# IoT Data Analytics Report 2016

## Report Excerpts

*Based on the Information on 47 IOT Analytics Technologies and Services*

Ideya/Camrosh Market Report
First Edition, May 2016

**EXTENSIVE COVERAGE OF IOT ANALYTICS VENDORS AND PRODUCTS — 47 TOOLS AND SERVICES FEATURED**

**IOT CONCEPTS, PRODUCT APPLICATIONS, INDUSTRY FOCUS, AND MARKET TRENDS**

**DESCRIPTION OF KEY PRODUCT FEATURES**

**PRICING AND CLIENT INFORMATION FOR 47 IOT ANALYTICS PRODUCTS AND SERVICES**

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*Dear Readers,*

*Ideya Ltd. and Camrosh Ltd. are pleased to share with you the First Edition of the IOT Analytics Report. This report gives you the most comprehensive overview to date of the rapidly evolving IoT Analytics industry that is the main value driver of the emerging Internet of Things. Our report offers detailed analyses of the current key players and available tools, the IoT Analytics market dynamics, and relevant technology trends and their expected impact on the IoT market. We hope that it will give you an understanding of what matters in this area, and that it will be a helpful resource to aid your decision-making when you need to deal with the Internet of Things in your industry. This report is based on extensive market research on key features, clients, technology partners, and current pricing of the tools and services. We have attempted to keep the level of technical language to a minimum, but made sure all relevant technology areas are captured in sufficient detail in a manner that they can be fully understood by non-technical expert readers. An extensive glossary of technical terms, and references, are included in the report.*
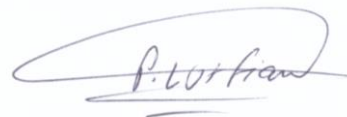
*We are aware that this report, like any report, can only give a snapshot in time of a highly dynamic and rapidly evolving area of technology in which up-to-date information is key for decision-making. We therefore would like to draw your attention to the fact that we will update latest information content of this report between full new editions on a regular basis. For access to this information please see our web pages, or get in touch with us directly.*

*We hope you will find it useful, and are looking forward to your feedback.*

*Yours sincerely,*

*Luisa Milic, Director, Ideya, Ltd.*                    *Dr. Pantea Lotfian, Director, Camrosh Ltd.*

# About the Authors

*Ideya Ltd* is a business and marketing consultancy, offering customised and innovative services to help its clients face the challenges of market disruptions and turn them into opportunities.

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Luisa gives seminars on market research methods and conducts workshops on strategic planning in the public and private sector.

*Camrosh Ltd* is a Strategic Foresight consultancy. Camrosh offers a range of services in Innovation and Technology Foresight, helping clients to create opportunities from uncertainty to innovate and grow.

*Pantea Lotfian, PhD* is the Founder and Director of Camrosh Ltd. She has over a decade of experience in working with Fortune 100 and 500 companies helping them develop and implement Open Innovation initiatives and explore current and future technologies and markets. Her interests and expertise are in exploring emerging technologies and markets, innovation portfolio management and Systems Analysis. She has worked with a number of different industries including manufacturing, engineering, chemicals, energy, oil & gas, pharmaceuticals and FMCG. Pantea is also a certified coach and works with executives, managers and teams on adapting to change with a focus on technology driven change.

Pantea is a member of the board at Pepal Ltd., a social enterprise that brings business and not for profit organisations together to address challenging development issues in Africa and Asia.

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# 1. INTRODUCTION

*EXCERPTS FROM THE IOT DATA ANALYTICS REPORT 2016, THE 1ST EDITION*

The term Internet of Things (IoT) has become increasingly prominent in the news and in discussions about the future of technologies, and essentially is a term to describe the "intersection between software and the physical world". It will soon impact practically every consumer and industry from household appliances, insurance, utilities systems, transportation, public safety, healthcare, manufacturing, and beyond. Increasingly, a large presence of Web connected platforms and technologies will produce massive volumes of data that need to be filtered, processed, analysed, and transformed into real-time intelligence that will lead to more actionable insights and smarter decision making in everyday business operations and the daily lives of consumers.

The value of connected objects or devices is in the data that they collect and the growth of the Internet of Things (IoT) ecosystem will increasingly drive companies to look for platforms and services that will help them efficiently manage and analyse the real-time data streams coming from multiple data sources to help them better predict, manage and optimise business processes and operations, improve efficiency and profitability, and resolve threats. This means that data analytics will be at the core of the IoT growth, placing significant pressure on executives to further their understanding of IoT data analytics and its ecosystem, and to set up strategies to procure and deploy adequate tools that will enable successful IoT adoption and real-time analysis and operations.

As advances in IoT technologies and the increase in device/things connectivity will continue to affect and shape enterprise big data and its applications, having the ability to transform raw device data into useful insights will also offer numerous opportunities and competitive advantage for growing companies that are looking to adapt to the changing digital landscape in a timely and efficient manner. Companies that integrate their intelligence programs directly into the IoT framework to leverage big data analytics beyond device data will gain the most, while those lacking the capability to convert newly discovered data into actionable insight, will be left behind as data resulting from connected devices (IoT) will continue to reach peak points of growth in the foreseeable future. Therefore, there is increasing pressure on businesses to find trusted and experienced analytics and big data tools and service providers to help them build their data intelligence operations to comprehensively combine streaming analytics (device data – IoT) and business intelligence, based on their specific business needs to transform their strategy from reactive to anticipatory, ensuring their adaptability and competitiveness in today's constantly changing markets.

## 1.2 RATIONALE BEHIND THIS IOT DATA ANALYTICS MARKET REPORT

We are aware that a number of market reports on the Internet of Things have been published recently, analysing the market from different angles. Providers typically focus on a few, well established tools and services, but currently, none of these reports gives a broad overview of the IoT analytics market,

its players and products. The purpose of this report is to fill this gap and provide an up-to-date, comprehensive view of the IoT analytics market and its product offerings. The report provides:

- Elaborate profiles of forty seven (47) IoT Analytics tools and services including key product features, pricing and contact information,
- Definition of important IoT Analytics concepts and key product applications,
- Pricing and client information,
- Up-to-date market trends and M&A activity in the IoT data analytics market,
- An overview of the importance and state of partnerships in the industry,
- A guide for selecting and using IoT data analytic products.

**UNDERSTAND KEY IOT AND IOT DATA ANALYTICS CONCEPTS , FUNCTIONS AND APPLICATIONS**

SEE HOW THEY CAN BE APPLIED WITHIN YOUR IOT PROJECT OR ORGANISATION

**UNDERSTAND IOT MARKET AND MARKET TRENDS**

- MARKET DYNAMICS

- TECHNOLOGY INNOVATION

- CUSTOMER POSITION

**LEARN ABOUT IOT ANALYTICS KEY PRODUCT FEATURES**

QUESTIONS TO ASK AND FACTORS TO CONSIDER WHEN SELECTING IOT ANALYTICS AND SERVICES

**PRICING, PRODUCT AND SERVICE AVAILABILITY**

LEARN ABOUT DIFFERENT PRODUCTS AND SERVICES, PRICING PLANS

**VENDOR EXPERIENCE:**

- CLIENTS SERVED

- # OF YEARS IN IOT ANALYTCS BUSINESS

- INDUSTRY FOCUS

- COMPANY SIZE

**FIGURE 1. Strategic Approach to Selecting and Employing IoT Analytics and Services**

We hope to enable companies and individuals to make effective decisions about the selection and use of IoT analytics tools and services in their businesses.

## 1.3 WHO WILL BENEFIT FROM THIS REPORT?

Information in this report can be useful to a broad range of organisations and individuals who are interested in identifying the relevant IoT data analytics products and services and the overall market trends, in particular:

- Large corporations and enterprises that want to build an ecosystem of relevant and reliable IoT tools and service suppliers to establish IoT based systems, to increase efficiencies and leverage big data to drive revenue growth and innovation in new products and services,
- Government agencies and other not for profit organisations that want to invest in updating their systems and services to take advantage of 21st century technology and offer optimum services, while keeping operational costs down,

- Small, and midsize companies and start-ups wishing to employ IoT Data Analytics and Services to maximise their current capabilities, design new business models, and gain insights from Big IoT data to support their business growth,
- Big Data and Analytics Companies looking for a comprehensive understanding of the market and new partnerships or acquisition targets for growth,
- IoT ecosystem players that wish to gain a better understanding of the competitive landscape as well as the ecosystem they operate in. These companies include Cloud-based Service Providers, IoT Application Developers and Aggregators, Data Processing and Management Companies, Managed Service and Middleware Companies, Semiconductor Companies, Telecom Infrastructure Suppliers, Embedded System Companies, Data as a Service (DaaS) Companies, Security, Privacy, and Identity Management Companies,
- Public Investment Organisations and Private Investors wishing to invest in the IoT Analytics market.

## 1.4 SCOPE OF THE REPORT

Through extensive secondary research and interviews with experts and IoT Analytics technology vendors, we collected information on forty seven (47) IoT Analytics technologies and services. We carefully examined product descriptions on the official company and product Web site and supplemented that information with product reviews, vendors' comments, and market reports in order to create a comprehensive profile for each IoT analytics tool and service.

The profiles are presented in the second part of the report, which is available as a separate document. The information in each of the profiles is laid out in a uniform and structured way to allow easy browsing and learning about each IoT Data Analytics tool in a time-efficient way.

We used the results of this research to create an in-depth analysis of the market dynamics of the IoT Analytics space.

The layout of the tool/service provider profiles is the following:

| | |
|---|---|
| ▪ **Name of the IoT Analytics Product** | Official name found on the official Web site |
| ▪ **Name of the vendor** | Name of the company providing the tool or service |
| ▪ **Contact information** | Product Website URL and Twitter Account Address, Telephone, and E-Mail Address |
| ▪ **Leadership** | Names of the Founder, CEO, and other executive leadership |
| ▪ **Geographical coverage** | Location of the Company Headquarters (HQs), offices worldwide, and market coverage. |
| ▪ **Founded** | The Year of Company Incorporation |
| ▪ **Company status** | Privately or Publically Owned |
| ▪ **Company size** | Number of employees |
| ▪ **Year of product introduction** | The year the IoT Analytics product was publicly released |
| ▪ **Tool functionality** | e.g., Connect, Manage, Analyse, Store, Secure, Integrate, etc. |
| ▪ **Industry focus** | Company/product specialisation in major industry segments (if any) |

| | |
|---|---|
| ▪ **Key product applications** | Specific product applications (e.g., Asset Management, Predictive Maintenance, Resource Optimisation, Operational Risk Management, and others) |
| ▪ **Product and service availability** | On-Premise, Edge, Cloud (IaaS, PaaS, SaaS), Mobile, Consulting, and others |
| ▪ **Product description and Key product features** | Description of key features including Data Sources, Data Preparation Features, Data Storage And Processing, Data Analysis, Data Presentation, Administration Management, Engagement/Action, Security, Reliability/Availability, Integrations, Development Tools and Customisation, Scalability, Flexibility and Client Support |
| ▪ **Product pricing, clients, and key partners** | Pricing information, published client list, and partners |

*We would like to thank the following IoT Analytics vendors for taking time to review their profiles, so our clients can get the most up-to-date information on their products and services:  **Accenture Plc** (Accenture Insight Platform), **Bright Wolf, LLC** (Bright Wolf Strandz IoT Platform), **Bit Stew Systems Inc.** (Bit Stew MIx Core™ and MIX Director™), **Falkonry Inc.** (Falkonry),  **Glassbeam Inc.** (Glassbeam Analytics), **IBM Corporation** (IBM Streams), **Measurence Inc.** (Measurence), **Microsoft Corporation** (Microsoft Azure Stream Analytics), **mnubo** (mnubo SmartObjects™ Analytics), **MongoDB, Inc.** (MongoDB), **Sensewaves** (Sensewaves Sweave), **Space Time Insight, Inc.** (Space Time Insight), **SpliceMachine Inc.** (SpliceMachine), **Teradata Corporation** (Teradata), **Tellient** (Tellient IoT Analytics), **waylay BVBA** (Waylay), **X15 Software Inc.** (X15 Software), and others.*

# 3. FEATURED IOT DATA ANALYTICS TOOLS

## 3.1 FEATURED IOT ANALYTICS PRODUCTS

In this report we have collected information about forty seven (47) IoT analytics products and services and we present their full product profiles in the Directory section of the IoT Analytics Report. TABLE 1. IoT Data Analytics Products, includes the listing of featured IoT Analytics products.

**TABLE 1. IoT Data Analytics Products (Total 47)**

| | | | |
|---|---|---|---|
| • Accenture Insights Platform | • Falkonry | • mnubo SmartObjects™ Analytics | • Sight Machine |
| • Actian Analytics Platform | • Glassbeam Analytics /Glassbeam Edge Analytics | • Mongo DB | • Space-Time Insight Suite |
| • AerVoyance IoT Analytics | | • Oracle Internet of Things Cloud Service | • SpliceMachine |
| • AGT IoT Analytics | • HPE Vertica Advanced Analytics Platform | • Oracle Edge Analytics | • Splunk |
| • Angoss Analytics | | • PLAT.ONE | • SQLstream Blaze |
| • Apama Streaming Analytics | • IBM® Watson IoT Platform Analytics Real Time Insights, | • Predixion RIOT™ | • Stemys.io |
| • Bit Stew MIx Core™ and MIX Director™ | | • PTC IoT Solutions - ThingWorx Platform / Axeda Machine Cloud | • Tellient IoT Analytics |
| • Blue Yonder Platform | • IBM Streams | | • TempoIQ |
| • Bright Wolf Strandz IoT Platform | • Quarks | • PTC IoT Solutions - KEPServerEX® | • Teradata® Listener™ and Teradata Aster® Analytics |
| • Cisco Connected Streaming Analytics | • Intel® Internet of Things (IoT) Analytics | • RapidMiner | |
| • Cisco® ParStream | • Keen IO | • SAP HANA® Cloud Platform for the IOT | • Vitria IoT Analytics Platform |
| • Datameer | • Measurence | | • Waylay |
| • DataStax | • Microsoft Azure Stream Analytics | • Senswaves Sweave | • X15 Enterprise™ |
| • Datawatch | | | |

## 3.2 HQS LOCATIONS OF IOT DATA ANALYTICS VENDORS

The majority of IoT Data Analytics vendors featured in this report have their headquarters (HQs) in the USA. Of the 47 IoT Analytics tools, 36 (77%) are offered by companies head quartered in the USA. This is followed by 3 (6%) in Canada and Germany, 2 (4%) in Switzerland, and 1 (2%) in each Belgium, France and Ireland…

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## 3.3 EMERGENCE OF DATA ANALYTICS TOOLS AND SERVICES OVER THE PAST DECADE

Over the past decade the expansion and integration of digital networks has led to an increasingly connected ecosystem of devices, sensors and people. This trend gained momentum particularly in the latter half of the decade with a sharp increase in the provision of analytics services to make sense of the increasing data volume resulting from this connectivity. The majority of the IoT Analytics tools and services featured in this report were introduced in the period from 2012 to 2015. The years 2014 and 2015, with twelve (12) and eleven (11) new products respectively, show the speed with which the market is picking up for IoT Analytics products and services. Already in the first quarter of 2016, 3 new products were launched.



**Featured IoT Analytics Products by the Year of Introduction (Period 2008 - 2016)**
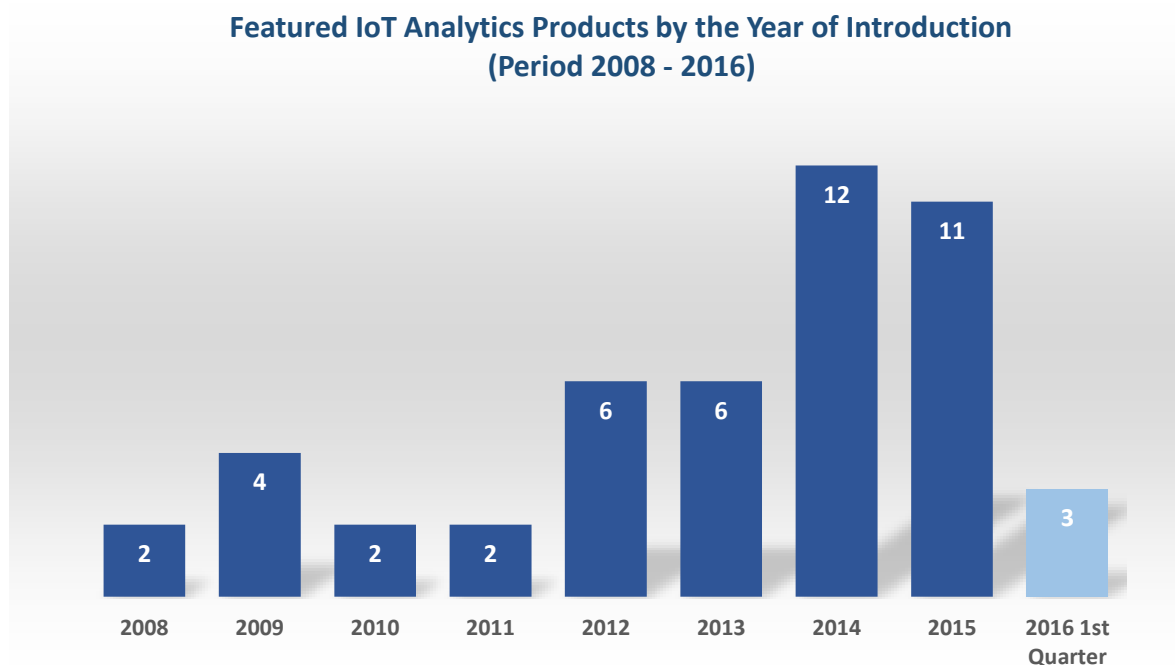
**FIGURE 3. Featured IoT Analytics Products by Year of Introduction (Period 2008-2016)**

For 2016, we expect this trend to catch up with the growth rate in the past two years. However, an increasing rate of M&As will impact this growth through consolidation of individual services into end-to-end product platforms. This will be discussed in more detail in Section 7.2.2. Merger and Acquisition Activity.

The main driver for this growth is increasing…

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# 4. THE INTERNET OF THINGS

IoT Data Analytics concepts refer to the elements that define an IOT Data Analytics process and the technologies it employs. Before addressing IoT Data Analytics specifically, a brief description of IoT and its constituent technologies is provided below to put IoT Data Analytics into perspective.

## 4.1 IOT DEFINITION AND CONCEPTS

The Internet of Things connects devices, such as everyday consumer objects, or industrial equipment to the Internet, enabling the gathering and management of information by these devices through sensors and interfaces with the real world through software. The information is processed and used to increase efficiency, enable new services, create new business models, or increase health and safety, or environmental benefits, to name just a few. There are three segments of IoT which are increasingly converging as IoT technology platforms mature and M&As change the landscape of active companies – (1) managed industrial systems comprising legacy applications and heavy equipment (M2M), (2) consumer focused devices such as connected vending machines, wearables, or smart home appliances with emphasis on applications and data collection for marketing, services and product development purposes, and (3) Enterprise IoT with emphasis on real-time integration of collected data streams for real-time decision making, based on analytics results. Many data analytics processes easily manage and analyse streams of data in either industrial systems or the consumer-focused IoT. However, there is an increasing trend in developing end-to-end services with the capability to cover both industrial settings as well as the consumer space. This trend is mainly pursued through strategic M&As that create full spectrum companies such as PTC, Inc. with the ability to service industrial as well as consumer platforms.

*IoT is a concept of connecting devices, objects and living beings to the Internet. The value is in collection and live streaming of data from the connected things and beings that is then processed and analysed. The resulting insights are used to create new products and services, design policy, improve security and safety, and many other relational outcomes that have never been possible before.*

The Industrial Internet of Things predates…

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# 5　　IOT DATA ANALYTICS

## 5.1 IOT DATA ANALYTICS DEFINITION AND CONCEPTS

IoT Data Analytics is the key to value creation in IoT. It enables organisations to analyse a mix of data (structured, semi-structured, unstructured, live streaming and historic data) collected from connected devices, objects, and from archives to generate actionable insights for improved performance and business growth.

To capture the real value of IoT, maximising the number of devices connected to the network is not enough. Both private and public organisations need to focus on improving their data capabilities (integration, automation, and analysis).

In a survey conducted by CISCO consulting services in 2014, 40% of respondents mentioned data as one of the key areas they need to improve the most to make effective use of IoT solutions, followed by business and operational processes (27%).

*IoT Data Analytics enables organisations to analyse a mix of data (structured, semi-structured, unstructured, live streaming and historic data) collected from connected devices, objects, and from archives to generate actionable insights for improved performance and business growth.*

## 5.2 IOT DATA ANALYTICS VALUE CHAIN AND ITS COMPONENTS

The IOT Data analytics value chain is a subset of the IoT value chain. The IoT value chain comprises both hardware and software players shown in FIGURE 6. The IoT Value Chain. The IoT market, despite being vast and showing considerable opportunities, is currently still fragmented and siloed with incompatibilities between …

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# 6. IOT DATA ANALYTICS BENEFITS AND APPLICATIONS

Understanding the benefits and possible applications of analytics in IoT is of utmost importance. The Internet of Things and the data it is generating, are becoming key conduits for change and transformation across businesses, government and consumers. With every object, consumer, technology and activity being connected through the IoT with the digital realm, an increasing amount of data is being created that can offer countless benefits for businesses and consumers.

To create value from the investments made in IoT systems, companies should have a clear understanding of IoT Data Analytics use cases and how they can support their business needs, goals and expected final outcomes from the IoT projects, from data collection to data analysis and insights. The value of connecting products with the Internet to create smart objects or machines comes from well-defined and thought-through processes to create meaningful products, services or interactions with the end users (e.g., consumers, operators, management) to help them make better strategic choices and decisions with a long-term impact.

In the following sections we discuss key benefits, applications and use cases of IoT Data Analytics across business functions and industry sectors.

## 6.1 IOT DATA ANALYTICS BENEFITS

Adoption of IoT Data Analytics will be driven by business needs, as it enables businesses to make faster and better decisions with the data available to them both internally and externally. By employing IoT enabled products and IoT Data Analytics, businesses and organisations can see tangible benefits and …

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## 6.2.1. IoT Data Analytics Applications/Use Cases By Business Functions

In order to create real business value from the Internet of Things by leveraging IoT data and Analytics, it is essential for companies to set up their business objectives across the organisation and identify and prioritise specific IoT use cases that support each of the organisational functions. Companies that have invested in IoT with a long-term view and business focus are well positioned to succeed in this fast evolving area.

For this report, we have selected six business functions to illustrate use cases of IoT data analytics, including Marketing, Sales, Customer Services, Product Development, Operations/Production, and Services.

| Marketing Sales Customer Services | Operations/Production | Services | Product Development |
|---|---|---|---|
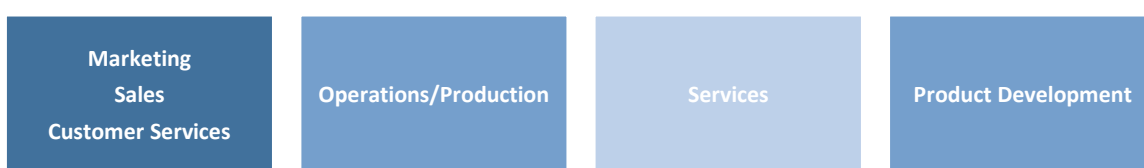
**MARKETING / SALES / CUSTOMER SERVICES**

**Goals:** To identify and meet customer needs, improve customer experience, differentiate product and service offerings, identify sales leads, develop long-term customer relationships, identify and generate new revenue streams, create new business models (e.g., pay per usage) and others.

- **Identification of Customer Insights and Opportunities**: Companies use IoT analytics to analyse usage data of IoT enabled products, device condition, and customer data to foresee customer needs, device usage and purchasing behaviour to drive sales optimisations. They can automatically trigger alerts for cross-selling and up-sell opportunities, predict future purchases, and create new models for multiple purchases. On the consumer products and services side, for example, it is easy for Oil and Gas retailers to integrate vehicle related services into cars with connected fuelling, targeting drivers with tailored offerings based on their proximity to locations. Similarly, manufacturers of smart refrigerators with IoT enabled technology, would be able to foresee when a customer's water filter is about to expire and automatically add them into a sales pipeline that market to that specific filter. Companies can create new dynamics in sales departments through providing upsell and cross-sell opportunities and enabling sales staff to focus on selling, by reducing time and effort required for data collection and account management tasks. In addition, companies can integrate ...

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## 6.2.2. IoT Data Analytics Applications/Use Cases By Industry Verticals

The IoT landscape is large and heterogeneous and many industry specific data analytics applications have emerged around IoT generated data. In industry verticals, insights generated from data analytics has to be matched with a deep understanding of industry dynamics and functional best practices. The following section of the Report illustrates some of the key examples of IoT data analytics use cases in various industry sectors including Agriculture, Energy, Utilities, Environment and Public Safety, Healthcare/Medical and Lifestyle, Wearables, Insurance, Manufacturing, Military/Defence and Cyber Security, Oil and Gas, Retail, Public Sector (e.g., Smart Cities), Smart Homes/Smart Buildings, Supply Chain, Telecommunication and Transportation.

| Agriculture | Energy | Utilities | Environment and Public Safety |
|---|---|---|---|
| Healthcare/Medical and Lifestyle | Wearables | Insurance | Manufacturing |
| Military/Defence, and Cyber Security | Oil and Gas | Retail | Public Sector (e.g., Smart Cities) |
| Smart Homes/ Smart Buildings | Telecommunication | Transportation | Supply Chain |

**AGRICULTURE**

- **USE CASES**: Real-time crop monitoring and management, soil moisture monitoring for controlled irrigation, smart usage of fertilisers and pesticides to manage and reduce environmental impact, equipment scheduling and maintenance, animal health monitoring and energy and greenhouse gas emissions management.
- **Benefits:** Reduction of environmental impact, reduced water, fertiliser and pesticide consumption, resource optimisation, livestock tracking, augmented crop productivity as well as numerous operational controls such as tracking water consumption to enable tariffing and detection of unauthorised water consumption as examples …

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Between 40% and 64% of the IoT Analytics tools are used in the top five use cases (Healthcare, Manufacturing, Public Services, Energy, Retail and Transport). The majority of the use cases …

In TABLE 2, we compare the IoT Data Analytics products based on key product functions, industry focus, key product applications and use cases.

**TABLE 2. IoT Data Analytics - Key Functions, Industry Focus and Use Cases**

| IoT Data Analytics | Key Functions | Industry Focus | Key Product Applications/ Use Cases (Examples) |
|---|---|---|---|
| ▪ **Falkonry** | Discover, Recognise, Predict, Learn | Transportation, Power Generation, Upstream Oil & Gas, Health Care (Medical Devices), Agriculture and others | Asset Condition Monitoring, Predictive Maintenance, Anomaly Detection, Early Fault Warning and Prevention, Performance Management and Optimisation, Abuse and Malfeasance Identification, Health and Safety Monitoring, Risk Analysis, Delays, and Choke-Points Detection |
| ▪ **Tellient IoT Analytics** | Access, Analyse, Visualise, Insights | Smart Home Systems, Consumer Electronics, Wearable, Technology | R&D/Product Development, Marketing, Finance, Customer Service, Supply Chain Management |

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# 7. MARKET TRENDS

In this section, we discuss and analyse the key market trends in the IoT Analytics area:

- Market Growth
  - IoT Data Analytics Market Continues to Demonstrate Significant Growth
- Market Dynamics
  - Open Source, Legacy Enterprise IT Vendors and BI Analytics Providers Entering the IoT Analytics Market
  - Rising Merger and Acquisition Activity
  - Building the Right Partnerships – The Key to IoT Success
- Technology Trends
  - Technology Trends Affecting IoT Analytics Evolution and Progress
  - Shift from Cloud Analytics to Edge Analytics
  - Use of Platform as a Service (PaaS) On The Rise
- Customer Position
  - Companies Recognising the Importance of IoT Big Data and Big Data Analytics
  - Companies Facing Challenges with Their IoT Projects
  - Security and Privacy of the Data Will Be at The Center Of Discussions

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# 8. A GUIDE TO SELECTING AND USING IOT ANALYTICS

In the following sections we offer a guide through the essential steps involved, when selecting and adopting IoT analytics. We also provide a detailed overview of IoT analytics key product features and a comparison of IoT analytics products, based on the key product features, scalability, flexibility, vendor's experience, industry focus, pricing and clients.

## 8.1 PLANNING FOR SUCCESS

Developing a data analytics strategy is critical for deriving true business value from the IoT and the volumes of data it is creating. Given the considerable investments financially, as well as in time, effort, and skills, careful considerations are necessary to realise success …

## 8.2 CONSIDERATION OF KEY FEATURES

IoT technology/platform vendors aim at delivering unique IoT data analytics solutions in terms of technologies they apply, key features, and pricing they offer. This often presents challenges to organisations that are embarking on adoption of IoT solutions for the first time, or have limited exposure to IoT technologies and are looking to expand and scale current activities. It is difficult to make an informed decision and the complexity and continuous change and emergence of new technologies increases the need for an overview of current options and new trends. Therefore, we compiled information on key features of 47 IoT analytics tools and services in this report. This report will be updated annually and we will expand the vendor list as the industry takes shape and changes. In each IoT analytics tool/service profile we have discussed the following features:

- Data Sources, Data Preparation, Data Storage & Processing, Data Analysis, Data Presentation, Administration Management, Engagement/Action Management, Security and Reliability, Integration, Development Tools and Customisations, Customer Support,

- Factors influencing purchasing decision including scalability, flexibility, vendor's years in business, vendor's industry focus, product use cases, pricing and key IoT clients.

We expect that these aspects will be important for outlining an initial IoT strategy, and for selecting specific IoT data analytics vendors. FIGURE 21. The Product Key Features and Factors Impacting the Selections Process illustrates the key product features that we discuss in the next sections…

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| Data Sources | Data Coverage |
| --- | --- |
| | Data Types |

| Data Preparation | Data Quality |
| --- | --- |
| | Data Profiling |
| | MDM |
| | Data Virtualisation |
| | Protocols for Data Collection |

| Data Processing and Storage | Technology |
| --- | --- |
| | Data Warehousing/Vertical Scale |
| | Horizontal Data Storage and Scale |
| | Data Stream Processing |
| | Data Latency |
| | Cloud Computing |
| | Query Platforms |

| Data Analysis | Technology and Methods |
| --- | --- |
| | Intelligence Deployment |
| | Type of Analytics |

| Data Presentation | Dashboard |
| --- | --- |
| | Visualisations |
| | Reporting |
| | Data Alerts |

**Administration Management, Engagement/Action, Security and Reliability/Availability**

**Integration and Development Tools and Customisations**

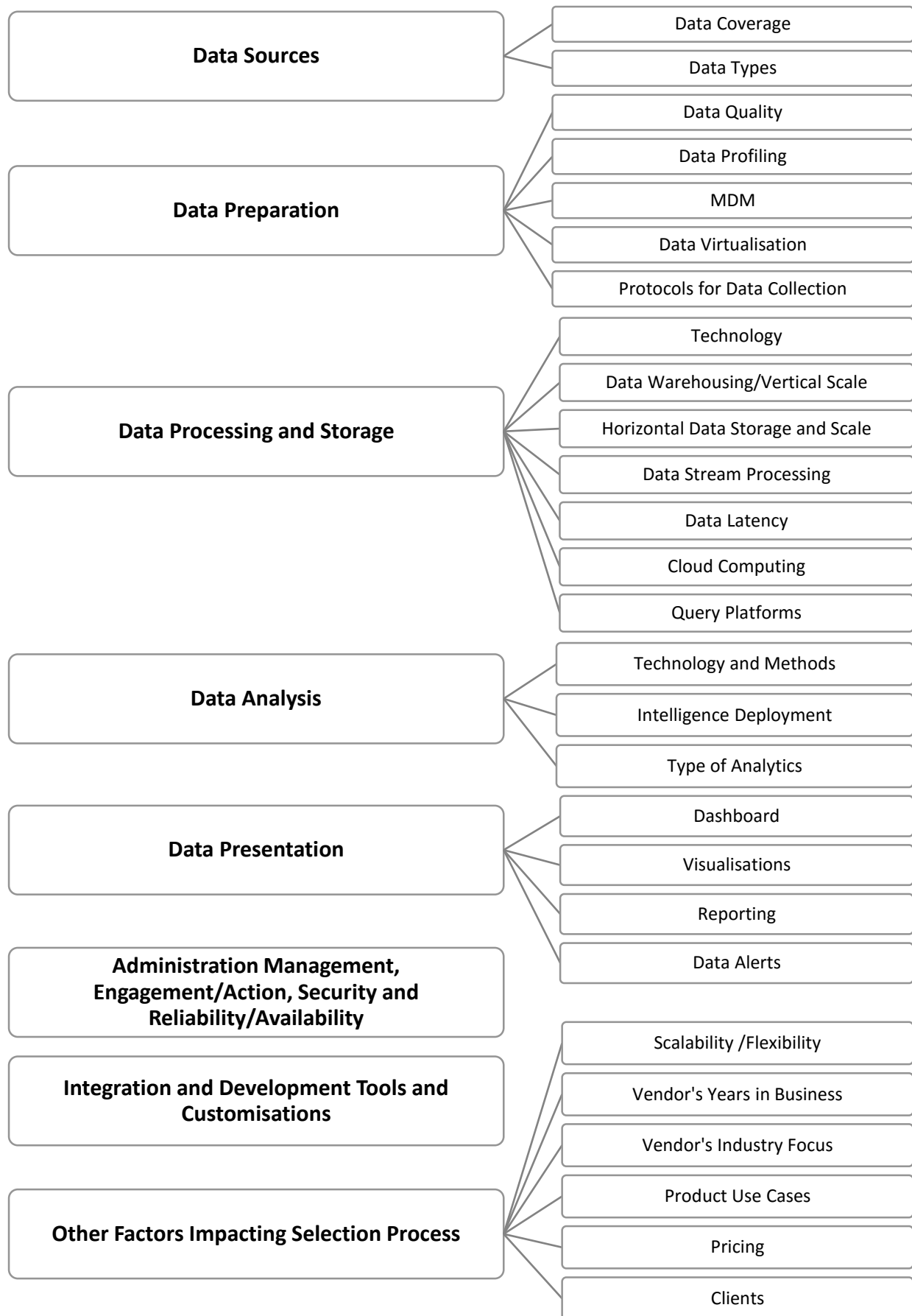| Other Factors Impacting Selection Process | Scalability /Flexibility |
| --- | --- |
| | Vendor's Years in Business |
| | Vendor's Industry Focus |
| | Product Use Cases |
| | Pricing |
| | Clients |

**FIGURE 21. The Product Key Features and Factors Impacting the Selection Process**

## 8.2.1   IoT Data Sources and Key Data Characteristics

IoT data automatically generated from real-world smart objects, with sensing, actuating, computing, and communication capabilities is currently exploding as more and more intelligent sensors and devices become connected in more applications and across more industries. The vast volume of data generated is coming from millions of sensors and sensor-enabled devices making IoT data more dynamic, heterogeneous, imperfect, unprocessed, unstructured, and real-time than typical business data, and it therefore requires more sophisticated, IoT specific, analytics to make it meaningful…

### 8.2.1.1   DATA VARIETY

IoT systems entail a variety of endpoints that gather and transmit data. This heterogeneous data is captured in a wide range of relational and non-relational formats, including structured, unstructured, and semi-structured data from diverse application domains. Data sources can be units of endpoints, such as sensors, machines, engines, medical devices, security cameras or come from aggregation nodes where data from units of endpoints are aggregated, for example a factory, buildings, a farm, or vehicles. Furthermore, data is often transmitted in a variety of protocols, including LAN, DNP3, ZigBee and SCADA. A robust IoT analytics system would have the ability to process and analyse large volumes of data in various types and formats: …

*Excerpts only - to read more, please order the full IoT Data Analytics Report or visit our publication page at   http://www.camrosh.com/publications/   or   http://ideya.eu.com/reports_iot.html   for more information.*

### 8.2.1.5   PRODUCT COMPARISON BASED ON DATA COVERAGE

In TABLE 6, we compare IoT Data Analytics products based on data types and formats.

**TABLE 6: IoT Data Analytics Product Comparisons by Data Formats and Types**

| Product/Company Information | Data Types and Formats |
|---|---|
| ▪ **Falkonry** | Data Formats: time series numerical and categorical, traditional transaction data or structured data, semi-structured and unstructured data; Data Types: activity data, sensor data, operation log data, and imported data from SCADA, Operational Historians, and Splunk. |
| ▪ **Tellient IoT Analytics** | Data Formats: any data source and external data types (structured, semi-structured, not structured data); Data Types: aggregates data from multiple sources including sensor data, document collections (text), video, audio, and image files, and others. |

*Excerpts only - to read more, please order the full IoT Data Analytics Report or visit our publication page at   http://www.camrosh.com/publications/   or   http://ideya.eu.com/reports_iot.html   for more information.*

### 8.2.3.9   PRODUCT COMPARISON BASED ON DATA STORAGE AND PROCESSING

In TABLE 7, we compare the IoT Big Data Analytics products based on the key data storage and processing features.

**TABLE 7. IoT Data Analytics Product Comparison Based on the Key Data Storage and Processing Features – List of IoT Data Analytics Tools and Services**

| Product Name | Data Storage and Processing |
|---|---|
| ▪ **Falkonry** | Data Storage: HDFS and NoSQL<br><br>Cloud Computing: Support for Microsoft Azure Cloud, Oracle Cloud, Google Cloud Platform, and AWS for both public and virtual private deployments<br><br>Data Processing: its Spark integration and use of distributed machine learning and signal processing algorithms enables massive real-time parallel processing, critical for low response time of industrial operations. Its multi-source processing can bring together data from multiple data sources and adaptively combine the data into analytical insights. Processing is separate for learning from real-time classification and can be performed in separate compute environments.<br><br>Data Latency: instantaneously and continuously performs queries and  analysis of IoT data, latency in seconds |
| ▪ **Tellient** | Technology:  Tellient Analytics Engine, Analytics Client Core, a custom protobuf implementation for collecting event data, small footprint that could be embedded directly in AllJoyn clients, thick or thin, depending on the requirement.<br><br>Cloud Computing: :  on-demand computing, that leverages a network of remote servers hosted on the Internet to store, manage and process data. |

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## 8.2.4   DATA ANALYSIS

IoT data analysis, through analytics tools, is the key to unlocking the potential of IoT data that is collected by sensors and other connected devices, as only the insights derived from the data will lead to informed action and thus can generate added value.

The power of streaming, primary IoT data, such as real-time sensor, weather, or energy use data can be augmented through combining it with other types of data, such as text, sound, image, video, and others to extract more value by creating context to immediately …

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6.2.4.3 PRODUCT COMPARISON BASED ON DATA ANALYSIS FEATURES

In TABLE 8, we compare the IoT Big Data Analytics products based on technology and methods, deployment options, and analytics types.

**TABLE 8. IoT Data Analytics Product Comparison Based on Data Analysis Features**

| Product Name | Technology and Methods | Intelligence Deployment (End Point, Gateway, Cloud) | Type of Analytics: Descriptive Analytics | Type of Analytics: Diagnostic Analytics | Type of Analytics: Predictive Analytics | Type of Analytics: Prescriptive Analytics |
|---|---|---|---|---|---|---|
| ▪ Falkonry | Artificial Intelligence/Machine Learning, Anomaly Detection, Basic Condition Identification, Root Cause Analysis, Advanced Condition Prediction, Event Detection | Edge Analytics, Cloud Analytics, On Premise | y | y | y | |
| ▪ Tellient IoT Analytics | Basic Statistic, Anomaly detection, and others | Cloud Analytics | y | | y | y |

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## 8.2.5  DATA PRESENTATION

Data presentation tools include dashboards, reports, alerts, portals, consoles, and data visualisations, such as maps, graphs, and charts. Some IoT analytics platforms do not offer their own data presentation tools and seamless integration with third party visualisation tools, such as Tableau, Informatica, Datawatch, and others to display data and analytics results in user-preferred formats is offered by a number of platform providers…

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### 8.2.5.4  PRODUCT COMPARISON BASED ON DATA PRESENTATION FEATURES

In TABLE 9, we compare the IoT Analytics products, based on the key data preparation features including Dashboards, Visualisations, Reports and Alerts.

**TABLE 9. IoT Data Analytics Product Comparison Based on Key Data Presentation Features: Dashboards, Visualisations, Reports and Alerts**

| Product Name | Dashboards | Visualisations | Reports | Alerts |
|---|---|---|---|---|
| ▪ **Falkonry** | Standard Dashboard | Provides dynamic charts visualisation of source data | Dashboard Reporting | y |
| ▪ **Tellient IoT Analytics** | Customisable Dashboards | Offers a range of graphs and charts including line chart, bar chats, doughnut charts, maps, and others | Dashboard Reporting, Standard Report (with interval set by a user) | y |

### 8.2.6.5  PRODUCT COMPARISON BASED ON ADMINISTRATION MANAGEMENT, ENGAGEMENT, SECURITY, AND RELIABILITY/AVAILABILITY FEATURES

In TABLE 10, we compare the IoT Data Analytics products based on administration management, engagement, security, and reliability/availability features.

**TABLE 10. IoT Data Analytics Product Comparison Based on Administration Management, Engagement, Security, and Reliability/Availability Features**

| Product | Administration Management | Engagement/Action | Security | Reliability/ Availability |
|---|---|---|---|---|
| ▪ **Falkonry** | Through its cloud offering, support single and team user accounts. The owners of a team account have a full control over other users' access to the account and can invite new users, delete users from the account, grant and remove ownership privileges, track invitation status, view and edit billing information, view payment history, and close the account | Available through external systems (e.g., Splunk, ThingWorx) | HTTP authorisation, Google and LinkedIn authentication, Secure Sockets Layer (SSL), and others | **Reliability:** By separating unknown patterns from previously confirmed patterns, Falkonry heavily reduces false positive reporting down to single digits. Even with very few verification examples, Falkonry is able to produce 50 to 90% recall across test/real occurrences, which produces a highly effective prediction system. Falkonry separately reports novel conditions from recognising validated patterns, whereby it can streamline model improvement while at the same time keeping operations humming along without too many false positives. **Availability**: Falkonry's Spark-based architecture is designed to ensure high availability during monitoring. Monitoring is not affected at all even through Falkonry software upgrades. |
| ▪ **Tellient IoT Analytics** | Administration Management: supports unlimited number of users | | Private cloud built-in security, flexible connectivity and protocol support over HTTP with SSL security and MQTT, enabled via ConnectIQ. | |

*Excerpts only - for more detailed description of each of the key product features accompanied with a sample list of companies offering a particular feature, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

## 8.2.7   INTEGRATION, DEVELOPMENT TOOLS AND CUSTOMISATION

As described in the previous sections, the value of IoT lies in the timely assembly and analysis of data from various sources including legacy systems, business assets streaming data, geospatial data and any other relevant data set. Providing the capability to access and interact with data in different formats and locations is what integration and application development in IoT is about.

When system integrators incorporate application and data analytics software into generic products a new service or industry specific solution is created. In combination with connectivity provided by network providers enabling …

*Excerpts only - for more detailed description of each of the key product features accompanied with a sample list of companies offering a particular feature, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

### 6.2.5.3   PRODUCT COMPARISON BASED ON INTEGRATION AND DEVELOPMENT CAPABILITIES

In TABLE 11, we compare the IoT Data Analytics products based on their integration and development capabilities.

**TABLE 11. IoT Data Analytics Product Comparison Based on Integration and Development Capabilities**

| Product | Integration | Development Tools and Customisation |
|---|---|---|
| ▪ **Falkonry** | Through simple APIs, Falkonry can be rapidly embedded into IoT application environments such as Azure IoT Hub, MQTT, Splunk, SAP HANA, Kepware, ThingWorx, and others. | Falkonry is a ready to use service without requiring lengthy implementation or special programming. |
| ▪ **Tellient IoT Analytics** | Tellient IoT Analytics can receive data directly from the device via a simple code integration, or cloud-to-cloud. It offers an optional modifiable device client library. Data feed is available for integration into third party systems or BI tools depending on client requirements | NA |

*Excerpts only - for more detailed description of each of the key product features accompanied with a sample list of companies offering a particular feature, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

## 8.3 OTHER FACTORS IMPACTING THE SELECTION PROCESS

### 8.3.1   SCALABILITY

The scalability of IoT applications refers to the ability to add new devices, services and functions for customers without negatively affecting the quality of existing services. Adding new operations and supporting new devices …

*Excerpts only - for more detailed description of each of the key product features accompanied with a sample list of companies offering a particular feature, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

#### 8.3.2.1   PRODUCT COMPARISON BASED ON PRODUCT SCALABILITY AND FLEXIBILITY

In TABLE 12, we compare IoT Data Analytics products based on product scalability and flexibility.

**TABLE 12. IoT Data Analytics Product Comparison Based on Product Scalability and Flexibility**

| Product | Scalability | Flexibility |
|---|---|---|
| ▪ **Falkonry** | ▪ Horizontal Scalability for processing purposes<br>▪ Falkonry is built to deliver big data fast, and easily scales out or down. Falkonry's technology has been designed from the ground up to be highly scalable and real-time in a way that keeps up with the level of usage. Falkonry rapidly learns prediction models for hidden conditions from existing data sources and scales to a large number of inputs and independently operated system.<br>▪ Easy deployment allowing users to connect to their data sources without the need for data science expertise, with fast self-configuration (in minutes), and easily scales across large teams and fleets. | Deploys on several operating systems easy to perform installation |
| ▪ **Tellient IoT Analytics** | Supports unlimited number of points | With cloud computing, companies can asily scale up as their computing needs increase and then scale down again as demand decrease, providing flexibility and elasticity. |

*Excerpts only - for more detailed description of each of the key product features accompanied with a sample list of companies offering a particular feature, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

### 8.3.4  PRICING AND CLIENTS

Coming up with exact pricing for IoT analytics products is a complex process. The overall cost of software may include the cost of software licences, subscription fees, cost for updates, upgrade, training, customisation, hardware, maintenance, support and other related services.

Based on our research, we have identified the following pricing models:

- Free (pilot/trial, introductory offer)
- Free Commercial Open Source: the customer can acquire software free without having to pay an upfront licence fee. Customers are responsible for the ongoing maintenance, upgrade, customisation and troubleshooting of the applications …

*Excerpts only - for more detailed information on pricing for IoT analytics products and client information, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*

**TABLE 13. Pricing and Sample Client List (as of April 2016)**

| IoT Data Analytics (Alphabetical Order) | Pricing Information | Key Clients |
|---|---|---|
| **Falkonry** | Falkonry is licensed for private deployments. Falkonry Service starts at $5,000/month (1,000 tags) and Service Cloud options are available by signing up at service.falkonry.io. | Fortune 50 companies |
| **Tellient IoT Analytics** | Flat pricing regardless of number of dashboard users. Tellient offers Insight as a Service model with cost tied to the amount of data processed so clients pay only for what they use. | Specific clients not disclosed. Majority of Tellient clients include chip manufacturers and mobile carriers in the IoT space. |

*Excerpts only - for more detailed information on pricing for IoT analytics products and client information, please order the full IoT Data Analytics Report or visit our publication page http://www.camrosh.com/publications/ or http://ideya.eu.com/reports_iot.html for more information.*
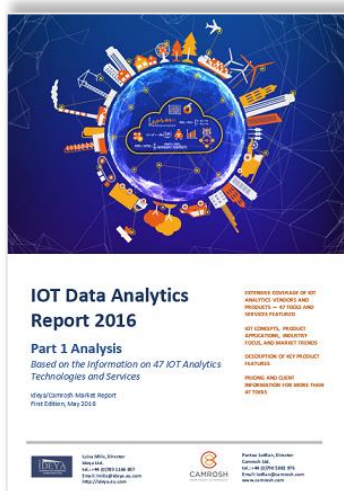
## IoT Data Analytics Report 2016

*IoT Data Analytics Report – Part 1: Analysis*

*IoT Data Analytics Report – Part 2: Directory*

**Content:** *Profiles of 47 IOT Analytics Products and Services*

## 2. PROFILES OF IOT DATA ANALYTICS PRODUCTS AND SERVICES

In this section we provide information on IoT Data Analytics products that we compiled from December 2015 - May 2016. We carefully examined tool descriptions on the official company and product Web site and supplemented that information with product reviews, market reports and vendors' comments in order to create a comprehensive profile for each IoT Data Analytics product. Information in the profiles is laid out in a uniform and structured way to support easy browsing and learning about the IoT Data Analytics products. We include links to the tool Websites and contact information, so that readers can easily access the latest information and obtain the most recent tool updates.

## SAMPLE PROFILE



## Tellient IoT Analytics

| | |
|---|---|
| **Company Name:** | Tellient |
| **Company Type:** | Private |
| **Number of Employees:** | 11-50 |
| **HQs/Country:** | United States |
| **Founded:** | 2014 |
| **Website:** | www.tellient.com |
| **Twitter:** | https://twitter.com/tellient |
| | |
| **Introduction of the tool:** | 2014 |
| **Areas:** | Access, Analyse, Visualise, Insights |
| | |
| **Management:** | Tristan Barnum, CMO, Founder |
| | Shawn Conahan, CEO, Founder |

**Contact:**                    Tellient, 101 W. Broadway, 2nd Floor, San Diego, CA 92101, United States
                                Tel: +1 858-256-6426

**Offices:**                    **Americas Region**: San Diego (CA)
**Email:**                      **General Contact:** info@tellient.com
                                **Direct Contact:** Tristan Barnum, CMO, Founder, email: tristan@tellient.com

**Overview**

Tellient is a big data analytics start up that offers analytics services for the Internet of Things (IoT). Focusing on consumer IoT, Tellient allows manufacturers to understand how their connected devices are being used by consumers and allowing business intelligence to be gleaned from interactions among IoT devices. Tellient offers a scalable, extensible and cost-effective platform that works with the thinnest of clients and the most resource-constrained devices.

Tellient provides an embedded client and a robust analytics solution specifically for connected devices. Its solution includes support for unlimited users and data points with easily customisable visualisation and platform agnostic support. Leveraging these tools allows client's to better understand how their products are used and drive future product development.

Tellient was the first IoT analytics company to join AllSeen Alliance, a group of innovative companies that joined forces to make it easier to connect all devices in homes and businesses, using one common platform that is part of an open source software framework, called AlllJoyn™. Through code that is available today and updated through the contribution by members and the open source community, AllJoyn acts as a universal translator for objects and devices to interact regardless of brand and other infrastructure considerations. Some of the biggest names in technology, such as IE Microsoft, Sharp, Qualcomm have joined AllSeen Alliance to work together with other companies on getting devices connected and enabling them to operate seamlessly with one another. By contributing open source code to AllJoyn, Tellient's Analytics for IOT technology is interoperable with any object or device maker using the AllJoyn framework.

The Tellient IoTA thin client integrates at the device OS (HLOS or RTOS) level and is extensible by device manufacturer. Device analytics data is published to Tellient cloud based system. Data and metadata are combined with aggregated external data (e.g., temperature, time, seismic data, traffic, or other open data feeds). The resulting output is real-time actionable data, usable for marketing, R&D/product development, finance, customer service, supply chain management or 3rd party systems and devices.

**Key Product Applications/Use Cases:**
R&D/Product Development, Marketing, Finance, Customer Service, Supply Chain Management

**Industry Focus**:
Smart Home Systems, Consumer Electronics, Wearable, Technology

**Product and Services Availability:**
Any platform and device (Desktop, IPad, Mobile), Cloud

**Key Product Features:**
▪ *Data Sources*
    o **Data Formats:** any data source and external data types (structured, semi-structured, not structured data),
    o **Data Types:** aggregates data from multiple sources including sensor data, document collections (text), and others.

▪ *Data Preparation*
    o **Data Ingestions:** data is received directly from the device via a simple code integration, or cloud-to-cloud,
    o **Data Enhancement:** data and metadata are combined with aggregated external data, such as temperature, time, seismic data, traffic, and other open data feeds.

- o **Protocols for Data Collection**: completely technology agnostics regardless of operating system or whether it uses CoAP, MQTT, or HTTPS.

- ▪ *Data Storage and Processing*
  - o **Technology:** Tellient employs various technologies including Tellient Analytics Engine, Analytics Client Core, a custom protobuf implementation for collecting event data, small footprint that could be embedded directly in AllJoyn clients, thick or thin, depending on the requirement.
  - o *Cloud Computing:* Tellient offers on-demand computing, that leverages a network of remote servers hosted on the Internet, to store, manage and process data.

- ▪ *Data Analysis*
  - o *Technology and Methods*: leverages various methods including Basic Statistics, Anomaly detection, Predictive modelling, and others.
  - o **Intelligence Deployment** *(End-Point, Gateway, Cloud):* Cloud Based Analytics
  - o **Analytics Types:**
    - ▪ **Descriptive Analytics:** provides insights into past business events and performance by analysing historical and real-time data, including performance analysis, correlations, historical/trend analysis, and others.
    - ▪ **Predictive Analytics:** predicts future probabilities and trends and find relationships in data, not instantly apparent with traditional analysis.
    - ▪ **Prescriptive Analytics:** include optimisation techniques based on large data sets, business rules (information on constraints), and mathematical models to ultimately produce recommendations for how to respond to likely events.

- ▪ *Data Presentation*
  - o **Customisable Dashboards:** allowing customisation of data views by individual user based on their needs. The key tabs and functions in the dashboard include: Overview, Revenue, Segmentation, Geo, Apps, Relationships, Marketplace and Activity.
  - o **Data Visualisations:** offers a range of graphs and charts including line chart, bar chats, doughnut charts, maps, and others,
  - o **Data Alerts:** automated threshold data alert informing users about anomalies,
  - o **Reporting:** scheduled reporting allowing users to set reporting intervals and publishing options delivered via email. Device analytics data is published to Tellient cloud based system.
  - o **Data Export:** enables users to export their live feeds to any other application to build a complete view of their ecosystem.

- ▪ *Administration Management, Engagement/Action, Security and Reliability/Availability*
  - o **Administration Management:** supports unlimited number of users.
  - o **Security and Reliability:** depend on client's SLAs. Some of the Tellient's largest clients demand hosting the solution in their own data centres, in which case, they are responsible for securing and monitoring the solution. Clients that choose Tellient's own cloud infrastructure are provided Carrier Grade security and reliability.

- ▪ *Integration*
  - o **API Integration:** seamless integration with third party systems or business intelligence (BI) tools,

- ▪ *Development Tools and Customisation*
  - o Tellient IoT Analytics can receive data directly from the device via a simple code integration, or cloud-to-cloud. It offers optional modifiable device client library. Data feed is available for integration into third party systems or BI tools depending on client requirements

- ▪ *Scalability and Flexibility*
  - o Supports an unlimited number of end points
  - o With cloud computing, companies can easily scale up as their computing needs increase and then scale down again as demands decrease, providing flexibility and elasticity.

- ▪ *Customer Support*: Email and telephone client support available.
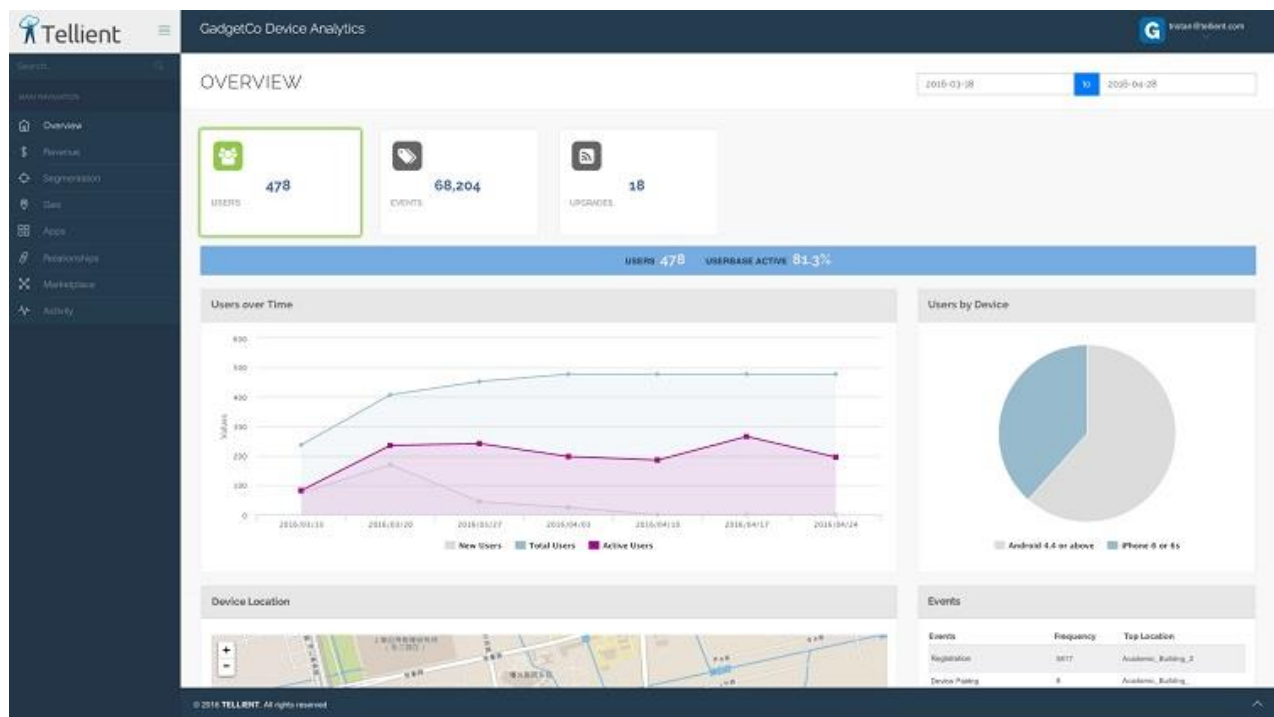
**Screen Capture 1: Tellient Dashboard – Overview**

**Clients:**
Specific clients not disclosed. The majority of Tellient clients include chip manufacturers and mobile carriers in the IoT space.

**Partners:**
Joined AllSeen Alliance for promoting the IoT interoperability

**Pricing**:
Flat pricing regardless of number of dashboard users. Tellient offers Insight as a Service model with cost tied to the amount of data processed so clients pay only for what they use.

**Geographic Coverage:**
Worldwide

**Case Studies:**
**Tellient Guide to IoT Analytics:** http://cdn2.hubspot.net/hub/435009/file-2074785862-pdf/Tellient-Guide-to-IoT-Analytics.pdf?t=1435098942449
**Keynote presentation from the AllSeen Summit "Analytics for the Internet of Things",** presented by Shawn Conahan, CEO at Tellient: http://www.slideshare.net/tristanbarnum/allseen-summit-keynote-by-tellients-shawn-conhahan

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