



NUCLEUS
RESEARCH

LCAP TECHNOLOGY VALUE MATRIX 2020

ANALYST

Isaac Gould, Daniel Elman, Nick Grizzell

THE BOTTOM LINE

Low code application platforms (LCAP) will become an increasingly important component of the enterprise technology stack. Companies realize value by increasing overall agility and filling functionality gaps in their existing digital ecosystems, leveraging the simplified tools to deliver new applications and custom capabilities more quickly than traditional full-code practices. The vendors were evaluated on the basis of functionality and usability, further broken down into: integration with other platforms and tools as well as the ability to export as a standalone app; available templates and out-of-the-box components used to accelerate development; built-in AI, analytics, and data management functionality; product scope (best-of-breed or open enterprise platform); key differentiators; and most critically, customer use cases and success with direct conversations with LCAP users informing the research.



OVERVIEW

Nucleus defines a Low Code Application Platform (LCAP) as an environment that hosts various low to no-code tools for both citizen and professional developers to build business solutions. Low and no-code tools can range from visual drag and drop workflow builders and set-up wizards that guide users through point and click processes to simplified coding language for complex tasks.

There is an expansive market for LCAP solutions, both from large full-suite application vendors that address multiple business segments or standalone vendors not beholden to another's platform or data service. Standalone vendors cover a wide range of the market in terms of platform functionality and the resulting complexity of the applications built. Some focus on automating manual processes and streamlining employee activities via Robotic Process Automation (RPA) and Business Process Management (BPM) capabilities. Others are better suited for developing full-fledged enterprise applications to address the functional gaps of customers' IT ecosystems, reducing the need for third-party solutions and the associated costs. When it comes to large multi-class solution vendors, including Oracle, Salesforce, Infor, Zoho, Microsoft, and Google, their LCAP user bases primarily stem from customers already using the platform for other solutions, databases, or cloud services. These users often leverage the LCAP solutions to customize their existing solutions and extend the functionality for their specific needs. They can also build standalone applications for both internal and external purposes to build applications and services such as interactive portals, forms, and web services.

On the surface, an LCAP is a valuable tool to build applications that supplement an organization's solution environment, digitizing a greater number of business processes and customizing existing applications to match needs and objectives better. However, the true value of LCAP lies not in the applications built but in its ability to improve organizational agility, flexibility, and cost-efficiency. While the applications built by an LCAP certainly enhance employees' productivity and work quality, developers express the most satisfaction with the low code tools. Businesses can deploy applications faster than ever before, often in a matter of one to three months, whereas implementing a third-party application is an arduous and expensive process that increases in price and time along with the size of the company and complexity of the system. Given the similarity between the functionality of leading LCAP solutions and the ability to build virtually an infinite number of unique applications, the key value driver of a low-code development product boils down to its out-of-the-box connectors, tools, and templates. Connectors for integration are a vital component of a solution's value proposition. For an application to drive automation and reduce the manual workload for a business, it needs to connect to neighboring systems for data intake to perform its purpose and then feed that data for downstream processes. Connection with third-party services and bots further improves the functional value of a solution as those tools can be easily ported in.

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When it comes to choosing the right LCAP, potential customers need to assess the no-code tools offered by a vendor to ensure it matches their development needs and its primary users' expertise, whether it's for tech-savvy business users or professional developers. Furthermore, users must first ensure that the LCAP will integrate with its IT systems, on-premise or cloud databases and that its developers are familiar with the code language, SQL or JavaScript, for example, since they will have to touch code at some point along the development or update process. After assessing the nature of an LCAP and its out-of-box tools and native integrations, users will be able to deploy applications rapidly with as little third-party support as possible. Speaking with dozens of end-users of all the low-code products featured in this report, Nucleus has noted that LCAP tools are still predominately used by either in-house professional developers or outsourced to a development partner. While citizen developers often play a vital role in designing the applications, laying out their vision to meet their objectives best, a professional developer is usually required to bring an application to fruition, especially for defining complex relationships and rules.

LEADERS

The Leaders in this year's Value Matrix include Appian, Infor, Mendix, Microsoft, Salesforce, and Zoho.

APPIAN

Appian provides a powerful low-code platform for rapid application development and driving enterprise automation. It unites end-to-end processes across an organization through advanced low-code tools for Robotic Process Automation (RPA), Business Process Management (BPM), Decision Rules, API Integration, Case Management, and AI. After speaking to several customers about their experiences with Appian, the consensus pointed towards an easy-to-implement and rapid go-to-live solution, with some customers fully utilizing the platform within the first few days. Customers also praised the platform for accelerating development cycles, reducing costs, and increasing user productivity.

The Appian platform excels in automating manual work, simplifying complex processes, and streamlining developers and business-level users' decision-making process. The platform's visual design paradigm and pre-built templates enable a developer to skip writing code and focus on delivering impactful business applications. Non-technical users can also leverage Appian's citizen development capabilities to create applications without compromising the platform's performance, governance, and security.

Appian's RPA technology enables users to automate repetitive manual tasks and integrate systems that lack modern APIs. Appian RPA caters to both developers with Java development tools and non-technical users with low-code design experiences. Appian RPA further includes extensive robot governance capabilities and pre-built modules to simplify and accelerate the implementation of robots. Appian RPA runs on Appian Cloud to increase the solution's security and stability and supports new features like intelligent image recognition of objects on a screen to reduce errors in bot actions. The elimination of manual tasks continues further with AI-powered Intelligent Document Processing (IDP) to automatically extract data from large volumes of documents without human intervention.

Additionally, the Appian platform excels at BPM, enabling users to create complex business process flows and logic in a no-code, drag-and-drop design environment. AI-assisted workflow modeling provides further guidance to users to improve the speed and accuracy of process design. Business insights are also continuously monitored by Appian's process analytics engine, which records every process execution for real-time metrics and KPI reporting. The platform includes a no-code design environment for its Decision Rules engine and its API Integration Designer, which ships with over 100 packaged connectors to common systems such as Salesforce, SAP, and Microsoft SharePoint. Through this, Appian is often used as a multi-experience platform for creating web, mobile, voice/SMS, and conversational applications.

Appian already filled 2020 with key updates, innovations, and integration capabilities to not only improve the platform but simplify the app development process for users:

- In March 2020, Appian released Appian RPA, which augments Appian's Low-code Automation Platform to govern cloud-native Appian software robots in a unified automation stack. The combination of RPA, AI, workflow management, case management, decision rules, and API integration tools helps accelerate low-code app development and automate end-to-end business processes.
- In March 2020, Appian expanded its partnership with Google Cloud. The partnership focused on intelligent document processing by enhancing the Appian AI offering and enabling out-of-the-box AI capabilities pre-configured for IDP.
- In April 2020, Appian launched its Workforce Safety solution to help companies protect employees' health and safety when returning to work during the COVID pandemic. The solution comes fully pre-built with workforce health screening capabilities, return authorization, contact tracing, and managing a phased return to work facilities.
- In May 2020, Appian announced a strategic technology partnership with DocuSign. The partnership aimed to enhance the integration between DocuSign and Appian's

Low-code Automation Platform by creating a no-code plugin to add electronic signature capabilities to any business process built on Appian.

- In June 2020, Appian released updates to the Appian Low-code Automation Platform. New features and updates included real-time AI guidance, low-code DevSecOps, and IDP to increase operational efficiency and improve customer experiences.

Nucleus spoke with several Appian customers and found benefits surrounding rapid deployment times, increasing employee productivity, simplifying application development, enabling non-technical users, and enterprise scalability and performance. Customers quantitatively highlighted a 20 percent savings on IT spend, a 45 percent increase to productivity, and an ROI of fewer than five months. Appian's low-code development platform is positioned as a leader in this year's Value Matrix with a simple and intuitive design environment, extensive automation capabilities, and tools to meet a diverse set of business needs.

INFOR

Infor Mongoose is Infor's low code application development framework to simplify the process of designing and deploying software applications. The framework is part of the Infor OS ecosystem that, when completely leveraged, supports Infor CloudSuite customers with improved stability and flexibility. Infor Mongoose excels at building simplified applications and gives users the tools and depth to create complex enterprise software application solutions. The simplified relational database technology combined with a unique architecture supports internal business-level and external end-users of applications by allowing both parties to extend and adapt the applications. The Infor Mongoose Framework covers an extensive range of capabilities ranging from automatic web rendering, multi-device support, flexible integration, diagnostic and monitoring capabilities, agile cloud deployment, and low cost of ownership.

Rapid application development is the central focus of the Mongoose platform, and the toolsets provided to developers and non-technical users ensure that the amount of program coding required by users is minimized. Infor Mongoose uses a metadata defined model for the user interface, the mid-tier business objects, and business processes to simplify processes. This metadata-driven approach seamlessly connects application and UI/UX presentations with Mongoose forms to Intelligent Data Objects (IDO), Mongoose's abstraction of complex data model definitions, relationships, methods, and an application event system. This philosophy and approach help insulate developers from extended upgrade cycles by making the entirety of metadata-described content upgradeable with framework tools such as FormSync. The metadata model also enables large portions of software application development tiers to be developed with zero code through Infor

Mongoose. Furthermore, Infor Mongoose utilizes reusable code within the framework, such as validators, scripts, and component classes.

Extendibility and adaptability also prove to be a pillar of the Mongoose structure, supporting access to key locations in the base application allowing end-users to add extensions. The extensions are automatically migrated when upgrades occur, further reducing the input required by the user. For example, users can extend any business process using the Application Event System to define rules that execute whenever an insert or update occurs to a business object in the application. Users can extend business objects to create new Intelligent Data Objects in the base application and add new tables and fields. Additionally, users can extend any portion of any screen, including new tabs or fields, validation logic, and enabling logic while also allowing users to embed controls written in HTML 5 or JavaScripts. Another key feature for extensibility is Mongoose's Photoshop-like ability to manage content development in layers. Content is able to be developed and controlled at various levels (vendor, site, entity, etc.) that allow folks to control extensibility as well as roll back changes. To further support the adaptability of Infor Mongoose, the platform strives to support integration with other business applications. Infor Mongoose allows users to connect an external application to query or update data and automate processing for a wide range of technologies such as WebServices, XML, .NET, and COM. Users can integrate software directly at the user interface level on Mongoose, which includes embedding any other application's web UI into any Mongoose form and interacting with client applications through the Mongoose document management functionalities. Furthermore, Infor Mongoose applications are fully cloud-enabled and support agile cloud deployment allowing users to extend and adapt applications in cloud scenarios.

Each month throughout 2020, Infor released updates to the Mongoose platform to improve the solution's usability, functionality, and overall performance. Here are some key improvements for 2020:

- In January 2020, Infor added support for internal web server application URL and added support for optional parameters in IDO extension methods.
- In March 2020, Infor added a new table and IDO wizard in App Builder, allowing users to create tables and collections that store data using data services. Infor also added a new wizard to import Data Lake objection from the Infor ION API into Infor Mongoose.
- In April 2020, Infor added a new wizard for strongly-typed APIs with Swagger documentation as well as a new wizard for external workflows to generate alert workflows, approval request workflows, and pulse alerts.
- In September 2020, Infor added new diagnostic features in Trace Viewer and the Diagnostics window. In Trace Viewer, users can now view variables created or

maintained by Mongoose runtime and referenced by forms. In the Diagnostics window, users can now submit expressions to be evaluated by Mongoose Parsing Utility.

- In October 2020, Infor enabled the Web Designer to support the use of Visual Studio when editing global and form scripts. Additionally, Infor improved the performance of license application processes to decrease the time required to apply or reapply license documents to tenants in the cloud.

These are just a few highlights from an extensive list of improvements to the Mongoose platform that are released each month. With continued support displayed throughout 2020 and industry-leading capabilities surrounding integration, out-of-the-box functionalities, data management, UI, and analytics, Infor Mongoose is positioned as a Leader in the 2020 LCAP Value Matrix.

MENDIX

Mendix is a low-code application development platform centered around a visual, model-driven software development model to enable both non-technical business-level users and advanced developers. The application development platform aims to create a medium between business and IT users by creating an environment where users of all skillsets can extract value and drive business processes. Mendix offers support for mobile, tablet, and desktop applications when developing new apps for many uses cases from IoT to legacy applications.

Mendix centers around a model-driven development approach that provides extensive capabilities without sacrificing functionality to support a broader skillset of employees. With many companies unable to hire large teams of programmers to handle application development needs, companies will look towards solutions like Mendix to enable its non-technical business-level users. As companies continue to adopt remote work environments, the development teams will be constructing more applications than ever before to support company operations. With a cloud-native architecture, citizen developers and advanced users can deploy apps on-premises or in the cloud with a single click. Mendix is also one of the first platforms to support AI-assisted development that only further enables non-technical users.

The Mendix Studio is the visual, no-code online environment that enables a wide range of business-level users. Mendix Studio deploys drop-down menus, drag-and-drop functionalities, visual workflow management, and AI-suggestions to increase non-technical users' productivity. Mendix Studio Pro is a desktop application that allows more advanced users, such as developers, to extract value from tools that dive deeper into the application development process. Mendix Studio Pro can be used by the full stack developer to create

extensive applications through more complex coding, logic, and integrations. Mendix also supports integration with DevOps as model changes can be merged to version control repositories, and change commitments trigger downloads of the latest app versions.

By offering both a no-code and low-code tooling in a single platform, Mendix can address all organizations' needs and user skill sets. The combination also increases the efficiency of IT departments as it promotes collaboration among developers and non-technical users. Developers and business-level users can develop across a range of use cases from mobile apps, operational efficiency apps, customer engagement apps, and legacy solution replacement. Model-based software development tools like Mendix can help companies replace legacy applications by applying new technology in areas that have seen minimal updates.

Throughout 2020, Mendix has released several updates to bring new capabilities to the platform as highlighted here:

- In May 2020, Mendix announced update 8.10.0 to the platform. The update included quality of life improvements and new features surrounding preserving data during offline synchronization and associations in microflow expressions. Whenever an offline-first app synchronizes, the offline database is cleared and repopulated from scratch to guarantee data integrity. Additionally, users can now follow the object's association in a microflow expression to get a referenced object's attribute.
- In July 2020, Mendix announced update 8.12.0 to the platform. The update brought associations with nanoflow expressions, which makes it easier to retrieve attributes. Furthermore, users can now retrieve attribute values from a data source for pluggable widgets giving users access to domain data within these widgets.
- In September 2020, Mendix announced update 8.14.0 to the platform. The updates saw a large wave of additions to the platform, including the release of Mendix Data Hub, which allows users to utilize data from different sources in an app without dealing with complex integrations. The introduction of a dynamic class property on widgets enables specifying an expression that computes class name(s) to apply. Users can also now use expressions and text templates in the context of a data source for pluggable widgets giving end-users more control and flexibility when using a widget. Further support for native mobile navigation, pop-up windows, and control over history aims to help understand end-user behavior and deliver applications that meet their needs.

Mendix continues to display a commitment to innovation with its low-code development platform by offering a diverse set of tools to enable both non-technical users and developers. The low-code development platforms that strive to support all user skill levels will succeed in 2020 and into 2021. For the continued addition of new features to the

Mendix platform and the support for a wide range of users, Mendix is positioned as a Leader in this year's 2020 Value Matrix.

MICROSOFT

Microsoft is a Leader in the LCAP Value Matrix 2020 with its offering of Microsoft Power Platform. Currently supporting businesses of all sizes across virtually all industries, Power Platform combines various tools to help customers tackle the full range of solution development complexity from simple forms to full-scale comprehensive enterprise applications. Microsoft supplements Power Apps, its primary low-code app development solution, with Power BI for embedded analytics, Power Automate for RPA to extend legacy systems' lifespan, Power Virtual Agents for no-code chatbot integrations and customizations. These integrated applications are all hosted on the Azure Cloud infrastructure, complete with Azure Services and Data Management capabilities for professional developers to access code when needed for continuous integration and delivery (CI/CD).

Interviewed customers have expressed satisfaction with the range of processes and activities that could be addressed through the Power Platform. For example, users used out-of-the-box connectors for edge and IoT devices to enable handheld scanners for warehouse and wholesale stores and container monitors to track the temperature and physical impact events for perishable or fragile assets in transit. Additionally, citizen developers can embed analytics into solutions through simple point-and-click wizards with Power BI. With native connectors to Common Data Services and Azure SQL Data Warehouse, the Power Platform supports scalability as developers can add additional entities to manage the data of complex solutions and aggregate data up to the petabyte-scale for analytics. The Power Platform is designed for widespread use across an entire organization; companies have steadily increased their investments in the LCAP, purchasing licenses across multiple departments for personnel with a range of coding expertise. While non-developers have been able to deploy upwards of a dozen applications independently, Microsoft's LCAP sees the most growth with technical developers driving productivity with no-code tools and the increasing number of services on the Azure platform.

On top of UI, workflow design, and business object and logic customization, Microsoft Power Platform differentiates itself through hundreds of out-of-the-box connectors to integrate Power App built applications with a wide range of CRM, ERP, and other enterprise solutions in the market. Further, Power Automate connects legacy systems with the broader IT ecosystem through RPA. Altogether, Power App solutions have considerably increased their value proposition as developers can rapidly design and deploy specific applications and business workflows without the need to rip and replace existing systems. This leads to two-pronged cost savings, where companies leveraging the Power Platform can build applications to avoid expensive third-party licensing fees and increase their ecosystems'

lifespan. Over the past year, Microsoft has increased the number of pre-built APIs, integrated the Power Platform with GitHub to enable collaboration between IT teams, connected Power Virtual Agents with Azure Bot Framework so no-code users can develop bots, and added Mixed Reality capabilities into the Power Platform. Nucleus believes continual investments in the Power Platform and the success of a diverse set of use cases establish Microsoft as a leading vendor pushing the functional limits of the LCAP market.

SALESFORCE

The Salesforce Lightning Platform is the toolbox for building transformative experiences - clicks and code work side-by-side for all aspects of the platform, and with CRM and other Salesforce applications natively integrated. COVID-19 has exacerbated the need for companies to respond to change in a short amount of time by updating business processes or creating new standalone applications.

Salesforce offers a rich, component-based framework for developers and administrators to use. It has expanded our drag-and-drop builder tools across the development process, from Schema Builder, App Builder, and Community Builder through more recent capabilities such as the Dynamic Forms, Dynamic Actions, and the Customer 360 Data Manager. Additionally, to further extend the reach available with the platform, customers can search the App Exchange for applications, components, connectors, and extensions created and offered by other members of the user community. In every domain, the focus is to empower business users to participate in the app creation process through low code tools that leverage reusable code, whether that is a data model, a web component, or a workflow. It aims to make developers more productive by offering low code tools that simplify the management of common developer tasks and build secure applications, with governance and security controls built in. This includes new functionality in development environments and development tools, including local development for Lightning Web Components. The framework uses JavaScript on the client-side and Apex on the server-side to create single-page web applications and provides users with a collection of code, allowing app development without writing the code itself. Lightning Component also uses an event-driven architecture to simplify the development of any application further. Salesforce Lightning also supports the open-source Aura framework, which lets users build apps regardless of whether data is structured or unstructured. It also includes changes to make writing code secure by default, with enhanced field and object-level permissions checking for SOQL and Apex. In addition to CRM data, it is a priority to work with third-party and legacy data sources through Platform Events and the MuleSoft integration offerings.

Periodically, Salesforce will release summer, winter, and spring updates to the platform that cover a wide range of products, including the Lightning suite:

- Winter 2020 Updates: As a part of the Winter 2020 release notes, Salesforce changed Lightning Web Components to an open-source framework giving users the ability to build web components on any platform. Lightning Web Components now also offer local development enabling users to build component modules, and view changes live without publishing to an org.
- Spring 2020 Updates: The Spring 2020 release notes aimed at Lightning App Builder with mobile enhancements for all, guidance for App Builder, and increased component capacity in page relations. All admins can now configure record pages, page templates, and component visibility rules for use on a phone. Users also get suggestions to improve their Lightning pages with guidance now built into App Builder. Lightning Components also saw several feature updates with simplified reactivity, style Lightning Web Components with custom Aura design tokens, and source tracking for Lightning Web Components in scratch orgs.
- Summer 2020 Updates: The Summer 2020 release notes saw Salesforce B2B Commerce come to Lightning Experience, giving users the tools to design, build, and launch a B2B commerce solution. Lightning App Builder also saw several updates with dynamic forms, dynamic actions, and accessibility enhancements.

Salesforce is positioned as a Leader in this year's Value Matrix. The Salesforce ecosystem is one of the most robust and active enterprise ecosystems, and the vast majority of those thousands of customers in that community leverage Lightning to extend functionality and enable custom processes in their Salesforce instances. It offers a balance between simplicity and ease-of-use that enables agility and rapid development with full-code tools, and security and governance controls to ensure quality, security, and enterprise-level performance out of the solutions that are produced.

ZOHO

Zoho Creator provides a graphical drag-and-drop low-code platform allowing both non-technical business-level users and developers to create online database applications centered around their business infrastructure. Zoho Creator covers the entire lifecycle of an application deployment project from development to delivery, and with Deluge, a powerful scripting language, users can design applications with little to no code involved. As with many low-code development platforms, Zoho Creator allows users to build and run applications without the need for on-premises infrastructure, saving companies time and money on maintenance. Zoho Creator also deploys an easy to navigate and visually appealing UI to support drag and drop visual builders for front-end and back-end development. Business-level users and developers can use these visual builder functionalities to accelerate the creation of forms, pages, and dashboards and simplify processes surrounding integration, workflows, and customer portals. For all skillsets, Zoho

Creator provides functionality for one-click deployment, cross-platform compatibility, and auto-scaling for diverse architectures. With Zoho Creator, a developer can build, design, preview, and deploy applications that are compatible with web, mobile, and tablets all at once without additional efforts.

To further support both non-technical users and developers, Zoho Creator deploys toolkits to assist throughout the development cycle. For example, the IDE in Zoho Creator verifies each line of code to detect issues before going too deep into the application development. This helps simplify the process of creating forms, reports, and customized HTML pages within the solution. Workflows can be added to forms and reports through a drag-and-drop interface to automate tasks and custom actions. Additionally, Zoho Creator supports web and mobile SDKs, widgets, and extensions to meet all developers' customizability standards.

The agile development environment deployed by Zoho centers around key toolsets such as Sandbox, version control, data connectors, templates, and APIs, and SDKs. The Sandbox allows users to create a copy of an application for editing and testing before fully deploying the application. Zoho's support for version control means that users can recall specific versions of the written code to accelerate the debugging process. Templates offer ready-to-use applications that can be rapidly deployed without sacrificing flexibility and customizability. Zoho Creator also provides REST and SOAP APIs that are immediately available without building endpoints. For security, Zoho Creator supports SAML, LDAP, and OAuth2 protocols to ensure users have extensive access management control.

On an almost weekly basis, Zoho Creator receives updates to improve performance, usability, and functionality. Key updates for 2020 include:

- In April 2020, Zoho added widgets to Zoho Creator, allowing users to embed widgets into pages and make widgets communicate with Creator applications using the provided JavaScript SDK.
- In May 2020, Zoho introduced shared analytics, which provides a conducive method for users to create reports while accessing applications from a web browser. Users can share the reports created with others, and other users' actions in these reports will be subject to their permissions in the app.
- In May 2020, Zoho introduced layout design for a quick view, which lets users create custom card-like layouts for displaying the records in a quick view of their list reports.
- In June 2020, Zoho unveiled Zoho Creator's v2 APIs, which brought improvements to a wide range of functionalities include OAuth based authentication, better structuring of the API request, better error handling, and improved performance compared to v1.

Zoho is positioned as a Leader in this year's Value Matrix. It continues to push meaningful updates to its low-code solution, ensuring that users get the best possible experience in terms of performance and functionality on the platform. Furthermore, Zoho Creator supports extensive integration capabilities with external applications as well as supporting both non-technical business-level users and developers.

EXPERTS

Experts in this year's Value Matrix include Oracle APEX, and ServiceNow.

ORACLE APEX

The Oracle Application Express (APEX) deploys a unique web integrated development environment to simplify processes for any level of use, from developers to non-technical business-level users. Oracle APEX focuses on improving visual development, data integration, and DevOps lifecycle management for its users. The low code platform simplifies monitoring and maintenance with drag and drop capabilities, built-in bug tracking, built-in project management, and full-stack application logging and dashboards. Oracle APEX utilizes a minimal application server footprint and does not require middle-tier servers to run business logic at scale like some Java and .NET applications. The Oracle APEX features also extend to real application clusters, flashback queries, SQL extensions, and robust security features for authorization, authentication, and logging.

Oracle APEX caters to all users by providing developers with advanced toolsets to dive deep into app development and deliver enterprise-level solutions while ensuring that non-technical users can build applications with minimal code through intuitive wizards. Non-technical users can expect to rapidly build data forms, reports, charts, and simplified applications on the platform. The simplified app development architecture supported by Oracle APEX extends to the APEX app itself as it handles session management for developers that would typically take time away from more important developmental processes. In terms of reporting capabilities for non-technical users, APEX supports most operational reporting use cases allowing users to create, modify, and customize their reports in the same environment to develop applications with little to no code. Oracle continues to augment developers and non-technical users with periodic updates to the APEX platform. As recently as April 2020, Oracle released version 20.1 with these key features:

- APEX and the App Builder interface now work in conjunction with Redwood, Oracle's new user experience design system.

- The APEX platform received faceted search enhancements to allow for a cascading list of values, conditional facets, and compact count display.
- The URL syntax for APEX apps was simplified and provide a Search Engine Optimization (SEO)-friendly URL structure. The structure makes it easier to understand and provides a more direct context of where a user is within an app by removing application or page numbers. Instead, it uses the workspace path prefix, application and page aliases, and standard web parameter syntax for its URL structure.
- Oracle APEX saw improvements in application lifecycle management with one-click app deployments, automated backups, and zip exports to make it easy to deploy APEX apps and integrate into an existing workflow.

Currently, Oracle APEX low-code development solutions support developers' extensive capabilities while also supporting non-technical users with simplified processes. The data management capabilities of Oracle APEX solidify the platform as an expert in the LCAP space, and with further development towards AI functionality and integration with third-party applications, Nucleus expects APEX to migrate to the Leader quadrant.

SERVICENOW

ServiceNow is an Expert in this year's LCAP Technology Value Matrix, recognized for the functionality of its Now Platform. The cross-departmental Now Platform enables businesses to develop applications, automate business processes, and integrate systems with a natural language environment. With a service-oriented approach, the Now Platform is often used to address IT, employee, and customer workflows. The vendor has been regularly updating its services to widen the breadth of its platform's functionality: In Q1, 2020, ServiceNow added Now Intelligence for AI and analytics tools for anomaly detection, predictive modeling, peer benchmarking, and performance forecasting. The Now Platform Paris release launched in Q3, complete with greater automation capabilities across financial operations, enterprise asset management, business process management, legal service, telecommunication management functions.

The recent analytic upgrades have boosted Now Platform's value proposition, especially for IT managers who can easily generate insights and assessments for recommendations on managing resource usage, identify vulnerabilities in daily tasks and software, and initiate the corresponding change requests. Software developers have responded positively to the extensive no and low-code DevOps tools to help their organizations overcome misalignments between development and operations teams, leading to faster time to value while complying with enterprise requirements. Leveraging the platform, non-technical users can automate tasks and processes, freeing up IT resources for more complex customizations

using standard web languages. Administrators, managers, and employees can even view development progress, approve tasks, submit requests, and access self-service portals through mobile solutions. Users reported faster time to live through no-code development, which has led to increased productivity by reducing workloads through automation and simplify developer tasks, which reduces operational costs by eliminating labor requirements and avoiding third-party IT services. Nucleus recognizes Service Now's emphasis on streamlining developers' daily tasks and its deep expertise in addressing the operational pain-points of service-based businesses.

FACILITATORS

Facilitators in this year's Value Matrix include Betty Blocks, Creatio, and Oracle Visual Builder.

BETTY BLOCKS

Betty Blocks is a facilitator in this year's LCAP Value Matrix. The Betty Blocks low-code development platform is recognized for its ease-of-use, providing non-professional developers the tools to build and deploy business applications at a rapid pace. Intending to make its product accessible to the whole organization, Betty Blocks is an entirely browser-based LCAP that does not require installation to allow users to get started as soon as possible. Further, per its namesake, Betty Blocks provides an extensive library of modules, or "blocks," that perform simple actions which customers piece together to build their applications. With front-end UI tools, workflow builders, and back-end connectors and process automation tools, Betty Blocks' users can replace much of their legacy IT ecosystem with homegrown applications that best suit their business needs.

Speaking with Betty Blocks customers, we have found that users can develop all sizes of applications through the compartmentalized approach. With access to a growing library of connectors and web services, citizen developers can build increasingly functional applications in an entirely no-code environment. Additionally, professional developers are often used for back-end customizations, and to build out any unsupported connections or alter existing ones for complex relationships between modules are other solutions in the IT ecosystem. With tools for the range of coding expertise, Betty Blocks provides an attractive value proposition, especially for SMBs that do not need a full suite of solution platforms for every segment of their business but can now target pain points with in-house applications. As Betty Blocks continues to invest in R&D, increasing the number of modules, connectors, and DevOps tools, its out-of-the-box functionality will soon grow to that of name-brand giants of the enterprise application market. Emphasis on developer governance and

compliance, Betty Blocks maintains its priority of accessibility to citizen developers with Citizen Development Control Center, ensuring users are building apps that will not harm business operations or the overall software environment. High usability, rapid deployment, and a clear development process educate non-professional users to the app-building process, further alleviating a company's dependence on IT staff. We believe the vendor is trending to become a challenger to leaders in the space within the next few years.

CREATIO

Studio Creatio is an intelligent business process management and low-code platform, enabling mid-sized and large enterprises to automate and accelerate business processes and build custom applications for specific needs. The platform is built with native intelligence to automate complex workflows and drive efficiency. It offers core functionality around salesforce and customer service automation, but the low code platform still allows users to extend functionality and create custom applications to fill in any functional gaps in their existing application stack. Because of its roots as a CRM provider, the most common use cases involve sales and customer service tasks, like creating and logging responses to custom forms or automating an online sales play. It includes pre-configured solutions for marketing, sales, and service, including verticalized capabilities for financial services, professional services, retail, media and advertising, telecommunications, manufacturing, pharmaceuticals, transportation and logistics, and the public sector.

Key capabilities and features include business process management with process modeling, execution, monitoring, and analytics; dynamic case management with context-based patterns, built-in artificial intelligence and machine learning capabilities allow non-technical users to create intelligent apps without wrangling extensive code or datasets; a fully-functional mobile app, and multi-level security to meet enterprise standards as many customers are large international organizations with thousands of employees, requiring extensive and reliable security protocols for all internal- and external-facing applications. Creatio also offers the Creatio Academy, an online learning resource and community where users can familiarize themselves with the platform and learn new skills, dramatically accelerating onboarding and time to value for customer organizations.

Creatio is positioned as a Facilitator in this year's Value Matrix. It offers a highly usable solution with extensive pre-built templates and capabilities to fit specialized industries and business processes. It is characterized by rapid deployments compared to other enterprise-level solutions. With Creatio being most-known for specialized business process management capabilities across the customer experience (sales, marketing, and customer service) domain, although this is constantly expanding to include new functional areas, it doesn't have the same level of mindshare among customers as larger platform customers like Microsoft and Salesforce. As its market presence grows and additional industries and

functional areas are supported, Creatio will continue to improve its positioning in the Value Matrix.

ORACLE VISUAL BUILDER

Oracle is a Facilitator in this year's Low Code Application Platform Technology Value Matrix, recognized for its intuitive Oracle Visual Builder. Focusing on the user experience and visual tools, Visual Builder complements Oracle's functionally robust, data modeling-centric APEX platform. Customers of both Oracle's LCAPs can leverage Visual Builder to design the front-end user-interface and workflows and use APEX for back-end data management functions and rest API connections. Professional developers and tech-savvy businesspersons are the target users of Visual Builder. The platform was initially designed with strict guard rails to focus on building small, quick, and easy applications. Recent product improvements have increased the flexibility of Visual Builder to allow the development of mobile and multi-tenancy applications.

Regardless of industry, Oracle's customers can use Visual Builder to design page layouts and flows with simple drag and drop tools to define business logic surrounding business objects with object validators, field validators, and object functions. Users frequently use Visual Builder to build webpage services and even incorporate microservices from other vendors like Microsoft and Salesforce. As part of Oracle's product line, Visual Builder comes out-of-the-box with security capabilities that enable declarative security on business objects, anonymous or authenticated user access, and role-based security protocols. The LCAP is also highly extensible through a comprehensive catalog of APIs, UI templates that can be embedded into the solution, and two-way editing with no-code capabilities and direct code access in JavaScript and HTML.

By connecting to the Oracle Cloud and Database, existing users of Oracle's ERP systems and other applications stand to extract the most value from their use of the LCAP while maintaining a cohesive look and feel. Integration is a primary value driver since users use Visual Builder to extend the functionality of their Oracle product investments, such as HCM, ERP, and Customer Experience applications, among others. In June 2020, Oracle released the Visual Builder Platform, which integrates the low-code solution with Oracle Developer Cloud Service to enable the complete development, deployment, and hosting of applications from a single environment. This joining has streamlined the development process and shortens the overall lifecycle. The platform now hosts a testing environment for debugging, release state management for sprint execution and multi-instance deployment, and team collaboration tools perform pushes and merges for CI/CD. Nucleus believes that Visual Builder and APEX's tandem use provides users with both the ease-of-use and depth of functionality to develop full-scale enterprise applications at a market-leading pace.

CORE PROVIDERS

Core Providers in this year's Value Matrix include Google, K2, Quick Base, and Trackvia.

GOOGLE

Google App Maker is a low-code application development tool available to Business G Suite accounts to help non-technical users build apps in-house. Users can connect elements, such as a form, to a database through simplified templates and a drag-and-drop UI design. Google App Maker does not rely on third-party software, and users develop applications directly inside the Google infrastructure, ensuring increased security measures. With Google already providing above industry-standard levels of security for applications like Google Drive, users can save money on building out security measures as it is all handled by Google. Google App Maker also aims to remove back-end bottlenecks when building databases and connecting UI elements. The solution automatically creates a database in Google Cloud SQL when a UI element is added to the solution. Users can manage data sources' structure through a visual interface allowing non-technical users to extract further functionality from the solution. Additionally, non-technical users can add new features to apps without coding through function-specific JavaScript and CSS libraries. In terms of updates and features, Google App Maker will be shut down on January 19th, 2021, and users will have to transition the functionality to another product. Alternatives such as AppSheet, Apps Script, Google Forms, and App Engine will help users achieve the same functionality but with a downside of using multiple solutions to achieve what Google App Maker achieved under a single platform. Users can look towards AppSheet to help automate processes, App Engine to develop apps, and Google Forms for data collections.

K2

K2 is a Core Provider in this year's LCAP Technology Value Matrix, recognized for its expertise in process automation from a low-code perspective. With a focus on automation, K2 provides BPM and RPA low-code tools. Users leverage the BPM to design workflows with Microsoft's SharePoint WorkFlow tool to either supplement the functionality of existing applications in the IT ecosystem or develop full-scale solutions to avoid expensive third-party products. Citizen developers often supplement BPM capabilities with RPA to achieve full process automation through UiPath automation tools. Users can build bots to target specific actions and steps along a workflow with text recognition to process forms and documents or connectors to eliminate manual data input. Given the open nature of the out-of-the-box tools, virtually all businesses can optimize their processes with the platform; K2 primarily services organizations within life sciences, healthcare, financial services, insurance, government, manufacturing, energy, and legal industries.

Customers have expressed satisfaction with K2's ability to grant both professional and citizen developers to reduce the manual, Excel, and pen and paper processes, boosting their employees' productivity. Streamlining the back-office internal processes for HR, financial reporting, client management, among others, K2 also enables the build of external-facing webpage services for its users' customers to interact with. Companies can intake forms and data from their customers to reduce manual touchpoints, making interactions much more accurate and painless for both parties. Improvements to UI design capabilities to promote ease-of-use for more complex layout designs will boost the usability of the LCAP as users rely less on professional developers. Improved testing and debugging functions along the DevOps flow will streamline the entire process as users can quickly identify mistakes to deploy solutions faster. Nucleus believes if K2 accelerates the addition of out-of-the-box connectors, it stands to improve its value proposition for both existing and net-new customers.

QUICK BASE

Quick Base is a low code application development platform centered around enabling both non-technical business-level users and advanced IT teams to work together in a secure and sustainable manner. The critical differentiator for Quick Base is that it focuses on supporting non-technical business-level users at an enterprise scale. Business-level users can expect to deliver real-time, actionable insights through diverse systems in an enterprise structure without sacrificing customizability. Additionally, Quick Base utilizes a single platform to reduce IT complexity and increase the agility of development teams throughout the application development process. For integration, Quick Base pipelines enable visual orchestration of workflows across third-party applications and tools using pre-built integration processes and APIs. Quick Base heavily supports continuous deployment by allowing users to implement changes in real-time with no downtime for updated applications to further support continuous integration and development. The application lifecycle management sandbox allows users to customize business applications, transform data, and change schema without forcing downtime for applications.

Throughout 2020, Quick Base releases monthly updates to the platform to improve all users' usability and performance. In February 2020, Quick Base added Quick Base Pipelines making it faster and easier to automate processes and integrate workflows. In May 2020, Quick Base added new table report functionalities to provide a modern interface to view, filter, sort, and group Quick Base data. Quick Base also gave developers the ability to utilize and extend Quick Base through RESTful API calls. In August 2020, Quick Base added new RESTful API capabilities, giving users the ability to get, add, and modify relationships and upload and download files. As recently as October 2020, Quick Base added a new authorization type for Microsoft Exchange connections for connected tables. Additionally, Quick added more persistent features and new toggle behavior for the recently released

table report. The continued support and updates for the Quick Base solution bode well for the solution in 2021. The low-code development tool already supports extensive integration and data management capabilities. As more AI, analytics, and out-of-the-box pre-built templates are added, Quick Base will rapidly push out of the Core Provider quadrant.

TRACKVIA

TrackVia is a low-code business app development platform deploying work management and automation software through an online database platform. The solution enables users to modernize and digitalize operational workflows and processes along with configuring and customizing web/mobile applications. TrackVia is targeted towards non-technical business-level users as it aims to reduce complexity and eliminate the reliance on complex coding or advanced users such as programmers. Non-technical users can build applications from the ground up or through spreadsheets and datasets. TrackVia's drag-and-drop interface allows users to create work management applications with zero code in a sandbox environment, ensuring that changes can be implemented safely. Furthermore, TrackVia has an API that can be connected to existing ERP and CRM systems, for example, to extend customized applications. The integrations extend to hundreds of applications such as Oracle Netsuite, Zapier, QuickBooks, Tableau, and financial systems. TrackVia deploys a multi-layered and pervasive security stack for security along with certifications such as ISO 9001, ISO 27001, and SOC 1/SAW 3402. Currently, TrackVia is positioned as a Core Provider in this year's Value Matrix. At Nucleus, we expect to see movement along the functionality axis with continued innovations towards overall functionality surrounding configurable workflows, data import/export, third-party integration, and workflow management.