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REPORT: VENDOR PROFILE

C3 IoT: A NextGen Platform for NextGen Applications

C3 IoT Enables Enterprises to Build Artificial Intelligence and Internet of Things Applications

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EXECUTIVE SUMMARY

The cloud era warrants a new approach to how enterprises build, consume and operate software. In the enterprise, automation is often scattered between operational and organizational siloes, some of them on-premises, some of them in the cloud. This disconnection looms over CxOs who know that their enterprises will need to start building their own software in the near future.

C3 IoT is a platform that enables enterprises to connect their wide-ranging data sources and build their own Artificial Intelligence (AI) and Internet of Things (IoT) applications. C3 IoT takes a data-first approach, allowing enterprises to bring together all data on a cloud-based system. Additionally, apps built on C3 IoT can be built with little or no code.

Further differentiators include a metadata-based type system that allows for fast prototyping and consideration of vertical differences that can potentially accelerate time to market. On top of its enterprise data repository, C3 IoT enables both insights and transactional applications to be developed by customers without technical savvy in a low- code and no-code approach. C3 IoT also builds apps available for purchase.

C3 IoT

- **Headquarters:** Redwood City, Calif.
- **Founded:** 2009
- **Type:** Privately held
- **2016 Revenue:** N.A.
- **No. Employees:** 150
- **Website:** http://c3iot.com
- **Twitter:** @c3iot

TYPICAL CUSTOMER PROFILE

- **Revenue:** At least $1 billion a year
- **Number of employees:** More than 10,000
- **Geography:** Global
- **Industries:** Can be used by many industries
- **Roles:** Chief Information Officer, Chief Technology Officer, Chief Revenue Officer, Chief Customer Officer, Chief Service Officer, Chief Human Resources Officer, Chief People Officer

Business Themes

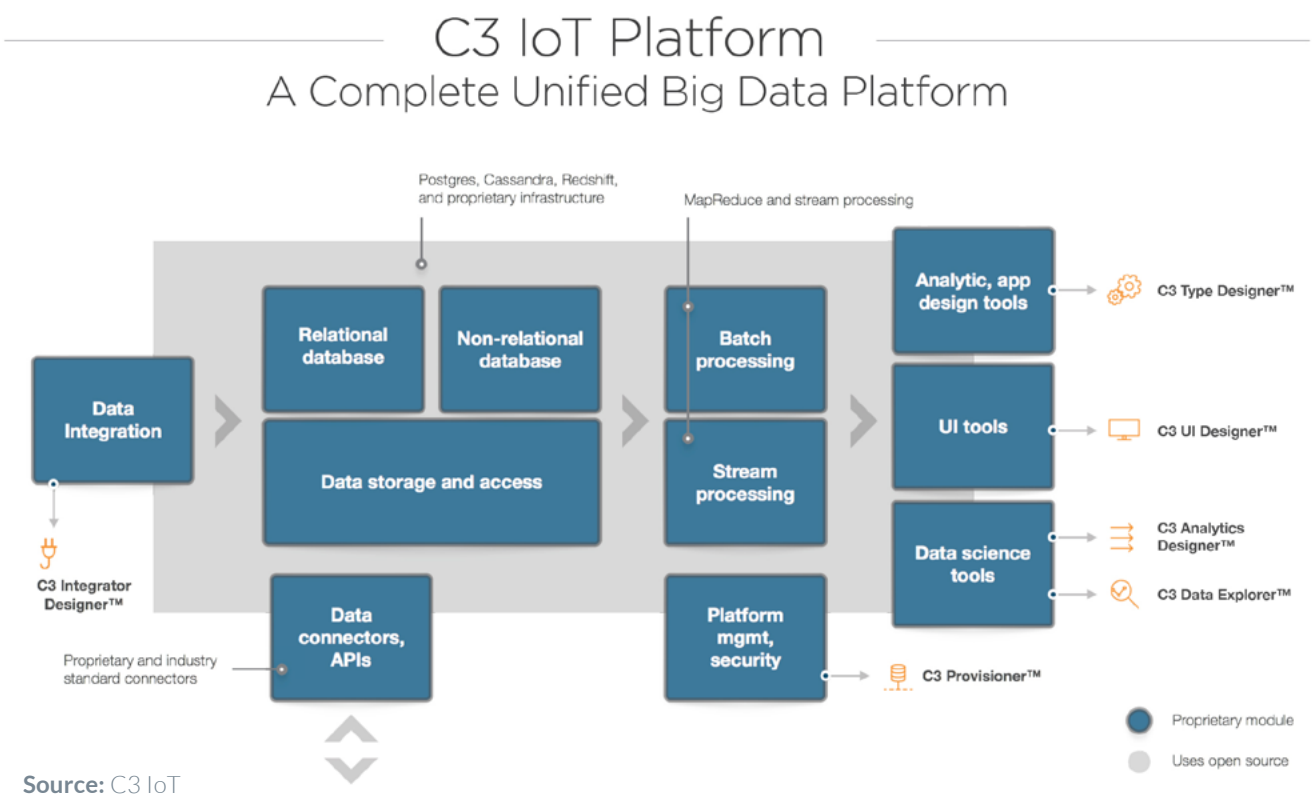
- Next-Generation Customer
- Future of Work
- Technology Optimization
- Consumerization of IT
- Data-to-Decisions

KEY DIFFERENTIATORS

C3 IoT is a platform that enables enterprises to create and operate nextgen-based applications, with a special focus on AI and IoT. The platform (see Figure 1) sets itself apart with four differentiators:

1. **Scale from Type System Architecture.** Enterprises have moved data for a long time, but those data movements almost always resulted in semantic changes and derived challenges. C3 IoT transfers data into a type system-based platform, where data is immediately filled with semantic meaning and intrinsic functionality. C3 IoT has adopted an industry approach to the type system, allowing customers to start using the platform with meaningful vertical functionality, right from the start. The approach allows for a reduction in go-live time frames, as enterprises can derive value from their data a few days after getting on the C3 IoT Platform.

Figure 1. The C3 IoT Platform



Source: C3 IoT

2. **Start with Data Import.** Practically all existing enterprise application systems have been architected with a transactional DNA; the Online Transactional Processing (OLTP) approach runs deep in almost all enterprise applications architectures and traces its roots to the limited computing capability of the last century. Born in the 21st century, C3 IoT acknowledges that data already exists, and starts with a data import. Starting with data import and transfer is an innovative but appropriate approach, as cloud computing propels computing architectures further into the quasi-unlimited computing era.

3. **Democratization of Insights.** In a traditional IT structure, business users depend on the specialists in IT, data warehouses and data science for data-driven insights. C3 IoT makes the process of gathering insights easy and intuitive so that business users without the skills of the specialists can derive key business insights from data. With this capability, C3 IoT allows business users to understand their business at scale and in depth.

4. **Building of Powerful NextGen Apps with BYOL and No Code.** C3 IoT offers enterprises the ability to build both standard applications on the C3 IoT Platform, but also allows enterprises to build their own nextgen applications on the C3 IoT Platform, utilizing Machine Learning (ML) and Artificial Intelligence (AI) capabilities. Existing skills can be utilized as the C3 Type System architecture makes no assumptions about programming languages, thus enabling "Bring Your Own Language" (BYOL) capability.

Management Team

C3 IoT's management is deeply rooted in Silicon Valley, having held important roles at two key companies, Oracle and Siebel Systems. Chairman and Chief Executive Officer (CEO) Tom Siebel (Siebel Systems bore his name) left Oracle to start Siebel Systems, which for over a decade was the leader in the market for Customer Relationship Management (CRM) software, reaching revenues of over $2 billion a year before merging with Oracle in 2006. Siebel started what is now C3 IoT for the

energy/utility sector and more recently has focused on the IoT space. Siebel is joined by President and Chief Technology Officer (CTO) Ed Abbo, who was a key development leader at both Siebel and Oracle. Chief Product Officer (CPO) Houman Behzadi completes the trio, also with a positive track record at Siebel and then Oracle.

Constellation's Analysis: The C3 IoT management team has a proven track record of building forward-thinking technology solutions. The fact that C3 IoT recently broadened its use cases from a utility focus to both a cross-industry and IoT focus is proof that the "group think" that can happen among people who have worked together for decades is not present at C3 IoT. The management team knows how to develop and grow a company as with Siebel, knows how to execute as an enterprise as with Oracle, but most importantly has experience building a product upfront. C3 IoT's leaders understand the transformational forces on business exerted by the cloud. They understand that in the cloud age, speed matters and they are of the mindset that time to go live is a critical Key Performance Indicator (KPI).

Partnerships and Alliances

No enterprise software vendor can operate in a vacuum. Partnerships foster synergies and ensure higher customer success rates. This section covers three recent and relevant partners/partner categories of C3 IoT:

- **Amazon Web Services (AWS).** C3 IoT partners with AWS as an Infrastructure-as-a-Service (IaaS) partner, making it the default platform for all products. AWS is the leading IaaS player, often cited as having multiple times the capacity of its closest competitors combined. C3 IoT brings load to AWS, which prefers the uniform load that Platform as a Service (PaaS) and Software as a Service (SaaS) vendors bring to AWS data centers. A sign of the synergy in this partnership is that AWS account managers get quota relief for bringing C3 IoT into AWS customer accounts.

- **Management Consulting Firms.** Enterprises seeking to prevent disruption are turning to management consulting firms for help from a strategy advisory perspective. In the 21st century, the classic management consulting firms have traded slides with real systems, and C3 IoT enables these firms to deliver data-driven insights not in a matter of months, but in a few days.

- **Universities.** Technology capability has for the first time surpassed the demands of business best practices. This creates a gap between the capabilities of the technology and the operating practices of the business. One key area of incubation for new best practices will be the leading universities – so C3 IoT is partnering with higher education institutions like University of California-Berkeley, Carnegie Mellon and Stanford to develop those practices. These universities receive a platform on which to experiment, learn and formulate new business best practices, and in return C3 IoT gets access to new employees that are already well-versed on its platform.

Constellation's Analysis: In its partnership with AWS, C3 IoT has joined with the right IaaS, at least for the foreseeable future. Yet, it is promising that the vendor has avoided platform lock-in, leaving its options open regarding future IaaS partnerships. Future IaaS partnerships may need to go beyond AWS due to technical performance, commercial performance, data residency reasons, and lastly, because of simple customer demand for another IaaS vendor.

The focus on partnering with management consulting firms and universities is also promising for C3 IoT. Both are key resources for driving nextgen application-related strategy formulation, which, over a period of experimentation, will define the business best practices of the 21st century that enterprises will strive to adopt.

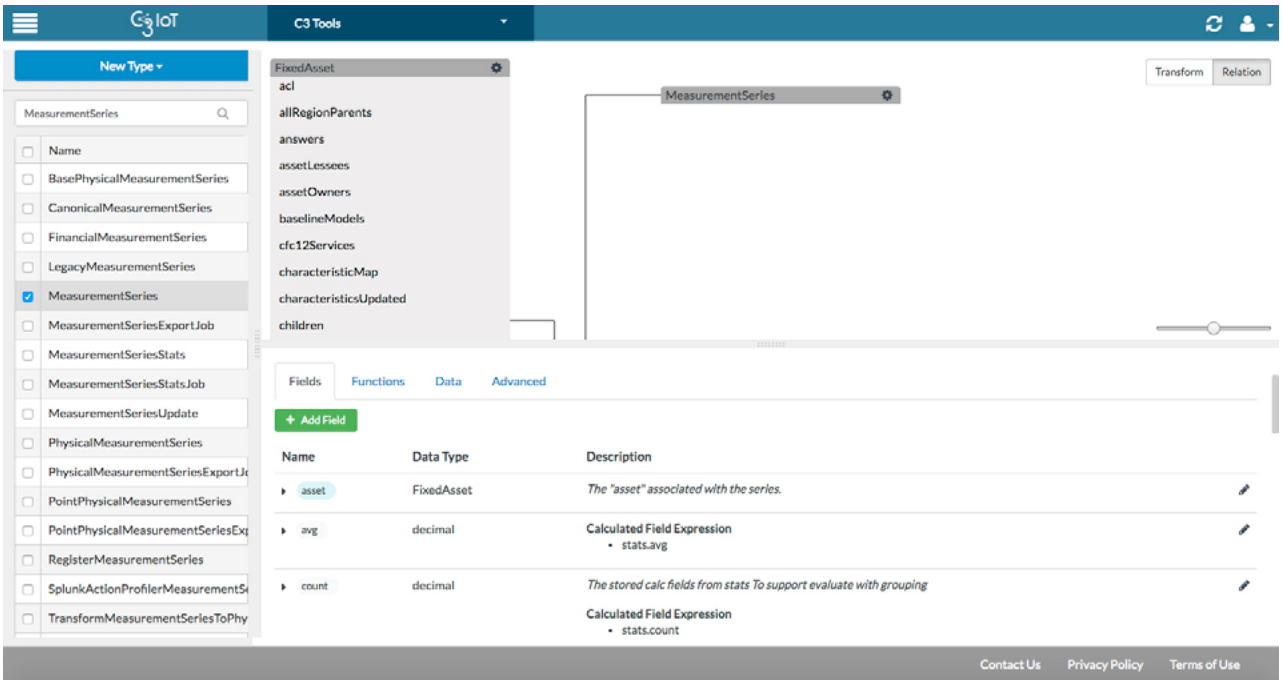
Key C3 IoT Capabilities

Model-Driven Architecture

C3 IoT operates on a model-driven architecture. By relying on the type system, C3 IoT makes assumptions about how information is stored and processed. With a vertical approach to the underlying type system, C3 IoT avoids rigidity with respect to enterprise information processing requirements. The type system approach, coupled with the assumption that all data will have to be imported into the system, makes the architecture flexible and enables it to show very quick returns once implemented (see Figure 2). And like all type system-based approaches, powerful foundational types allow users to both adopt and future-proof the overall type system architecture much more efficiently than in other architecture approaches. Furthermore, the C3 IoT Platform exposes code in REST APIs, making consumption of capabilities and functionality easy for all users of the enterprise application.

Moreover, C3 IoT does not limit the model-driven approach with the underlying data

Figure 2. The C3 IoT Type System for a Fixed Asset



Source: C3 IoT

architecture of the platform. It remains in the model-driven approach when it comes both to analytic insights and application creation. For analytics insights, C3 IoT provides a structure that is based on standards like Predictive Model Markup Language (PMML) to create and/or plug in models that use analytic algorithms and/or Machine Learning. These model-driven approaches for the creation of insights and apps are easy to understand, even for the less technically-inclined business user.

Constellation's Analysis: Model-driven architectures have shown their potential in many areas of enterprise software, but have typically been applied to smaller, more limited use cases, such as configurators, call center scripting, and sales methodologies. Using the same approach consistently across a complete enterprise automation platform is innovative. Typically, enterprise software systems architectures will be renewed over time and co-exist with the older architectures in the same operational environments. For many other vendors, acquisitions have also created an inconsistent application architecture. C3 IoT's approach is unique here, as the company not only applies the model-driven architecture consistently across all layers of an enterprise software system, but also to the creation of insights and applications on top of the platform.

A No-Code and BYOL Application Design Experience

For as long as enterprise software has been around, business users have depended on IT, consultants and developers to create, update, support and maintain business applications. As a result, there was always a system delay between the business requirements and the capability of business applications. Many enterprises experienced delays, cost overruns and poor system compatibility due to the miscommunications between the business and the technologists.

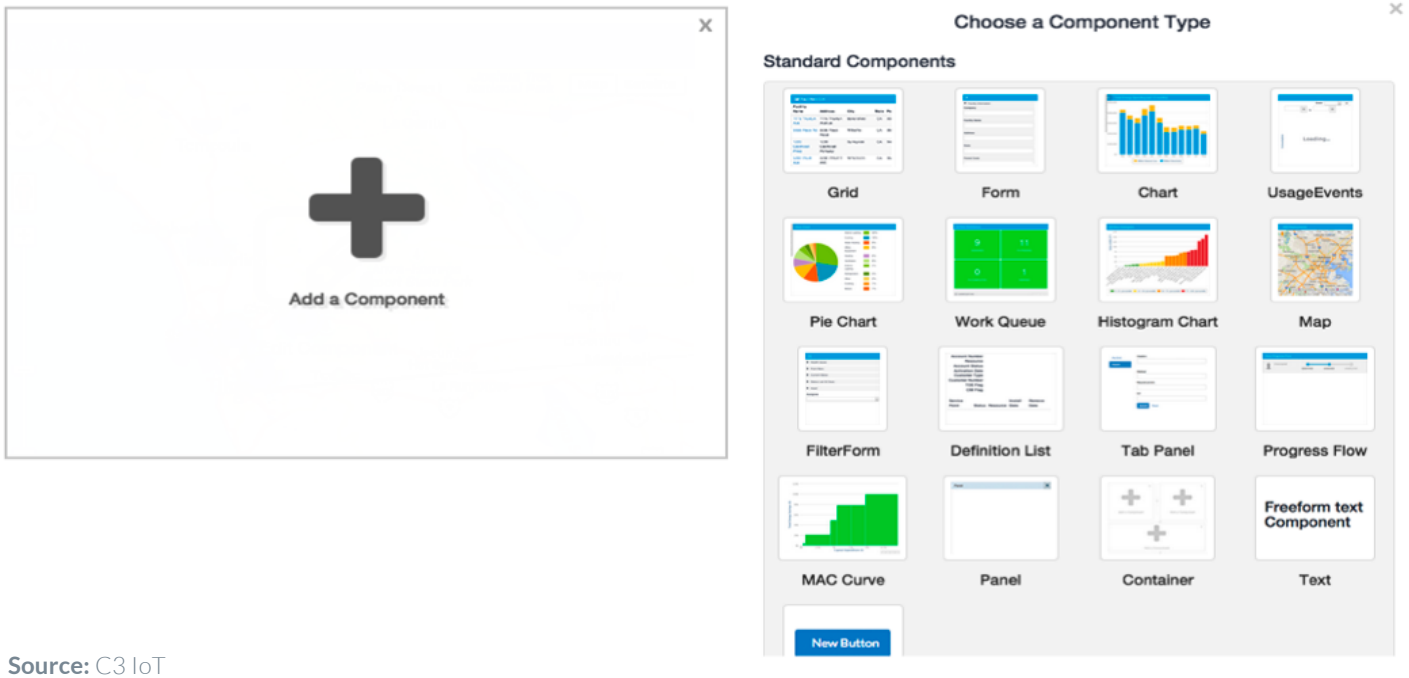
C3 IoT addresses this perennial challenge by enabling business users to create applications by themselves. C3 IoT's no-code application design experience allows business users with minimal technical abilities to build applications. Business users can leverage their knowledge

about business to build applications that serve both individual practitioners and the overall business well (see Figure 3). C3 IoT also enables business users to derive data-driven insights directly from the platform, thus accelerating the speed to insight.

C3 IoT supports "Bring Your Own Language" (BYOL) on top of the type system-based architecture. This is a factor that determines how quickly developers get up to speed on a new platform. BYOL also protects the assets both enterprises and developers have created before the C3 IoT implementation.

In early engagements, C3 IoT was able to present live systems in a matter of a few days, thanks to a combination of a no-code platform and BYOL, which enables both enterprise users and developers to use the platform right away. Pre-existing code assets from previous systems and projects can be used on the C3 IoT Platform. Interestingly, C3 IoT allows customers to keep intellectual property (IP) of any system extensions and code they may create. Customers could take their intellectual property and code and apply them to other platforms, reducing potential lock-in.

Figure 3. Metadata-Driven Application Development



Source: C3 IoT

Constellation's Analysis: Allowing enterprises to move faster and become more agile is always a good "true north" for enterprise software companies. Allowing more business users to access the software creation process without having to rely on skilled and hard-to-come-by programming resources will empower enterprises to develop software more quickly. The low-code nature of the C3 IoT system empowers business users to build the software they want, per their own specifications. Being able to bring existing code assets and the programming language (BYOL) that enterprise development teams are already accustomed to is a further advantage when it comes to the critical "time-to-live system" metric.

Ending the finger pointing between the constituents of in-house, enterprise-based software creation can deliver a major boon for business users looking to nextgen applications to address their unique automation needs.

Lastly, in the current era of business best practice uncertainty, in which enterprises must experiment to develop new business processes, the ability to retain the IP of such experiments is a substantial benefit of C3 IoT. On other platforms where customers are not permitted to retain their IP, any IP created while the customer builds software is shared with the platform's entire customer base with each release of the platform, thereby destroying competitive advantage derived from building software. And being able to possibly leverage these code assets beyond the current scope of the C3 IoT Platform is a major differentiator for buyers seeking to avoid lock-in.

Integrated Artificial Intelligence and Machine Learning

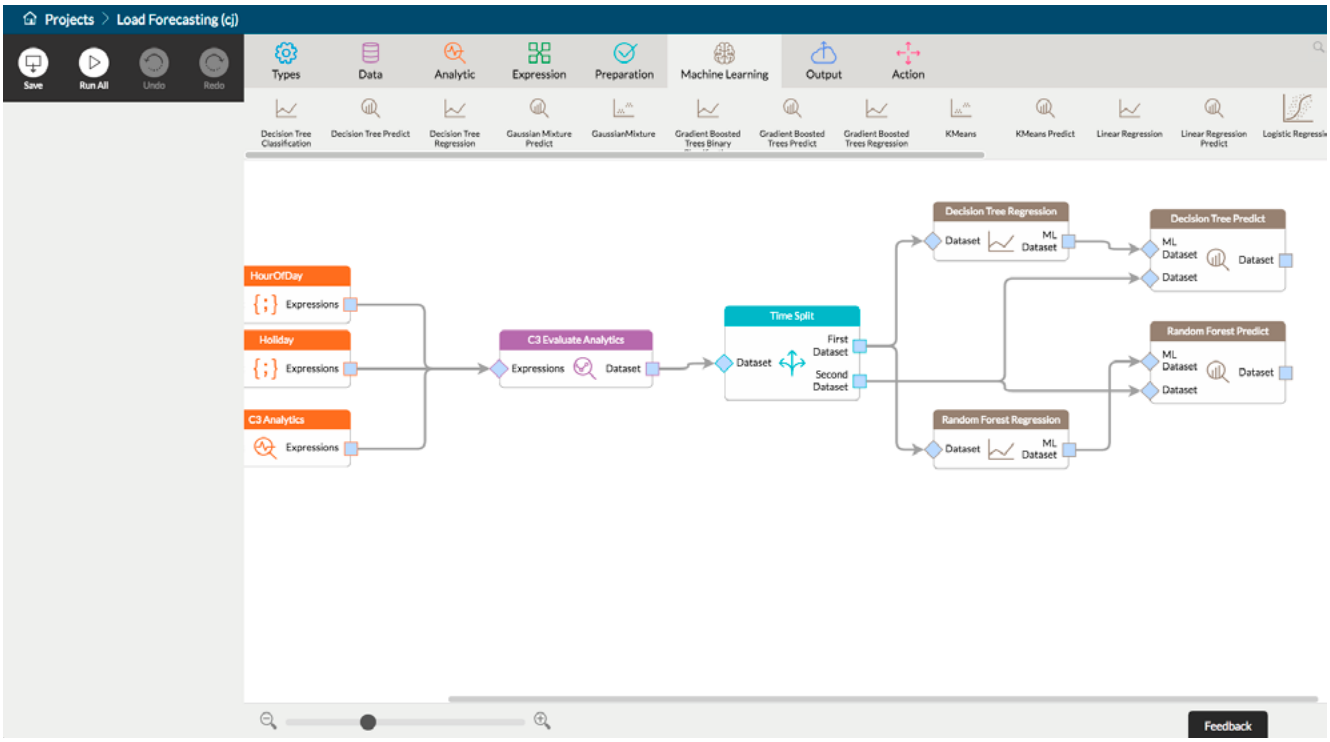
As a second generation, born-in-the-cloud offering, C3 IoT boasts native, integrated AI and Machine Learning capabilities (see Figure 4). With its data-first approach, C3 IoT can leverage all information stored in the platform to power AI and Machine Learning insights. Enterprises often experience the challenge of handling the enormous amounts of data required to enable AI and Machine Learning-derived insights. The C3 IoT Platform, by contrast, is designed to manage data of this nature, reducing the challenges of Big Data

and Machine Learning, and, more importantly, substantially reducing the time to insights.

C3 IoT's platform provides the tools to allow all users, irrespective of their technical abilities, to create their own Machine Learning models. This reduces the technical complexity of creating Machine Learning-powered models to pointing and clicking. For the more technically inclined users, C3 IoT currently supports both Python and R (see Figure 5). Finally, the platform also supports business analysts, who deliver their enterprise insights across the board, with an easy-to-use, powerful, tool-enabled platform.

Most importantly, C3 IoT serves all these users without requiring organizations to shift, move, and transport data from the transactional system to analytical systems. Data stays in place in the C3 IoT Platform, eliminating the standard shifting of data that is involved in the creation of Machine Learning-based insights. Data also gets updated on the platform from both external and internal data sources and is automatically available to produce

Figure 4. Visual Design for Integrated Machine Learning



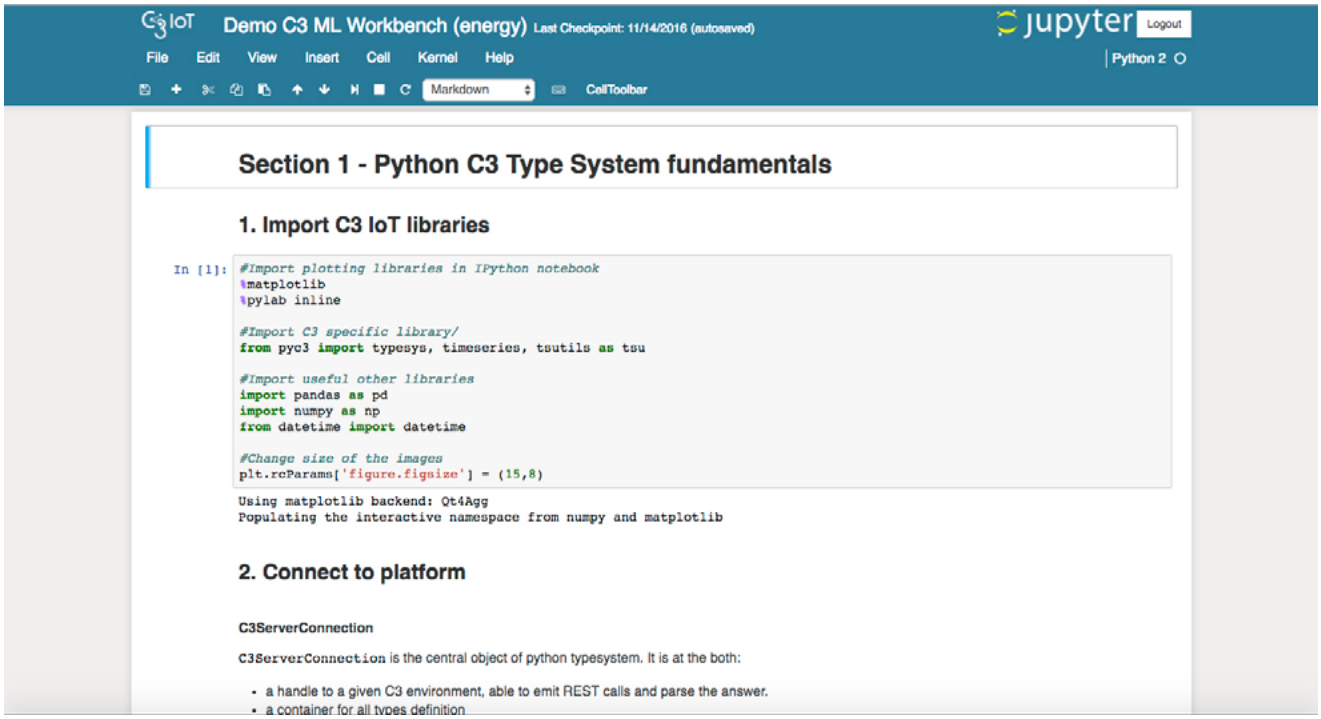
Source: C3 IoT

new insights. Conveniently, all Machine Learning-based insights can be applied to the applications on the C3 IoT Platform. That bridges the moat between OLTP and OLAP apps that has plagued enterprise application users since their very inception.

Constellation's Analysis: C3 IoT successfully addresses a number of challenges that have plagued enterprises in the past with respect to traditional approaches to Machine Learning. With C3 IoT, data remains in place, gets automatically updated and refreshed, and thus Machine Learning capabilities are no longer the domain of a small clique of advanced users. Business users are empowered to create their own Machine Learning-powered analytical applications and can plug them in to transactional applications as needed.

As a welcomed side benefit, the C3 IoT Platform ends traditional conflicts between a security-minded and control-minded IT organization and an insight-driven and less security- concerned data scientist community. It allows all constituents to use a single platform that addresses their combined needs to serve the enterprise.

Figure 5. Integrated Machine Learning for Python and R Users



Source: C3 IoT

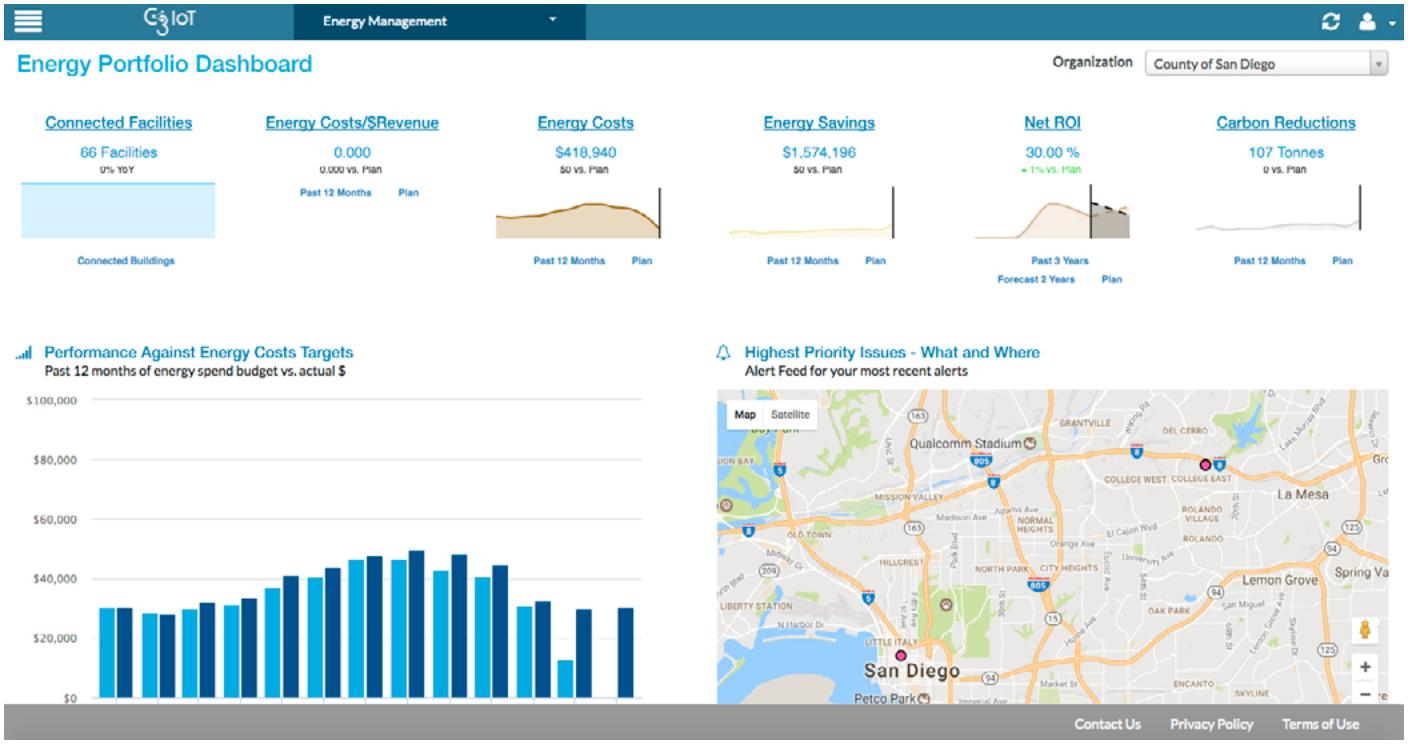
System of Systems

C3 IoT enables enterprises to bring all data together, no matter if it comes from traditional enterprise applications, third-party systems or newer data sources such as IoT-based applications (see Figure 6). Traditionally, the only option for enterprises to address a similar use case was through the data warehouse. But data warehouses have proven too slow, too limited, and too expensive to satisfy the performance requirements of the 21st century enterprise. Moreover, they only supported the OLAP use case and not a combined OLAP and OLTP use case.

C3 IoT has created a new category of enterprise software to consolidate data sources, a system of systems. C3 IoT can import information from a variety of sources, including new types of data sources like website traffic and IoT information into its type system-based architecture.

Furthermore, C3 IoT ships a number of powerful applications that run on top of the

Figure 6. A Dashboard from C3 IoT



Source: C3 IoT

platform. C3 IoT also allows users to create new applications on the platform to serve enterprise, departmental and individual needs.

Constellation's Analysis: Enterprise automation has always strived for the "system of systems," one that could consolidate the enterprise's information into a central system of record, thereby serving as a single source of data and insights across all systems. The mythological "system of systems" would also enable all members of the enterprise to not only look at the data in a uniform and consistent way, but also to process information consistently and, with that, lead an enterprise in a coherent, rational way. C3 IoT has practically created such a "system of systems" through the combination of a data-first platform approach, the type-based system architecture, and the exposure of new automation via APIs. This combination of capabilities allows customers to bring all information together on the C3 IoT Platform, not only for insight and Machine Learning processes, but also to make the C3 IoT Platform the central system of record and the base for nextgen applications.

NextGen Comprehensive Platform

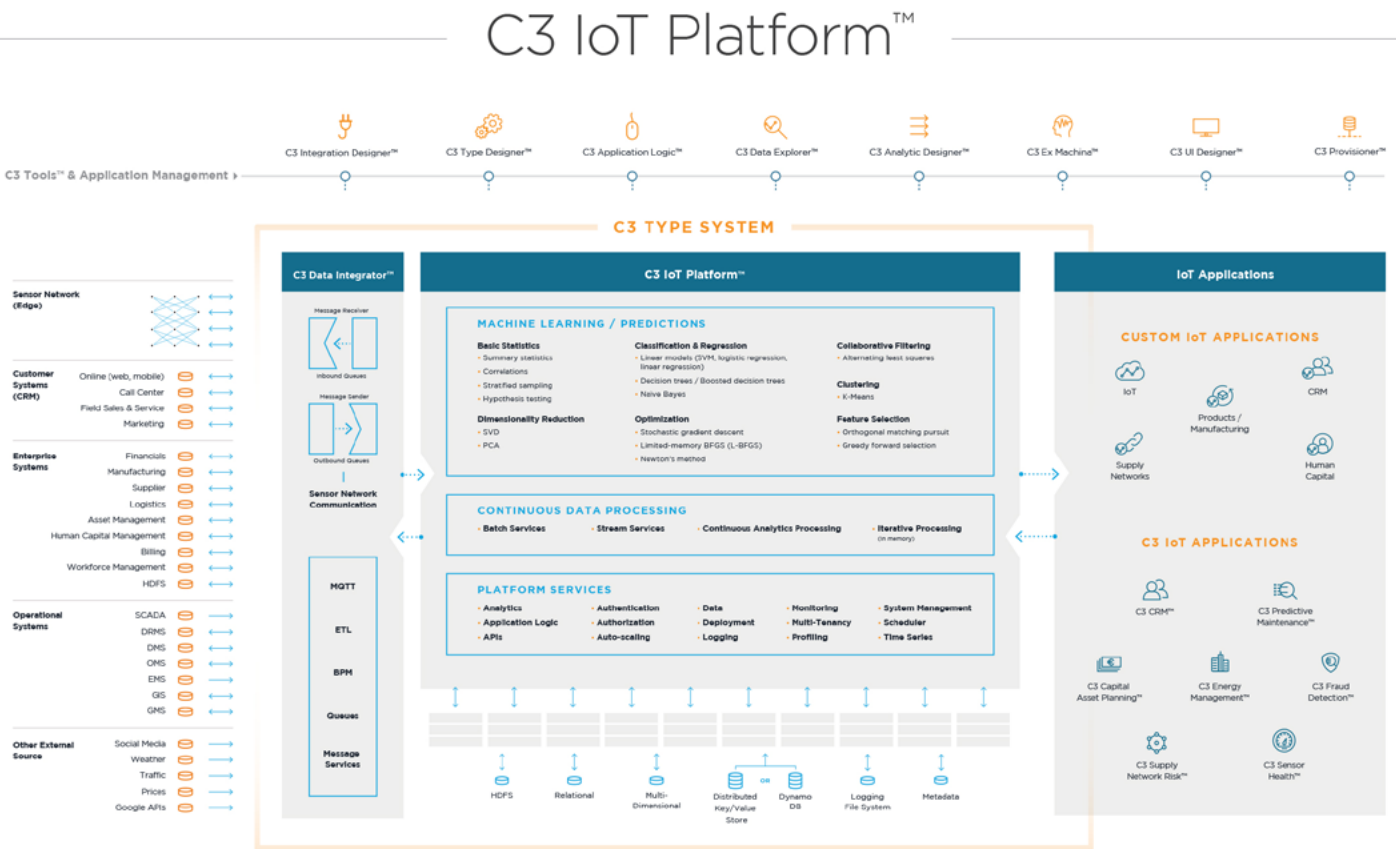
When building its platform, C3 IoT took note of the dearth of traditional technical skills and resources that plagues conventional platforms and systems. As such, the "time to go live" and "time to insight" metrics were crucial design criteria for C3 IoT. The platform has demonstrated the ability to deliver value to enterprises in a matter of days, in contrast to the few quarters traditional platforms can take. Being able to achieve more with less resources (time and talent) is a proposition that is very attractive to enterprises at a time when software is a strategic differentiator.

C3 IoT is a unique platform in that it starts with a data-first approach and combines it with a model-based development approach. Enabling both skilled professional and business users to garner insights and use Machine Learning to go beyond traditional Business Intelligence capabilities makes the platform even more appealing. Additionally, C3 IoT ships purpose-built applications on top of the platform, but also enables enterprises to build their own applications on the platform (see Figure 7).

All these capabilities of the C3 IoT Platform have been created with the idea of empowering a few users to do a lot of work, while at the same time broadening the potential user base by requiring more business acumen than technical knowledge from platform users.

Constellation's Analysis: C3 IoT has combined offerings that can typically be found in no less than eight different categories of use. The data integration capabilities make the C3 IoT Platform an instrument for Business Intelligence, Data Extraction and ETL spaces. The type-based architecture of the core platform makes it a Platform as a Service (PaaS) and a model-driven application development platform. The integrated Machine Learning capabilities allows it to be used for Machine Learning/Artificial Intelligence (AI). Packaged applications built by C3 IoT serve several enterprise software needs, such as CRM. The ability to manage large amounts

Figure 7. A Detailed Overview of the C3 IoT Platform



Source: C3 IoT

of IoT data in a public cloud-based platform serves customers seeking a tool for Big Data, IoT and cloud-based Software as a Service (SaaS) and PaaS categories. And, lastly, C3 IoT's accommodation of Low Code/No Code makes it attractive for organizations seeking to empower their less technical lines of business to build software.

Potential customers should evaluate if the integration benefits of C3 IoT's suite of products outweigh the potentially deeper functionality of a best-of-breed solution. The remarkable finding on this key topic is that C3 IoT, most likely due to the recent creation of the platform and the requirements drawn from enabling IoT applications, has native capabilities that are on par, if not often ahead of, traditional products in individual categories of use. Combining all capabilities in a single platform makes C3 IoT a unique, powerful platform for building nextgen applications in the enterprise.

PRICING

C3 IoT takes a new approach to pricing, with a pure consumption-based pricing model as follows:

- **C3 IoT Platform.** Pricing of the C3 IoT Platform is fully based on storage volume and computing power in the platform.
- **C3 IoT Applications.** Pricing of C3 IoT Applications is based on a combination of computing and storage.

To help enterprises get a handle on future Total Cost of Ownership (TCO), C3 IoT gives customers a set of calculators that helps estimate the future costs of the C3 IoT software.

Constellation's Analysis: For the longest time, enterprise software vendors have experimented with pricing models, seldom to a satisfactory degree for their customers. This has changed with the emergence of cloud computing and IaaS vendors that operate on a pay-only-for-what-you-use model. C3 IoT takes a page from that pricing strategy,

tying licensing cost to usage and consumption of both computing and storage resources by enterprises. This is a fair approach to pricing that insulates enterprises from being overcharged, while ensuring that the vendor, in this case C3 IoT, is not forced to operate on an unprofitable model.

RECOMMENDED SCENARIOS

Constellation sees several scenarios where enterprises would turn to C3 IoT to solve their IoT automation needs. The flexibility of the data-first approach, combined with the speed to go live based on the type system, allows enterprises to derive value very quickly when choosing C3 IoT. With the industry versions of the type system, vertical industry specifics are addressed out of the box, but at the same time allow for further vertical extensions of the platform.

Despite focusing on IoT (and having IoT in the company name), the capabilities of the C3 IoT Platform qualify the product beyond IoT scenarios. The challenging nature of IoT regarding throughput, scale, and Machine Learning, makes the platform attractive for many more nextgen application use cases.

Constellation sees a strong case for C3 IoT capabilities in the following scenarios:

1. **Revolutionizing Intra-Enterprise Functions.** Enterprises need to reinvent how they operate internally. This will require them to transition from being traditional organizations using stovepipe applications to agile organizations that can quickly implement new best practices.

2. **Digitizing Value Chains.** Enterprises pursuing Digital Transformation need to capitalize on opportunities presented by the supply and sales value chains. Traditional applications lack the best practices of the 21st century to disrupt and operate these value chains.

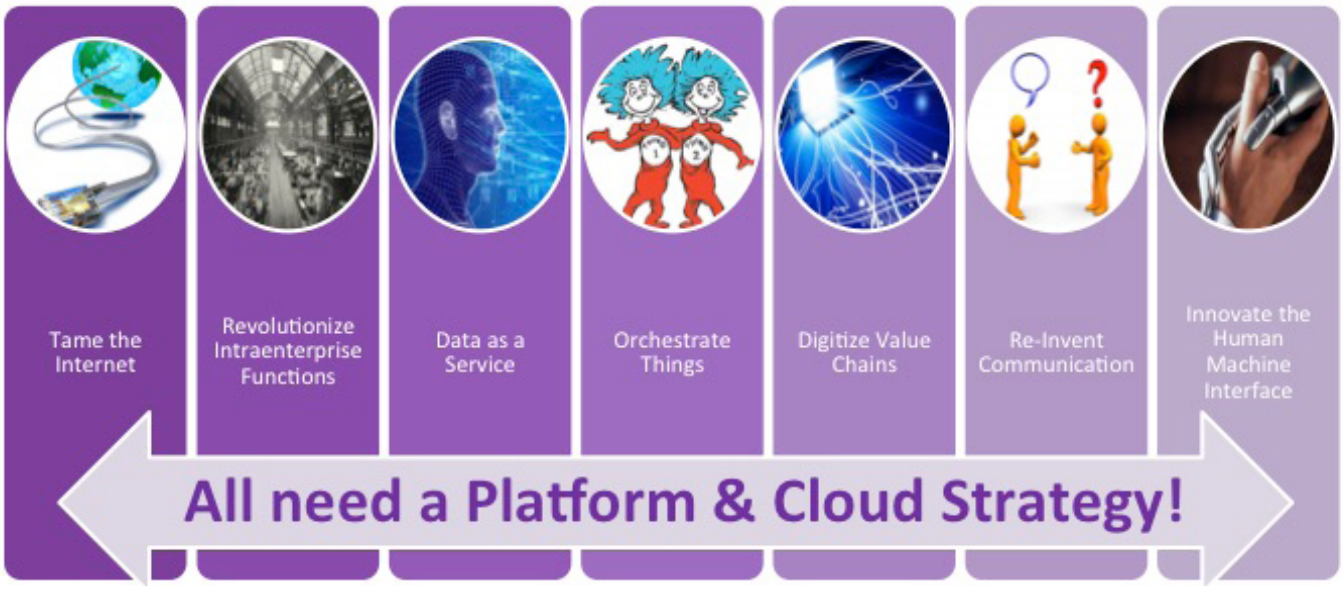
3. **Taming the Internet.** Mining the internet and processing the reams of internet data available represent a new field of business for enterprises. This emerging enterprise software category has seen no standard

players yet, forcing enterprises to build their own solutions.

4. **Using Data as a Service (DaaS)**. Enterprises possess and can create millions of real-world data points that they can process, monetize, benchmark and exchange as part of DaaS.

More than 25 large customers have implemented or gone live on C3 IoT, demonstrating the feasibility of the platform. Constellation recommends shortlisting C3 IoT for IoT platform selections, with additional consideration for the nextgen application use cases mentioned above (see Figure 8).

Figure 8. Constellation's Seven Universal NextGen Apps Use Cases



Source: Constellation Research

Holger Mueller

Vice President and Principal Analyst

Holger Mueller is vice president and principal analyst at Constellation Research, providing guidance for the fundamental enablers of the cloud, IaaS, PaaS, with forays up the tech stack into big data, analytics and SaaS. Holger provides strategy and counsel to key clients, including chief information officers (CIO), chief technology officers (CTO), chief product officers (CPO), investment analysts, venture capitalists, sell-side firms and technology buyers.

Prior to joining Constellation Research, Holger was VP of products for NorthgateArinso, a KKR company. He led the transformation of products to the cloud and laid the foundation for new business-process-as-a-service (BPaaS) capabilities. Previously, he was the chief application architect with SAP and was also VP of products for FICO. Before that, he worked for Oracle in various management functions - both of the application development (CRM, Fusion) and business development sides. Holger started his career with Kiefer & Veittinger, which he helped grow from a startup to Europe's largest CRM vendor from 1995 onwards. Holger has a Diplom Kaufmann from University of Mannheim, with a focus on Information Science, Marketing, International Management and Chemical Technology. As a native European, Mueller speaks six languages.

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- 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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