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## Take a new view on MLOps

And AI spreads to every corner of your company

A report by the Deloitte AI Institute



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The Deloitte AI Institute helps organizations connect the different dimensions of a robust, highly dynamic and rapidly evolving AI ecosystem. The AI Institute leads conversations on applied AI innovation across industries, with cutting-edge insights, to promote human-machine collaboration in the “Age of With”.

The Deloitte AI Institute aims to promote a dialogue and development of artificial intelligence, stimulate innovation, and examine challenges to AI implementation and ways to address them. The AI Institute collaborates with an ecosystem composed of academic research groups, start-ups, entrepreneurs, innovators, mature AI product leaders, and AI visionaries, to explore key areas of artificial intelligence including risks, policies, ethics, future of work and talent, and applied AI use cases. Combined with Deloitte’s deep knowledge and experience in artificial intelligence applications, the Institute helps make sense of this complex ecosystem, and as a result, deliver impactful perspectives to help organizations succeed by making informed AI decisions.

No matter what stage of the AI journey you’re in; whether you’re a board member or a C-Suite leader driving strategy for your organization, or a hands on data scientist, bringing an AI strategy to life, the Deloitte AI institute can help you learn more about how enterprises across the world are leveraging AI for a competitive advantage. Visit us at the Deloitte AI Institute for a full body of our work, subscribe to our podcasts and newsletter, and join us at our meet ups and live events. Let’s explore the future of AI together.

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# Experiencing AI pilot-to-production challenges?

**Artificial Intelligence (AI) is creating amazing results across many industries.** It can predict pricing. It can prevent maintenance failures. It can help doctors find early disease. It can detect supply chain issues. It can automate customer service round the clock. Every department in every company wants some aspect of AI to drive business value, just take a look at [this dossier](#), which highlights dozens of compelling, business-ready use cases for AI.

However, deploying AI solutions in production can be challenging. If business stakeholders and technologists fail to collaborate effectively, resulting investments in AI can fail to address the business need. Too often, data science driven teams' focus can lie more on designing and deploying highly accurate AI/ML models than working with business and product teams to reach the heart of the challenge. By redefining the framing of MLOps, organizations can better meet the needs of the business and drive value.



# What exactly is “MLOps?”



**MLOps is the process of operationalizing machine learning models, using automation across different domains.**

Born out of agile and DevOps principles, MLOps aims to accelerate software infrastructure development and delivery. By nature, DevOps is iterative with quick releases that trump the long development processes of yesteryear. MLOps is based on the same premise, delivering the benefits of AI to the organization in a faster way. The workflow traditionally focuses on the build, deploy, and monitor pieces of the process or the technical details, overshadowing the importance of connecting data scientists with the broader ecosystem of business objectives, people and processes.



# Don't forget the business value

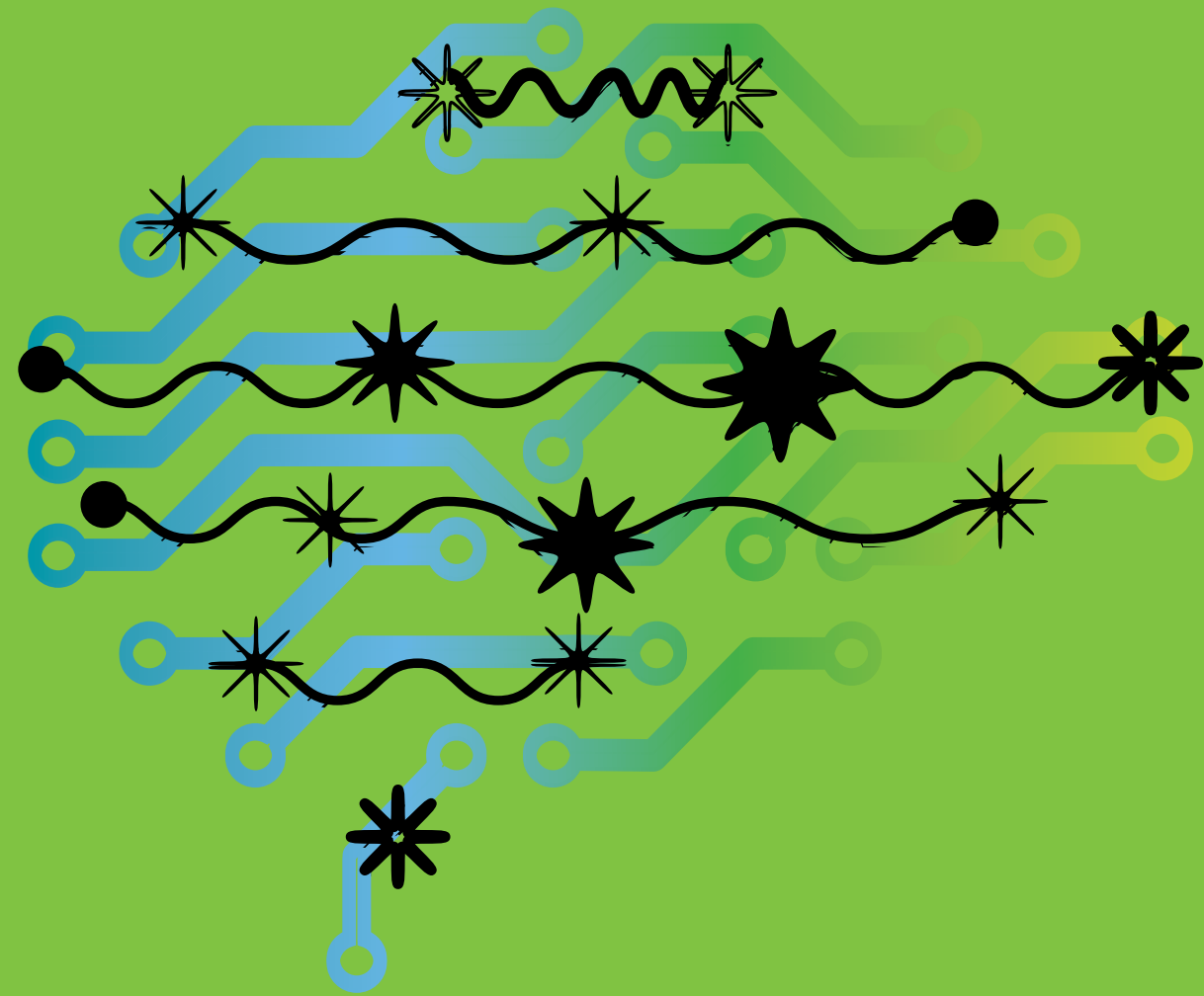
MLOps provides data science teams a structured way to rapidly develop, deploy, monitor, and maintain AI/ML solutions.

**Well-functioning MLOps processes arm data scientists with the tools to continually monitor AI models and adapt to changing conditions in their data.**

However, too often the engineering focus of the MLOps process makes AI model development, deployment, monitoring and maintenance seem like "just another technology." Organizations that take this approach and rely on data science teams to make inference about how AI should adapt to shifting conditions in the organization are often disappointed in the results. There can be long cycle times in AI model updates and misaligned integrations into business processes and products. Sometimes significant AI ethics and business risks are introduced as a result.

Not only can the model itself drift, but people can seem to drift away from the intended business value at hand.





There's a disconnect

# Don't fall in the "brains in a jar" trap

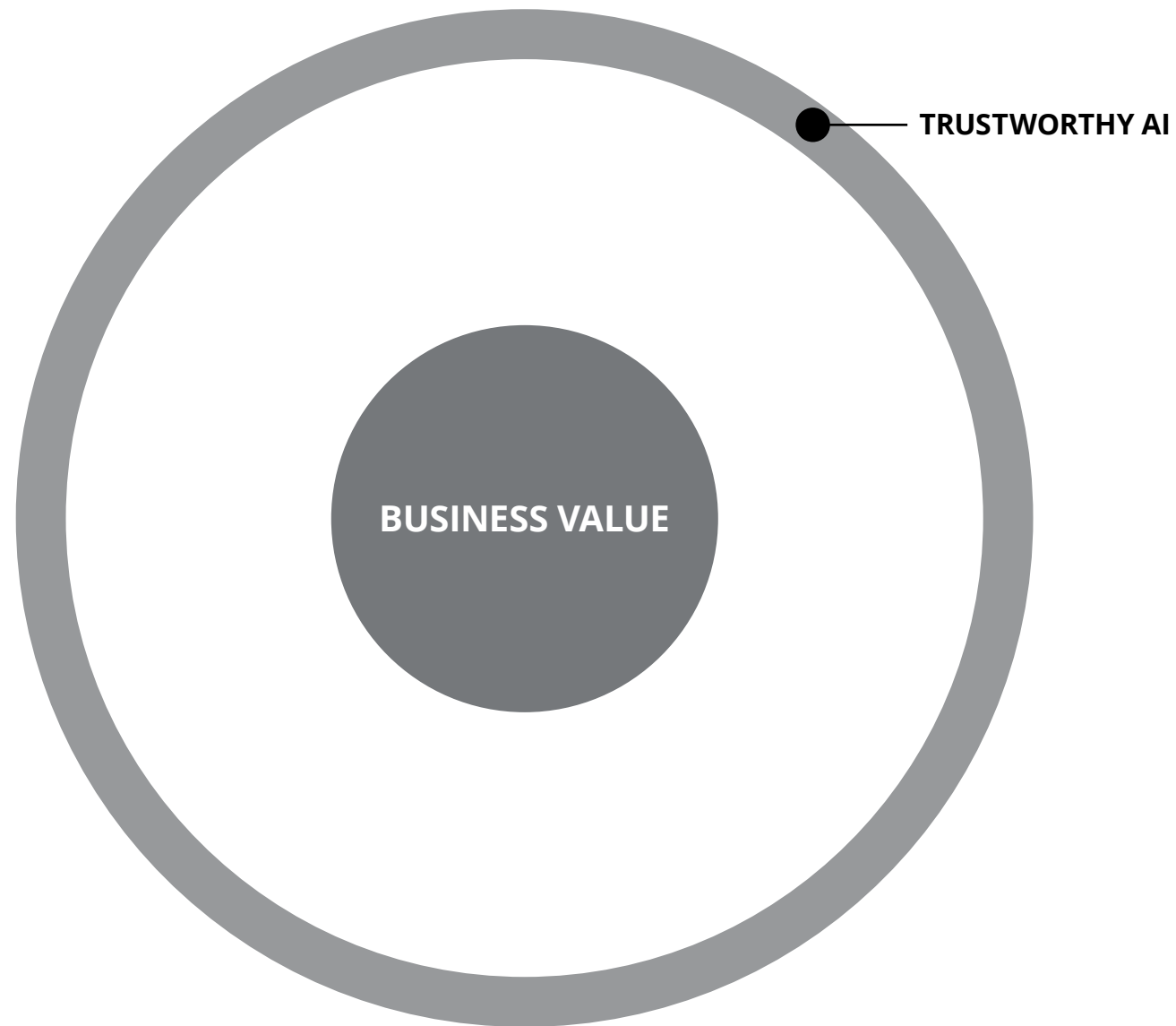


For too many companies, there's a disconnect between creating models and delivering business value. **AI Strategy, and the process to deliver AI, should prioritize alignment to an organization's business strategy over perfecting models.** Models that fail to meet the needs of business processes or products are akin to creating "brains in a jar"—sitting on a shelf. Those brains can be expensive and yet almost worthless to an organization at the same time. Why? Because while the models may work perfectly with pilot use cases, they often fail to create business value down the road. Business and data science leaders should be in tune to the challenge.

In fact, according to the recent [2021 Deloitte's State of AI in the Enterprise](#), 4th Edition, which surveyed 2,875 IT and business executives, leading companies that succeed at industrializing AI are three times more likely to have an enterprise AI strategy that is aligned with the core business strategy.



# Companies should consider a new view on MLOps



MLOps can be the right framework for industrializing AI, if business value is at its core and responsible, [Trustworthy AI](#) is the guardrail. Business value should be tracked and assessed within an agreed upon boundary at every stage of MLOps. **Our new view on MLOps incorporates an envision phase, which defines guiding principles for the entire process.** The added step helps ensure that business value is tracked and assessed within an agreed upon boundary at every stage of MLOps.

While AI can deliver exponential benefits to companies that successfully leverage its power, if implemented without ethical safeguards it can also damage a company's reputation and future performance.



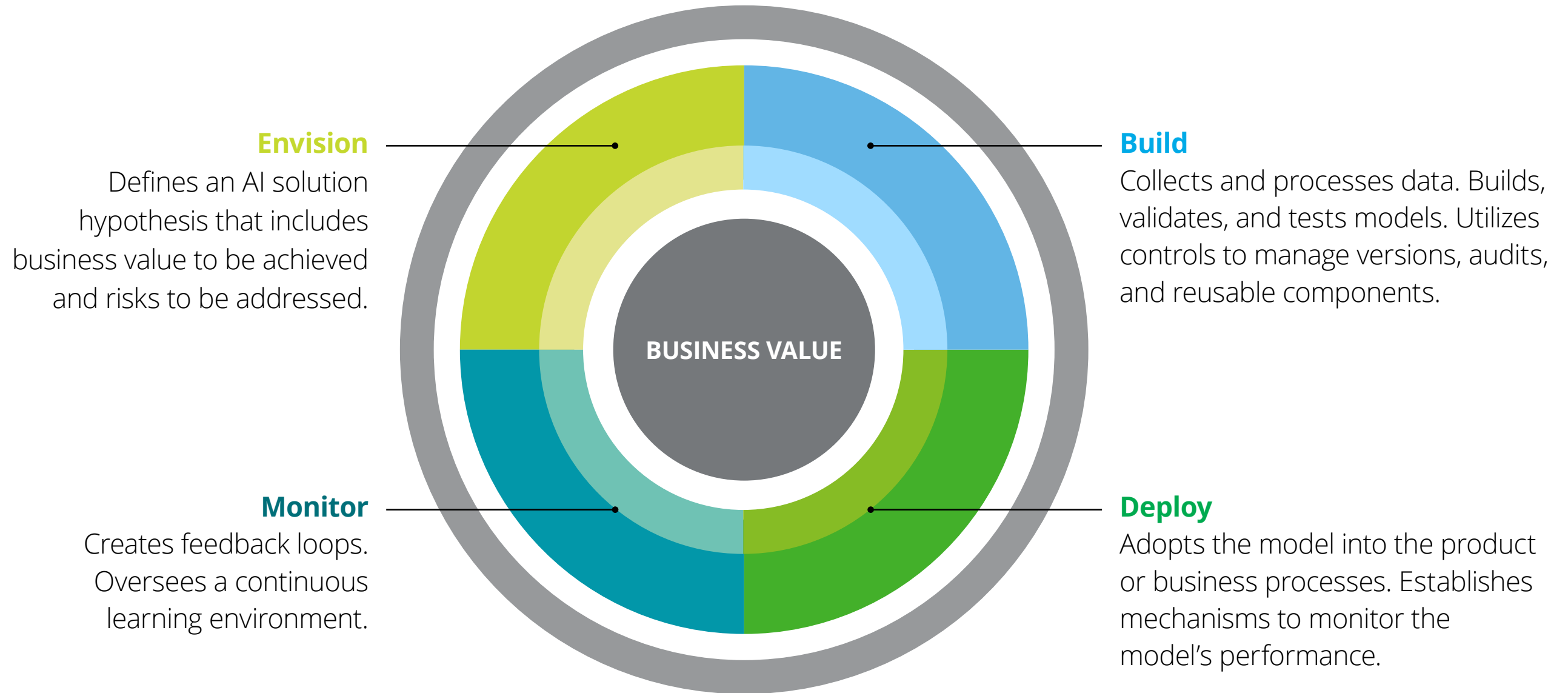
# Do the upfront planning

AI projects start with decision-makers, end-users, and domain and data science teams. The decision-maker provides clear objectives and defines project success criteria. End users and domain experts provide organizational and use-case context. Data Science teams shape the AI solution hypothesis and how it can be designed to suit the business needs within the confines of responsible AI safeguards.

**Essentially, the Envision phase helps the team understand what they are building and why.** The “why” is extremely important; without it an organization may be left with attractive “use cases” that are disconnected from the core business strategy. Effective ideation and planning provide the guiding direction throughout the remainder of the MLOps process. Companies that approach AI development with a cross-functional mindset can be well positioned for success. It takes solid planning upfront and continuous ownership from thereon.



There are four key phases to MLOps.  
The first, Envision, is a critical step

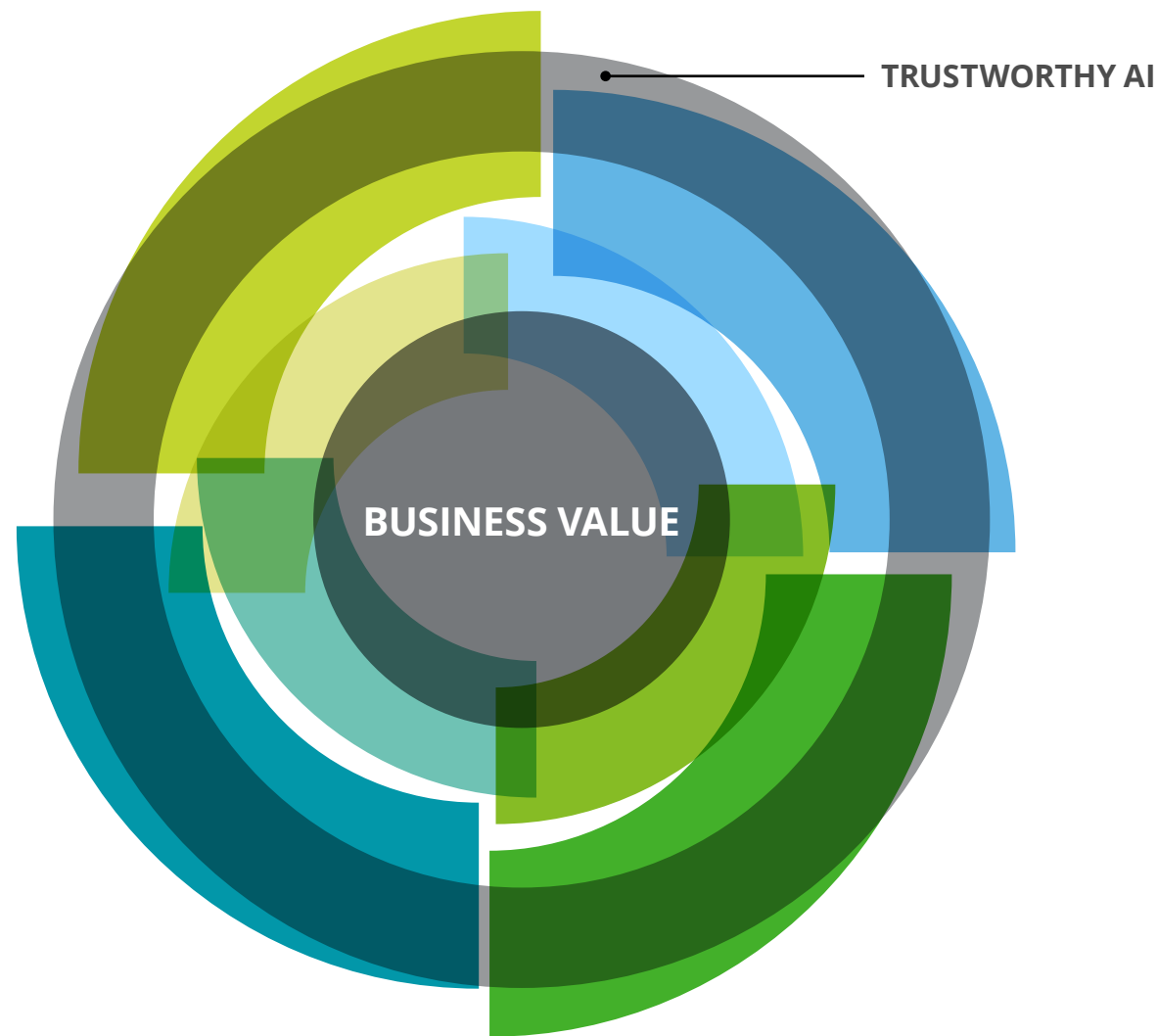




Putting the new view on MLOps in motion—  
Just twist slightly for the new approach



So every step addresses business value, keeping guardrails in check



Carrying the planning from the Envision phase throughout the MLOps Lifecycle requires AI Model Product Managers that sit between the business and the engineers/scientists. As the teams work their way through the MLOps activities, they evaluate model development, deployment, and monitoring trade offs against agreed upon business metrics and target goals.

**So how does MLOps get put in motion to create value?**

It addresses business value assessments and Trustworthy AI tactics in every phase. Key MLOps processes overlap the foundation—business value—at every turn.



## Phase 1 Envision

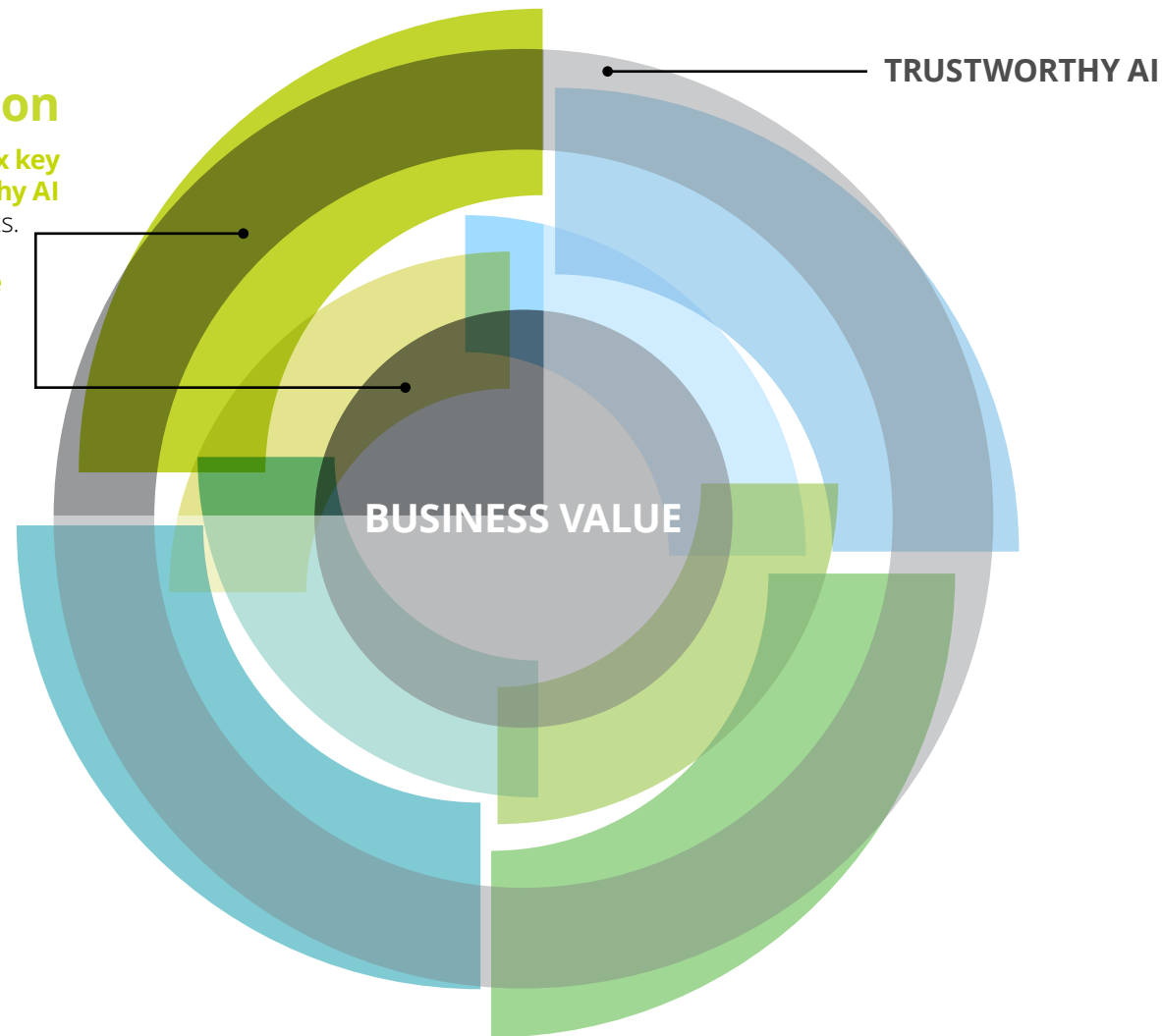


# Collaborating with business

### Envision

Plan for six key Trustworthy AI components.

Define the business value in ideation.



# Envision how machines support people for the better

Bring a cross-functional team together to collaborate on ways to create sustained business value from AI. Identify risks and ethical considerations to guide future build, deploy, and monitoring activities. Planning should consider humans at every step—this is the essence of [Deloitte's Age of With](#). It is “people with machines, doing more than either could alone” by:

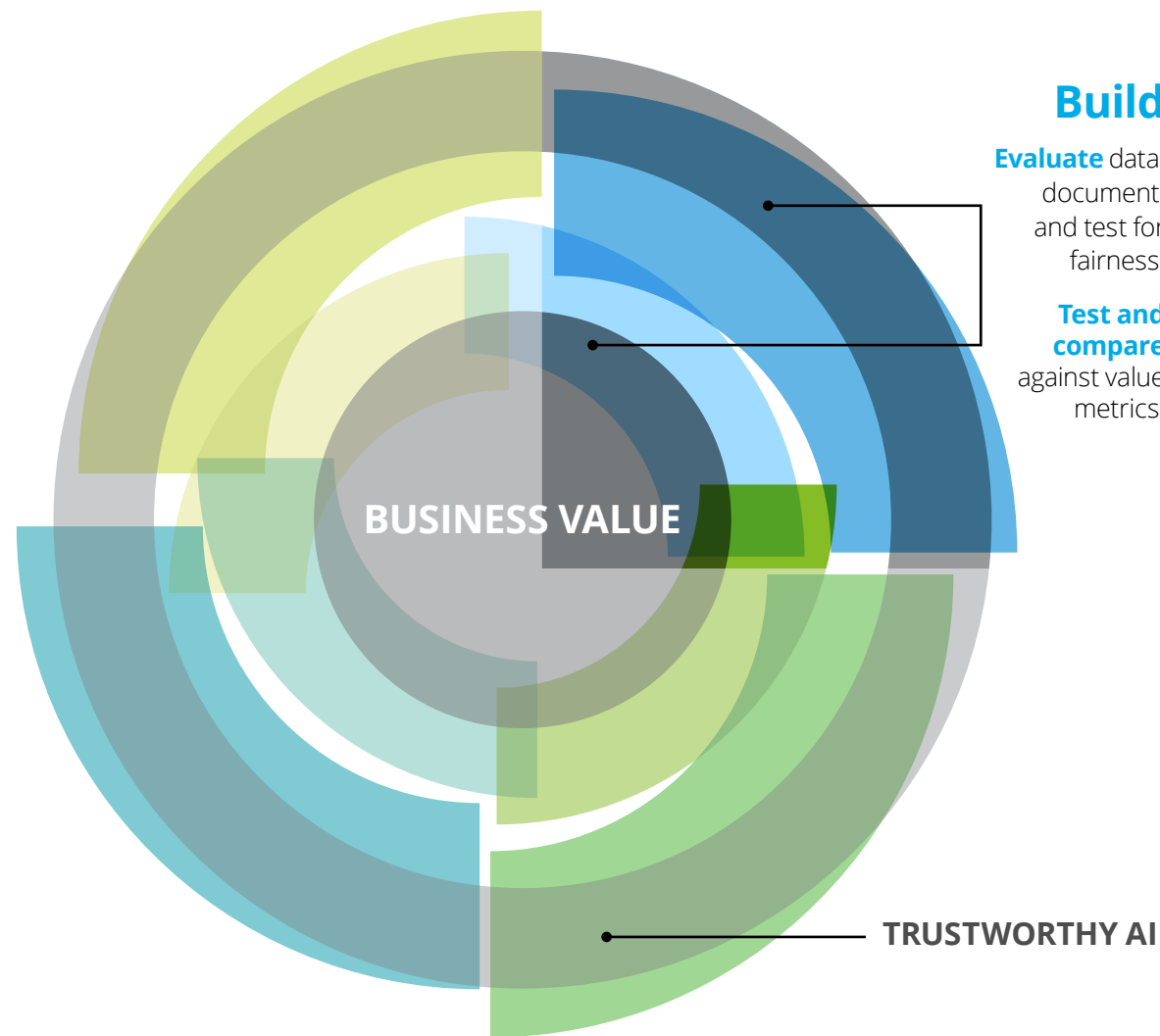
- Helping them prevent cyber security threats.
- Bringing to light customer issues earlier than they could see them before.
- Automating redundant tasks so they can focus on more strategic tasks.

**Don't forget business experts in planning. Without their contributions, scientists may create a "brain in a jar" solution that fails to create value.**

## Phase 2 Build



# Bringing models to life



## In fair, just, valuable ways

An organization's models should be tested and measured against metrics that reflect the value the organization wants. Is it increased profitability through cost reduction? Speed to execution? Reduced complexity? It could be all of these, and more. Business measures should be considered side by side with traditional statistical methods used to evaluate and select models as they are being built. By collaborating, the data science teams can learn how statistical changes impact value levers that the business cares about; likewise, business teams can improve their data science acumen as they learn how statistical measures impact model results.

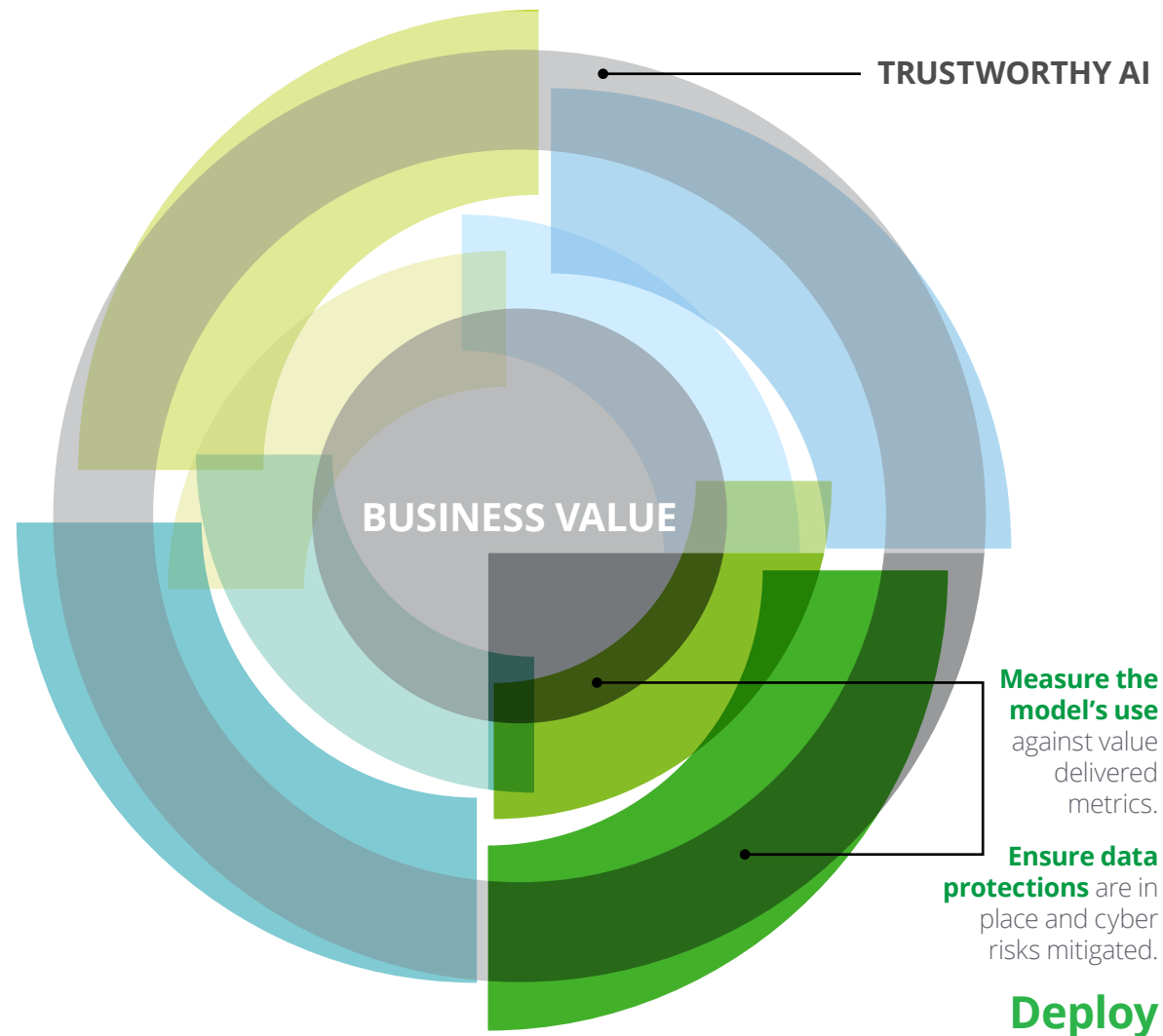
Further, incorporating Trustworthy AI guardrails in the development process instills the importance of conscientiously considering how, when, and why models may introduce risk to the business (e.g., bias, ethical, regulatory, robustness). While going through the development process teams should contentiously reflect on the Trustworthy AI hypothesis established in the planning phase and dial up/dial down their guardrails. Remember, not every use case is the same so not every implementation of Trustworthy AI guardrails will require the same amount of rigor.



## Phase 3 Deploy



It's game on



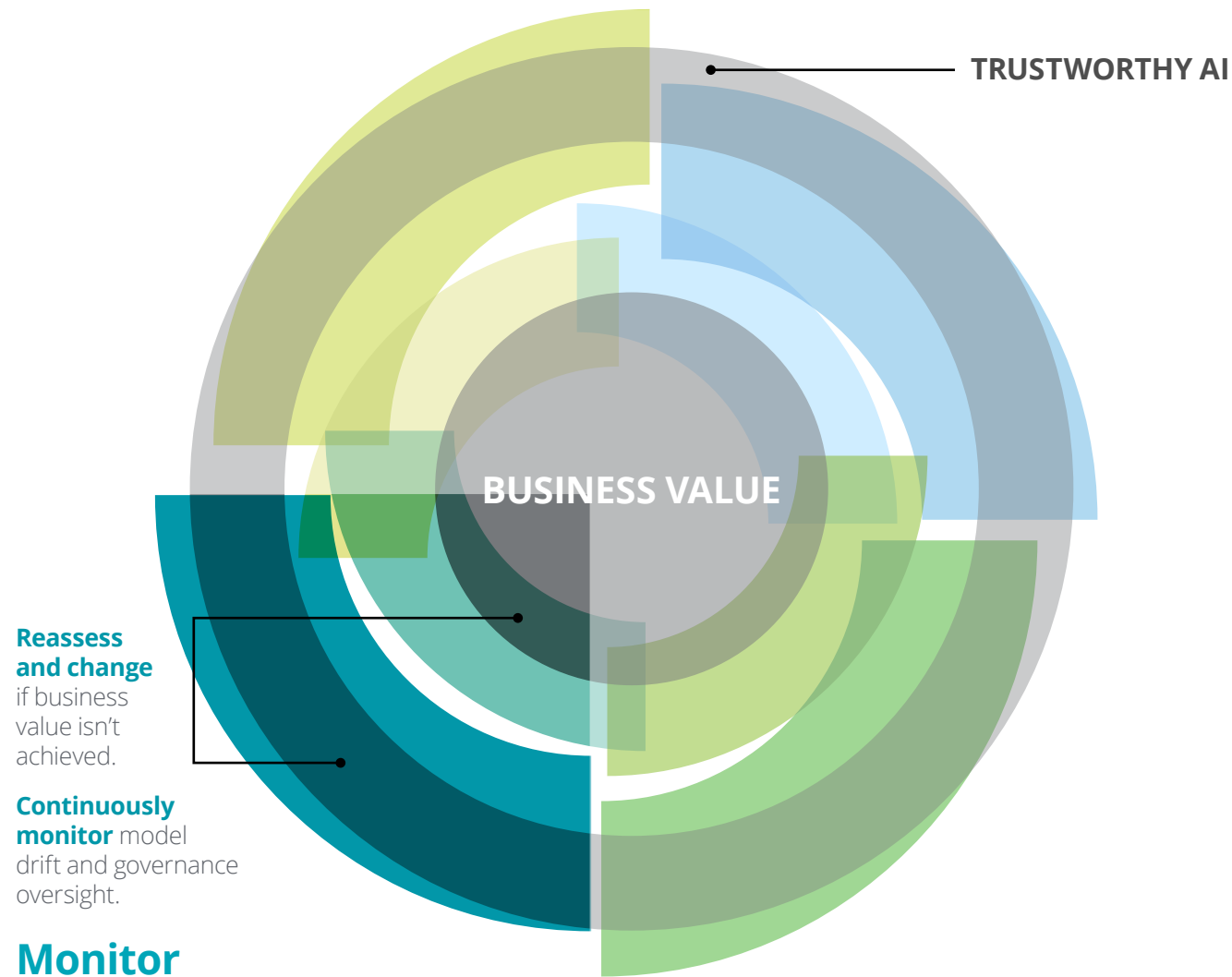
# How will you know if you are getting the promised value?

The next step is to launch. The engineering aspects of MLOps help ensure that models are deployed in a way that aligns with the organization's standard software release methods. This step helps ensure that models, their data feeds, and target systems are ready. Adding a business value view to deployment means the model should be integrated into an organization's products and business processes seamlessly. Team members should know how their workflow will change and how to use the model's reporting and analytics in their jobs. Further considerations should be made to help ensure data protections and other Trustworthy AI guardrails are in place to manage the usage of the model so that protections for customers and employees are in place from day one. Protecting customer and employee data is a big part of enhancing brand trust for the company.

## Phase 4 Monitor



# Watch, learn, and listen



## The never-ending step

Processes should be in place to provide governance oversight over the models to help ensure that they continue to provide the expected business value and do not wander outside of the Trustworthy AI guardrails. Models are living, breathing entities. They inhale data and exhale their perspectives—for better or worse. It's important to catch when models are going astray and losing their predictive power (concept drift) and/or when the patterns in the data feeding the model have changed (data drift).

In the same light, if the business value being sought is realized and technical performance is on track, teams have the proof points to showcase their results and celebrate for their successes.

The guiding principles defined in the envision phase continue to safeguard the investment in monitor phase. Is the model continuing to deliver the return on investment that was expected? That's the intension.



# Here's where to consider starting:



## **Define the AI strategy**

Establish the business purpose and measurement protocols to estimate business value. Decide the methods for communicating the new AI strategy across the organization.



## **Establish roles and responsibilities**

Bring together a highly skilled cross-functional team, from data scientists to domain experts. Establish roles and responsibilities that surface unique technical, business, and ethical perspectives while defining the AI solution hypothesis.



## **Establish effective governance and oversight**

Align the team on the criteria of regulatory, privacy, security, and bias policies and determine the business metrics to measure to evaluate the success of the AI effort.



## **Assess AI risks**

Use a common methodology to identify risks so that decisions about proceeding or not can be made. Mitigation requirements can be tiered with first and second lines of defense depending on the need.

# Prevent wasted model deployment efforts

MLOps is a process, in classic Lean Six Sigma parlance. It is not dependent on a few experts, niche use, bespoke designs, or custom development. It's a process that integrates humans at every step. By following a value-driven, team-driven strategy and interweaving Trustworthy AI you can help ensure that your data science teams are realizing the promised return on investment.

**Change your view and drive business value throughout the MLOps process.**





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