The State of Real-Time Big Data Analytics & the Internet of Things (IoT)

January 2015 Survey Report

Executive Summary

Much of the value from the Internet of Things (IoT) will come from data, making Big Data analytics a key ingredient for capturing value in IoT initiatives. Furthermore, from real-time customer experience management to security and fraud prevention to optimizing the Smart Grid, this IoT data value will come from real-time applications.

Organizations in all industries must be able to create and capture value by analyzing the Big Data from IoT projects at three levels:

1. For an individual asset
2. For a network of assets
3. For everything (e.g., things, people, systems, and processes)

This presents a new set of analytics challenges and questions, such as what sources of data to measure and monitor? What analytics features and capabilities to invest in? What analytics benefits to expect and to achieve? How to measure and attribute these benefits to the top line and bottom line? And most importantly, how to evaluate if your organization is ready for real-time Big Data analytics?

In November of 2014, Vitria Technology, Inc. conducted a survey to gain insight into real-time Big Data analytics for IoT initiatives. The highlights from the survey are:

1. 48% of organizations have active real-time Big Data analytics projects
2. Business Intelligence (BI) solutions and stream processing / event processing solutions are the two most used solutions for IoT projects
3. Preventive maintenance using predictive analytics tops the desired benefits list. Overall predictive analytics figures in a lot of respondent's plans, with 53% indicating they are deploying or planning on deploying predictive models on real-time data.
4. Mobile devices, cell towers, and smart meters are the top three IoT data sources
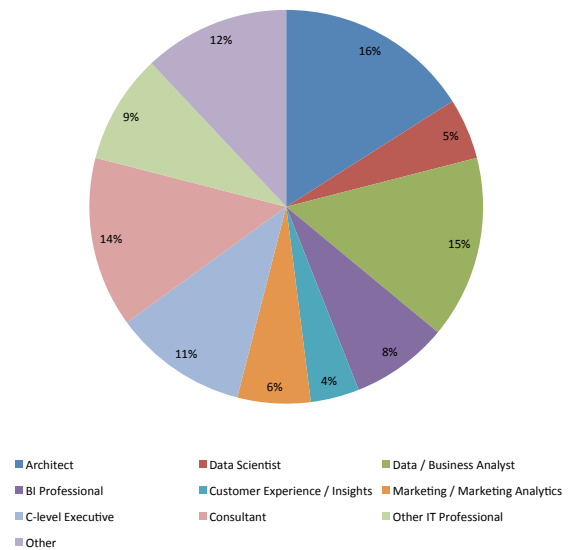
Survey Profile

About the Survey Respondents

The survey was conducted online over the span of six weeks with representatives from industries such as telecommunications, IT software / hardware / services, financial services, insurance, energy, healthcare, pharmaceuticals, government / public sector, manufacturing, supply chain, retail, transportation & logistics, education, and more.

235 respondents took part in the survey. 29% of the survey respondents were from the telecommunications industry, 26% were from the IT sector, and 14% of the respondents were from the financial services & insurance industries. 21% of the respondents were from seven industry sectors – education, energy utilities, healthcare & pharmaceuticals, government / public sector, manufacturing / supply chain, media & entertainment, and transportation & logistics.

There was no overwhelming majority in the job function / role of survey respondents, indicating that Big Data analytics is becoming more pervasive throughout the organization, wherein individuals at all levels are getting involved with Big Data analytics initiatives. 11% of the respondents identified themselves as C-level Executives. 16% of the respondents identified themselves as Architects, followed closely by Data / Business Analysts at 15%. 14% of the respondents were Consultants, suggesting that there is still a shortage of Big Data experts and/or a lack of easy-to-use tools.

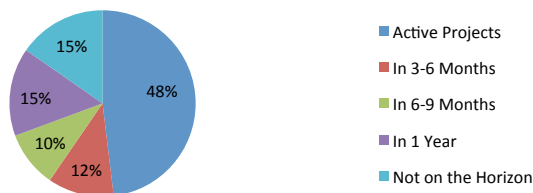**Fig. 1: Job Function / Role Segmentation of Survey Respondents**

- Architect
- Data Scientist
- Data / Business Analyst
- BI Professional
- Customer Experience / Insights
- Marketing / Marketing Analytics
- C-level Executive
- Consultant
- Other IT Professional
- Other

Four Major Key Findings

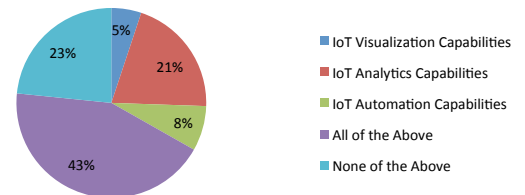## #1: Active Real-Time Big Data Analytics Projects, Says 48%

Of those surveyed, 48% (Figure 2) noted that they currently have an active real-time Big Data analytics project underway. 37% of the respondents plan to actively engage in a real-time Big Data Analytics project(s) within the next year. This is further indication that companies are seeing and recognizing the value of streaming real-time Big Data analytics.

For their IoT initiatives, 43% (Figure 3) of survey respondents are looking for building capabilities in visualization, analytics, and automation, and planning to increase subsequent resources and spending in those areas.

Fig. 3: IoT Resource Allocation

- IoT Visualization Capabilities
- IoT Analytics Capabilities
- IoT Automation Capabilities
- All of the Above
- None of the Above

Fig. 2: Level of Importance of Real-Time Big Data Analytics Projects

- Active Projects
- In 3-6 Months
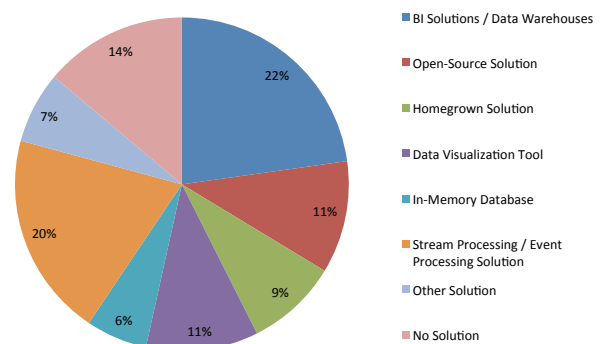- In 6-9 Months
- In 1 Year
- Not on the Horizon

#2: Business Intelligence Solutions & Stream Processing / Event Processing Solutions are the Two Most Used Solutions for IoT Projects

20% (Figure 4) of the survey respondents indicated that they are considering a stream processing / event processing solution for their IoT initiatives, further demonstrating a growing realization of the need to glean real-time insights that can be automatically acted upon. For some organizations, however, being able to consolidate data in Hadoop or a Data Warehouse, perform offline queries and analysis, and visualize the results equates to "real-time" Big Data analytics.

Hence, why 22% of respondents said that they are considering BI Solutions or Data Warehouses for real-time Big Data analytics.

Fig. 4: Real-Time Analytics Solutions

- BI Solutions / Data Warehouses
- Open-Source Solution
- Homegrown Solution
- Data Visualization Tool
- In-Memory Database
- Stream Processing / Event Processing Solution
- Other Solution
- No Solution

Four Major Key Findings (con't)

#3: Predictive Maintenance Tops Benefits List

The survey respondents were asked to weigh-in on the anticipated benefits from real-time Big Data analytics for their IoT initiatives. 18% ranked real-time Predictive Maintenance as the top benefit. Real-time Network Monitoring / Service Assurance ranked second with 17% of respondents indicating it as a major benefit. Real-time Security & Fraud Detection was third at 14%, followed by real-time Demand Response Management at 13%. The fact that real-time Predictive Maintenance topped the list suggests that organizations are not quite ready to reap the full benefits of real-time Big Data analytics (i.e., generating new revenue streams based on new opportunities) and are still more focused on asset utilization and cost reduction initiatives.

Considering that the top anticipated benefit from real-time Big Data analytics for IoT initiatives is Predictive Maintenance, it is not surprising that the majority of survey respondents said that they not only have a need to deploy predictive models on real-time data, but are also actively exploring how to do so (47%) or have already figured-out how to do so (25%).

Open-source and/or other commercial tools still seem to be the top tools and technologies (28%) that organizations are utilizing to build such predictive models for machine learning, followed by R (21%) and SAS (17%). However, it is worth noting that these tools, though they allow data scientists to build predictive models on historical aggregated data, do not support the deployment of the predictive models against streaming data for run-time prediction. Such a deployment requires porting the predictive models from the modeling environment of choice to a streaming analytics platform capable of providing real-time predictions.

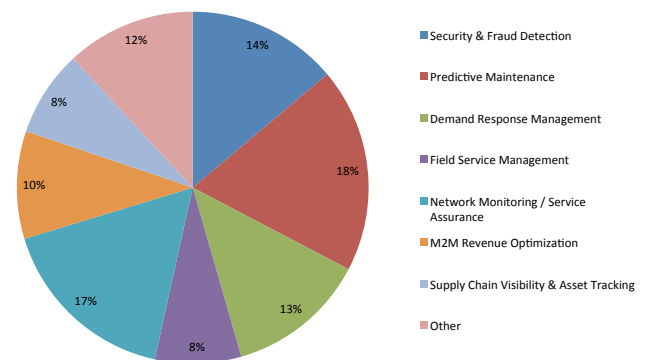**Fig. 5: Anticipated Real-Time Big Data Analytics Benefits**

- Security & Fraud Detection
- Predictive Maintenance
- Demand Response Management
- Field Service Management
- Network Monitoring / Service Assurance
- M2M Revenue Optimization
- Supply Chain Visibility & Asset Tracking
- Other

Fig. 6: Need to Deploy Predictive Models on Real-Time Data

- Yes & We Do It Already
- Yes & We Are Exploring How
- No
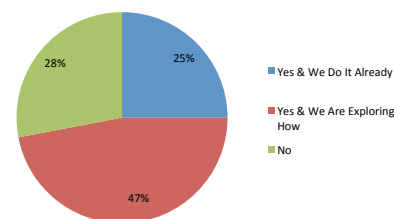
Fig. 7: Tools & Technologies to Build Predicitve Models

- R
- Apache Mahout
- Apache Spark
- SAS
- IBM SPSS
- Other Commerical / Open-Source Tool
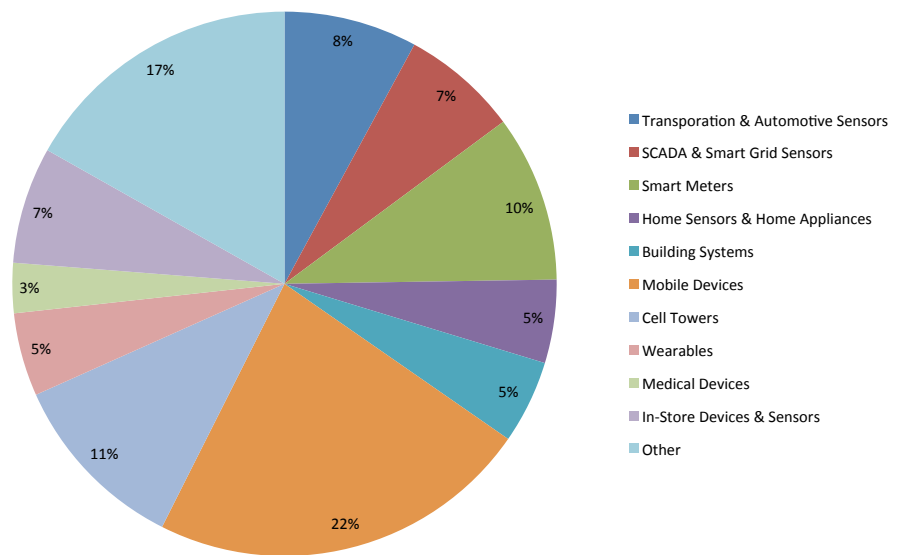- None

#4: Mobile Devices, Cell Towers, & Smart Meters are Top 3 IoT Data Sources

The survey respondents were asked to rank their top three IoT data sources. 22% of the respondents stated mobile devices as their top IoT data source, which makes sense considering the prevalence of smartphones and tablets. 11% of respondents identified cell towers and 10% identified smart meters as their top IoT data sources. As more and more devices become connected to the Internet, organizations will be pressured to ingest and correlate both streaming data with stored contextual data to give complete situational awareness.

Fig. 8: Top IoT Data Sources

Legend:
- Transporation & Automotive Sensors
- SCADA & Smart Grid Sensors
- Smart Meters
- Home Sensors & Home Appliances
- Building Systems
- Mobile Devices
- Cell Towers
- Wearables
- Medical Devices
- In-Store Devices & Sensors
- Other

Recommendations

Organizations that are looking to deliver actionable insight, in seconds or minutes, from their IoT initiatives should take stock of their analytics architecture. Consider complementing your existing BI, data warehouse, and other stored Big Data infrastructure with solutions that can ingest, enrich, analyze, predict, and act on streaming real-time Big Data.

Consider streaming real-time Big Data analytics solutions that provide advanced functionality that go well beyond what open-source solutions can provide. Evaluate solutions that also incorporate capabilities that will enable your organization to take automated action on the discovered insights – e.g., immediately send alerts and notifications or kickoff a remedial process. When rethinking your analytics infrastructure for IoT projects, look for approaches that afford a quick win around a specific business problem, but factor in being able to scale for multiple initiatives.

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Vitria provides the industry's leading streaming analytics software platform, empowering partners and customers alike to analyze streaming Big Data, complex events, and business processes in the proper context and in real-time. The result is faster, better decision-making with immediate automated actions. With a rich heritage as a technology pioneer, Vitria's award-winning streaming analytics platform provides operational intelligence for many Global 2000 companies. Vitria has customers in North America, South America, Europe, Asia, and Australia.

Contact Us: +1.877.365.5935 | www.Vitria.com