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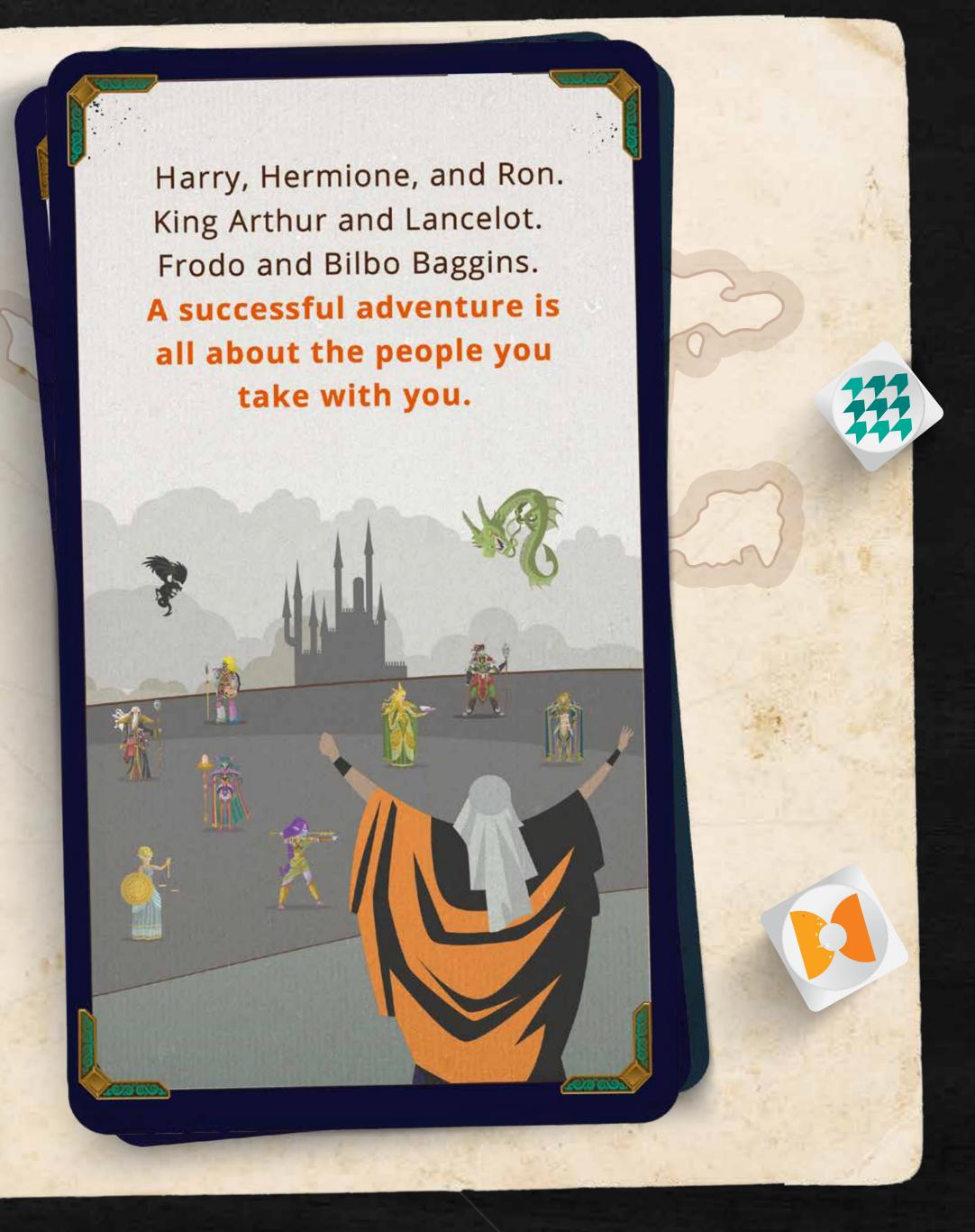
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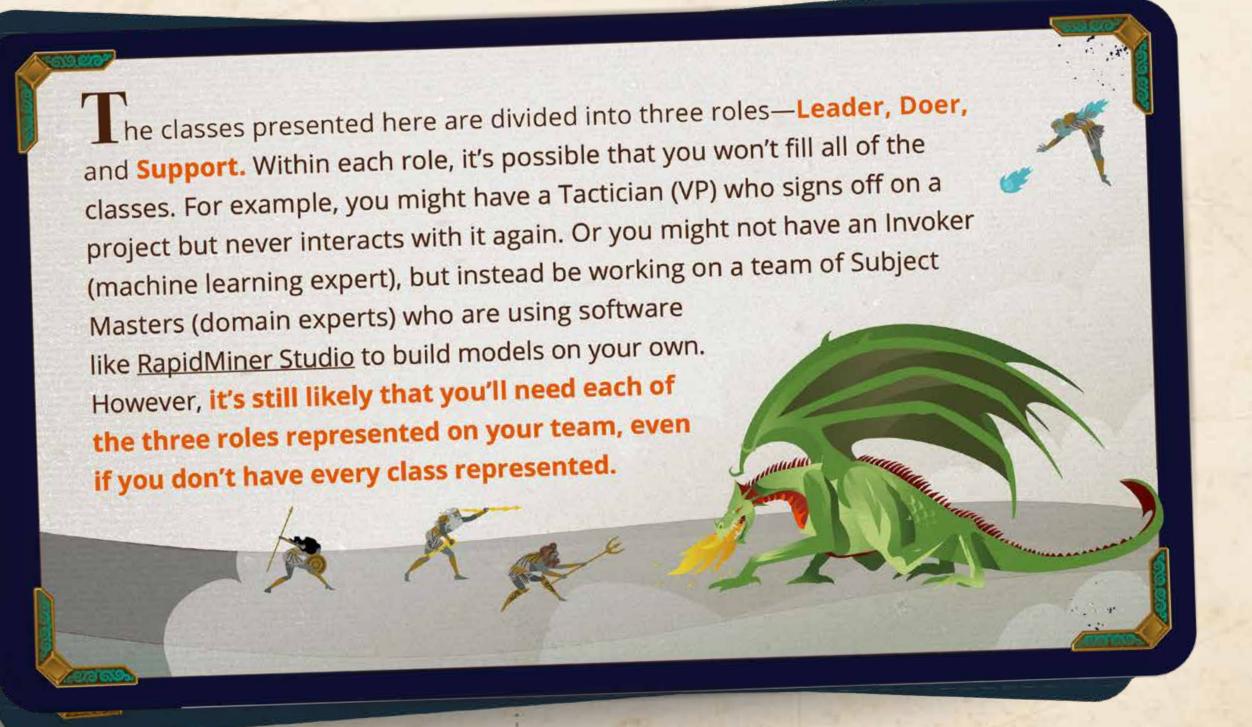
If you're getting ready to set out on a new machine learning journey, you're probably thinking about who to bring so you have the right skills for your project. This guide is designed to help you figure that out, no matter how experienced an AI adventurer you are.

If you're assembling a team for the first time, you might be feeling overwhelmed with all of the things that need to get done and roles you need to fill. If that's you, this guide will help you think about who you need to call together in order to make your project a success.

If you're someone who's participated in machine learning projects previously, this guide can help your current or future projects by giving you a better understanding of what's involved from all sides, regardless of your particular role.



Just as there's no one way to vanquish a dragon, there's no one-size-fits-all solution to building machine learning teams. What we've laid out here is designed to be a high-level guide, organized by the functional roles that are needed on a team, which we call classes, rather than by job title. To help you understand how these classes relate to your team and your project, even when they aren't an exact match, there are a few details to keep in mind as you browse this guide.



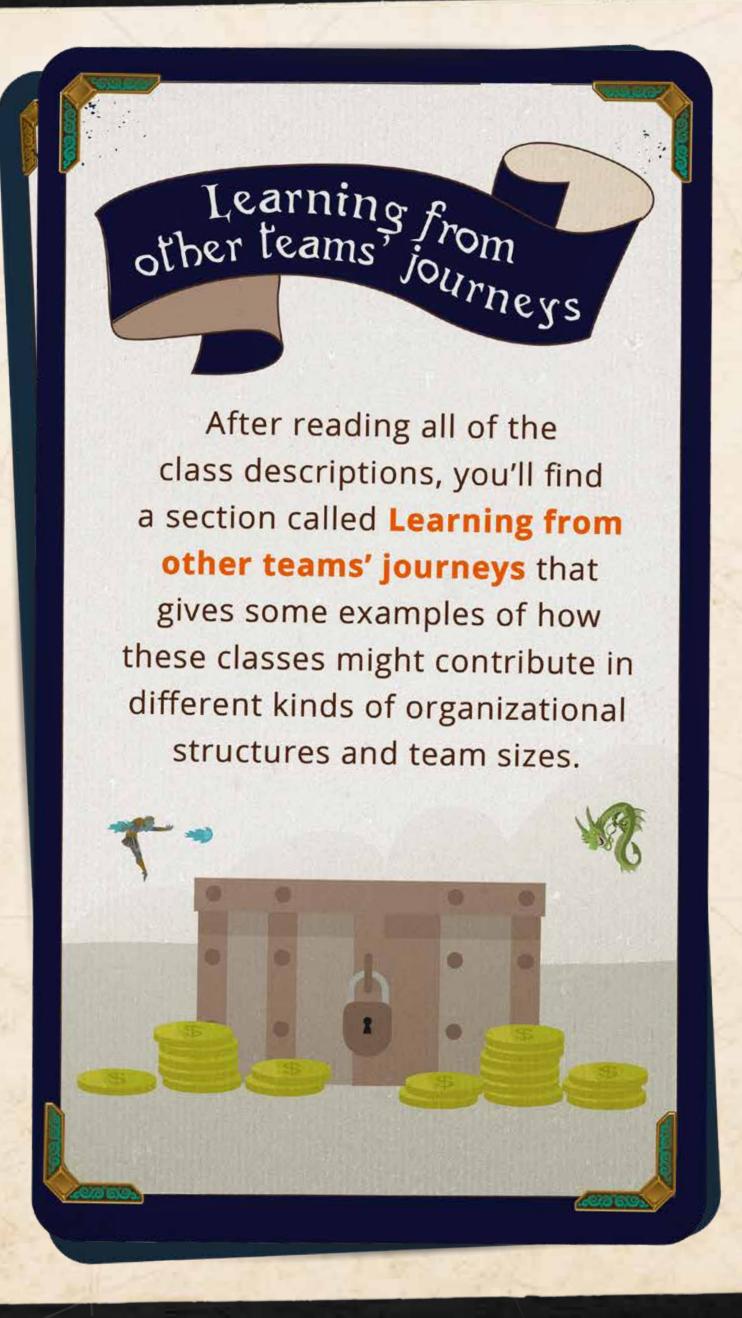






We've also included information about multiclassing—a single individual taking on the roles of more than one class within a team—as part of the introduction to each role. This will give you some sense of how flexible these classes can be as you're thinking through your battle plans.



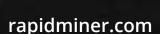




The following page shows you how we've laid out the information for each class, with details about the features that matter most when it comes to their work on a machine learning project.

Whether you're using AI
to slay a dragon or find buried
treasure, this guide will help
you on your journey—
let's get started!







Possible Class Backgrounds

THIS SECTION HIGHLIGHTS SOME OF THE JOB
TITLES THAT PEOPLE DOING THE WORK OF THIS
CLASS MIGHT HAVE.

Achievements

The **achievements** section outlines some of the challenges that might occur for a given class, and what successfully navigating those challenges looks like.

Class layout overview

Each class has two or three attributes, as shown below. Although these are far from exhaustive of everything a given class might bring to a project, it should help you understand the critical expertise that each class contributes to a project.



DATA

ENGINEERING













VISUALIZATION

INFRASTRUCTURE

Importance

The importance rating explains how essential a class is to a project, as well as who else on the team might be able to fill that role, functionally speaking. Where relevant, we've also included notes about software that can help fill these roles.

Class Role CLASS ROLES

Class roles highlight the major responsibilities that each class is responsible for on a given project.

An Illustration

Each class ends with a fictionalized account to illustrate how that class can help shape a machine learning project for the better. These aren't case studies in the truest sense, but instead synthesize RapidMiner's experience across a range of industries and team sizes to show what each class can bring to a project.





Leader multiclassing suggestions

Whether they're overseeing a project from the top or organizing the daily fray, Leaders are essential to give a team structure and vision.

In general, you'll want to have both a Tactician and an Arbiter on your Al team—one to manage the high level, and one to manage the day to day. If you're working as part of a team at the enterprise level, or even at a moderately sized start-up, that's what you should expect.

However, there are scenarios—especially those related to small teams—

Leaders consider the larger

implications of the work they're

doing and how people with

different backgrounds and skills

are going to work together to:

create a successful team.

However, there are scenarios—especially those related to small teams—where it might make sense for someone to multiclass and take on both the Tactician and Arbiter roles. For example, the head of a research lab at a university might play both these roles if she's managing her own budget. This might also make sense at a lean start-up where leadership is trying to harness machine learning.

66 Chaos isn't a pit. Chaos is a ladder. ")

— Littlefinger, Game of Thrones





Tacticians serve as the point of a contact between a project and the company's leaders, understanding when it succeeds, when it fails, and why. Tacticians oversee from the top by moving resources to get work done, all while monitoring the ebb and flow of a project at a high level. They have the final say in which projects go forward and which get put on hold.

Some Tacticians have deep technical expertise that they bring to a machine learning project, having grown into a leadership role from the trenches, with experience writing code and developing machine learning solutions. Other Tacticians have been focused on business for their entire careers and rely on a team of experts to advise them about technical issues.

Importance

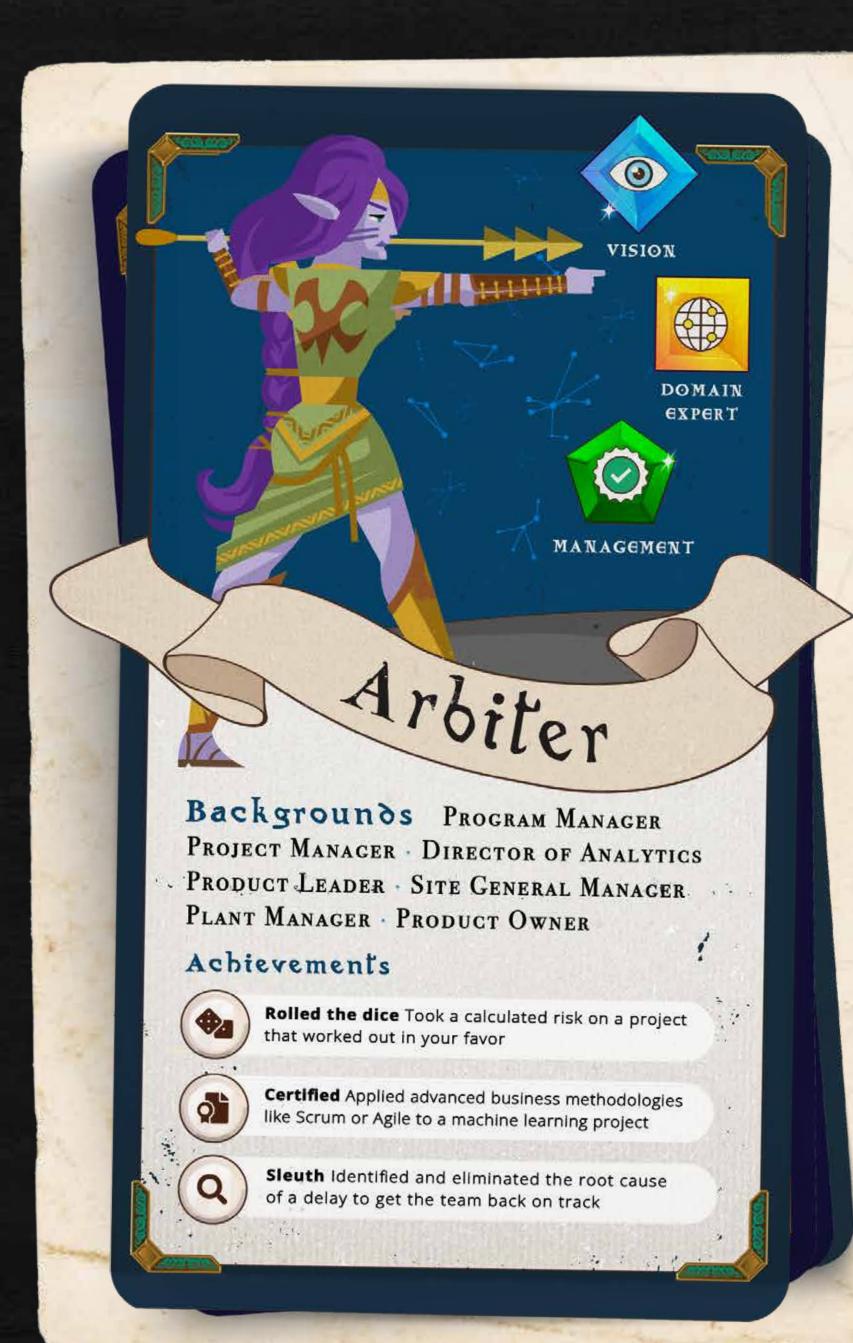
Essential. A Tactician is absolutely essential for any AI project. Without someone to make high-level decisions and allocate resources, projects are likely to languish for months or even years without making substantial progress.

Tactician Tactician CLASS ROLES

- Make critical, high-level decisions about the project
- Own the business aspects of the project
- Understand what success looks like
- Manage change within the organization

A Tactician's Direction

A team that's been trying to finalize a model that forecasts supply chain delays hasn't been able to make the progress they'd like. Their model does an okay job, but they need some help to improve it, as well as someone to implement the solution once it's finished. Unfortunately, they haven't been able to get anyone to commit to helping. They pitch their idea to a Tactician, who immediately sees the potential for huge business impact and an improved bottom line. The Tactician reallocates resources to work on the project, pushing it over the finish line and saving the business millions.



Arbiters dive into the fray, coordinating efforts to ensure success in both the short and long term.

Much of the Arbiter's work relates to translating understandings, problems, and solutions from one team to another, while tracking deadlines and being accountable to a Tactician for progress.

One Arbiter might be embedded with a team to coordinate work internally, communicate results externally, and solicit resources when needed.

Another might be juggling several projects across different teams, working with a team only long enough to get a single project off the ground before moving on to a different project.

Importance

Essential. Without someone overseeing the day-to-day work of the various participants and helping translate needs and requirements between teams, it's unlikely a project will be successful.



Arbiter CLASS ROLES

- Understand at breadth, not at depth
- Keep teams on track, on task, and accountable
- Help teams understand the work that others are doing
- Communicate team results to stakeholders

An Arbiter's Plan

A Tactician has set a high-level goal to implement an Al-driven solution to improve churn. However, the data science and IT teams are having difficulty understanding the constraints and problems that arise on the other team, slowing down development and deployment. The Tactician tasks an Arbiter to help, who goes to work by drawing up a detailed plan and developing an understanding of the problems on both sides so that they can communicate them to others. With this new structure in place, the team is able to make rapid progress on predicting and mitigating churn.







ENGINEERING

Skilled technicians who pull data from warehouses, process it, and make it ready for machine learning projects







DATA ENGINEERING DOMAIN EXPERTISE

Masters who bring their knowledge of a subdomainlike finance or linguisticsto a project







Model builders and algorithm tuners who summon insight from data

You're a little scary sometimes, you know that? Brilliant... but scary. ""

- Ron Weasley, Harry Potter and the Sorcerer's Stone

Doers work to bring models to life, whether it's by pulling and cleaning data, advising about their particular area of expertise, or building models.

Doer multiclassing suggestions

For both the Leader and Support roles, it's likely that you'll have different people filling the different classes, as the requirements and backgrounds needed are different.

For the Doer roles, however, it's quite possible that you'll have one or two people performing the work of these three classes. The person pulling and processing the data might be the same person building the models. Your model builder might also be a domain expert.

Keep in mind as you read this section that, although you need to fill all three of these roles to make your project a success, you might not need to bring in three different people to fill them.



A machine learning project is only as good as its training data. Data Wizards use their skills to create clean data sets, extract analytical insights, and support others in harnessing the power of AI.

One Data Wizard might use her knowledge of data storage to summon the information needed for a machine learning project, extract important features from noise, and then pass that data on for model training. Another could take a more hands-on approach, using intricate codes and tools to analyze data and extract insights for leadership.

Importance

Functionally essential. Having someone who knows where data lives and how to process it to extract insights is critical to your project. As noted previously, however, that person may be someone filling one of the other Doer roles. Additionally, aspects of the Data Wizard role can be filled by tools that have automated data prep capabilities, such as RapidMiner.

Data Wizard CLASS ROLES

- Understand where data lives in an organization
- Manage warehouses of data from different sources
- Know how to extract relevant and important data from noise
- Produce quantitative analyses and reports that don't rely on Al or ML

A Data Wizard's Knowledge

An airline wants to be able to more accurately predict potential flight delays. However, there is so much noise in the data set that the model prototypes aren't able to improve on current prediction methods. The team pulls in a Data Wizard, who's able to spend time looking through the data and processing it so that only the most impactful data points are included in the model training set. After this change, the model is able to improve the airline's predictions about when a flight is in danger of being delayed by more than 30%.





A Subject Master's experience lies not in the realm of AI, but in business processes or academic domains. Subject Masters often have years of work experience in a particular field and an intuitive grasp of what data should look like, how it should be analyzed, and what it means.

A linguist with a background in text analysis might serve as a consulting Subject Master for a team building a system that detects potential spam in customer reviews.

Or a financial analyst might join a team as an embedded Subject Master to advise on how to identify fraudulent credit card transactions.

Importance

Functionally essential. Having someone to weigh in about the specific subject matter of what you're building is important. Depending on the scope of your project however, this might be someone who consults periodically as you're developing and rolling out your project, rather than a full-fledged team member. It's also possible that another team member, such as a Data Wizard, would have the domain knowledge to fill this role.

Subject Master Subject Master CLASS ROLES

- Possess deep subject matter expertise
- Explain concepts to team members with diverse backgrounds
- · Consult to provide knowledge as needed

A Subject Master's Expertise



10

A team working to build a chatbot is having trouble parsing out customer responses that contain proper nouns. They consult a Subject Master with a background in linguistics who's able to provide her experience with named entity recognition, and even knows of an off-the-shelf tool they can use, significantly increasing chatbot performance and customer satisfaction scores.



Invokers stitch together data and code, creating intelligence and deriving insights that aren't visible to the naked eye. Invokers are often at the forefront of solving novel problems in business by building models that provide accurate, actionable insights to stakeholders and help automate rote tasks so humans can concentrate on creating value.

An Invoker might be contracted by the human resources department of a hospital to better understand the reasons that nurses experience burnout. With that understanding, they build a model to predict when burnout is likely to occur based on schedules and patient loads. Or an Invoker might be hired to create systems that guide autonomous delivery drones, using data from sources on the ground and onboard sensors to make decisions about the safest and most efficient flight path.

Importance

Functionally essential. As this is the class that's going to build your model, it's critical that it be filled functionally. However, if you have the Data Wizard or Subject Master class filled by a human, you can use AI tools like RapidMiner Go or RapidMiner Studio to create the model itself, without relying on a human Invoker.

Invoker CLASS ROLES

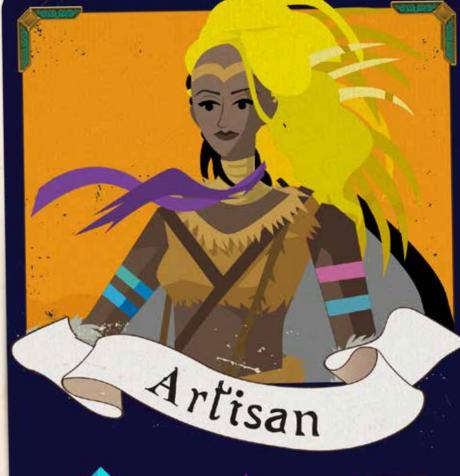
- Understand how to solve business problems with AI and ML
- Train and develop models to solve business needs
- Build resilient models that are able to adjust to changing circumstances

An Invoker's Acumen

An analytics team consisting of a Data Wizard and a Subject Master is sitting on a treasure trove of data at a financial firm. They're sure that they could build a system to identify potentially fraudulent transactions if they had an Invoker to help, but they aren't able to find anyone who has time to work with their data. Instead, they make use of RapidMiner Go to automatically develop a model to improve fraud detection efforts.



Technological whizzes who make systems speak to each other safely and securely





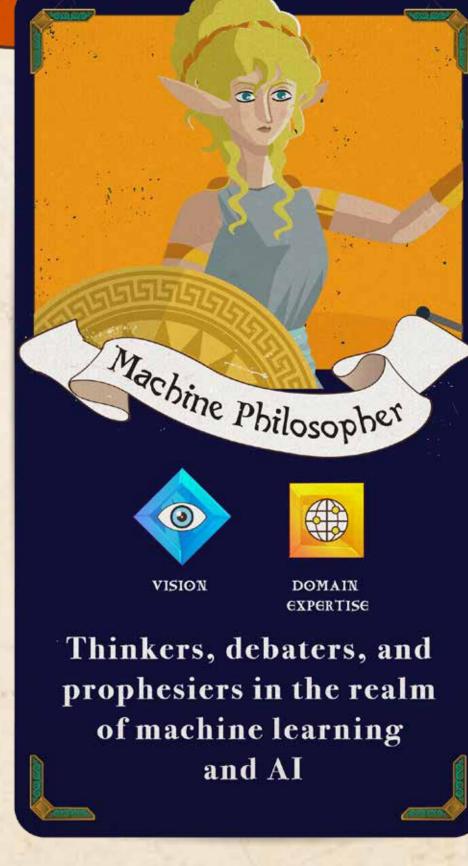






VISUALIZATION

Sculptors who put understandable, aesthetically pleasing faces on a project



The support roles are a veritable potpourri of skills, backgrounds, and interests, and not all of them will be required for every project. But for projects that need them are essential.

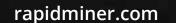
Support multiclassing suggestions

Unlike the Leader and Doer roles, the uniqueness of Support classes means that it's unlikely you'll see much multiclassing within Support. However, someone filling a Support role might also function as a Leader or a Doer.

For example, a Chief Al Officer who is a thought leader in the ethics of machine learning could act as a Machine Philosopher while also being the project's Tactician. Similarly, the Artisan role could be filled by a Data Wizard or Subject Master with a background in analysis who is used to building subject-specific visualizations.

Even the smallest person can change the course of the future."

— Queen Galadriel, Lord of the Rings





Tinkerers take models and make them talk to the world, driving business impact by setting up data pipelines and computing resources as needed. Tinkerers also often act as sentinels who protect data from prying eyes both inside and outside an organization.

A Tinkerer might manage a large database structure for a company, ensuring that data is both secure and accessible when needed. Other Tinkerers work closely with data science and analytics teams, building out new pipelines and helping to scale computing resources for novel projects.

Importance

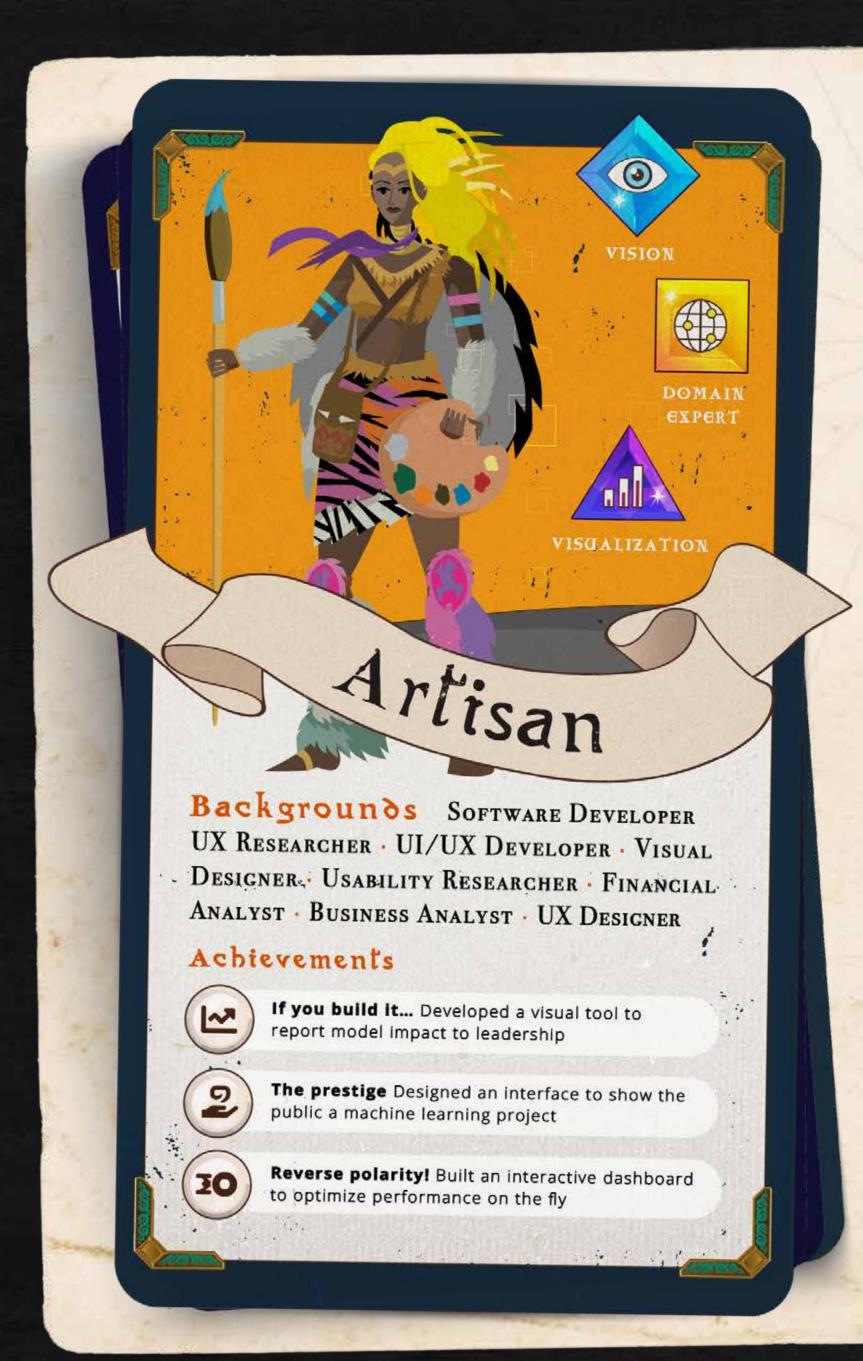
Case dependent. If your project needs to talk to an already extant infrastructure, consider the Tinkerer class essential. Additionally, many AI tools like RapidMiner require computational resources and infrastructure that might require IT insight, whether from a Tinkerer as a core team member, or someone brought in to consult.

Tinkerer CLASS ROLES

- Possess knowledge of current system infrastructures
- Understand how data is housed within a company
- Communicate security best practices for accessing data
- Manage computing resources needed for AI development

A Tinkerer's Implementation

At a large manufacturing plant, a Data Wizard has provided data to an Invoker, who's built a model that helps predict how changes in the flow of materials through the factory will impact the company's bottom line. Now they want a way to build a digital twin, reading in live data from the factory and updating the model to make real-time decisions about the flow of materials. The Tinkerer goes to work, setting up a system which allows the Invoker's model to read live data and update itself, while also allowing factory flow workers to make tweaks to the running processes to improve efficiencies.



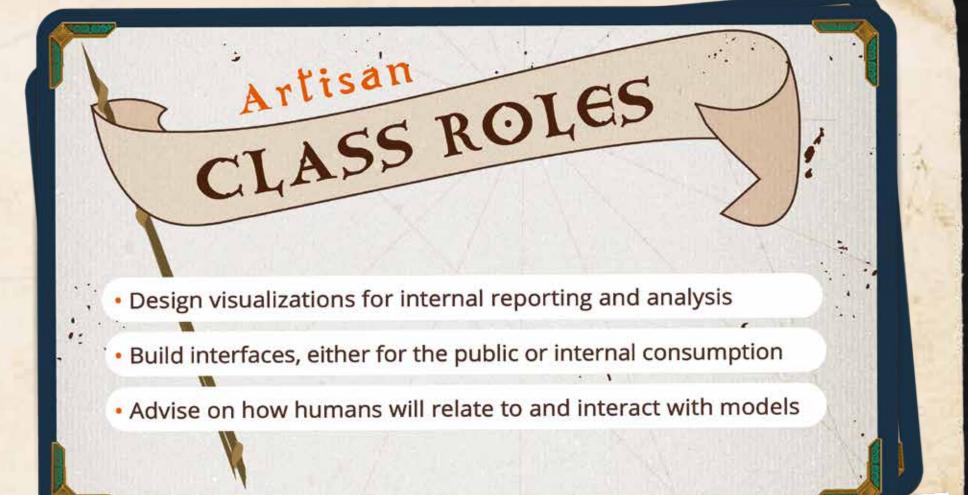
Artisans take the ugly bits and pieces of a machine learning project and wrap them up in beautiful packages. As experts in human behavior and aesthetics, Artisans provide a much-needed face for the code at the heart of AI.

One Artisan might work to put skin on a chatbot, covering raw algorithms with a user-friendly interface.

Another might take the insights derived from a machine learning model, pair them with analytics from other sources, and produce a consumable dashboard to communicate key findings to leadership.

Importance

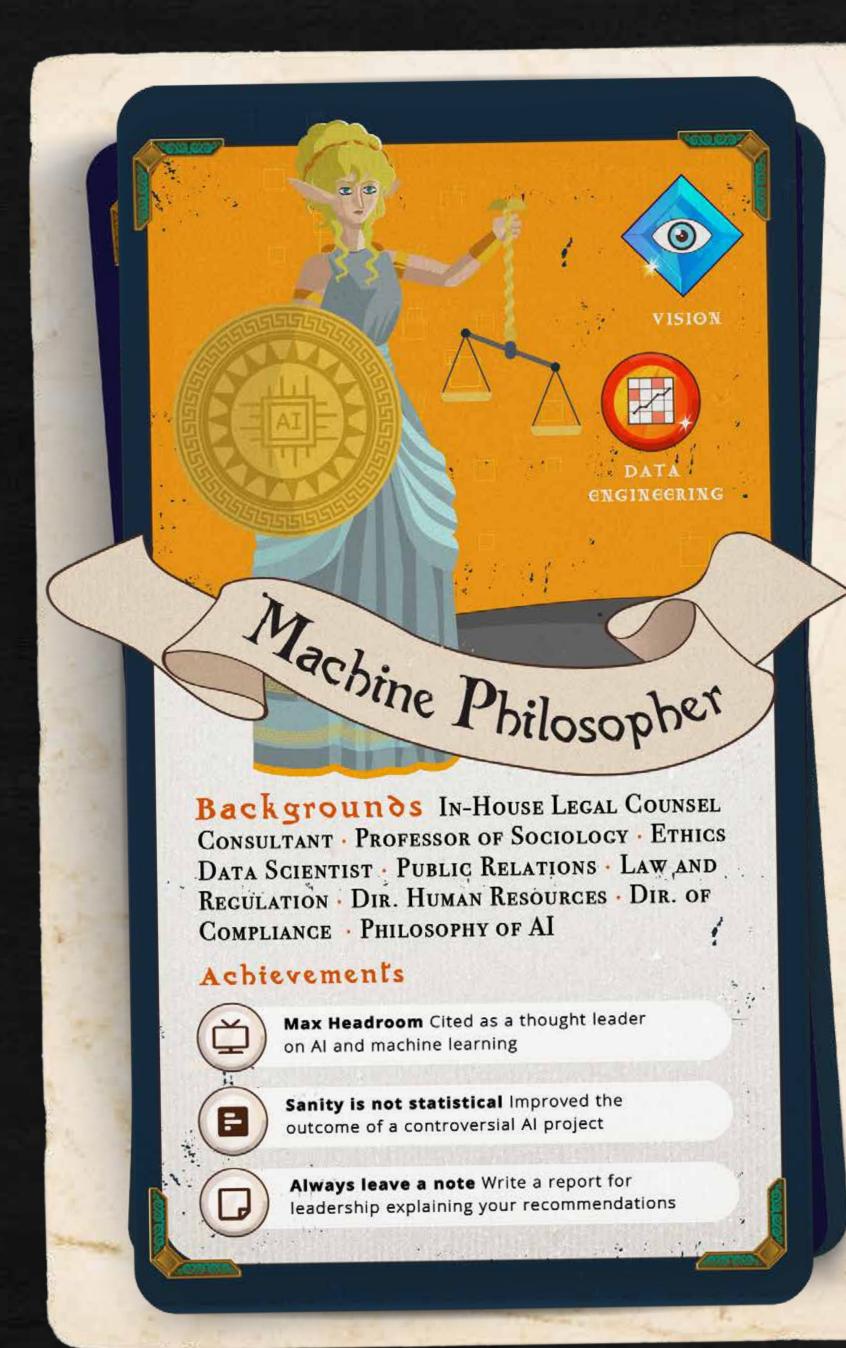
Optional. Only some projects will require an Artisan with product development or UX experience. And, in many cases, your Subject Master or Data Wizard might already have experience visualizing relevant data. Additionally, some machine learning tools have built-in visual tools or integrations to help create dashboards and visualizations. If your project will require this class, though, it's better to bring someone in earlier rather than later to ensure that you don't have to redo work as you're designing interfaces.



An Artisan's Visualization



A new Al team has built a model that's able to accurately predict when a mobile food order will be delivered to a customer, without needing to rely on check-ins from the restaurant or GPS signals from the driver. To present this information to the customer, the team taps an Artisan who constructs an animated illustration of a sandwich being assembled so that order status can be determined at a glance, reducing customer inquiries and increasing customer satisfaction.





Machine philosophers focus on big ideas.

How does AI impact society, both legally and ethically? Where is machine learning going in the next five, ten, or fifty years? That big-picture view doesn't insulate then from the day-to-day impact that AI might have for a business, however.

Digging into regulations, a Machine Philosopher might advise a Tactician on the potential legal requirements of a new technology. Or a Machine Philosopher might be brought in from a local university or consultancy to advise on ethical and social issues related in a project.

Importance

Optional. Many projects that seek to harness AI and ML won't need to think about ethics. But with concerns about issues like privacy becoming more prominent, before you decide against including a Machine Philosopher on your project, be sure that you don't need one. This class doesn't need to be a full-time spot on the team, but you might consider who you can reach out to with questions about thorny issues, including thinkers in AI and ML from both inside and outside your company.



- Deep understanding of ethics
- Ability to translate between business and societal impact
- Ensure that AI development work complies with legal requirements

A Machine Philosopher's Insight

A company that lets users rent their cars out to each other wants to create a system that scans the internet when a user registers and see if there are any potential red flags in their online presence. However, the team is worried about the ethical and privacy implications of such a system. They bring in a Machine Philosopher to draft a report with potential problems and recommendations. Based on this report, they make several changes to how the system works to protect user privacy and prevent consumer backlash.



Learning from other teams' journeys

As we've just seen, there

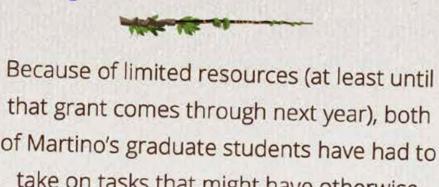
are many classes that can contribute to a machine learning project—some required, some optional. To give you a better sense of how these different roles can work together, this section provides some realistic examples of team structures we've seen in our work with clients across different industries and team sizes.



A University Research Lab

Dr. Martino's research lab is just getting up and running. She oversees two graduate students, both of whom are Subject Masters. Martino serves as both the Tactician—setting high-level strategy—and the Arbiter—overseeing the day-to-day flow of work in the lab. Dr. Martino is convinced that there are insights hiding in the population health data they've gathered over the past several years that machine learning can unlock.





of Martino's graduate students have had to take on tasks that might have otherwise been filled by a Data Wizard or an Invoker—processing data and building models. Although both are very familiar with what data looks like in their field, and have no problem processing the data, neither have any experience with machine learning models.

To fill this gap, they turn to RapidMiner Go, which allows them to automate the work of prototyping and building models.





A Manufacturing Start-Up

A Chief of Al Tactician at a furniture manufacturing start-up has tasked an Arbiter with building out a team to explore the ways that machine learning can optimize the flow of materials through their processes. Given the Tactician's mandate, the Arbiter is able to draw on resources from a range of different teams to work on this project, including a Data Wizard, several Subject Masters with experience in manufacturing, and an Invoker to build out models.





The Subject Masters use RapidMiner

Studio to pre-process and clean the data and highlight relevant insights, while the Invoker packages the Python code that he's writing into processes that can be used by the Subject Masters to test their hypotheses.

The Arbiter also brings on an Artisan who builds a virtual dashboard so that workers in the factories can view the flow of materials in real time, use the new models to estimate how various changes would impact the company's bottom line, and then implement the most effective adjustments.



A Social Media Giant

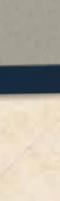
Our Tactician, the CEO of an established social media platform, assigns an Arbiter a machine learning program to detect fake news shared by users and remove it.

Because the company is so large, much of the Arbiter's work consists of coordinating with Arbiters embedded on other teams—a team of Tinkerers to make sure that the new model talks to the current infrastructure, a team of Data Wizards to help harvest and pre-process data, and a team of Invokers to prototype and finalize the models.



The Tactician also pulls in a Machine
Philosopher from the company's legal
department to consider possible
objections regarding privacy and
censorship. She helps head off potential
concerns by explaining the company's
reasoning internally as well as providing
feedback on the messages that users see
when their posts are removed.





ASummarv

















Tactician

Arbiter

Data Wizard Subject Master

Invoker

Tinkerer

Artisan

Machine Philosopher

Summary

High-level visionaries who allocate resources and oversee the big picture

LEADER

Essential

Profit-sensitive

models and dashboards

stakeholders

0

Front-line managers immersed in the scrum of machine learning and artificial intelligence work

Skilled technicians who pull data from warehouses, process it, and make it ready for machine learning

DOER

Functionally

essential

Masters who bring their knowledge of a subdomain-like finance or linguistics-to a project

Model builders and algorithm tuners who summon insight from data

Technological whizzes who make systems speak to each other safely and securely

SUPPORT

Case

dependent

Sculptors who put understandable, aesthetically pleasing faces on a project

SUPPORT

Optional

Thinkers, debaters, and prophesiers in the realm of machine learning and AI

SUPPORT

Role

Attributes

Importance

RapidMiner can support

Do AI alternatives exist?

















Functionally

essential

DOER











DOER









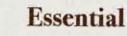






Ways

communicate business impact to other high-level this class



Unified platforms allow teams to transparently share prototype models and code to drive collaboration and track progress

NAY

Automated data prep solutions, especially those with data-agnostic ingestion, speed data processing and sanitizing

RapidMiner Turbo Prep

Automated workflows that allow subject matter experts to prototype models and easily frame business problems as machine learning problems

Functionally essential

Platforms increase team efficiency and collaboration, allowing them to reuse work and scale more effectively

Supported by network integrations, one-click model deployment aids pushing models into production where they can have real business impact

Integrated visualizations provide immediate impact by creating interactive dashboards to showcase ongoing model results and highlight impact

Transparent, explainable data pipelines empower understanding and triaging of model concerns

Optional











RapidMiner Go RapidMiner Studio



RapidMiner Server

NAY



Conclusion

We hope this guide will help you assemble your dream team and set off on a successful AI adventure. If you'd like to learn more about how you can get a machine learning project off to a great start, check out A Human's Guide to Machine Learning Projects, which picks up where this ebook leaves off and talks about how to manage the first days and weeks of a new project in a way that sets you up for success.

If you have questions, you can also reach out to us to schedule a <u>free AI</u> <u>assessment</u>. We'll walk through your business needs and challenges with you, and help you identify use cases that can have a substantial and immediate impact on your bottom line.



