Making Digital Products More Capable with AI

An Executive Guide

Co-created by

Emerj Artificial Intelligence and **NLP Logix**

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Introduction

Increasingly, Artificial Intelligence is descending deeper and deeper into the bedrock of today's digital products. The days have passed where AI lingered near the surface of a digital product's vast pool of capabilities and innovations.

For many organizations, AI still represents a long journey fraught with ***"learning moments"*** and ***"sideways weeks."*** However, as digital products continue their evolution:

- How do today's organizations make those products more capable with AI?
- How do they ensure that AI adds value and, more importantly, reaches ROI as soon as possible?

Today's digital ecosystem comprises the widest breadth of AI variety that we have ever seen. Whether a digital product provides a banking user with forward-looking predictions and projections related to their financial data or assists a customer support professional when they search for client documents within a large enterprise's many databases, AI has leveled up and has overtaken the abilities of traditional software solutions that, until recently, seemed disruptive and innovative in their own right.

How can leaders and their teams create AI solutions that take digital products to their next level? In this white paper, we will examine the evolution of AI initiatives within enterprises, from early-stage, supplemental, bolt-on solutions - to mature AI projects that integrate AI into the heart of the products it supports.

We will meet with **Matt Berseth**, NLP Logix's Co-Founder and Chief Information Officer, who specializes in data science research and applications in the information technology and services industry. We will explore the growth many companies experience as they mature in their approaches and applications of artificial intelligence in their digital products. We will also review three use-cases that will serve as examples to organizations as they chart their own AI journeys.

The AI journey: Looking before you leap

When you plot across a spectrum how companies approach AI, an analogy often helps make the progress and value of this sometimes-intangible technology more concrete and easier to understand.

When AI first finds its way into a digital product, it's as if an AI project leader is some sort of cook adding toppings to a pizza. The pizza represents a complete product per se, but AI adds value by enhancing that core product. At this early stage, we add AI, like pizza toppings, atop the product, sometimes as an afterthought, and often as bolt-on capabilities, without which the product would have worked just fine.

Following a few successes, we might find that we are layering AI and ML onto our core products with ease and growing confidence. We start to wonder if incorporating these AI components earlier on—baked into the product instead of just added on at the end—would add more value and unlock additional capabilities. We consider whether we want lasagna instead of pizza, and if a product with AI as an integral ingredient would add more value for customers and users.

Starting Out Small with AI

Before you start with AI, the best question to ask may be, What can we do without AI?, says Matt Berseth. "While AI promises a lot of good," he continues, "there's also a lot of overhead. Start small. Start simple, and be pragmatic."

> ***Considering whether AI represents the right fit for your application or need should be a top-of-the-list question for anyone considering taking the plunge into AI and all its offerings.***

For companies in their earliest stages of AI adoption—at the pizza toppings end of the spectrum—NLP Logix has seen a lot of value in starting slowly. By starting slowly, companies can learn about the data they have collected and the possibilities it offers. They can also begin to flesh out what is not possible at this early stage.

A lot of value can emerge from a company's first attempt at AI, even if the project team suffers setbacks and sideways weeks where they do not progress toward their goals. A company's first AI and ML projects may stumble at key decisions such as determining which data sources will deliver predictive value to a product. ***"When we get a fresh problem, a fresh dataset, and use case,"*** says Berseth, ***"what's possible isn't well known."***

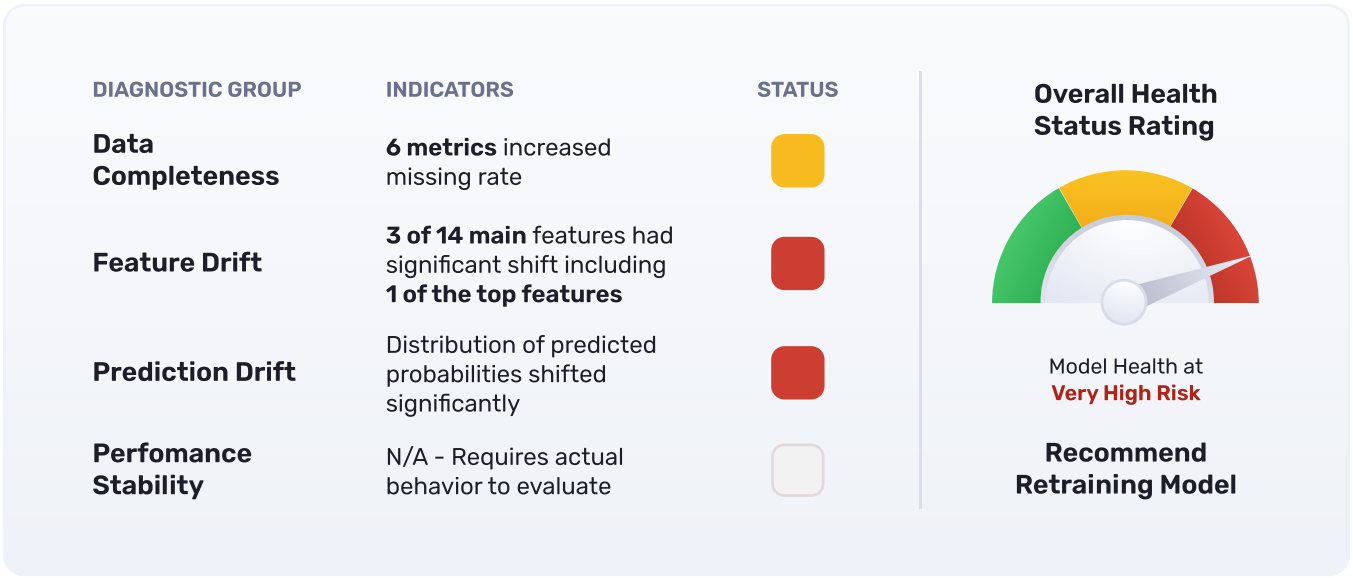
NLP Logix starts client projects with its 10Q approach, which helps customers establish and test assumptions about their data. ***"Something we've learned time and time again," says Berseth, "is that half of those assumptions are wrong."***

Exposing truths and realities about a company's data helps move team members, stakeholders, and decision-makers onto the same page regarding what their data can and cannot do. ***"That's a good starting point,"*** Berseth advises.

NLP Logix frames this part of AI development as a discovery process where stakeholders discuss possibilities for AI and ML applications and existing knowledge, expertise, and constraints. After the project team develops an objective, with goals and milestones, they move to modeling—where they identify important features and link the data they will need to support them.

"There's a lot of value in the first model,' advises Berseth. That incremental value can lead to a project roadmap and useful guidance on how to communicate a project's value and ROI. ***"We have a model health scorecard to make sure that the things we thought were true when we put the model in production are still true,"*** says Berseth. ***"We have scheduled touchpoints with the customer to talk about model health."***

Armed with a functioning model, project teams can extract valuable information that helps indicate which path a digital product should take so that it brings value and produces ROI for the time, people, and resources a company has invested.



An example of the model health scoring system used by NLP Logix.

Following a few small, quick wins, project teams can use that traction to begin thinking about bigger applications for their growing AI expertise. They can begin baking AI and ML deeper into the core of their digital products.

The Call of Larger AI Projects

What drives companies to take on bigger AI and ML projects, risk more resources, and wade into the potentially unfamiliar waters of integrating AI technologies deep into their digital products? “Competition,” posits Berseth. “Honestly, marketing drives a lot of this. It’s a little bit of an arms race.”

Soon, AI and ML solutions that just “top the pizza” compete against digital products with AI technologies that have been baked deep into the DNA of a digital product. With building confidence and a sense of urgency, teams become emboldened by their progress, gain traction, and begin to consider grander possibilities for AI and ML and the power of layering the features it makes possible.

> ***AI at the heart of a product is fundamentally different than a bolt-on. I feel strongly that the learnings of the ‘toppings’ of early projects form the core of the next gen of the whole product.***
>
> **Matt Berseth,** Co-Founder and CIO, NLP Logix

When teams stretch their competencies in new directions, they look for familiar ground, but application development is “a different mindset,” says Berseth. While traditional application development follows predictable linearity, AI is still new and different. AI departs from traditional mindsets and looks at drastically transforming processes and creating novel experiences. AI does not always deliver weeks that reflect progress. Often, teams learn a lot from sideways weeks, but do not progress toward their goals.

Experience can help iron out the wrinkles that complicate AI project plans. “We have 11 years in this field,” says Berseth of NLP Logix, “We can give our customers a linear path through many modeling exercises. But some problems are harder than others. For those, we are transparent and bring them through the journey with us. Those are the two paths.”

AI and ML use cases: Real-world applications

In this section, we examine three use-cases that span computer vision, RPA (robotic process automation), and OCR (optical character recognition) technologies and show how these tools helped organizations solve their problems.

Computer Vision helps scale image processing

"Our client was trying to process images at large scale," explains Berseth, "in terms of the volume of images and the types of detection and metadata they wanted to capture from the images." The client had an existing team and architecture, which was part of a bigger enterprise application.

At every checkpoint and milestone, however, the client struggled to develop algorithms and get them accepted, approved, deployed, and maintained. They came to NLP Logix for help with AI architecture, the streamlining of processes, and the ability to scale algorithms.

NLP Logix started with the data—and, specifically, the labels—and soon found out that the client had outsourced some of the labeling exercise. The client had spent a lot of time and money labeling their data, ***but missed some critical steps, such as:***

- → Assessing the quality of data to be labeled
- → Identifying inconsistencies
- → Assembling a labeling book
- → Constructing an audit process

> ***"If you don't have a good process around capturing the labels, and auditing and verifying them, you get the classic garbage in, garbage out problem.***

Matt Berseth
Co-Founder and CIO, NLP Logix

NLP Logix started with data labeling and created the inferencing architecture that would meet the client's application needs and then pipelined the models. The project team also helped the client build an audit process—and a successful, scalable model.

To overcome the client's rigid architecture that did not offer domain-specific preprocessing or post-processing, NLP Logix streamlined how inference was performed, allowing the client to more effectively use their compute resources.

To improve accuracy, NLP Logix added a validation checkpoint to the labeling exercise, a human-powered quality assurance point where new labels could be added, or existing ones adjusted. For certain labeling cases, a human would review the model's decision and correct it as needed. Those annotations created an alive ML system that improved as it gained experience.

Sometimes, projects require the courage to make personnel changes before they can be successful. In the end, in this use case example, not many of the prior project team remained through project conclusion, explains Berseth. "A lot of the folks on the ground did not make it through that very first phase. Rather than a team collaboration, it was more of a replacement."

In cases where in-house experience does not survive or never existed at all, the key is to build that experience so it can be retained in-house and it becomes doubly important to build an AI-enabled product that actually works.

Enabling scale through customizable Robotic Process Automation

For NLP Logix, opportunities frequently arise to step in and help clients with many different types of use-cases. In some of these, the technology may already be commercially available, but the point of failure becomes its licensing requirements.

In this use case, the client extracted healthcare documents from an industry-specific software system. The client wanted to make the process much more efficient because it relied on humans to do the clicks and capture the data in the documents. To the client, RPA technology represented a big leveling up from a time-saving perspective. However, they could not find an RPA solution that met their needs.

> ***The client needed to scale its robotic process automation (RPA) software, but the licensing model of the large, commercially available RPA solutions did not meet their needs.***
>
> **Matt Berseth,** Co-Founder and CIO, NLP Logix

The client needed to scale its RPA solution in ways that existing licensing models would not support. They also needed to go deeper in an area where two of the leading RPA offerings in the market did not focus. The client soon concluded that the cost of existing tools was not going to be feasible.

The client turned to NLP Logix for help. ***"Our charter was not to replace those platforms,"*** Berseth explains, ***"but to go really narrow and deep, meet the cost objectives, and enable the solution to scale as the business scales."***

To approach the client's problem, NLP Logix started small and focused on under 100 transactions a day where RPA processes collected and packaged data into a single transaction. From there, NLP Logix scaled up the solution. ***"We're now at 15,000 transactions a day,"*** says Berseth, ***"and we're working to get to 80,000 a day, where our client wants to be."***

A screen shot of the NLP Logix bot monitoring dashboard.

> ***We had all this text data, this unstructured mess. The use case was to help. We needed to add structure to the data and help the people who processed that data manually. We needed to help them work with the data, more quickly and effectively.***

Matt Berseth
Co-Founder and CIO, NLP Logix

Using advanced language models, NLP Logix stood up a solution that considered the text documents ingested about each patient and delivered a number of predictive outputs. Those outputs helped detect and recommend target outcomes that the system's end-users could then use to make decisions.

Through partnering with NLP Logix, the client was no longer restricted by the limitations of the leading RPA solutions available on the market. Through NLP Logix, they gained a partner who helped them build a custom solution, tailored to their specific needs.

Last-Mile Optical Character Recognition

When the next client came to NLP Logix for help, they had some 300 human data entry personnel who reviewed and keyed in corrections for healthcare forms that had been first-passed by an OCR solution. The client sought labor cost savings by cutting the number of people involved in the quality control and correction process by half.

> ***A lot of people think that OCR is done and solved. They think that if we can do deep learning, how can we not solve OCR? But it's far from a solved problem.***

Matt Berseth
Co-Founder and CIO, NLP Logix

The client partnered with NLP Logix to build a high-end, long short-term memory (LTSM) OCR solution, which was trained on years of correctly labeled, historical claims data. To make the solution's OCR functionality even more accurate, it relied heavily on a critical advantage: the training data contained the fonts, smudging, top-of-line printing, faxing, folds and other nuances that the LTSM OCR solution would encounter in new healthcare documentation.

NLP Logix calls the approach that helped this client, Last Mile OCR. The accuracy delivered by NLP Logix's Last Mile OCR engine allowed the client to hit their labor-savings operating goal. NLP Logix developed that accuracy by identifying areas within the data that exhibited weaknesses and then troubleshooting the data types that delivered the best accuracy improvements for the invested efforts.

At a tactical level, the client's business problem was to digitize their form, which included patient information including name, date of birth, and more. Their SLA tasked them with having no more than two incorrect fields per every 100 forms—a high bar for quality and a high demand for the accuracy of the solution that NLP Logix designed.

To test its solution, the client presented NLP Logix with a 1000-form test set that they had hand-picked to run through the system. ***"I would say that maybe they weren't representative of exactly what they get day to day,"*** says Berseth, ***"but they had a good mix of what they felt was important."***

In the end, the field-level accuracy delivered by the NLP Logix system ***reached 92%***, up from 85% in the baseline sample, an improvement from the client's current process that would only continue to achieve better results with ongoing training of the model.

About NLP Logix:

NLP Logix is an advanced analytics and machine learning data product and services company, which has grown from a vision in 2011 to one of the fastest growing teams of deep learning practitioners.

The company was started by three professionals who worked together at a medical services company developing and applying predictive models and advanced analytics into its workflows. When the founders started NLP Logix, they began competing in international data science contests hosted by Kaggle.com…and started winning.

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The founders knew that developing algorithms through machine learning was only one piece of the solution, so they began to focus on the practical application of integrating the learned models into a customers' workflow to deliver the most value at the point where decisions were being made. That business model lives today.

About Emerj Artificial Intelligence Research:

Emerj Artificial Intelligence Research is a market research and advisory company focused exclusively on the business impact of AI.

Companies that thrive in AI disruption run on more than just ideas. They leverage data and research on the AI applications delivering return in their industry today and the AI capabilities that unlock true competitive advantage into the future - and that's the focus of Emerj's research services.

Leaders in finance, government, and global industries trust Emerj to cut through the artificial intelligence hype, leverage proven best-practices, and make data-backed decisions about mission-critical priorities.

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