Wipro Intelligent Recruitment Agent capturing verbal and non-verbal cues.

3. Scaling out enterprise Know Your Customer (KYC) programs. Using the HOLMES AI platform, the KYC solution starts with knowledge extractor bots which bring together due diligence on customer information through interactive machine learning, statistical methods, and deep

learning. The investigation bots perform a cognitive search based on key requirements using semantic search and reasoning, automated ontology creation, and graph traversal and scoring. Requirements can include buyer propensity, life time value,

and credit risk assessment. Finally, the maximizing bots assist with customer onboarding using the knowledge base and deep belief networks to create best practices and act as an intelligent virtual assistant.

Figure 4. How Wipro HOLMES Artificial Intelligence Platform Can Be Used

Client	Solution	Description
Financial	KYC Automation	Cognitive solution to minimize manual efforts and deliver an automated, compliant, efficient, and cost-effective process
IT	Helpdesk Automation	Optimizing the incident management process across the organization using bots which capture user queries and Categorize, Diagnose and Recommend potential solutions
Financial	Financial Tax Form Automation	Tax Form verification automation using Machine Learning and Computer Vision
Insurance	Insurance Policy Reconciliation and Administration	Policy Reconciliation , Policy Verification, Email Processing and Chat for automated response to customer policy queries
Healthcare	Helpdesk Automation	Helpdesk Automation for supporting Level 1 IT helpdesk, addressing employee's infrastructure issues.
Healthcare	Infrastructure and support desk	HOLMES Chat Service to capture user queries and do appropriate ticket classification, diagnosis and resolution
Telecom	Product Support	Full Lifecycle Product Support, including Ticket Analysis , Work Assignment, Problem Diagnosis and Resolution
Manufacturing	Neural Net- based Data Insights from Engineering Drawings	Accurate analysis of engineering drawings to identify components and derive insights for rapid update to e-commerce portals
Telecom	RFP/RFI Assist	Automated verification of compliance for RFI/RFP response using Natural Language Processing and Intelligent Reasoning

Source: Constellation Research

Constellation's analysis: Of the front office facing use cases, KYC provides the best potential to rapidly automate and identify potential opportunities for human engagement. The ability to craft bots to automate information, information aggregation, information extraction, and verification enable organizations to move from a manual process and document-centric approach to a Data to Decisions automation model. Early interest in KYC pilots comes from some of the largest banking and telecommunications customers.

Customer References

Constellation has not received any public customer references from Wipro and its partners. However, interest in Cognitive Solutions remains great, including in internal Wipro operations seeking the scale of artificial intelligence.

Constellation's analysis: Wipro HOLMES is in a beta period with pilots for demonstration. Customers seeking new use cases should take the time to evaluate a partnership with Wipro

to jointly create new IP as well as new delivery models. A common model to engage Wipro is through go-live pilot production, with sharing in outcomes delivery. Some clients have chosen to use a shared service approach.

CORPORATE DIRECTION

Management Team

K.R. Sanjiv, Wipro's Chief Technology Officer, leads the charge on Wipro Holmes. RamPrasad K.R. is the Chief Technologist and Distinguished Fellow who heads the HOLMES platform engineering and created the vision for the HOLMES platform. Wipro has committed 40 people in core engineering and 100 resources in data and applications.

Constellation's analysis: Wipro has quietly changed its landscape and investment to build core platforms and core services that can be accessed both externally by customers and internally by delivery teams. This approach takes Wipro one step forward toward delivering on defensible IP-related revenue.

Partnerships, Alliances and Ecosystems

Wipro has cautiously approached partnerships for HOLMES. At its innovation center in Mountain View, Calif., the firm expects to build products in partnership with startups in Silicon Valley on automation and artificial intelligence technologies. The only public partnership announced to date is with IBM's Watson team.

Constellation's analysis: Wipro has made a smart decision to put its innovation center in Silicon Valley. While it does have a number of partnerships that have not been publicly announced, Constellation believes that the entry into the Silicon Valley ecosystem will help Wipro not only hone its skills in building software partnerships, but also improve the overall HOLMES offering.

Target Markets

Wipro is focused on:

1. **Global 2000 organizations seeking a digital**

advantage. Large organizations seeking a strategic advantage or in the midst of digital transformation programs.

2. **Dynamic systems automation.** HOLMES is best applied in use cases where systems can continuously ingest new data to adjust to changing conditions and when the complexity or volume of information moves beyond human scale but still requires augmented human decision making.
3. **Knowledge worker automation.** HOLMES can capture the expertise of knowledge workers for multiple types of industry processes and IT processes. HOLMES bots can participate in business processes and IT processes and assist knowledge workers to enhance productivity, accelerate processes through cognitive decision making and also respond autonomously.

Constellation's analysis: The future of Cognitive Computing will provide game changers to organizations who start early. Those who start late will have lost a

competitive advantage as time and volume of data are the key factors to achieving precise decisions. Wipro's target markets will evolve, but today these three criteria will serve the platform provider well in using software to not only optimize operations, but also identify opportunities for innovation.

RECOMMENDED SHORT LIST SCENARIOS

The future of applications and systems will come from cognitive computing. Wipro HOLMES can be considered in five application categories where systems have the ability to continuously learn from new data, provide recommendations to augment human decision-making, add learnings to the knowledge base, and use right-time information to predict or forecast opportunities and failures.

Constellation suggests these five scenarios when putting HOLMES on the short list:

1. Predictive systems. Identify patterns, suggest recommendations, learn from actions, repopulate the knowledge graph.

- 2. Digital virtual agents.** Transform user experiences through natural language and visual capabilities.
- 3. Visual computing applications.** Use sensory techniques to identify patterns and make recommendations to augment human decision-making.
- 4. Knowledge virtualization.** Take curated knowledge from knowledge databases and apply AI techniques to support a Data to Decision process.
- 5. Cognitive process automation.** Apply deterministic and probabilistic approaches to identifying IT and business process automation based on machine learning and reasoning capabilities.

ANALYST BIO

R "Ray" Wang

Founder and Principal Analyst

R "Ray" Wang is Founder, Chairman, and Principal Analyst of Constellation Research, Inc. and the author of the popular enterprise software blog, "A Software Insider's Point of View." He previously was a Founding Partner and Research Analyst for enterprise strategy at Altimeter Group.

A background in emerging business and technology trends, enterprise apps strategy, technology selection, and contract negotiations enables Wang to provide clients and readers with the bridge between business leadership and technology adoption. Wang has been recognized by the prestigious Institute of Industry Analyst Relations (IIAR) as the Analyst of the Year, and in 2009, he was recognized as one of the most important analysts for Enterprise, SMB, and Software. In 2010, Wang was recorded as part of the ARInsights Power 100 List of Industry Analysts and named one of the top Influential Leaders in the CRM Magazine 2010 Market Awards.

Wang graduated from the Johns Hopkins University with a B.A. in natural sciences and public health. His graduate training includes a master's degree from the Johns Hopkins University in health policy and management and health finance and management.

 [@RWang0](https://twitter.com/RWang0) |  www.constellationr.com/users/r-ray-wang |  www.linkedin.com/in/rwang0

ABOUT CONSTELLATION RESEARCH

Constellation Research is an award-winning, Silicon Valley-based research and advisory firm that helps organizations navigate the challenges of digital disruption through business models transformation and the judicious application of disruptive technologies. Unlike the legacy analyst firms, Constellation Research is disrupting how research is accessed, what topics are covered and how clients can partner with a research firm to achieve success. Over 350 clients have joined from an ecosystem of buyers, partners, solution providers, C-suite, boards of directors and vendor clients. Our mission is to identify, validate and share insights with our clients.

Organizational Highlights

- Named Institute of Industry Analyst Relations (IIAR) New Analyst Firm of the Year in 2011 and #1 Independent Analyst Firm for 2014 and 2015.
- Experienced research team with an average of 25 years of practitioner, management and industry experience.
- Organizers of the Constellation Connected Enterprise – an innovation summit and best practices knowledge-sharing retreat for business leaders.
- Founders of Constellation Executive Network, a membership organization for digital leaders seeking to learn from market leaders and fast followers.



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info@ConstellationR.com



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