

# 5 CRITICAL STEPS OF A SUCCESSFUL AI PROJECT

## WRITTEN BY

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# INTRODUCTION



According to IDC's latest Worldwide Artificial Intelligence Spending Guide, Australia's spending on AI will grow to \$3.6 billion in 2025. Yet, only 39% of large organisations planned to invest in AI technology in 2020. For many organisations, roadblocks and challenges still exist when looking at deploying AI. Research shows that the top three most significant challenges companies face when considering the implementation of AI are staff skills (56%), the fear of the unknown (42%), and finding a starting point (26%).

I wanted to share how we at MaxusAI build visual AI projects to ensure success for organisations of all sizes in any industry. Drawing from global thought leaders and our experience we have identified five critical aspects that you can follow to ensure a successful AI project. This approach focuses on building a series of smaller projects or incremental experiments to allow for continuous value and learning. Throughout this guide, we will use an example of the work that we did with one of Australia's leading energy transmission providers to give you practical, real-world examples of the process. You can copy these steps yourself to start your AI journey.

# DEFINE A BUSINESS PROBLEM

The start of any project needs to identify the issues worth the further investment of time and capital. Defining your problems and aligning your goal for the project is probably one of the most critical steps to beginning any AI project. It sets the tone of the entire project and guides all of the activities that follow.

Think of it as your guiding force that provides alignment throughout the project for what you and your team are trying to solve. Having a strongly aligned strategic goal and a clearly defined problem will help you generate higher-quality outcomes when you and your team start to ideate potential solutions. It is very easy to get lost in ideation if you don't have a meaningful and actionable strategic goal to help you and your team focus on.

In principle, this sounds easy, but we often find that many of our clients have difficulty clearly defining the problem they want to solve and aligning it with their corporate strategy. When trying to define your business problem, we always give our clients the same advice; consider areas finding efficiency for laborious manual tasks which are boring and repetitive for your skilled workforce.

For example, the visual inspections required for maintaining significant assets across states or cities are a constant challenge for management in Mining, Oil and Gas and even Agriculture. A project that streamlines the manual inspection process of large amounts of photos or videos reduces the cost and ensures a solid ROI.

## How we Defined the Problem

To help the client define their business problems, we facilitated a series of discovery meetings and interviews with key stakeholders to understand what AI initiatives had already been undertaken and to uncover their needs and requirements.

During this process, we identified that the client was collecting thousands of images of their transmission towers as part of their asset inspections and maintenance processes each year. These images were either captured by the ground crew who would climb up the transmission towers or from independent helicopter companies who were commissioned to capture images as they flew over the assets. Once this data is captured, the Asset Strategy team manually reviews each photo, extracts the data and aligns it to one of 500+ defect codes in excel. This aggregated data forms the basis for further analysis of a network health index.



Based on this information, the Asset Strategy team can optimise their maintenance work by determining if the scheduled maintenance needs to be moved forward or back to make way for higher priority maintenance.





To better understand their goals for the project, we also investigated what AI initiatives they had undertaken. In 2018, the client worked with a leading university to explore how computer vision and AI could be leveraged to automate the analysis of their asset images. This project provided the client with a strong understanding of what could be accomplished theoretically, but the proposed approach was not appropriate for production as the client didn't have the skill sets required in-house.

With all of these factors in mind, at the end of this stage, collaboratively, we broke down the client's goal to "Use computer vision and AI to detect the nuts and bolts on the transmission towers and rate the corrosion based on their internal rating system".



# IDEATE AI SOLUTIONS

Now that you have a clearly defined goal and problem statement, it is time to start generating possible solutions. When you were defining your business problem, you would have generated a list of ideas that the business would like to solve and with our experience and by providing guidance about the power of AI, a company can come up with potential AI solutions to those problems.

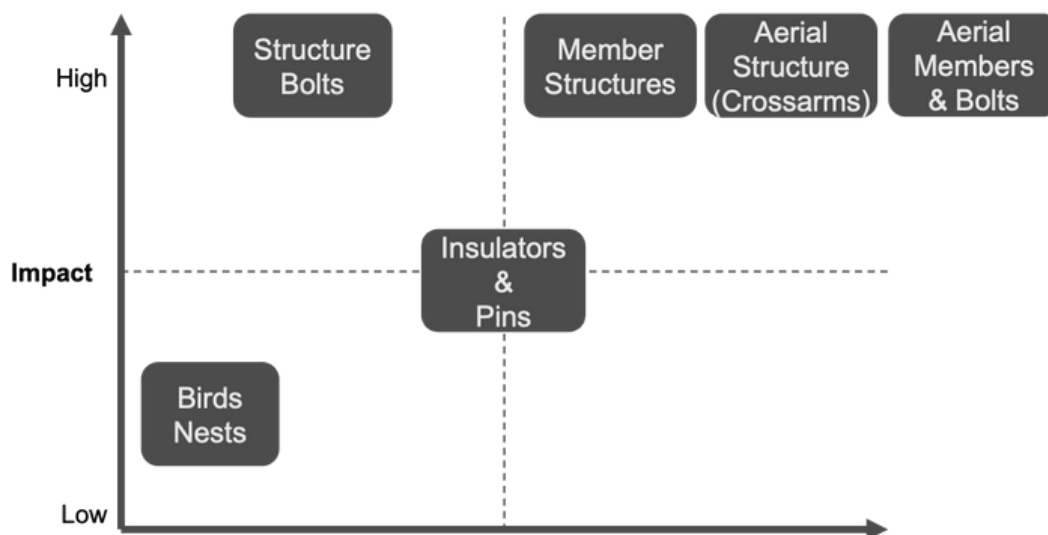
*“How might we use computer vision and AI to detect the nuts and bolts on our transmission towers and rate the corrosion based on our internal rating system?”*

We often find that most of our customers know what they would like AI to do for them, but they don't understand the capabilities of the AI algorithms or know how and where to get started.. So in this stage, we ideate possibilities for solutions and how we might break the project down into smaller achievable AI experiments. We look at the possibilities with respect to the use cases, identify what parts of the problem can be automated, and start thinking about solutions that can be tested.

In our example, using a design thinking approach, we took our problem statement from the first step and turned it into a “how might we” question which looked like this: *“How might we use computer vision and AI to detect the nuts and bolts on our transmission towers and rate the corrosion based on our internal rating system?”*.

We use guiding statements like these to collaboratively identify what parts of the problem AI might be leveraged for a solution. By walking through a design thinking approach and process, we can help clarify what the customer wants, uncover their strategic goals, and identify what their ideal outcome would be. With our experience, we guide the process of working through potential AI solutions. Some solutions we know might be feasible, others we don't know, and we explore all of the ideas that we might be able to test and experiment with.

As we broke this down for our client, the big solution they wanted to come to was to use helicopter imaging to detect corrosion on nuts and bolts and on members of their transmission towers. To solve this problem, we devised many solutions that could assist them to achieve that larger goal. Then we broke it down into 5 to 6 smaller experiments to test what the AI can do and where the practical limits are. Along the way, there was room to increase the application of the AI, for example, identifying defects on insulators or detecting the year of manufacture. Progress and learnings were shared on a weekly basis or sprint.



Each sprint also identified limitations, for example, as the helicopter could not fly underneath the assets, there was a limitation to the extent to which the AI could analyse all of the structural components as some components were not being visually captured.



A key part of this step for us was to extract as much potentially useful information about their processes, uncover how they used their images, identify the limitations of their manual processes, and assess the state of current assets they have with respect to the available images. We use this in a process to start imagining together what could be extracted from the existing images or with small changes to the workflow and within the capabilities of AI. Of course, when doing this in an iterative process, the initial problems and solutions you have in mind may lead you to other problems and other solutions. So this stage of initial problems to tackle sets us up for the agile process.

To guide and focus us throughout the ideation process, we asked strategic questions such as "What could we possibly accomplish with the datasets they already had from helicopter images?". Understanding the limits of the technology, we can then use design thinking to remove those thinking barriers and approach the strategic challenges. For our client, this allowed us to come to solutions that would culminate in a network health index that would inform their maintenance strategies in an automated way so that the manual labour and the human factor are not the roadblocks.

Think of this as the start of an agile AI adoption program that runs between 6-12 weeks, where each week or sprint, we define the experiment we're going to do. During each sprint, we can try to get clarity on what the AI can do, what data is needed, what manual effort is required to prepare the data for the AI, and how we want to measure whether it's successful or not.



# EVALUATE FEASIBILITY

Now that you have pinpointed and refined your ideas with which to move forward, this is where you identify the right AI project to start with. The project not only needs to be technically feasible, but it also needs to be viable for the business.

When we refer to viability, we mean that the solution needs to create value in terms of either cost-saving or creating new revenue streams for the organisation. Important factors that you need to consider when evaluating the viability of a project is to consider how much it costs to create it, and most importantly, how much time you will need from a domain expert to create the input data for the AI.

In principle, this may sound easy, but in the beginning, it is near impossible to know which project is more viable and feasible than others. This is where our approach is different. Rather than mapping out complex large-scale projects to start with, we help our clients adopt a “fail-fast, learn faster” approach when starting any AI project. To begin, we always recommend designing a small test to validate the application of AI and to identify where the limits of the technology are before allocating significant time and resources to it.

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## How we Evaluated the Feasibility of the Project

When our client was assessing the feasibility of the project, we assessed these key questions:

1. Will the AI be able to learn it?
  - If a human eye can see it, then the AI should be able to recognise it as well. Also, the AI has the potential to identify objects better than a human eye as it looks at each pixel.
2. How much data is needed?
  - Of course, there is the function of data. How much data did they have, and can it be prepared in a format that the AI can use? If a use case has never been done before and no other research is available, it is hard to estimate how much data is needed. We have seen use cases requiring only a handful of images to hundreds and thousands, depending on the diversity of the visual data and complexity of the use case. Hence, we always take an iterative approach to identify roadblocks early on and adapt our efforts to increase the chances of success for the project.
3. How much time will it take to prepare the data?
  - How much manual effort is needed to train the AI and for you to feel comfortable that AI can semi-automate the analysis with just a domain expert monitoring the results?
  - As we knew that the client's domain experts were time-poor, we developed a mitigation strategy where we created a guideline for how to create the data so it could be outsourced. Then the domain expert only needed to undertake a final review to validate the data.

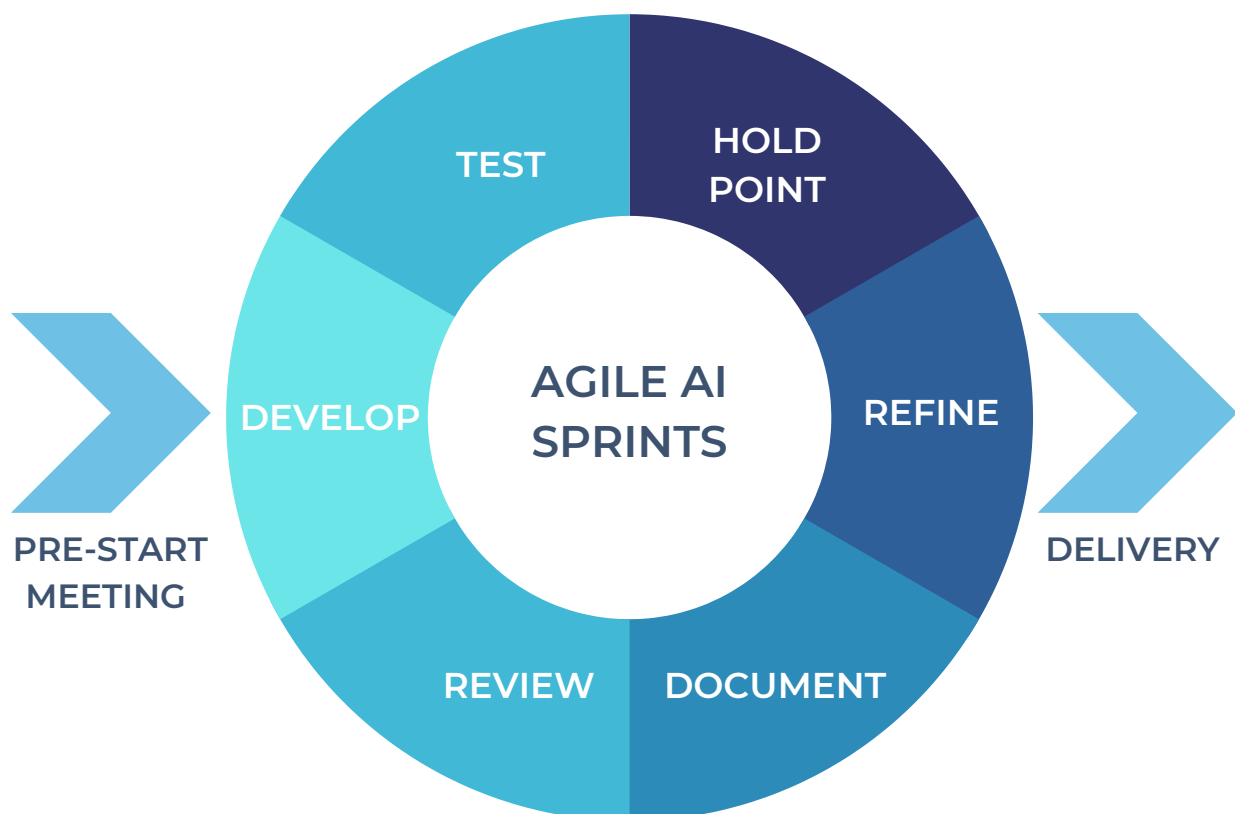
For our client, we broke the project down into small iterations to test the application of AI and identify where the limits of the technology were.

# DETERMINE SPRINT GOALS

Based on our “fail-fast, learn faster” approach, and due to the unclear, custom nature of many project characteristics, we always recommend implementing an agile methodology for all AI projects.

In each sprint, try to identify three things:

1. Can the problem be represented in a digital format so that the AI can make sense of it? Can we translate the problem into an AI schema to get the desired output?
2. Identify if the AI can learn. Is the AI extracting information, or is it random chaos?
3. How much data should be generated? And what data should you choose to test the capability of the AI? If you only take easy data, then it will only give you good answers on easy data. It is important to use data that will enable you to identify the limits of AI. Then you can determine whether to mitigate this shortcoming, or whether you recognise these limitations and choose not to use that type of data in the future.





This approach helps you get the right data which is imperative for any AI project. It ensures that the data is of the highest quality. If the data quality is not kept high, the domain expert will be unable to determine if it is the data that is wrong, or if the AI algorithm is inadequate to solve your particular problem.

We always advise our clients to start small with high-value, low-hanging use cases, where they can quickly yield results, within one to two weeks. From there, incrementally increase the complexity of your sprints.

## How we Determined Sprint Goals

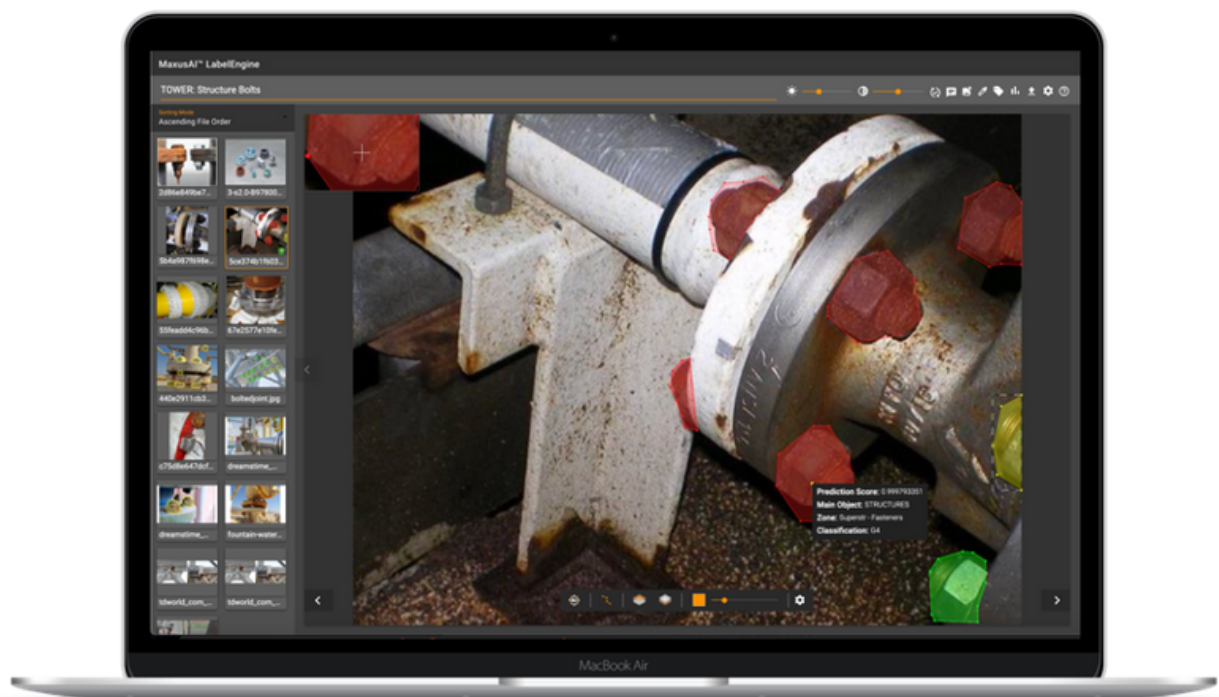
Before we started the first sprint, we held a couple of exploratory sessions with the client to understand what information they were currently extracting from their images and videos and what other data they would like to extract moving forward. We also reviewed their defect codes as well as the condition attributes for their assets.

We began the first sprint by collating the roadmap of use cases into the matrix based on their value generation and required effort level. This is where the experience of our team comes in; we were able to identify which of those use cases would most likely yield results within one to two weeks. From there, we prioritised what we would take in the first sprint while having a big goal in mind. We designed week-by-week experiments that would inform us and the client if the AI was working towards the ultimate goal.

For the first sprint, we advised the client to only focus on the high-risk structures where they had good quality images that contained a reasonable count of nuts and bolts and only required a reasonable amount of manual effort to mark-up the objects within the images.

As we have mentioned throughout this paper, the integrity of the data is imperative in any AI project. We needed to ensure that corrosion grading was consistent for the AI model training. Even though the client had some specifications to assist with the standardisation of the grading of corrosion, each department that assessed the images of the assets would grade the corrosion slightly differently especially in edge cases. To effectively transfer knowledge internally and scale up the mark-up efforts, we worked with the client to develop standardised corrosion assessment guidelines for fasteners, structural members and insulators across all departments. By the end of the first sprint, we had proven that the AI could detect and grade the severity of corrosion of the nuts and bolts on cross arms of transmission towers.

Now that we had validated the core experiment, for each of the following sprints, we designed experiments that incrementally approached more complex images of more complex and detailed structures and long-distance images.



# BUDGET FOR RESOURCES

A key component for any project is to ensure that we appropriately budget for resources.

One of the best parts of our process at MaxusAI is that we set a fixed budget and timeframe very early so that business outcomes and value is achieved. Many companies can not get started with AI because of the perception that putting together an AI project can be expensive, which they can be if not approached in an agile fashion and without the expertise to guide the process.

The key to the process is to identify and avoid picking difficult long-term projects that are not likely to succeed. Yet, utilising our experience at the outset avoids developing expensive models, as we can anticipate challenges that make a project unviable or makes an alternative use case viable. With our projects, we are able to stay on consumer hardware until we provide the business case for a more detailed and expensive approach.

Starting an AI project without these approaches can be very expensive. You can waste resources exploring use cases that may be interesting academically but are expensive and are without real business value. This is the real value of using a proven methodology to get the outcome to a fixed timeframe and budget.



So why do we like to do things on a fixed budget and timeframe? We like to focus on the business value. With a budget as a constraint, we put limits on the “wouldn't it be nice” exercises that many academic and “research” projects do. Unlike universities and paid researchers, we don't have the privilege of doing something for the sake of proving what can be done, we set a budget that needs to produce a viable commercial outcome.

Seeing a budget makes us think and have a commercial mindset from the beginning and reduces the focus on the “nice-to-have” type of problems.

We want to focus on problems that are high-value and create value going forward either through cost saving or creating additional revenue, whilst being mindful that it's still an unknown. At the end of the day, it's still an experiment where we do not have time or resources to waste on doing something just nice to have. By validating projects on a smaller budget, we are able to leverage the upside potential of future investment without requiring that investment up front and are providing the necessary insights to create future business/investment cases.

There are more than just financial considerations in budgeting, such as access to domain experts. It is important to consider the time it takes to capture the knowledge of the business or domain expert. To make any AI project worthwhile, the problem needs to be accurately reflected for the AI, and that comes with access to and documenting the company's domain knowledge.





# RESULTS



Within 8 weeks, across 6 AI sprints, analysing more than 1,000 images containing 15,000 fasteners and structural members, we validated that an AI solution could improve and scale the condition monitoring process and approach for corrosion detection for nuts, bolts & fasteners across their asset network.

Most importantly, as the client created the AI application alongside us, they gained a better understanding of AI. They now understood the limitations and had an informed view of how they could apply AI within the organisation. They also had a clear view of how AI could be applied to transform their business and how they could best implement it across the entire organisation.



# SUMMARY



Hopefully, by following this approach you feel confident about beginning your AI journey and selecting your first AI project.

Don't worry if you don't feel confident that you can do it on your own, our team at MaxusAI is here to help. Each month, I offer 30-minute one-on-one innovation strategy sessions to those that are new to AI and are looking at getting up and running.

As you can expect these sessions are in high demand, so I am only able to offer one of these complimentary sessions per fortnight.

In this quick 30-minute session, we will be able to:

- Uncover some of the current challenges you are hoping AI can assist with
- Review the goals you have for your AI project
- Recommend next steps for how you can achieve results

To claim your complimentary session email me at [glenn.neuber@maxusai.com](mailto:glenn.neuber@maxusai.com)

