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As organizations embrace artificial intelligence (AI) for business process automation, they face challenges with its adoption. Low-code platforms promise to simplify this process, but the supporting evidence is limited. We studied the adoption of a low-code conversational AI platform in four multinational companies and found three significant challenges linked to fundamental assumptions about low-code approaches. Based on this case study research, we recommend steps companies can take to guide the adoption and maximize the potential of low-code AI platforms.[1,2]

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False Assumptions in the Use of Low-Code to Create AI Applications

Low-code platforms provide graphical user interfaces that enable employees to create digital applications quickly even when they lack coding expertise.[3] As companies are increasingly seeking to use artificial intelligence for business process automation, low-code AI platforms[4] democratize the creation of AI applications by helping novices take advantage of AI-powered software programs.[5] However, our research shows that the implementation of these platforms is often based on false assumptions that limit the potential of both low-code and AI. These

1 Noel Carroll is the accepting senior editor for this article.

2 This article is based on a longitudinal embedded case study of a low-code conversational AI platform. Two empirical papers that support this article were presented earlier at the European Conference of Information Systems (ECIS), June 2023, and the 57th Hawaii International Conference on System Sciences (HICSS), January 2024.

3 For a primer on how low-code/no-code platforms can democratize digital application development, see Carroll, N. and Maher, M. "How Shell Fueled Digital Transformation by Establishing DIY Software Development," *MIS Quarterly Executive*, (22:2), 2023, pp. 99-127.

4 Low-code AI platforms combine a user-friendly low-code software development environment with advanced AI capabilities for the creation of smarter, more automated applications capable of performing tasks that resemble human cognition by a wider community of nontechnical experts.

5 How low-code/no-code platforms may enable novices to use AI is detailed in Sundberg, L. and Holmström, J. "Democratizing Artificial Intelligence: How No-Code AI Can Leverage Machine Learning Operations," *Business Horizons*, (66:6), November-December 2023, pp. 777-788.

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assumptions stem from a tendency to extrapolate the low-code development environment beyond the graphical user interfaces used in the creation of applications to other domains. This prolongs implementation, makes the creation of useful AI applications difficult and limits returns on platform investment. Based on our analysis of how four multinationals managed challenges caused by false assumptions, we offer managerial recommendations centered on three key questions that managers should consider when procuring, implementing and using low-code AI platforms.

Considering how recent examples such as ChatGPT, Copilot and Midjourney have demonstrated a sophisticated ability to generate text, images and videos in a human-like manner, it is easy to understand the hype that surrounds the use of AI.[6] One of the many domains in which companies seek to leverage AI is for the creation of conversational AI applications such as chatbots, voicebots and virtual agents.[7] While ChatGPT and Copilot, built on OpenAI's language models, are examples of broad conversational AI applications with a general purpose and wide accessibility, companies can create more specialized chatbots to automate or augment, for example, the handling of routine customer queries. However, as with most forms of AI, the development and use of conversational AI applications typically require expertise in coding, design, machine learning and natural language processing.

Most companies do not have the resources to create conversational AI applications in-house. As a result, they may turn to vendors who offer low-code AI platforms specifically oriented toward simplifying the process of creating customized chatbots. Such platforms promise to simplify the development process by reducing technical barriers to the point where even those without advanced technical skills are able to generate fully operational chatbots. With easy-to-use interfaces, in which logical elements can be arranged using drag-and-drop functions, low-code AI platforms allow companies to create conversational applications to resolve specific queries. Further, these platforms can also assist the deployment of applications on multiple platforms and channels, such as website chat functions and mobile virtual assistants. Typically, low-code AI platforms also provide a means to analyze data generated through conversations between chatbots and humans, providing insights companies can use to continuously improve their applications.

The belief that low-code platforms make it easy to explore the potential of AI and rapidly create fully operational AI applications is growing among managers (not least due to vendor marketing), but academic research also reflects this view. Noting how few empirical studies on the implementation and use of low-code AI platforms in companies currently exist[8] and reflecting on the substantial body of research that has emphasized how individual, social and contextual factors make predicting implementation outcomes difficult,[9,10] we sought to understand whether this belief is misplaced.

By studying the implementation and use of the same low-code conversational AI platform (CAIP) in four multinational companies from the energy (EnerCo), automotive (AutoCo1 and AutoCo2) and retail (RetCo) industries,[11] we observed how the processes were characterized by the emergence of unexpected challenges and setbacks. As detailed below, we trace these challenges to preexisting assumptions of how CAIP would facilitate implementation and use in domains beyond the use of a graphical user interface to create AI applications. Companies falsely assumed that CAIP would render

6 The hype surrounding AI and how it can be operationalized for process innovation is well described in Davenport, T. H. *The AI Advantage: How to Put the Artificial Intelligence Revolution to Work*, MIT Press, 2018.

7 For a description of conversational AI, see https://www.ibm.com/topics/conversational-ai.

8 While empirical studies of low-code platforms for AI application development have been scarce, recent research has started to investigate these platforms for the development of other types of software. See, for example, Novales, A. and Mancha, R., op. cit., September 2023.

9 Practice-based research has convincingly shown how organizational outcomes of implementation stem more from how individuals make sense of and act in practice than from predetermined plans and aims. See Orlikowski, W. J. "Improvising Organizational Transformation Over Time: A Situated Change Perspective," *Information Systems Research*, (7:1), March 1996, pp. 63-92.

10 A prominent example of how social and contextual dynamics shape the organizational outcomes of new technology implementation and use can be found in Barley, S. R. "Technology as an Occasion for Structuring: Evidence from Observations of CT Scanners and the Social Order of Radiology Departments," *Administrative Science Quarterly*, (31:1), March 1986, pp. 78-108.

11 The names of the case companies (in parentheses) have been anonymized in accordance with a verbal agreement made before the interviews.

underlying AI techniques intelligible and operable to everyone, that conversational AI applications would be easily tailored to the conditions of different business contexts and that the platform could be easily integrated with internal systems. Because of these false assumptions, companies were not prepared for what implementing and using CAIP actually required in practice.

About the CAIP Platform

CAIP has existed since 2012. CAIP offers the opportunity to study a well-established platform in that it pioneered both a low-code development environment and conversational AI well before the current trend. CAIP facilitates the development, deployment and maintenance of applications such as chatbots and voicebots. Like platforms such as Rasa[12] and Kore.ai,[13] CAIP strives to democratize the creation of AI applications by offering a low-code development environment designed to empower people in sales, marketing, HR and customer service to develop intelligent applications without the need for coding expertise.

CAIP facilitates access to AI capabilities through ready-made chatbot templates and prebuilt modules that users can combine in a drag-and-drop interface to create custom applications. The modules include both rule-based natural language processing engines and machine learning models. The ability to combine both using a hybrid approach is a prominent feature of CAIP. While rule-based natural language processing provides applications with the ability to process human language without access to preexisting data, machine learning enables conversational AI applications to learn from the data generated by their use. As a result, companies can use CAIP out of the box to develop operational applications quickly and then gradually apply machine learning to improve their conversational ability over time.

To facilitate the development of applications, CAIP offers a low-code development environment centered on a graphical user interface that visualizes the overall operational process of individual conversational AI applications. This process is represented in a tree structure, allowing users to specify the application's actions based on different scenarios. The environment includes tools for maintaining and improving applications, such as supervising the training of machine learning models on the data their use has generated. Additionally, it features real-time analytics for monitoring application performance. Beyond its internal tools, CAIP offers an extensive library of prebuilt interfaces, such as application programming interfaces (APIs) and software development kits (SDKs) that can be used to export data to, for example, Power BI or Tableau.

Unlike typical low-code platforms that streamline development with visual interfaces and drag-and-drop components, platforms such as CAIP integrate advanced hybrid AI layers and robust data analytics. This integration enables managers to swiftly deploy and continually enhance applications through machine learning. Additionally, analytics tools that are supported by a visual interface, like those on CAIP, provide managers with valuable insights, facilitating real-time adjustments and data-driven decision-making. This ensures that conversational AI applications are not only effective but also responsive and adaptable across diverse markets and contexts.

Four Companies that Adopted CAIP

To learn how companies are implementing and using low-code AI platforms, we investigated four multinationals in three industries, referred to as EnerCo, AutoCo1, AutoCo2, and RetCo. We selected these companies using three criteria. **(1) Platform choice:** We decided to focus on CAIP, a mature low-code AI platform with robust low-code features and advanced AI capabilities. **(2) Size and Industry representation:** We engaged with four large, well-established companies from various industries that were all using CAIP and needed varying levels of technical expertise to automate complex, established business processes. **(3) Adoption leadership:** We chose to study companies that are recognized in their industry for their early adoption of low-code AI platforms with the aim of providing valuable insights in an area currently lacking empirically

12 *Design, Review, and Personalize Your AI Assistant as a Team in a Low-Code UI*, Rasa, available at: https://rasa.com/product/rasa-x-enterprise/

13 Acknowledged as the "Future-Oriented Low-Code Multi-Channel Bot Development Platform." See kore.ai for more details.

grounded insights. By focusing on these large enterprises from three industries, we sought to provide an objective perspective on the implementation and use of low-code AI platforms.

By collecting and analyzing interviews, documents, news posts, press releases and presentations (see the Appendix for methodological details), we sought to understand the companies' rationales for adopting CAIP, what challenges emerged during implementation and use and how companies addressed these challenges.

Multinational Energy Company (EnerCo)

EnerCo is a multinational energy company with over 90,000 employees in more than 100 countries. It adopted the CAIP platform as part of its digital transformation strategy to automate customer service support and enhance operational efficiency through AI-powered chatbots. In assessing the market, EnerCo reviewed low-code conversational AI platform vendor rankings and shortlisted five vendors. After developing pilot applications for each platform, EnerCo selected the CAIP platform. The choice was guided by the platform's robust low-code and AI features. Its prebuilt connectors and interfaces promised to facilitate smooth integration with numerous internal and external data sources, complemented by advanced natural language understanding and processing abilities. By leveraging CAIP, EnerCo became a pioneer in delivering AI-driven services for customers. As highlighted by an implementation lead: "Our technical help desks handled only a few hundred thousand calls annually, making it impossible to manage millions of interactions cost-effectively without AI. And this is what these [conversational AI applications] do." While using CAIP and discovering the potential of AI through low-code development, EnerCo expanded its automation efforts, developing over 20 conversational AI applications across different sectors, which, according to the implementation lead, resulted in fully automated customer support that brings "a lot of complementary income, managing millions of customer assets, saving over $100 million annually by reducing downtime and lost production." The implementation lead shared that implementing CAIP and its applications "allowed the company to explore how to digitize their services and gave an opportunity to rethink the technical support and think how to capitalize on these digital resources." He concluded that CAIP and its applications "became a very important part of the [EnerCo's] digital transformation journey."

Multinational Automotive Company 1 (AutoCo1)

AutoCo1, a multinational automotive company with over 30,000 employees in more than 100 countries, sought to enhance its online customer service and sales processes through AI-powered chatbots and voicebots. According to the AutoCo1 implementation lead: "The goal was to enable customers to purchase cars entirely through [a chatbot], eliminating the need to visit a showroom, because the user would just simply go through the steps with the [conversational AI assistant] and get the car delivered to the house." After reviewing several vendors, AutoCo1 selected CAIP for its low-code development environment, specifically for its "strong visual interface which eliminates the need for technical developers who are rare and expensive, seamless integration capacity to connect to the company's back-end systems and extensive language capabilities." Additionally, AutoCo1 saw the opportunity to access AI and experiment and learn about conversational automation facilitated by applications using a low-code approach. According to a business manager, AutoCo1 saw CAIP as "a somewhat low-hanging fruit to learn about AI, experiment with it and understand its dependencies." The business manager further added that the platform's low-code capabilities allow "your business developers to develop [conversational AI applications] because [CAIP] is more suited for business-oriented users. Meaning, you will have quicker access to the market." As a result, AutoCo1 expanded the market coverage and capabilities of the chatbots built on CAIP across new markets, delivering even more personalized recommendations to the customers reviewing the company's products. AutoCo1's long-term strategy is to create a seamless, integrated digital experience for its customers by connecting the company's in-car digital assistant to the CAIP platform and its applications.

Multinational Automotive Company 2 (AutoCo2)

AutoCo2 is a multinational automotive company with over 50,000 employees in more than 100 countries. It adopted CAIP to automate business processes in IT, HR and customer service, while empowering more of its employees to develop AI applications using low-code. According to the AutoCo2 implementation lead: "After evaluating seven other vendors and attempting to build chatbots in all of their technologies, we found that [CAIP] was the most capable platform." The implementation lead further noted that because of its low-code capabilities, the company expected the platform to enable "anyone to work with the solution without extensive coding knowledge. As a large company, we need more people to build and maintain solutions to speed up automation." As further explained by the implementation lead, the CAIP platform offered the potential "to scale chatbot initiatives widely, alleviating bottlenecks on software developers and those with coding skills." An IT developer stated that adopting CAIP aligned well with the company's strategy to further the citizen developer approach. He highlighted that "with our citizen development approach the idea is to engage business in the process and understand that IT is not owning the development of everything, otherwise it will be very difficult to automate things." Ultimately, AutoCo2 leveraged the CAIP platform to develop multiple applications in various languages and markets. Though this was not achieved without challenges, an IT manager attributed the "success of the company's democratization efforts to the visual representations and low-code aspects of [CAIP]."

Multinational Fuel and Convenience Retail Company (RetCo)

RetCo, one of the world's leading convenience and fuel retail businesses with 40,000 employees in more than 15,000 locations, aimed to implement conversational AI applications to improve its customer service. As noted by a business manager, "While chatbots have been around for a while, it was something new for us." After evaluating other vendors, RetCo opted for CAIP because

> *"we were looking for a user-friendly platform to accelerate our plans and involve business users in the development process. When we first looked at [CAIP], we were impressed by its easy-to-use graphical interface with drag-and-drop functionality, where business developers can collaborate. It automatically does a lot of the heavy lifting that can make other development platforms so complex."*

Not without a struggle, and after identifying people with the interest and skills for working in a low-code environment, RetCo expanded the use of CAIP into new departments and business functions. A business manager from RetCo admitted how, by focusing primarily on the graphical user interface of the platform and its flexible nature, the company underestimated the skill level required. She explained that despite being a low-code platform, CAIP still demands a higher level of expertise compared to simpler platforms with fewer features.

The Companies' Challenges

In our cross-case analysis, we identified three common challenges. These were often tied to initial assumptions about low-code that proved incorrect once they were tested. Specifically, we identified how assumptions of high usability, adaptability and integrability all led to severe consequences (see Table 1 for a summary of assumptions about low-code).

Challenge 1: Differing Views on the Platform's Low-Code Usability and AI Intelligibility

In our analysis, we observed that while the IT staff we interviewed found CAIP user-friendly and accessible, domain experts and business managers encountered a much steeper learning curve than they had anticipated. While IT staff from AutoCo2 claimed that "anyone can work with [CAIP] without having deep knowledge in coding or software development," a domain expert expressed how working with the platform "was like Greek: what is optimization? What is a query and what is metadata? Lots of words that didn't make sense." A domain expert from RetCo expressed how they "thought that this would be a very simple task, building the process and then just [dragging and dropping]. But you still have

Table 1. Low-Code AI Platforms: Assumptions, Approaches and Results

False Assumptions	Approaches	Results
Usability: Low code means that anyone can use the platform to develop applications without coding or AI expertise.	Business and domain experts were expected to use the platform to develop conversational AI applications on their own.	In practice, developing effective conversational AI applications required a foundational level of coding knowledge, algorithms, and machine-learning principles. As a result, companies faced difficulties in operationalizing the applications and realizing a significant return on their investment.
Adaptability: The platform would enable users to easily and rapidly tailor applications to different business contexts.	The applications themselves were expected to become "gurus," quickly replacing humans and automating business processes.	Creating applications that could handle complex and diverse business processes, contexts, and languages proved challenging and time-consuming. Companies had to invest resources in understanding and standardizing existing processes before automation could begin. While the applications did improve and eventually approached the performance of human operators, this process took considerably longer than anticipated.
Integrability: The platform and applications would easily and rapidly become integrated with other services and platforms.	The platform would allow conversational AI applications to easily retrieve and leverage data from legacy systems.	The varying interfaces and use of diverse data formats presented integration challenges. Many legacy systems did not align with the standardized interfaces provided by the platforms. Additionally, legacy systems stored and labeled data in formats incompatible with the platform.

to code. It became a lot more complex coding-wise than we initially expected." Overall, domain experts from RetCo and AutoCo2 came to realize that low-code still required a foundational level of coding knowledge, especially for more complex customizations and integrations, which many of them did not have.

Business managers also found the knowledge requirements for working with CAIP surprisingly demanding. For instance, a business manager at AutoCo2 observed that, even though the low-code environment of CAIP made it easier to visualize the machine learning models, most business staff still found it challenging to fully understand how the AI capabilities functioned. She explained: "The business side is struggling to understand the AI capabilities of this platform. The further you are from IT the more the solution is a black box for you." A business manager at EnerCo stressed that his business staff, not fully understanding the platform's AI functioning, "feared that the [chatbots] would recommend the wrong product, which could lead to machinery malfunctions, imposing unnecessary risks and liability on the company." Despite the experiences of domain experts and business staff, senior management initially maintained that CAIP should be easy enough for everyone to use. A business manager from RetCo described her interactions with potential CAIP customers, highlighting a common misconception among senior management. She noted:

> *"I've shared my experiences with some of the potential customers of [CAIP]. In those discussions, I sometimes have a feeling that these CTOs, CEOs and that level of management expects, 'Oh, this is a [low-code conversational AI]. We can easily automate our processes. So, we will just buy the service, launch it and then it's done. We can fire 100 people from customer service,' It's not how it works. We learned*

that you will have to keep working with the technology continuously."

As reflected by an IT developer from AutoCo2, there is an apparent tendency among senior management to jump on the AI bandwagon without considering what it would require from the staff: "AI technologies generate considerable hype, without sufficient critical examination of their practical implications and the methods required for their realization; people do not think critically what this is all about."

Although the advent of low-code development is making AI more accessible, it creates some tensions between the envisioned ease of implementation and the practical realities of deploying AI applications effectively within organizations. The simplification promised by low-code does not eliminate the need for a foundational understanding of AI and its integration into existing workflows.

When companies managed to develop a functioning application, they struggled to comprehend how the AI function in an application worked. Being caught up in the hype, senior management seemed not to look beyond the implied simplicity associated with low-code. In companies like RetCo, the implementation and initial use of CAIP faced delays and tensions due to differing views on use requirements. A RetCo customer service expert explained that the company mistakenly believed only business knowledge was needed, neglecting the necessary technical expertise. This led to failures in some regions, as selected personnel were unprepared for technical tasks, even in a low-code environment. Consequently, many of those initially assigned to develop chatbots had to be replaced due to their lack of necessary competencies.

Challenge 2: Navigating Challenges in Adaptation and Application in Different Business Contexts

As with the initial assumptions of high usability, companies expected that the platform would be highly flexible and facilitate the tailoring of conversational AI applications to the specific requirements and conditions of any business domain. As a business manager from AutoCo1 explained, initial assumptions of versatility led the company to think that "it would be easy to pour all the relevant knowledge into it, expecting it would become a guru."

A common realization among the case companies was the difficulty of tailoring the platform to manage a wide range of customer queries, especially in B2C contexts where queries are highly varied. The requirement for a large, nuanced knowledge base was challenging to fulfill. An AutoCo1 business manager noted that they found it rather "difficult to bake everything inside [a chatbot], to have such a wide knowledge. If you want to have lots of relevant content, you need to spend lots and lots of time training the machine learning models to understand it." This issue was less pronounced in B2B contexts, where customer needs are more predictable. An AutoCo1 implementation lead explained that B2B companies like energy firms know their customers well because they are always buying motor or engine oils, making interactions straightforward. In contrast, B2C contexts require a much larger knowledge base for chatbots to handle diverse customer inquiries.

Overall, the people we interviewed agreed that despite the low-code development environment, adapting the platform and its applications proved more challenging than anticipated. The cases illustrate that while low-code development can facilitate the adaptation of conversational AI applications by offering modular flexibility and graphical user interfaces for process visualization, it is important to understand that this approach is not a catch-all solution. Although it offers a strong foundation for initiating application development, achieving alignment with the detailed and varied needs of distinct business domains necessitates significant investment in time and resources.

For example, the case companies recognized that effectively adapting CAIP to their specific business needs required a deep understanding of the processes to be automated. This included not just knowing the process itself but also its complexities, such as back-end dependencies and user needs. However, all four companies encountered the absence of well-defined and standardized business processes that they wanted to automate through the platform. An AutoCo2 business manager exemplified this challenge:

> *"Some people think that we can automate the whole process [through CAIP]. Quite often we think it's a standardized easy process and you just get this input from somewhere. But often processes vary and lack standardization. Sometimes there is even a lack of process. And sometimes there is a need to involve many systems to build [the application], making it complex."*

As noted by an AutoCo2 IT manager, though the CAIP's low-code nature "helps reflect on our business processes, what they actually look like and what they depend on," automating them through the platform can be challenging.

Over time, companies realized that while low-code can enhance the flexibility in designing conversational AI applications, companies need to approach it with a clear understanding of its limitations. Although CAIP's environment simplifies the visualization and training of machine learning models for applications, an AutoCo1 implementation lead highlighted the continuous challenge of deepening application knowledge. This process involves ongoing training and retraining of the models. The successful implementation of CAIP demands a commitment to substantial training efforts, especially for B2C contexts, careful adaptation and organizational alignment to leverage the full benefits of low-code for conversational AI development.

Challenge 3: The Realities of Integrating Low-Code AI Platforms with Existing Systems

The companies we studied recognized the potential benefits of the platform's low-code features for simplifying integration with various systems, such as CRM and databases. However, they initially believed this would be a plug-and-play process, facilitated by low-code. This anticipation stemmed from the platform's promise to streamline complex integration processes, a vision that was well-received because of the operational efficiencies it could introduce. The organizations' interest was piqued by demonstrations and discussions on how these low-code features could directly address specific integration challenges. As an AutoCo2 IT developer explained, this perceived integrability of CAIP sparked "discussions on integrating it with various systems, enhancing end-to-end automation processes. For example, do we have an opportunity to link [conversational] AI applications to an RPA [robotic process automation] process for scheduling to personalize conversational assistance further?" He added that there was an expectation the platform could be easily connected to other systems. However, this proved to be overly optimistic. A RetCo domain expert added, "Though the platform is flexible and allows you to do a lot of things, you require people on board with knowledge in coding and APIs." Our analysis shows that all four organizations encountered two key integration challenges.

First, companies were keen to leverage CAIP and its applications with their current infrastructure. However, they soon discovered that their existing back-end systems were not as compatible with the platform's requirements as expected, necessitating significant efforts to make them align with the platform's connectors and interfaces. This misalignment pointed to a broader challenge: the necessity for a comprehensive strategy to enable system interconnectivity. As noted by an EnerCo business manager, many companies, including their own, "did not really have a joined-up strategy, where all these legacy systems and databases share information and talk to each other." Our analysis showed that for conversational AI applications to be effective, the platform would need access to other systems in a way that was difficult to foresee and plan for. Illustrating these complicated dependencies, one of the business managers from AutoCo1 explained how

> *"from the technical point of view [conversational AI applications] depend on the platform itself, then, of course, on all the integrations because without them they would probably be just dumb. All the systems [the applications] consume are essential for them to be alive. And it's a lot of systems: HQ [headquarters] ones and local ones that need to be integrated."*

Second, the value of CAIP and its applications rested on their ability to access and interpret data from existing back-end systems to deliver accurate customer responses. However, companies soon recognized that their databases were not immediately suited for seamless

communication through the applications. An IT developer from AutoCo2 explained how "sometimes what you get from the databases is not enough to get a human-like answer. You want to know why the case is pending." An AutoCo1 business manager noted similar database challenges designed on industry-specific acronyms and identifiers, which made sense to experienced domain experts but became problematic for machine learning model training. As he explained it: "Those who train ML [machine learning] models, load utterances, but [because of the acronyms and IDs used in the databases], they don't see full text. For example, instead of 'the range of XYZ is 500 kilometers,' they see, 'XYZ_ID_2,' making model training more challenging." Moreover, as highlighted by an EnerCo implementation lead, many of the databases were not ready to face the customers externally, as they were initially designed for internal use only. This challenge prompted a reassessment of the company's data management and protection strategies. He further added that "we had to redesign our internal databases and systems, so that they're designed for the future and fit for the outside world and fit for data privacy, data security and available outside our firewalls. We have merged many of our databases and ensured safe API portals."

We observed that the success of low-code integration in enhancing conversational AI applications is contingent upon the readiness and adaptability of existing systems to meet the demands of low-code AI platforms. This realization advances our understanding of low-code by underscoring the necessity for organizational alignment and system adaptation to fully leverage low-code's benefits for conversational automation.

Recommendations For Low-Code AI Platform Implementation and Use

Despite the allure of democratizing AI for all, implementing and using low-code AI platforms often presents unexpected challenges (see Table 1). To assist managers in navigating these challenges, we propose managerial recommendations centered on three key questions. Thorough investigation of these questions will help managers address misconceptions about low code's ability to democratize AI, revealing the true implementation and usage requirements. We suggest actions that can help managers better understand and meet the requirements of low-code AI platforms.

1. What can we do to accurately assess a low-code AI platform's usability and how can we ensure that our team is adequately prepared for the learning curve to develop operational AI applications?

The learning curve required to implement and use a low-code AI platform, especially for business managers and domain experts, turned out to be significantly steeper than anticipated in the companies we studied. This necessitated the involvement of IT personnel to facilitate the operationalization of conversational AI applications. Companies could have avoided these issues if the knowledge requirements for using the platform in practice had been better understood and seriously considered from the beginning. We recommend that managers take the following steps to make sure that all users, regardless of their technical expertise, can effectively utilize a low-code AI platform to develop operational AI applications while aligning their expectations more closely with reality:

- **Thoroughly test a low-code AI platform, preferably before it is procured and implemented.** Hype and marketing may lead companies to believe that low code guarantees that a platform can be used by anyone from the start. However, low-code may just imply that a platform facilitates specific steps of the application development process. To make AI applications fully operational, users may still require a mix of skills that individual employees are unlikely to possess. AI application development often requires expertise in coding, AI and business, even with low-code platforms. To determine the exact nature and level of expertise needed in specific cases, we recommend that companies test platforms before purchase, preferably with intended users and use cases as close to their real practical conditions as

Table 2. Key Questions and Recommended Actions for Adopting a Low-Code AI Platform

False Assumptions	Key Questions	Recommended Actions
Low-code AI platforms enable everyone to develop applications regardless of their level of expertise in coding and AI	What can we do to accurately assess a platform's usability and how can we ensure that our team is adequately prepared to develop operational AI applications?	• Test and review leading low-code AI platforms' features and capabilities before procurement and implementation • Secure a wide range of expertise • Implement training programs • Enable cross-functional collaboration
The platforms enable easy and swift tailoring of AI applications to contextual conditions	What steps should our company take to effectively adapt AI applications to our business contexts using alow-code AI platform?	• Analyze existing business processes to understand their dependencies and uniformity • Alter business processes to fit with the platform
The platforms can be easily integrated with a wide range of other services and platforms	What steps should our company take to ensure the smooth integration of a platform with our existing back-end systems and databases?	• Review infrastructure compatibility based on platform requirements • Identify the data sources AI applications will need to access • Align data structures and formats to platform requirements

possible. Once expertise requirements are clarified, managers can make informed decisions on how these can be met. EnerCo's effective implementation of CAIP exemplifies the benefits of a structured procurement process. An EnerCo implementation lead explained: "We approached the integration of [conversational AI applications] into our company differently. Initially, we evaluated Gartner's studies to identify the top contenders. We then set up different scenarios varying in complexity based on real customer data and presented these to the top five companies." This meticulous approach enabled EnerCo to gain deep insights into each platform's capabilities and shortcomings, ultimately allowing them to select the one best aligned with their business needs.

- **Ensure that the diverse expertise required by a low-code AI platform can be cultivated through training and cross-functional collaboration.** Our analysis of the studied firms suggests two effective approaches, either individually or in combination, to help companies secure the necessary expertise. First, targeted training programs that focus on helping users understand and use the functionalities of a particular platform in practice can ensure that the overall skill of a larger group of users is strengthened. These programs may vary in duration, ranging from initial onboarding sessions to ongoing workshops and continuous learning initiatives and experimentation as new users, functions or data are introduced. They may also involve specific or mixed groups of staff. At AutoCo2, for instance, the onboarding process spanned eight weeks and involved both IT and business staff working together to learn how CAIP could be used in practice. According to one IT developer, this allowed groups to learn from each other while they were working with actual conversational AI application development. He noted: "Projects were used to facilitate learning, enabling us to address both education and project objectives simultaneously. Instead of separating education and project work, we integrated them and, I would say, we had succeeded quite well with this approach." Second, our research strongly indicates that bringing people with different forms of expertise together in cross-functional

teams creates good conditions for low-code AI application development success. Working in this way, business, coding and AI experts can together figure out how the different parts of a low-code AI platform work and, in the process, gain a better understanding of their company's business dynamics. Reflecting on their experience at EnerCo, an implementation lead highlighted: "We would typically spend a full day just prototyping one [business process]. It was very different to anything we had done before and we all loved it."

2. What steps should our company take to effectively adapt AI applications to our business contexts?

Low-code AI platforms often come bundled with modules and tools that can be mixed and matched by users to create a variety of different functions, including machine learning modules for data learning and improvement. Our study revealed that this modular aspect, coupled with the belief that AI ensures data-driven enhancements, can lead companies to anticipate easy development of AI applications tailored to specific contexts. As in the companies we studied, this can result in expectations of AI applications quickly becoming "gurus" that can readily be used to automate a wide range of processes. However, human-operated processes are inherently complex and lack the standardized procedures required by machine-operated systems. Business processes often rely on diverse and tacit human knowledge to make careful judgments, and regardless of all modules and tools available on a platform, these are not easily translated into functions of an AI application. A business manager from AutoCo2 explained that the company experienced this issue and came to the conclusion that in order to automate a process with conversational AI, they would first need "to review and understand the process and what it depends on. Then, they [would] need to describe it, standardize it, so that the system thinks in ones and zeros. It has to work without any additional human factor of evaluation, it has to be data input from somewhere." We propose that managers take the following actions:

- **Analyze how processes that you want to automate currently work and what they depend on.** When analyzing current processes, we propose that two main factors should be in focus. First, it is important to understand whether a process operates in a uniform or dynamic manner. For instance, our informants highlighted that B2B processes are often highly standardized, making them relatively straightforward to automate. Conversely, B2C processes tend to be more dynamic, with diverse and randomized requests requiring extensive machine learning model training. Second, understanding the nature and origin of resources needed by a process is key. Customer input and interaction are typically the primary resources, as their needs and responses directly drive business value. EnerCo's approach illustrates the importance of consulting domain experts who understand customer behaviors and preferences. According to EnerCo's implementation lead, these experts possess crucial insights into customer expectations and responses that are essential to properly aligning operational processes.
- **Understand if and how these processes can be altered to fit with the span of functions offered by a specific low-code AI platform.** Beyond leveraging the flexibility offered by ready-made modules and tools, companies are likely to be limited in their ability to alter the functions of a platform to fit with their current business processes. Therefore, companies may instead need to work in the other direction and adapt their processes to fit with what is possible to achieve with the platform. As an AutoCo2 business manager highlighted, companies need to describe and standardize their processes so that they can be handled by an AI system, minimizing the need for human intervention. This involves ensuring that all data inputs are systematically structured and can be processed by AI. As the implementation lead at EnerCo told us, the systematic structuring of input data and the redesign and alignment of existing databases enabled the company to actualize

the "power of big data and make our customers a lot more loyal. Because it's very difficult to change away from somebody who knows a lot about you and can help you in good ways."

3. What steps should our company take to ensure the smooth integration of a low-code AI platform with our existing back-end systems and databases?

For those oriented toward the development of AI applications through low-code AI platforms, obtaining data is absolutely vital, as it directly impacts the scope and scale of what developed applications can do. The notion of plug-and-play, thanks to prebuilt connectors and interfaces that often come as part of the bundle, can make low-code AI platforms particularly attractive. However, this convenience can lead to a misconception about the ease of integration. Acting on this assumption, the companies we studied overlooked the need to evaluate whether CAIP would be compatible with their legacy systems and faced unexpected setbacks when trying to make them exchange data. Learning from their experiences, we propose that managers take the following actions:

- **Review infrastructure compatibility based on platform requirements.** Before integrating a low-code AI platform, thoroughly evaluate its compatibility with existing back-end systems. First, identify the specific systems that the platform and its applications will interact with. Second, determine the geographical location of these systems. As noted by AutoCo1's implementation lead, these systems may be distributed regionally or centralized at headquarters. Integrating conversational AI applications with regional systems can be challenging due to varied data formats and protocols, whereas consolidating integration at a central headquarters can streamline processes but requires seamless handling of varied data sources. A business manager from AutoCo1 highlighted the complexities: *"Our company operates across different markets, each with their own environments and back-end systems, which makes it difficult to integrate the platform and applications. To overcome this challenge, we built an integration layer, so the platform talks with the integration layer and the integration layer on its own has micro services running for each country."* Finally, continuously monitor changes in the back-end systems and their databases, ensuring that they remain synchronized in real-time with the platform to maintain application relevance. As emphasized by an EnerCo implementation lead: *"Our products are a moving target. We always delete, add and change products and formulations in our portfolio. So, it's critical for our knowledge base to be real-time, live and API-connected to the databases that have the master data in them."*
- **Identify the necessary data sources that AI applications need to access.** Our case studies underscore the importance of early identification of data requirements for efficiently integrating low-code AI platforms and their applications. First, managers need to understand and specify the exact types of data that AI applications require to function properly. Next, they must determine where this data resides within the company, whether in internal databases, external sources, or other repositories, and ensure its accessibility and integration into the applications. While many platforms offer prebuilt connectors and interfaces, custom solutions are often necessary. Additionally, managers must adhere to privacy and security concerns related to data access and usage, ensuring that proprietary data is not shared by the AI applications with external entities. For instance, EnerCo quickly realized that its applications relied on internal databases containing proprietary information about the company's products and formulations. To address this, the company restructured and redesigned the data sources required for CAIP and its applications. The company also customized some integrations to create safe API portals to ensure that the data required for the applications is available, secure and compliant with relevant regional regulations. The EnerCo lead

noted that during this process, "we learned about local data privacy variations. For instance, in countries like China, there are specific rules about where data can be stored. So, we had to carefully plan our hosting arrangements to comply with these local requirements."

- **Align data structures and formats to platform requirements.** Make sure that data formats and terminologies are standardized to be compatible with the platform. Companies like EnerCo, AutoCo1 and AutoCo2 realized that their existing data was formatted using industry-specific terms and acronyms, rendering it unusable by CAIP without human interpretation and translation. The EnerCo implementation lead explained: "In every industry or company, there are specific products or concepts, often described using unique industry terminology. Ensuring that the platform and its applications comprehend this specialized terminology is key." There is also a need to work with domain experts to translate industry-specific terms and acronyms into formats that the low-code AI platform can understand and utilize. The EnerCo lead highlighted that "building industry-specific terminology was one of the biggest tasks to ensure the solution could run smoothly. We did a lot of work around it."

Taken together, these recommendations allow companies to:

- Scrutinize assumptions about low-code AI platforms for AI application development. Companies should avoid taking assumptions at face value and consider the potential challenges that may arise if they are left unquestioned.
- Gain a nuanced understanding of platforms for AI application development, recognizing them as powerful yet not all-encompassing tools. As highlighted by one interviewee, they are "not magic and can't solve everything for everyone but can be used for a lot." Designed for general purposes, they require customization for context-specific needs.
- Implement low-code AI platforms with a clear strategy to address specific challenges related to data integration, expertise requirements and customization for effective AI application development. This approach ensures that the platforms are leveraged effectively to achieve operational efficiency and strategic goals aligned with the company's unique business context.

Concluding Comments

This article examines the promise and perils of low-code AI platform adoption for AI application development, drawing on experiences from four multinational companies that implemented a low-code conversational AI platform called CAIP. Our investigation reveals three significant challenges stemming from false assumptions about the platform's low-code characteristics, specifically regarding its usability, adaptability and integrability. *Challenge 1* reveals that even low-code platforms, despite their claims, require a basic understanding of coding from nontechnical experts. *Challenge 2* highlights that the platforms have been designed for general purposes and require customization and adaptation to meet context-specific requirements. *Challenge 3* shows that firms' existing back-end systems and databases do not readily align with the immediate requirements of a low-code AI platform, hampering integration and requiring redesign efforts.

Based on the actions employed by these companies to navigate these challenges, we provide three recommendations for information systems practitioners and C-Suite managers considering the adoption of low-code AI platforms: *Recommendation 1* addresses the misconception that low-code platforms are universally intuitive and straightforward for non-IT staff, stressing the need for collaboration between IT and business teams to realize the full potential of the platforms through deliberate, iterative use and expertise sharing. *Recommendation 2* warns that low-code cannot simply bypass the intricacies inherent in human-operated business processes. To successfully develop AI applications and implement business process automation with a low-code AI platform, companies must analyze, standardize and even reengineer their business processes for AI compatibility. *Recommendation 3* underscores

Table 3. Overview of Case Study Research

	Company and Number of Employees	Industry	Roles and Number of Interviews	Supplementary Data
1	**EnerCo:** 90,000+ employees	Energy	Implementation Lead (2)	Case Study (1) Internal Presentations (2) Blog Posts (8) Press Releases (6)
2	**AutoCo 1:** 30,000+ employees	Automotive	Implementation Lead (1) Business Manager (1)	Case Study (1) Blog Posts (2) Press Release (1)
3	**AutoCo 2:** 50,000+ employees	Automotive	Implementation Lead (1) Business Manager (1) IT Developers (3) Domain Expert (1)	Case Study (1) Internal Presentation (1) Press Release (2)
4	**RetCo:** 40,000+ employees	Retail	Business Manager (1) Domain Experts (2)	Case Study (1) Blog Posts (3) Press Release (3)
	Total		**13 Interviews**	**32 Documents**

the importance of not just appreciating the user-friendly front-end of low-code platforms with prebuilt connectors and interfaces but also thoroughly evaluating the company's data and back-end system integration capabilities that the platform and its applications will rely on.

Although not directly related to the assumptions and implementation challenges of low-code AI platforms, we observed that companies initially focused too narrowly on the immediate return on investment from the platform. They relied heavily on the promise of low-code to democratize AI application development and viewed it primarily as a tool for process automation and staff reduction.

However, our data suggests that the true value of CAIP and similar platforms lies in their long-term potential. They offer ongoing opportunities for improvement and innovation through continuous data gathering,[14] which enables the expansion of platform capabilities and applications over time. This process also provides companies with real-time customer insights, serving as an ongoing source for enhancing products and services. Nevertheless, this potential relies on customers' engagement with these systems, as it depends on continuous communication and feedback loops.

Appendix: Research Methodology

This paper is based on a case study of the implementation and use of a low-code conversational AI platform (CAIP) in four multinational companies.[15] To uncover adoption

14 The ability of AI platforms to increase in value with an increase in data has recently been explored through the concept of data network effects, see e.g., Gregory, R. W., Henfridsson, O., Kaganer, E., & Kyriakou, S. H. (2021). The Role of Artificial Intelligence and Data Network Effects for Creating User Value. *Academy of Management Review*, 46(3), 534–551.

15 Kandaurova, M. and Bumann, A. "Governance in Implementing Weakly Structured Information Systems," *ECIS Research Papers*, June 2023, https://aisel.aisnet.org/ecis2023_rp/354

challenges, we conducted 13 semi-structured interviews with key informants: platform implementation leads, business managers, domain experts[16] and IT developers. The interview questions covered reasons for adopting the platform, as well as implementation hurdles, practices and outcomes. The semi-structured interviews provided flexibility for interviewees, revealing deeper insights beyond the initial questions. We supplemented our data with additional data sources such as case documents, blogs, press releases and presentations.

Our data analysis, which incorporated open, axial and selective coding, revealed three challenges the companies faced when implementing and using CAIP. Upon closer examination, we observed how these challenges followed a pattern traced back to the initial expectations regarding the implications of low-code for conversational AI application development. In this deeper analysis, we paid particular attention to the statements across all interviewees such as "initially," "we thought," "what we did, was …," "we encouraged," "we ended up," and "it allowed us." These statements provided insights into the perceived technical capabilities of the platform, including its low-code architecture, conversational functionality supported by natural language processing and machine learning AI technologies, and its ability to capture conversational data. This approach enabled us to trace the actions the organizations took, which informed our practical recommendations. Methodological triangulation, enriched by additional data, ensured that our findings were based on data depth and diversity, not on the volume of interviews.[17] Additionally, our focus on how the technical architecture of CAIP with its low-code features and AI capabilities evolved over time complemented our understanding of the challenges and assumptions.[18]

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16 Domain experts are individuals with specialized knowledge and expertise in a domain (such as logistics, finance, or customer service) relevant to the use of the AI platform. A recent study on democratizing AI suggests that enrolling domain experts is critical for tailoring AI systems to function effectively within a particular domain, ensuring that they provide accurate and contextually relevant responses to the users. See van Giffen, B. and Ludwig, H. "How Siemens Democratized Artificial Intelligence," *MIS Quarterly Executive*, (22:1), March 2023, p. 1-21.

17 Fusch, P. I. and Ness, L. R. "Are We There Yet? Data Saturation in Qualitative Research," *The Qualitative Report* (20:9), September 2015, pp. 1408-1416

18 Kandaurova, M. and Skog, D. A. Initiating and expanding data network effects: A longitudinal case study of generativity in the evolution of an AI platform. *Proceedings of the 57th Hawaii International Conference on System Sciences (HICSS)*, January 2024, pp. 6250-6259