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OFFERING OVERVIEW

C3 AI Powers Next-Gen Apps With Its Innovative Enterprise AI Platform

How to Build Strategic Apps Better and Faster With C3 AI

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Produced exclusively for Constellation Research clients

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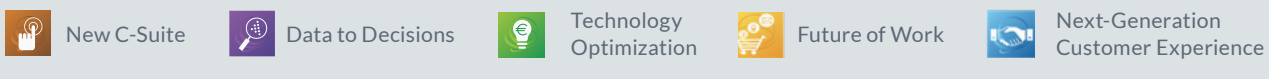
EXECUTIVE SUMMARY

This report provides an overview of how the C3 AI platform enables enterprises to build next-generation AI applications. Some of the world's largest companies in manufacturing, energy, financial services, defense, and other industries have deployed the C3 AI Suite in production at scale to deliver significant business value through improved operational efficiencies, reduced operating costs, and improved customer satisfaction.

C3 AI has a unique approach to platform as a service (PaaS): It starts with the data first, versus starting with the code the way most traditional PaaS platforms do. This immediately creates a unified federated data image across various internal and external sources for all application, analytical, and machine learning (ML) use cases. By focusing on data first, C3 AI enables very fast creation of applications, given its model-driven development approach. Enterprises can further accelerate their application creation by reusing existing applications and integrations. Moreover, the C3 AI platform facilitates artificial intelligence (AI) enablement in all aspects of next-generation application development and supports all user constituents, from business users and data scientists to no-code/low-code and full-code developers. Finally, C3 AI's platform enables enterprises to run across multiple clouds while abstracting cloud-specific capabilities to exploit them at their best in the native form of each specific cloud infrastructure.

The other platforms covered in this Constellation Market Overview are (in alphabetical order) AWS, Google Cloud, IBM Cloud, Microsoft Azure, Oracle PaaS, Pivotal Cloud Foundry, Red Hat OpenShift, Salesforce Platform (Force.com and Heroku), SAP Business Technology Platform (BTP), and Siemens (with Mendix).[1]

Business Themes



ABOUT THE C3 AI PLATFORM

Overview

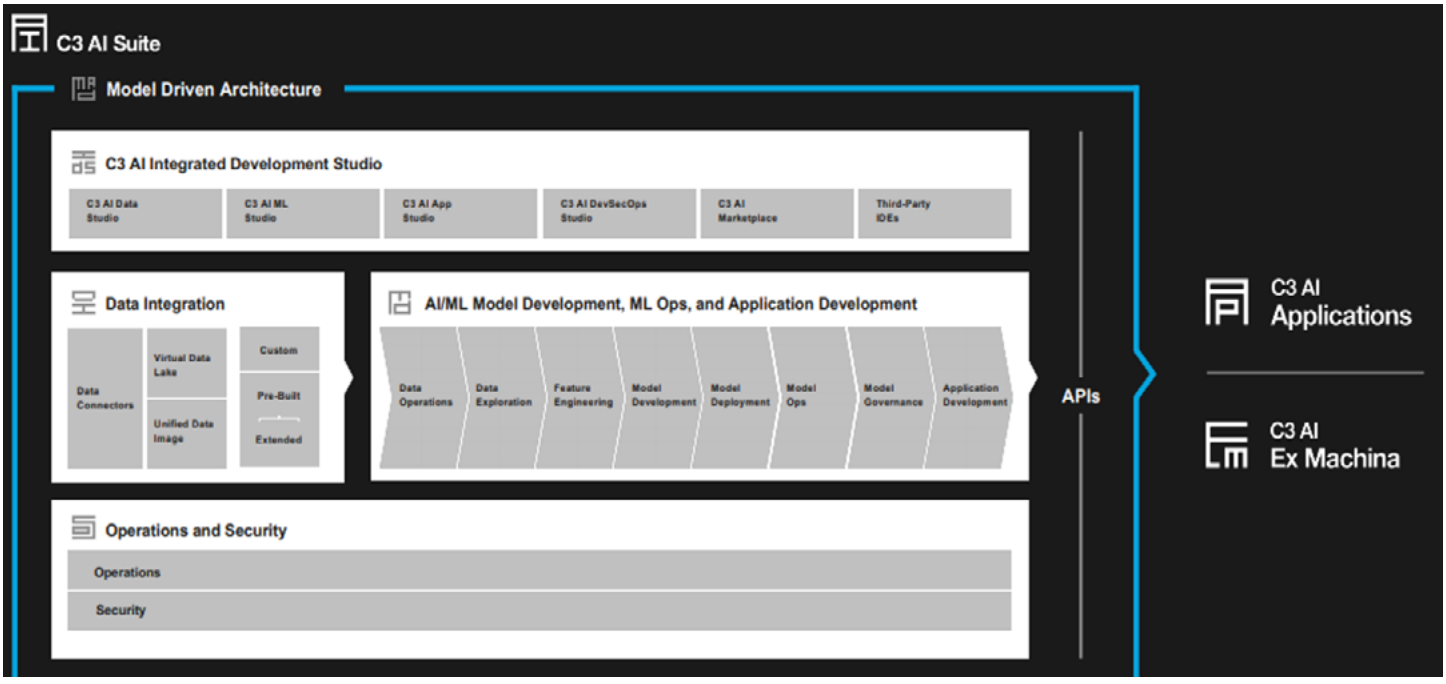
A Multicloud Platform for AI-Powered Enterprise Applications

Enterprises need to be able to build their next-generation applications as quickly and efficiently as possible to succeed in the era of digital disruption, where digital automation assets determine the fate of an enterprise.

C3 AI's platform (see Figure 1) caters to these demands very well, with the following five differentiators standing out from the competition:

1. **A declarative multicloud platform for rapid app creation and investment protection.** C3 AI jump-starts AI application creation with its object model, based on its proven type system (a logical system made up of a set of rules that assigns a "type" property to computer program constructs such as

Figure 1. The C3 AI Platform



Source: C3 AI

variables, functions, and modules to reduce the possibility of program bugs). Instead of re-creating the usual enterprise relationships in a new object model on yet another platform, C3 AI provides that proven object model from project start. Moreover, the C3 AI platform is multicloud-enabled and enables enterprises to operate on multiple clouds simultaneously, creating deployment freedom and investment protection. Importantly, the C3 AI architecture uses an abstraction model that, via mapping, enables enterprises to use each cloud's proprietary technology to its fullest extent. C3 AI's platform features powerful operational and security capabilities for operating applications in a safe and efficient manner.

2. **A data-first platform that addresses all current and future data needs.** Data layers and foundations are the first step for the creation of enterprise applications but can quickly become a hindering factor for future application versions. C3 AI's platform provides a holistic data layer from the start of a project, enabling all enterprise data needs with a data lake. For an enterprise, the key benefit is that all data is there for its applications' current and future data needs, whether they are transactional or analytical in nature. Moreover, out-of-the-box data integration capabilities enable the successful present and future operation of C3 AI-created applications, avoiding lengthy and costly integration efforts.

3. **A configuration platform for application reuse that powers higher developer velocity.** C3 AI's platform does not start enterprises with the infamous line 1 but enables them to build on top of available applications, components, and integrations. This approach substantially accelerates application creation for enterprises, enabling them to efficiently focus on differentiating and unique industry-disrupting capabilities instead of focusing on the repetitive clerical tasks of building foundational application capabilities.

4. **An end-to-end AI-powered PaaS platform augmenting every app with AI on a model-driven architecture.** AI is the most transformative new technology available for powering next-generation applications in an enterprise. C3 AI's platform makes it easy to enable and infuse applications with AI at any level of automation, from "just" infusing some AI into a traditional application all the way to a full-scale, dedicated AI application. Given the platform's model-driven DNA, it is easy and fast to create applications, regardless of whether they are AI-powered. The C3 AI platform supports full AI model development and AIOps as well, making it easy to create, infuse, and operate AI-powered applications.

5. **A platform for everybody, enabling all users to participate at their best.** Enterprises are shorthanded and have low human-power capacity when it comes to building next-generation applications, especially because most of these applications are being built under material time pressure: The sooner an enterprise can disrupt its competition, the better—and the sooner it can avoid being disrupted and forced into a reactive role, the better as well. Therefore, it is a key capability and differentiator for the C3 AI platform that it caters to all users, from a no-code/low-code business user to a full-code programmer and from a business user dabbling in AI automation to a bona fide data scientist or a fully dedicated AI developer.

Overall, C3 AI offers a powerful platform that differentiates itself from other offerings in this market overview with its data-first reusable application, inclusive role support, and multicloud capabilities.

Market Segment: Platform as a Service (PaaS)

Market Definition

Although the term "platform as a service" has evolved over the past two decades, application development has always relied on platforms for building, deploying, and operating software. The emergence and relevance of the public cloud has affected the application development platform market in two ways. First, it allows a shift of the application development platform off-premises. Second, the cloud has become a target platform for enterprises building next-generation applications.

Next, the PaaS market has seen a proliferation of specialized PaaS incarnations. Take IPaaS, which refers to products focused primarily on integration. Then there is CPaaS, which refers to a PaaS that enables communication-intensive applications. A third example is MPaaS, named for products focused on building mobile applications. Finally, there is BPaaS, a platform aimed at constructing and combining business processes.

For this report, we focus on general, all-purpose PaaS offerings geared for building a broad array of next-generation applications. (Note, though, that these often require specific extensions that can make the evaluation of a specialized PaaS relevant.)

Meanwhile, there has been a significant expansion of PaaS user personas. The role of traditional developer who could do it all has branched into various specialized developer roles—for instance, the front-end (or user-interface) developer, the back-end (or application programing interface [API]) developer, the database developer, the integration developer, and the DevOps professional.

PaaS offerings now are being used in low-code, no-code, and data-centric scenarios (by data scientists, statisticians, and so forth). This trend has opened opportunities for new players, with the option to redefine the vendor landscape for different PaaS use cases.

Constellation's conversations with clients show us that careful consideration must precede an initial PaaS selection. Why? Switching PaaS platforms is hard and expensive, and doing so often poses a risk to business continuity, along with the learning curve involved with coming up to speed on a new platform. Enterprise leaders must make wise decisions about PaaS platforms that provide a long-term return on investment, reduce overall operating costs, and deliver on enterprise agility.

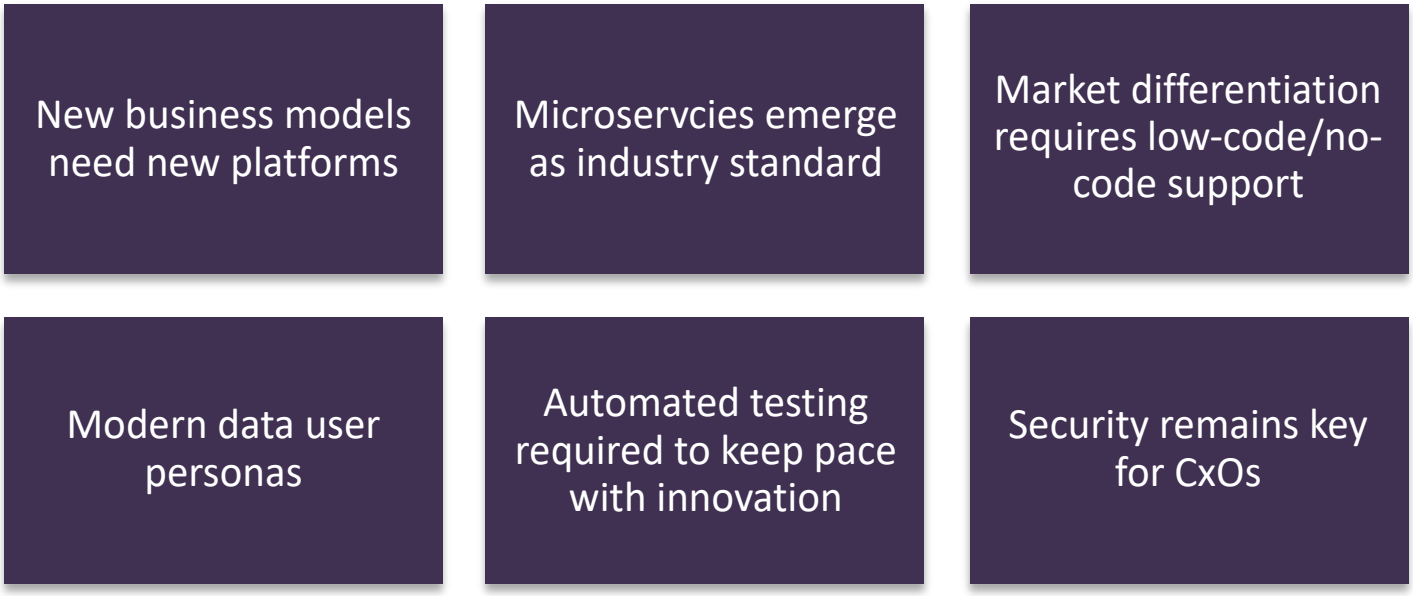
Market Trends

Future of Business Applications Requires Platforms That Support New Business Models

Demand for next-generation apps drives enterprises to select PaaS platforms that support big data, ML, and AI. At the same time, software architectures have fundamentally changed in the last 10 years (see Figure 2).

Effectively, we have entered the era of Infinite Computing.[2] It started with the innovation of Hadoop, which for the first time allowed enterprises to store all relevant information in a cost-efficient way. Coupled with infinite (and very cheap) compute capabilities delivered by multicore CPUs, usually residing in the public cloud, neural networks have become the new bedrock for analytics. Moreover, neural networks are quickly being disrupted by their self-driving version: the automated deep learning platform.

Figure 2. Six Market Trends Defining Next-Gen PaaS



Source: Constellation Research

Microservices Emerge as an Industry Standard

The trend toward Infinite Computing demands better scalability. Obviously, the smaller the scaling units are, the more efficient utilization of resources, billing to cost creators, and operation of infrastructure-as-a-service (IaaS) providers will be.

Past best practices saw large units—servers—as the scaling unit. The rise of virtualization saw increased utilization of server capacity via virtual machine (VM) workloads. But over time, VMs began to experience bloat. The need for a smaller, better scaling unit was recently answered with the advent of microservices, a newer take on service-oriented architecture in which applications are composed via a set of lightweight, loosely coupled services.

The downside of microservices is that older codebases cannot take advantage of them due to their monolithic programming models. The result is a need to build new software that can take advantage of microservices.

Market Differentiation Requires Low Code/No Code

Traditionally, software development has relied on developers, who often take years to become highly skilled and a few quarters, at best, to become proficient on new platforms or PaaS systems. With the worldwide number of developers not projected to grow substantially in the next decade, the rising need to build applications on an enterprise, divisional, and departmental level can no longer be addressed with the traditional developer workforce. Advances in user interface technology, cloud delivery, and better technology abstraction of compute resources recently gave rise to low-code/no-code users, sometimes referred to as citizen developers. These business users have some level of technology expertise but are foremost business experts. Low-code/no-code capabilities in PaaS platforms allow them to build reasonable applications on a departmental and sometimes even divisional level.

Modern Data User Personas

Traditionally, enterprises have employed data warehouses, usually with 24-hour updates, for their major insights. But a rising demand for real-time and near-real-time analytics is putting pressure on IT teams to deliver.

Similar to how CxOs overall are welcoming low-code/no-code tools to relieve pressure on their application developers, IT teams are embracing tools that allow non-technology-centric departmental users to analyze big data clusters for insights. Hence, CxOs should also look for PaaS vendors that can support the required data user personas in their platforms.

Automated Testing Required to Keep Pace With Innovation

By now, CxOs have widely realized and accepted that their enterprises have become software companies. As enterprise boardrooms dictate entries into new business models, the software that needs to be created to operate these new models becomes critical.

By the same token, software quality remains crucial. The good news is that PaaS has made progress on this front. How so? Automated software test cases can be created on the fly. Code reviews can be

automated. Peer code reviews can be automatically organized. DevOps can be automated. User behavior can be analyzed. Application stores can be sliced and analyzed and microtargeted for better application positioning and sales success.

Security Remains Key for CxOs

In the era of the Equifax breach and other security scandals, the pressure on CxOs to deliver next-generation applications in a secure manner has only increased. PaaS providers are responding in two ways. First, they continue to develop security architectures using the latest and greatest best practices and industry standards. Going further, they are also creating self-driving processes and architectures that achieve an inherent, intrinsic level of security—without human intervention. It is an approach to security that understands that the code creation, production, and delivery process needs to be secured from the beginning against threats such as code injection and intellectual property theft.

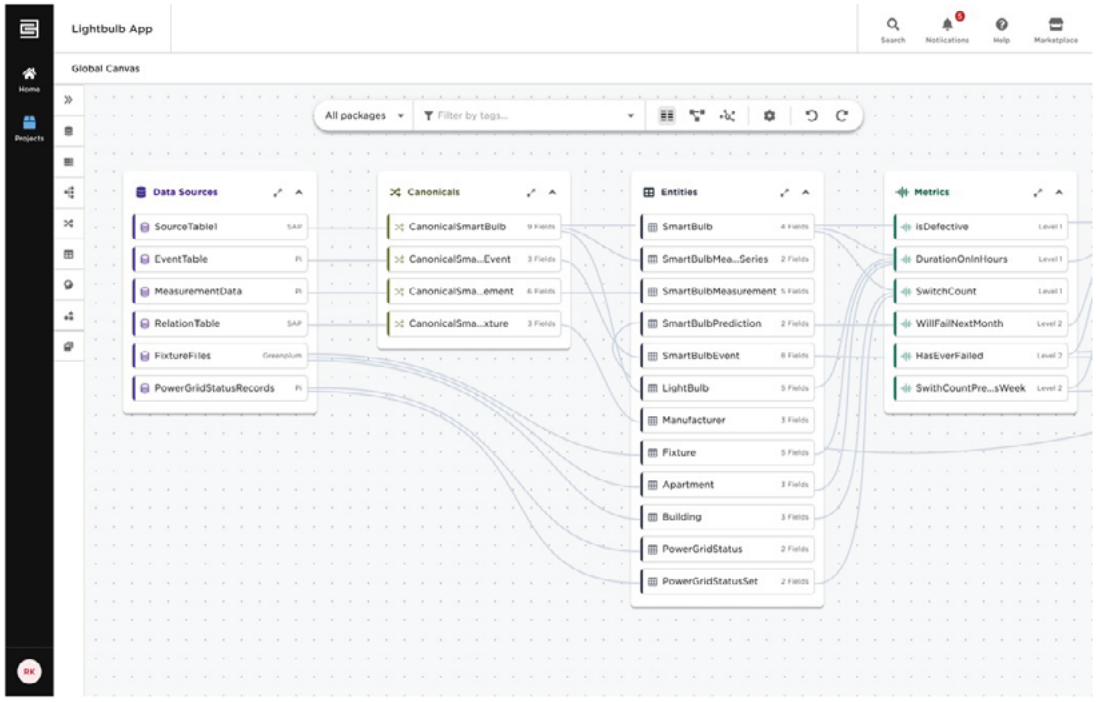
KEY CAPABILITIES

This section describes the most important capabilities of the C3 AI platform.

Getting It Right: Start With Data; Then Build Apps

Data is what powers and transcends all applications: Without data, the applications are worthless. Typically, application development starts with creating the code and then the data, not with integrating data and then building code for the combined new data plane. Perhaps advantaged by its DNA in utility applications, C3 AI takes a data-first approach in its application creation, bringing together all relevant data (and more) in a data lake. This differs substantially from competitors' approaches to application development, where the data lake is an afterthought to application creation. C3 AI's approach is superior here, because it enables application creation on a complete data plane (see Figure 3), with full lineage and traceability, as well as the ability to extend the data model to address all analytical use cases an enterprise may have. And finally, this approach is superior when it comes to infusing applications with AI or even when building dedicated AI applications: Relevant data is never missing, meaning superior AI performance. And in the rare case that it may be missing, the underlying data lake can easily accommodate that missing data. As such, C3 AI's platform powers Infinite Insights.[3]

Figure 3. C3 AI's Platform Mapping From Data Sources to Metrics



Source: C3 AI

C3 AI's platform does not stop with data management across different data sources but also provides substantial support for data integration. Data integration matters for enterprises, because no application ever runs stand-alone and integration efforts can slow down application creation as well as disrupt application operation. To make integration easier, C3 AI's platform ships out-of-the box integration with, for example, SAP systems. Importantly, integration traditionally is limited to information stored in relational databases, but C3 AI enables users to store data in the appropriate storage technology—for example, in name-value pairs, graph stores, and distributed file systems as well as its data lake.

In addition, C3 AI's platform uses data storage in a virtualized way, enabling developers to operate on the data in one consistent and efficient way without being slowed down by the different detailed intricacies of the various storage platforms.

Furthermore, C3 AI's platform makes it easier to integrate and operate on data, because it follows industry data standards such as HL7 for healthcare, eTOM for telecommunications, CIM for power utilities, PRODML and WITSML for oil and gas, and SWIFT for banking.

Finally, AI development is well supported by C3 AI's platform. By enabling AI developers and data scientists to operate with test and production data across streams, batches, memory, and clusters, C3 AI accelerates the creation, validation, and operation of AI models.

Build Apps Faster With Model-Driven Development on a Multicloud Platform

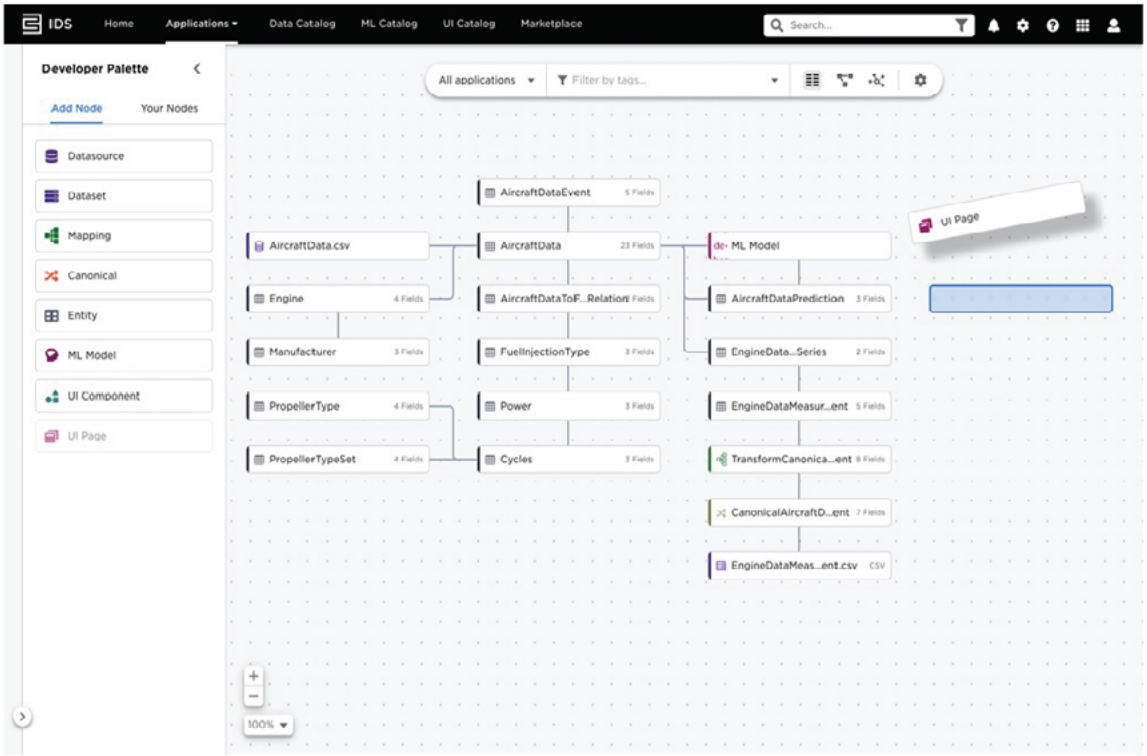
Enterprises need to practice Enterprise Acceleration[4] to survive and thrive, and a key part of that strategy is to build next-generation applications. The faster these applications can be built, the better an enterprise will fare, because it can choose to play an active role (build disruptive applications for its markets) or a reactive role (reacting to what a competitor has done). Realistically, even the most aggressive enterprise will see itself in a reactive scenario; nonetheless, for both scenarios, the speed of building software matters.

C3 AI enables very high developer velocity with its model-driven approach to building next-generation applications (see Figure 4). Built on its proven type system architecture of former platform versions, C3 AI enables enterprises to build applications faster via the availability of a functionally rich, all-enterprise-encompassing object model. This enables developer teams to avoid reinventing the wheel again and again. Importantly, the C3 AI object model is completely declarative and is interpreted by the C3 AI platform at runtime. A sophisticated versioning system of the object model enables C3 AI to maintain objects as well as enabling enterprises to extend these objects as needed. Via abstraction and encapsulation, these changes are isolated from each other and do not trigger substantial rework and retesting when changes happen.

Because it is hard for enterprises to build software, investment protection of the new code assets is paramount: C3 AI addresses this both on a code level, with the object versioning system, and on a platform level. C3 AI supports the leading cloud platforms (AWS, Microsoft Azure, and Google Cloud) out of the box, giving enterprises the ability to protect their investment in code assets across deployment needs. Enterprises need multicloud capabilities for several reasons, with data residency, data gravity, and commercial prudence being the most prominent.

The challenge of cross-platform support is that the underlying cloud platforms do everything within their power to differentiate themselves in their services, often creating substantial incompatibilities.

Figure 4. Model-Driven Development in C3 AI's Platform



Source: C3 AI

To address this challenge, C3 AI abstracts cloud platform capabilities as well, enabling enterprises to take full advantage of the native capability of a specific cloud. The C3 AI platform has mapped the platform capabilities to their specific implementation; for example, for streaming needs, the C3 AI platform maps to the specific streaming demands and capabilities of AWS (Kinesis) and Azure (Azure Stream Analytics).

An important recent addition to C3 AI's out-of-the-box capabilities is the faster creation of AI models via reuse of AI models provided by C3 AI. The core challenge to reusing AI models is mapping them to the underlying data. If the model cannot find the relevant data on which to operate, it is unusable and data scientists and AI developers must roll up their sleeves to make it work. C3 AI addressed this problem by creating a systemwide hierarchical and ontological object model across a customer's data. But it did not stop there, adding an abstraction level of organizational, analytical, and IT concepts. The result is that mapping C3 AI models to the customer's data is a simple translation (and ultimately mapping) process between the customer data and the model data. C3 AI has patented the approach, so this capability is a strong differentiator, even from a legal perspective.[5]

Build Apps Faster by Leveraging an Application and Integration Library

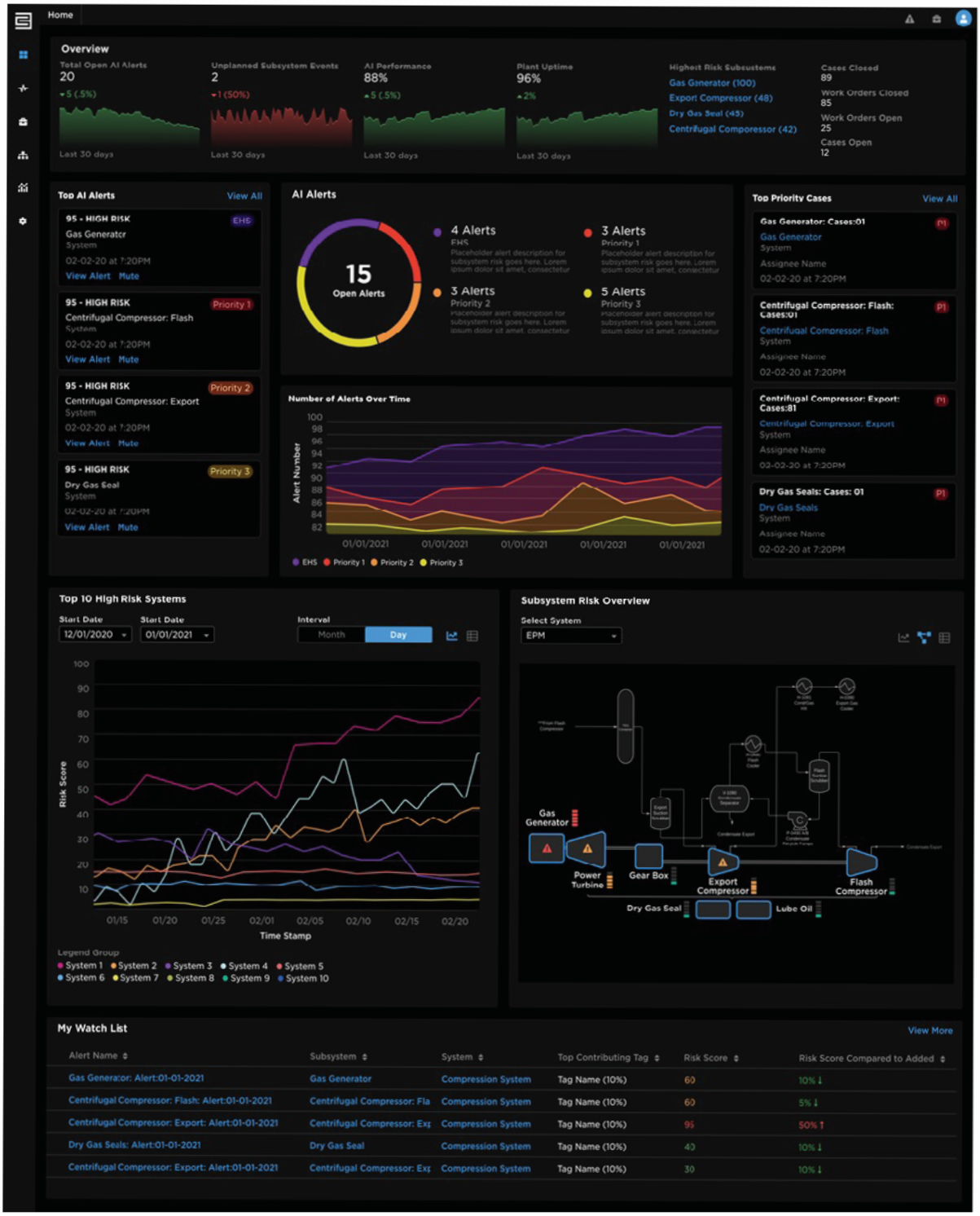
This report has already mentioned how important velocity is for enterprises when it comes to next-generation applications: A key booster to velocity when it comes to C3 AI is the reuse of its prebuilt applications and integrations.

On the application side, C3 AI provides AI-powered applications for a wide range of automation areas, the most prominent being in the functional areas of asset management, condition monitoring, remote monitoring, predictive maintenance, field operations monitoring, process optimization, worker safety, industrial fleet monitoring, and environmental monitoring, plus customer engagement, fraud detection, and inventory optimization. Each of these automation areas poses a substantial challenge to an enterprise if it must create, maintain, and operate the automations in-house. On the flip side, being able to leverage them out of the box and have them maintained by C3 AI is a huge accelerator for enterprises building their next-generation applications. Instead of having to focus on horizontal and therefore repetitive capabilities, enterprises can focus on the differentiating and necessary custom capabilities. Constellation estimates that reusing a C3 AI application can reduce application creation times by as much as 85% and offer more than a 90% reduction in continued maintenance effort.

On the integration side, C3 AI supports a wide range of C3 AI-maintained integrations, making it fast and easy to integrate with third-party systems. Moreover, because the C3 AI object model follows industry-specific standards, integration efforts are minimized: It is easier to integrate on an industry-specific level between systems, because both integrated systems feature the same vertical data needs and processes.

The results of having prebuilt applications and integrations are very rich next-generation AI-powered applications that are built in a fraction of the time it takes to build apps of the same scope with a traditional AI/PaaS platform (see Figure 5).

Figure 5. An Example of an Application Created on the C3 AI Platform, Leveraging Out-of-the-Box C3 AI Apps and Integration



Source: C3 AI

AI as Second Nature in New Apps, Thanks to an End-to-End AI Platform

AI is the most transformative technology that has emerged in the last 50 years, because it has the ability to change software from human-operated to autonomous and, with that, enable the complete automation of systems. But the path to autonomy is arduous, plastered with challenges and riddled with setbacks.

The key enabler for bringing enterprises closer to building AI-powered or even stand-alone AI applications is having the right platform, and C3 AI offers a strong platform for simplifying the creation of both AI-infused and stand-alone AI applications.

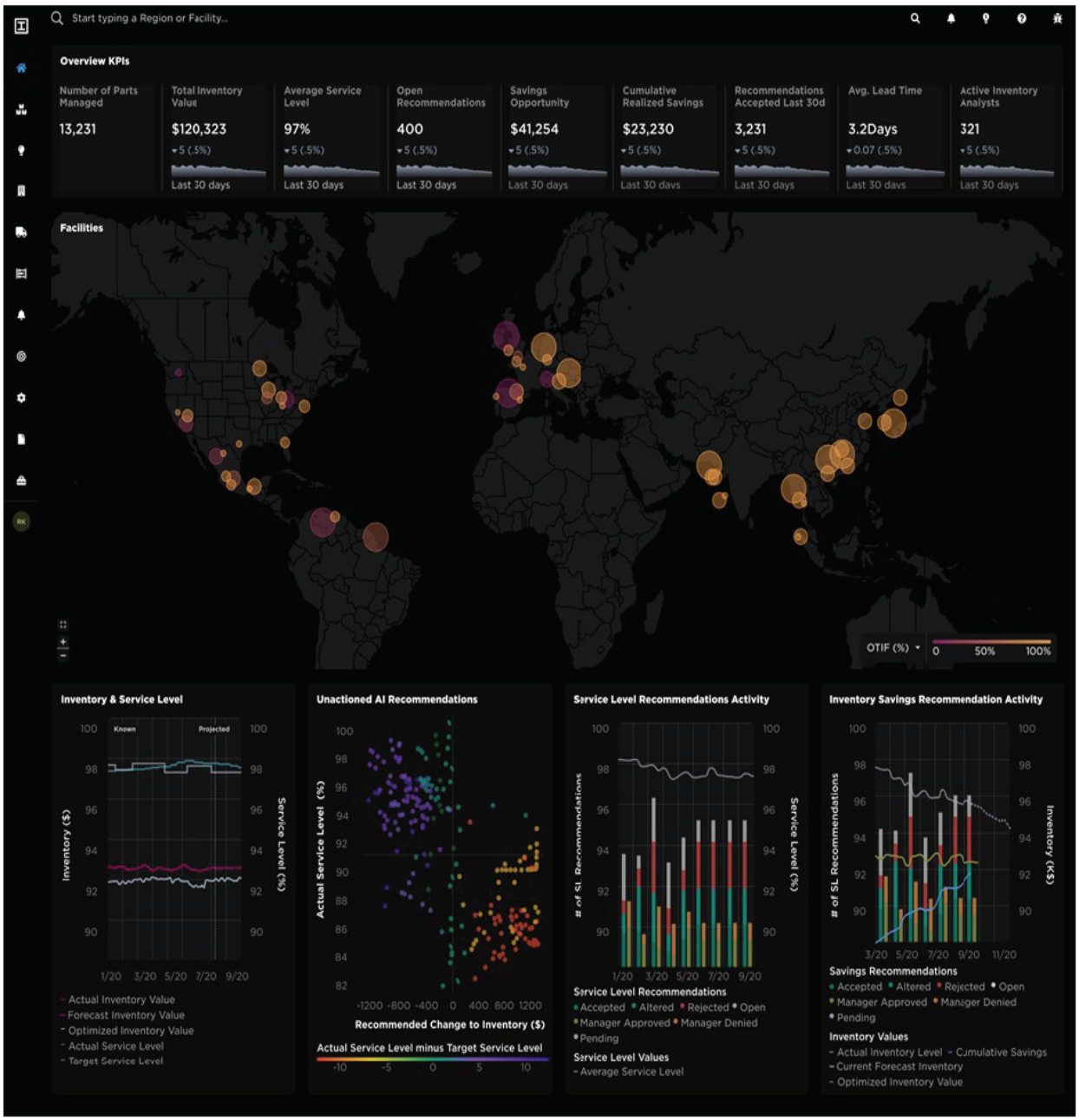
Data is the key ingredient of AI, because the quality of AI stands and falls with the underlying data; therefore, a strong data management foundation is crucial for any AI success. The degree of automation in that platform is critical, especially for AI-specific data management requirements.

With its data-first DNA and a data lake underpinning each C3 AI implementation, C3 AI has a very strong case to make when it comes to enabling AI-related and -required data management processes. C3 AI supports data lifecycle management, including long-term preservation of data as well as archiving in its platform. Given AI's tremendous hunger for data, archiving no-longer-relevant data, with the ability to return it when relevant, is a crucial data management capability for AI success. The C3 AI platform supports key data management tasks such as capacity provisioning, automated migration of data across different cost tiers in compliance with data regulation and residency policies, and eventual scheduled deletions of data.

Because C3 AI applies the same continuous-integration/continuous-delivery (CI/CD) framework to AI apps as it does to regular apps, AI app creation benefits from a CI/CD automation framework that enables the automated execution of tests, viewing of test results, creation of releases, and deployment of the AI applications.

Moreover, the C3 AI platform supports management of AI models, which is vital to managing AI applications. With C3 AI ML Studio, C3 AI supports the full AI lifecycle, including the creation of models,

Figure 6. A C3 AI-Powered Application With AI-Powered Suggestions at the Bottom



Source: C3 AI

their validation (single- and cross-model), A/B testing, managing of champion/challenger models, autoscaling, and rollback support. All of these out-of-the-box capabilities enable data scientists to focus on what matters: building rich AI applications that change the automation portfolio of their enterprises for the better (see Figure 6).

A Single Platform for Every Builder of Next-Gen Apps

In a digital economy, enterprises can suddenly find themselves in an "all hands on deck" situation, where it matters that all relevant and capable people in the enterprise can contribute to the creation or update of a next-generation application. But even outside of an emergency, it is advantageous for enterprises to be able to involve as many as capable and willing people as possible in a next-generation application project.

To face the capacity shortfall of developers, enterprises need to use platforms that enable business users to operate with no-code/low-code capabilities, thus taking ownership of their own automation destiny. There simply are not enough full-code developers available to build all the code that enterprises need and want in order to survive in a digital economy. Moreover, the support of no code/low code increases the velocity of application delivery, because the business users internalize the requirements collection and potential misunderstandings about the requirement.

A similar situation has arisen on the AI side, where the world simply does not have enough data scientists to build all the AI models enterprises need and want. Taking a page from the playbook of the developer shortage, enterprises need to use platforms that enable ordinary developers to build AI apps (although there is a shortage of developers as well, it is less drastic than that of data scientists) and even empower business users to build AI apps.

Finally, enterprise applications and AI applications are all about data. But data landscapes have substantially increased in complexity over the last two decades. Data is now fragmented across multiple systems, typically across multiple clouds. Again, the world is suffering from a data engineer shortage, so enterprises need to use platforms that enable developers, data scientists, and business users to manage their own data operations.

C3 AI addresses these trends with an inclusive-platform approach that caters to all roles, as follows:

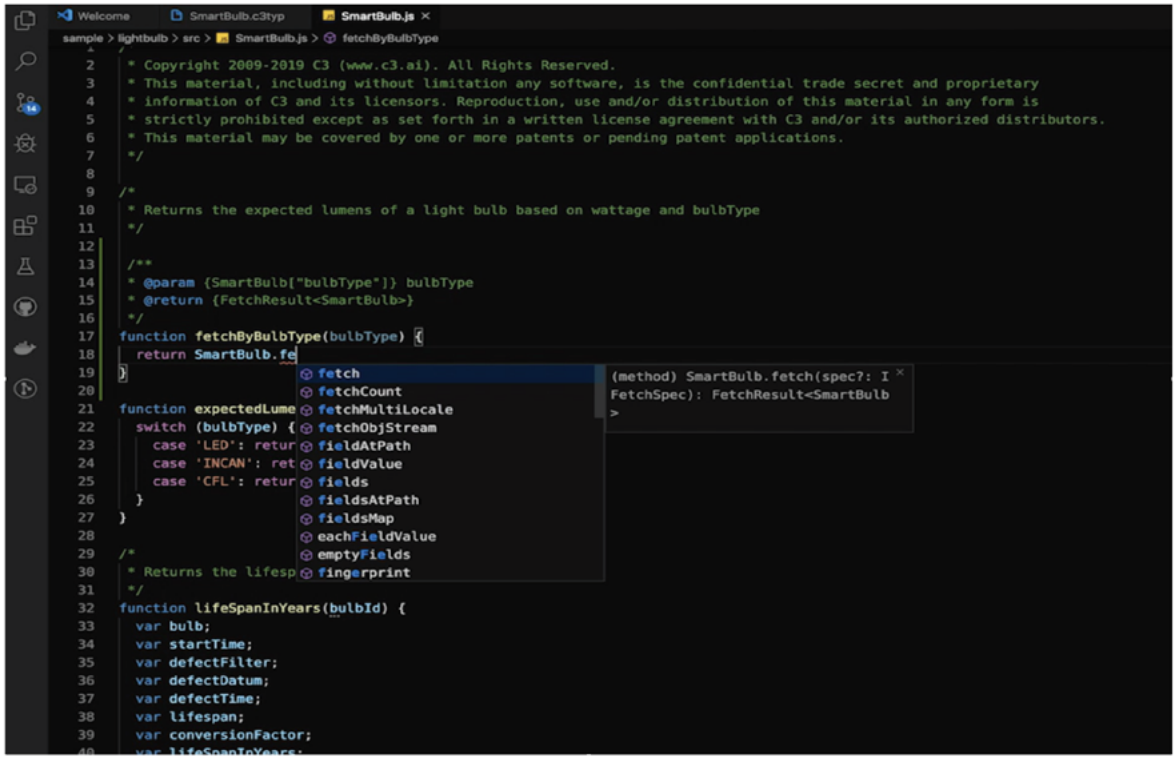
- Application developers have a freedom-of-tool choice. C3 AI's platform gives developers the best of both worlds (full code versus no code/low code) by offering them the choice to use both full-

code assets (via plug-ins such as C3 AI Visual Studio Code Extension—see Figure 7) and low-code application development with the C3 AI Integrated Development Studio (IDS). With C3 AI IDS, developers can operate on a continuous integration framework that enables them to monitor builds, promote deployments, and administer environments.

- Data engineers have powerful data management tools at their disposal. C3 AI Data Studio enables data engineers to easily create a data model, ingest data, define transformations, enable data discovery, author metadata, discover and explore data, document data element definitions, and more. Most importantly, all these capabilities are available from the same application/user interface (UI).

- Data scientists can focus on AI and save time on data "plumbing." C3 AI ML Studio is the tool for data scientists that enables them to model, develop, train, and tune AI models. It is also the place where data scientists can collaborate, monitor experiment progress, and deploy and operationalize trained models. With C3 AI ML Pipelines, data scientists can use a low-code-powered pipeline tool that

Figure 7. Full-Code Developer Experience Using C3 AI Visual Studio Code Extension With Syntax Highlights, Autocompletion, Error Checking, and Data Model Validation



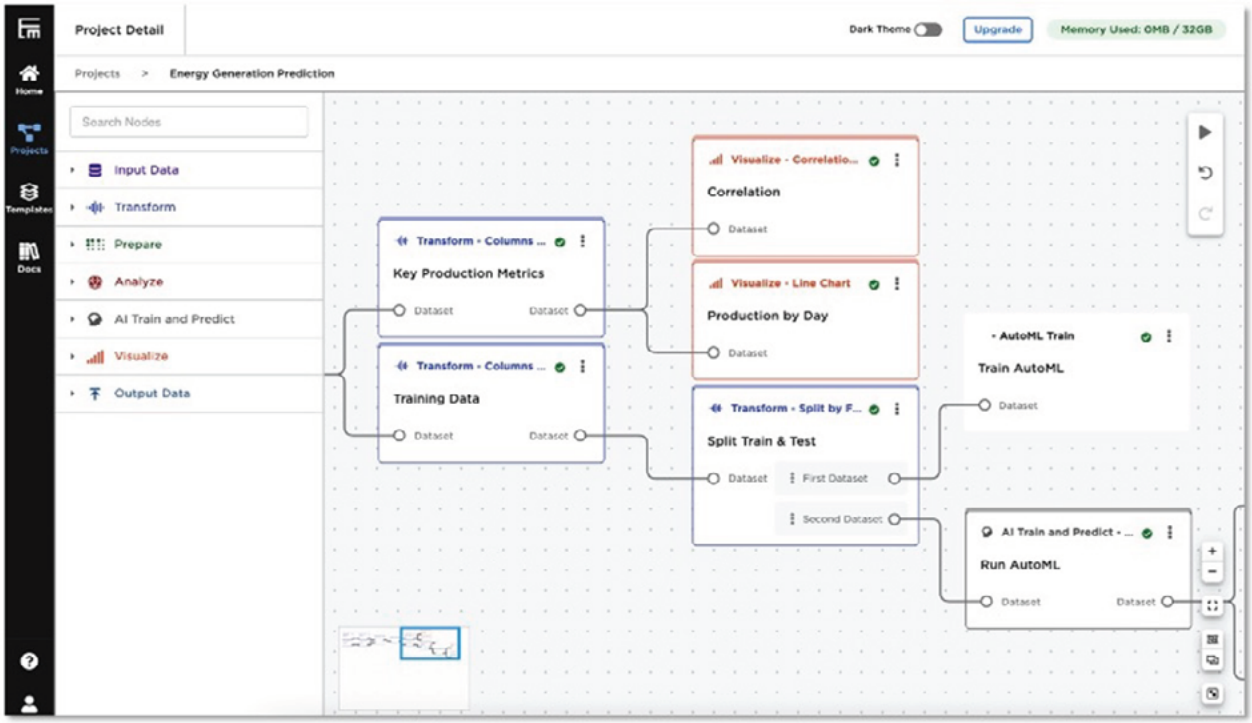
Source: C3 AI

enables them to declare and operate multistep, multiframework, and multihardware ML pipelines. Finally, C3 AI ML Studio enables automated model management of AI models at enterprise scale, across multiple clouds.

- Citizen data scientists can build their own AI apps. Citizen data scientists use C3 AI Ex Machina as their tool for building, training, and tuning C3 AI Suite models. C3 AI Ex Machina also provides an in-memory drag-and-drop design tool that can be used by business analysts and data scientists alike to explore data, discover data features, and develop AI models across C3 AI-related and third-party data.

- Business analysts and users are in charge of their automation destiny. Business analysts can use C3 AI Ex Machina as well to create, test, and maintain AI-based applications. Via an easy-to-use, intuitive UI, they can manage the full lifecycle of their AI projects, which enables them to create AI-powered automation that matters to them but that other enterprise resources have not been able to tackle (see Figure 8).

Figure 8. How C3 AI Enables a Business User to Build AI Apps With C3 AI Ex Machina



Source: C3 AI

Source: Oracle

ANALYSIS AND OBSERVATIONS

For CxOs making decisions about their enterprise PaaS platform, C3 AI provides a strong contender for consideration. Constellation sees the strengths and weaknesses discussed below.

Strengths

- **Functionally rich PaaS platform for AI apps.** Across the PaaS vendors in this Constellation Market Overview, C3 AI has one of the functionally richest PaaS products, all delivered in a single platform, UI, and release cycle. This enables enterprises to build next-generation applications faster and more efficiently.

- **Multicloud support with function abstraction.** C3 AI's platform is one of the few PaaS platforms that acknowledges the need for multicloud deployment and the functional incompatibilities and functional maturity of the single-cloud players. C3 AI's abstraction and mapping to cloud-vendor-proprietary implementations mean an elegant and efficient architecture for solving an industry-wide problem.

- **Inclusivity of all users and their automation needs.** To cater to the "all hands on deck" usage scenario in enterprises, C3 AI has consistent and powerful offerings for each enterprise user constituency, from developers and data engineers to data scientists and business users/citizen data scientists. Consistency and reuse of architecture set C3 AI apart here for high-velocity next-gen application creation that includes all enterprise personas.

- **High velocity for next-gen (AI) app creation and operation.** Combined, the factors described above make C3 AI one of the most efficient and fastest platforms for creating a next-generation application—exactly what CxOs need in order to make their enterprise succeed in the 21st century.

Weaknesses

C3 AI as a vendor and the C3 AI platform possess the following weaknesses compared with other offerings in this market space:

- **Being a smaller, less-known vendor.** Although C3 AI keeps growing rapidly and is very successfully expanding around the globe, it is still a relatively small PaaS vendor, raising potential viability concerns. And although historic pivots have only made the platform stronger, they also pose category and long-term strategic-direction questions. C3 AI went public in December 2020, which should bring more financial transparency, and is partnering with some of the largest cloud platform and application providers in targeted industry domains.

- **Proprietary stack concerns.** C3 AI's biggest strength also encompasses a key weakness: a fully integrated in-house-built stack. Although C3 AI offers standard industry architectural integration points in its technology stack, detractors will raise this architecture feature, coupled with the relatively small size of the vendor, as a concern.

- **Battling much larger competitors.** C3 AI, one of the smaller vendors in this Constellation Market Overview, is clearly punching above its weight class. It needs growth and economies of scale to thrive in the long term; otherwise, it risks being relegated to niche vertical and regional vendor status.

Table 1. C3 AI Strengths and Weaknesses

STRENGTHS	WEAKNESSES
· Functionally rich PaaS Platform for AI apps · Multicloud support with function abstraction · Inclusivity of all users and their automation needs · High velocity for next-gen (AI) app creation and operation	· Being a smaller, less-known vendor · Proprietary stack concerns · Battling much larger competitors

Source: Constellation Research

RECOMMENDATIONS

Constellation recommends the following for CxOs looking at C3:

- **Enable Enterprise Acceleration.** Enterprises need to move faster than ever, and IT/computing infrastructures cannot continue to be the shackles on agility that they have been. Therefore, CxOs should look to PaaS platforms that enable their enterprise to not only integrate and extend their automation portfolio but also to build the relevant applications needed to run their enterprise in the era of digital transformation.

- **Select vendors with an eye on key capabilities, roadmap, and business user enablement.** PaaS capabilities are becoming a strategic part of cloud platform selection. A lack of PaaS capabilities can severely hamper enterprise success, so CxOs need to consider roadmap items and roadmap delivery times as well. Given the proprietary path that large cloud players are taking, CxOs should consider third-party PaaS players such as C3 AI to provide an "uber" cloud platform.

- **Pick your next PaaS platform carefully, and make sure multicloud and AI capabilities are well supported.** PaaS platforms can decide the fate of an enterprise, because they enable Enterprise Acceleration. Key high-level capabilities required are the ability to build, deploy, and operate across clouds and build AI or AI-infused applications at high speed.

- **Exploit C3 AI to its fullest as a C3 AI customer.** Existing C3 AI customers that are not using C3 AI to its fullest are missing out on suite-level and integration efficiencies. Instead of using third-party tools for different parts of the application lifecycle, they should evaluate and benchmark C3 AI capabilities. In the end, it is all about velocity for building end-to-end AI-powered next-generation applications, and that can better be achieved with a suite of PaaS capabilities.

- **Take a stance on commercial prudence.** Regardless of the vendor, enterprises need to make sure they obtain the value they seek. With C3 AI, CxOs must pay attention to ensure that subscription costs provide their enterprise with an attractive TCO. As with all other services-related offerings, prices will fluctuate, need to be contractually agreed upon as long as desired, and must be constantly monitored to avoid negative commercial surprises.

RELATED RESEARCH

For the underlying Market Overview and more on next-gen applications and PaaS offerings, see: Holger Mueller, 'Why Next-Gen Apps Start with a Next-Gen Platform as a Service," Constellation Research, April 5, 2018. https://www.constellationr.com/research/why-next-gen-apps-start-next-gen-platform-service

For more best-practice considerations for PaaS offerings, see: Holger Mueller, "As PaaS Turns Strategic, So Do Implementation Considerations," Constellation Research, May 9, 2018. https://www.constellationr.com/research/paas-turns-strategic-so-do-implementation-considerations

For a Constellation ShortList on PaaS vendors, see: Holger Mueller, "Constellation ShortList™ PaaS Tool Suites for Next Gen Apps," Constellation Research, February 10, 2021. https://www.constellationr.com/research/constellation-shortlist-paas-tool-suites-next-gen-apps-4

Also see: Holger Mueller, "Constellation ShortList PaaS Suites for Next Gen Apps," February 17, 2021. https://www.constellationr.com/research/constellation-shortlist-paas-suites-next-gen-apps-4

For additional IaaS and PaaS selection criteria, see: R "Ray" Wang and Holger Mueller, "Key Questions for Every Public Cloud IaaS/PaaS Decision Matrix," Constellation Research, January 24, 2018. https://www.constellationr.com/research/key-questions-every-public-cloud-iaaspaas-decision-matrix

For a 2017 perspective on C3 AI, see: Holger Mueller, "C3 IoT: A NextGen Platform for NextGen Applications," Constellation Research, January 31, 2017. https://www.constellationr.com/research/c3-iot-nextgen-platform-nextgen-applications

For an example of how C3 AI has helped an enterprise, see: Holger Mueller, "ENGIE Transforms Its Business by Building on C3 AI IoT's PaaS," Constellation Research, March 23, 2018. https://www.constellationr.com/research/engie-transforms-its-business-building-c3-iot-s-paas

For an example of digital transformation, see: Holger Mueller, "Lufthansa Digitally Transforms the Workplace for Flight Managers," Constellation Research, February 27, 2018. https://www.constellationr.com/research/lufthansa-digitally-transforms-workplace-flight-managers

ENDNOTES

[1] *For the underlying Market Overview, see: Holger Mueller, 'Why Next-Gen Apps Start with a Next-Gen Platform as a Service," Constellation Research, April 5, 2018. https://www.constellationr.com/research/why-next-gen-apps-start-next-gen-platform-service*

[2] *Constellation Research uses the term* Infinite Computing *to describe how computing resources have practically become infinite for enterprise purposes, effectively eliminating the need to size hardware resources. For more details, see: Holger Mueller, "The Era of Infinite Computing Triggers Next-Generation Applications," Constellation Research, June 1, 2018. https://www.constellationr.com/research/era-infinite-computing-triggers-next-generation-applications*

[3] *Constellation Research uses the term* Infinite Insights *to describe how Hadoop-style technologies have enabled a new class of insight-focused applications that never run out of potential data to base these insights on and never limit the questions asked by business users. For more, see: Holger Mueller, "Infinite Insights Are the Architecture Imperative for Enterprise Acceleration," Constellation Research, July 14, 2020. https://www.constellationr.com/research/infinite-insights-are-architecture-imperative-enterprise-acceleration. Infinite Insights are the second layer of the best-practice Infinite Computing architecture described here: Holger Mueller, "The Era of Infinite Computing Triggers Next-Generation Applications," Constellation Research, June 1, 2018. https://www.constellationr.com/research/era-infinite-computing-triggers-next-generation-applications.*

[4] *Constellation Research defines* Enterprise Acceleration *as the need for enterprises to move faster and become more agile. For more, see: Holger Mueller, "Why the C-Suite Must Embrace Enterprise Acceleration," May 2, 2019. https://www.constellationr.com/research/why-c-suite-must-embrace-enterprise-acceleration*

[5] *For more details on the patent, see: Systems, methods, and devices for an enterprise AI and internet-of-things platform, U.S. Patent No. US10,824,634B2).*

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

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