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Low Code AI: Mission Ready?

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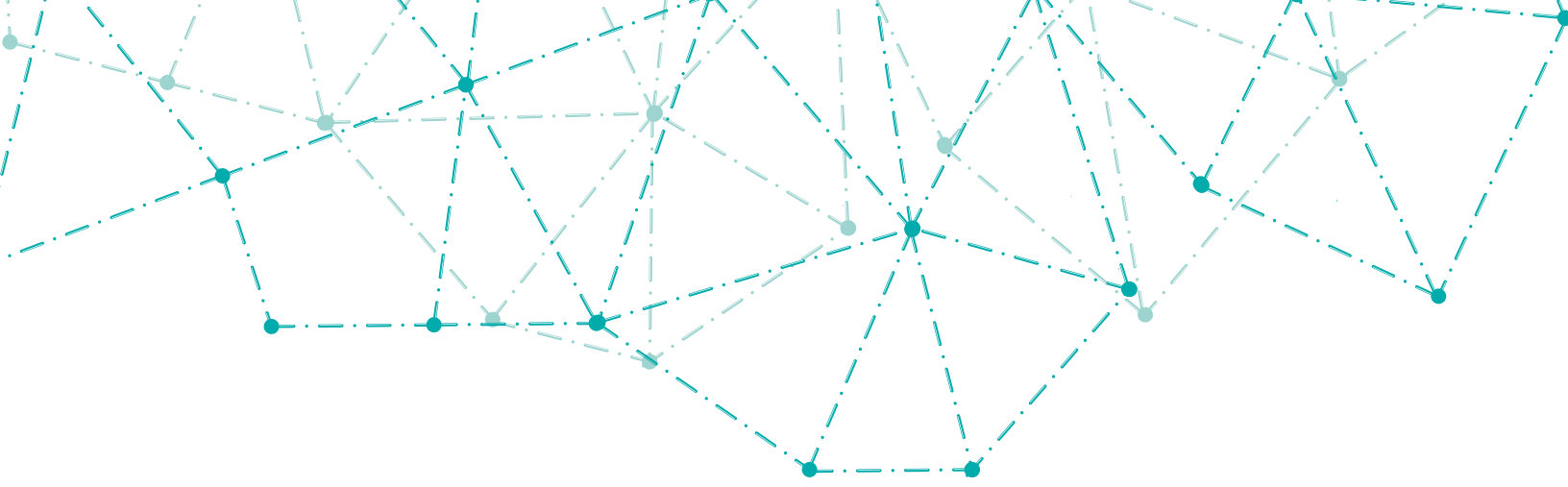
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Low Code AI: Mission Ready?

Much has been written in both the business and popular press about the promise and perils of Artificial Intelligence (AI). Without a doubt, AI will drive significant changes in the way we work, play and create - as well as how we will interact with our government and public institutions. But what has seldom been written about is the topic of *Low Code* AI. Furthermore, even less has been written about how Low Code AI solutions – and there are many – perform under rigorous comparative analysis.

What is Low Code AI? Why use it and when? How will it reduce the cost of providing citizen services? And more importantly, how will it improve the quality and speed of service delivery? This paper aims to answer these questions with an eye towards the potential positive impacts on public sector agencies and organizations. Given sector-wide challenges securing AI savvy IT talent, Low Code AI tools may offer the best chance for the public sector to take advantage of the benefits of AI to address a host of business and mission challenges

More specifically, this paper will address:

- **What is Low Code AI? And Why Use it?** We cover the basics and when it makes sense to deploy it.
- **What are the most common and appropriate uses?** We address specific use cases that align well with the Pros, and minimize the Cons.
- **How has Low Code AI been used to deliver value?** We highlight a Deloitte case study that has led to a dramatic reduction in time spent on expense submissions.
- **Comparing Low Code AI Tools.** We put two vendor offerings through the paces in a rigorous and structured test with a common use case.
- **Our Low Code AI Testing Results.** We highlight our findings at a summary level and describe what additional data we have available for the curious and intrepid reader.

As the body of AI knowledge is still developing, we invite readers to reach out to the authors listed at the conclusion of the paper to discuss our study and all things Low Code AI.
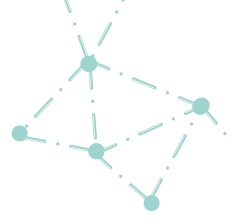
What is Low Code AI?

Broadly speaking, **Artificial Intelligence (AI) is the ability of a computer to recognize patterns, learn from experiences, and adjust to new inputs.** While applications for AI exist in nearly every sector, AI technologies can be complicated, expensive, and require highly skilled talent to develop and maintain. In the past, creating an AI solution required a team of experienced data scientists and IT infrastructure engineers to develop solutions. Today, many technology vendors offer low code AI software suitable for a wide variety of mission and business applications. **These low code solutions offer a potentially faster and cheaper path to AI deployment without sacrificing effectiveness.**

Low code AI software can be configured and deployed with **minimal coding** and often employs drag-and-drop interfaces, pre-built components, and other tools that make it easier for non-data scientists to implement.

Low code AI vendors offer two main flavors of solutions. First are **Pre-Trained AI models** for common use cases that, in theory, can be used directly out of the box and are immediately deployable. While these models come pre-trained — meaning large data sets have been used to teach the AI's underlying machine learning model to more accurately predict future outputs — they can often be further tuned using your specific data for improved performance. The second variety of solutions are **Configurable AI models** that come partially built and can be tailored, trained and tested within a user interface. These solutions offer a more involved experience than the pre-trained AI models, as the model must be trained on one's particular use case. However, they are much more accessible to the non data scientist than **Fully Custom AI models**, which are endlessly customizable.

In general, choosing between low code and custom development approaches to AI involves weighing trade-offs: **the decreased effort of low code AI models is accompanied by less (or sometimes no) flexibility to tailor the model**. When time and effort are more important than flexibility and customization, a low code AI solution may be the right tool for the job.
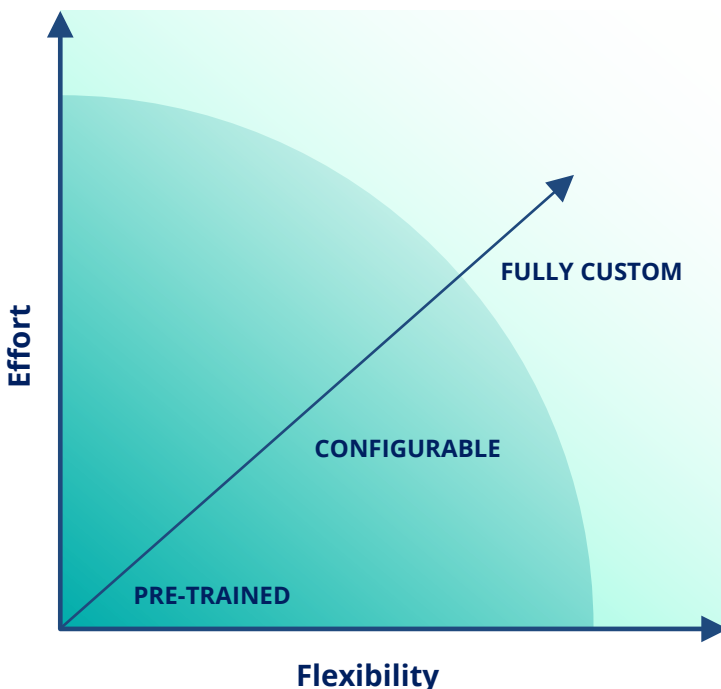
Low Code AI requires much less effort to build and deploy, but offers less flexibility
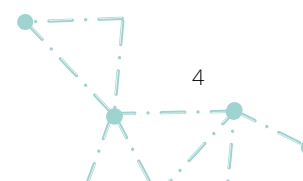
Why Use Low Code AI?

Low code AI solutions help agencies reap the benefits of AI, without hiring a platoon of Ph.Ds. While there are some limitations to low code approaches—decreased flexibility in AI techniques available, for one—the trade-off may be worth it when tackling common use cases or when available pre-trained models can rapidly accelerate the speed of deployment.

Since skilled AI talent is both rare and expensive, and the public sector lags behind the private sector in acquiring top AI talent, **using a more straightforward low code AI approach helps to leverage the skills of the current workforce** while still reaping the benefits of AI.[1] An individual with fundamental knowledge of a platform and basic computer science skills could test and deploy a configurable AI model or use an interface to train a new AI skill to address a specific need. Similarly, it does not take a data scientist to tap into a Software-as-a-Service AI offering that can deliver AI model outputs for common use cases via APIs.

Depending on which vendor solutions are available to your agency, **the vendor's pre-built models may pair well with an existing automated process (with RPA) or workflow (with CRM or ERP systems).** This approach allows organizations to quickly add AI capabilities to their current intelligent automation platforms of choice, without worrying about integrating a net-new, custom technology. Coupling AI with existing automation approaches means expanding use cases to include interpreting narrative text or extracting data from unstructured documents. Adding AI to an organization's automation capabilities is the logical next step in end-to-end process automation.

Finally, since numerous low code platforms have been in use for several years, agency governance processes for these solutions have been tested, refined and should be known quantities. **Leveraging low code AI modules nested within approved vendor platforms should mean a reduced IT governance approval burden** to earn the approvals necessary to use in production.

Newly introduced low code AI solutions can provide organizations access to advanced automation and decision support capabilities that were previously unattainable without a team of data scientists. For these reasons, **low code AI brings significant value by being faster and more cost effective to implement, while facing fewer governance and infrastructure hurdles when compared to custom models.** The key to success with the low code approach, however, is finding the right use cases that hit the low code AI sweet spot.

When to use Low Code AI?

There are countless use cases suitable for Low Code AI, so it often takes a structured analysis to determine if a use case is appropriate. **A good rule of thumb is that if multiple vendors offer pre-built AI models for your use case, you can go with a low code solution.** While vendor performance claims should be taken with a grain of salt, use cases such as invoice processing, receipt processing, and text translation have been successfully solved for numerous times by many vendors. So low code AI and pre-built models may be the fastest path to capturing value when available.

At a high-level, **Low Code AI may be best suited for common use cases** (such as sentiment analysis, image recognition, and text classification), **when there is a lack of training data** (pre-built models are often trained on large, diverse datasets), or **when you are trying to rapidly prototype or test new ideas**. It is also important to note that while Low Code AI can be a good choice in many situations, it may not offer the flexibility needed to tackle highly complex or unique use cases.

For a case study of a low code AI model delivering real value at scale, we look no further than Deloitte's own travel expense system.

Many Low Code AI products include both **pre-built models or interfaces for training a model** for the **following use cases**:

Invoice processing
Extract information from invoices

Text recognition
Extract all text in photos and PDF documents (OCR)

Receipt processing
Extract information from receipts

Identity document reader
Extract information from identity documents

Document processing
Extract information from documents

Sentiment Analysis
Detect positive, negative, or neutral sentiment from text

Category classification
Classify citizen or customer feedback into predefined categories

Entity extraction
Extract key elements from text and classify them into predefined categories

Key phrase extraction
Extract most relevant words from text

Language detection
Detect predominant language of a text document

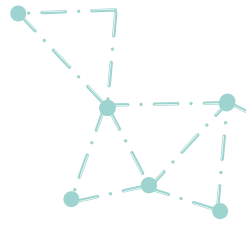**Text translation**
Detect and translate languages

Prediction
Predict outcomes from historical data

Object detection
Detect custom objects in images

Travel Expenses Made Easy with AI:
A Case Study

Recognizing the benefits of pre-configured AI models, Deloitte uses them in its own operations. Recently, the internal Deloitte Financial Systems team implemented an **Automatic Hotel Expense Itemization Tool** using a low code AI model.

The Business Challenge

Deloitte employees frequently stay in hotels for business travel. Receipts from these hotel stays had to be itemized manually, involving tedious manual entry, line-item categorization, and calculations. Approximately **250,000 hours a year** were estimated to be spent on this non-value add task.

The Solution

Automating the Hotel Expense itemization process, enabled employees to upload their hotel receipts and let the system automatically itemize the receipts. This automation has not only improved the **accuracy of expense submissions,** but it will **free up 225,000 hours annually by reducing 90% of time spent on receipt itemization,** including time taken for corrections.
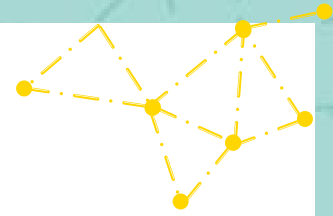
The Technical Approach

The Azure Form Recognizer* receipt model performs OCR and expense type prediction for uploaded receipts. Custom features (such as tax line-item grouping and expense type override) ensure itemizations match internal business rules.

* Deloitte's use of Azure Form Recognizer is not an endorsement of this tool

90%

Of time spent on manually itemizing hotel receipts reduced

225k hours

freed up annually on itemizing hotel receipts

Travel Expenses Made Easy with AI:
A Case Study (Continued)

1 **Receipt (PDF/image) is uploaded** to expense portal.

2 Itemization tool **extracts** text, **filters line items** based on key words, **categorizes** expense type, and **groups** daily tax items.

3 Itemization tool **inputs grouped line-item expenses** into expense portal. User checks inputs and submits expenses.
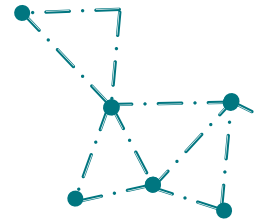
# Comparing Low Code AI Tools: A Structured Approach

The Setup – While the marketplace for Low Code AI offerings is not yet fully mature, several vendors offer viable options for a wide range of use cases. Given the lack of experience in the public sector with these tools, we decided to put two products to the test to determine which tools were truly mission ready. We benchmarked the tool performance on quantitative factors and captured Developer feedback on qualitative factors such as ease of setup, user friendliness, and other intangible factors.

The Products – We chose two separate Low Code AI products for testing, representing different vendor approaches to Low Code AI. Our test set included: (A) a low code application development suite's offering, and (B) a leading RPA vendor's offering. We then identified a use case that both vendors offered a ready-to-use AI model for: receipt processing. Using an out-of-the-box model leveled the playing field for all vendors, as the skill of the Developer would not be a factor. We could process the same test data set through both vendors, further removing another source of potential bias.

The Approach – We deployed a group of Developers with experience in intelligent automation and low code AI tools within the public sector to set up the products, deploy the models, conduct the tests and provide feedback on qualitative factors. Test outputs were consolidated and analyzed by a separate team. Our data set of 100 representative receipts included a wide variety of actual receipts, similar to those used to file standard expense reimbursement requests.

Similar studies frequently gloss over the setup and installation of low code products. However, these steps can be unintuitive or complicated, and have the potential to significantly add to the project duration. Our Infrastructure Engineers, Solution Architects, and

Developers supporting this study took note of the challenges, or lack thereof, setting up each product.

Our Results – We compiled our analysis, as well as lessons learned, which we highlight in this paper at a summary level. We also described what we know to be true about each vendor tool and what areas still need to be explored further. The full results of our testing and analysis are available upon request, along with live demonstrations of each tool, for interested federal, state, and local government agencies and higher education institutions.
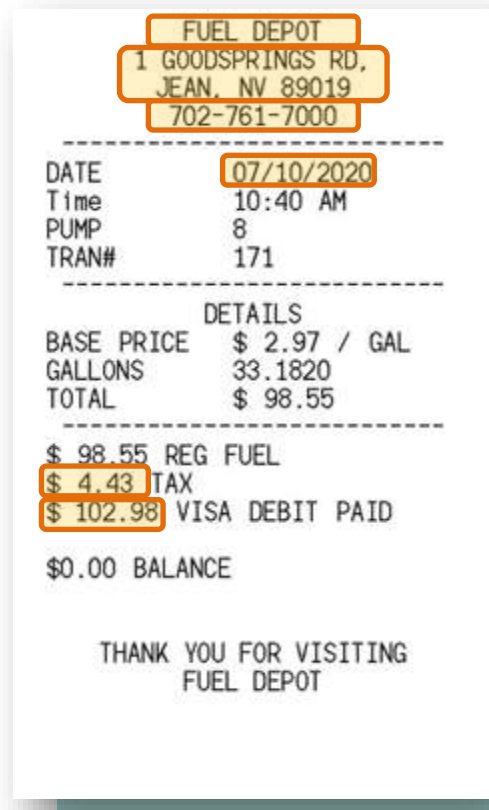
Receipts Processing Use Case: We chose a common use case, which every vendor had a preconfigured ML model to address, advertised as pre-trained and ready out-of-the-box.
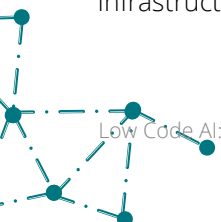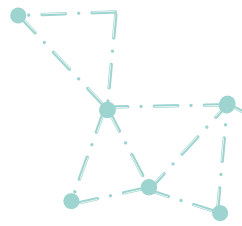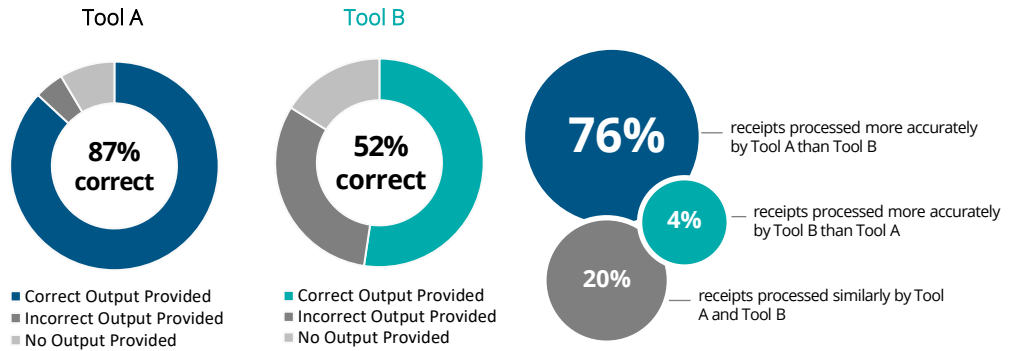
Results Highlights: Did Low Code AI Deliver?

Accuracy

Our two chosen products performance varied widely for our chosen receipts processing use case. Tool A accuracy was significantly higher than Tool B, both in terms of identifying the correct field and in correctly digitizing the receipt text.

Percent of fields correctly identified and digitized using:

Tool A

87% correct

- Correct Output Provided
- Incorrect Output Provided
- No Output Provided

Tool B

52% correct

- Correct Output Provided
- Incorrect Output Provided
- No Output Provided

76% receipts processed more accurately by Tool A than Tool B

4% receipts processed more accurately by Tool B than Tool A

20% receipts processed similarly by Tool A and Tool B

Confidence Scores

Confidence scores indicate the AI models' predictive confidence of the accuracy of the model output. While a meaningful range of confidence scores were given, both tools struggled to predict which of its results were most likely to be correct; confidence scores were only somewhat correlated with verifiable accuracy.

Average Confidence Scores

Tool A
- Correct: 94%
- Incorrect: 87%

Tool B
- Correct: 88%
- Incorrect: 79%

Range of Confidence Scores

Tool A: 30% — 99%

Tool B: 50% — 99%

Qualitative Factors

We noticed an inverse relationship between ease of (and speed of) deployment, and the flexibility of the vendor solution.

Pros and Cons

Tool A
- 👍 Quick and easy to set up software
- 👍 Model was operational in ~2 hours
- 👍 Numerous options to ingest receipts
- 👎 No Choice of OCR engine options
- 👎 Pre-built models are not retrainable

Tool B
- 👍 Flexibility of on-prem / cloud options
- 👍 Many OCR engine options
- 👍 Highly configurable
- 👎 Time consuming to set up
- 👎 Steep learning curve

Mission Ready? Yes... with some caveats

Our analysis yielded impressive results using one low code vendors' out-of-the-box AI model. While we had dissimilar experiences in terms of setup and results, at least one vendor's product was processing receipts and pulling accurate, usable data in just a few hours. Given the 90% automation levels Deloitte achieved using a similar approach, public sector clients are leaving staff time on the table if they manually process receipts—or similar documents—without the aid of a low code AI model. Here are our other findings and considerations:

Key Findings
Software Setup & ML Model Deployment is not universally easy. At the very least, you will need an experienced product specialist, and may need direct vendor engineering support, for deployment of your first low code AI model.

Performance was impressive (for one vendor). If you choose a best of breed vendor for the use case, and loop in human reviewers for lower confidence score results, you could reap significant time savings and likely improve data quality at the same time.

There is a trade-off between simplicity and flexibility. The lower performing product was also more flexible, as its AI model was retrainable for further tuning using an organization's specific

data. Retraining may have improved our results. The take-away is that if your data is unique compared to the data used to train a pre-configured model, you will need to think about whether a more flexible tool is needed.

Other Considerations
Define success up front. This includes setting realistic expectations and asking yourself questions like: Do you need pristine outputs, or are some typos / mistakes acceptable? At what level of confidence do you push outputs to a human for review?

Sharpen your pencils for pricing. Calculating the total cost of ownership (TCO) for a low code AI solution can be complicated and base licensing prices are only a small part of the equation. Infrastructure costs and processing costs (e.g., GPUs), custom connectors, volume-based pricing and human reviewer costs means it takes some effort to calculate TCO.

Low Code AI may not always be a best fit. These tools will not cover all use cases; you still need highly skilled Data Scientists for complex and novel problems.

Prepare IT Governance. With low code AI pre-trained models, the time to implementation can be quick, so expect the technical work to far outpace the ability of most

governance processes to keep up. However, because so many vendors now have dozens of pre-trained models and interfaces to train custom models across a range of functions, the time to start working out the governance kinks is now. These are (relatively) quick projects, and low risk, but the experience you gain from working through the process will be valuable because **you will be using these solutions soon**, if you haven't already.

The Bottom Line
Is Low Code AI "Mission Ready"? In a word, Yes. In near-real-time, low code vendor AI models are getting better and better, meaning passable results today will transform into high-performing results in just a few vendor release cycles. This means public sector clients should find a business process that could benefit from a low code AI model today, choose a vendor that complements its enterprise architecture, and go for it.

Want to Know More?
For a detailed discussion regarding our comparative testing, specifics on the performance we documented including demos of multiple vendor products, and how these low code AI products can work for you, please reach out to the authors listed at the end of this paper.

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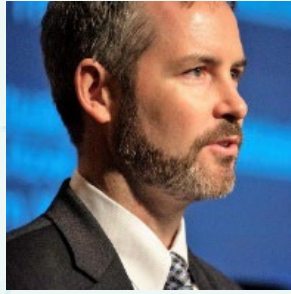
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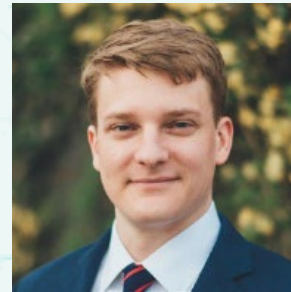Senior Manager
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Endnotes

1. Kyle Wiggers, "Survey finds talent gap is slowing enterprise AI adoption," *VentureBeat*, April 19, 2021.

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