CIONET CIDO Networking Event

AI in Manufacturing

Unleashing Germany’s Data Treasures

01.10.2024 | 18:15 | IPAI Heilbronn

24. Oktober 2024 | 18:00 Uhr | Zu Gast bei e·on München

IT WORKFORCE TRANSFORMATION

Dem Technologiewandel Schritt halten

COMPUSAFE
Agile Solutions

CIONET


CIONET
TANIUM
TURBO S YOUR SERVICENOW
Unlock ServiceNow ROI through Realtime Data & AI Automation
Executive Roundtable Dinner | 22.Oct.2024 World Forum Eve | Munich


CIONET Community Event
servicenow applied
CIO/CDO Use Cases aus der Praxis
21.11.2024 | 17:30 Uhr | München

CIONET FLAGSHIP COMMUNITY EVENT

AI HORIZONS

[UN]SUCCESSFUL STORIES

28. November 2024 | Frankfurt am Main

Digitalisierung an NRW-Schulen

Keiner kann sie einrichten, deshalb bleiben tausende Tablets ungenutzt

Von Alexandra Ringendahl 26.10.2023, 17:32 Uhr Lesezeit 5 Minuten

Tablets einzurichten und zu warten bleibt oft an Lehrkräften hängen. Und jetzt läuft auch noch bald der Digitalpakt 1.0 aus. Land und Kommunen sehen die Gefahr, dass die Digitalisierung an den Schulen in NRW zum Stillstand kommt.

Umsetzung einer KI Implementierung & Lebenszyklusmanagement

09:00 Uhr - 09:10 Uhr - **Icebreaker | Format: Interaktive Gruppenarbeit**

- Ein lockerer Start in einen Vormittag intensiver Zusammenarbeit.

09:10 Uhr - 09:25 Uhr - **KI Use Case Ideation | Format: Vortrag**

- Einführung in den Prozess der Ideation von KI-Anwendungen mit Schwerpunkt auf der Identifizierung potenzieller Anwendungen von KI.

09:25 Uhr - 09:35 Uhr - **Ausarbeitung KI-Use Cases | Format:Individuelle Arbeit**

- Die Teilnehmer konkretisieren den KI-Anwendungsfall, den sie vorbereitet haben, und wenden dabei die im Vortrag behandelten Konzepte an.

09:35 Uhr - 09:50Uhr - **KI-Use Cases | Format: Kollaboratives Gruppenfeedback**

- Präsentation der KI-Use Cases, danach interakives Peer-Feedback.

09:50 Uhr - 10:00 Uhr - **Bewertung von KI-Anwendungsfällen - Theorie | Format: Vortrag**

- Einführung "Wie KI-Anwendungsfälle anhand ihres wirtschaftlichen Wertbeitrags, der Machbarkeit und der zu erwarteten Ergebnisse priorisiert werden können.

10:00 Uhr - 10:25 Uhr - **Bewertung von KI-Anwendungsfällen - Praxis | Format: Interaktive Gruppenarbeit mit Canvas**

- Gruppen arbeiten an der Bewertung und Priorisierung ihrer Anwendungsfälle unter Verwendung des Priorisierungs-Canvas.

10:25 Uhr - 10:30 Uhr - **Use Case Pitches | Format: Präsentation im Plenum**

- Jede Gruppe präsentiert kurz ihren priorisierten KI-Anwendungsfall, unterstützt durch Peer-Feedback.

10:30 Uhr - 10:40 Uhr - **Q&A Session | Format: Vortrag mit Q&A**

- Beantwortung von Fragen und Diskussion mit zusätzlichen Einblicke in den Prozess der Use Case Evaluation.

How to implement AI

FORBES.COM

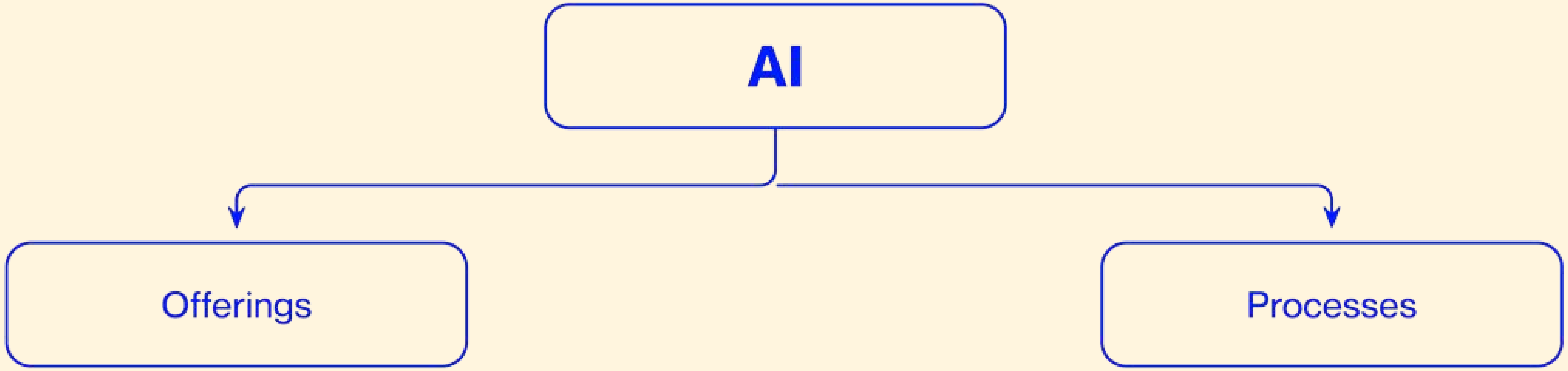
OCTOBER 14 2020

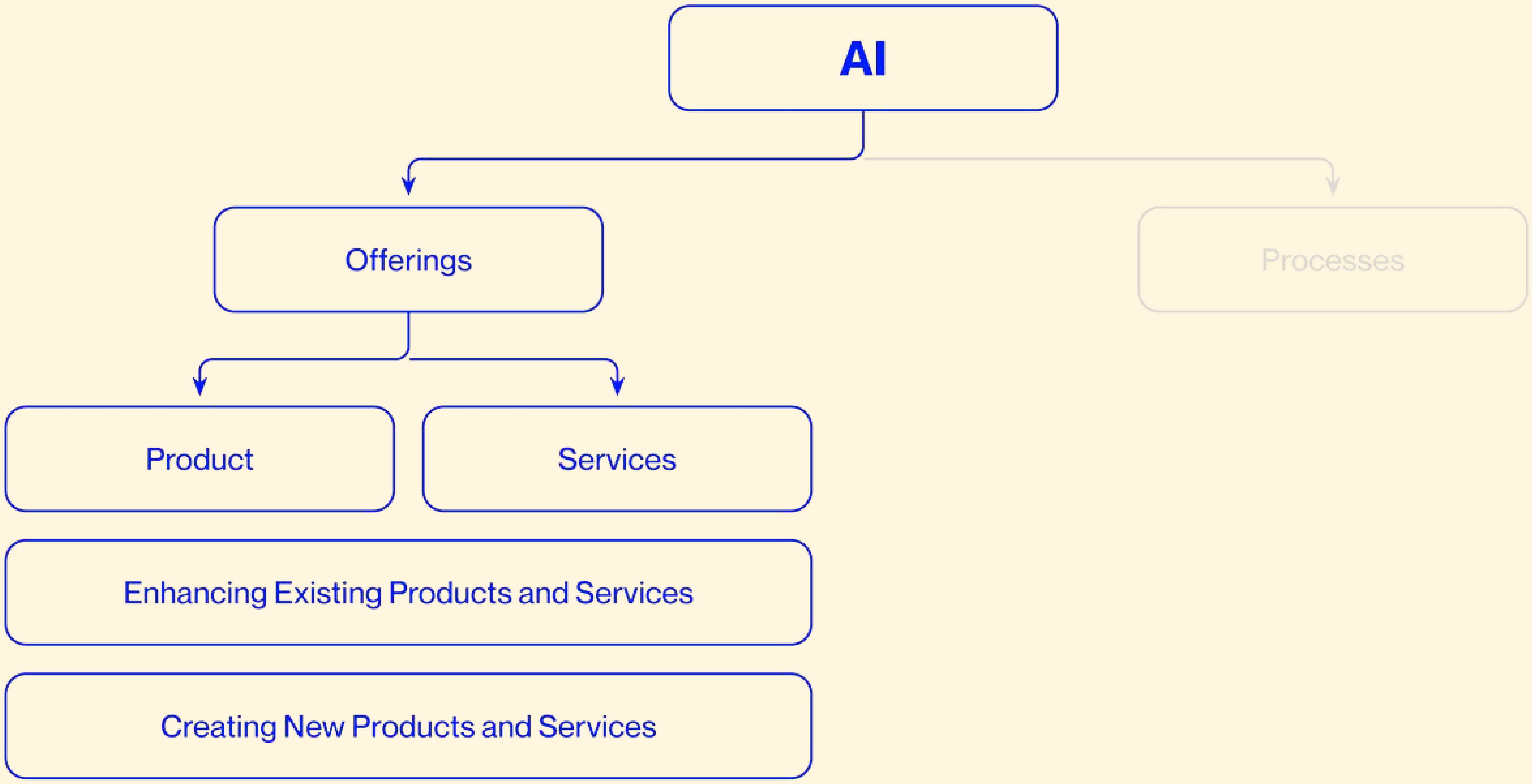
WHY DO MOST AI PROJECTS FAIL?

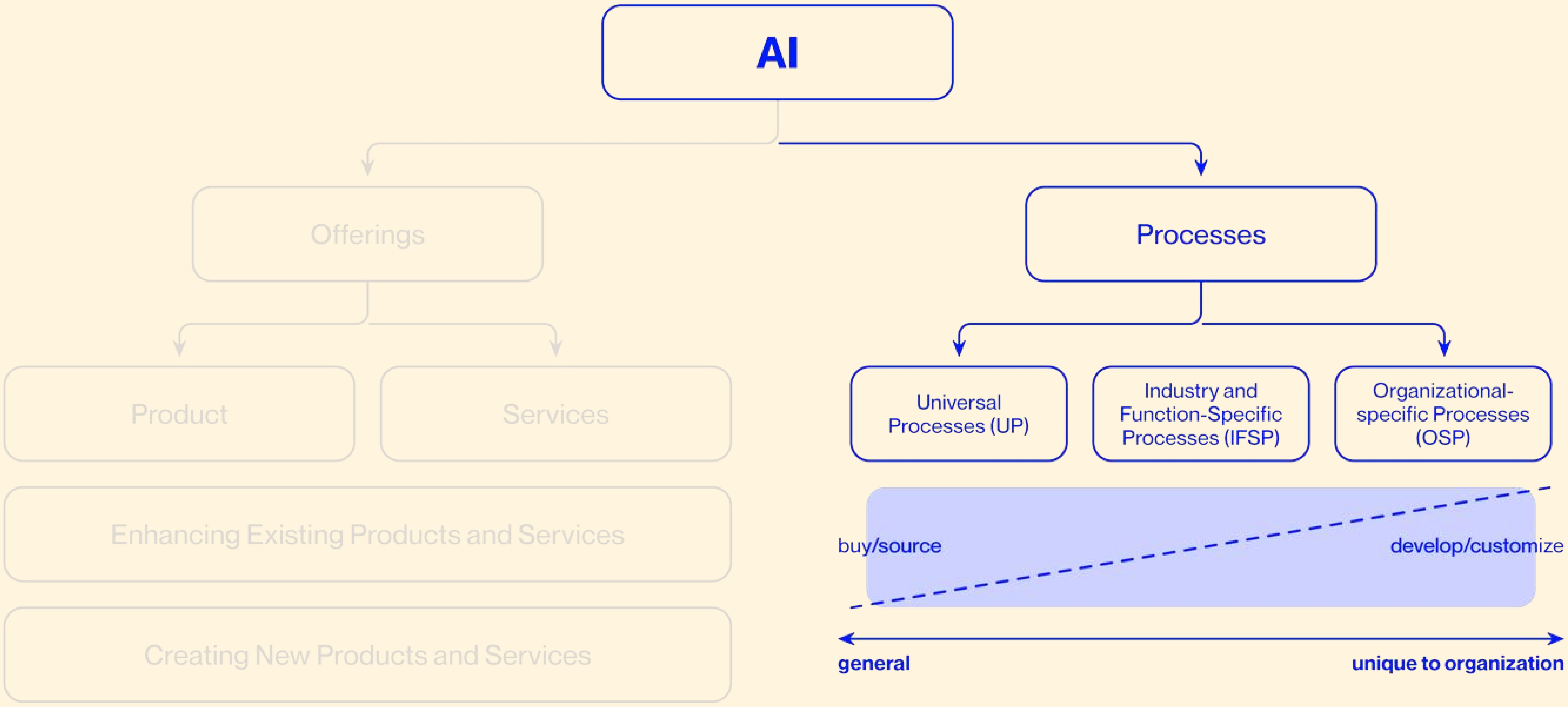
Many organizations fail to understand that the AI model is just as Important as the final integration of which it will be part.

This failure occurs because AI integration into an already working system is an immensely difficult task.

To do so requires not only a top-notch AI system, but also a good connection with the existing system.

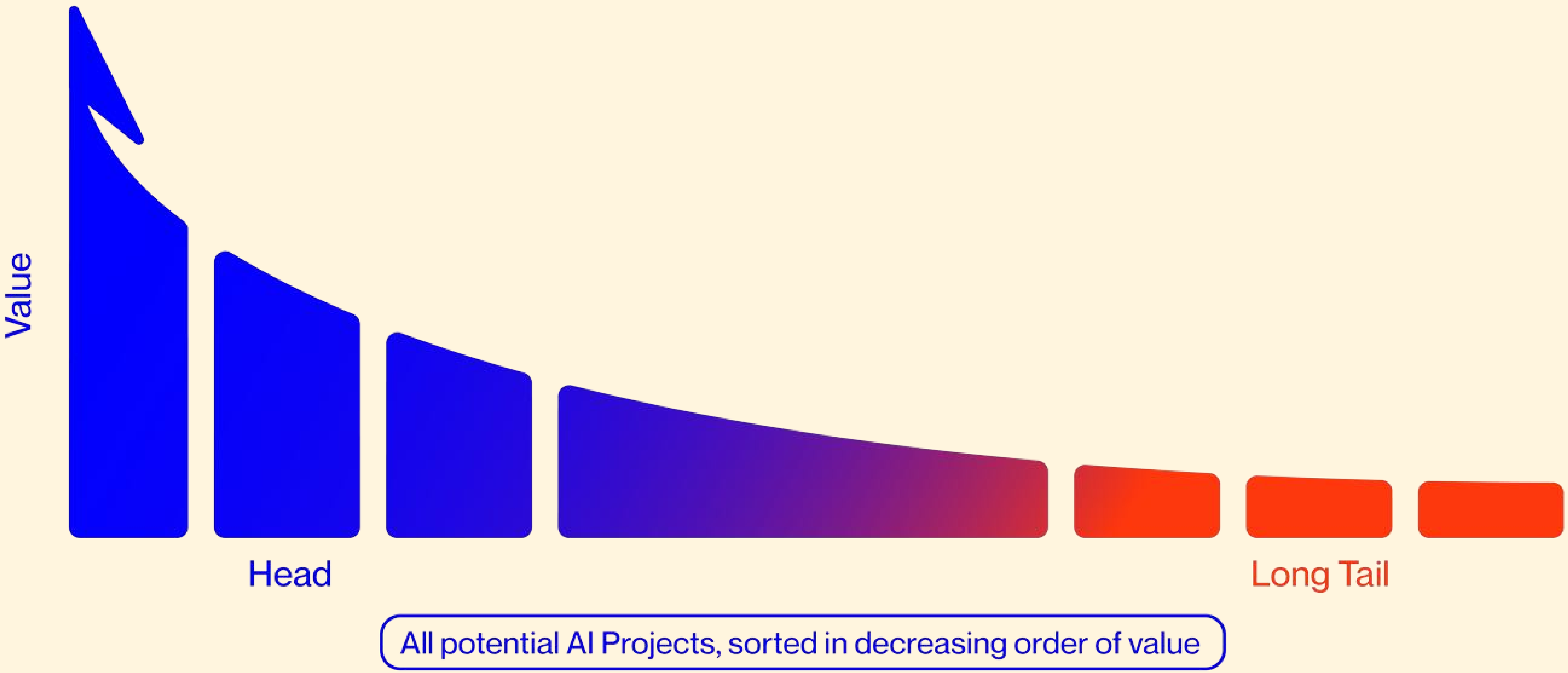

AI
Offerings
Processes


AI
Offerings
Processes
Product
Services
Enhancing Existing Products and Services
Creating New Products and Services


AI
Offerings
Processes
Product
Services
Enhancing Existing Products and Services
Creating New Products and Services
Universal Processes (UP)
Industry and Function-Specific Processes (IFSP)
Organizational-specific Processes (OSP)
buy/source
develop/customize
general
unique to organization

AI Use Case Ideation

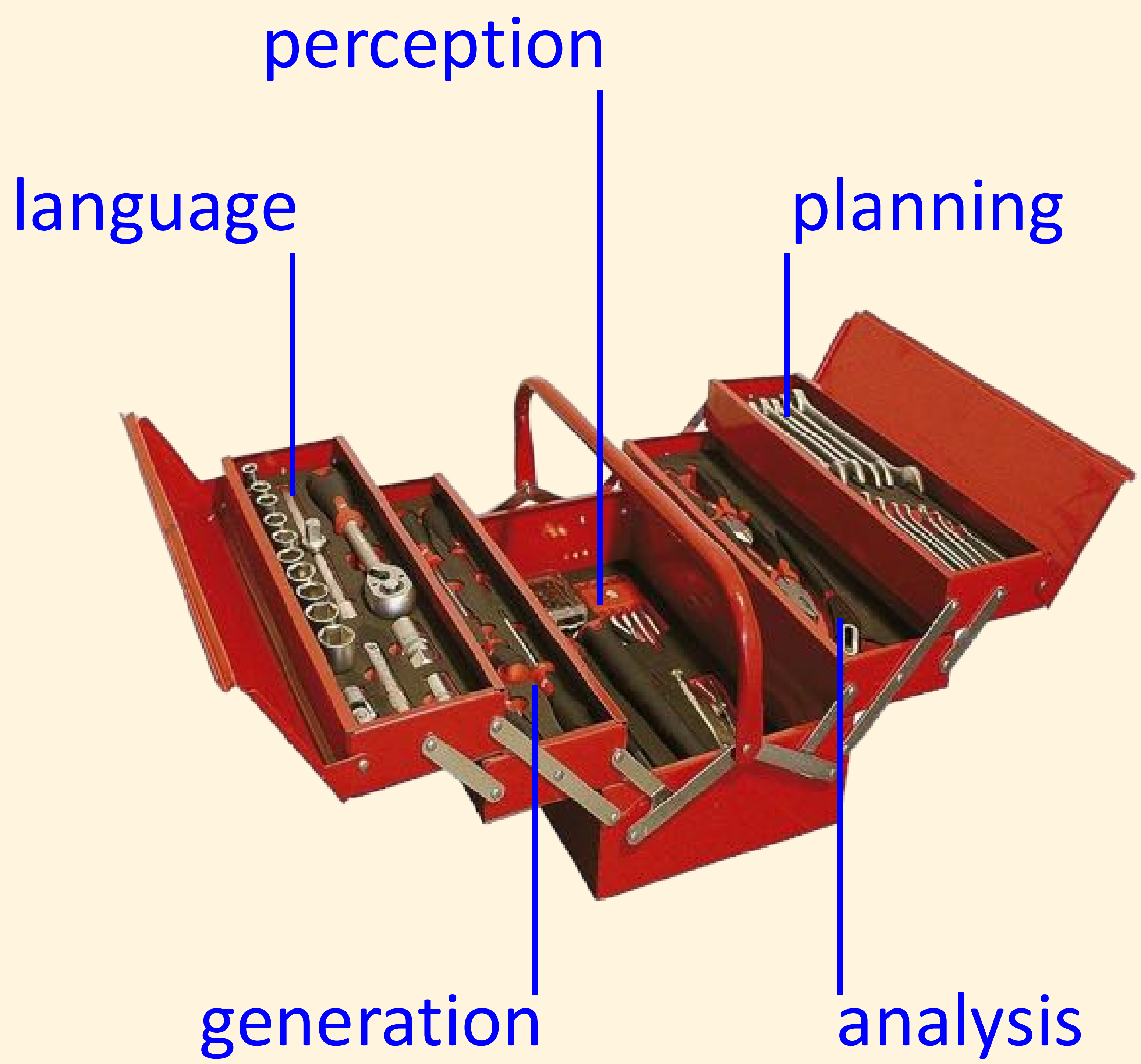
The Ideation Process



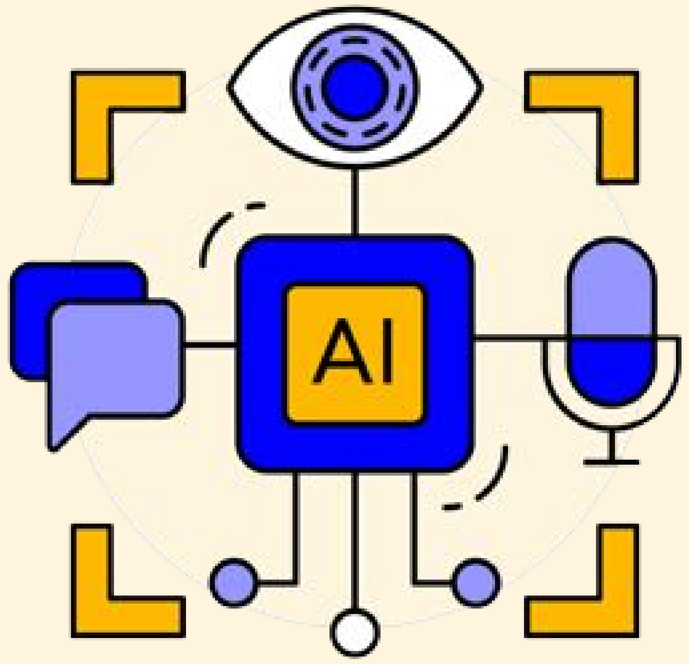
AI Use Cases

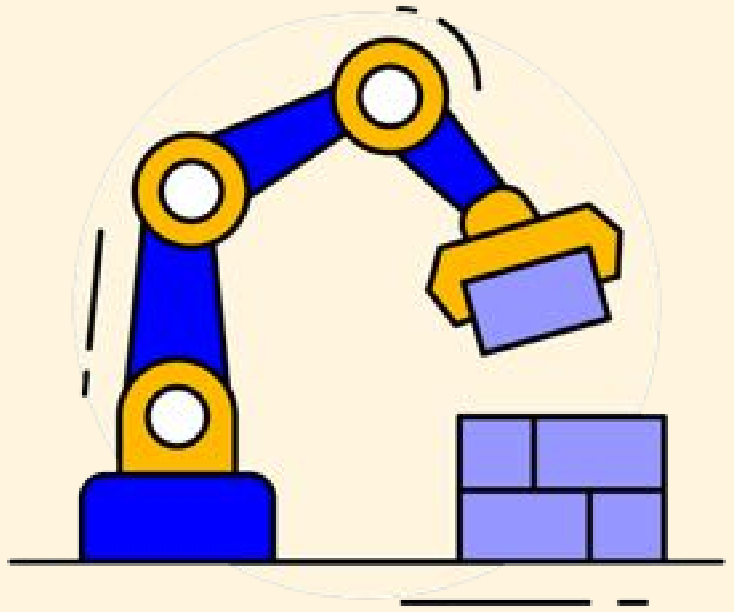
Clearly defined set of activities designed to reach a specific goal from a business or costumer perspective, in which one or more AI solution are involved in reaching the perspective goal

Use Cases use AI capabilities like tools in a toolbox



Machine Capabilities





Perception Capabilities

- Comp. Vision
- Comp. Audition
- Comp. Linguistics

Analytical Capabilities

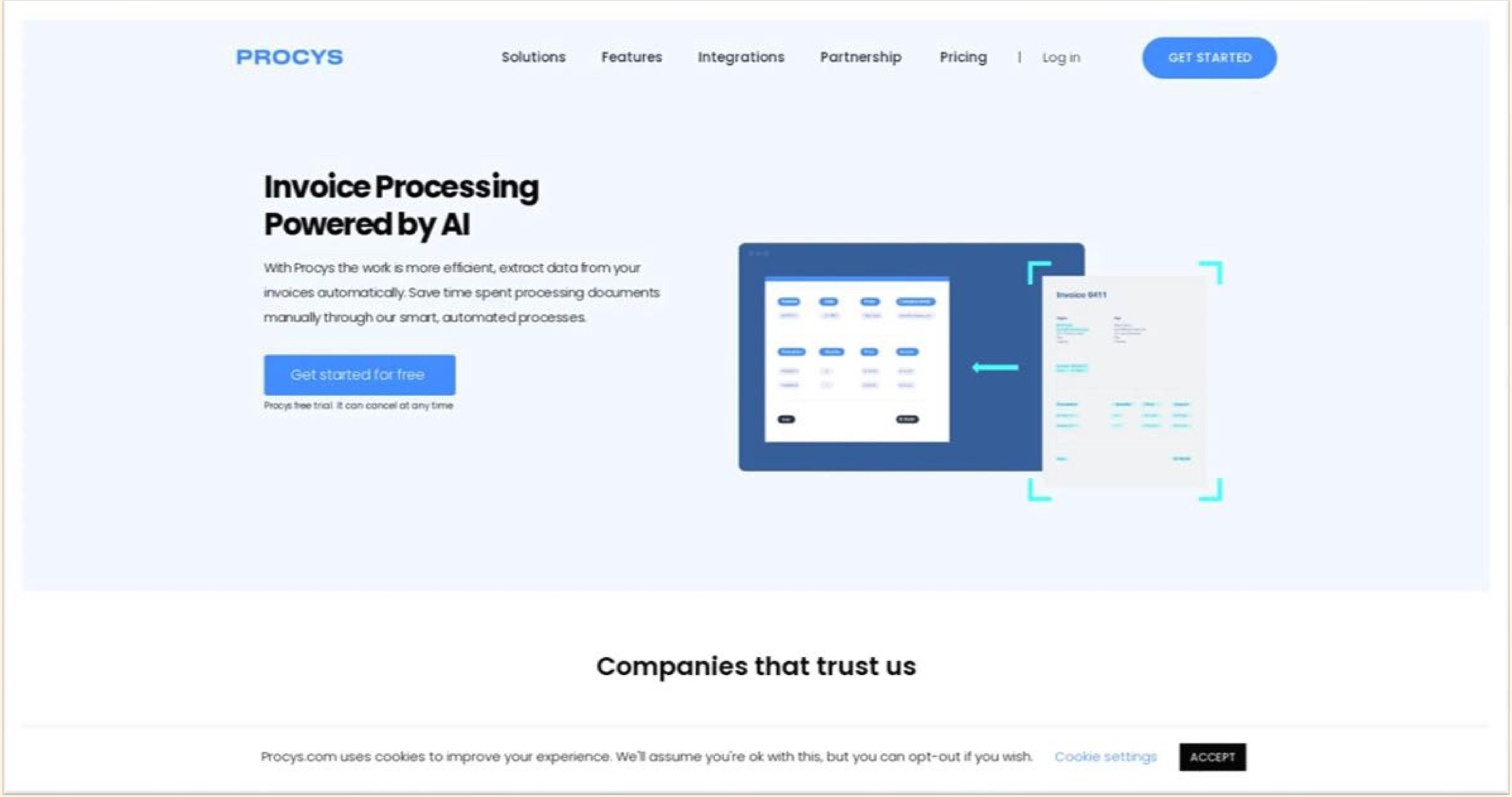
- Discovery
- Forecasting
- Planning & Optimization

Motoric Capabilities

- Advanced Robotics & Control

Generating Capabilities

- Creation



Procys is an AI-powered invoice processing tool that helps businesses streamline their billing processes. It provides users with automated processes to extract data from invoices, label each fragment of the document correctly and export the processed data in a structured way.

invoice

LOGO

FROM	INVOICE #	US-001
East Repair Inc.	INVOICE DATE	11/02/2019
1912 Harvest Lane	P.O.#	2312/2019
New York, NY 12210	DUE DATE	26/02/2019

BILL TO

John Smith
2 Court Square
New York, NY 12210

SHIP TO

John Smith
3787 Pineview Drive
Cambridge, MA 12210

QTY	DESCRIPTION	UNIT PRICE	AMOUNT
1	Front and rear brake cables	100.00	100.00
2	New set of pedal arms	15.00	30.00
3	Labor 3hrs	5.00	15.00

Subtotal	145.00
Sales Tax 6.25%	9.06

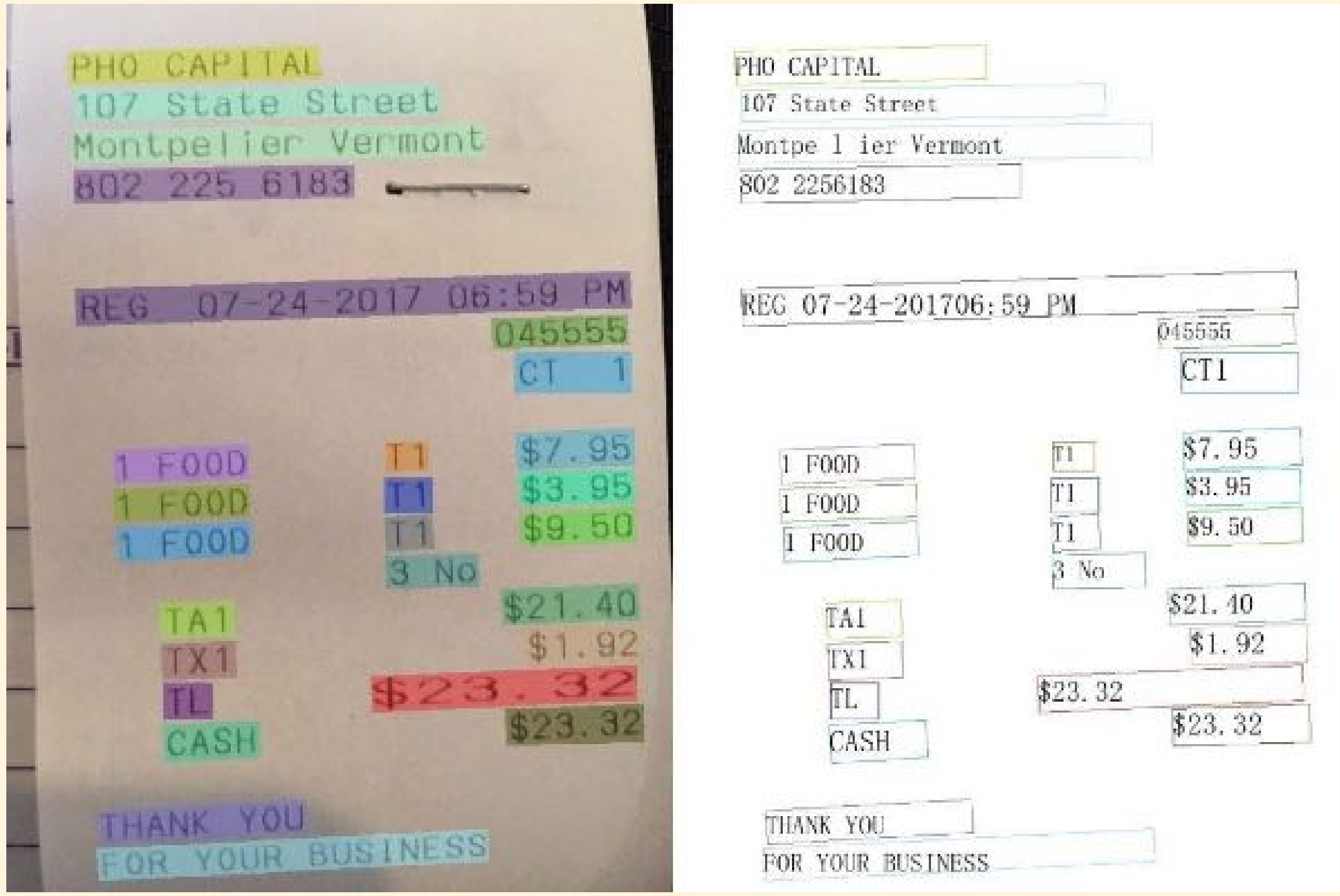
TOTAL $154.06

John Smith

TERMS & CONDITIONS

Payment is due within 15 days

Please make checks payable to: East Repair Inc.

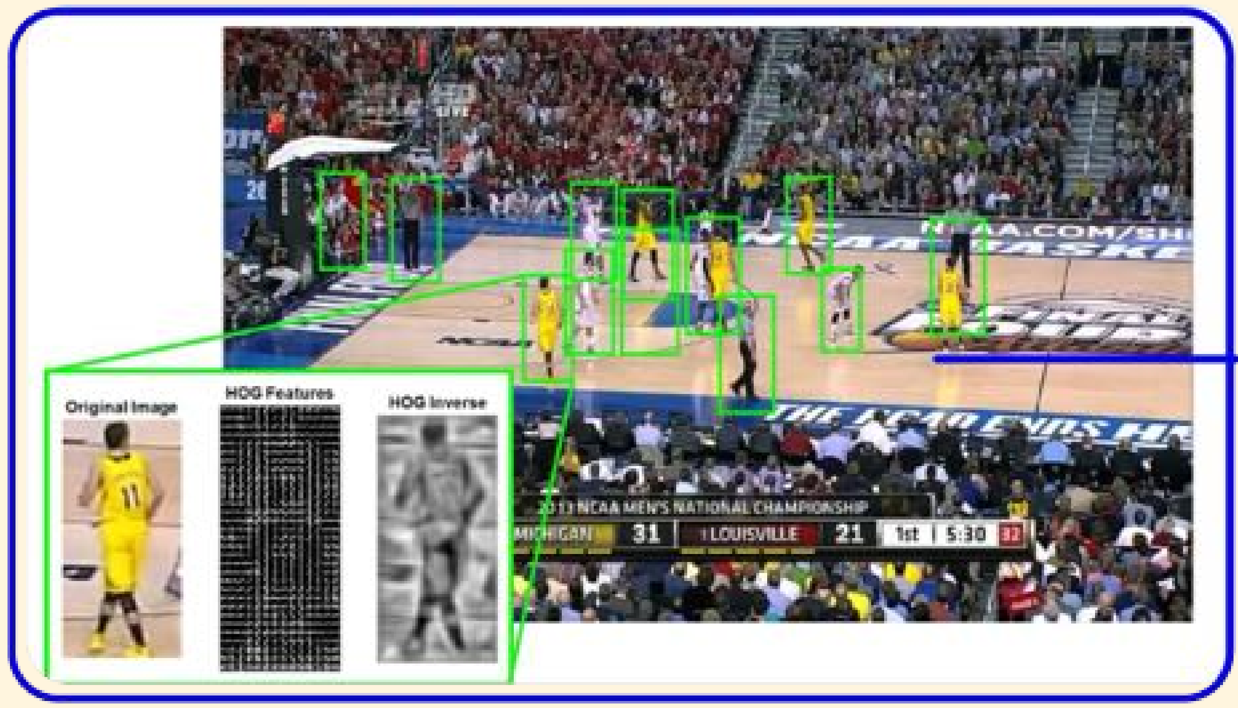


Breaking Down
a Complex Use Case

Initial Frame

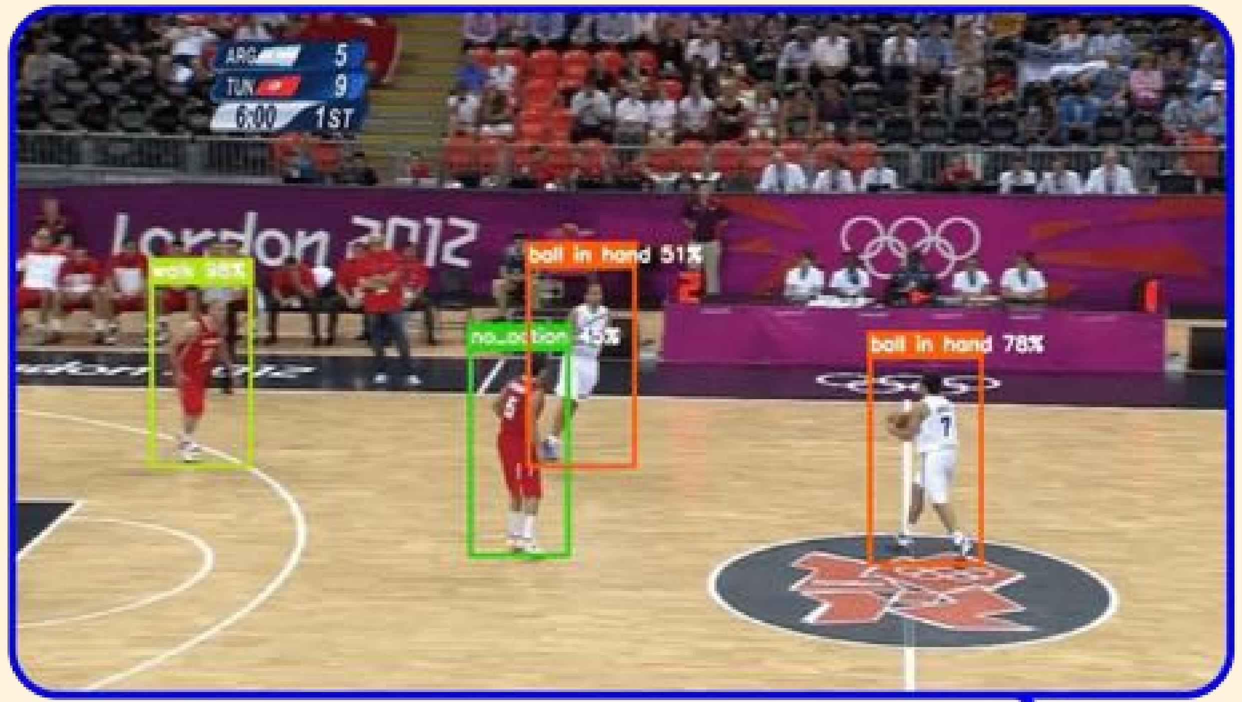
Court detection

Pedestrian Detection
with histogram of
Oriented Gradients
(HOG)

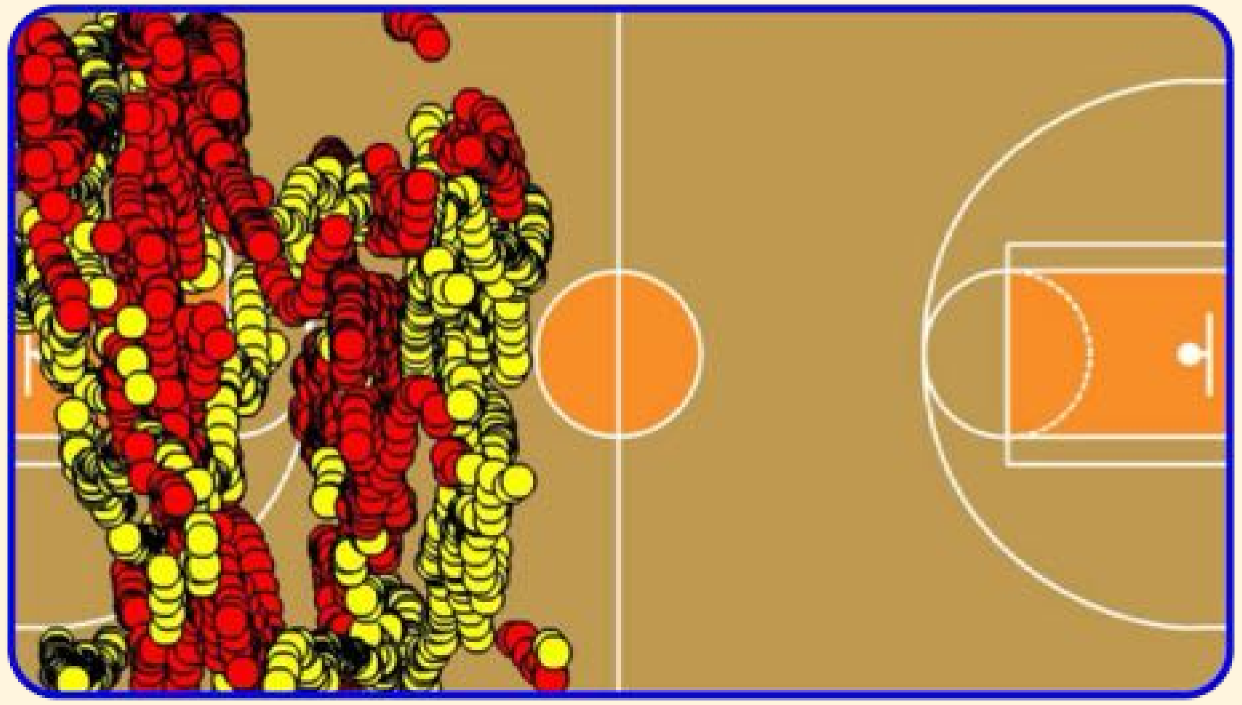


Color-Based
Player Detection and Classification

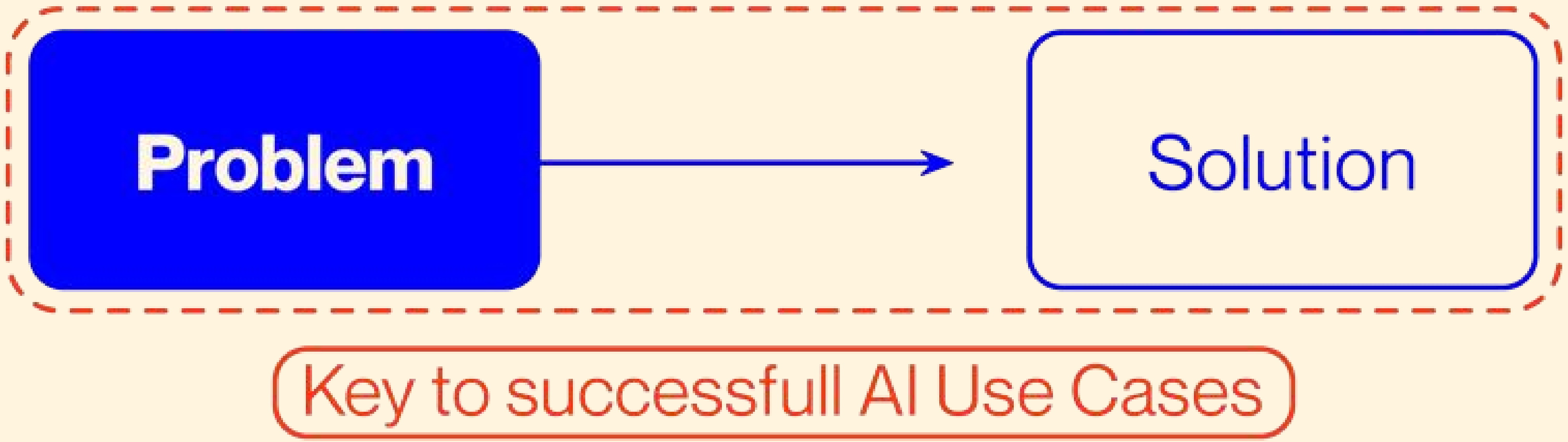
Player Tracking



Mapping

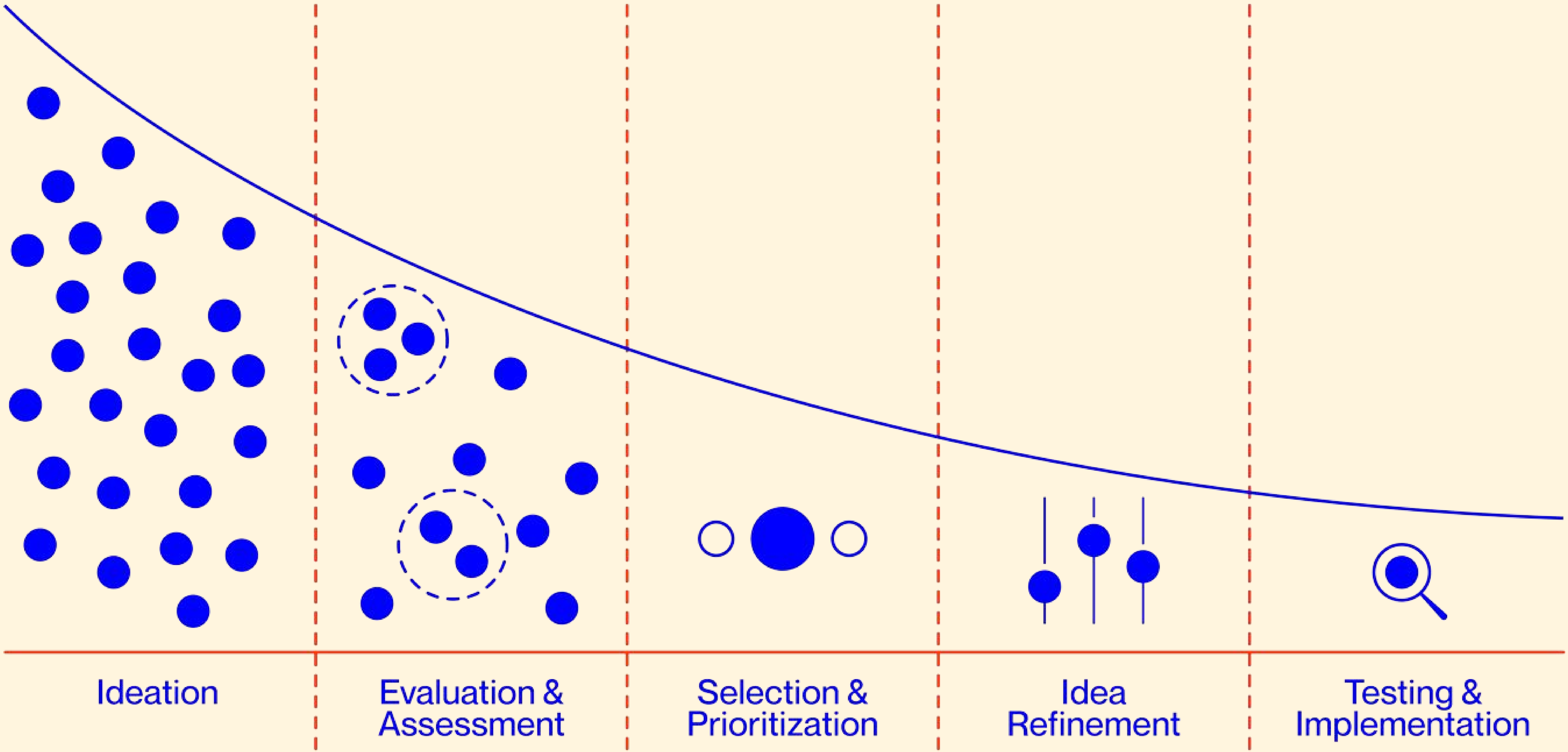


Conceptualising Use Cases



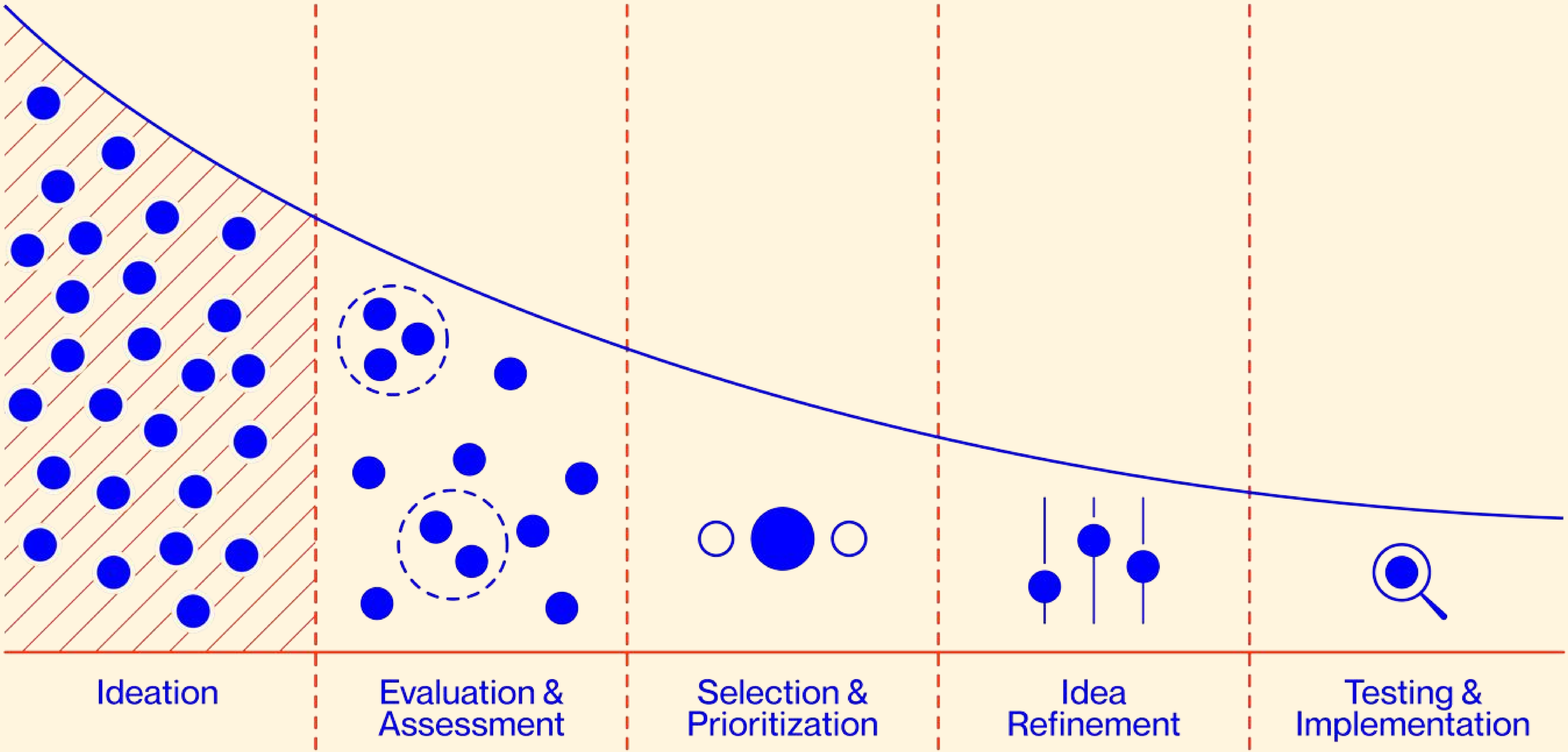
Did you know this?

The Ideation Process



Ideation
Evaluation & Assessment
Selection & Prioritization
Idea Refinement
Testing & Implementation

The Ideation Process



Ideation
Evaluation & Assessment
Selection & Prioritization
Idea Refinement
Testing & Implementation

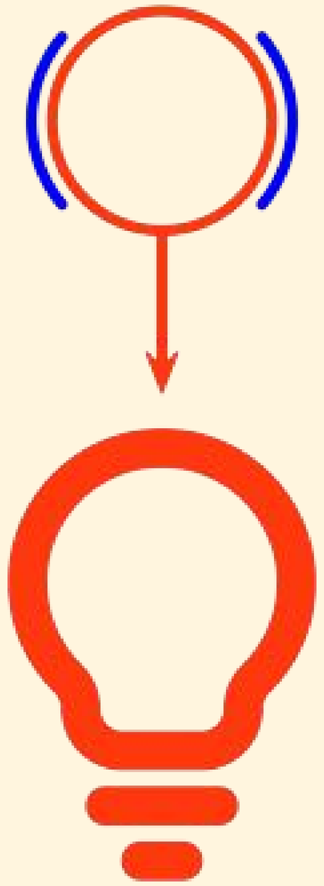
Ideating and Evaluating AI

Firm Specific Capabilitites

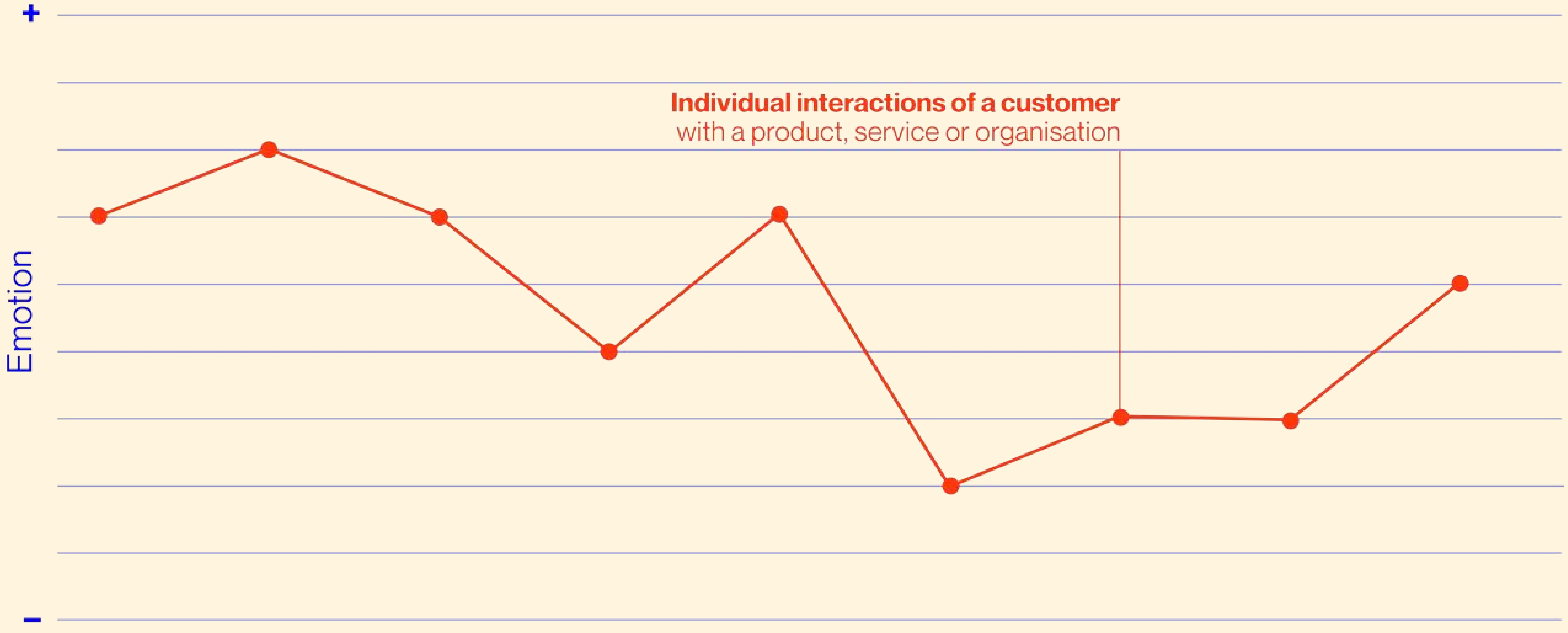
Demand Side Methods
Exploring opportunitite focusing on...

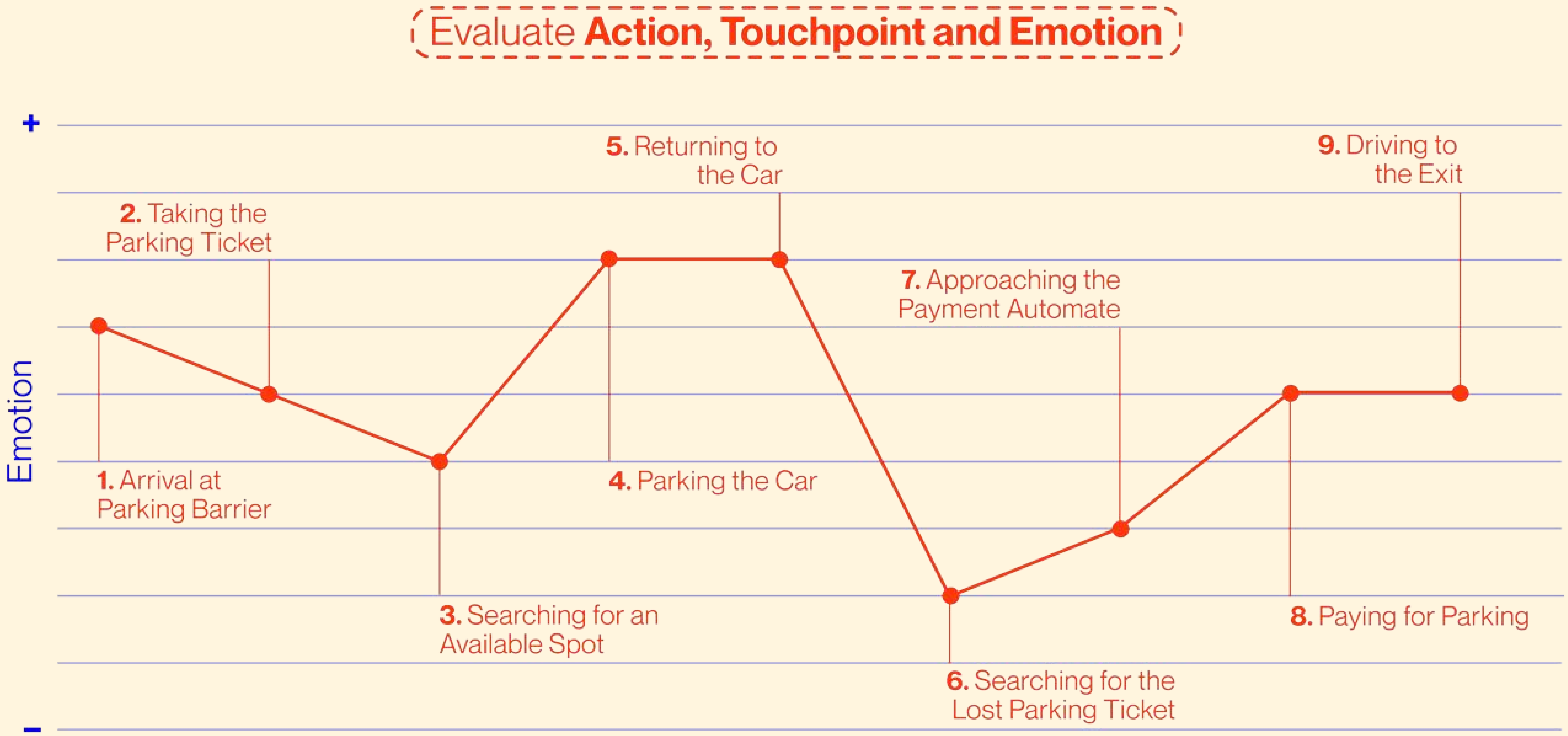
Costumer Journey Map

Process Map

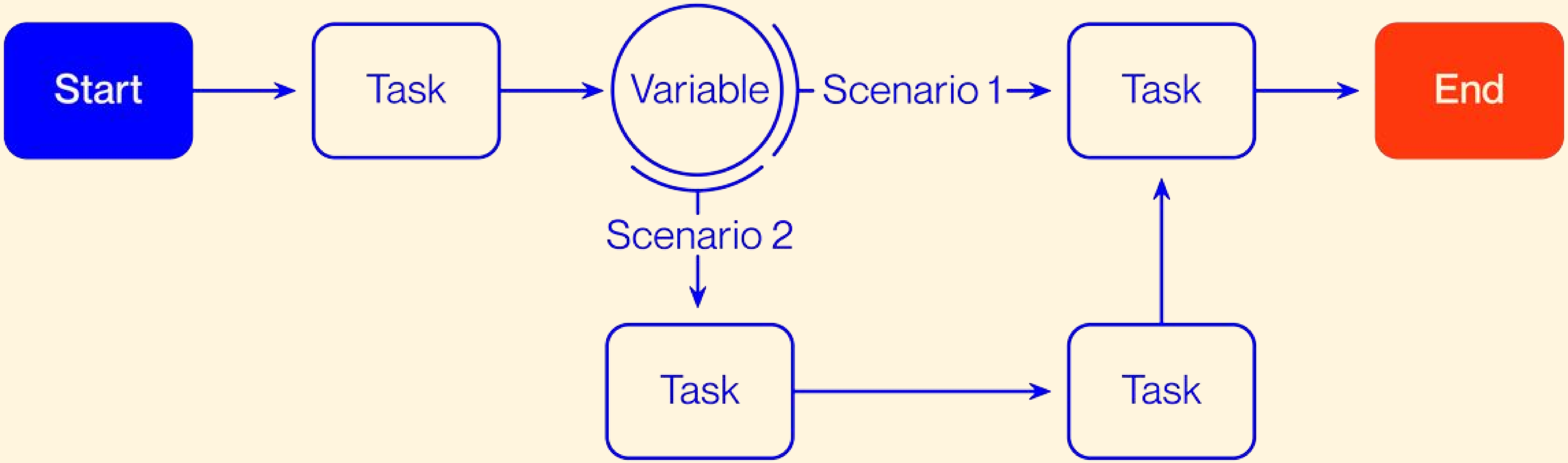


The Costumer Journey

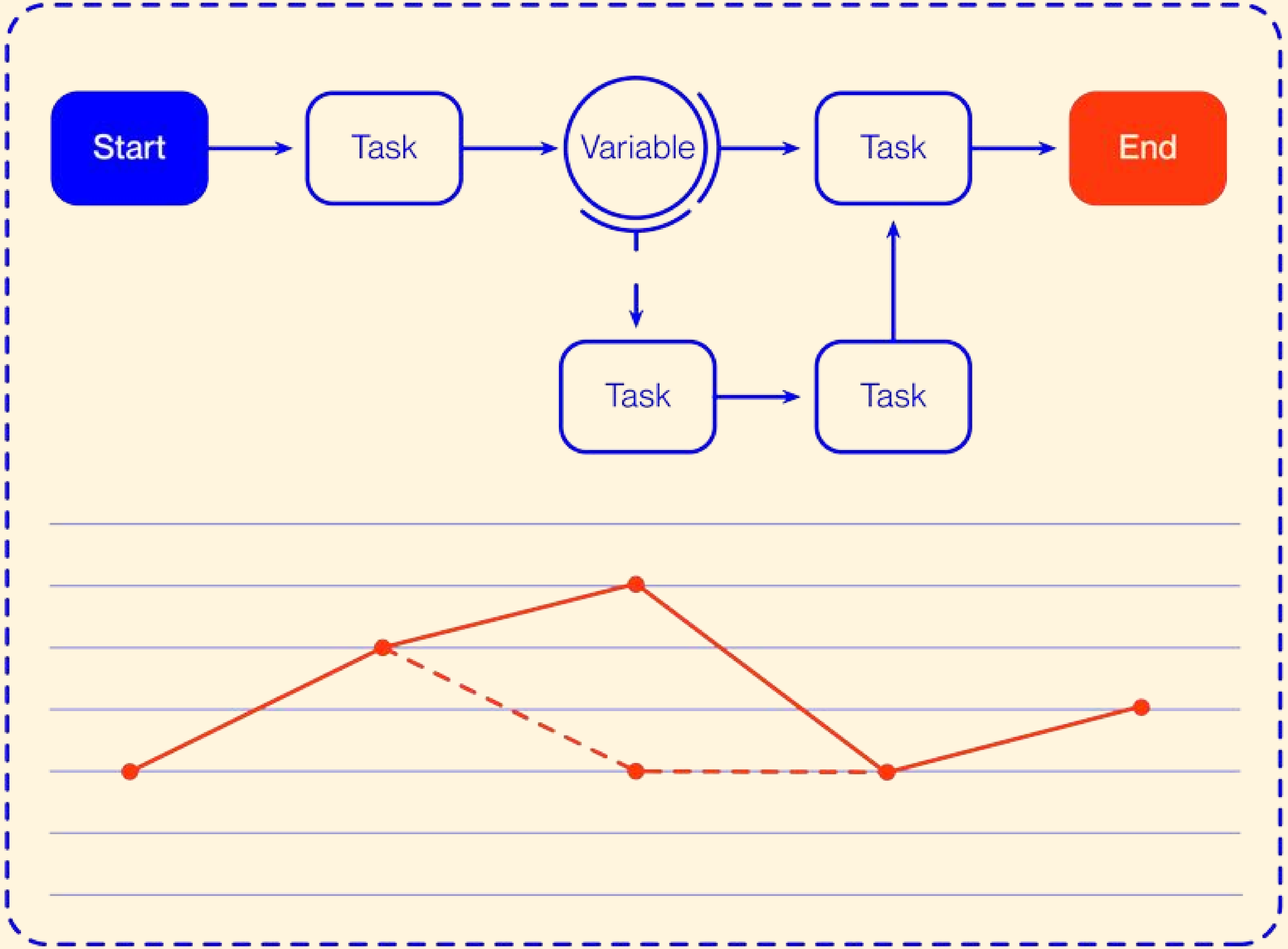



Evaluate **Action, Touchpoint and Emotion**
+
Emotion
−
1. Arrival at Parking Barrier
2. Taking the Parking Ticket
3. Searching for an Available Spot
4. Parking the Car
5. Returning to the Car
6. Searching for the Lost Parking Ticket
7. Approaching the Payment Automate
8. Paying for Parking
9. Driving to the Exit

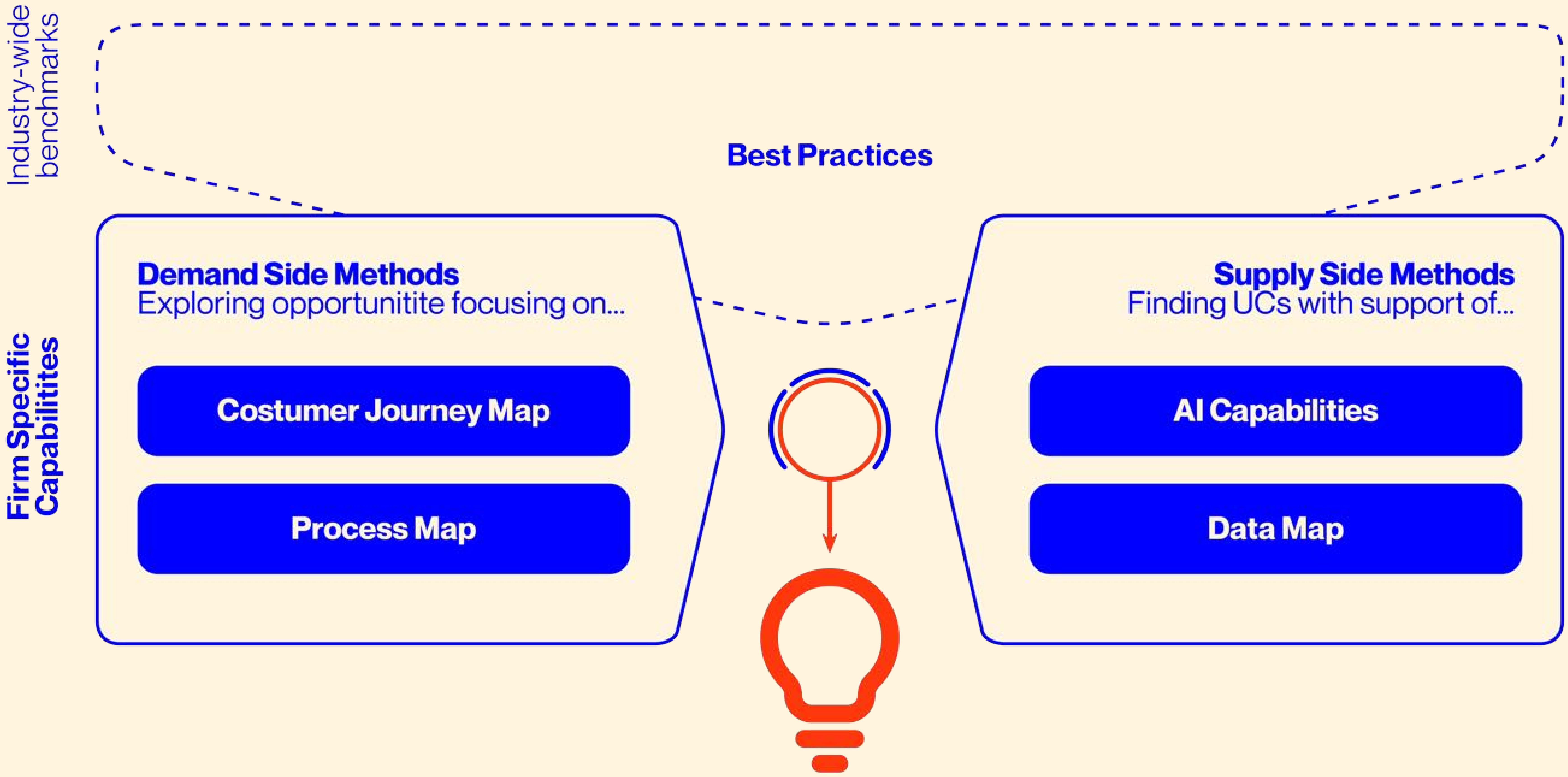
The Process Map



Combining both Customer Journey and Process maps ensures AI solutions are technically robust and user-centric, **facilitating ideation and efficient problem-solving.**



Ideating and Evaluating AI



Interactive Intelligence | **Motion / Creative Int.**

Computer Vision
Process visual data and recognize objects

understand the semantics of images or video sequences

Computer Audition
Process and interpret **audio signals**

Natural language Proc.
Process, interpret and generate **text and speech**

Robotics and Control
Analyze, interpret and learn from data representing **physical systems (incl. IoT)** and control its behavior

Machine Capabilities Challenge Business Models

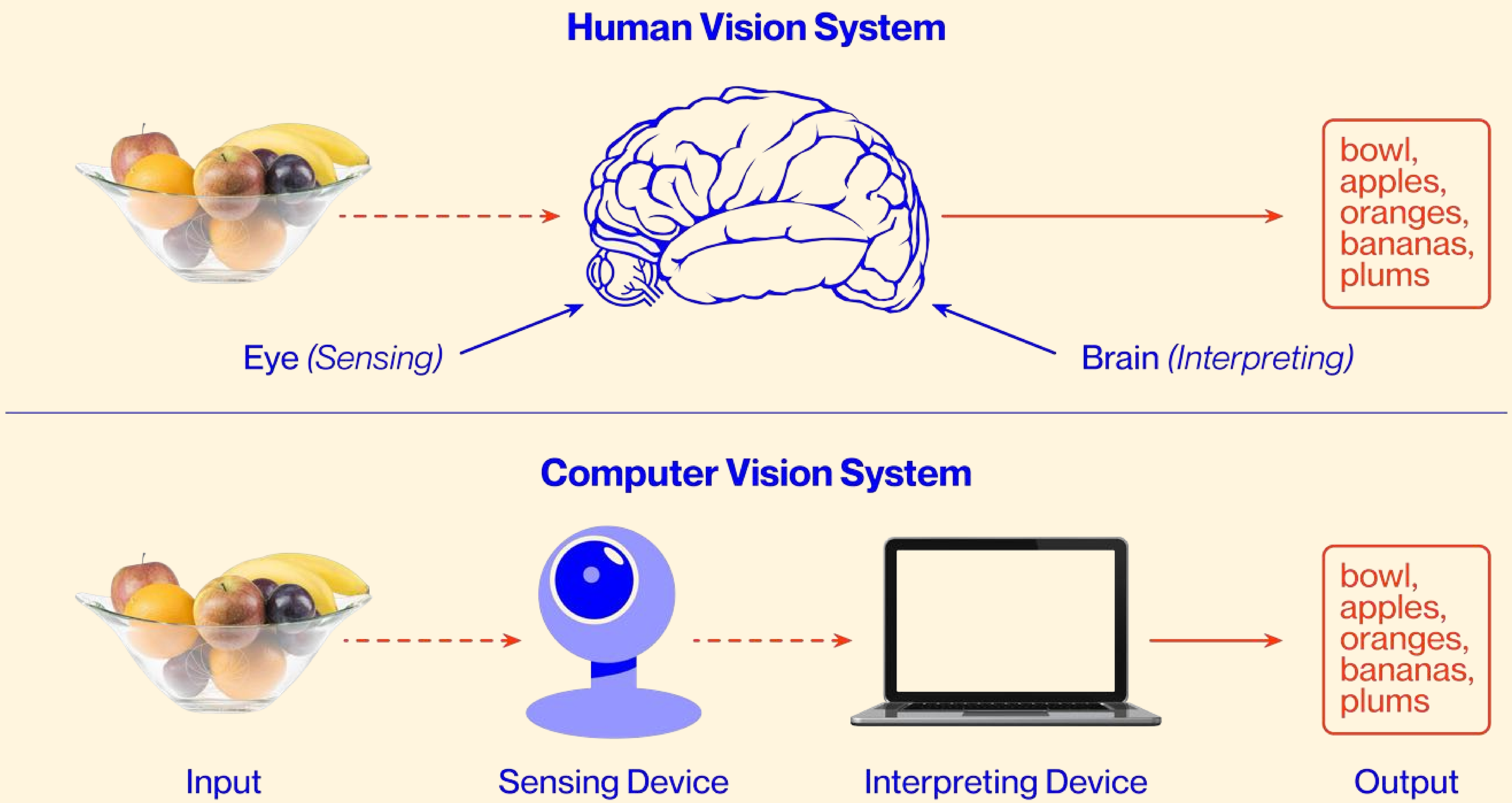
Discovery
Process large amounts of data and **find patterns and 'logical' relationships**

Planning and Search
Look for **optimal solutions to problems** with large solution space

Forecasting
Make predictions about future course of time, series or likelihood of events

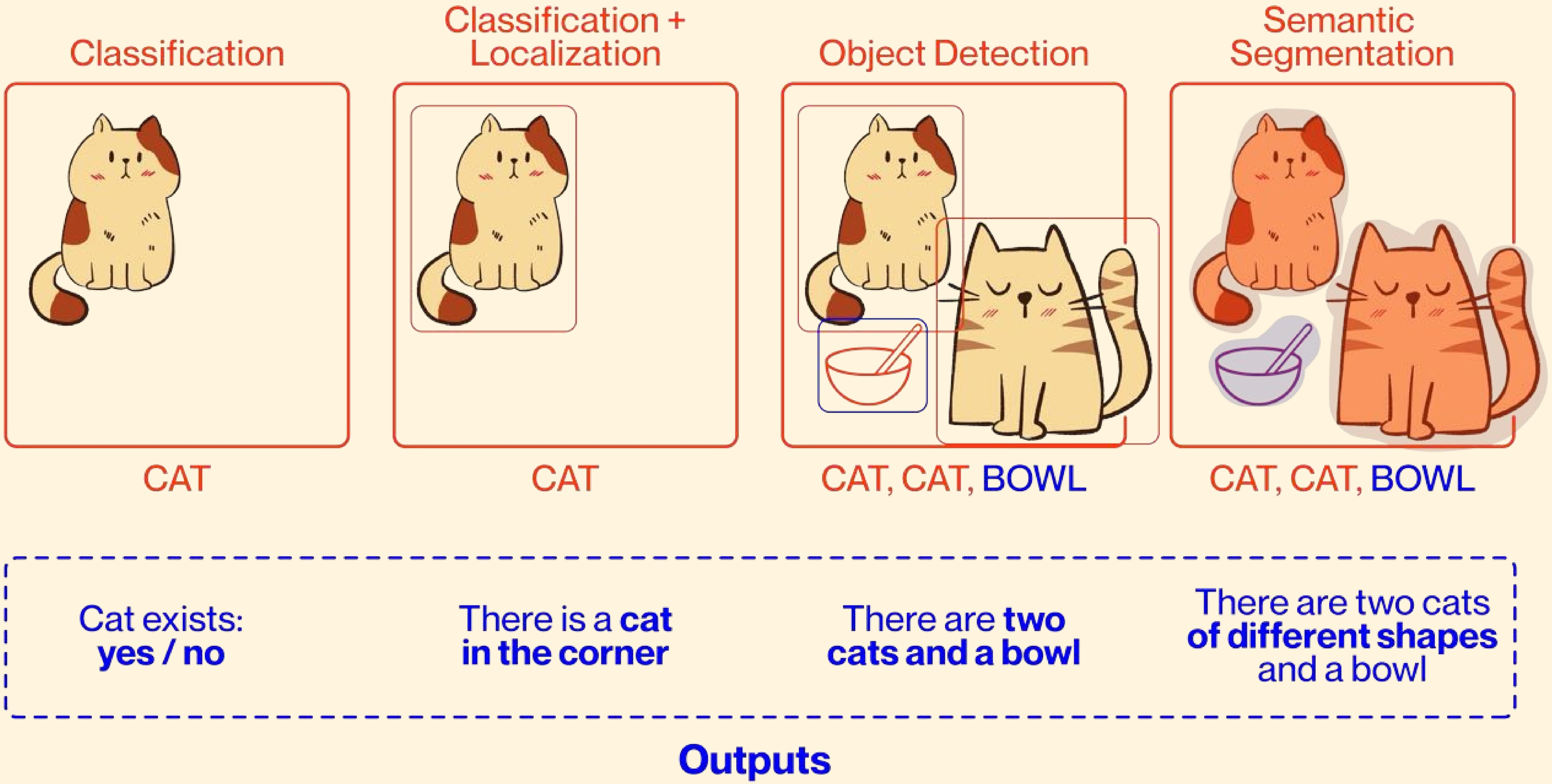
Creation
Generate images, music, speech and more based on sample creations

Analytic Intelligence | **Motion / Creative Int.**

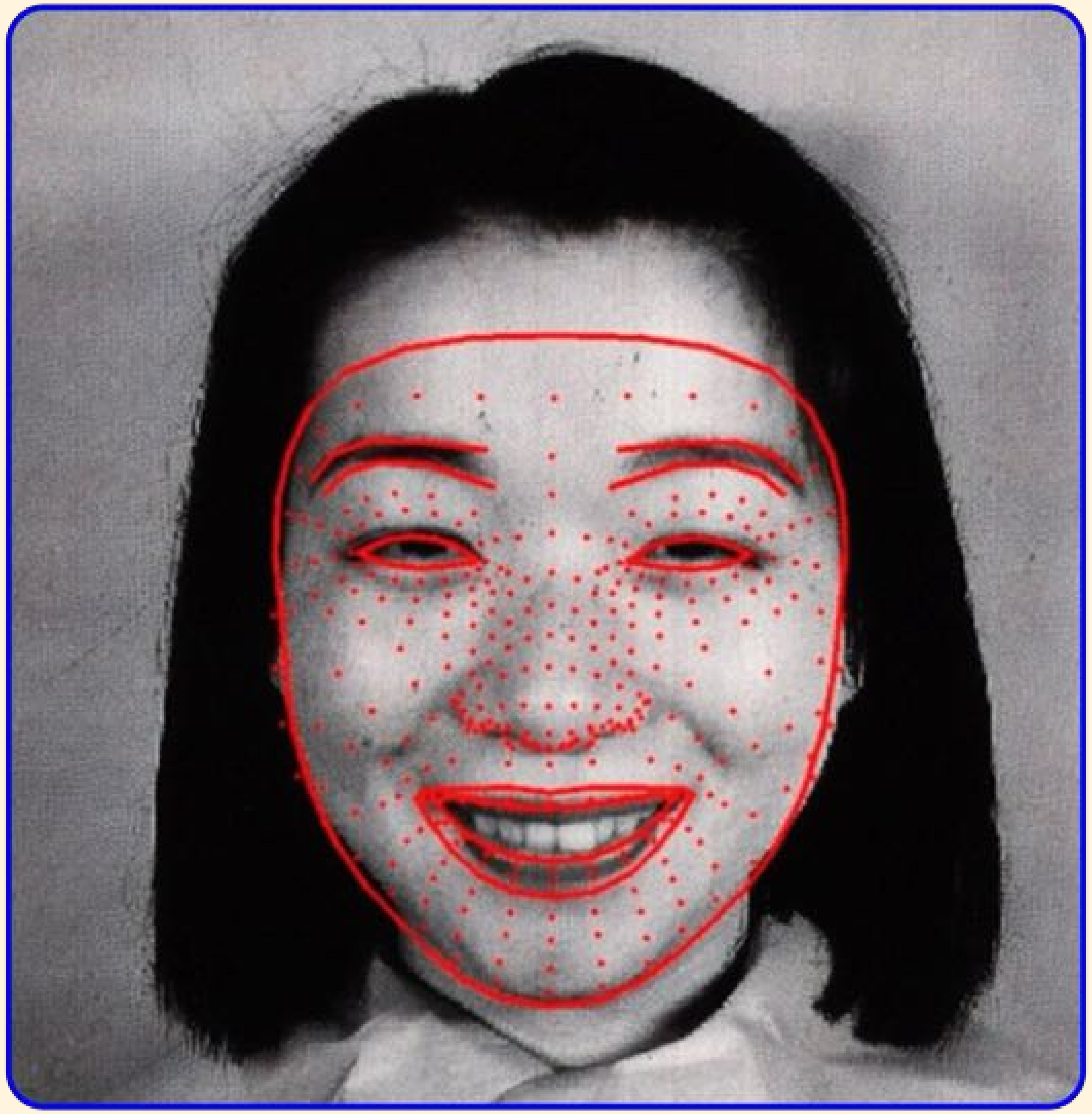


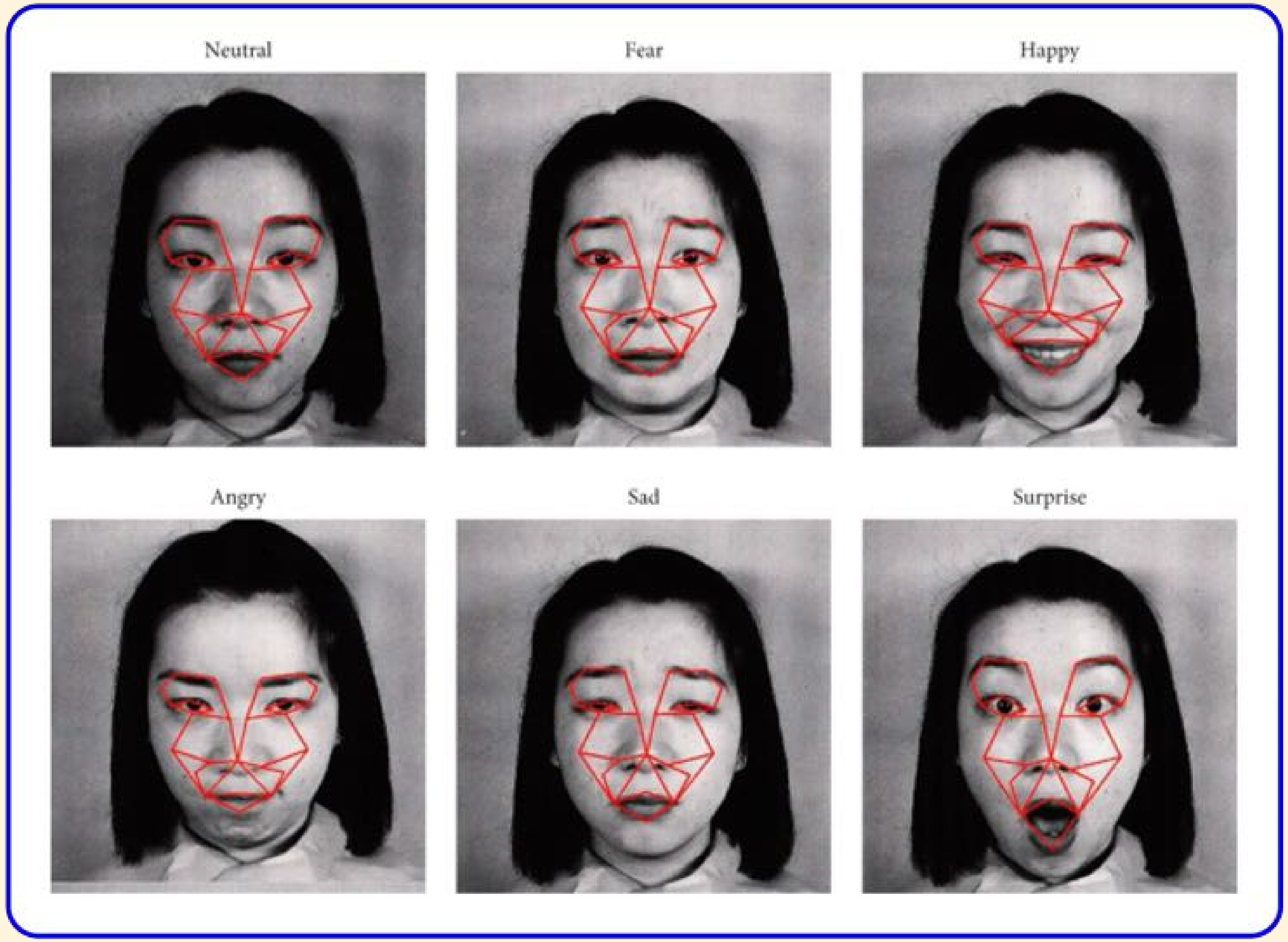
Human Vision System
bowl,
apples,
oranges,
bananas,
plums
Eye (Sensing)
Brain (Interpreting)
Computer Vision System
bowl,
apples,
oranges,
bananas,
plums
Input
Sensing Device
Interpreting Device
Output

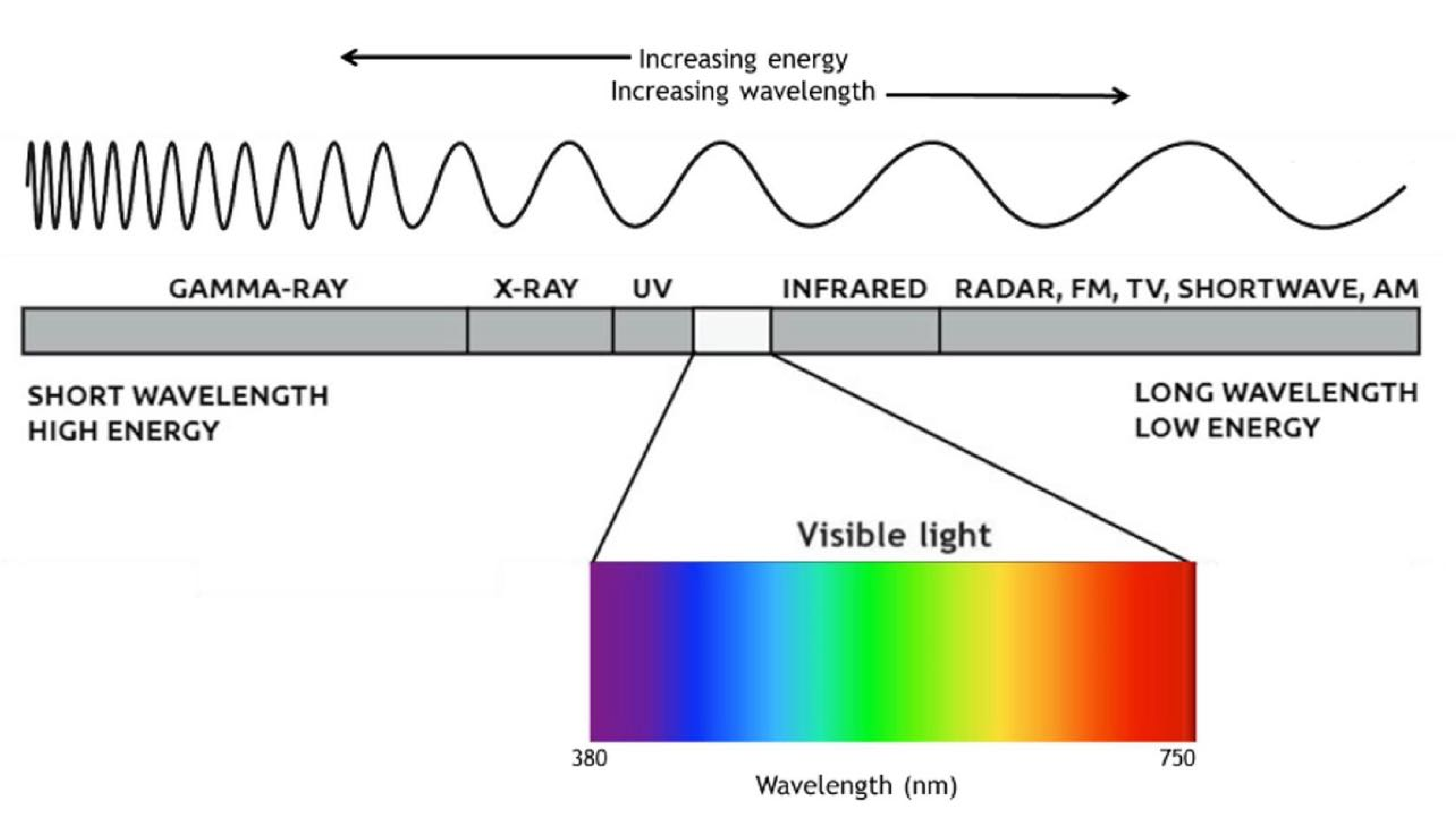
Computer Vision Problem Types



Emotion Recognition



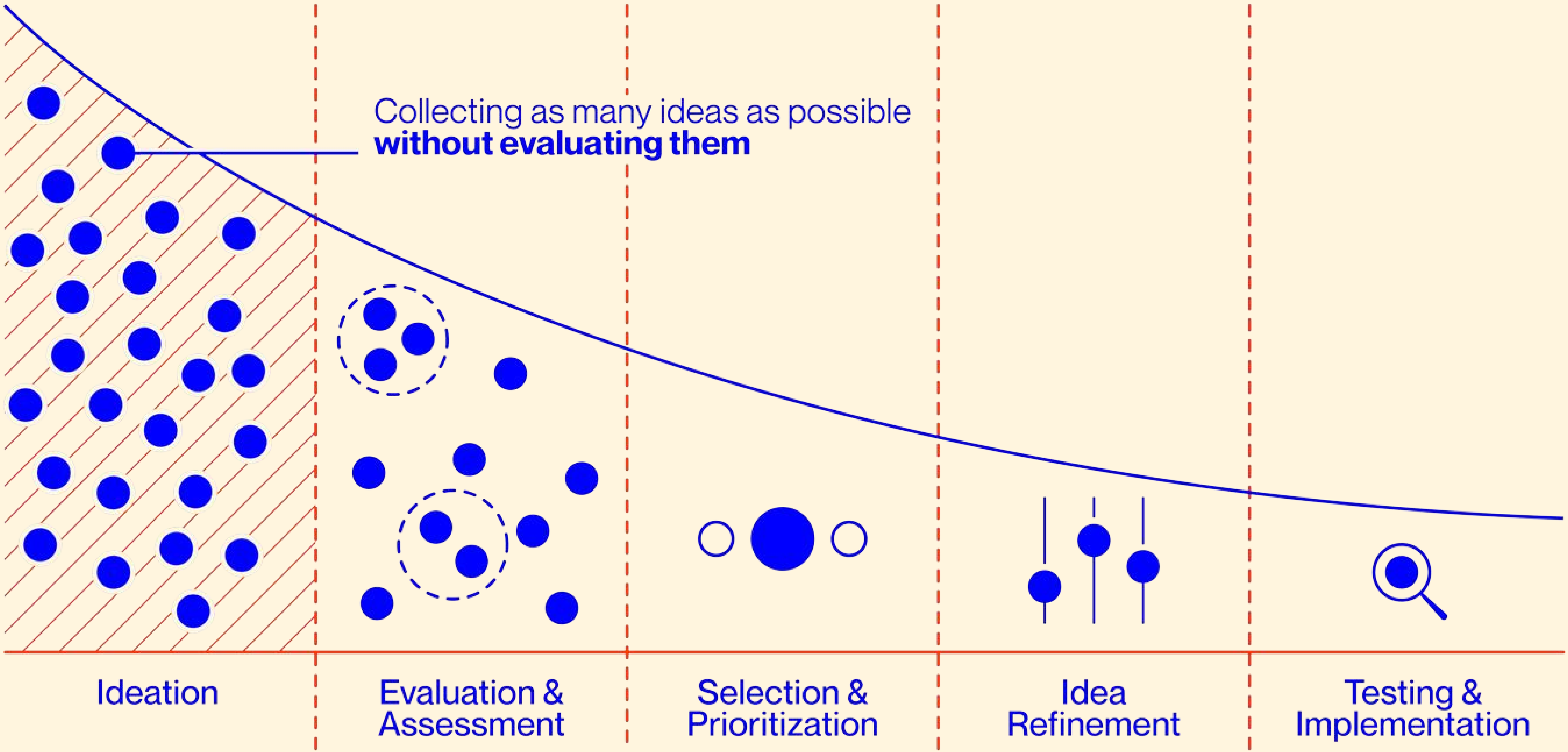




Increasing energy
Increasing wavelength
GAMMA-RAY
X-RAY
UV
INFRARED
RADAR, FM, TV, SHORTWAVE, AM
SHORT WAVELENGTH
HIGH ENERGY
LONG WAVELENGTH
LOW ENERGY
Visible light
380
750
Wavelength (nm)


牛奶是只猫

16th century art...meet
21st century tech.


Collecting as many ideas as possible
without evaluating them
Ideation
Evaluation & Assessment
Selection & Prioritization
Idea Refinement
Testing & Implementation

AI Use Case Ideation Canvas

Name:

Team Name:

Date:

Use Case Name	Use Case Description	Problem

[illegible]	Cost	Potential Risks
Overall Score:	Overall Score:	Guiding Questions:

Input → Output → Triggered Action → Value Generated

Area of Application	AI Capability Used
Product/Service: Process:	

Key Hypotheses to Validate	[illegible]

Overview of AI Capabilities:

AI Capability:

Perception Capabilities:

Analytical Capabilities:

Motoric Capabilities:

Generating Capabilities:

Computer Vision:

Object Detection and Tracking:

[illegible]

Emotion Recognition:

3D Reconstruction:

Image Segmentation:

Computer Audition:

Speech to Text:

Musical Knowledge:

Sound Similarity Assessment:

Source Separation:

Audio-based Sentiment Analysis:

Computer Linguistics:

Translation:

[illegible]

Sentiment Analysis:

Entity Recognition:

Relation Extraction:

Conversational Systems:

Discovery:

Segmentation and Clustering:

Anomaly/Outlier Detection:

Correlation Analysis:

Causal Inference:

Association Analysis:

Forecasting:

Time Series Forecasting:

Dependency-based Forecasting:

Planning & Optimization:

Cooperative Multi-Agent Systems:

Policy Development/Strategic Agents:

Logistics Planning:

Planning and Scheduling:

Advanced Robotics & Control:

Robot Motion Planning:

HD Mapping and Localization:

Control Optimization:

Collaborative Robotics/Human-Robot Interaction:

Advanced Drones:

Mobile Robots:

Generative AI:

Text Generation:

Image Generation/Manipulation:

3D Generation:

Video Generation/Manipulation:

Speech Generation:

Voice Generation:

Use Case Description

10:00

Use Case Presentation in Group

08:00

Umsetzung einer KI Implementierung & Lebenszyklusmanagement

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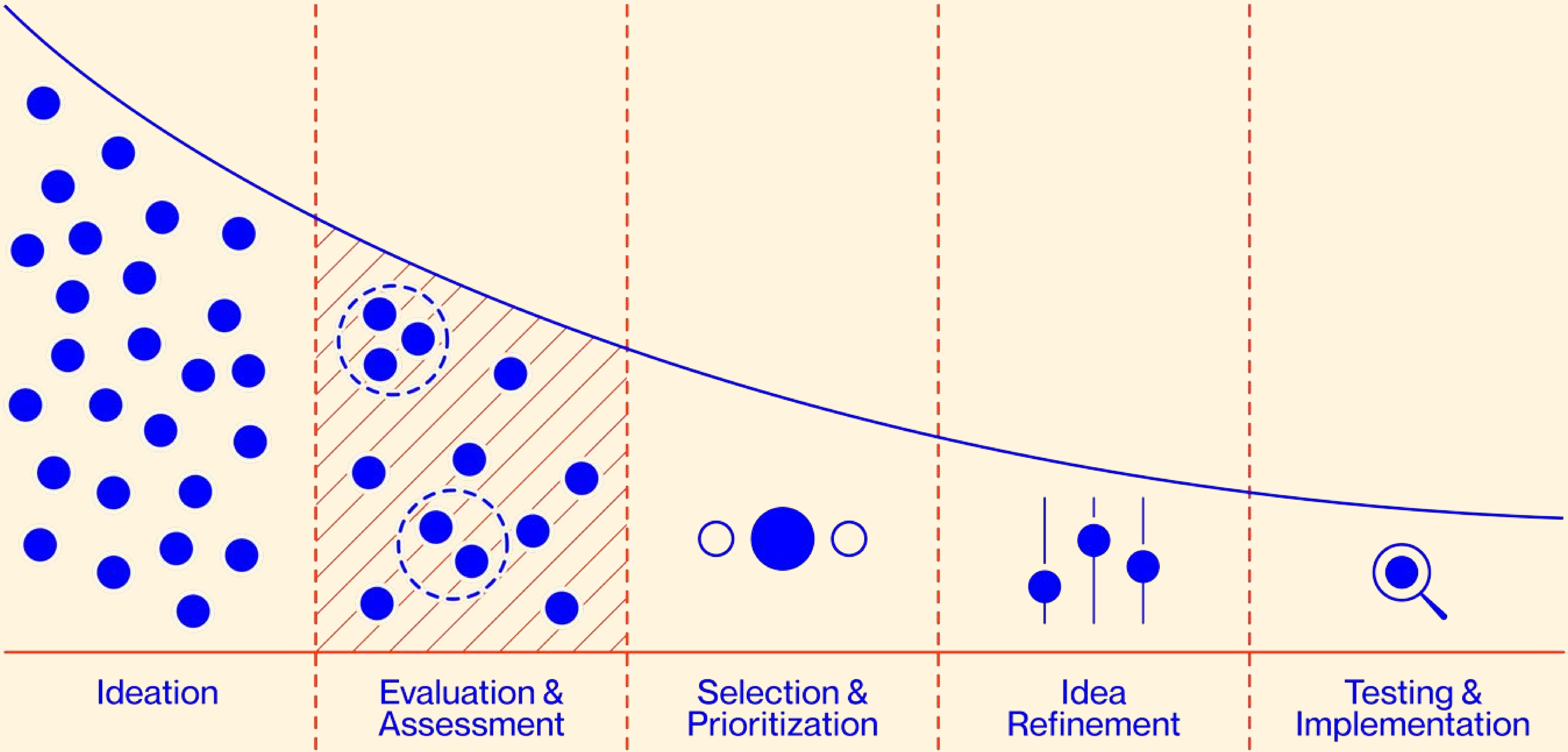
10:30 Uhr - 10:40 Uhr - **Q&A Session | Format: Vortrag mit Q&A**

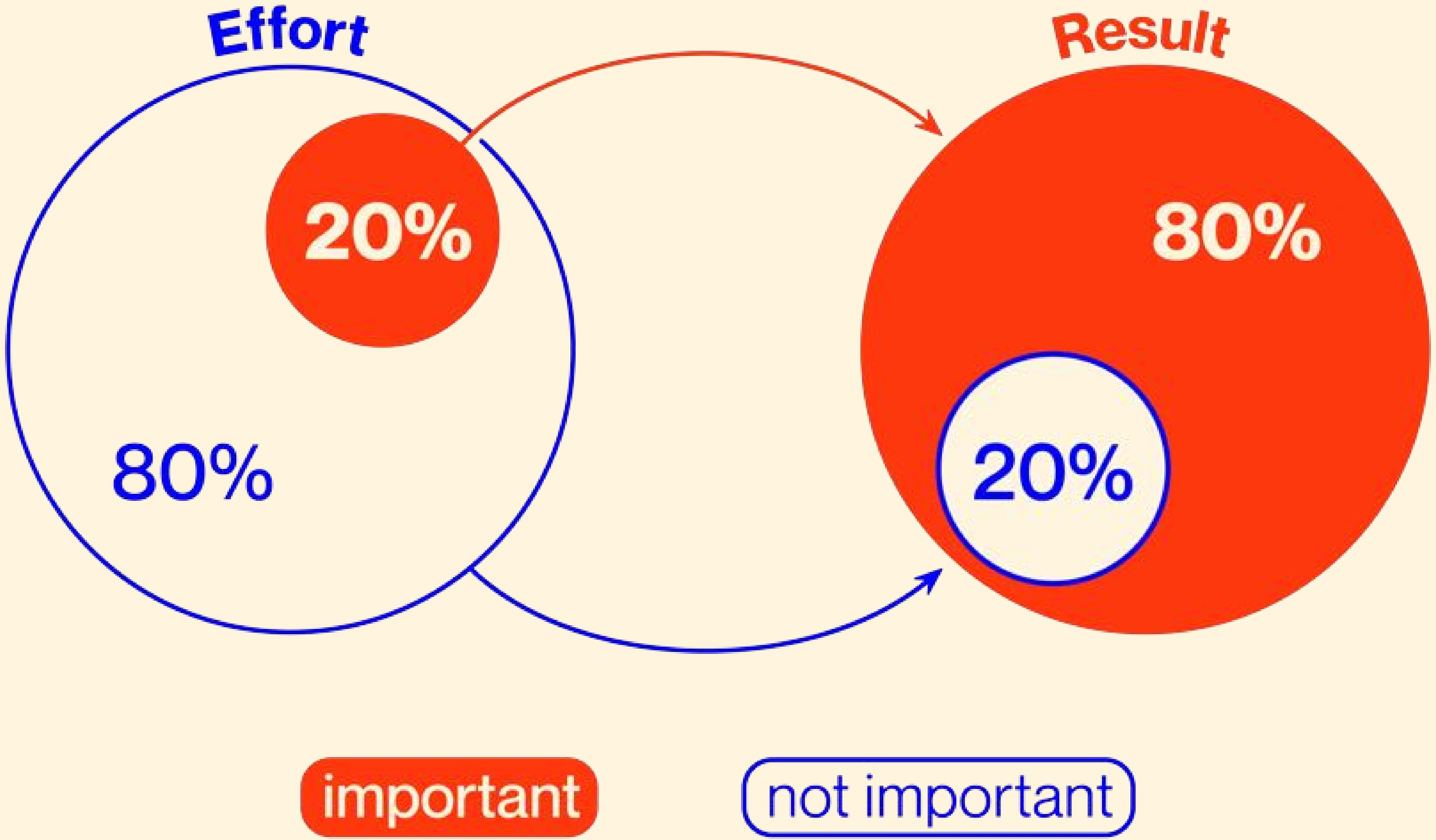
- Beantwortung von Fragen und Diskussion mit zusätzlichen Einblicke in den Prozess der Use Case Evaluation.

Evaluation & Selection

The Ideation Process


Ideation
Evaluation & Assessment
Selection & Prioritization
Idea Refinement
Testing & Implementation

The Pareto Principle



Assessing an UC in two Dimensions

Dimension	Specification	Key Question	Value Score
Value	**Economic Value**	What is the Economic potential of the UC (e.g. cost reduction, additional sales...)?	(low value = 0 high value = 5)
	Strategic Alignment	Does it contribute to the AI Strategy?	– –
Ease of Implementation			

Assessing an UC in two Dimensions

Dimension	Specification	Key Question	Value Score
Value	**Economic Value**	What is the Economic potential of the UC (e.g. cost reduction, additional sales...)?	(low value = 0 high value = 5)
	Strategic Alignment	Does it contribute to the AI Strategy?	
			Avg.: –
Ease of Implementation			

Assessing an UC in two Dimensions

Dimension	Specification	Key Question	Value
Ease of Implementation	**Data**	Do we have the necessary data?	(difficult to implement = 0 high ease = 5)
	Algorithm	Is there a known implementation of the UC? In our industry or in anouther industry/domain?	– –
	Process / Systems	Which processes and systems are affected	– –
	Required Know-How	Do we have the required technical and domain know-how?	– –

Assessing an UC in two Dimensions

Dimension	Specification	Key Question	Value Score
Value	**Economic Value**	What is the Economic potential of the UC (e.g. cost reduction, additional sales...)?	(low value = 0 high value = 5)
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	Process / Systems	Which processes and systems are affected	– –
	Required Know-How	Do we have the required technical and domain know-how?	– –

Example: **Smart Parking**

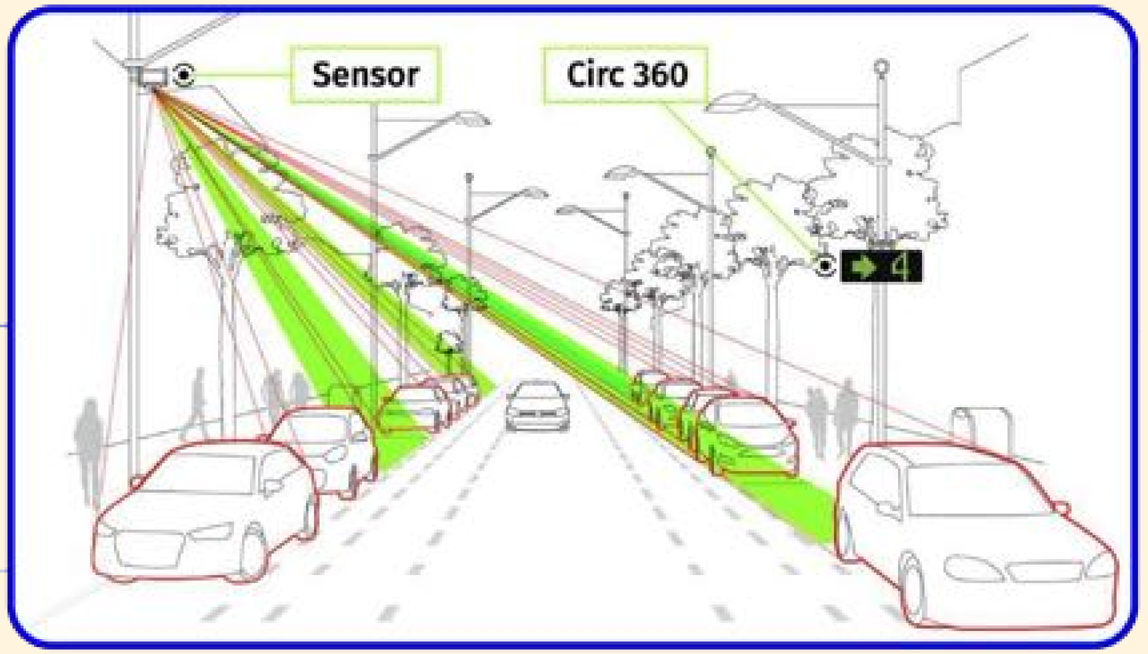
Ground Sensor

Camera + Computer Vision

Assessing an UC in two Dimensions

Dimension	Specification	Key Factors	Value Score
Value	Economic Value	Benefits: Improved Customer Experience, Reduced Traffic Congestion, Enhanced Security, Accurate Data Analytics, Revenue Generation Costs: High Cost of Installation, Regular Maintenance Requirements	4.5
	Strategic Alignment	Efficient Ressource Management, Environmental Benefits, Customer Loyalty, Scalability and Adaptability	4.5
		Avg.:	4.5
Ease of Implementation	Data	Availability, Difficulty in Procurement, Importance	4
	Solution Blueprint	Prior Implementations, Pre-existing Templates	4.5
	Process, Systems Tools, People	Processes Affected, Systems and Tools, People Affected	3.5
	Required Know-How	Technical Expertise, Domain-specific Knowledge, Difficulty in Acquisition	4
		Avg.:	4

Assessing an UC in two Dimensions



Dimension	Specification	Key Question	Value Score
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		Avg.:	**4**

Assessing an UC in two Dimensions

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		Avg.:	**4.5**
Ease of Implementation	**Data**	Availability, Difficulty in Procurement, Importance	4
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	Required Know-How	Technical Expertise, Domain-specific Knowledge, Difficulty in Acquisition	4
		Avg.:	**4**

AI Red Flags

AI red flags are **critical issues** such as regulatory compliance, ethical dilemmas, cybersecurity vulnerabilities, and human-centric challenges that can **significantly impede the successful implementation of AI systems**.

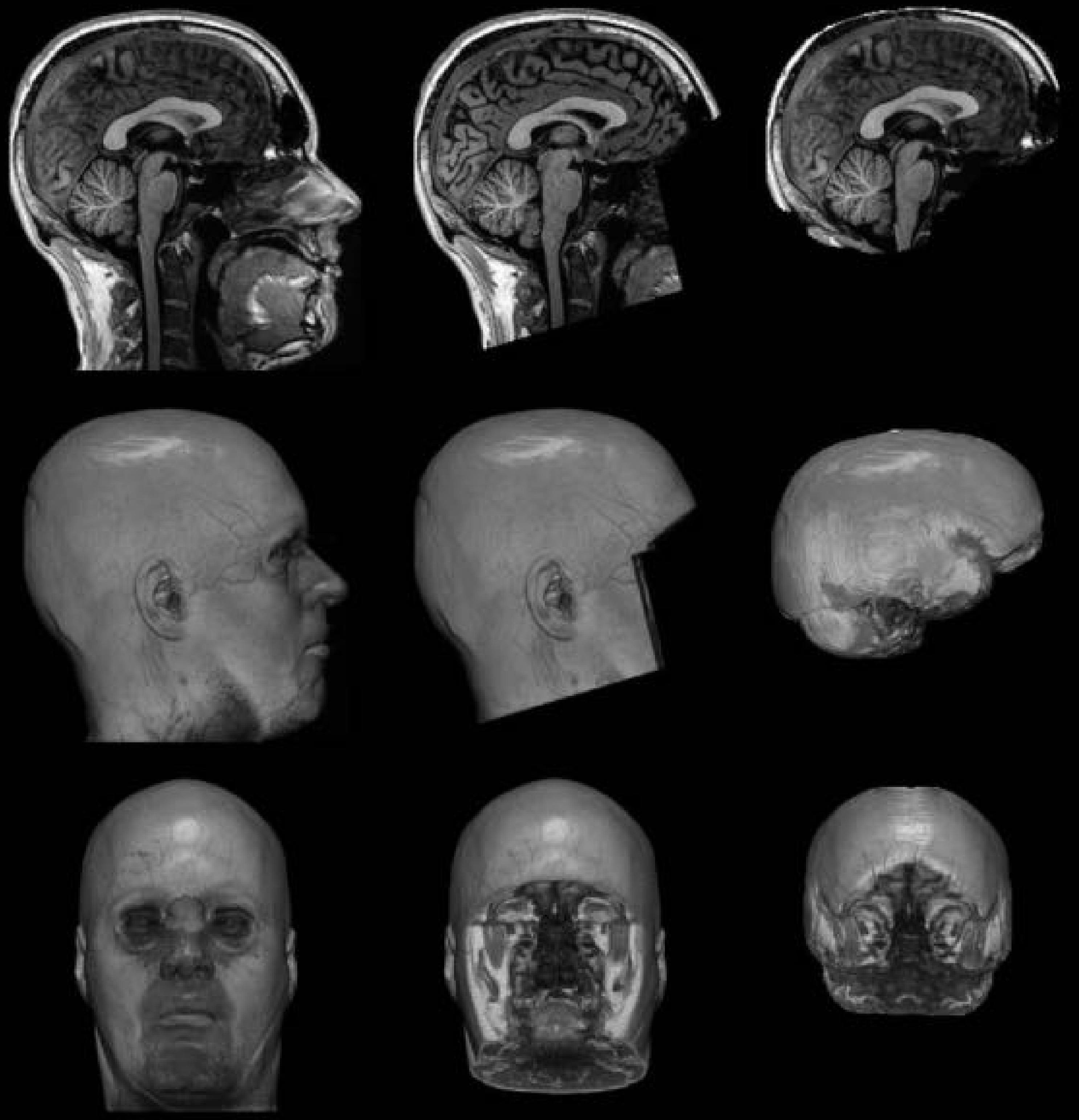
Regulations / Ethics	Cybersecurity	Human Aspect
Navigating complex and evolving regulatory frameworks and ethical considerations presents significant challenges in AI implementation.	Ensuring robust cybersecurity measures is critical, as **AI systems are increasingly targeted by sophisticated cyber threats**.	**Addressing the human factor**, including workforce adaptation and public perception, **is essential for successful AI integration and acceptance**.

Raw Data Defaced Brain Mask

Sagittal
(cut middle)

Rendering
(right side)

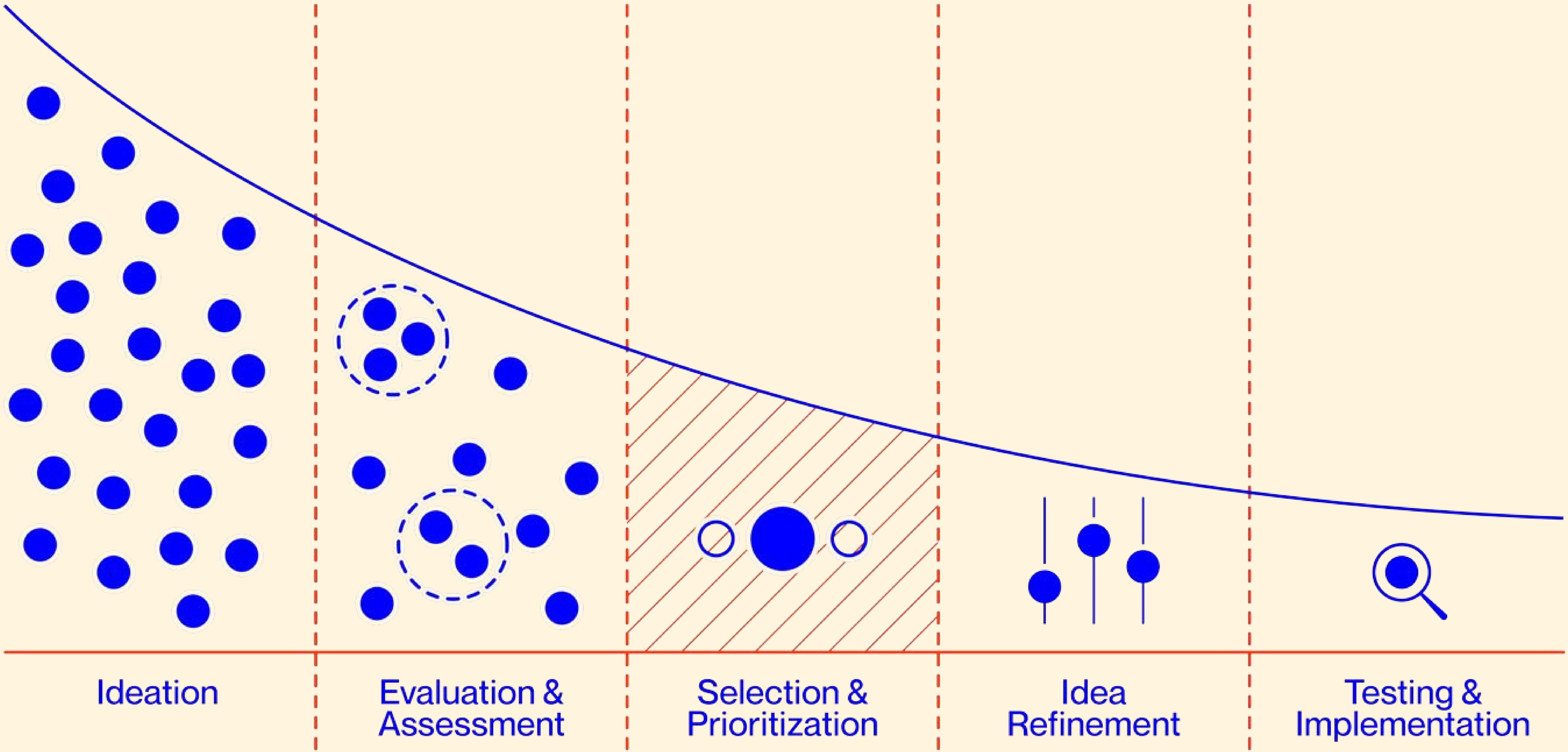
Rendering
(frontal)



The Ideation Process

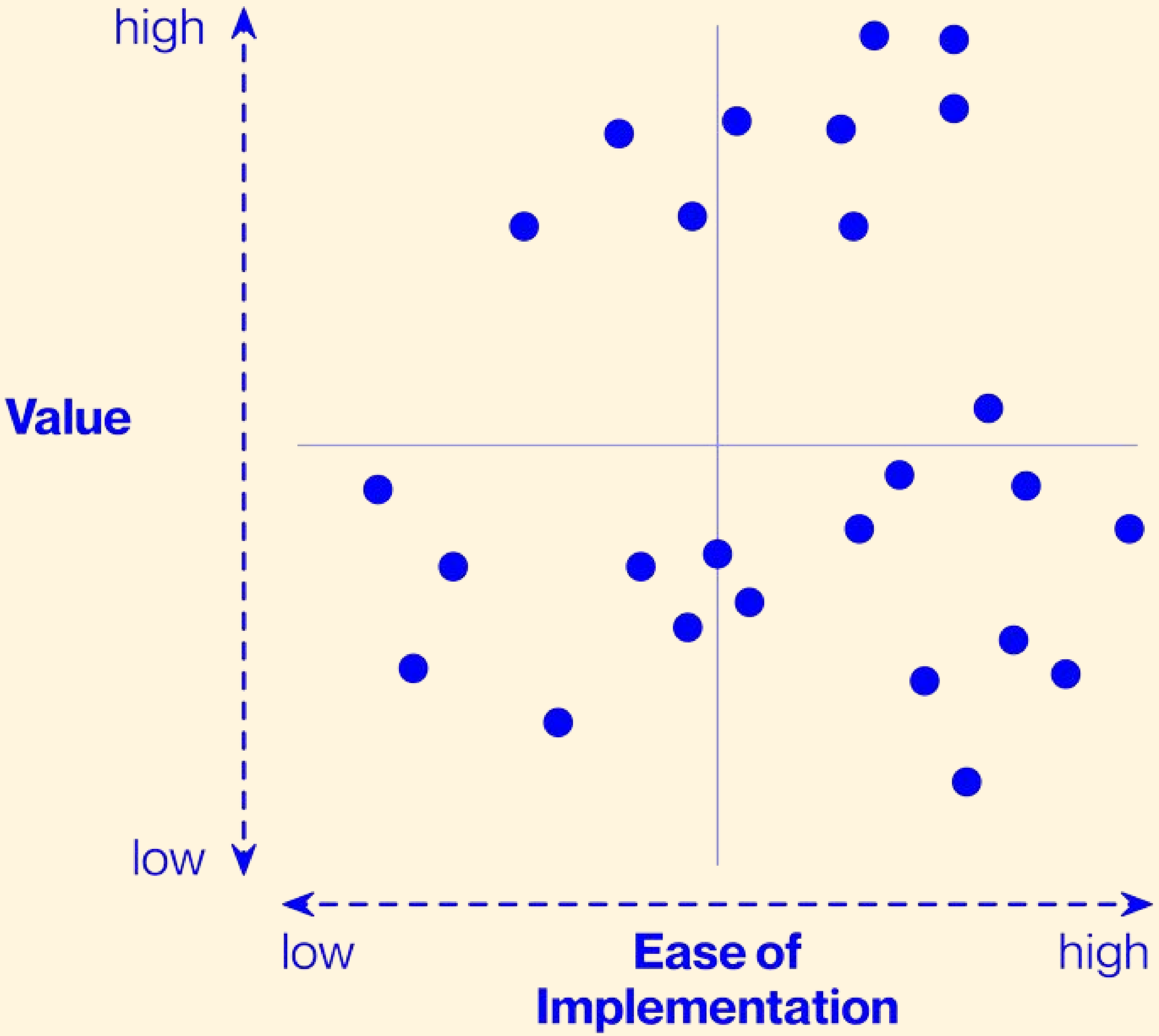
Use Case Evaluation

10:00



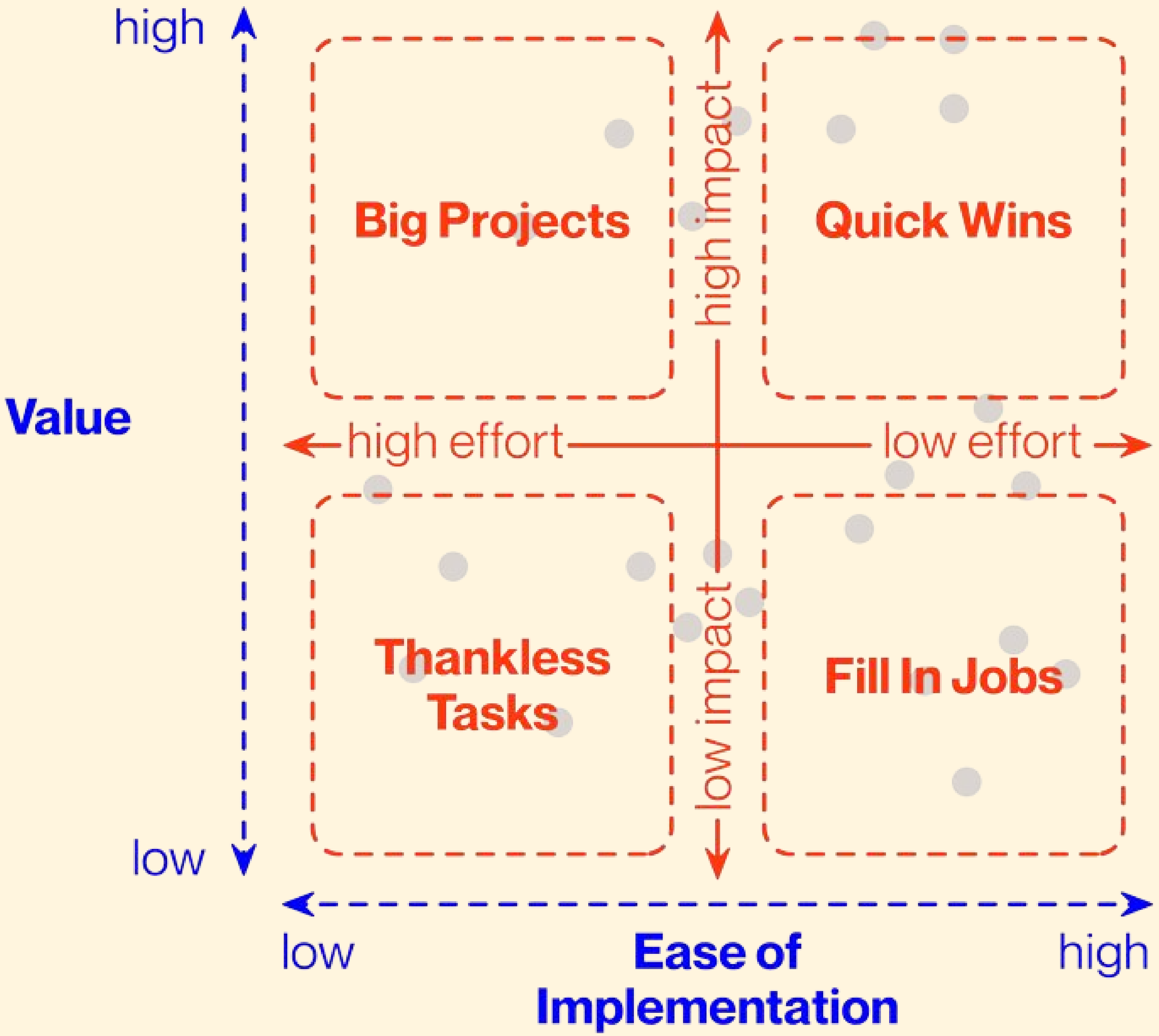
Ideation
Evaluation &
Assessment
Selection &
Prioritization
Idea
Refinement
Testing &
Implementation

Priotitization Matrix



A Tool to rank projects based on their **value and ease of implementation**.

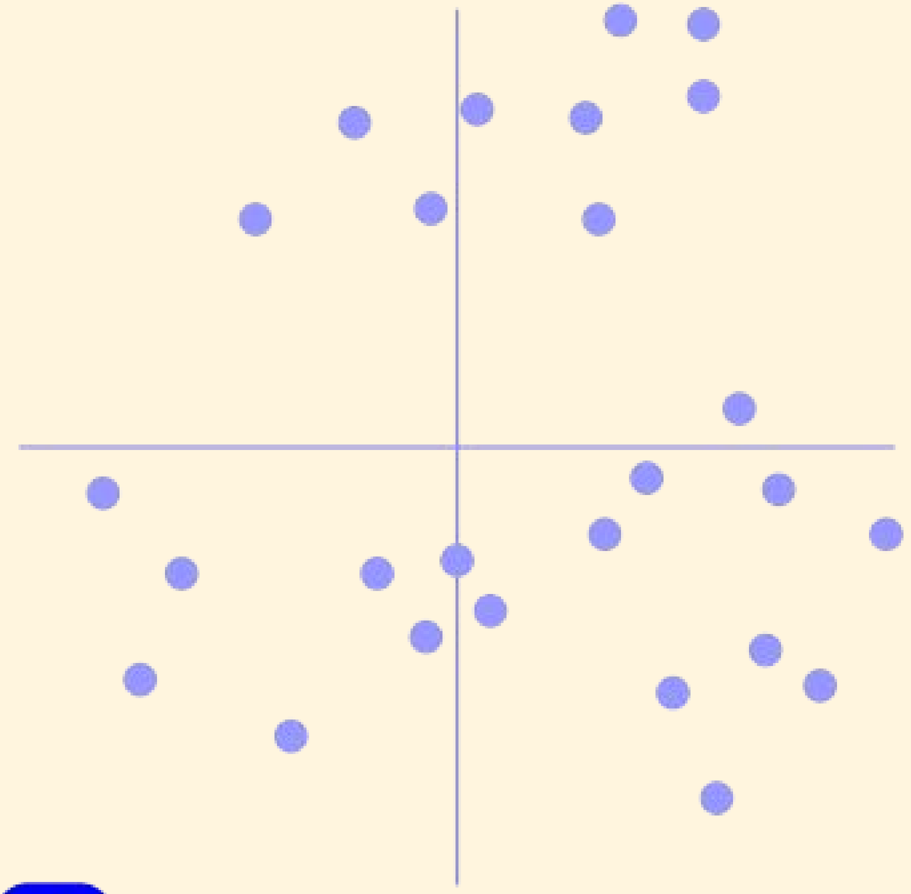
Priotitization Matrix



A Tool to rank projects based on their value (business & customer value, strategic alignment) **and ease of implementation** (data, algorithm, process/system, required expertise).

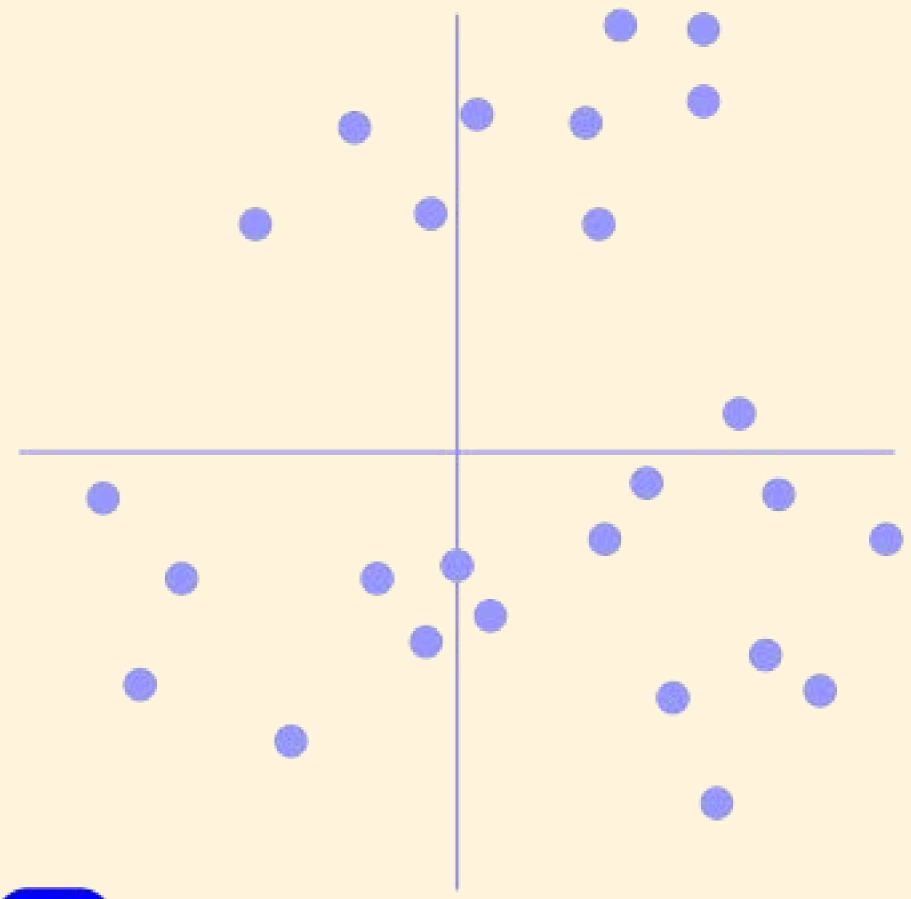
Note:
Ideally both business domain and AI expertise should be in the room for this excersice

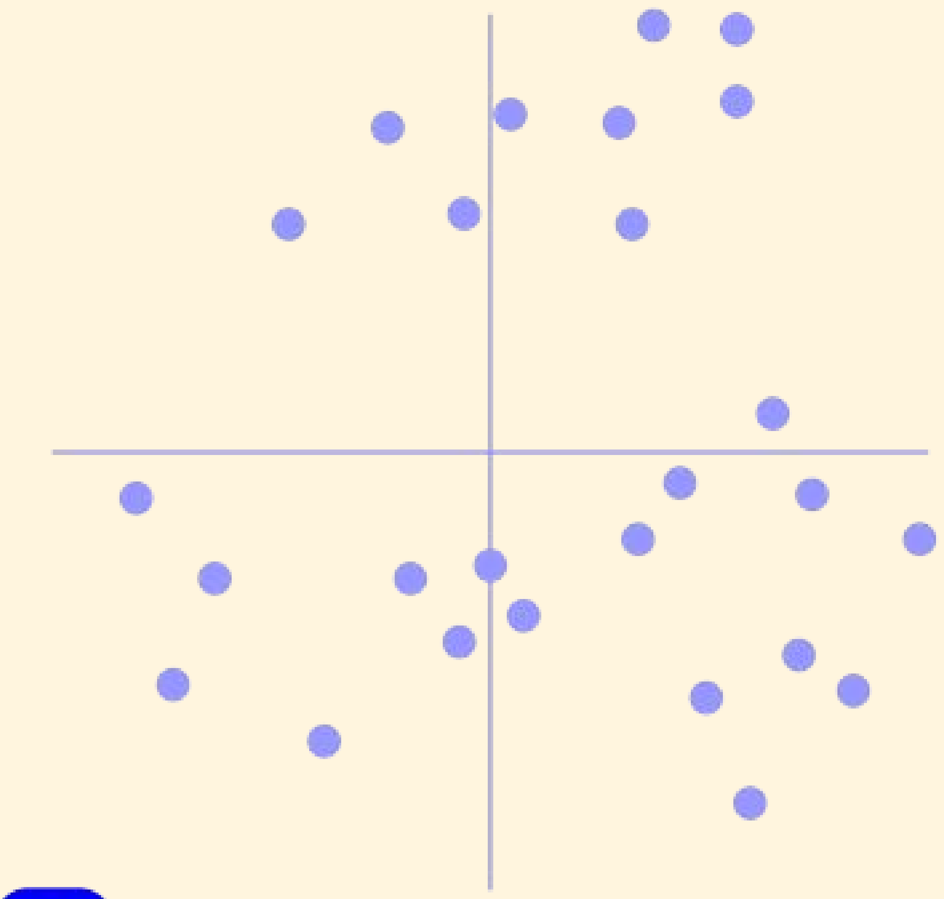
Clustering and Selecting UCs



1 Map UCs on the prioritization Matrix, **evaluating strategic value and ease of implementation**

Clustering and Selecting UCs





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2 **Cluster UCs by**

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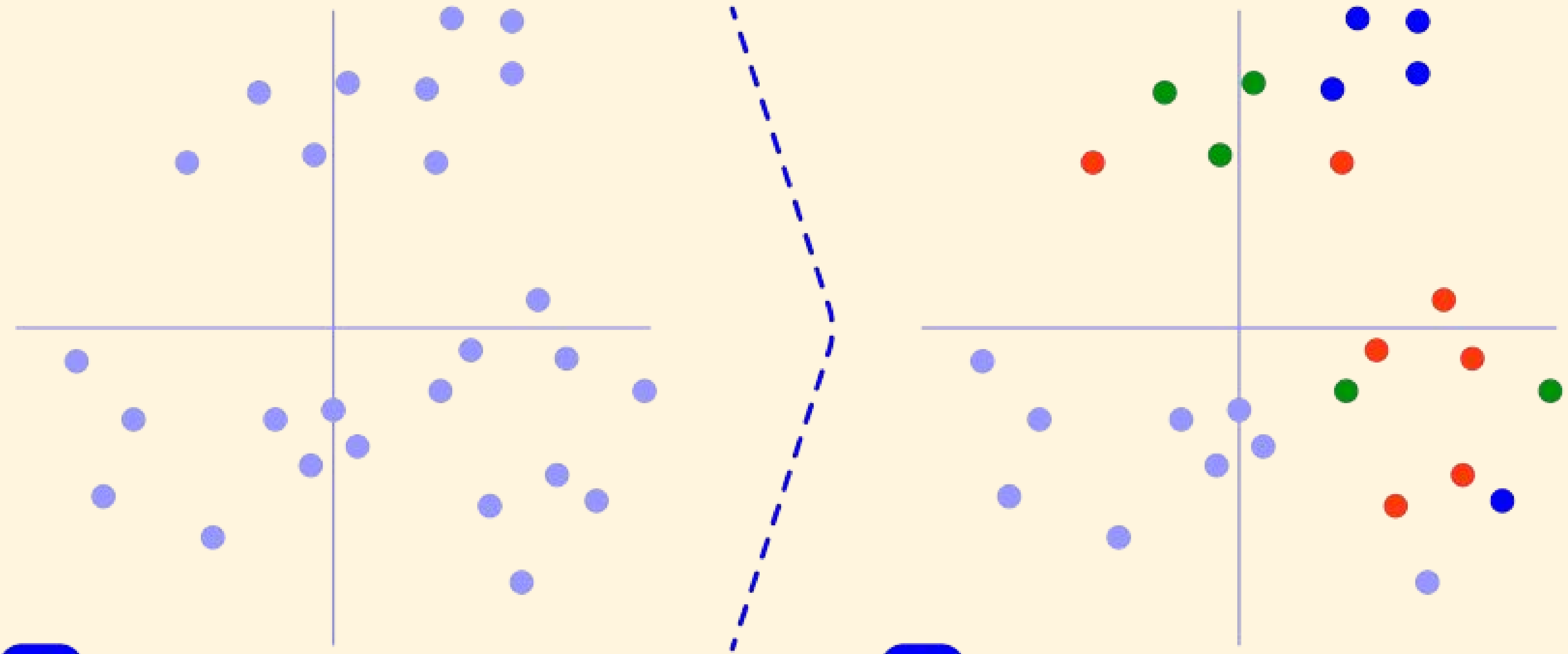
- AI capability
- Product / process

Clustering and Selecting UCs



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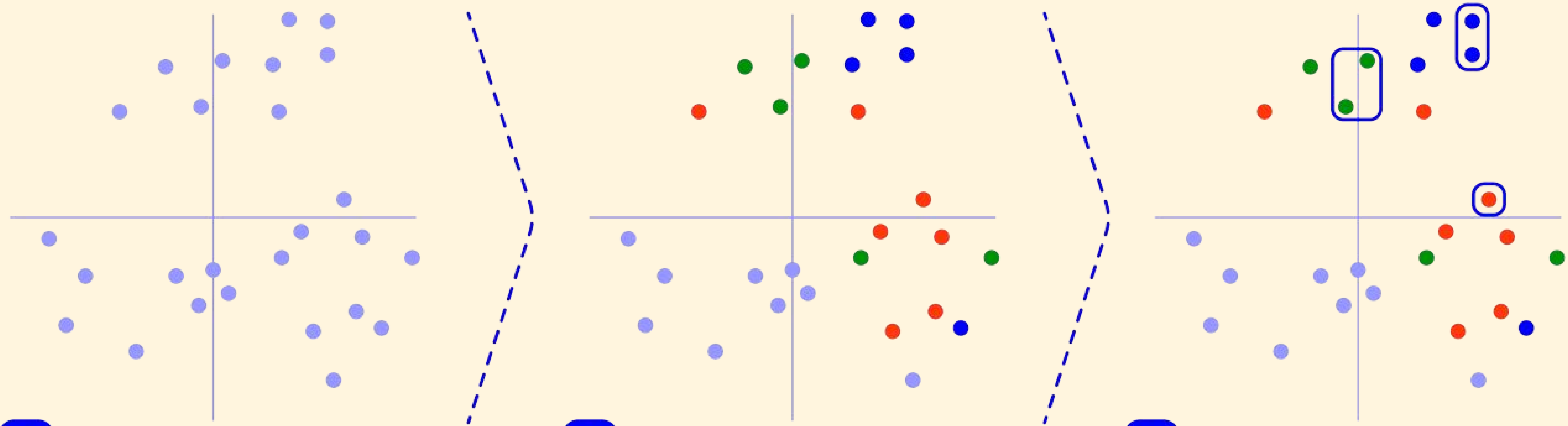
3 **Prioritize 2-3 clusters**

Clustering and Selecting UCs



1 Map UCs on the prioritization Matrix, **evaluating strategic value and ease of implementation**

2 **Cluster UCs by**

- Input data
- AI capability
- Product / process

3 **Prioritize 2-3 clusters**

4 **Within prioritized clusters, pick 1-2 UCs** (so 3-6 cases overall) for validation – good candidates can have different characteristics, e.g.

- quick wins
- High strategic relevance
- High marketing relevance

Use Case Prioritization

10:00

Presentation of Prioritization

Umsetzung einer KI Implementierung & Lebenszyklusmanagement

09:00 Uhr - 09:10 Uhr - **Icebreaker | Format: Interaktive Gruppenarbeit**

- Ein lockerer Start in einen Vormittag intensiver Zusammenarbeit.

09:10 Uhr - 09:25 Uhr - **KI Use Case Ideation | Format: Vortrag**

- Einführung in den Prozess der Ideation von KI-Anwendungen mit Schwerpunkt auf der Identifizierung potenzieller Anwendungen von KI.

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- Die Teilnehmer konkretisieren den KI-Anwendungsfall, den sie vorbereitet haben, und wenden dabei die im Vortrag behandelten Konzepte an.

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- Einführung "Wie KI-Anwendungsfälle anhand ihres wirtschaftlichen Wertbeitrags, der Machbarkeit und der zu erwarteten Ergebnisse priorisiert werden können.

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- Gruppen arbeiten an der Bewertung und Priorisierung ihrer Anwendungsfälle unter Verwendung des Priorisierungs-Canvas.

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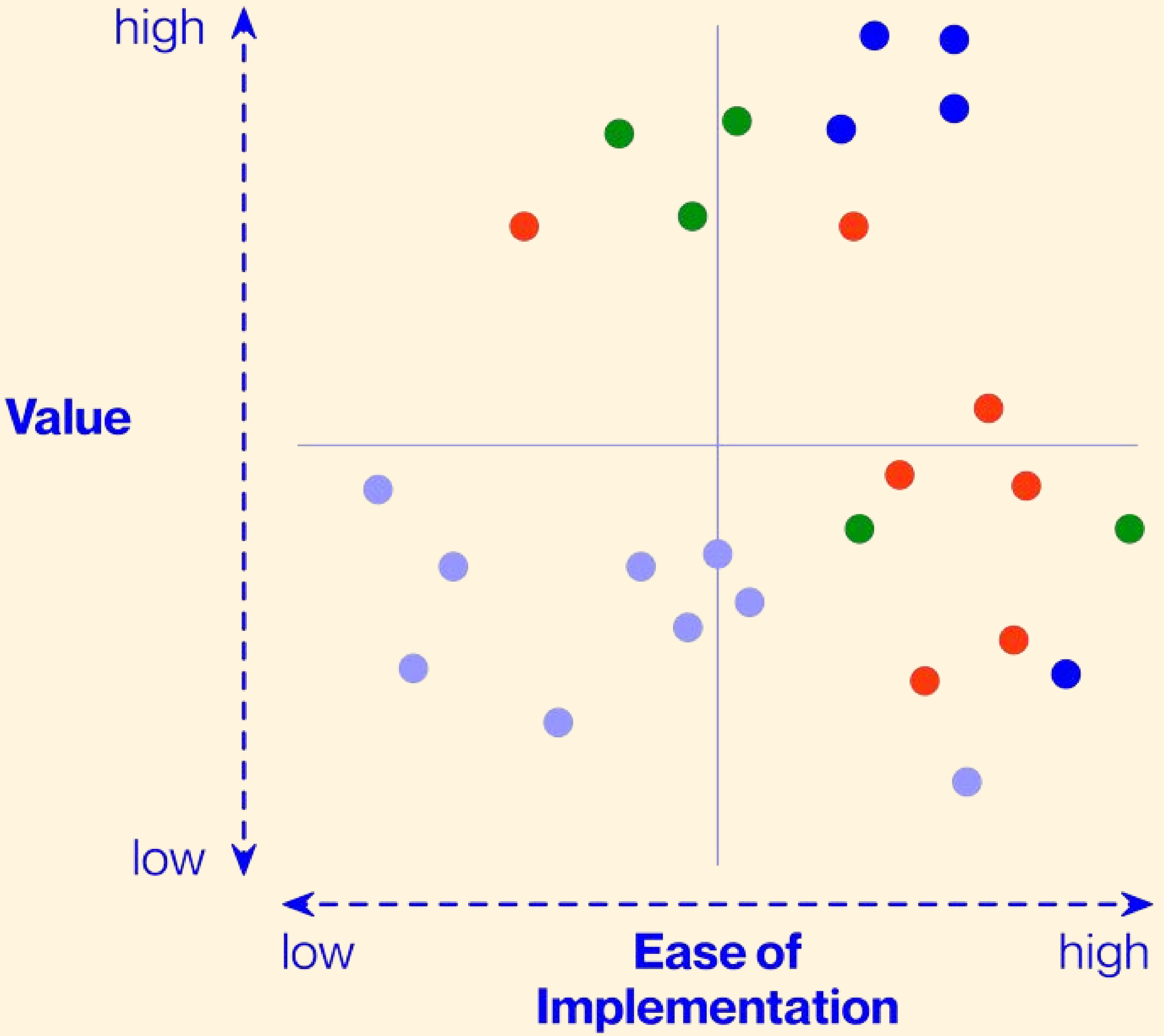
- Jede Gruppe präsentiert kurz ihren priorisierten KI-Anwendungsfall, unterstützt durch Peer-Feedback.

10:30 Uhr - 10:40 Uhr - **Q&A Session | Format: Vortrag mit Q&A**

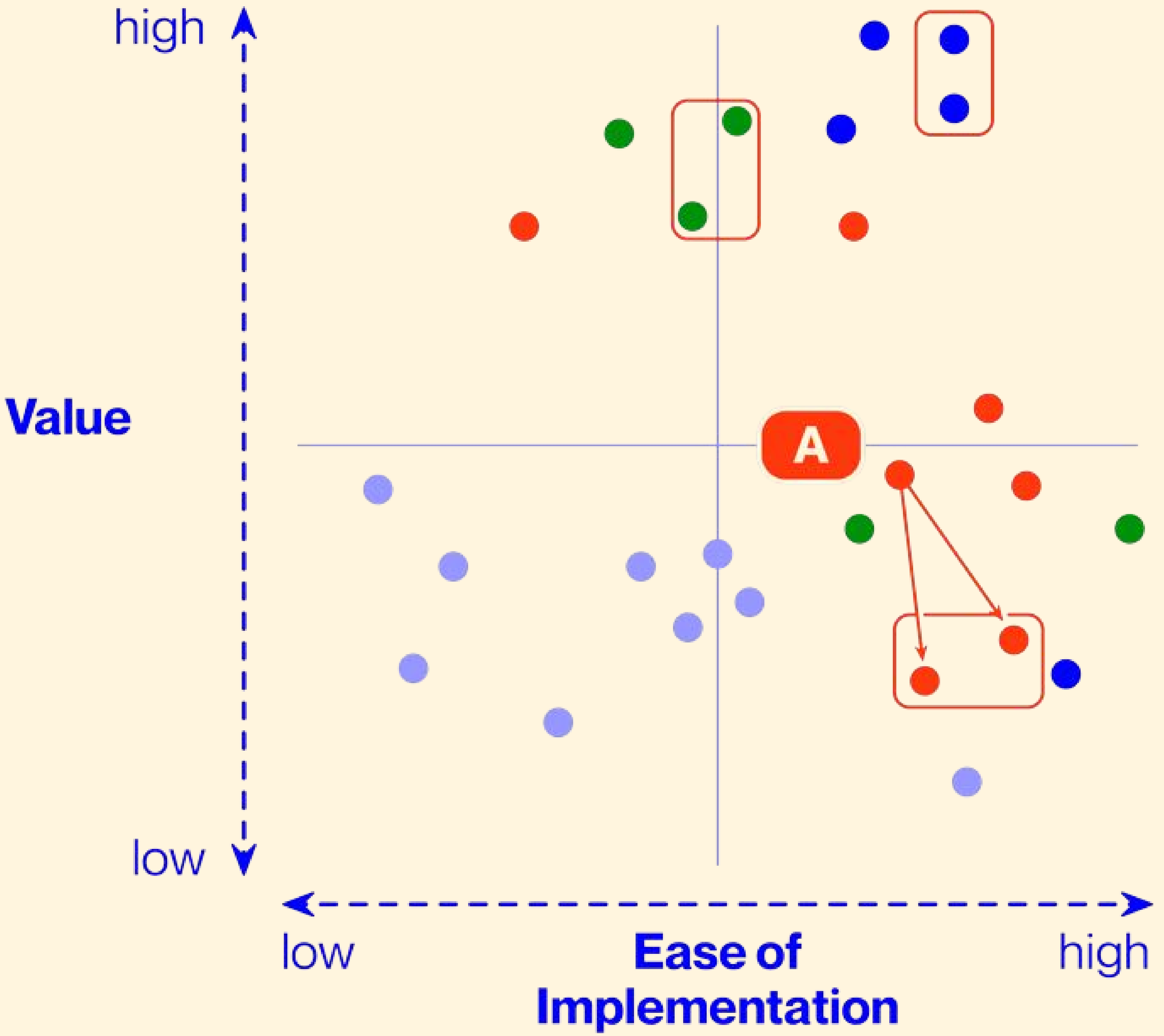
- Beantwortung von Fragen und Diskussion mit zusätzlichen Einblicke in den Prozess der Use Case Evaluation.

Priotitization Matrix



AI Use Cases can be clustered by
data source, AI capability, domain etc.

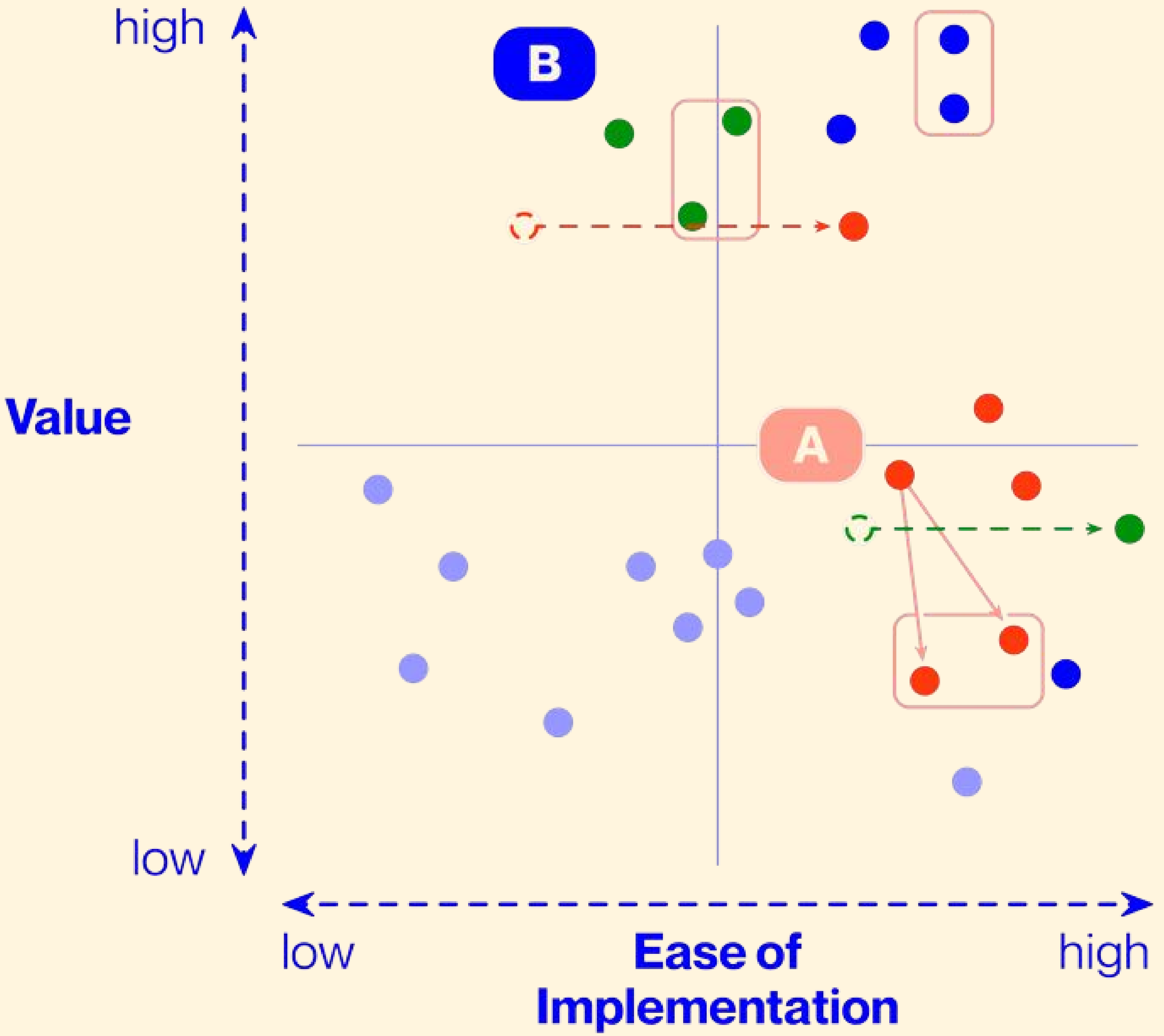
Priotitization Matrix



A Do not discard complex UCs immediatly

- High Value UCs might be **significantly complex**
- Try to **decompose them into intermediate "viable products"** and develop a **roadmap** how to pursue implementation step by step

Priotitization Matrix



A Do not discard complex UCs immediatly

- High Value UCs might be **significantly complex**
- Try to **decompose them into intermediate "viable products"** and develop a **roadmap** how to pursue implementation step by step

B Be aware of technological interdependencies

- Executing one UC can have **positive implementation benefits for other UCs** due to re-use of same data set, etc.
- This can **change the dynamic** in the prioritization/selection and clustering those can **speed up collective implementation**

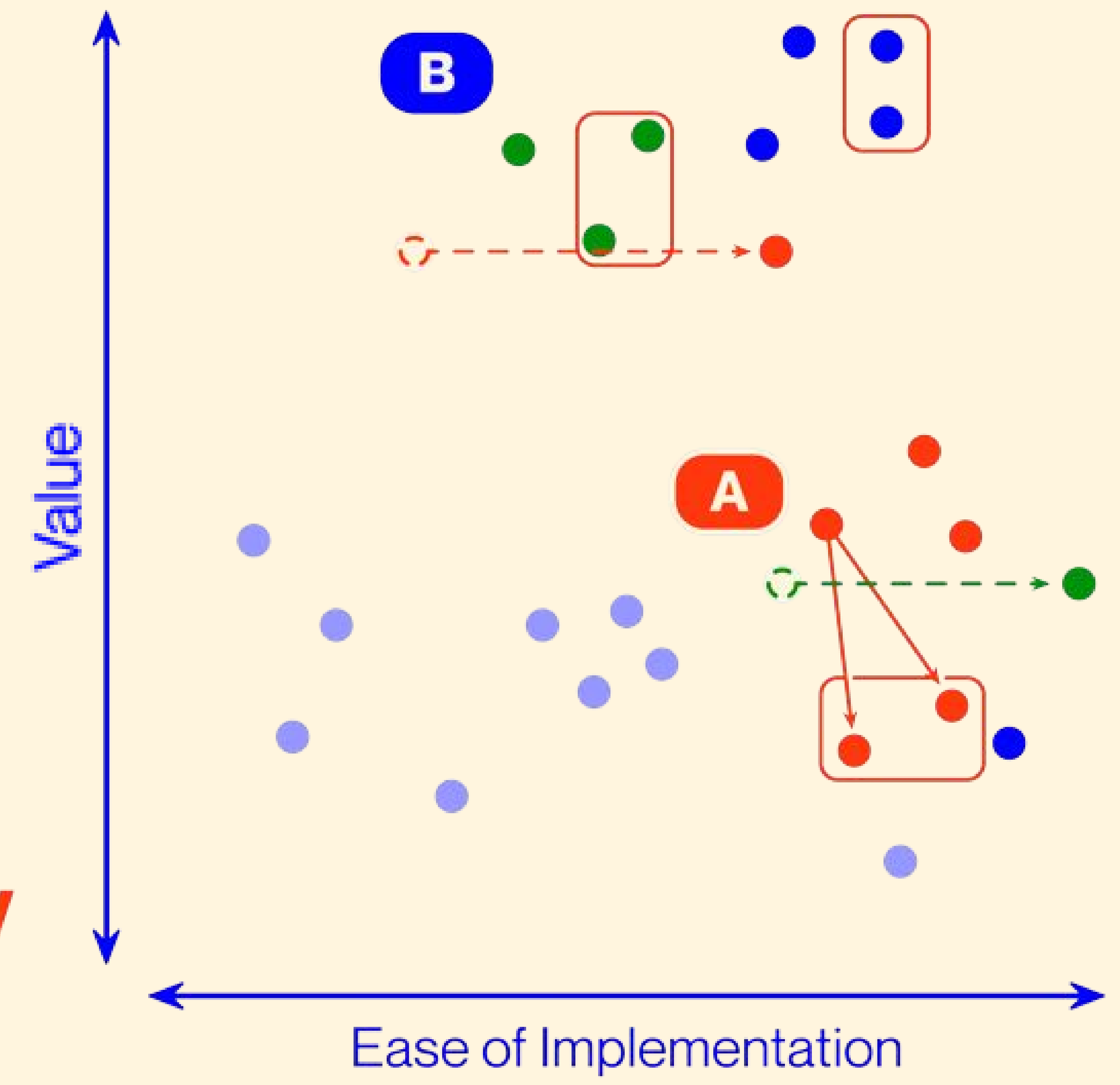
An Iterative Process

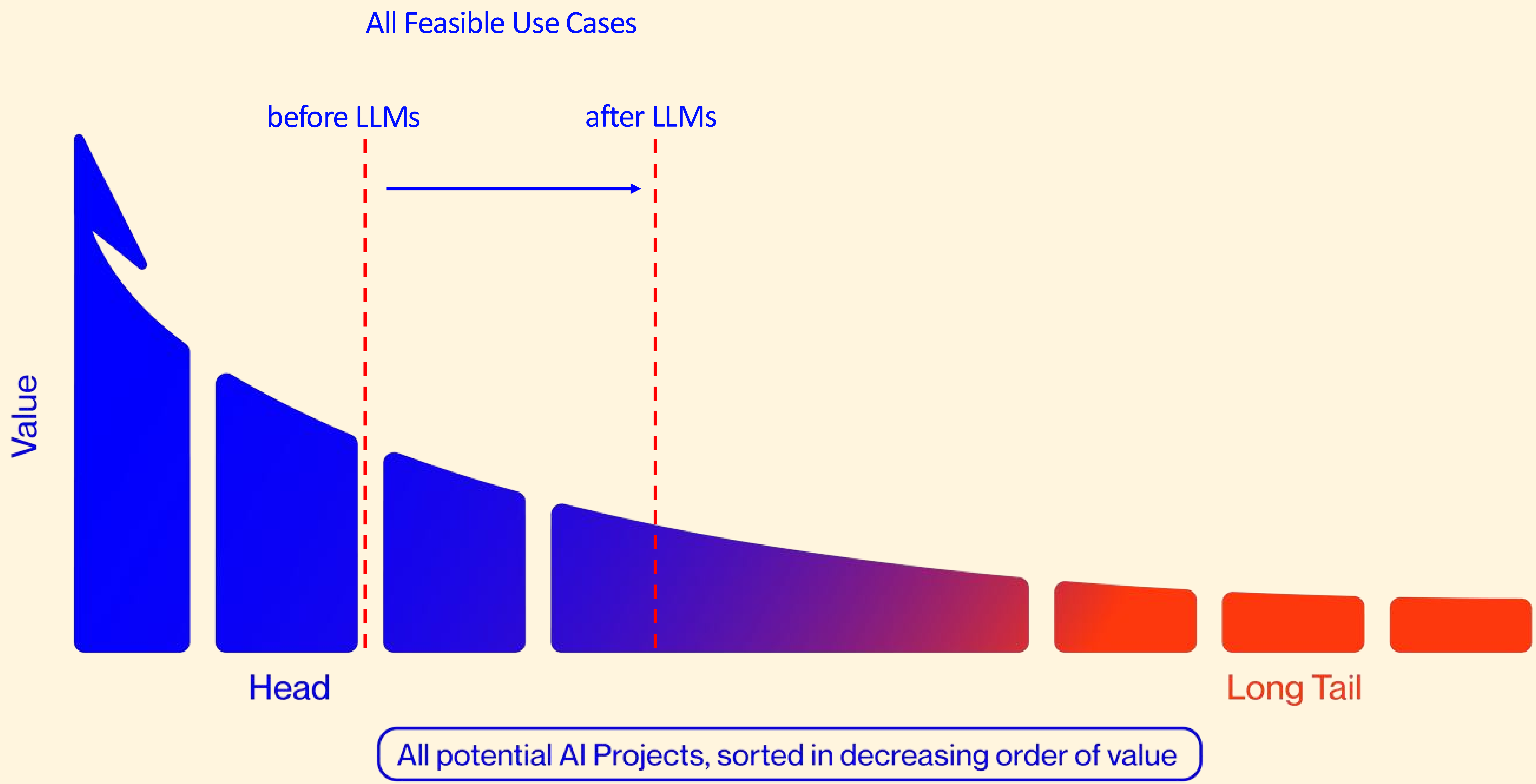
Assessment of UC Ideas

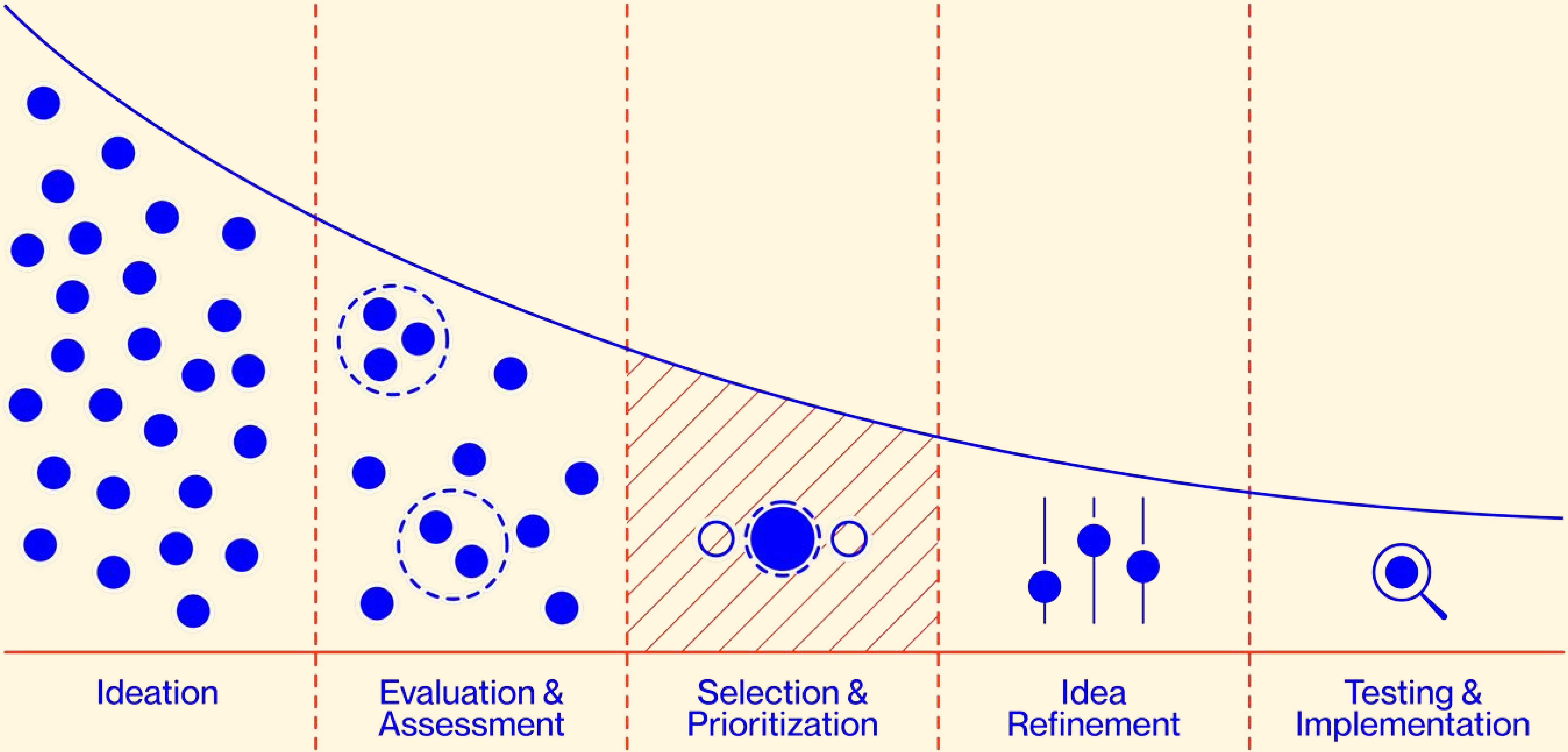
Dimension	Specification
Value	**Economic Value**
	Strategic Alignment
Ease of Implementation	**Data**
	Algorithm
	Process / Systems
	Required Know-How

Iterate as necessary

Prioritization of UC Ideas




All Feasible Use Cases
before LLMs
after LLMs
Value
Head
Long Tail
All potential AI Projects, sorted in decreasing order of value



Ideation
Evaluation & Assessment
Selection & Prioritization
Idea Refinement
Testing & Implementation

The Ideation Process

Idea Refinement & Testing

Return on AI

Return on AI (ROAI) $=$ $\dfrac{\textbf{Return}}{\textbf{Investments}}$

Return:

Internal and external value generation

−

Uncertainty of benefits

Investments:

Resources for model development, operation and maintainance

×

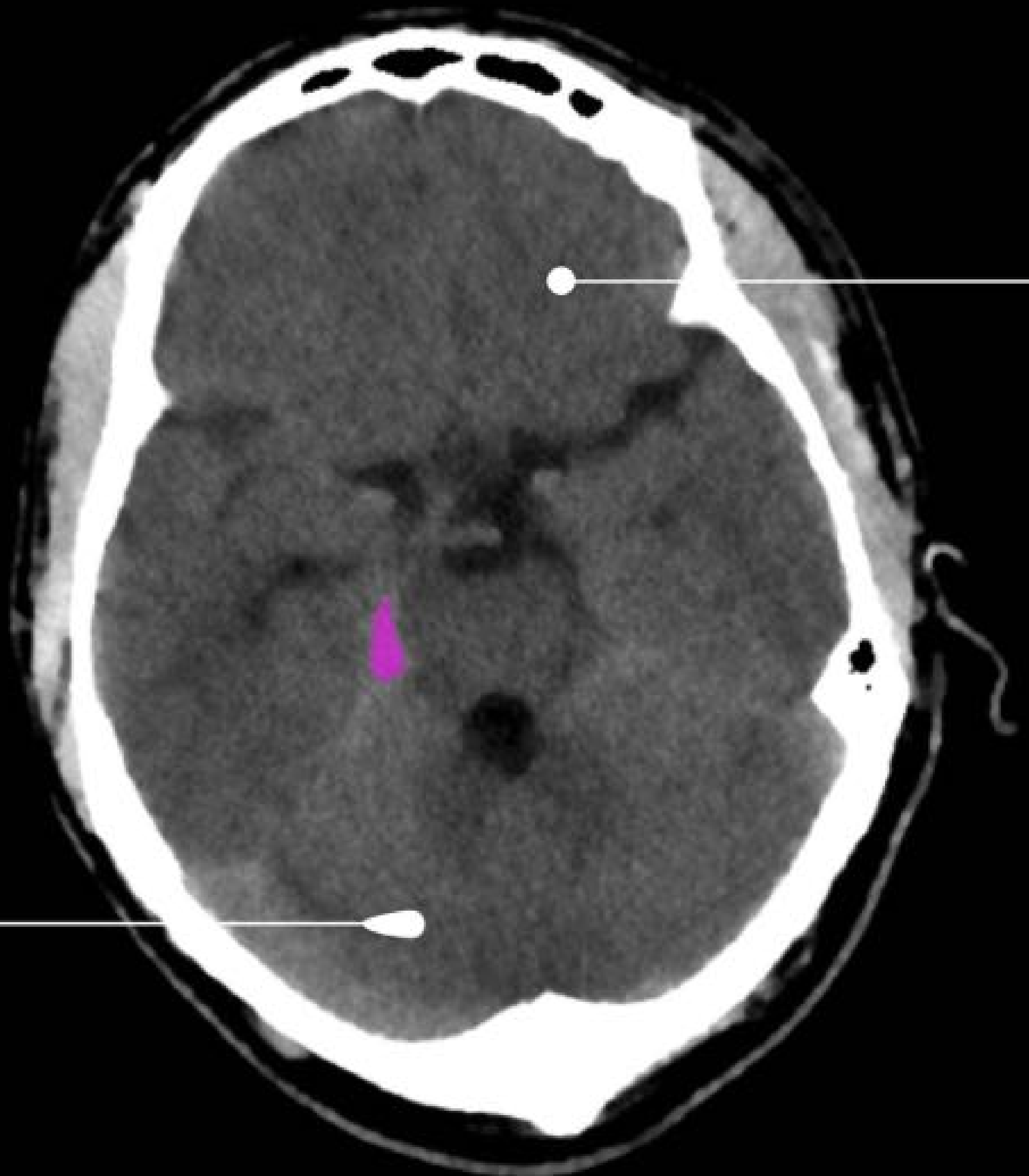
Cost per resource

Saving Time with AI

Original time taken: 30 min

Time taken with AI Assistance: 15 min

Time saved per scan: 15 min



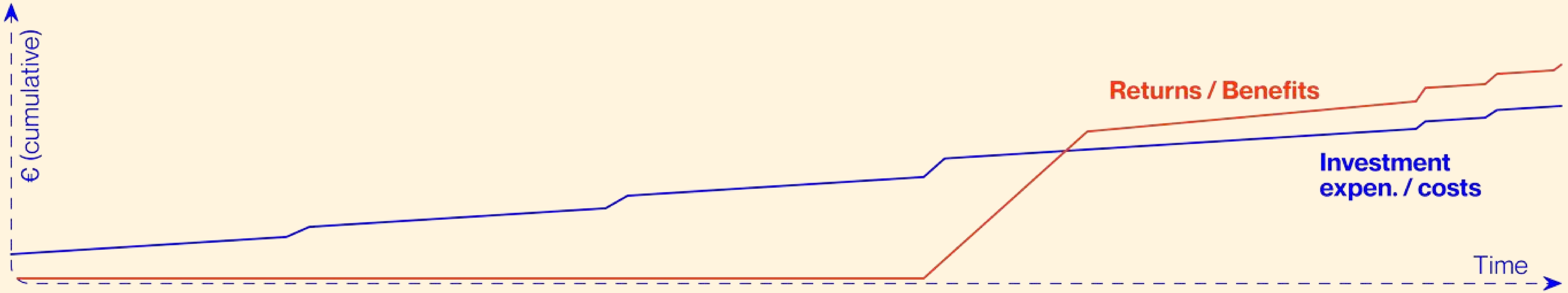
Cost of error

×

Percentage of errors reduced

= **saving**

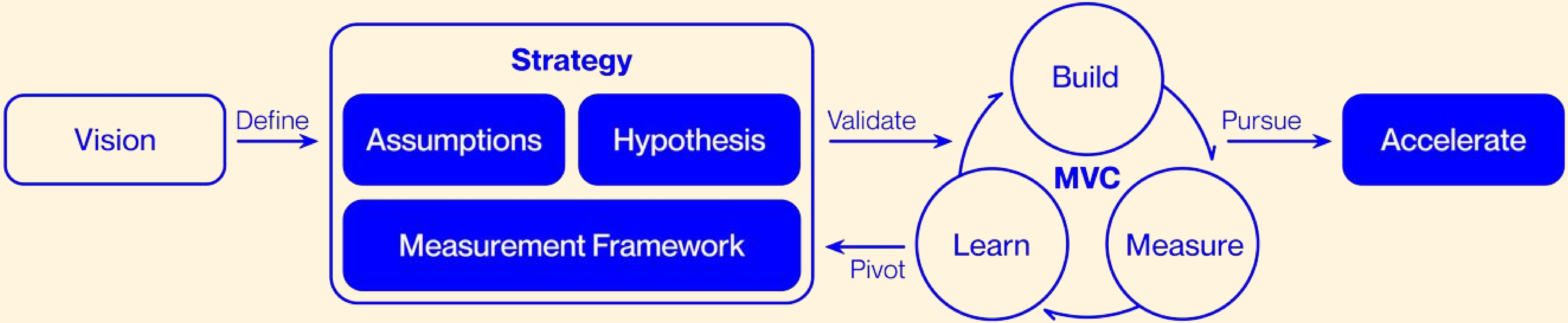
Ideation & Scoping	Exploration	Development, validation and testing	Deployment	Operation, monitoring, maintenence, scaling
Ideated, prioritized use case	**Go/no-g decision for further development**	**Technically & commercially validated, deployment-ready model**	**Integrated, productive application/service**	**Operational self-learning, maintenance and scaling**
Structured use case ideation; initial (qualitative) value assessment aease of implementation evaluation; connection of model perf. metrics to business KPIs	Data acquisition; exploratory data analysis and insight generation; initial modeling and testing; (re-)eveluation of value and technical feasibility hypotheses	Data analysis and preparation; feature engineering; model training, validation and testing; (automated) model selection; model versioning (exp. tracking)	Review for deploy; testing (QA / staging); inference pipeline design; model serving (deployment to appropriate runtime engine)	Model monitoring mainten. (incl [automated] retraining); reporting; infrastructure mgmt.; further roll-out/scaling across processes, regions, sites, etc.

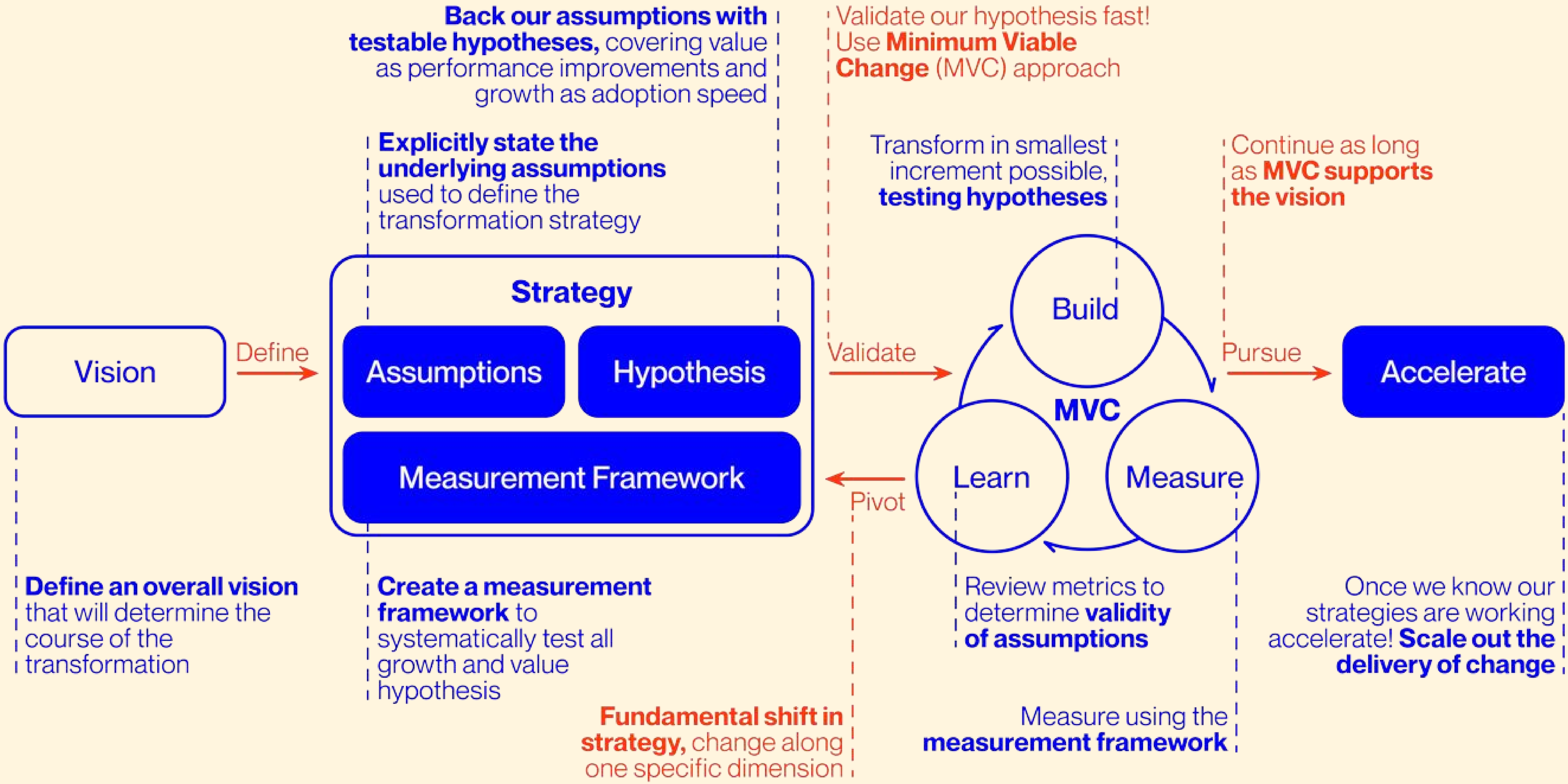


AI Value Assessment

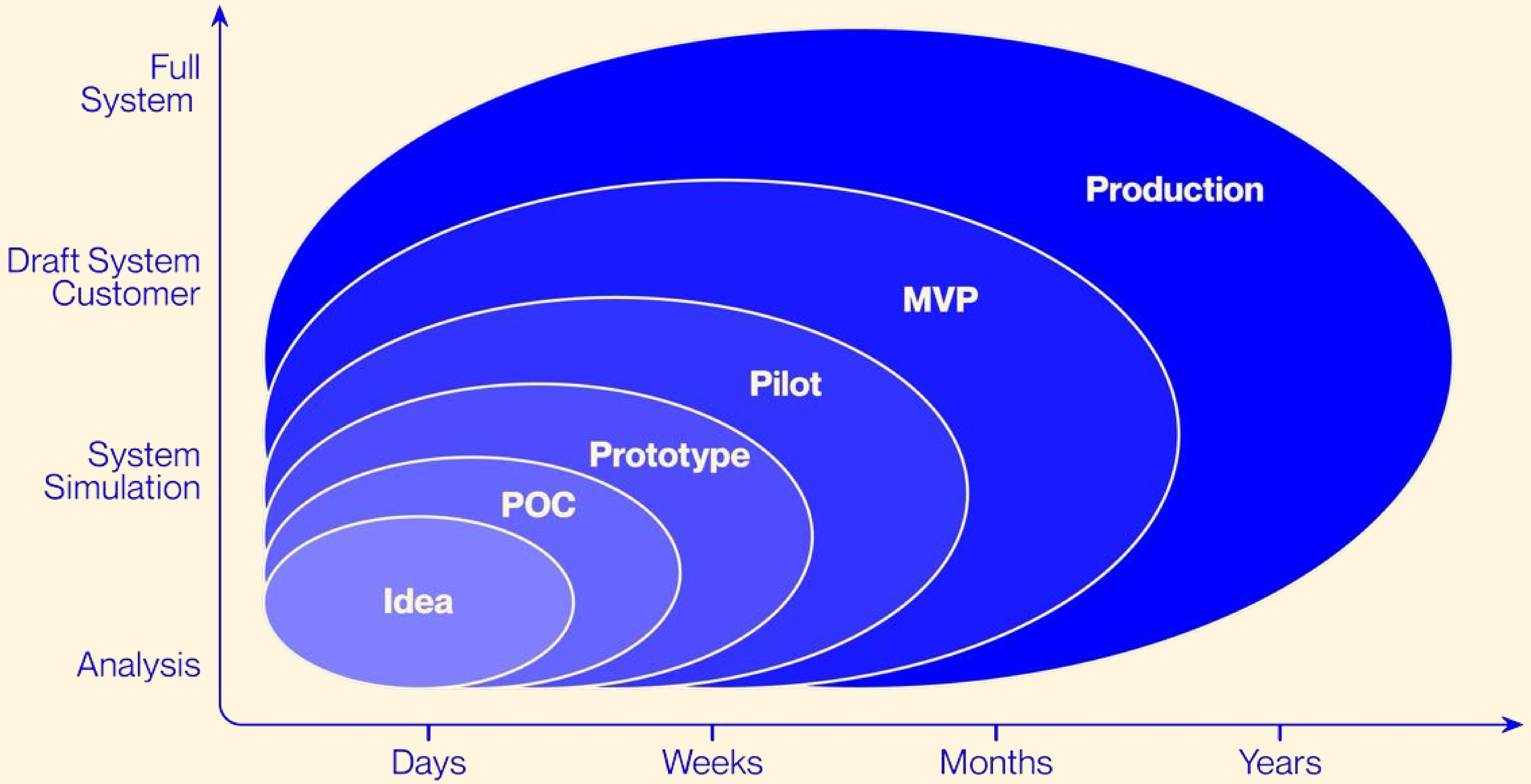
1. Discern the primary **source of value**
2. Form a **Value Hypothesis**
3. Testing and refinement **of value hypotheses**

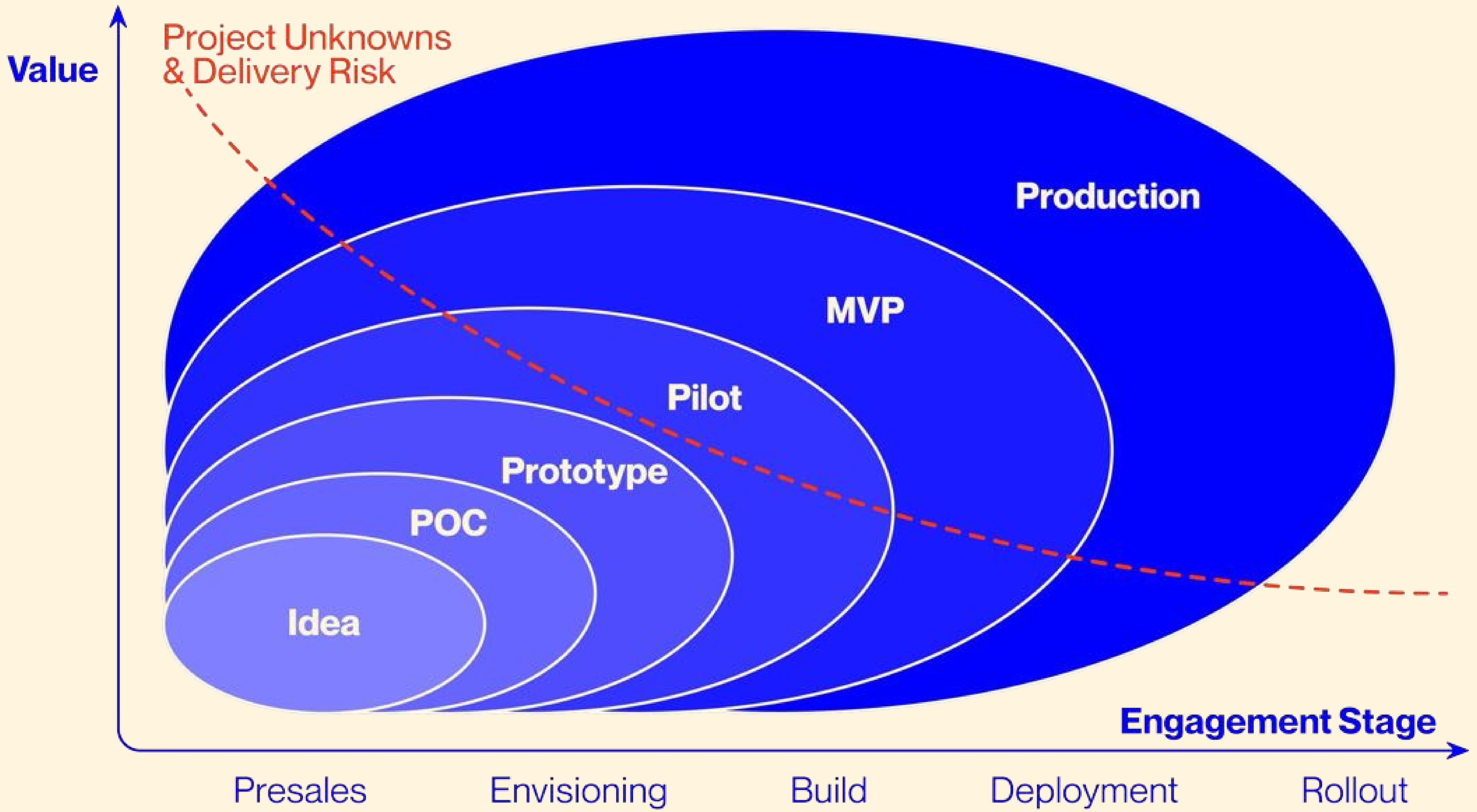
Essential for formulating
a product pricing strategy


Vision
Define
Strategy
Assumptions
Hypothesis
Measurement Framework
Validate
Pivot
Build
MVC
Learn
Measure
Pursue
Accelerate

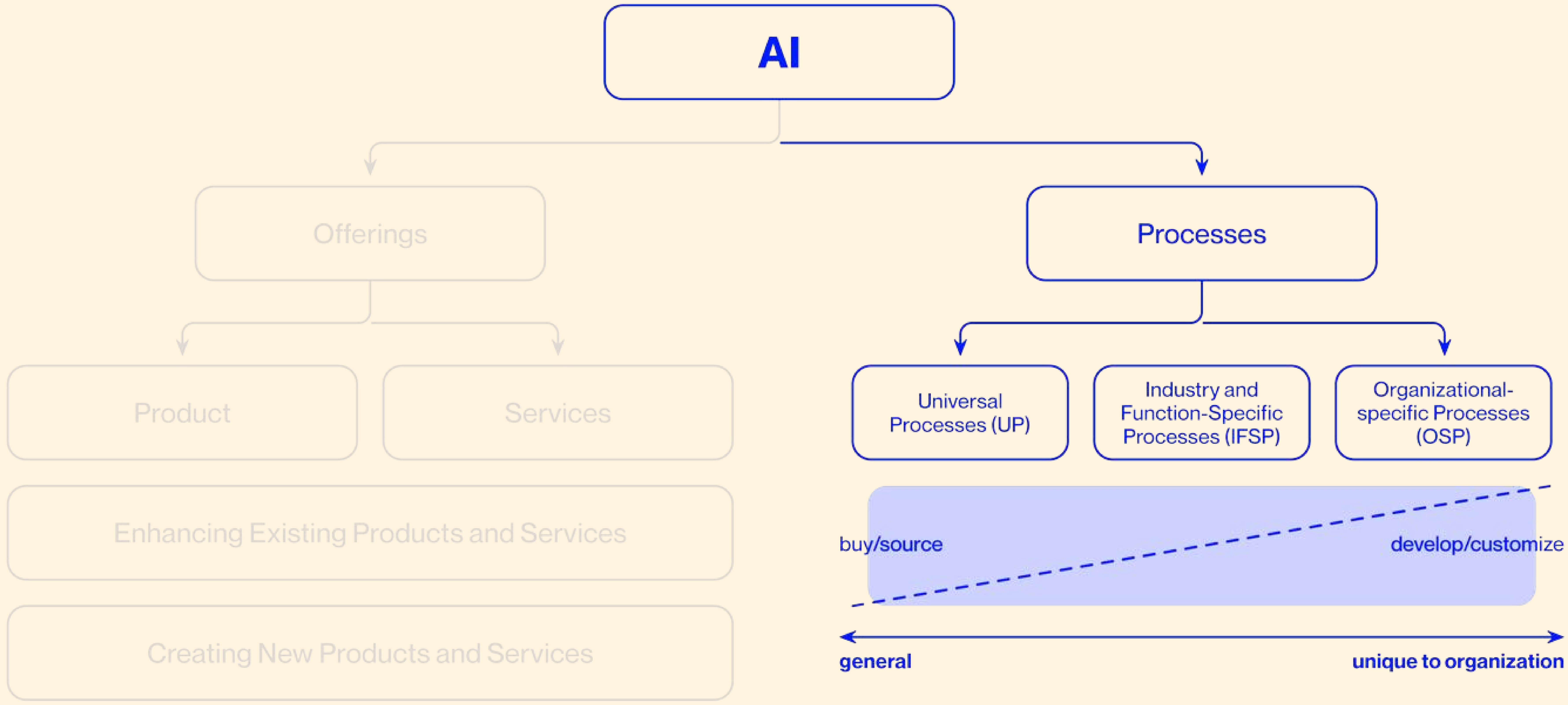

Back our assumptions with testable hypotheses, covering value as performance improvements and growth as adoption speed
Validate our hypothesis fast! Use Minimum Viable Change (MVC) approach
Explicitly state the underlying assumptions used to define the transformation strategy
Transform in smallest increment possible, testing hypotheses
Continue as long as MVC supports the vision
Strategy
Build
Vision
Define
Assumptions
Hypothesis
Validate
Pursue
Accelerate
MVC
Measurement Framework
Learn
Measure
Pivot
Define an overall vision that will determine the course of the transformation
Create a measurement framework to systematically test all growth and value hypothesis
Review metrics to determine validity of assumptions
Once we know our strategies are working accelerate! Scale out the delivery of change
Fundamental shift in strategy, change along one specific dimension
Measure using the measurement framework

Development Process

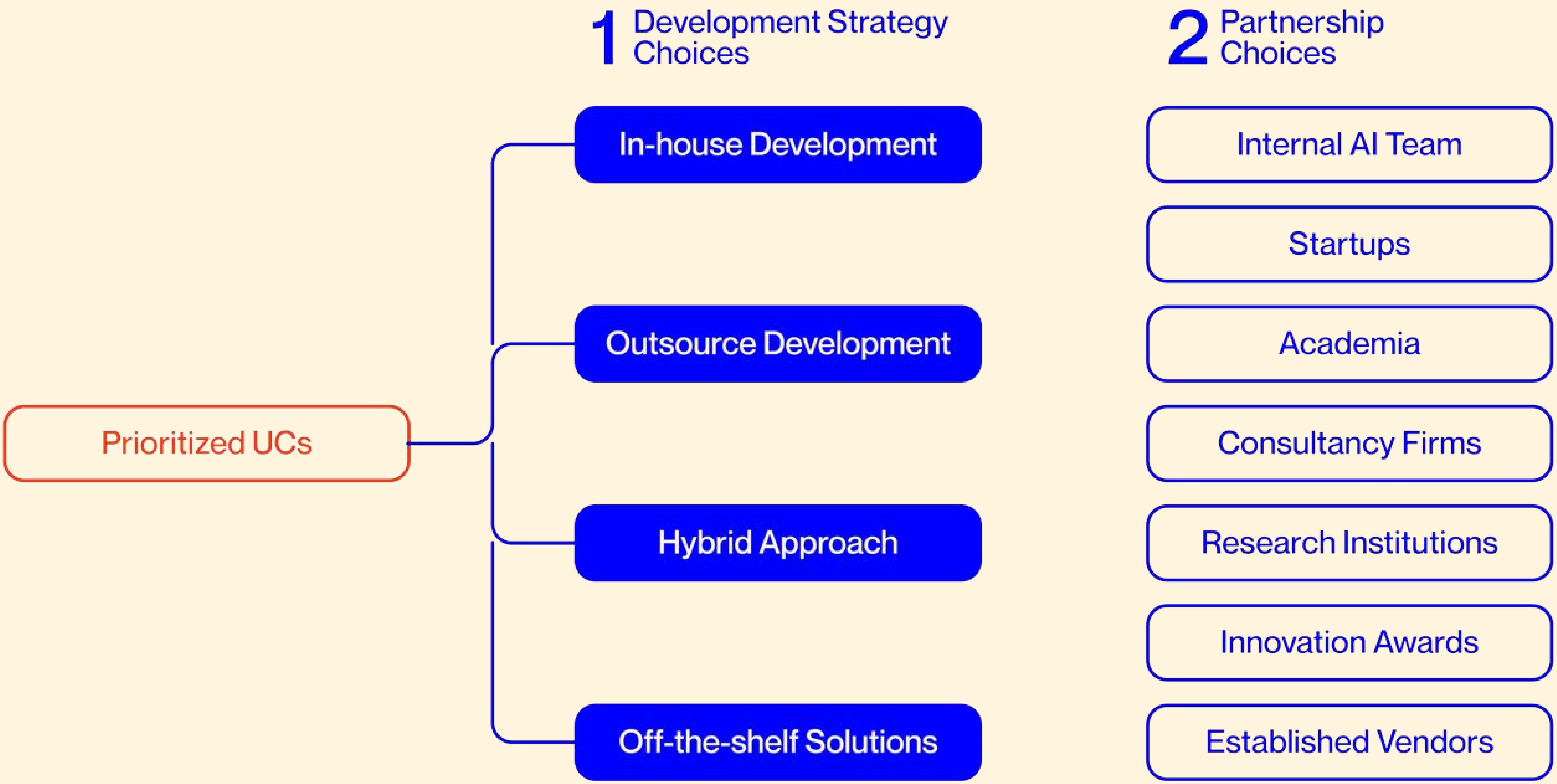

Full
System
Draft System
Customer
System
Simulation
Analysis
Production
MVP
Pilot
Prototype
POC
Idea
Days
Weeks
Months
Years


Value
Project Unknowns
& Delivery Risk
Production
MVP
Pilot
Prototype
POC
Idea
Engagement Stage
Presales
Envisioning
Build
Deployment
Rollout

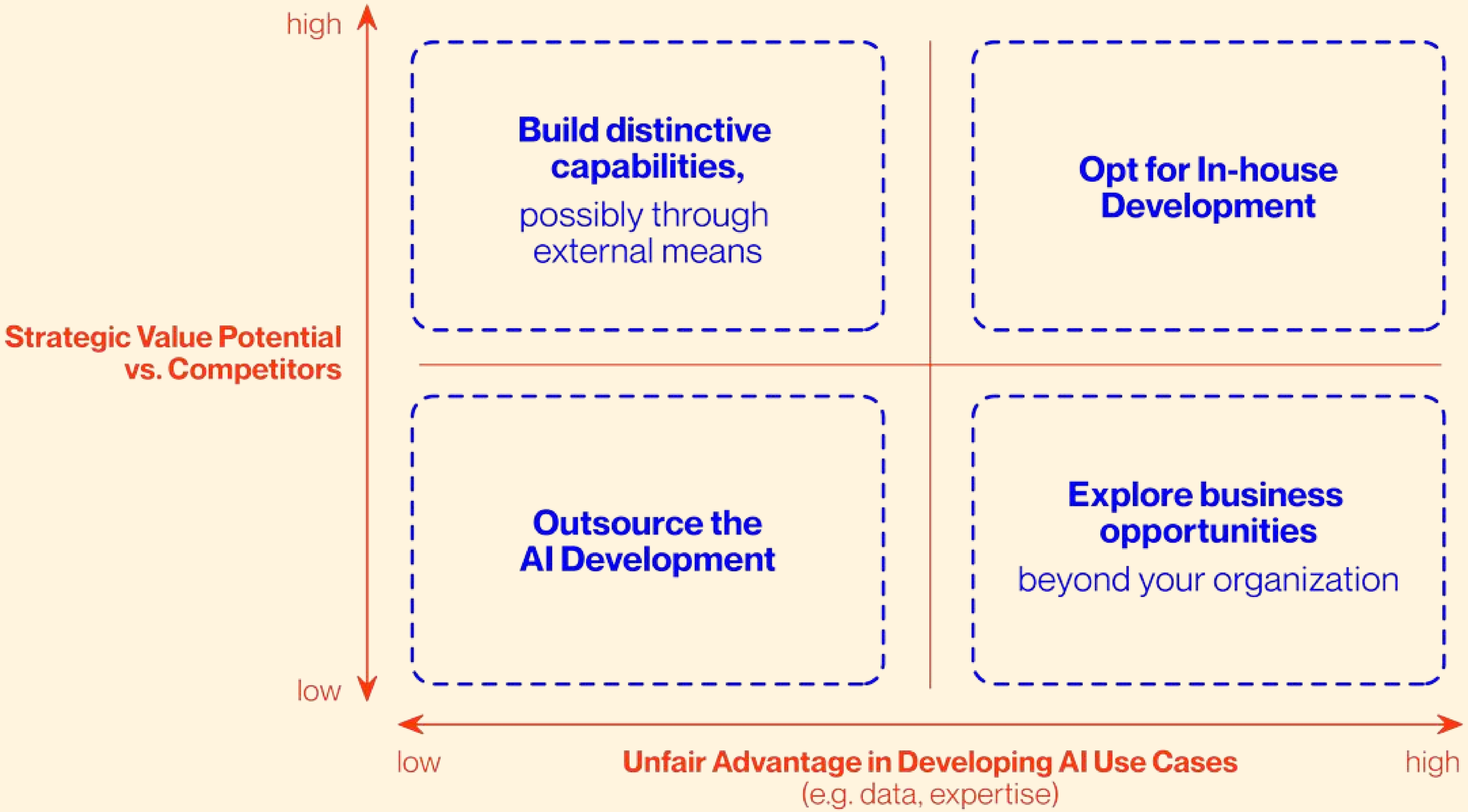
Make or Buy


AI
Offerings
Processes
Product
Services
Universal Processes (UP)
Industry and Function-Specific Processes (IFSP)
Organizational-specific Processes (OSP)
Enhancing Existing Products and Services
Creating New Products and Services
buy/source
develop/customize
general
unique to organization

Development Choices



Make or Buy Decision



Umsetzung einer KI Implementierung & Lebenszyklusmanagement

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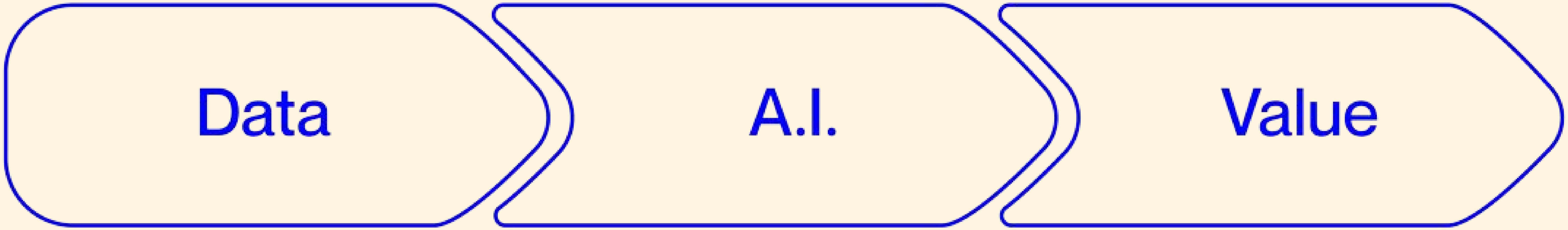
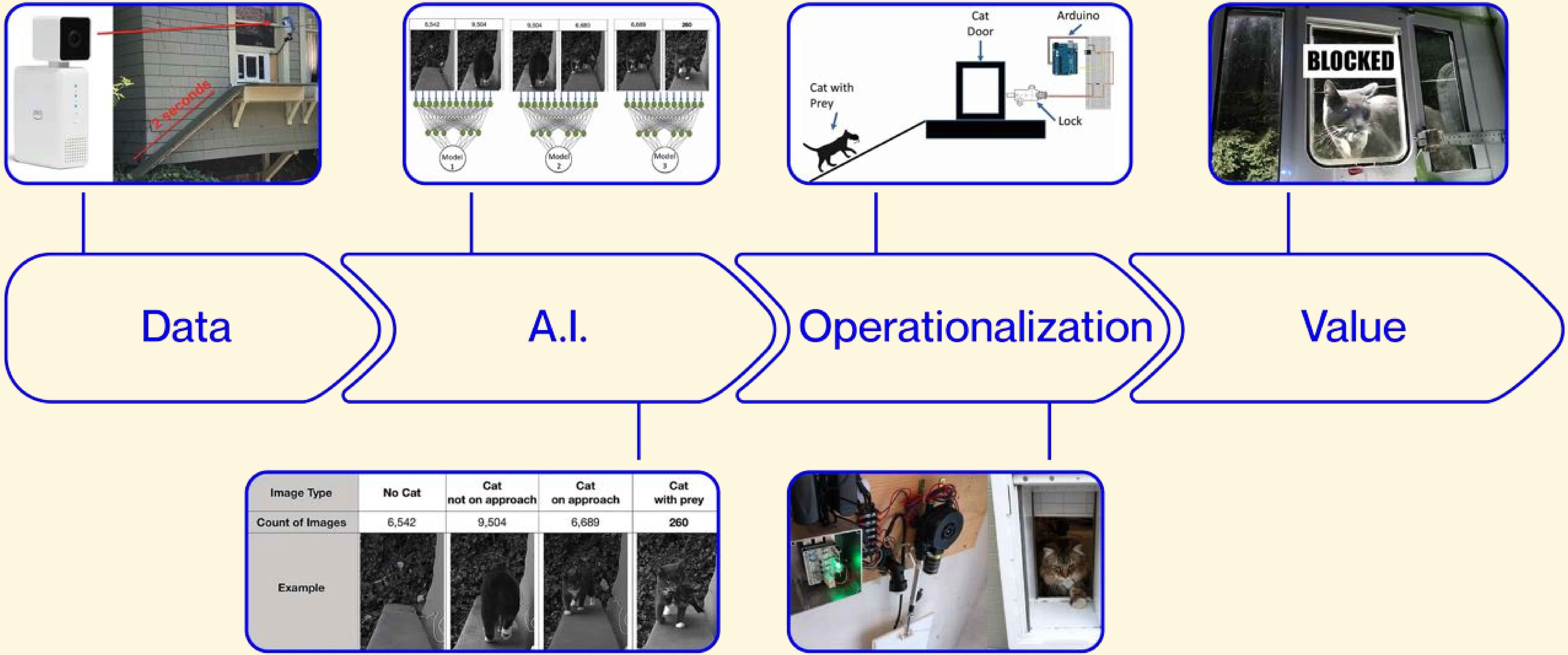
- Beantwortung von Fragen und Diskussion mit zusätzlichen Einblicke in den Prozess der Use Case Evaluation.

ML Lifecycle Management

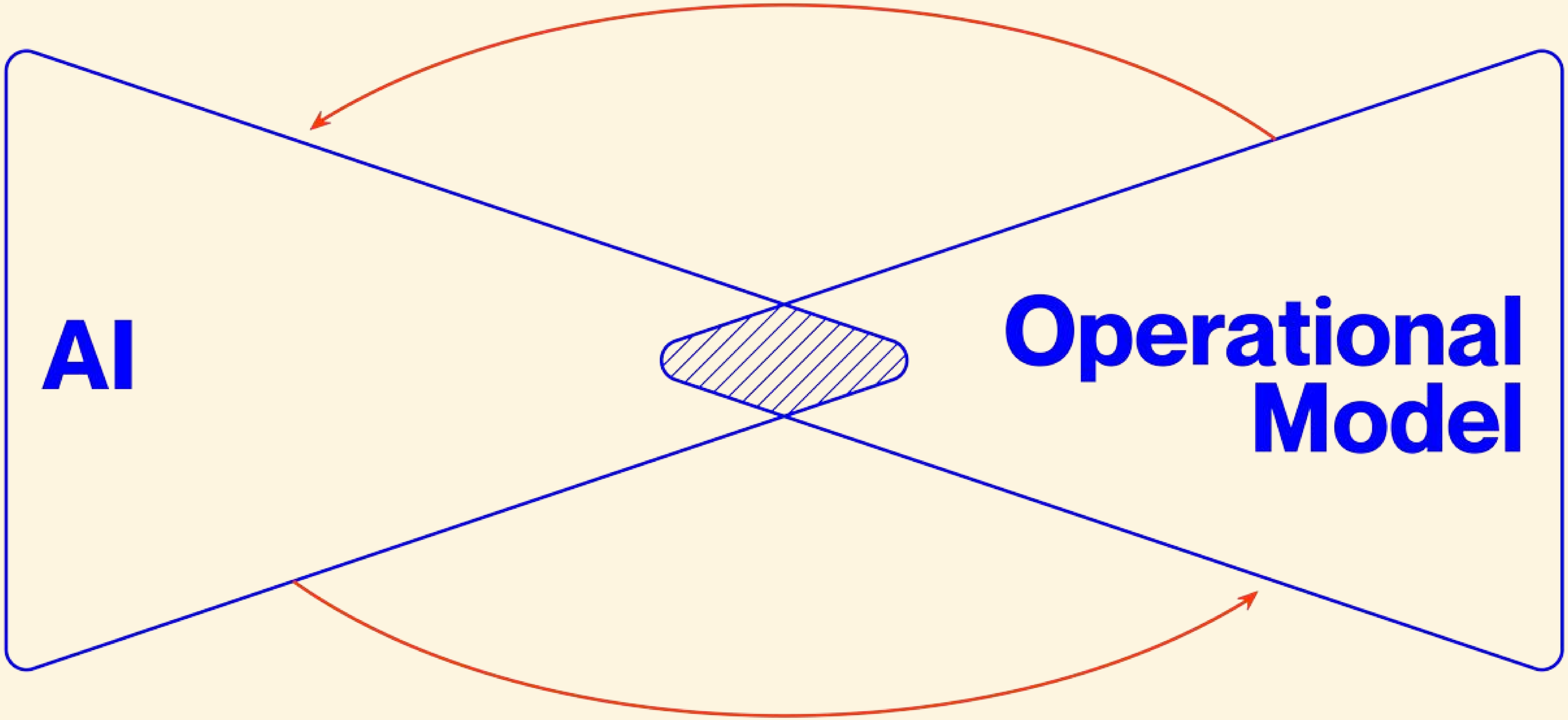
From Output

To Value



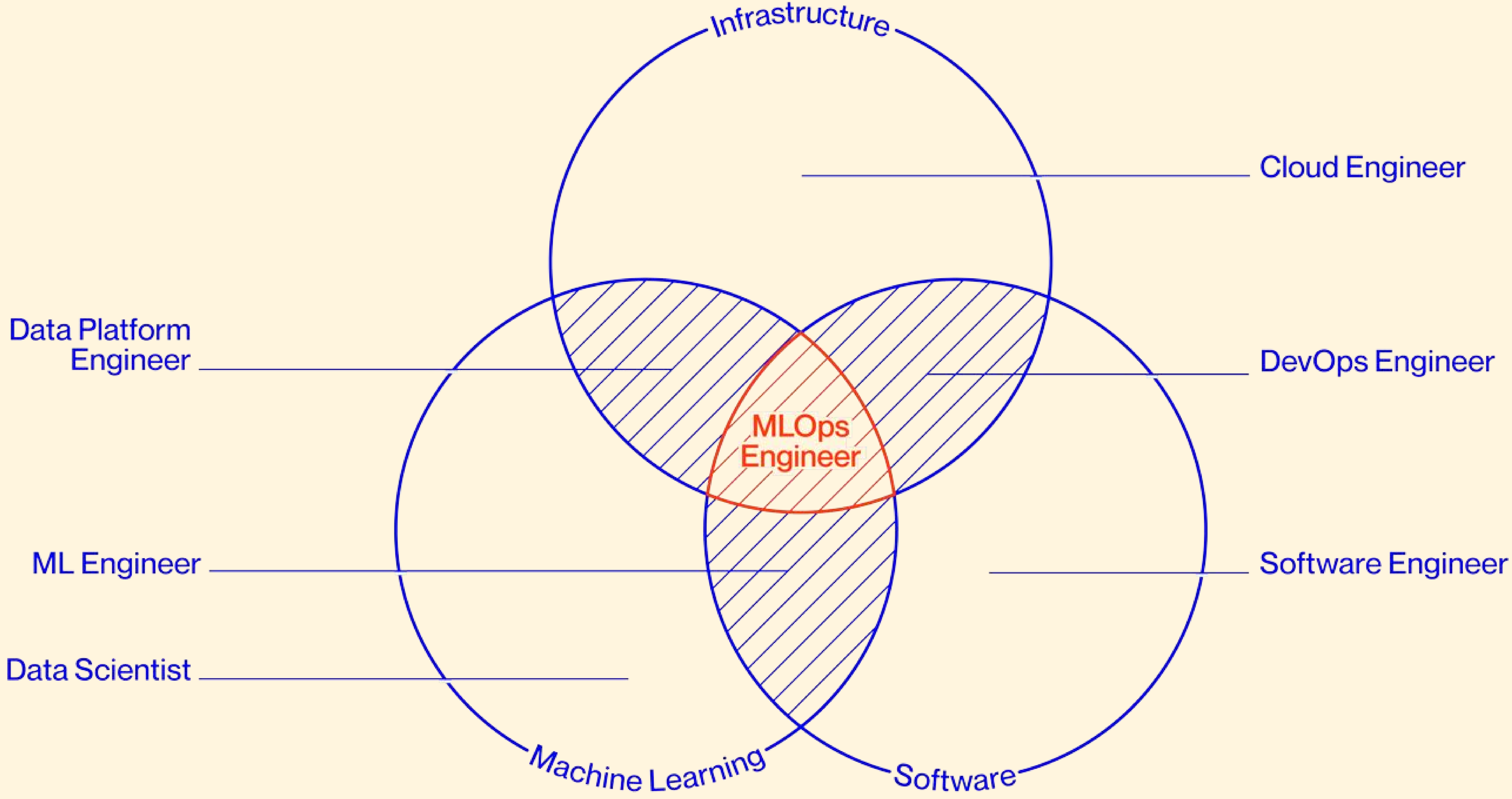


Data
A.I.
Operationalization
Value
2 seconds
Model 1
Model 2
Model 3
Cat Door
Arduino
Cat with Prey
Lock
BLOCKED
Image Type
No Cat
Cat not on approach
Cat on approach
Cat with prey
Count of Images
6,542
9,504
6,689
260
Example


AI
Operational Model

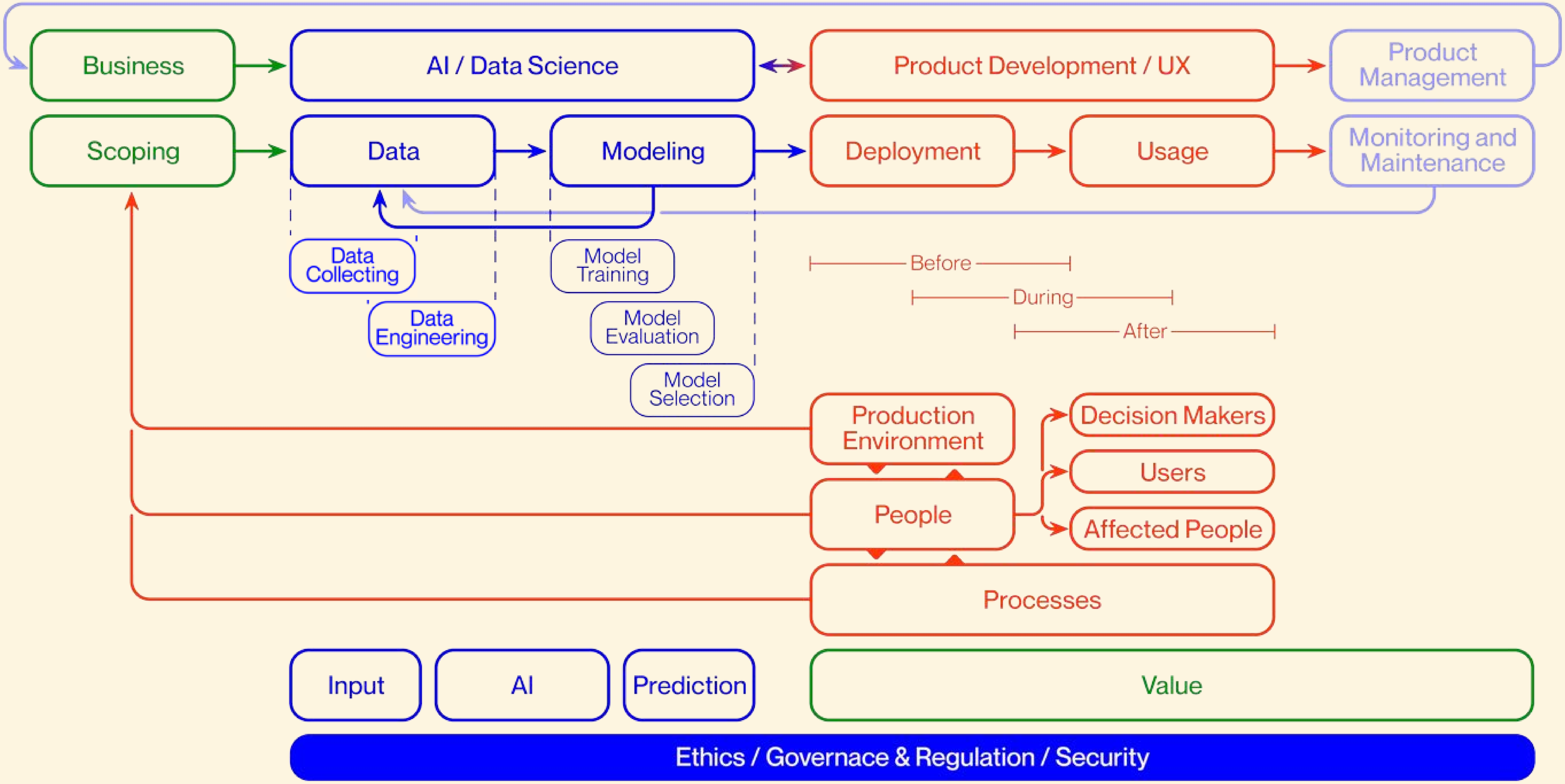
MLOps

MLOps unifies machine learning development and operations, emphasizing seamless integration and deployment of ML models in production environments.



Infrastructure
Cloud Engineer
Data Platform
Engineer
DevOps Engineer
MLOps
Engineer
ML Engineer
Software Engineer
Data Scientist
Machine Learning
Software

Human- and Process Centric MLOps



Human Centric ML Ops Canvas

MLOps:
MLOps unifies machine learning development and operations, emphasizing seamless integration and deployment of ML models in production environments.
Human-Centric MLOps:
Human-Centric MLOps emphasizes how AI fits into human workflows and behaviors, ensuring models align with organizational needs and are adoptable by users.
Comment on the Main Difference:
While MLOps focuses on efficient ML deployment, Human-Centric MLOps ensures AI integrates well with human needs and organizational processes.

User Name:

Use Case Name

Case Description

Team Name:

Canvas Date:

Scoping

This is the phase where we clearly define what problem we want to solve using AI. Think of it like choosing the destination for a journey. We need to ensure that the goal is achievable, beneficial to the organization, and well-understood by everyone involved.

Why it's important:
Without a clear destination, we might end up building an AI system that doesn't address any real-world problem or need.

Problem Definition:

- What specific challenge or opportunity are we aiming to address with AI?
- How does this problem or opportunity align with our broader organizational goals or needs?
- What existing solutions or processes are in place, and how does AI offer a unique or improved approach?

Objective Setting:

- What are the specific, measurable outcomes we aim to achieve with our AI solution?
- How will we measure the success or impact of the AI implementation?
- Are these objectives both short-term and long-term, and how might they evolve over time?

Feasibility Analysis:

- Do we have access to the necessary data to train and validate an AI model for this objective?
- Does our current technical infrastructure support the development, training, and deployment of an AI solution?
- What are the anticipated benefits of pursuing an AI approach compared to other potential solutions?

Stakeholder Engagement:

- Who are the critical stakeholders for this AI project, both internal and external?
- How can we ensure consistent communication and collaboration among these stakeholders throughout the AI lifecycle?
- What concerns or input might these stakeholders have, and how can we address or integrate their feedback?

Expectation Management:

- How are we communicating the potential outcomes and limitations of the AI project to all stakeholders?
- What is our estimated timeline for each phase of the AI lifecycle, from scoping to monitoring?
- How will we manage and address potential shifts in expectations or project objectives as we progress?

Data

In the world of AI, data is like the fuel for our car. Before we start our journey (or build our AI model), we need to ensure we have the right kind of fuel and enough of it. This phase involves collecting relevant data and preparing it for use.

Why it's important:
Just as a car can't run without fuel, AI models can't function without data. The better the quality of our data, the more efficient and accurate our AI system will be.

Acquiring Data:

- What kind of data do we need to address our defined problem or opportunity?
- Which data sources are currently available internally within our organization? Who are the stakeholders or departments responsible for this data?
- If internal data is insufficient, what external data sources can we consider? Are there third-party providers or public datasets that could be relevant?
- Are there any ethical or regulatory considerations we should be aware of when acquiring external data? How can we ensure that data acquisition respects privacy and has proper consent?

Preparing Data:

- Once we've identified our data sources, how will we collate and consolidate this data into a usable format?
- Are there any immediate quality issues with the data, such as missing values, duplicates, or inconsistencies, that need addressing?
- Do we have a clear understanding of what each data field or feature represents? If not, who in the organization can provide clarity or context?
- How will we divide the data to evaluate our AI solution's performance effectively, considering we might want a portion of the data as a reference for its success?

General Data Availability and Management:

- Do we have a centralized system or platform within our organization where data is stored and managed? If so, is this system accessible for our AI project?
- Who are the gatekeepers or stakeholders responsible for data management within our organization? Do we need to get permissions or collaborate with them for our AI initiative?
- Are there established data management practices or protocols within our organization that we should be aware of or align with?
- If external data is being considered, how will it be integrated with our internal data? Are there compatibility or format issues we should be mindful of?

Modelling

This is where the magic happens. We take our prepared data and use it to train an AI model. Think of it like choosing the best car for our journey, based on the terrain and destination.

Why it's important:
Just as you'd choose a rugged SUV for a mountain trip and not a sports car, selecting or building the right AI model ensures we effectively address the problem we set out to solve.

Requirements & Expectations:

- What specific requirements do we have for our model? For instance, do we need it to be highly explainable for regulatory or user trust reasons?
- How accurate does our model need to be? Is there a minimum performance threshold that it should meet?
- Are there specific considerations regarding false positives or false negatives? How critical would it be if the model makes a mistake, and what could be the potential repercussions?

Internal Capabilities:

- Do we have internal teams or departments with the expertise to build and train this model?
- If not, do we need to consider external contractors or consultants? How will we evaluate and choose the right external partners?
- Does our organization have the necessary infrastructure and tools to support model development, training, and testing?

Research & Existing Solutions:

- Are there existing models or solutions available, either within our organization or externally, that address similar problems? Can these be adapted or fine-tuned for our use case?
- Has someone documented building a similar model in research papers, case studies, or online platforms?
- Can we leverage insights or findings from these existing works to expedite our model development or to set performance benchmarks?

Model Selection & Evaluation:

- Based on our problem definition and requirements, what types of machine learning models might be appropriate? (e.g., regression, classification, clustering)
- Which metrics will we use to evaluate our model's performance? (e.g., accuracy, precision, recall, F1 score)
- How will we handle trade-offs? For instance, if achieving higher accuracy compromises model explainability, how will we prioritize?

Deployment

Once our AI model is ready, it's time to put it into action in the real world. This phase is like driving our car out of the garage and onto the roads. We integrate the AI system into our existing operations, ensuring it's accessible to users.

Why it's important:
An AI model that remains unused is like a car that's never driven—it's a wasted resource. Deployment ensures our AI-driven solutions reach the people who need them.

Integration & Interaction:

- How will the AI model be integrated into our existing systems or platforms? Are there APIs or other interfaces that need to be developed or adapted?
- With which systems, databases, or services will the deployed model interact? Are there any specific compatibility considerations or technical constraints to address?

User Experience & Accessibility:

- How will end-users interact with the deployed model? Is it through a web application, mobile app, or some other interface?
- What will the user experience look like? How can we ensure that it's intuitive, efficient, and satisfying for the user?

Technical Skills & Resources:

- What technical skills are needed for deployment?
- Are there specific programming languages or platforms that our team needs to be proficient in?
- Do we have the necessary expertise in-house? If not, do we need to hire new talent or collaborate with external partners?

Hardware & Software Considerations:

- Is the deployment purely software-based, or is there a hardware component involved (e.g., IoT devices, sensors, edge devices)?
- If there's a hardware aspect, how will it be sourced, installed, and maintained? Are there any specific environmental or logistical considerations to account for?

Value & Impact:

- What is the expected value or impact of the deployed model? How does it align with our broader business or organizational objectives?
- How will we measure the success of the deployment? What metrics or KPIs will be used?

Usage

Now that our AI system is in operation, we need to ensure people are using it effectively. It's like ensuring drivers and passengers know how to use the car's features and follow the rules of the road. This phase emphasizes training and adaptation.

Why it's important:
Even the best AI system can't add value if people don't use it correctly or understand its benefits.

People

Decision-Makers:
Who are the decision-makers?

Before Deployment:
- What is the vision for this AI solution in the organization?
- What specific objectives are we aiming to achieve?
- What is the allocated budget for the deployment, including hidden costs?

During Deployment:
- What metrics will be used to measure ROI during the implementation phase?
- What are the major milestones in the deployment roadmap?

After Deployment:
- Is the solution achieving its intended objectives?
- How does the maintenance cost compare to the forecasted budget?

Users:
Who are the users?

Before Deployment:
- What does the current workflow look like?
- Which aspects of the current system are pain points?

During Deployment:
- What kind of training will facilitate smoother transition and adoption?
- How will we ensure minimal disruption during transition?

After Deployment:
- How intuitive is the AI solution for end-users?
- Are there any emerging challenges or pain points post-deployment?

People Affected:
Who are the people affected?

Before Deployment:
- Which roles will be most impacted by the introduction of this AI solution?
- Are there any concerns or apprehensions among the affected parties?

During Deployment:
- How will we maintain transparent communication with affected parties?
- What mechanisms will be in place to capture feedback?

After Deployment:
- Have roles been positively or negatively impacted post-deployment?
- Were initial concerns effectively addressed?

Additional Stakeholders:

List all relevant additional stakeholders

Processes

Before Deployment:
- How will the AI solution integrate into our existing workflows?
- Which specific processes stand to benefit the most from the AI's capabilities?

During Deployment:
- Are there any processes that need to be temporarily adjusted or halted during implementation?
- How will we ensure a seamless integration of the AI solution into ongoing processes?

After Deployment:
- How have workflows evolved with the AI solution in place?
- Are there any unforeseen process bottlenecks that have arisen post-deployment?

Roll-out

Test Pilots:
- Who are the ideal candidates to be our first test pilots for the AI solution?
- What criteria make them suitable for this initial phase?

Roll-out Strategy:
- How will the roll-out be structured in phases?
- What are the benchmarks for moving from one phase to the next?

Feedback Mechanism:
- How will we capture feedback during the initial roll-out?
- What mechanisms are in place to quickly act upon the feedback received?

Monitoring

Like regularly servicing our car, we need to keep an eye on our AI system to ensure it runs smoothly. This phase involves checking its performance, ensuring it's still solving the problem effectively, and making necessary adjustments.

Why it's important:
The world changes, and so does data. Continuous monitoring ensures our AI system remains relevant, accurate, and beneficial, just as servicing ensures our car remains roadworthy.

Responsibility and Management

Ownership:
- Which team or department will own the responsibility for managing and monitoring the AI product post-deployment?
- Are there specific roles, like AI product managers or MLOps engineers, within the team to oversee this?

Communication:
- How will the responsible team communicate findings and updates related to the AI product to other stakeholders in the organization?
- What is the process for escalating any critical issues that arise during monitoring?

Feedback Collection

Data-Driven Feedback:
- How will changes in data distribution (data drift) be detected and managed?
- Is there a mechanism in place to automatically retrain or flag the model if it starts performing below a certain threshold?

User Feedback:
- How will user feedback be captured post-deployment?
- Is there a structured way for users to report any anomalies, errors, or challenges they face while interacting with the AI system?

Process Impact:
- How will the system's impact on existing workflows and processes be assessed continuously? Are there any KPIs (Key Performance Indicators) set up to measure the tangible benefits of the
- AI system on organizational processes?

System Monitoring

Objectives of System Monitoring:
- How will we measure and ensure the reliability of the AI system over time?
- What safeguards are in place to maintain the security of the AI solution, especially concerning user data and proprietary information?
- What benchmarks are set up to ensure the AI system is performing optimally?

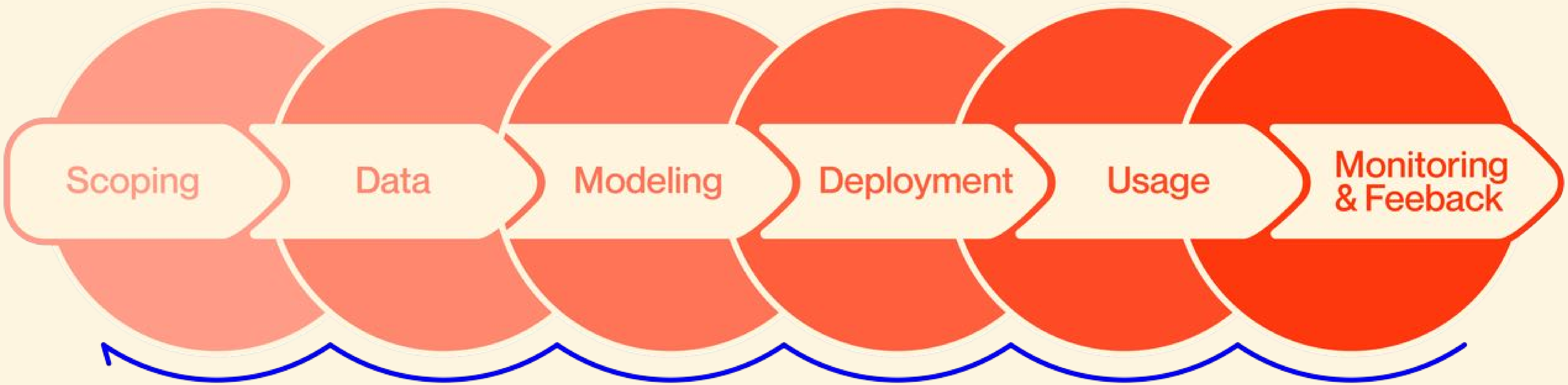
Key Areas to Monitor:
- **Technical Glitches:**
  - How will we monitor for hardware and software glitches that could impair the AI system's functioning?
  - Is there an alert system in place for immediate notification of any technical issues?
- **User Behavior:**
  - What metrics and tools will we use to understand how users are interacting with the AI system?
  - How will user feedback be used to enhance and refine the AI system over time?
- **Security:**
  - How will potential security breaches be detected?
  - What mechanisms are in place to ensure data integrity and prevent unauthorized access?

Continuous Improvement:
- Based on the findings from monitoring, how often will the AI system be updated or refined?
- Is there a pipeline in place for continuous integration and continuous deployment (CI/CD) for the AI solution?

Human- and Process Centric MLOps

Human-and Process Centric MLOps emphasizes how AI fits into (human) workflows and behaviors, ensuring models align with organizational needs and are adoptable by users.

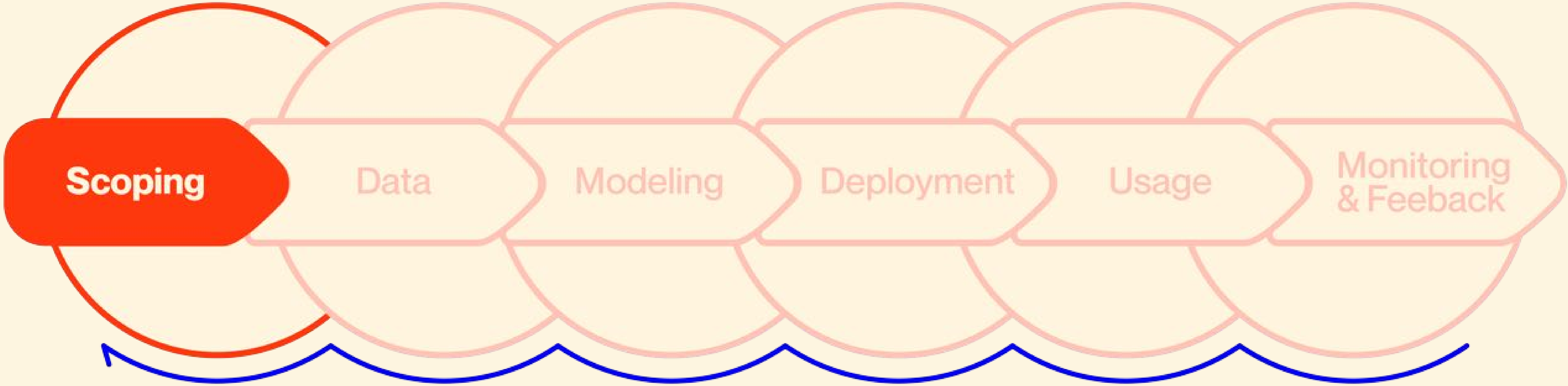
Human Centric ML Lifecycle



This Process is ever iterative.
Developments in later stages may require revisiting earlier ones.

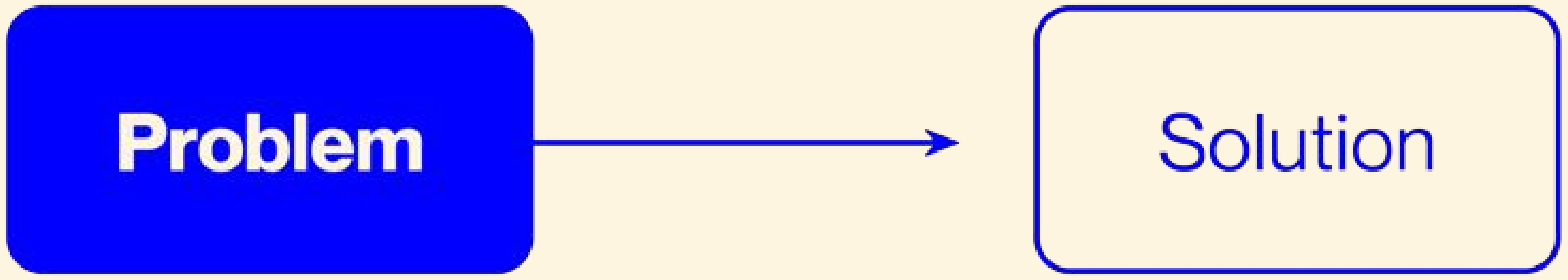
Scoping

Human Centric ML Lifecycle

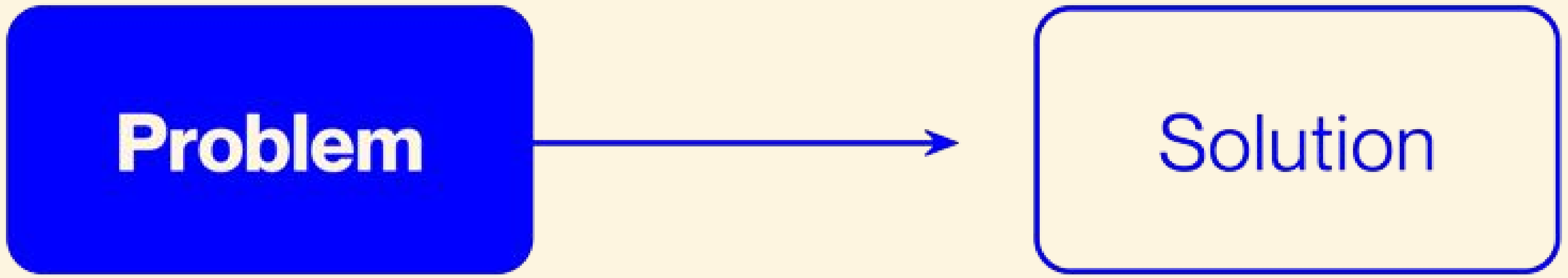


This Process is ever iterative.
Developments in later stages may require revisiting earlier ones.

Starting From a Real Need



Starting From a Real Need



Use Case: "a clearly defined set of activities designed to reach a specific goal from a business or costumer perspective, inwhich one or more AI solutions are involved in reaching the respective goal"

Always ask:
what is the right tool for the job?

Image Type	No Cat	Cat not on approach	Cat on approach	Cat with prey
Count of Images	6,542	9,504	6,689	**260**
Example				

@TheC15jon vor 3 Jahren

I like this. Can't help wondering if you could've just weighed the cat on the way out and locked it out if it's heavier when it comes back? #justsayin

10 Antworten

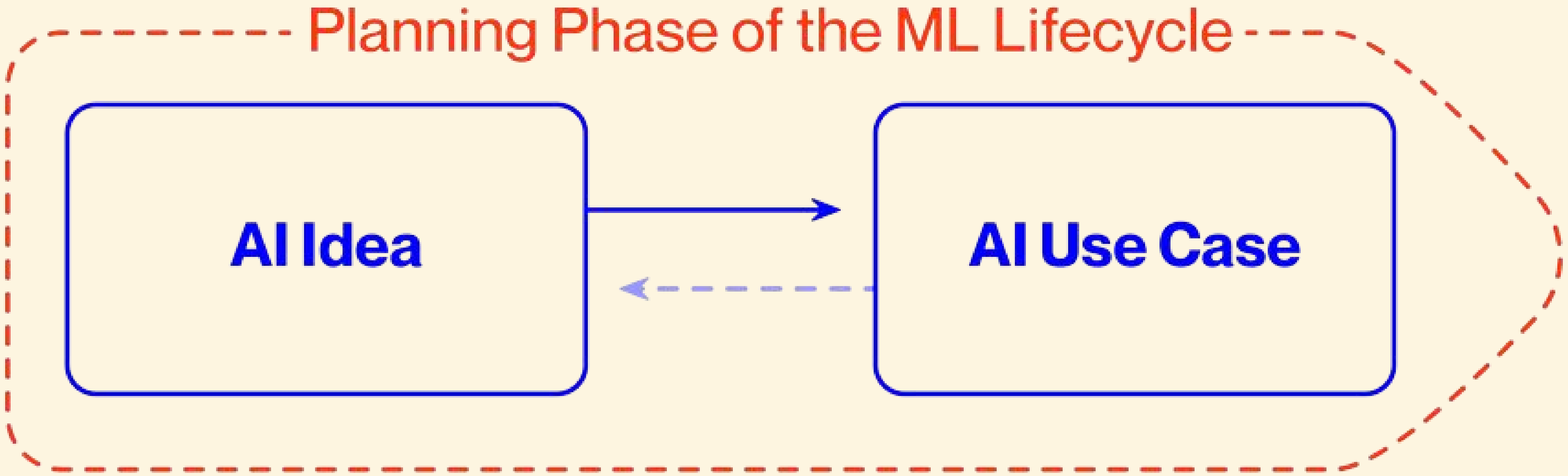
1 Antwort

@LK-pc4sq vor 1 Jahr

yes that would work and far simpler

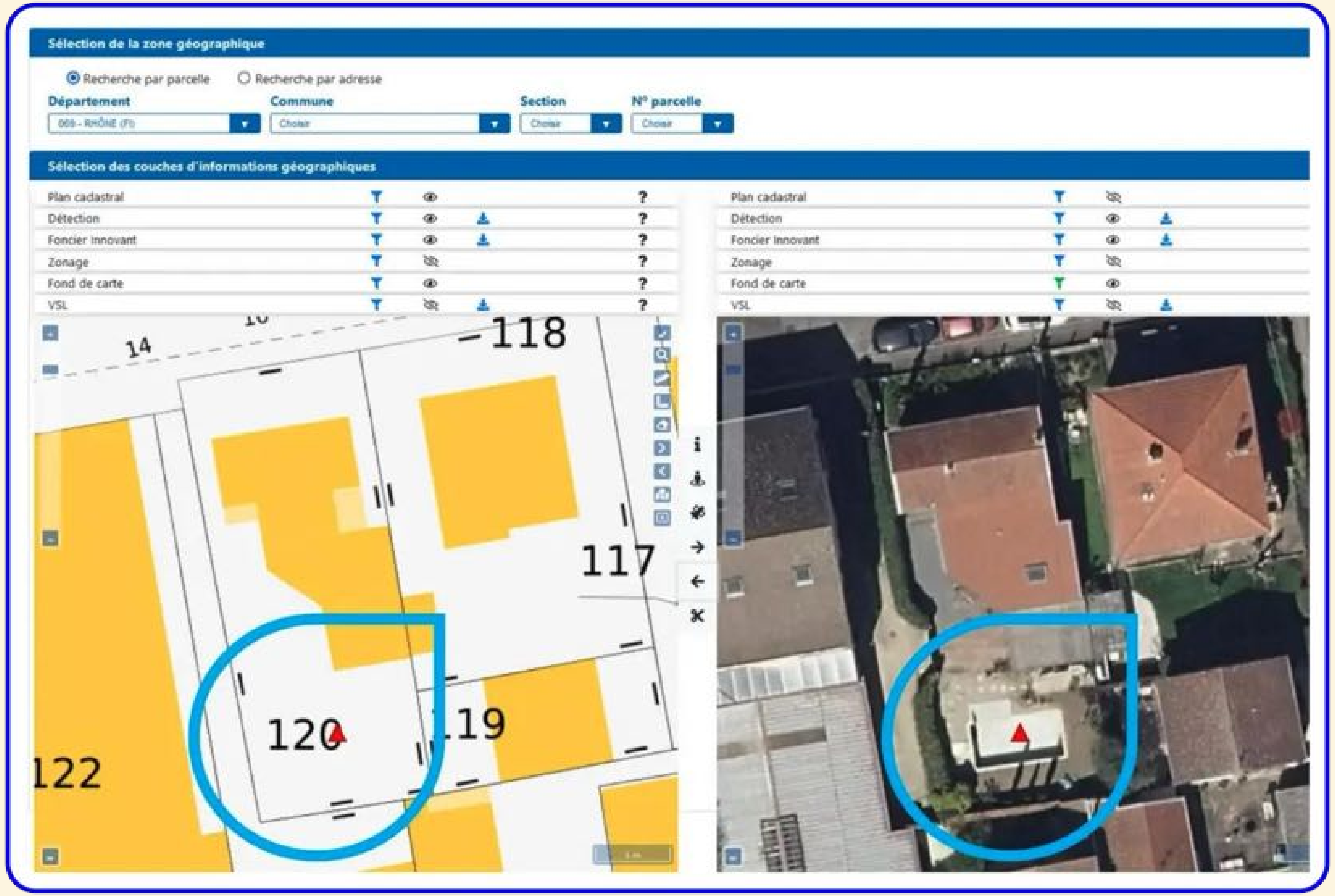
Antworten

From Idea to Reality



“ To begin with the end in mind means to start with a clear understanding of your destination. It means to know where you’re going so that you better understand where you are now and so that the steps you take are always in the right direction

Stephen Covey
Author



How can the French tax authorities efficiently detect
these undeclared swimming pools to ensure proper taxation?

Detection and Classification of Rice Plant Diseases for the World Food Organization

Develop an AI system to help farmers in India detect and treat rice plant diseases using smartphone images. This solution will aid in improving crop yields and tracking disease outbreaks in rural areas.

Pneumonia Detection in Pediatric Chest X-rays for Doctors Without Borders

Create an AI-based diagnostic tool to detect pneumonia in children from chest X-rays, assisting healthcare workers in remote areas of Africa. This system will ensure timely treatment and help monitor the spread of the disease.

Quality Control for Potato Chips at Frito-Lay

Implement a deep learning model to automate the detection of defective potato chips, focusing on burnt or damaged areas.
This solution will maintain product quality and prevent the closure of a Frito-Lay factory in Spain.

https://shorturl.at/IbbCX

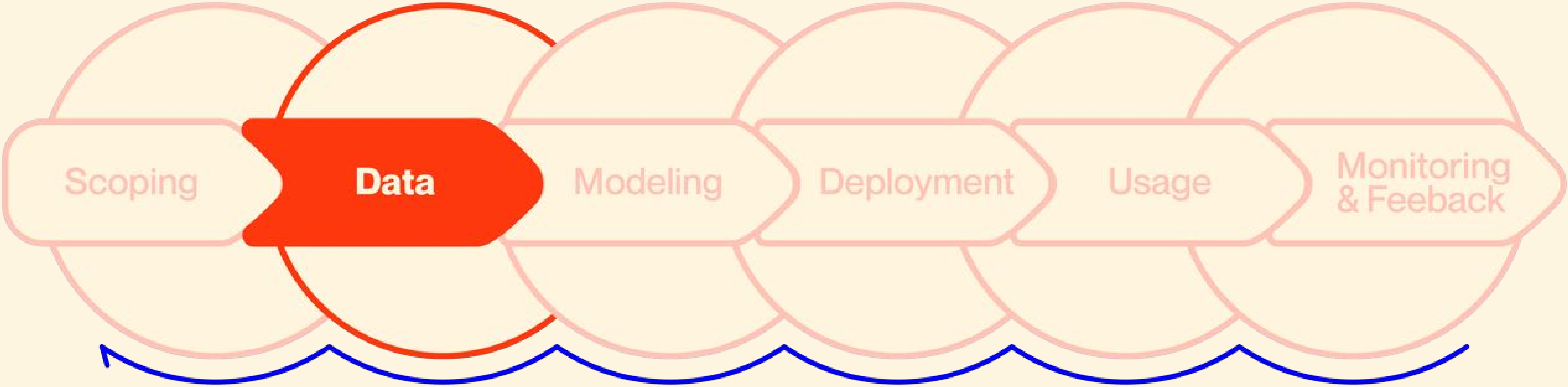
Scoping

- What is the problem that you are trying to tackle?
- How could the problem be solved using AI?
- What is the role AI plays?
- What will be the output of the AI model?
- How will the solution change the status quo?

08:00

Data

Human Centric ML Lifecycle



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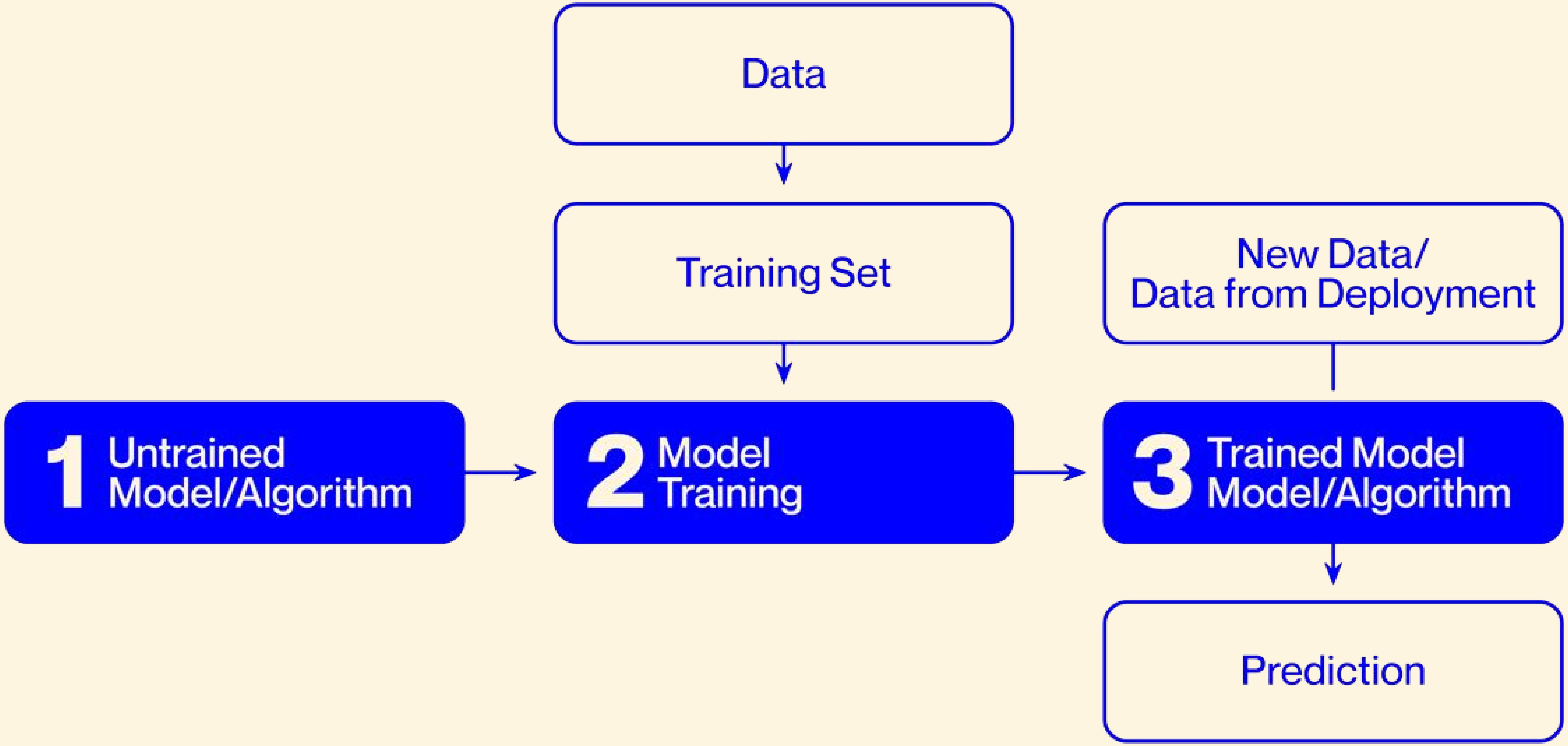
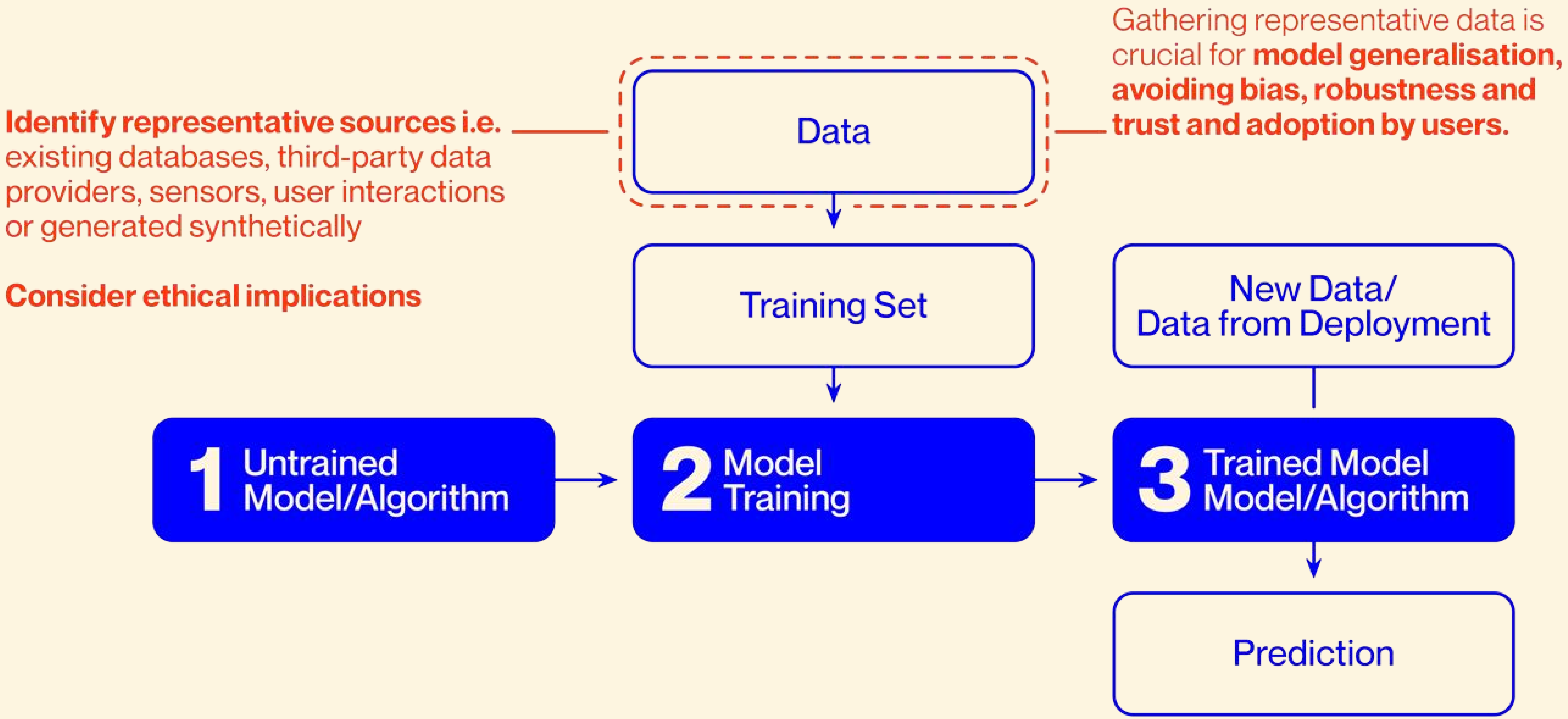
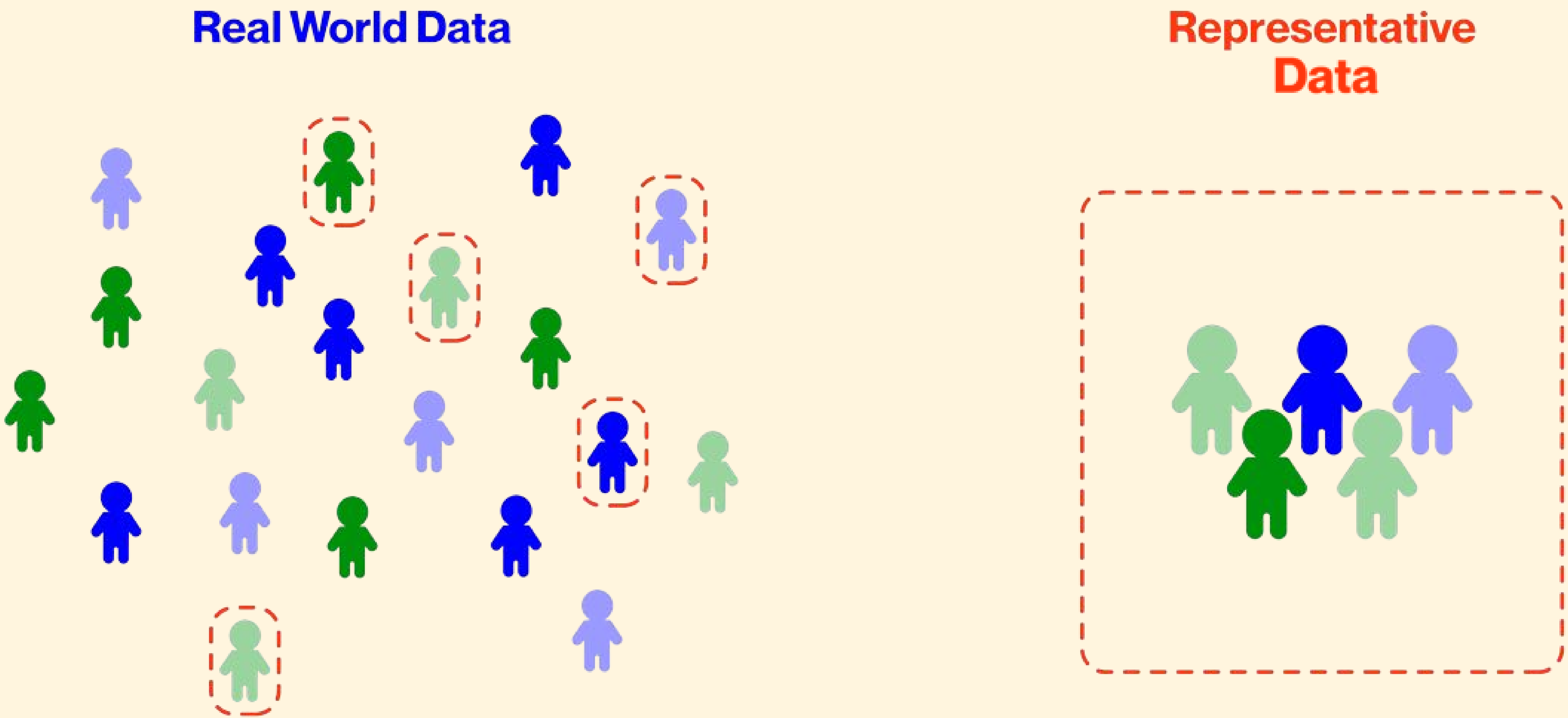
Acquiring and Preparing Representative Data

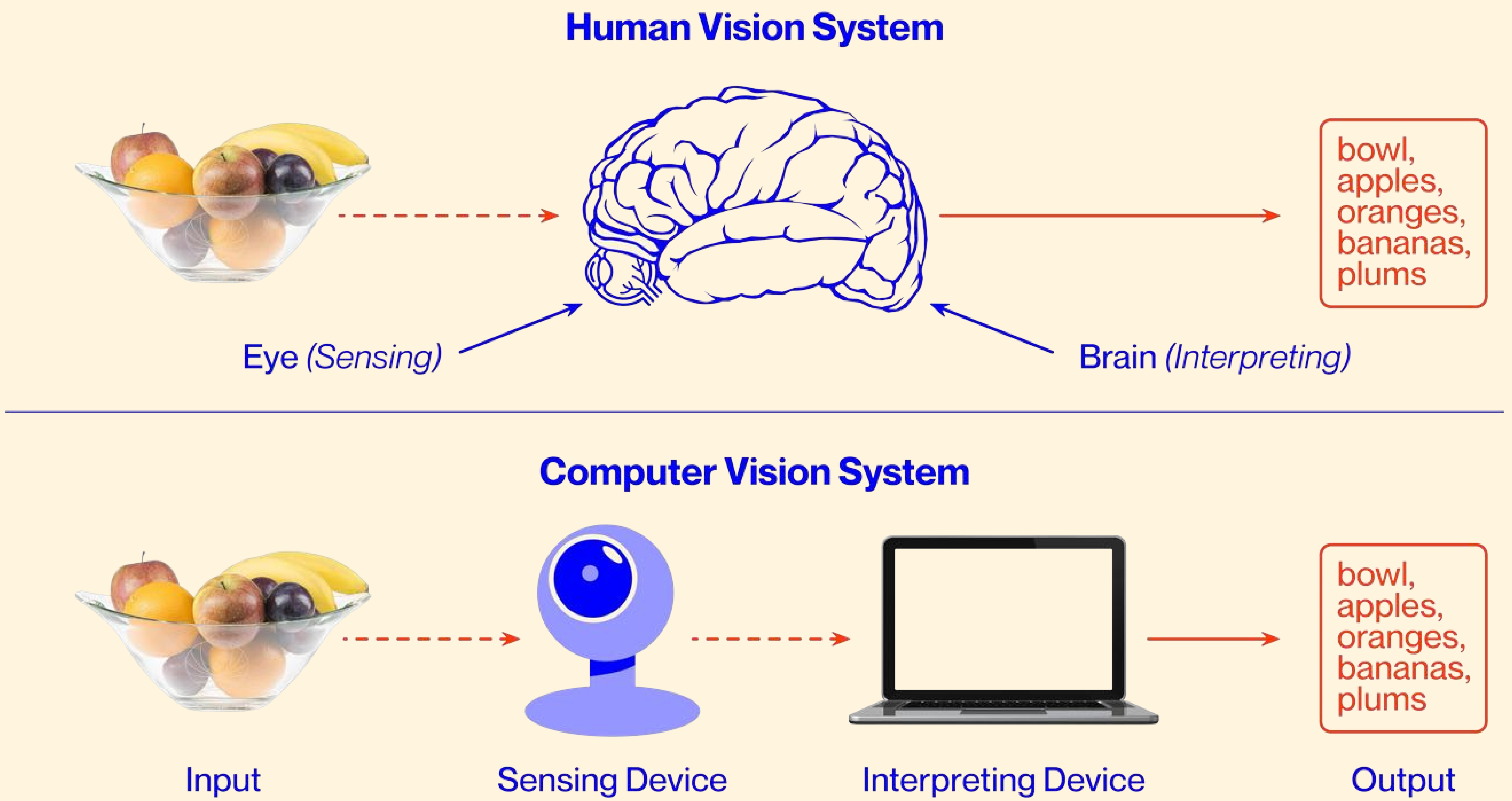


Acquiring Representative Data

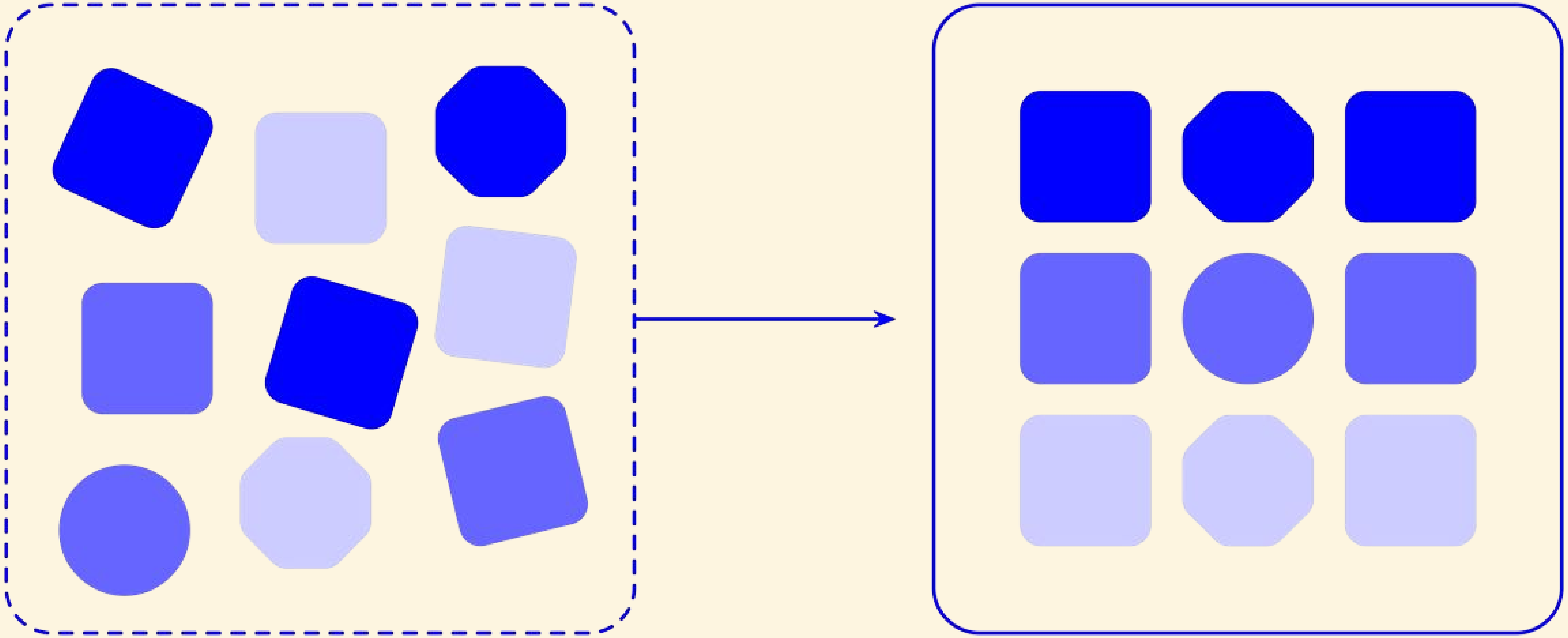


The Right Data




Human Vision System
bowl, apples, oranges, bananas, plums
Eye (Sensing)
Brain (Interpreting)
Computer Vision System
bowl, apples, oranges, bananas, plums
Input
Sensing Device
Interpreting Device
Output

Acquiring Representative Data



Deep Dive: Data Cleaning

Representation

Contradictions

Ref. integrity

CUST

CNr	Name	Birthday	Age	Sex	Phone	ZIP
1234	Costa, Rui	18.2.80	37	m	999999999	1000
1234	Ana Costa	32.2.70	37	m	965432123	55555
1235	Rui Costa	18.2.80	27	m	963124568	1000

Uniqueness

Missing values

Duplicates

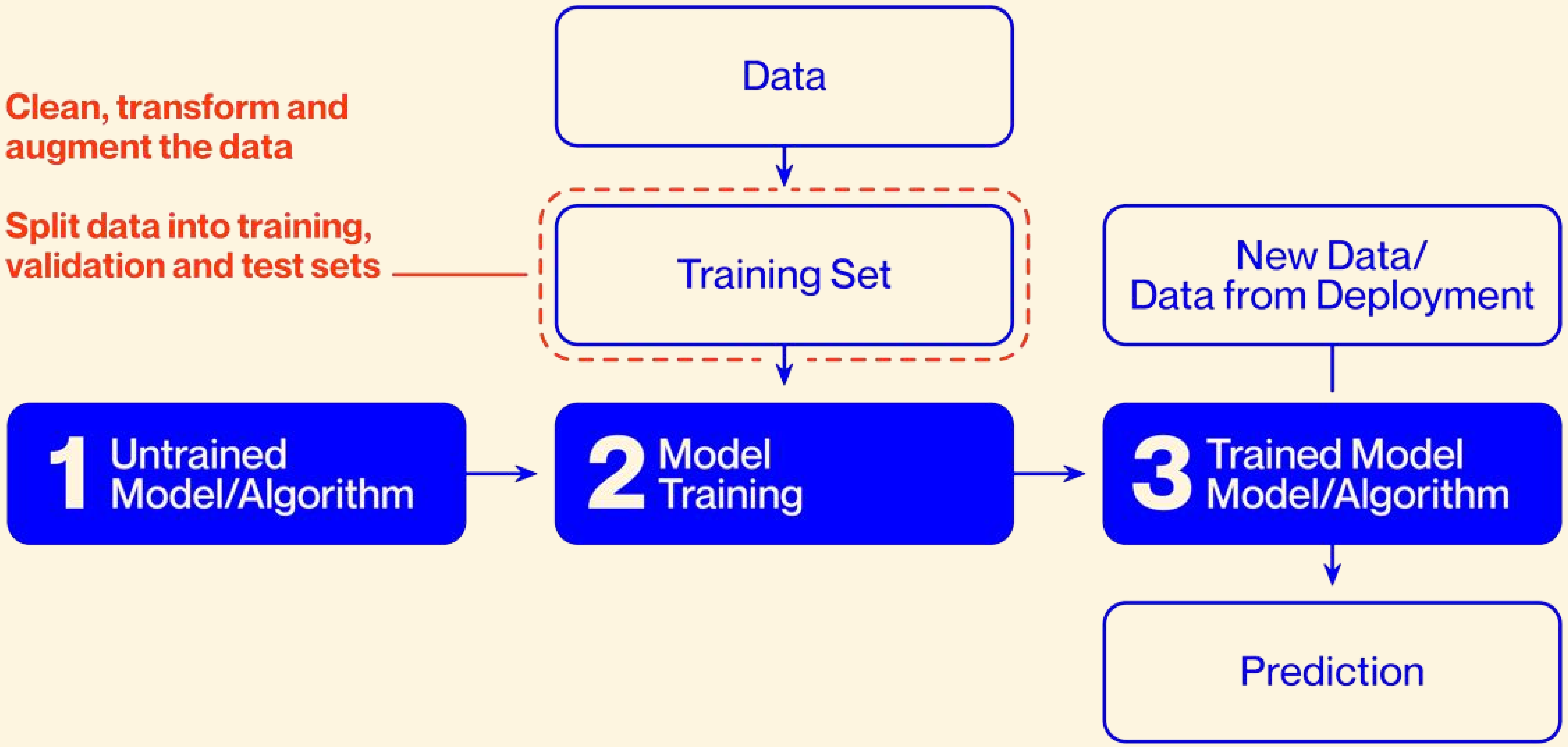
ADDRESS

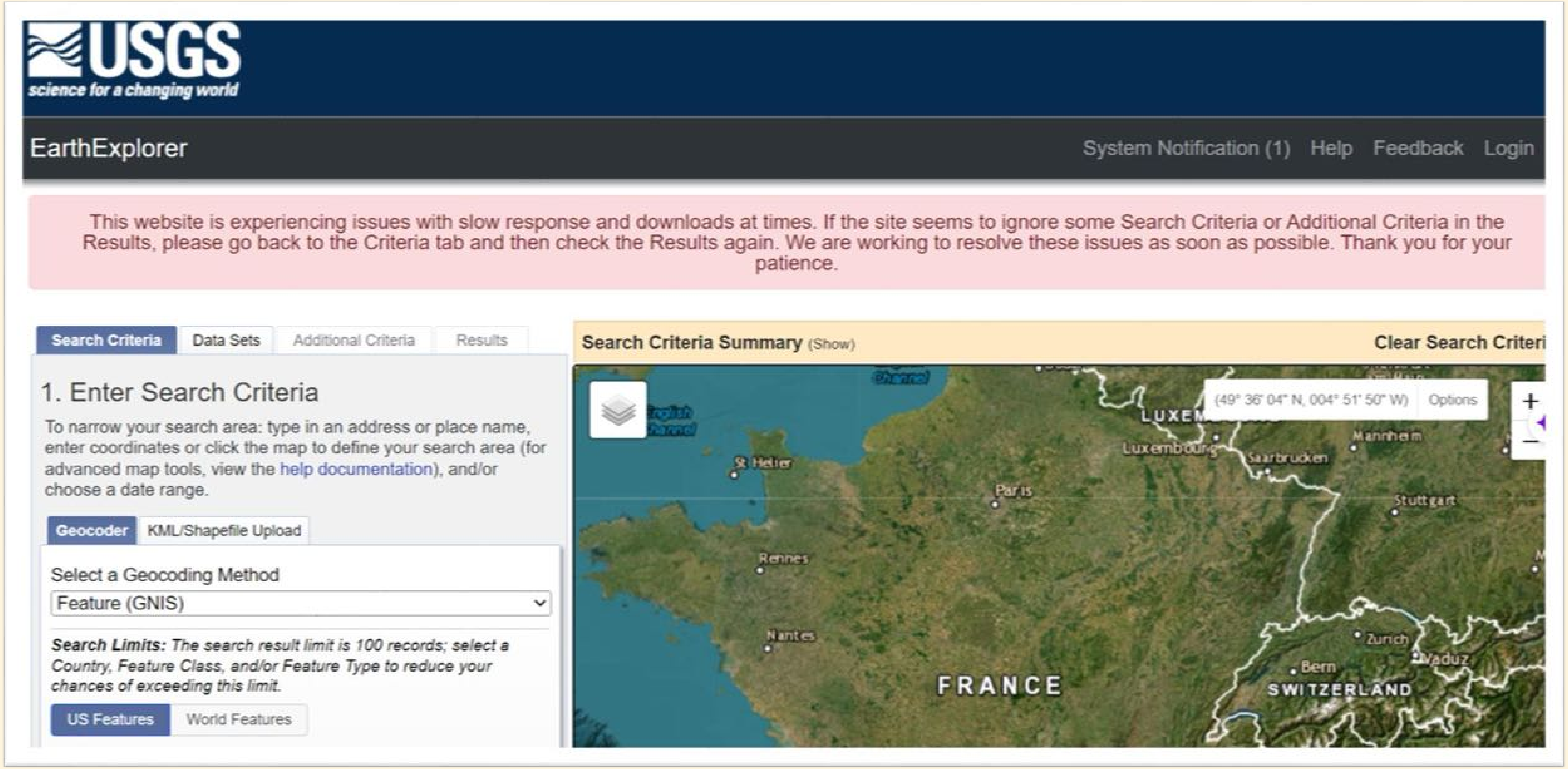
ZIP	Place
1000	Lisboa
1000	Lsiboa
1024	Portugal

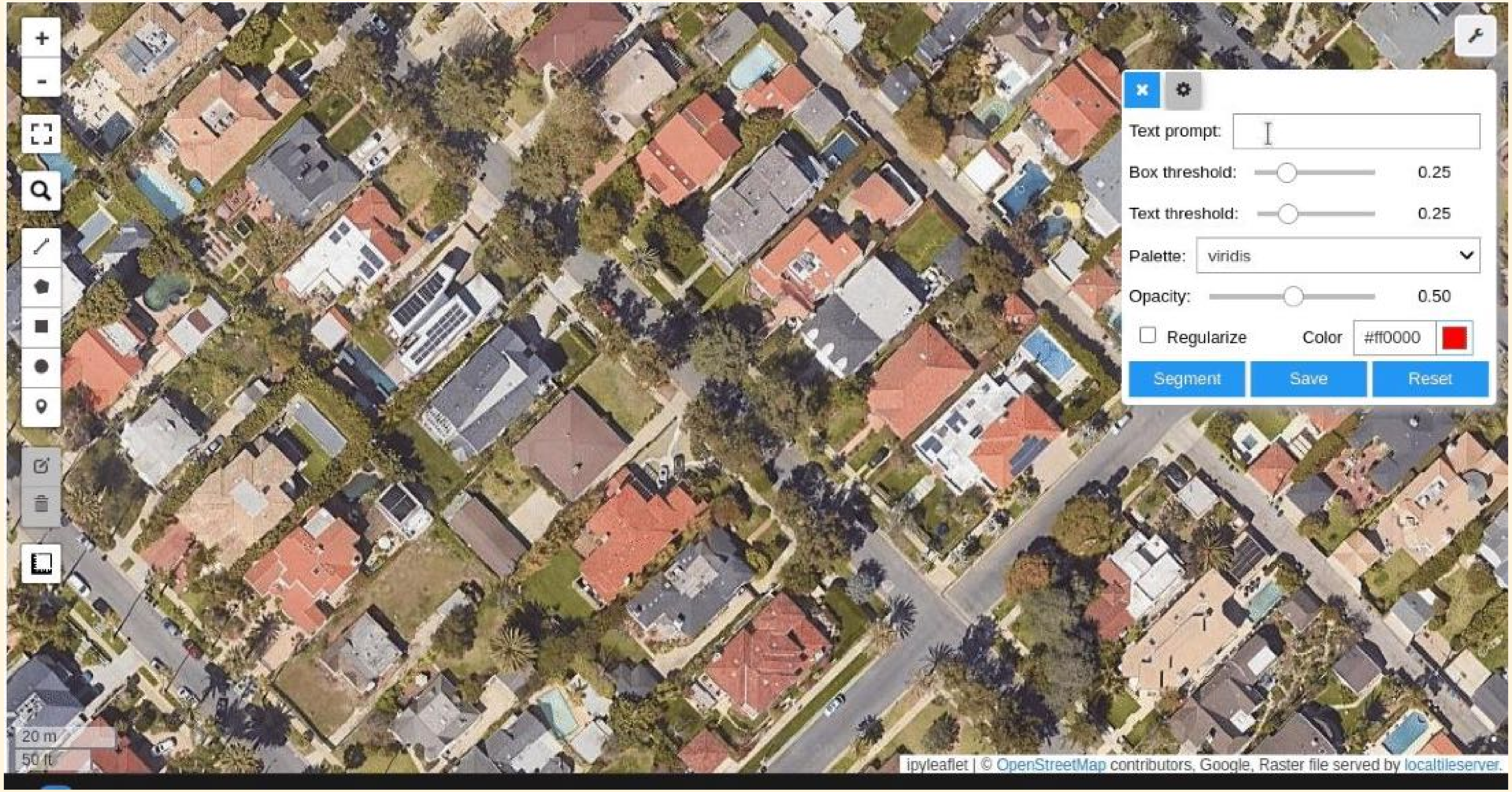
Typos

Incorrect values

Preparing Representative Data




USGS
science for a changing world
EarthExplorer
System Notification (1)
Help
Feedback
Login
This website is experiencing issues with slow response and downloads at times. If the site seems to ignore some Search Criteria or Additional Criteria in the Results, please go back to the Criteria tab and then check the Results again. We are working to resolve these issues as soon as possible. Thank you for your patience.
Search Criteria
Data Sets
Additional Criteria
Results
1. Enter Search Criteria
To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the help documentation), and/or choose a date range.
Geocoder
KML/Shapefile Upload
Select a Geocoding Method
Feature (GNIS)
Search Limits: The search result limit is 100 records; select a Country, Feature Class, and/or Feature Type to reduce your chances of exceeding this limit.
US Features
World Features
Search Criteria Summary (Show)
Clear Search Criteri
(49° 36' 04" N, 004° 51' 50" W)
Options
St Helier
Paris
Luxembourg
Saarbrucken
Mannheim
Stuttgart
Rennes
Nantes
FRANCE
Zurich
Bern
Vaduz
SWITZERLAND

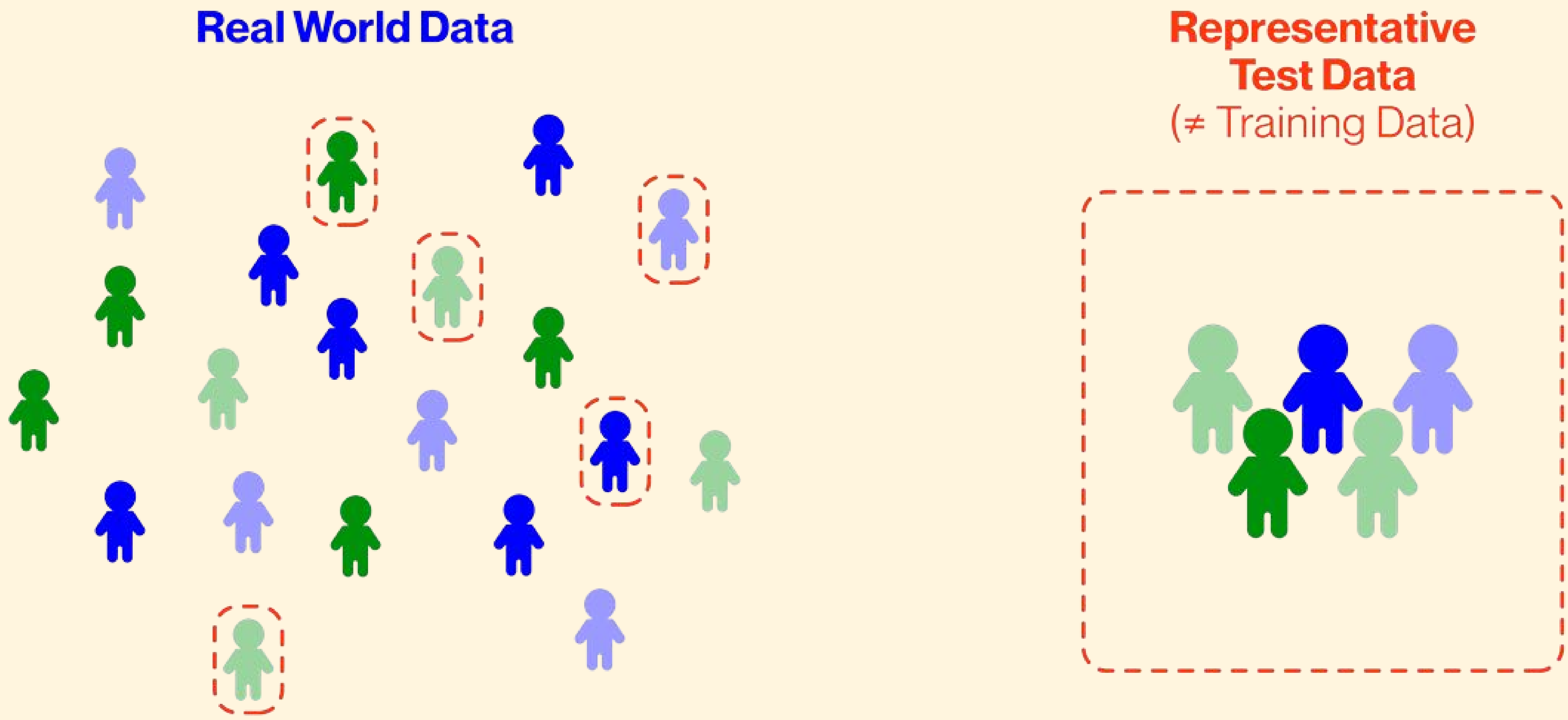

Text prompt:
Box threshold: 0.25
Text threshold: 0.25
Palette: viridis
Opacity: 0.50
Regularize
Color #ff0000
Segment
Save
Reset
20 m
50 ft
ipyleaflet | © OpenStreetMap contributors, Google, Raster file served by localtileserver.

Testing Set

1. presence of a lake and a blue tag,
   433 × 340 pixels
2. encloses two swimming pools and a pool look-alike glassstructure,
   442×258 pixels
3. a pool without one of the most common characteristics, the blue colour,
   298 × 241 pixels
4. very small and high zoom image,
   100 × 118 pixels
5. unusual swimming pool body,
   366 × 270 pixels
6. very high-quality 3-dimensional picture with two pools and a basketball court,
   1351 × 1364 pixels
7. the same court as in image 6 and a green swimming pool,
   1099 × 1333 pixels,
8. the basketball court seen in images 6 and 7 but with higher zoom percentage,
   732 × 613 pixels

Eight test images taken from *Google Maps* with different sizes and resolutions.

The Right Data



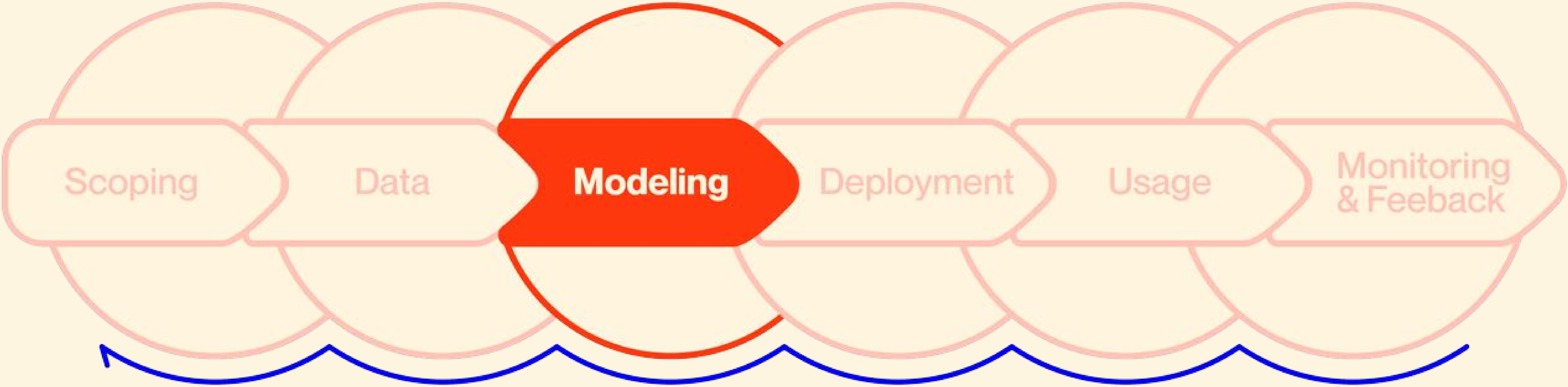
Data

- What data do you need?
- How would you get/collect the data?
- How can you make sure the data is correct?
- What might be challenges?

08:00

Modeling

Human Centric ML Lifecycle



This Process is ever iterative.
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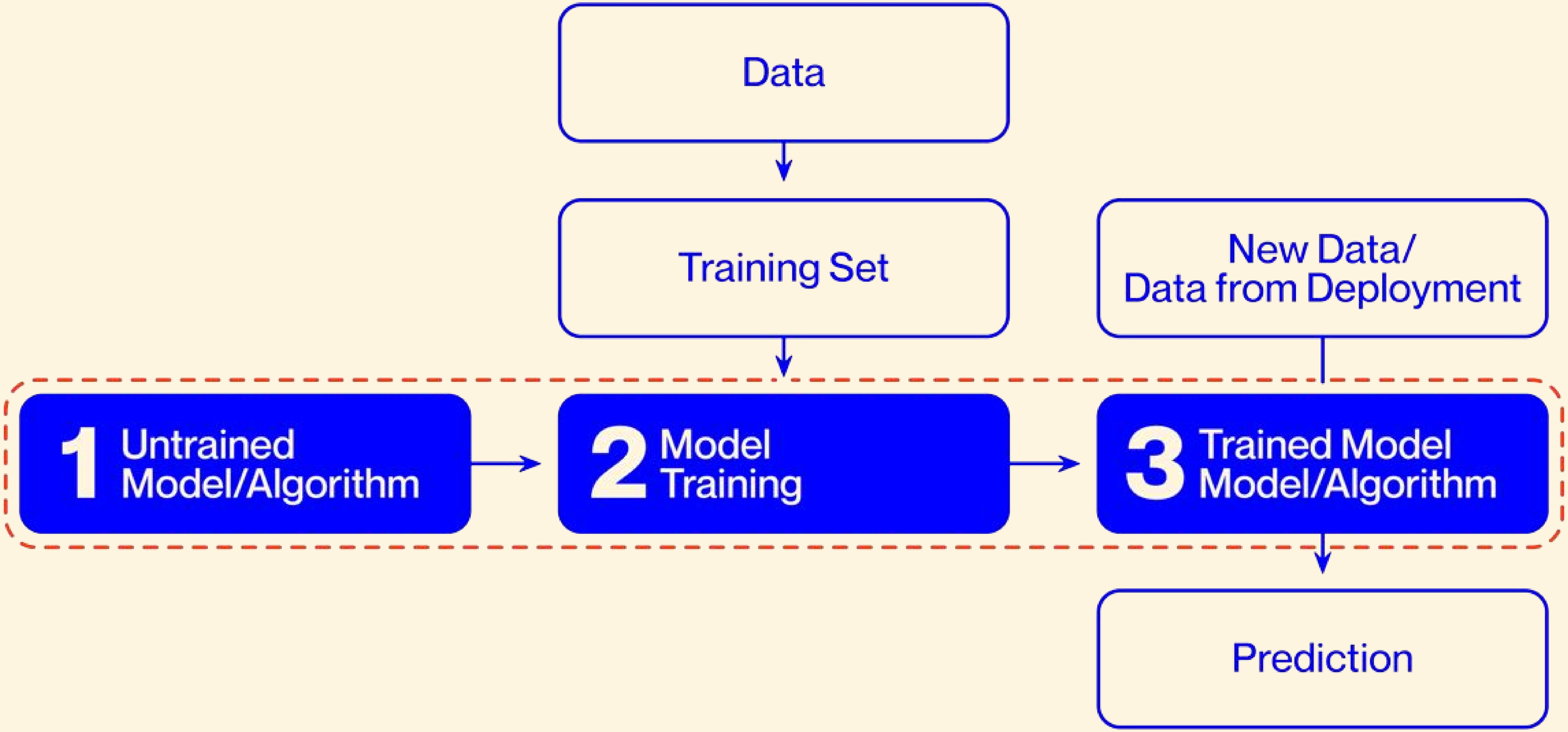
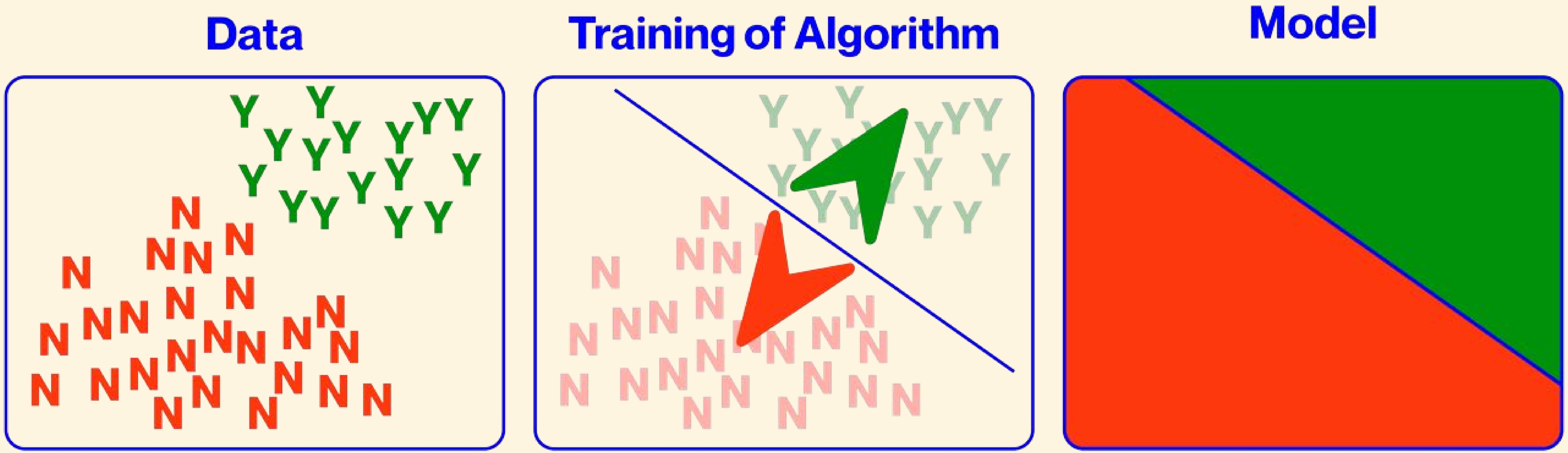
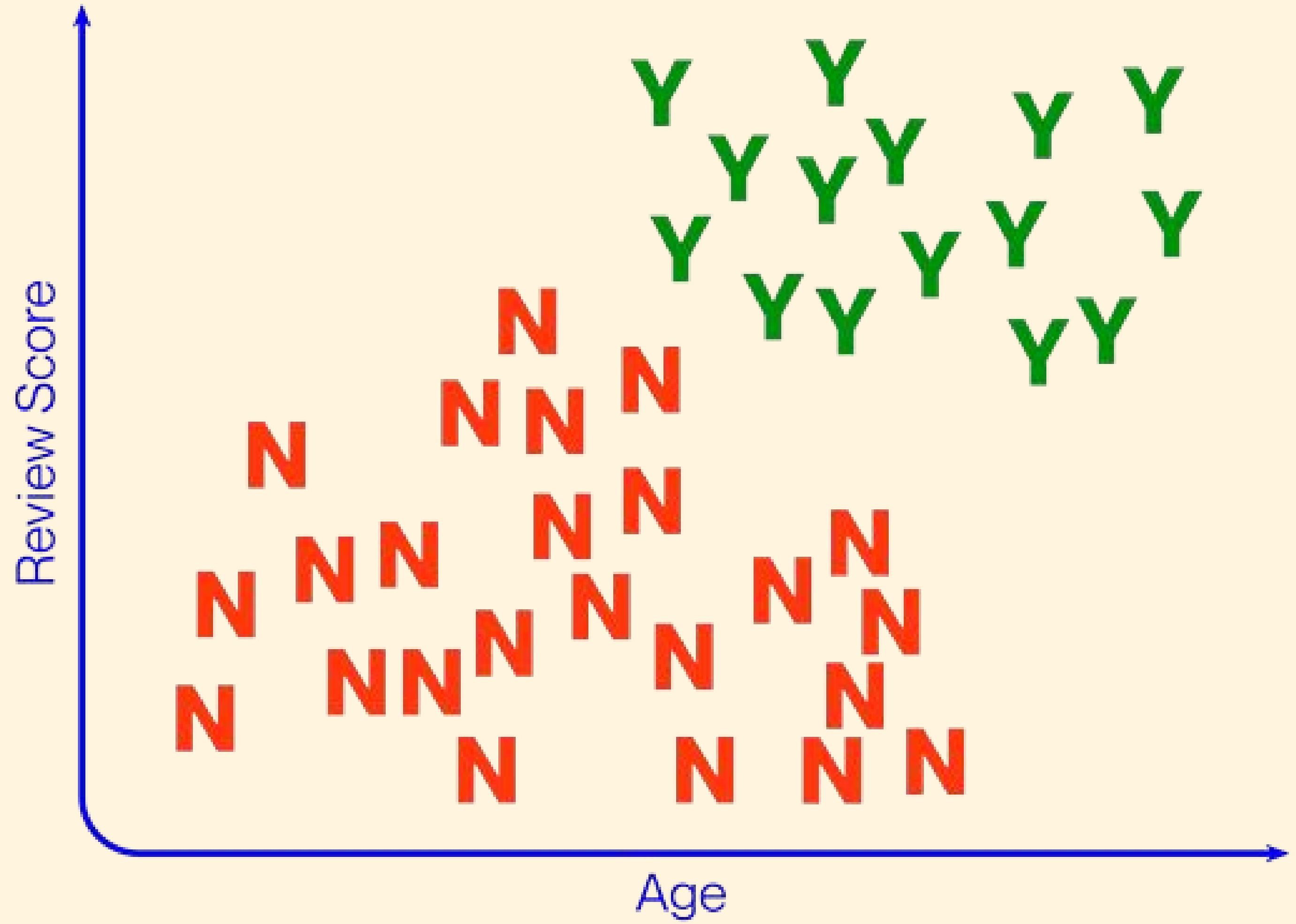
Algorithm Selection and Model Evaluation



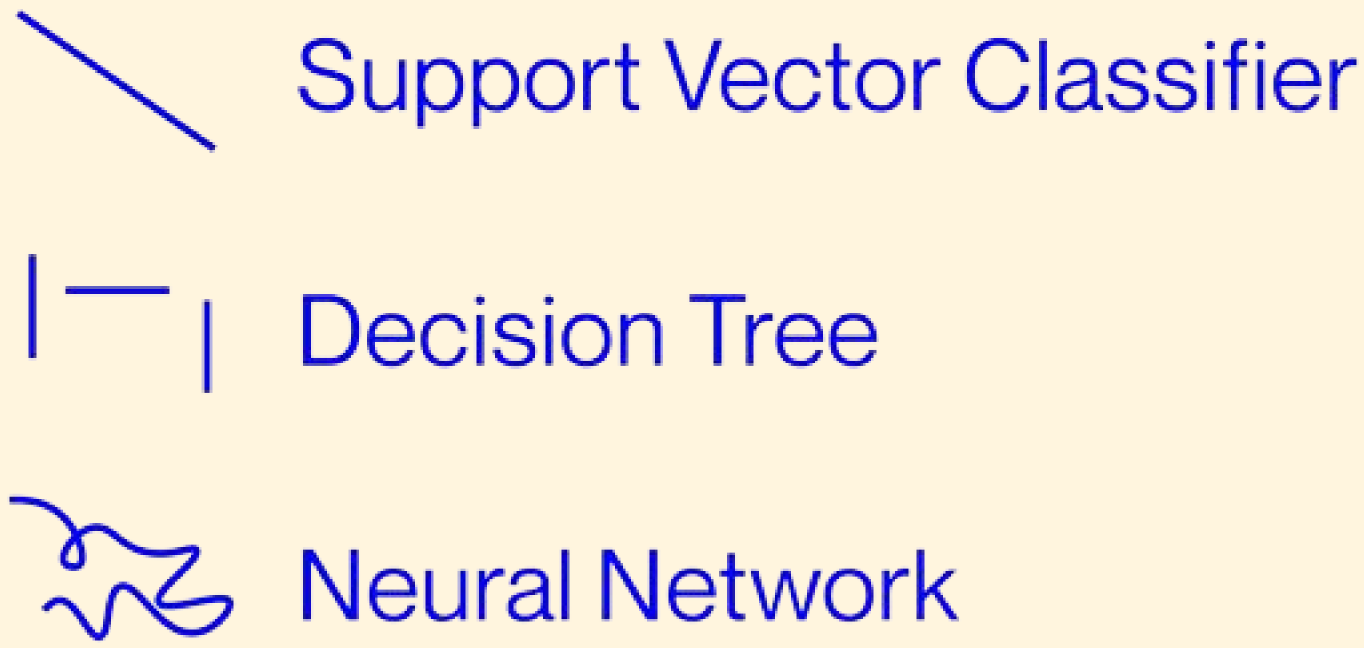
Data to Trained Model



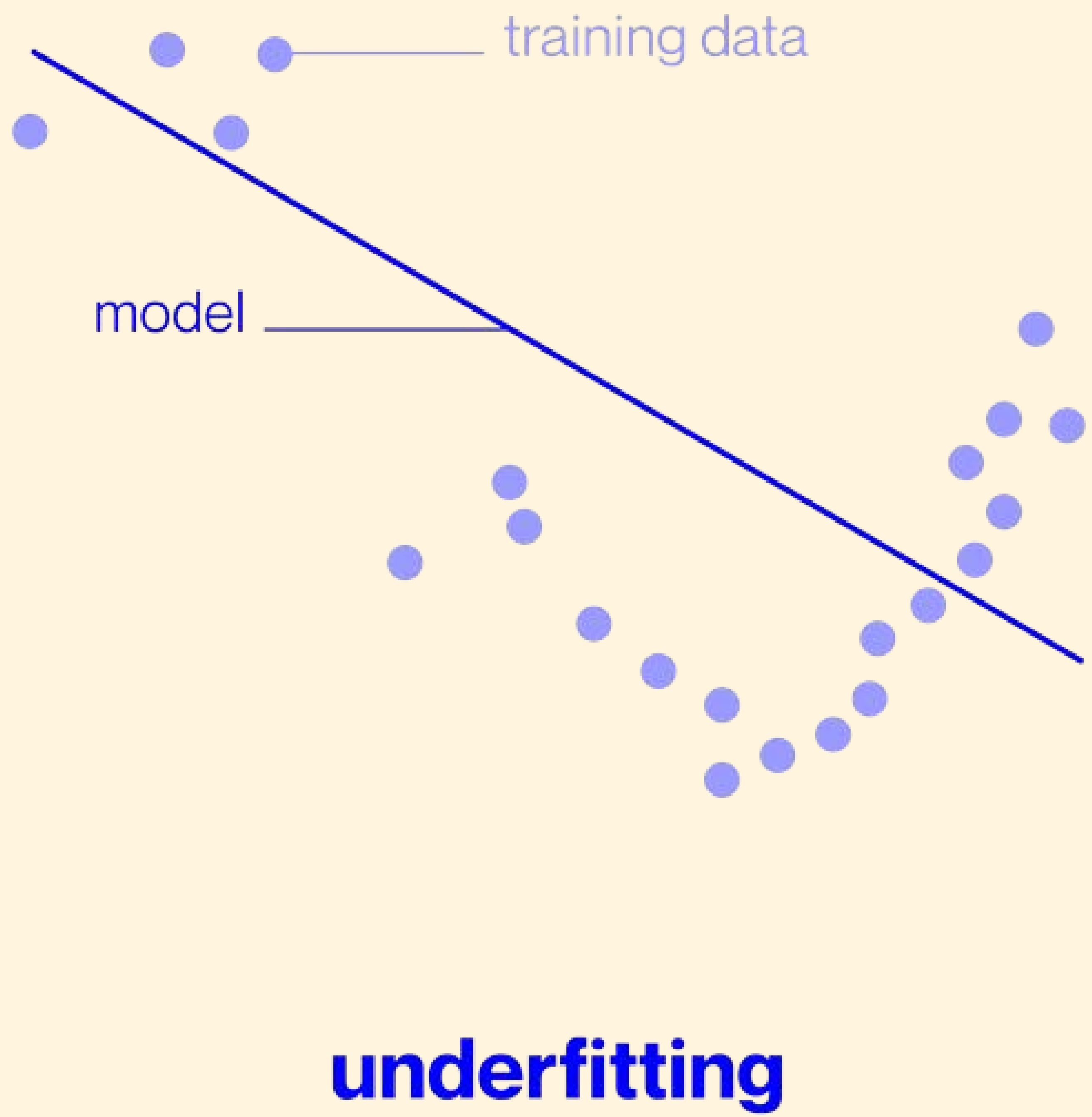
Choosing the Right Algorithm



Algorithm selection:

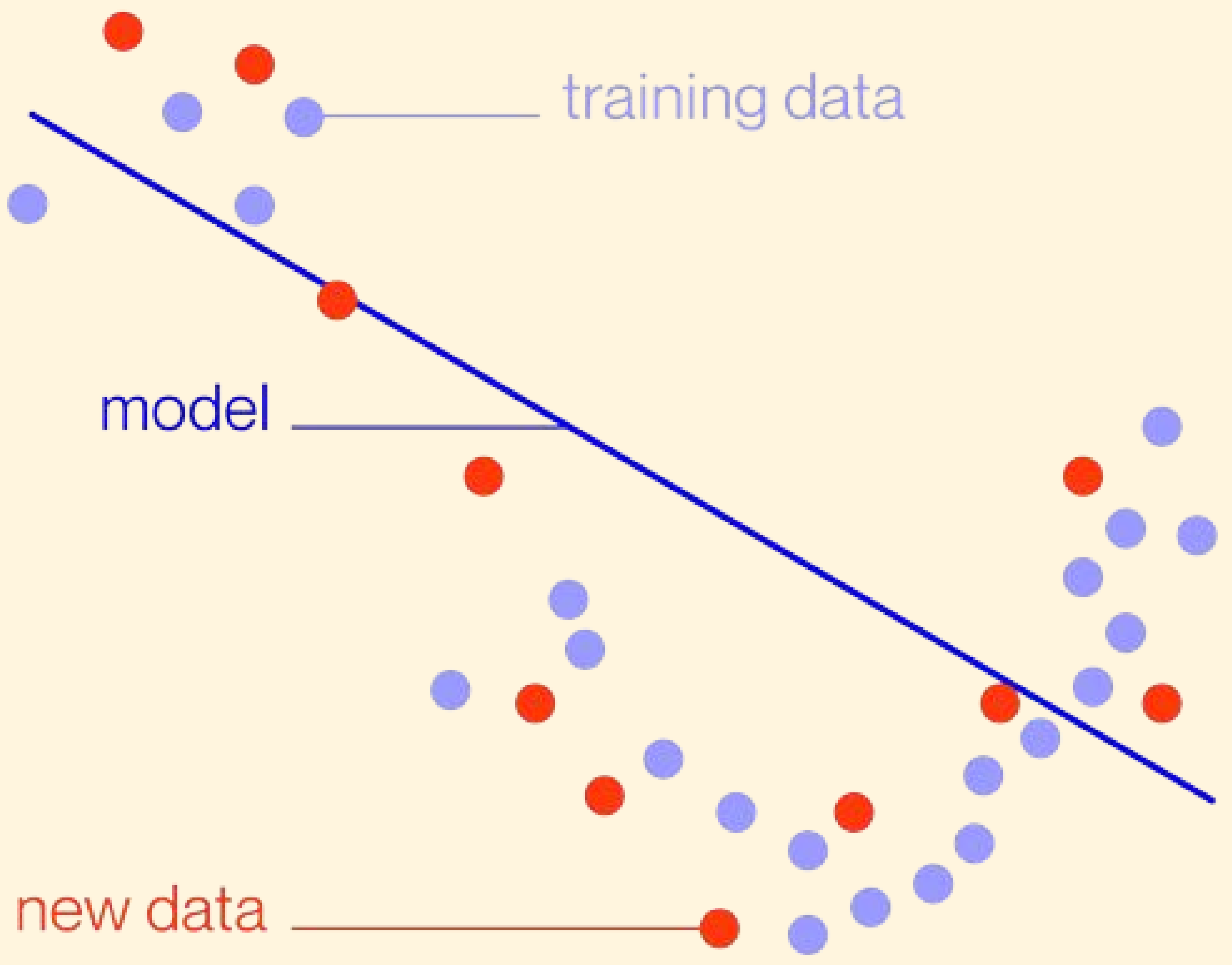


Underfitting



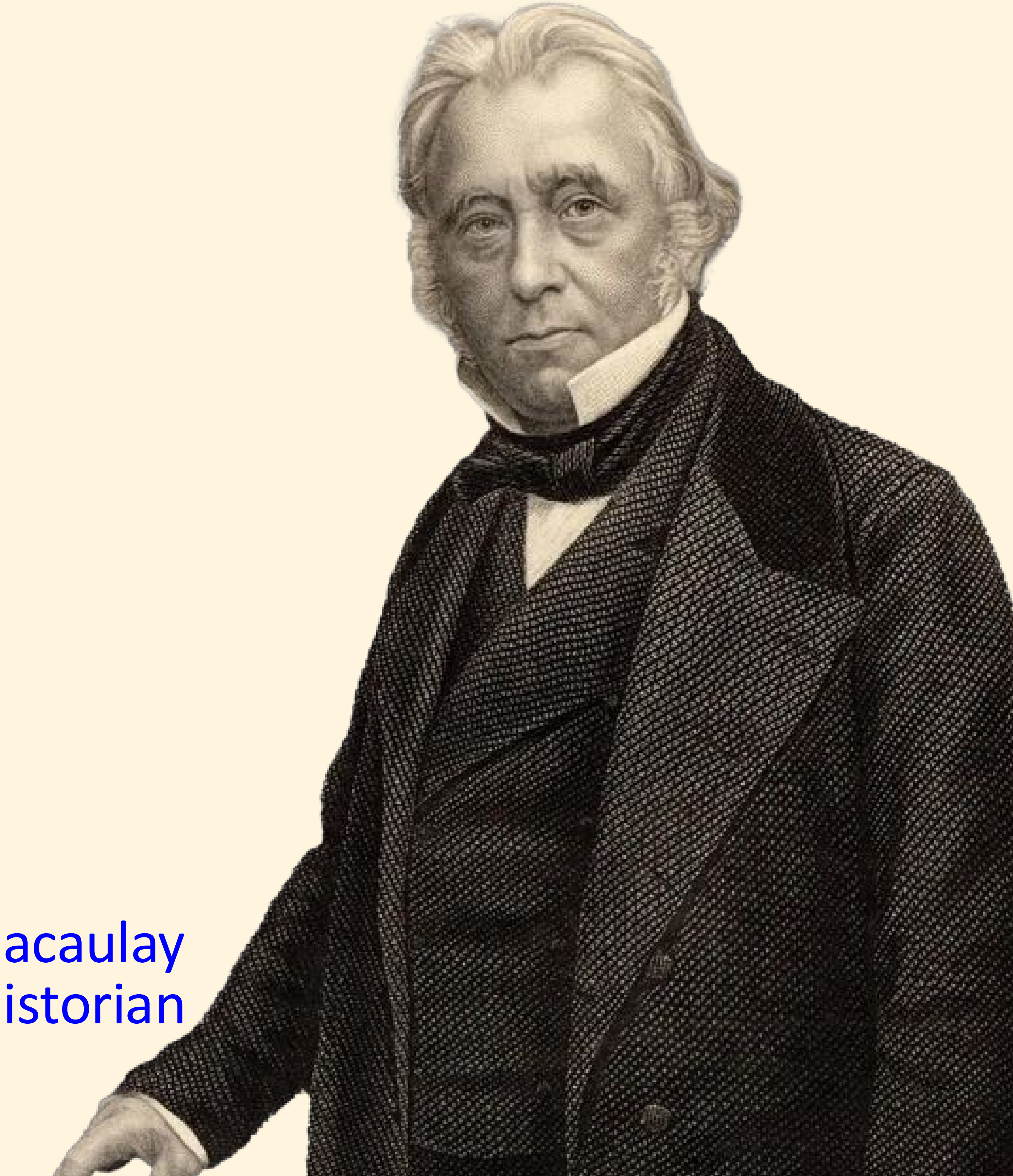
Underfitting

the underfitted model lacks the depth and complexity needed to make accurate predictions.



underfitting

" Half knowledge is worse than ignorance

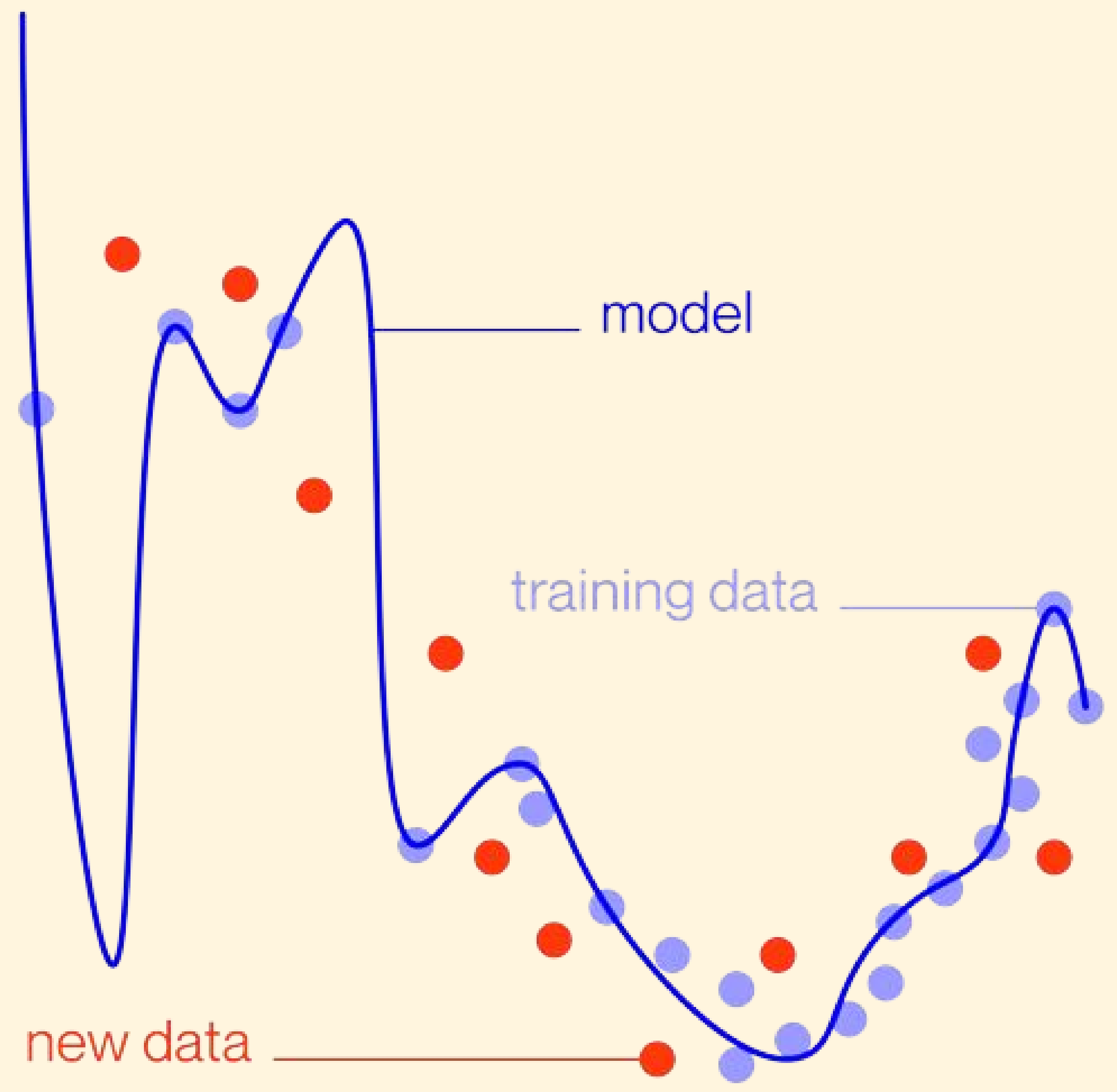


Thomas B. Macaulay
Historian

Overfitting

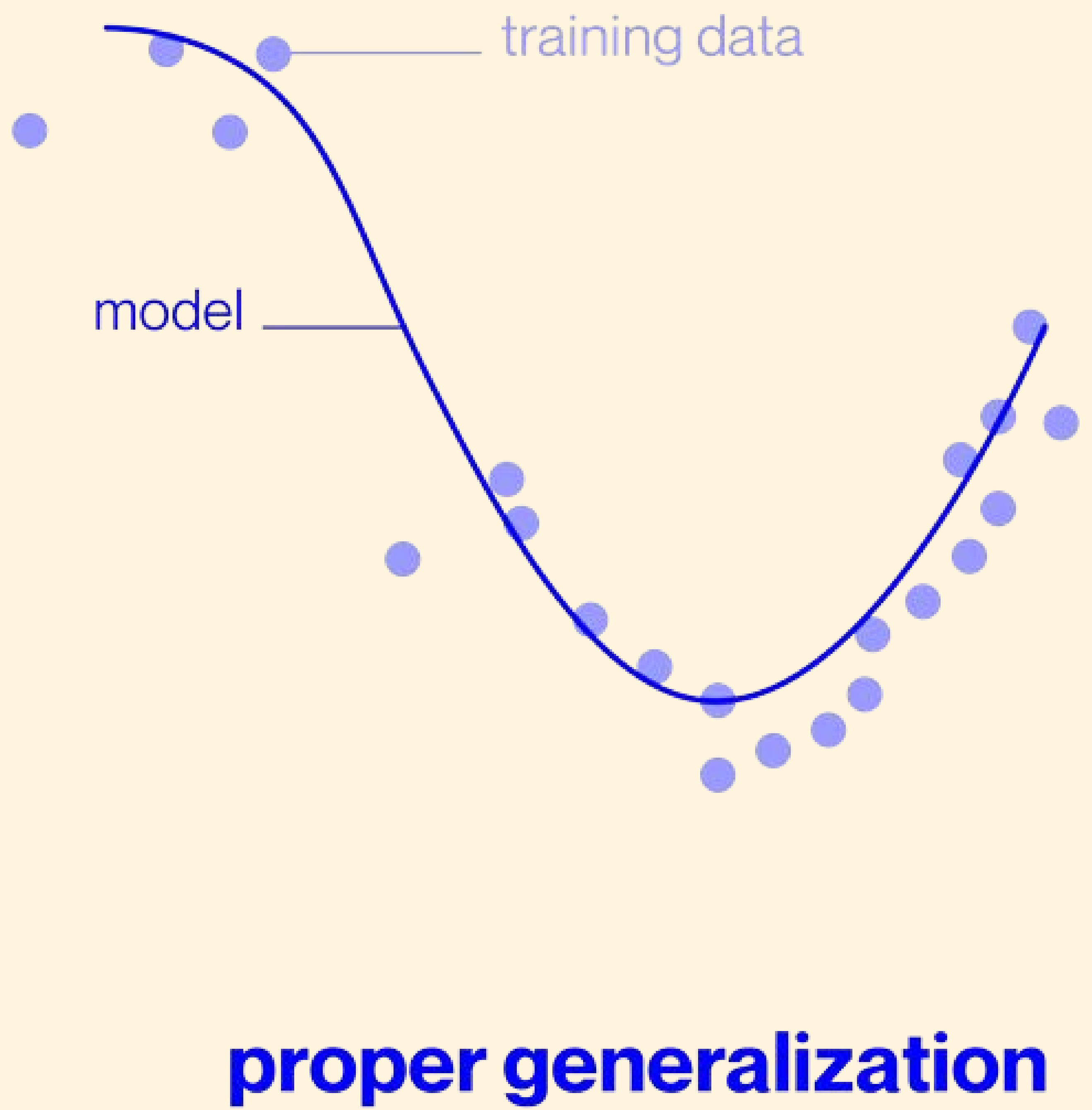
Overfitting

The overfitted model is so tailored to the training data that **it fails to generalize to new scenarios.**



overfitting

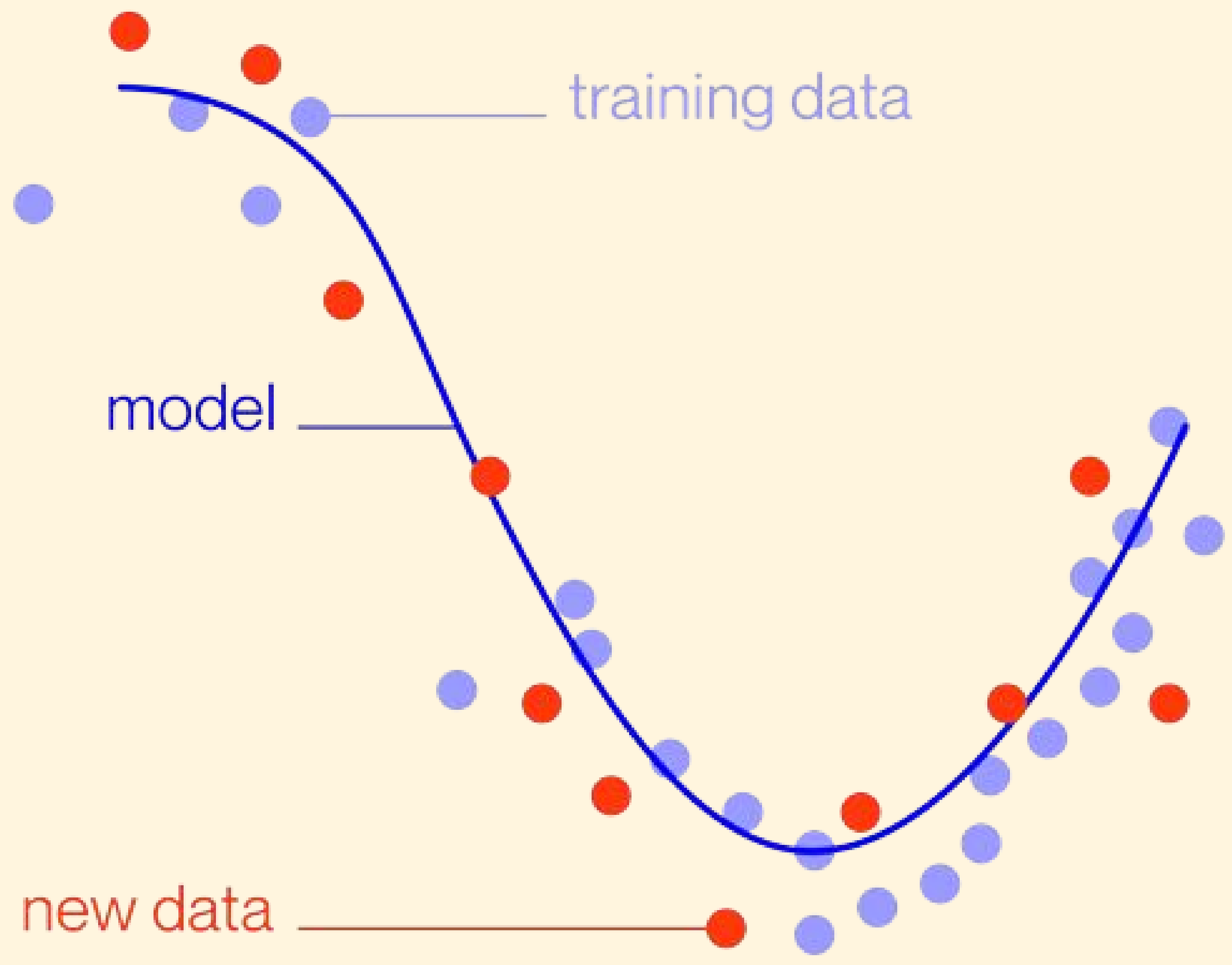
Proper Generalization



Proper Generalization

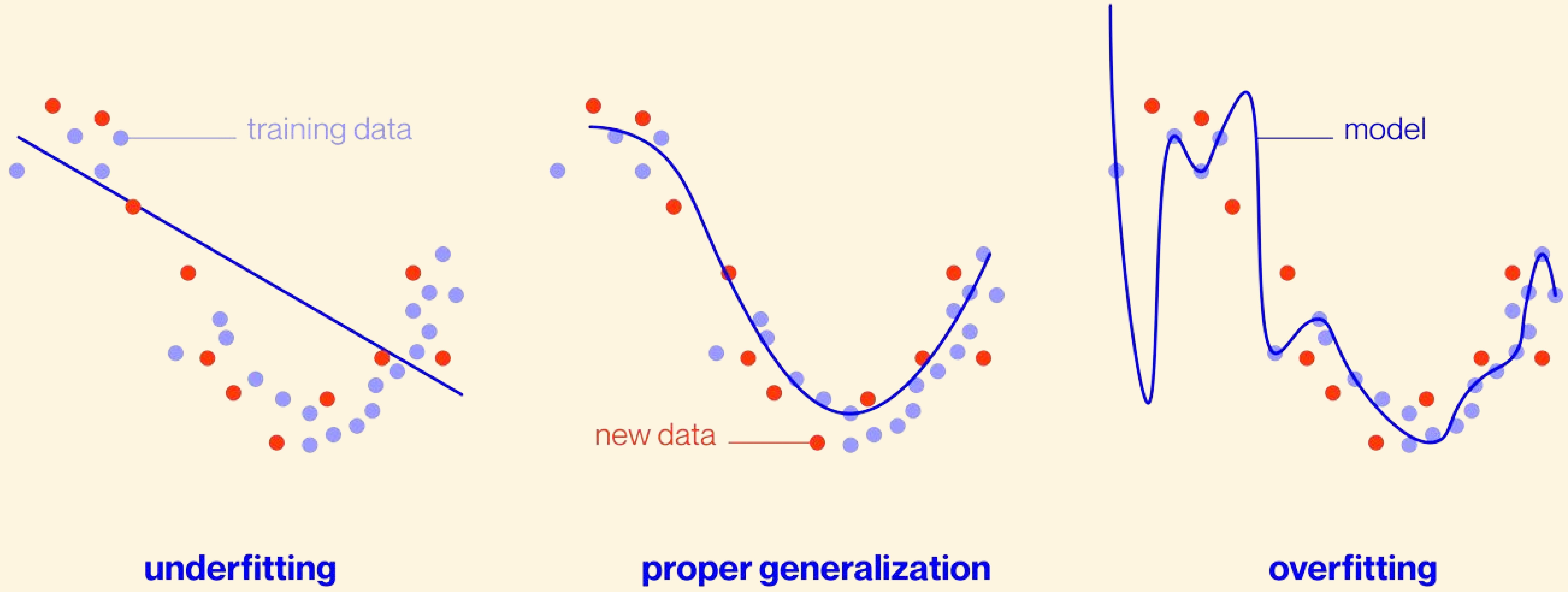
To ensure our model generalizes well, we aim for a **balance between the extremes of underfitting and overfitting.**

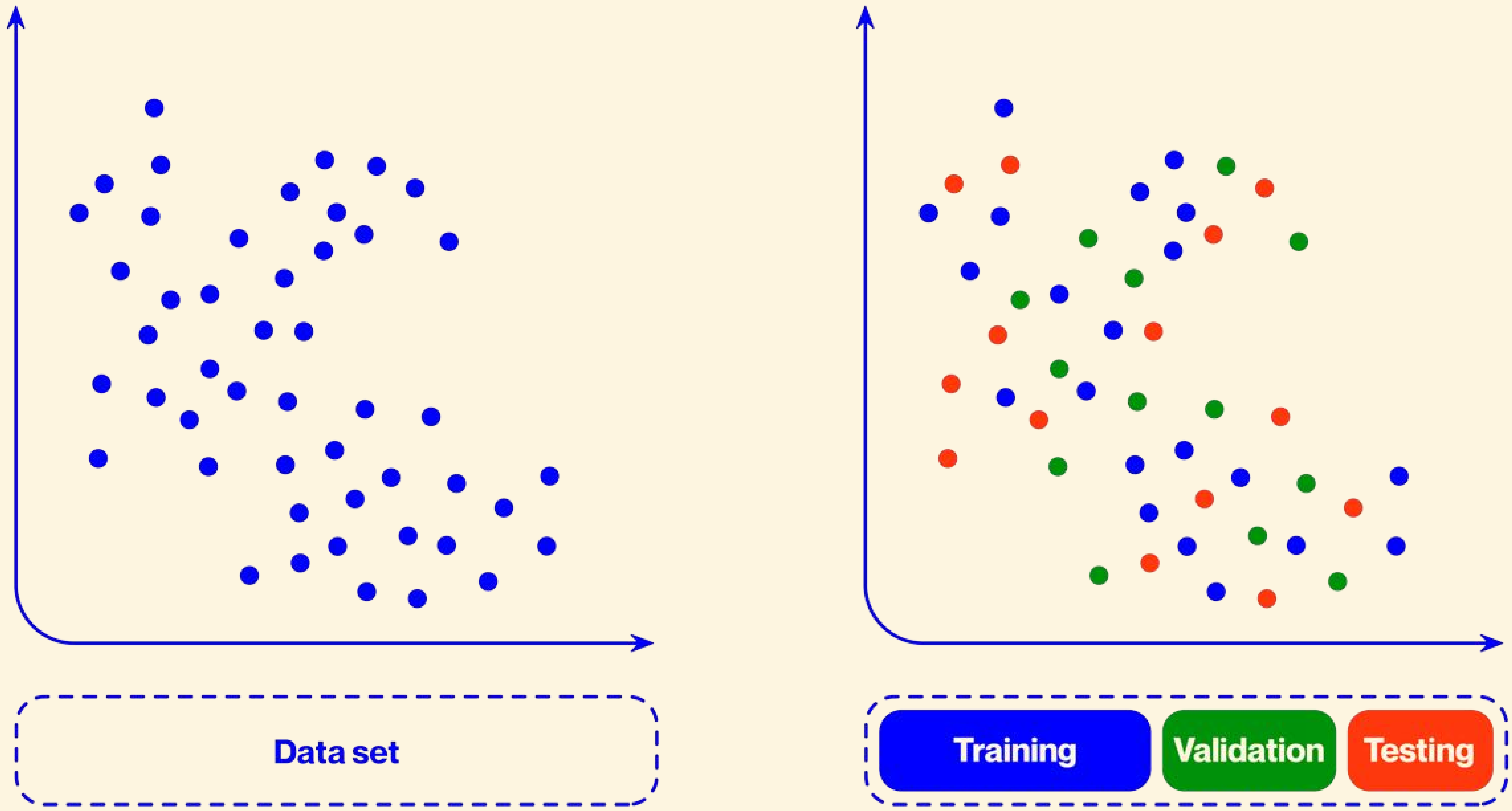
We want a model that learns the essential patterns from the training data without getting bogged down by its intricacies, **ensuring it performs well in real-world**



proper generalization

Model Valuation Generalisation



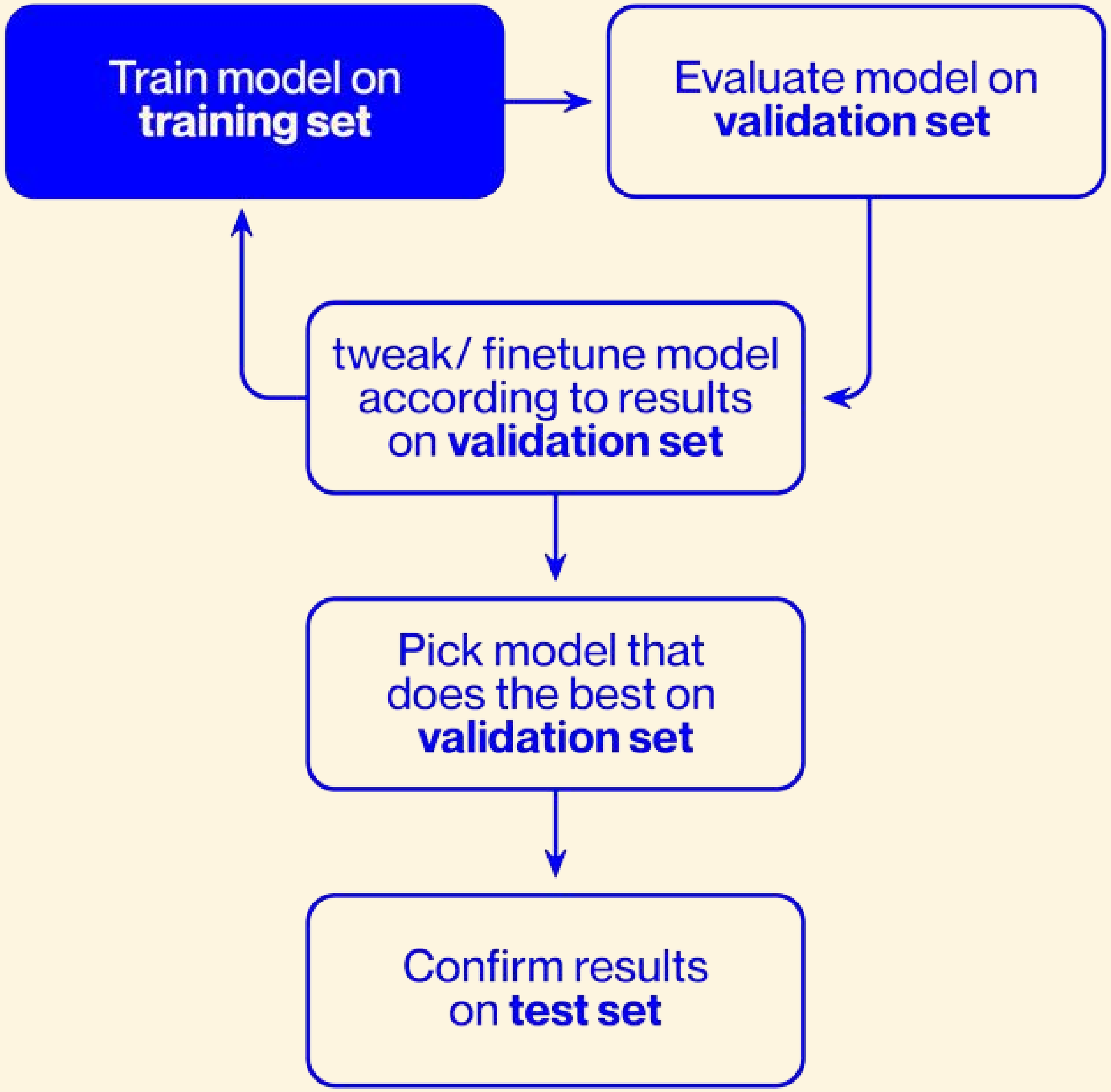

Data set
Training
Validation
Testing

How to pick the right model

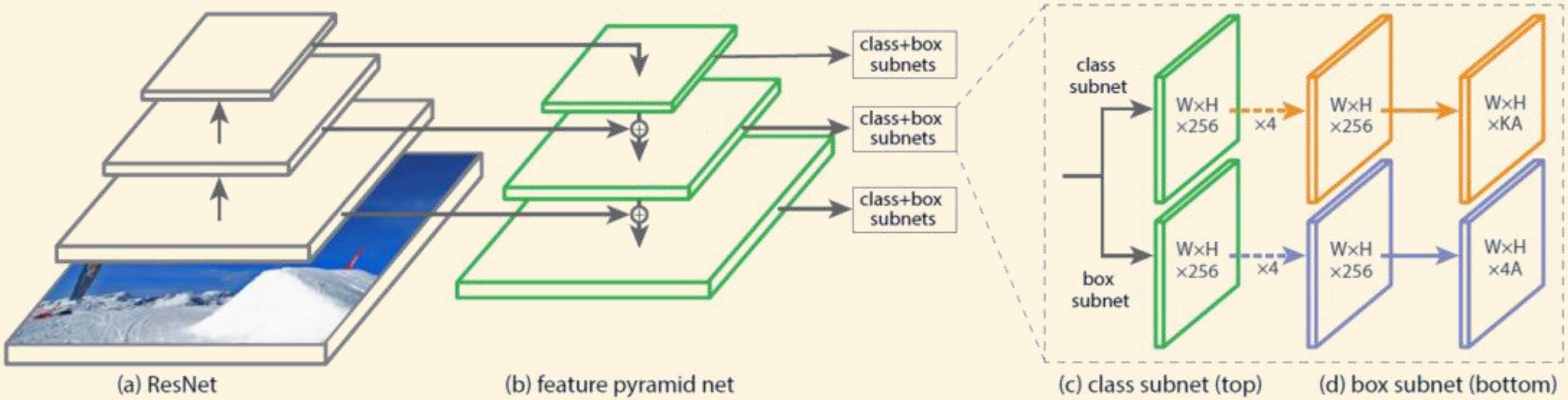
Model Validation refers to **the process of confirming that the model actually achieves its intended purpose.**

In most situations, this will involve confirmation that the model is predictive under the **conditions of its intended use.**

this type of validation occurs by comparing model simulations to an independant experimental data set. Data used in estimation of model parameter values cannot be included in the external data set.



The Model



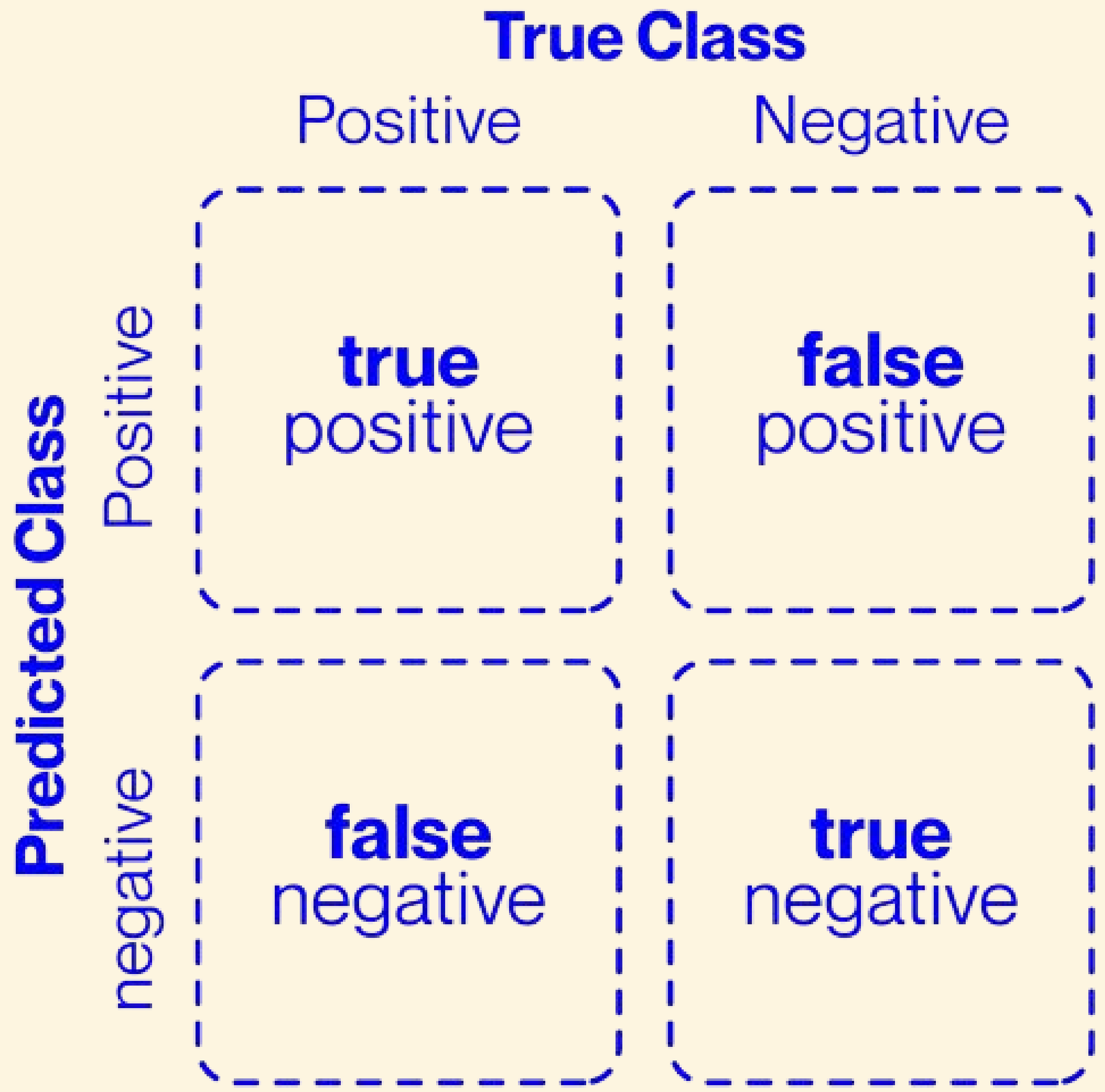
RetinaNet network architecture composed of four main components:
a) Bottom-up pathway; b) top-down pathway;
c) classification subnetwork; d) regression subnetwork

The Model

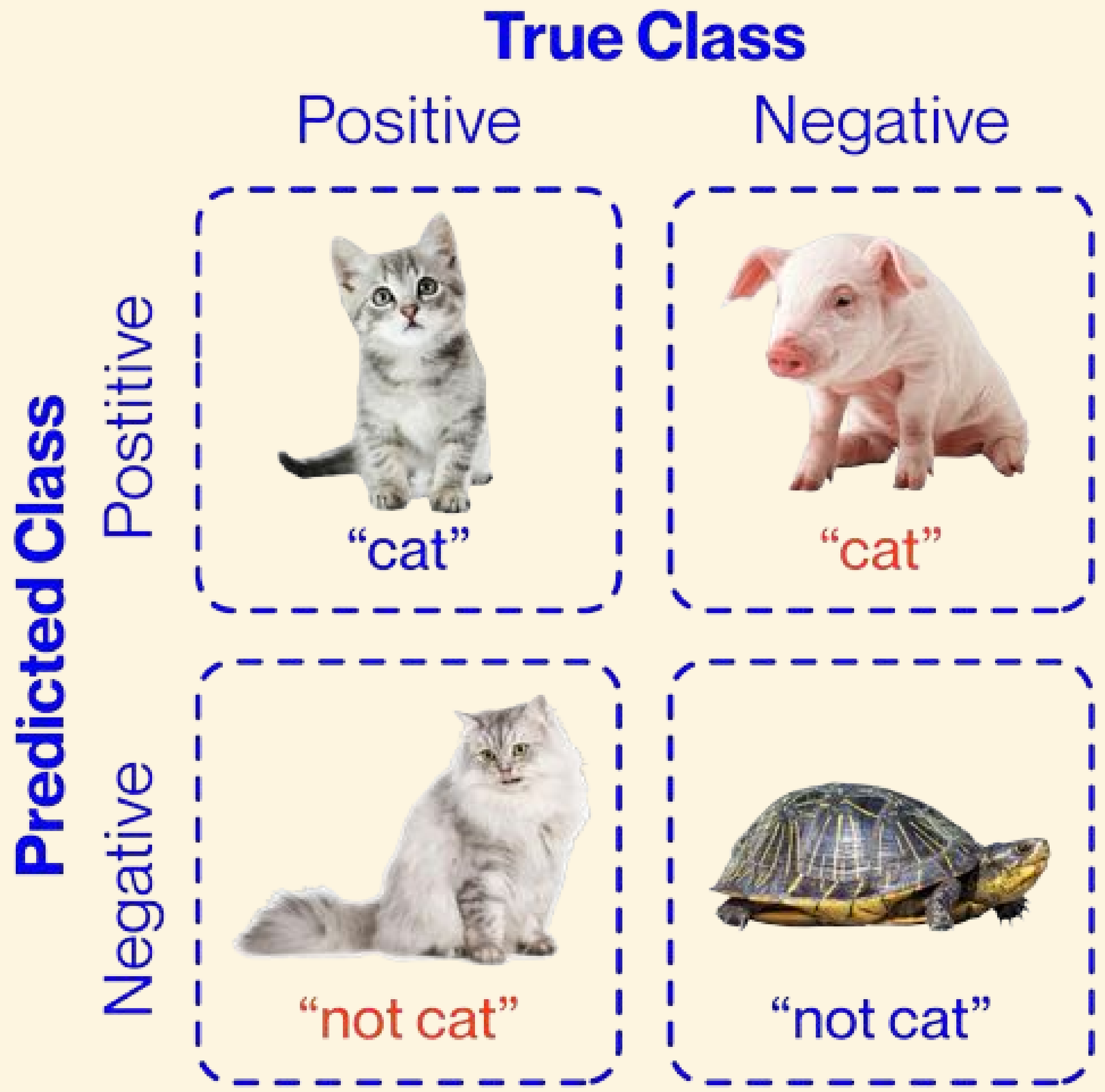
layer name	output size	18-layer	34-layer	50-layer	101-layer	152-layer
conv1	112×112	7×7, 64, stride 2				
conv2_x	56×56	3×3 max pool, stride 2				
		$\begin{bmatrix} 3\times3, 64 \\ 3\times3, 64 \end{bmatrix}\times2$	$\begin{bmatrix} 3\times3, 64 \\ 3\times3, 64 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 64 \\ 3\times3, 64 \\ 1\times1, 256 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 64 \\ 3\times3, 64 \\ 1\times1, 256 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 64 \\ 3\times3, 64 \\ 1\times1, 256 \end{bmatrix}\times3$
conv3_x	28×28	$\begin{bmatrix} 3\times3, 128 \\ 3\times3, 128 \end{bmatrix}\times2$	$\begin{bmatrix} 3\times3, 128 \\ 3\times3, 128 \end{bmatrix}\times4$	$\begin{bmatrix} 1\times1, 128 \\ 3\times3, 128 \\ 1\times1, 512 \end{bmatrix}\times4$	$\begin{bmatrix} 1\times1, 128 \\ 3\times3, 128 \\ 1\times1, 512 \end{bmatrix}\times4$	$\begin{bmatrix} 1\times1, 128 \\ 3\times3, 128 \\ 1\times1, 512 \end{bmatrix}\times8$
conv4_x	14×14	$\begin{bmatrix} 3\times3, 256 \\ 3\times3, 256 \end{bmatrix}\times2$	$\begin{bmatrix} 3\times3, 256 \\ 3\times3, 256 \end{bmatrix}\times6$	$\begin{bmatrix} 1\times1, 256 \\ 3\times3, 256 \\ 1\times1, 1024 \end{bmatrix}\times6$	$\begin{bmatrix} 1\times1, 256 \\ 3\times3, 256 \\ 1\times1, 1024 \end{bmatrix}\times23$	$\begin{bmatrix} 1\times1, 256 \\ 3\times3, 256 \\ 1\times1, 1024 \end{bmatrix}\times36$
conv5_x	7×7	$\begin{bmatrix} 3\times3, 512 \\ 3\times3, 512 \end{bmatrix}\times2$	$\begin{bmatrix} 3\times3, 512 \\ 3\times3, 512 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 512 \\ 3\times3, 512 \\ 1\times1, 2048 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 512 \\ 3\times3, 512 \\ 1\times1, 2048 \end{bmatrix}\times3$	$\begin{bmatrix} 1\times1, 512 \\ 3\times3, 512 \\ 1\times1, 2048 \end{bmatrix}\times3$
	1×1	average pool, 1000-d fc, softmax				
FLOPs		1.8×10^9	3.6×10^9	3.8×10^9	7.6×10^9	11.3×10^9

Classification Confusion Matrix

A confusion matrix is a **summary of prediction results on a classification problem**



Classification Confusion Matrix

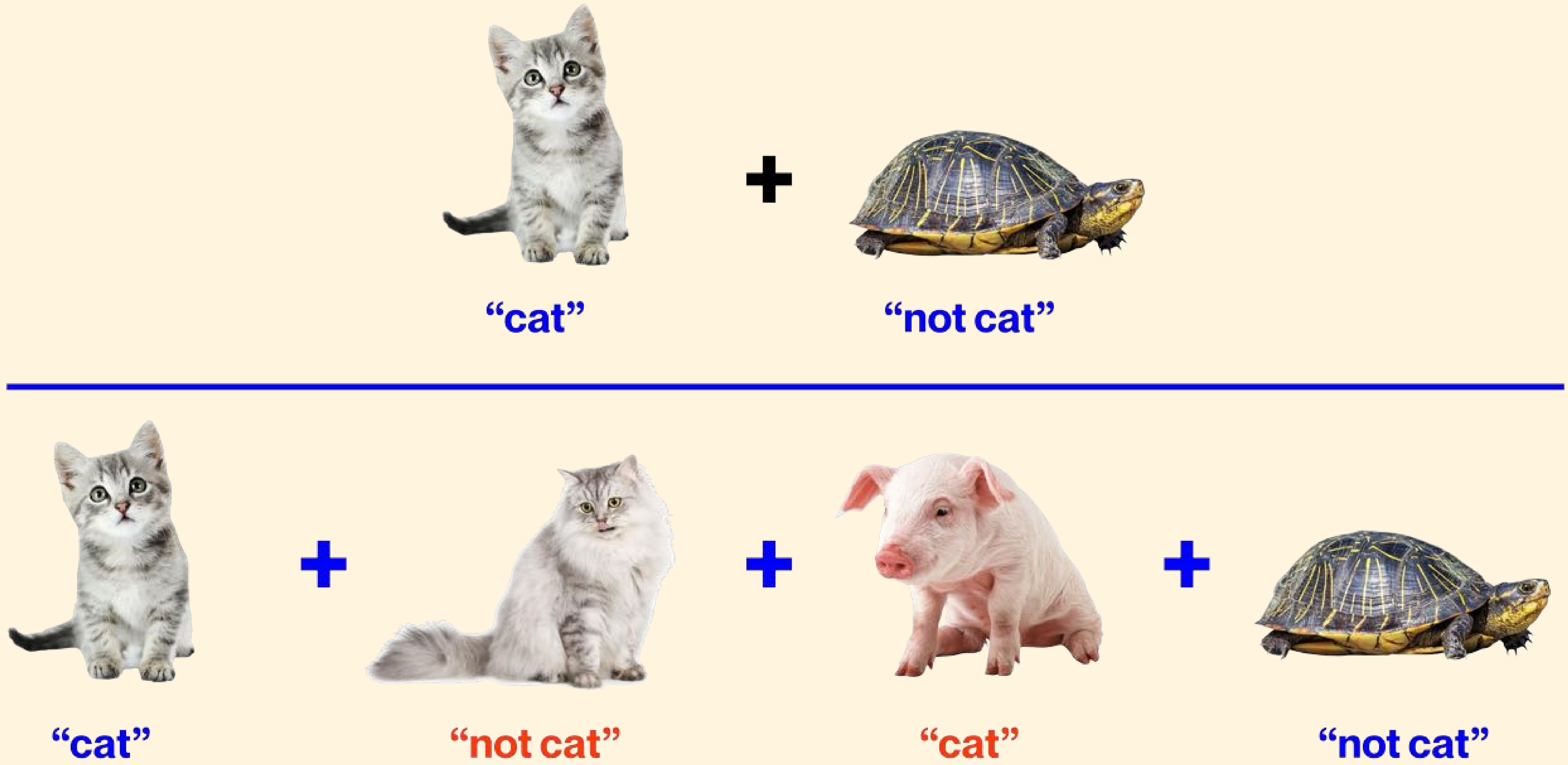


Classification Accuracy

Accuracy is defined as the percentage of correct predicitions for the test data. It can be calculated by deviding the number of correct predictions by the number of total predictions.

$$\textbf{Accuracy} = \frac{\textbf{Correct predictions}}{\textbf{All predictions}}$$

Classification Accuracy



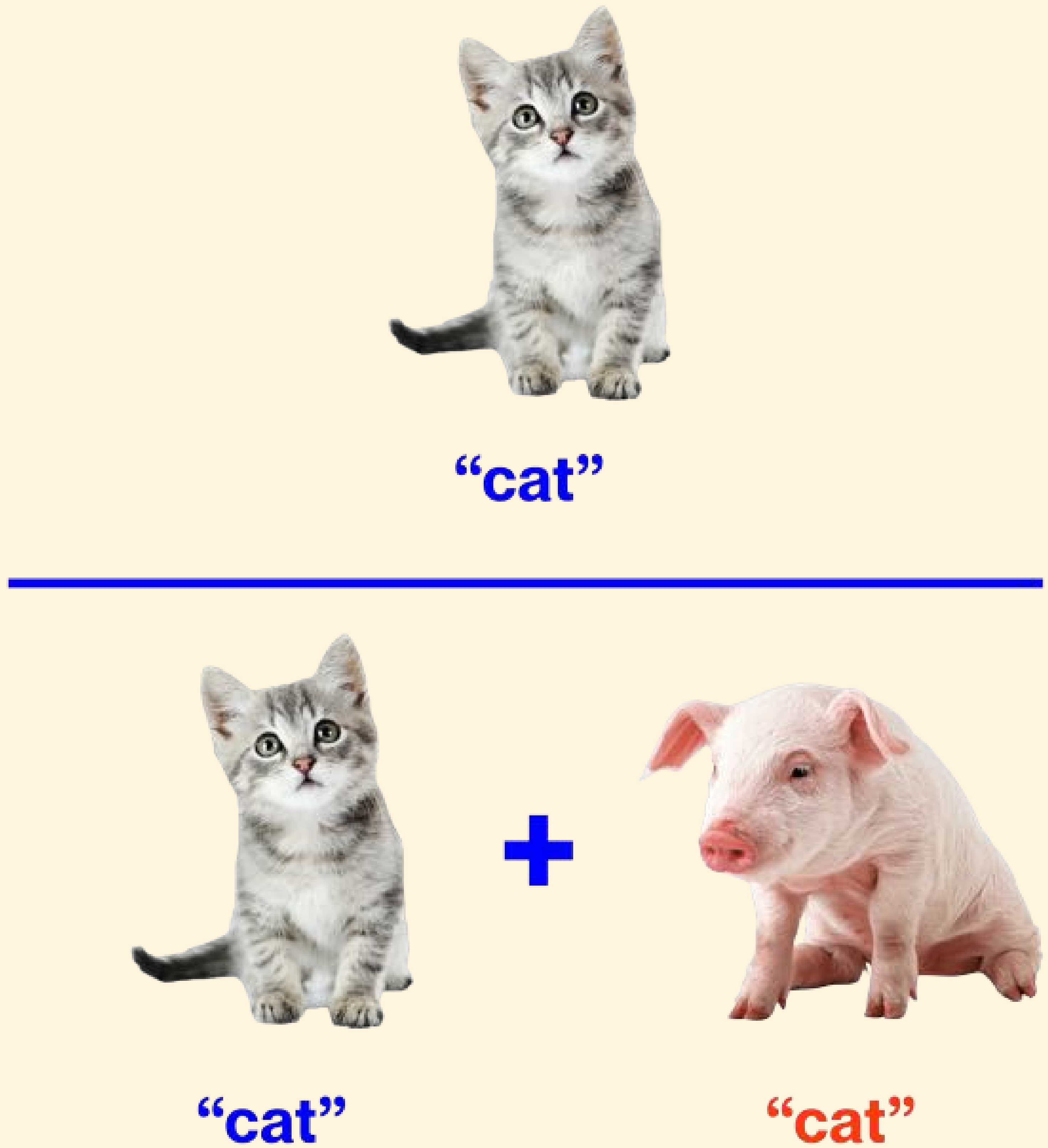
Classification Precision

Precision is defined as a fraction of relevant examples (true positives) among all off the examples which were predictied alto belong in a certain class.

Or: Out of all examples that are predicted as positive, how many are actually positive?

$$\textbf{Precision} = \frac{\text{True Positives}}{\textbf{True + False positives}}$$

Classification Precision



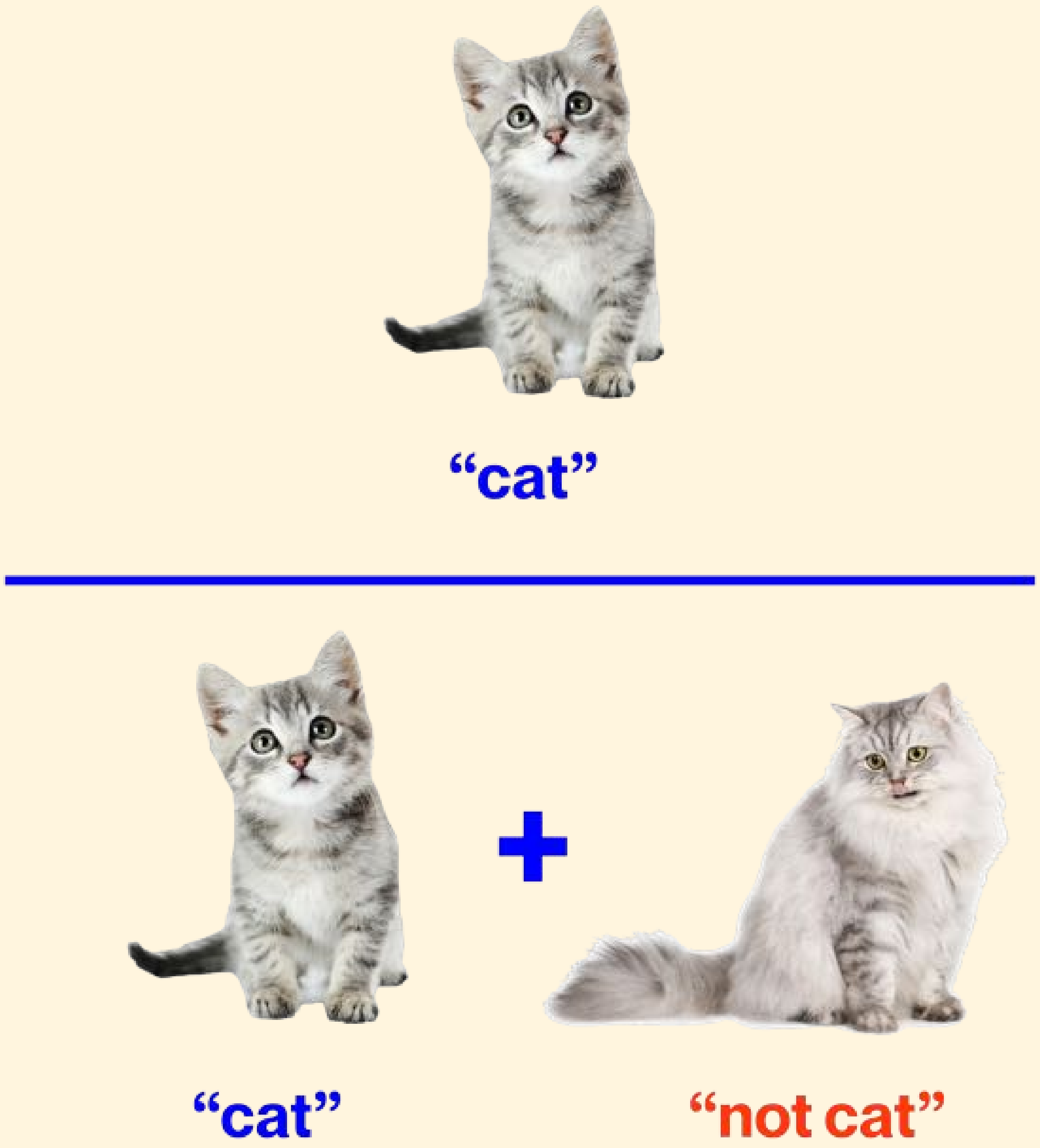
Classification Recall

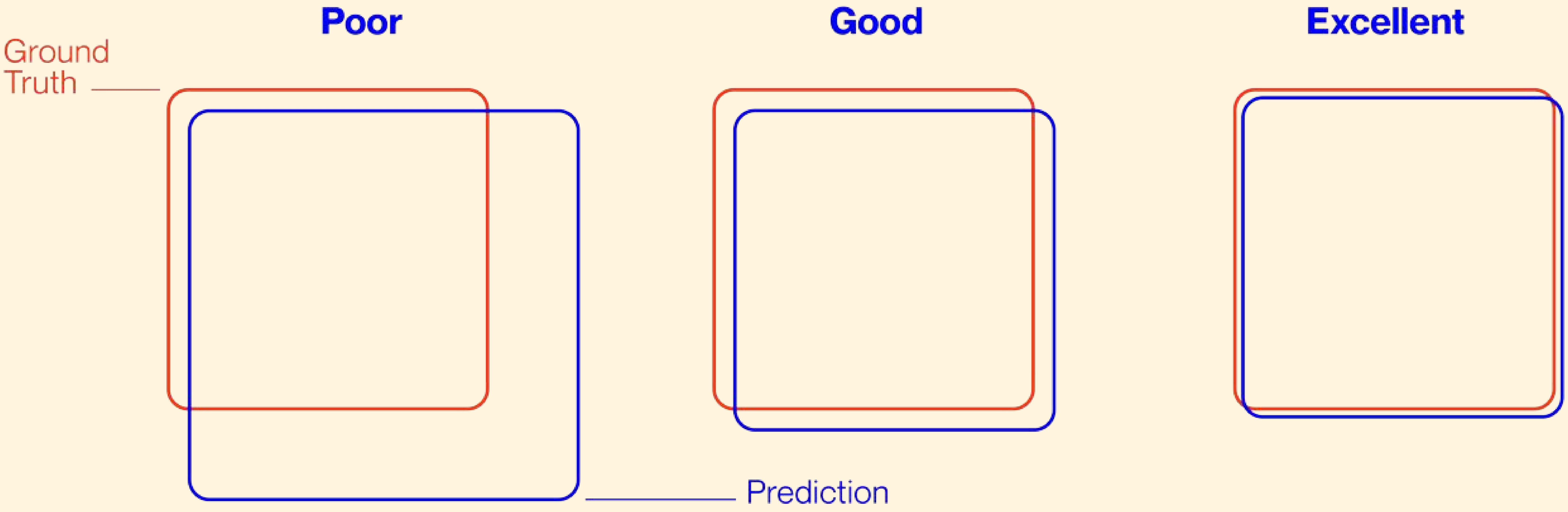
Recall is defined as the fraction of examples which were predicted to belong to a class **with respect to all of the examples truly belonging to said class.**

Or: Out of all positive examples, how many are really predicted as positive.

$$\textbf{Recall} = \frac{\text{True Positives}}{\textbf{True Postives + False negatives}}$$

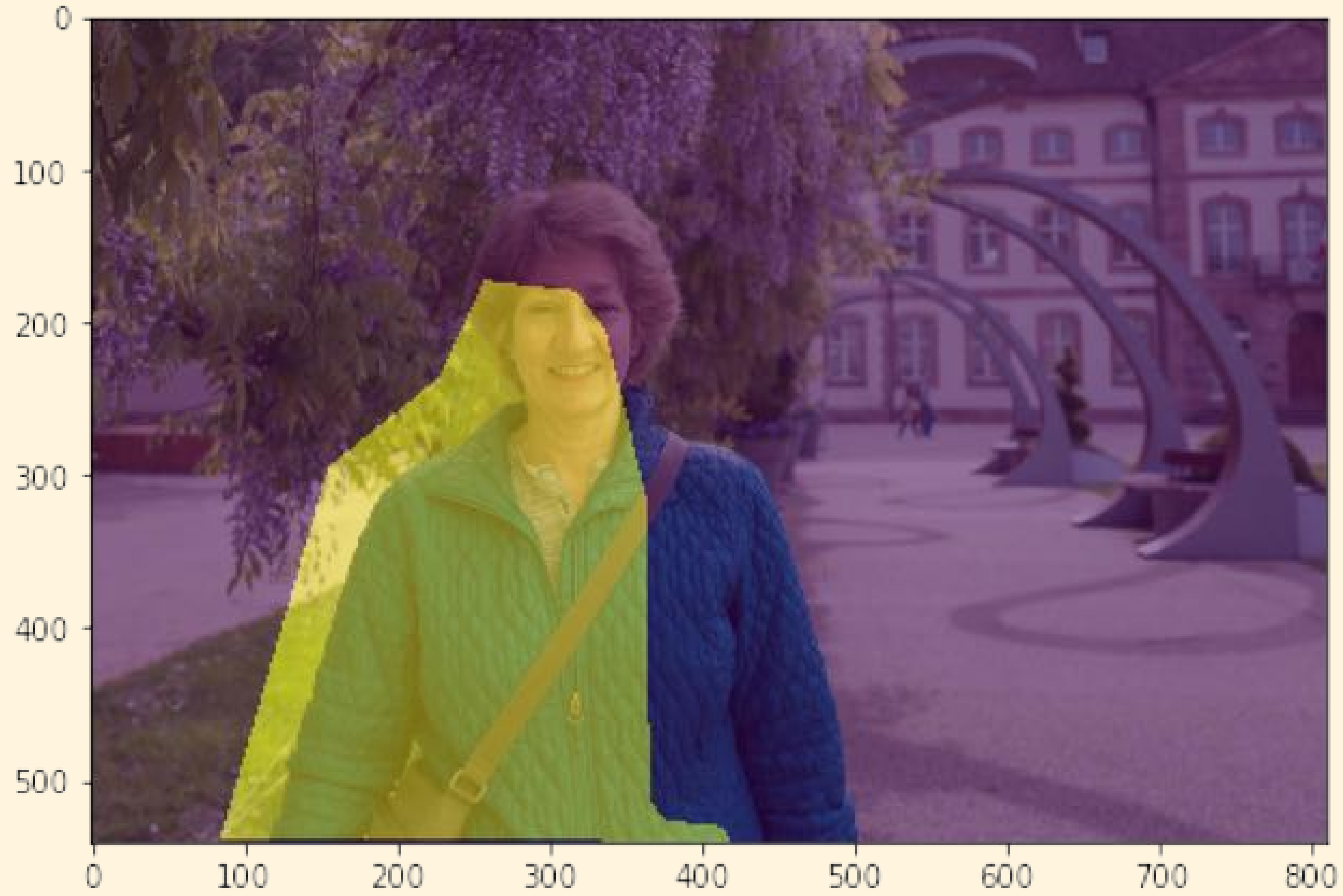
Classification Recall





Ground truth refers to information that is known to be real or true,
obtained through direct observation and measurement rather than inference.

Ground Truth vs. Prediciton

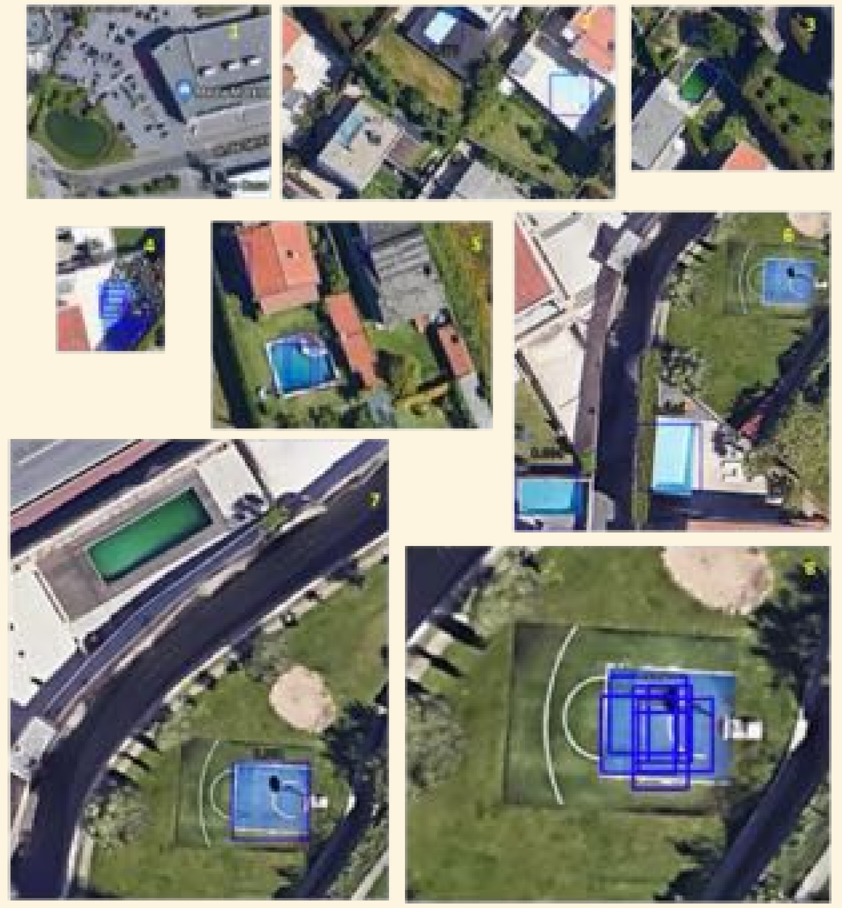


Testing Set

1. presence of a lake and a blue tag, 433 × 340 pixels
2. encloses two swimming pools and a pool look-alike glassstructure, 442×258 pixels
3. a pool without one of the most common characteristics, the blue colour, 298 × 241 pixels
4. very small and high zoom image, 100 × 118 pixels
5. unusual swimming pool body, 366 × 270 pixels
6. very high-quality 3-dimensional picture with two pools and a basketball court, 1351 × 1364 pixels
7. the same court as in image 6 and a green swimming pool, 1099 × 1333 pixels,
8. the basketball court seen in images 6 and 7 but with higher zoom percentage, 732 × 613 pixels

Eight test images taken from *Google Maps* with different sizes and resolutions.

Model Selection



RetinaNet + ResNet50

The models with ResNet50 and ResNet101 are not able to detect unusually coloured pools, green as in the tested examples.

The results show that the model with ResNet50 is sensitive to the zoom of the image, indicating a wrong classification of objects when the zoom percentage is high

RetinaNet + ResNet101

The models with ResNet50 and ResNet101 are not able to detect unusually coloured pools, green as in the tested examples.

RetinaNet + ResNet152

Classification of exceptionally small images is difficult for the model with ResNet152.

Model Selection

	TP	TN	FP	FN	Accuracy	Precision	Sensitivity	Specificity	Type I	Type II
ResNet50	471	2200	18	149	0.9412	0.9632	0.7600	0.9919	0.0081	0.2400
ResNet101	480	2285	7	140	0.9495	0.9856	0.7742	0.9969	0.0031	0.2258
ResNet152	503	2241	6	117	0.9571	0.9882	0.8113	0.9973	0.0027	0.1887

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	TP	TN	FP	FN	Accuracy	Precision	Sensitivity	Specificity	Type I	Type II
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ResNet152	503	2241	6	117	0.9571	0.9882	0.8113	0.9973	0.0027	0.1887

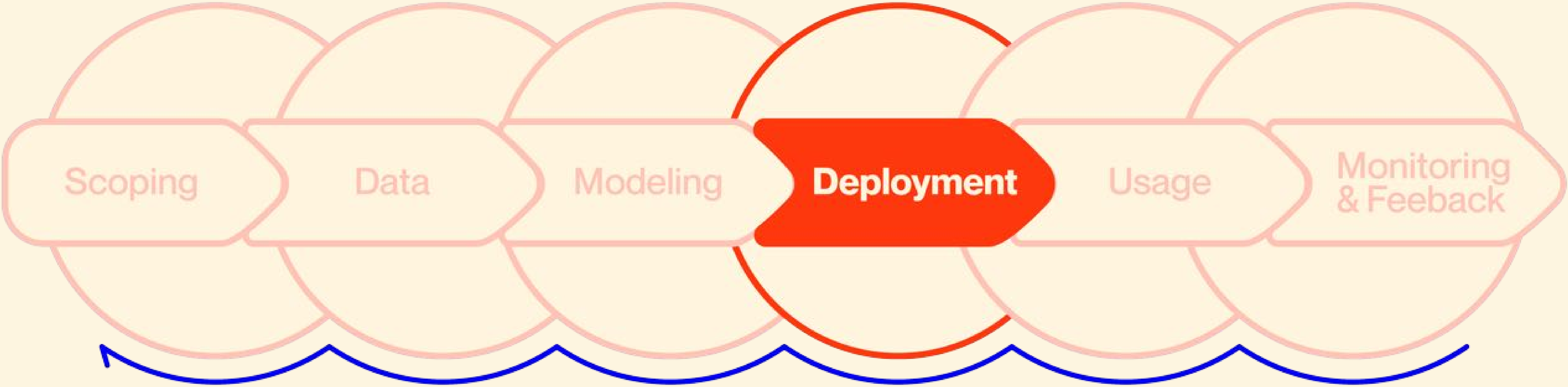
Modelling

- Use the provided data set from Google drive to gather and group images into classes
- Use Google Teachable Machine to train your model on these classes
- Test the model model to ensure it can correctly classify new examples
- Save the model later for the presentation

08:00

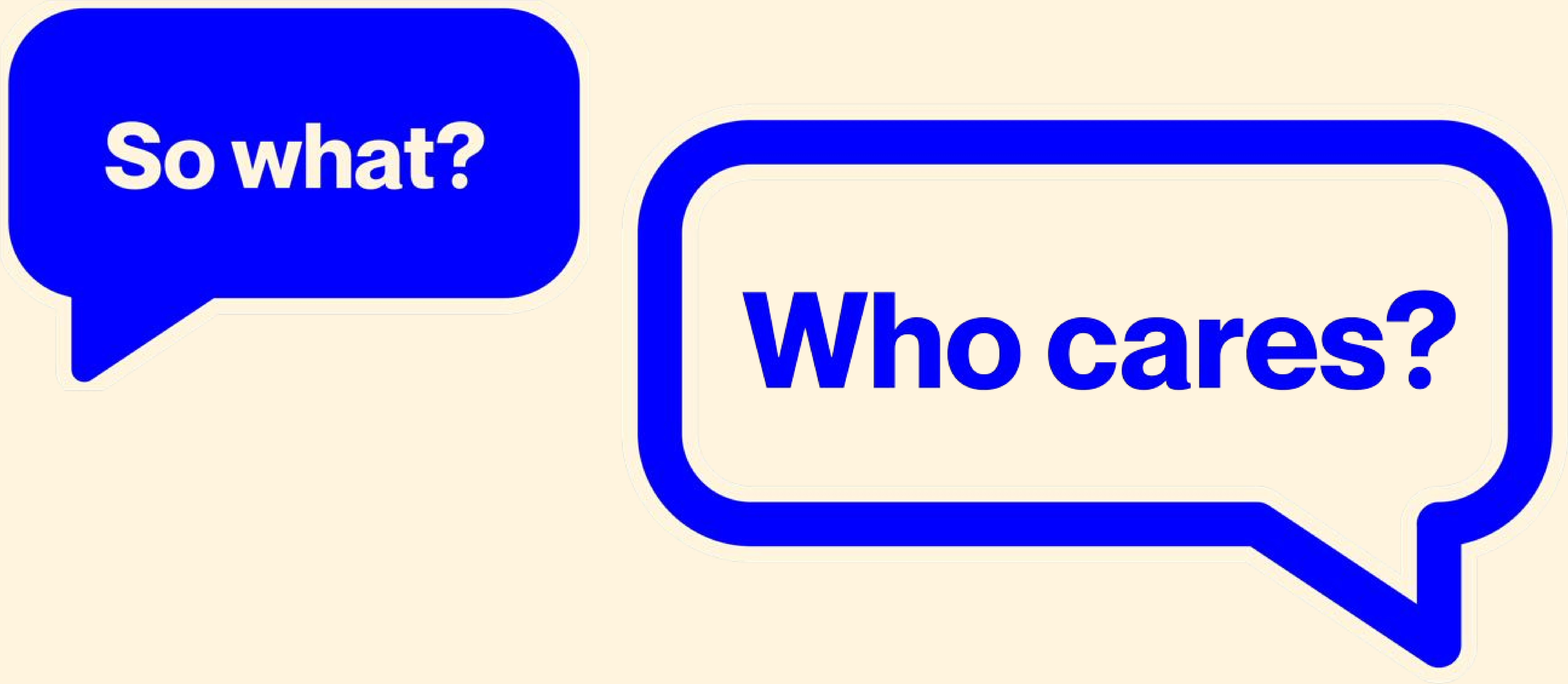
Deployment

Human Centric ML Lifecycle

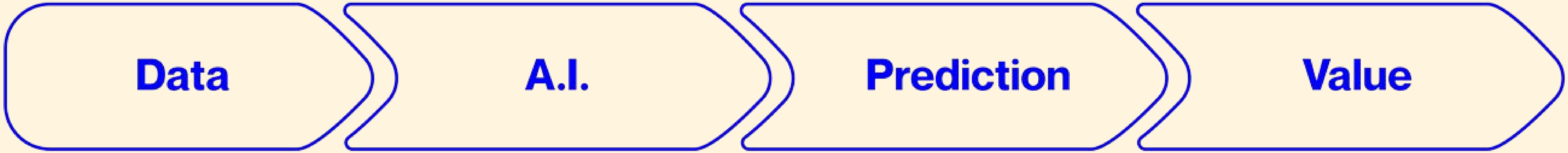


This Process is ever iterative.
Developments in later stages may require revisiting earlier ones.

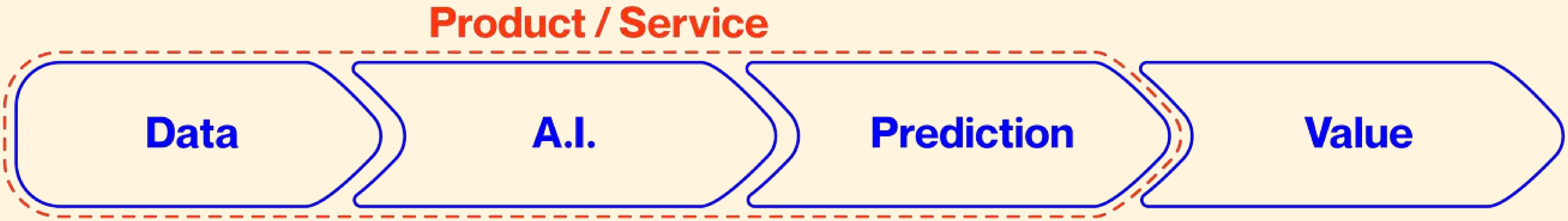

NOW YOU CAN
DETECT SWIMMING POOLS
TELL ME MORE


So what?
Who cares?

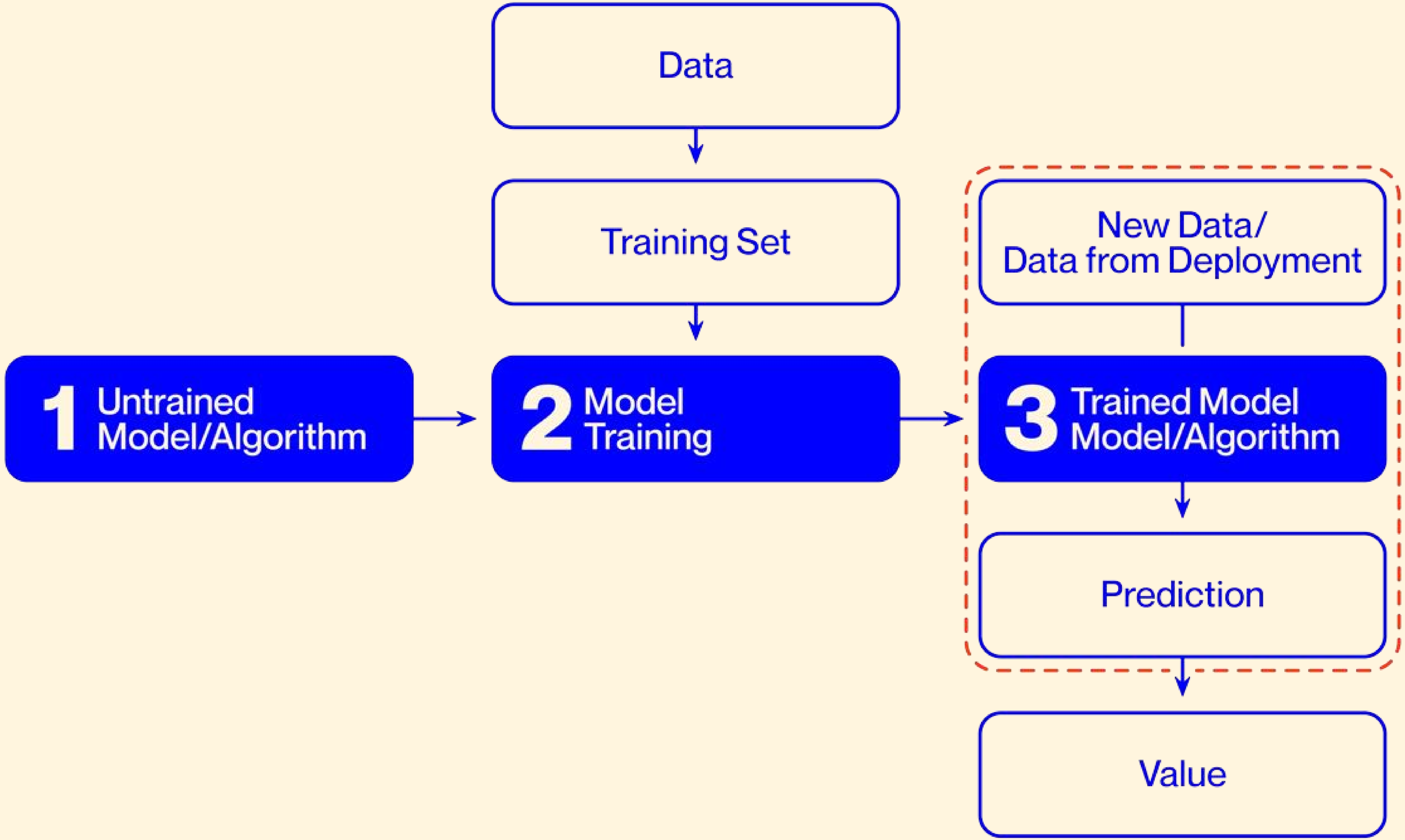
Creating Value

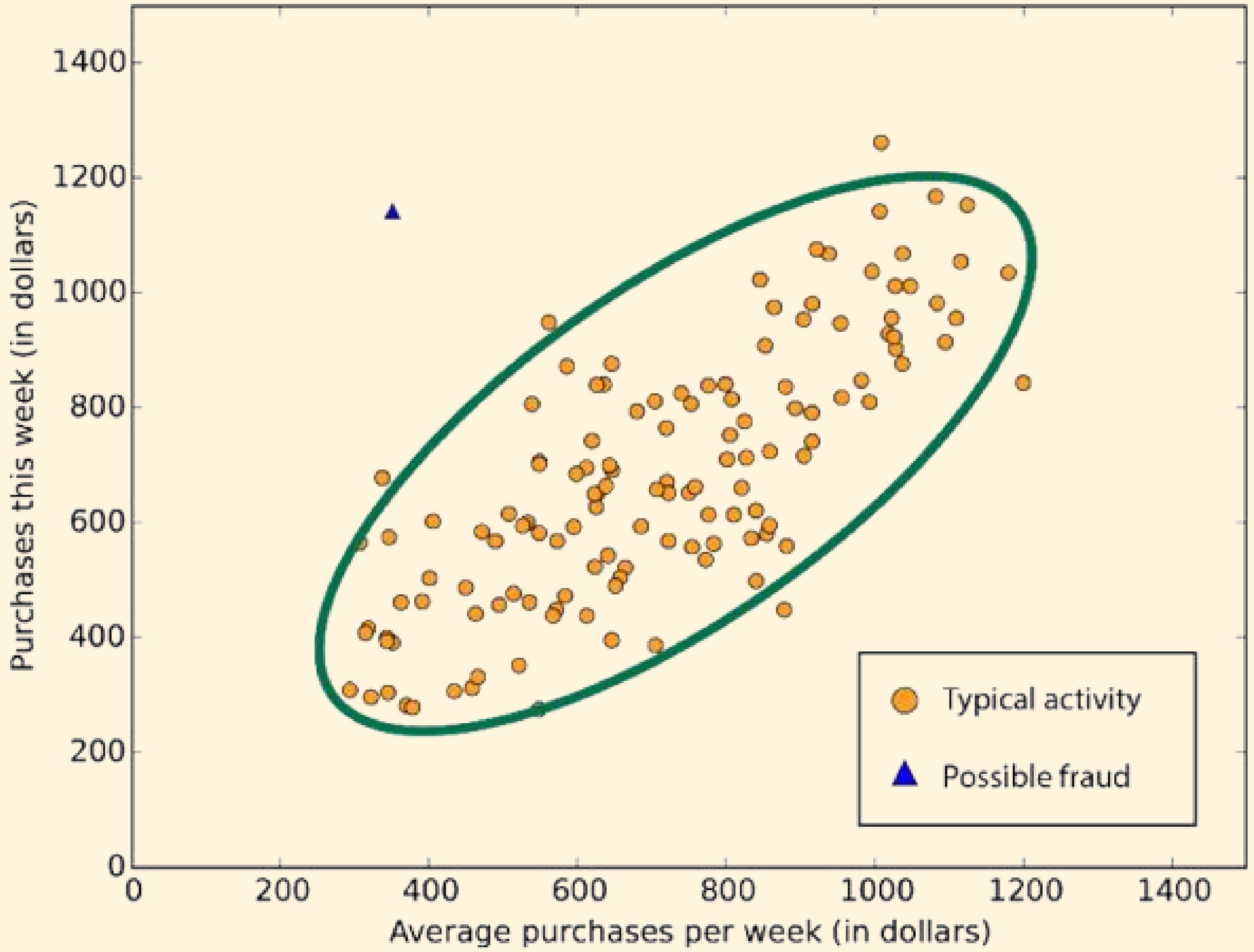


Creating Value



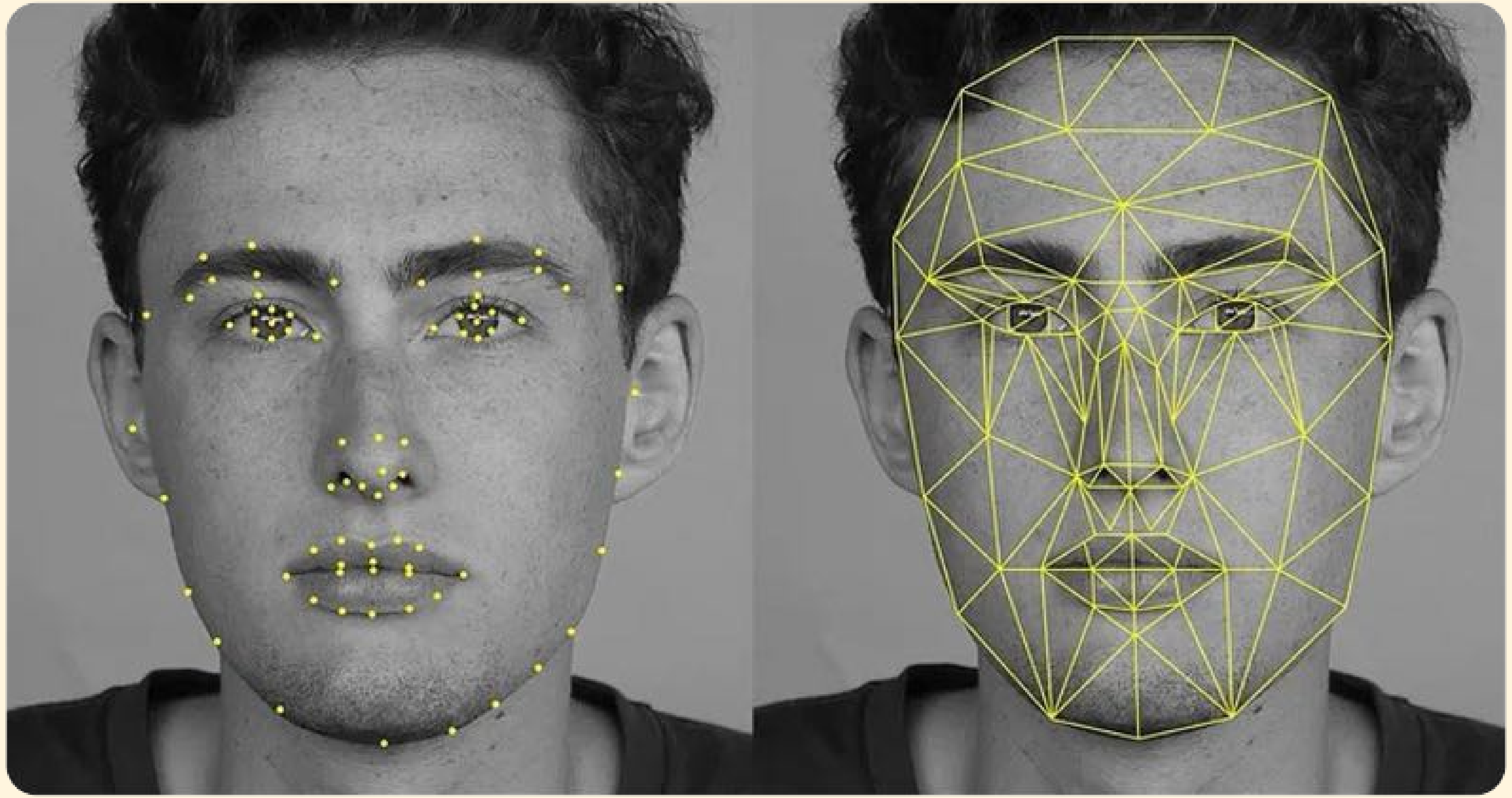
Creating Value





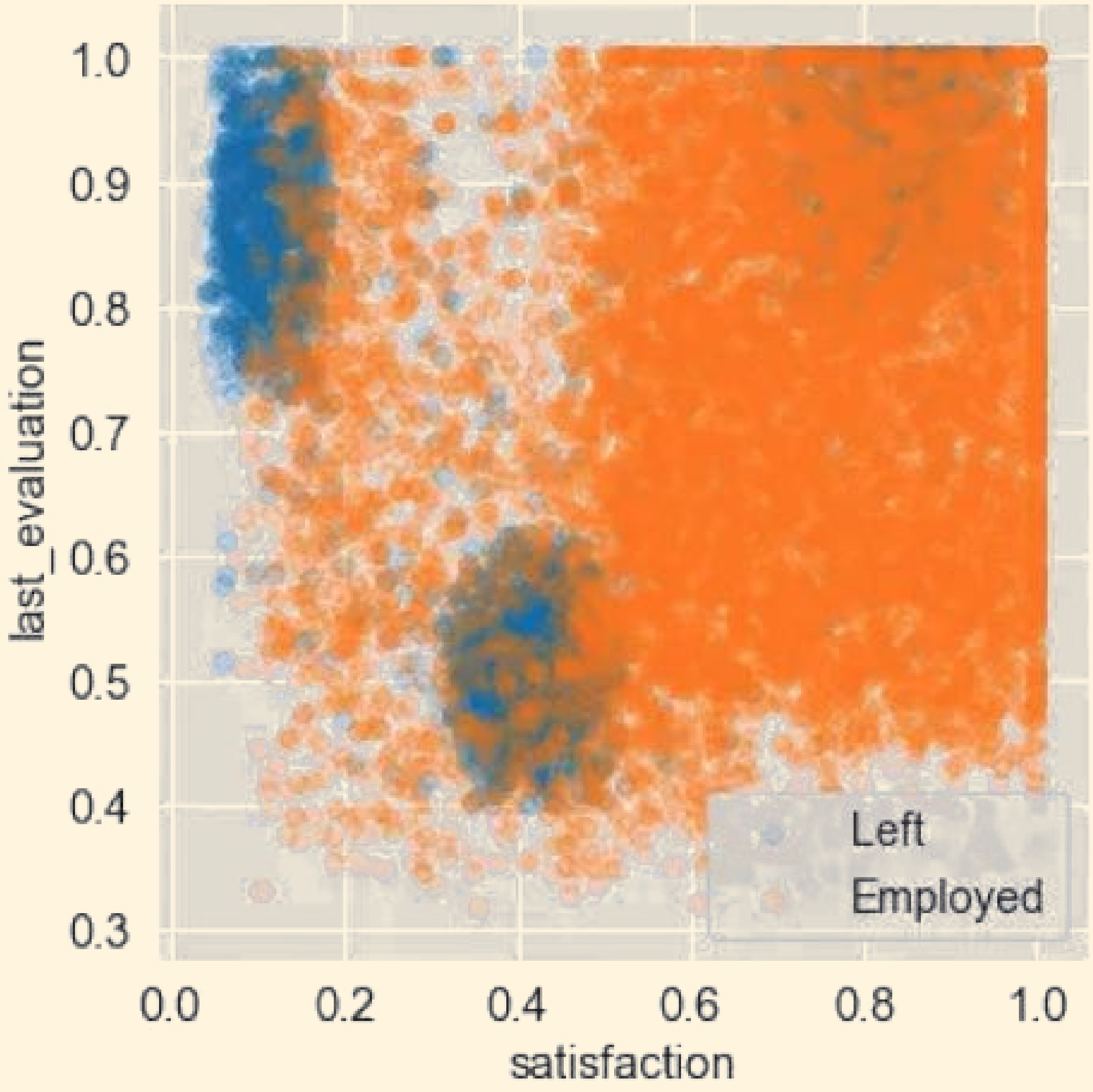
Model that predicts wther a transaction is fraudulent or not

Inform Customer



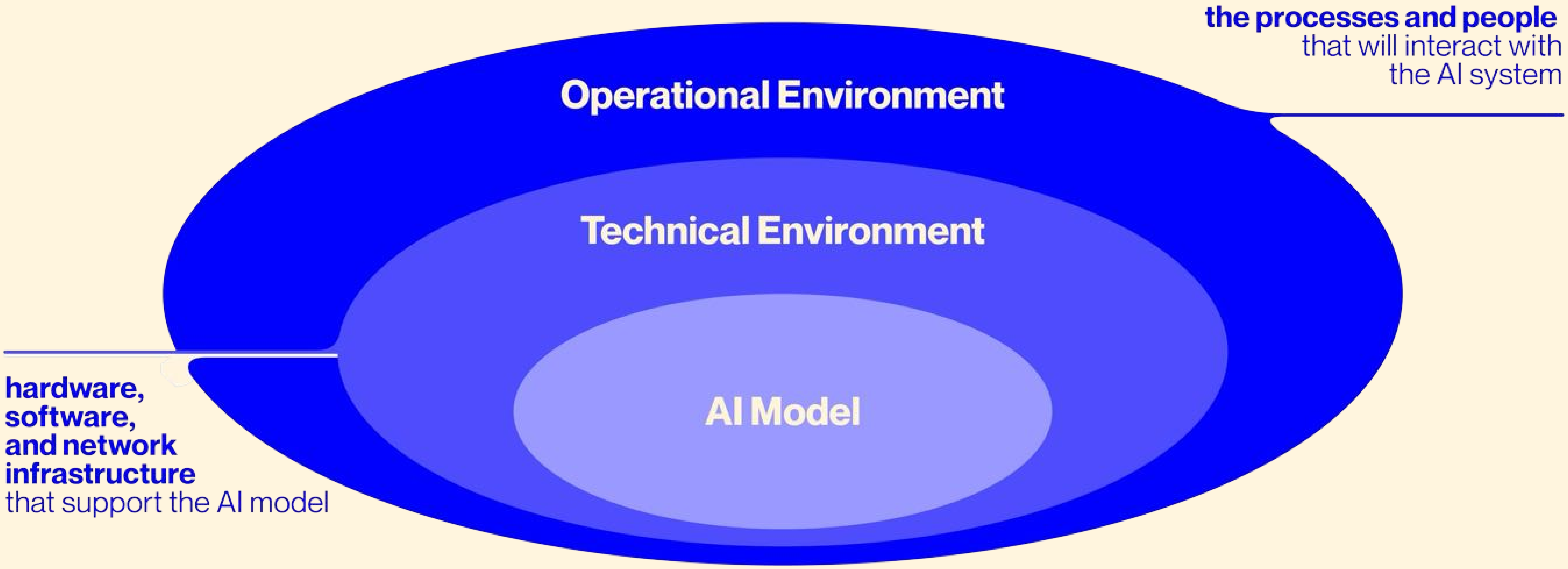
Model that predicts wether the face in the image is you

Unlock iPhone

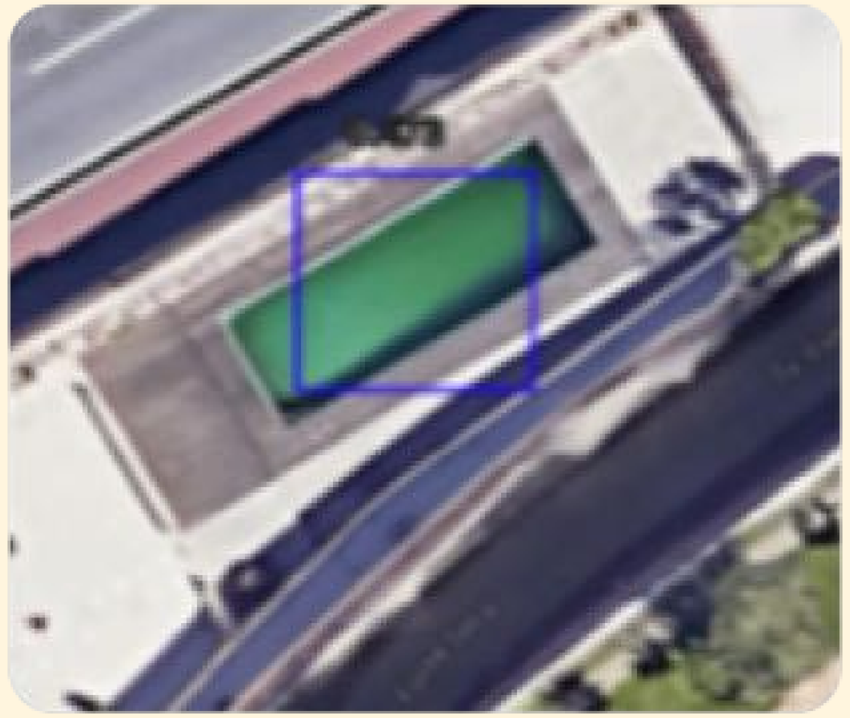


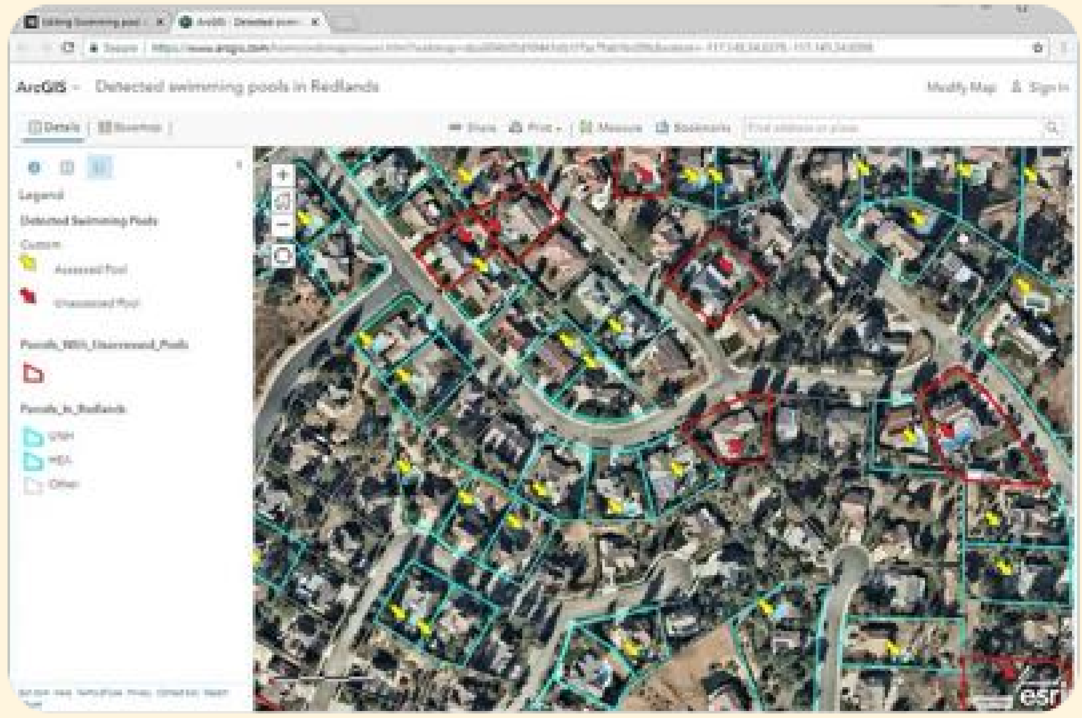
Model that predicts employer churn

- **Invite employees, that are high performers** and have high churn rate to HR
- **Inform Managers** about model output

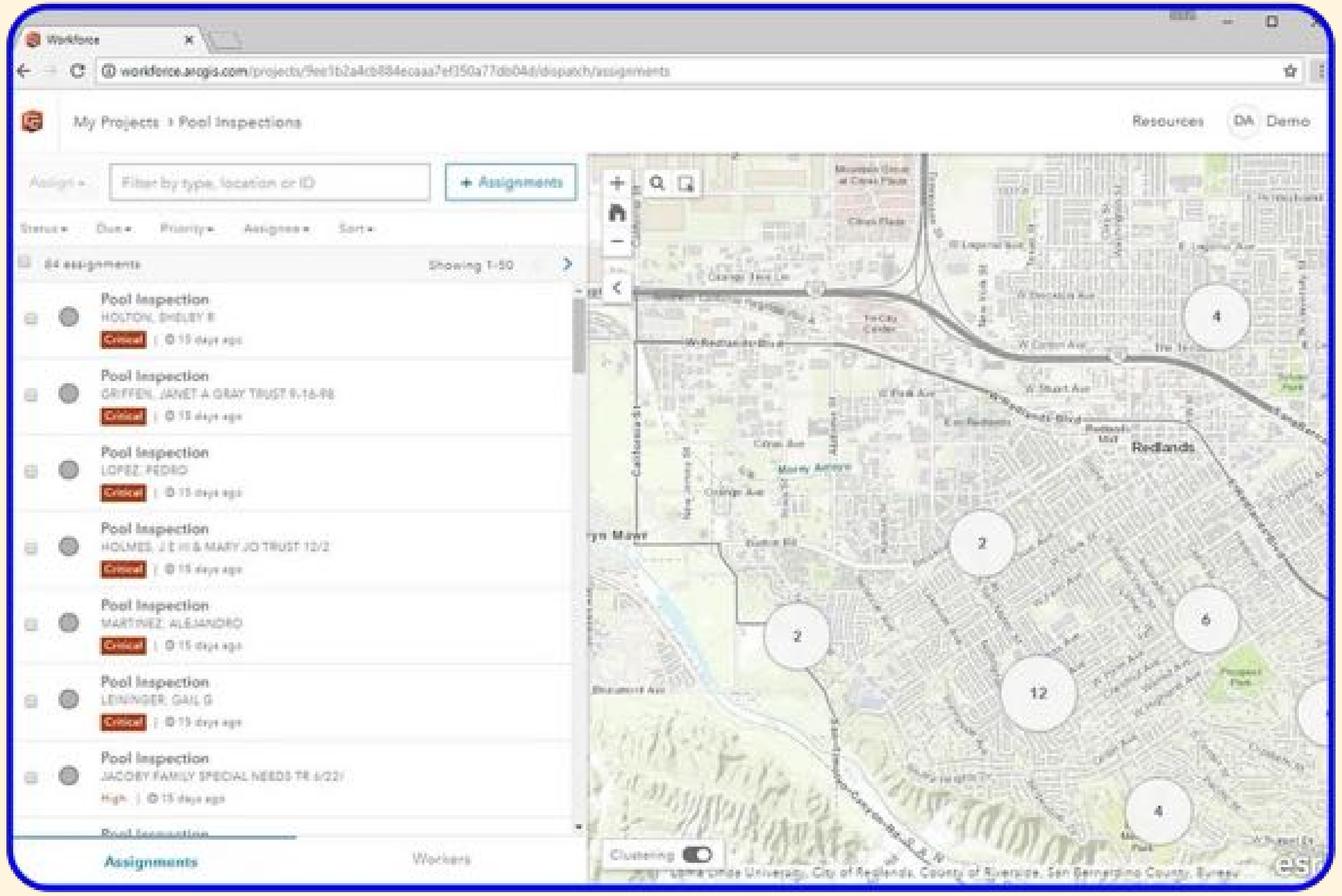

the processes and people that will interact with the AI system
Operational Environment
Technical Environment
AI Model
hardware, software, and network infrastructure that support the AI model

Creating Value in Production





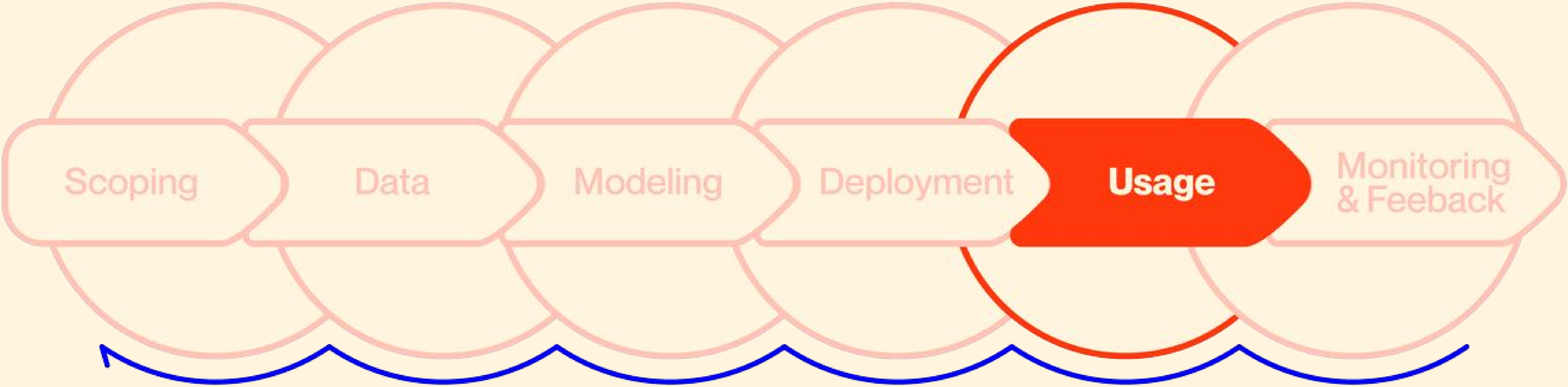
Prediction → **System Creating Value**



Governmental Inspection

Automatic Written Notice

Human Centric ML Lifecycle



This Process is ever iterative.
Developments in later stages may require revisiting earlier ones.

Don’t forget the people

<table>
<tr><th></th><th>Before</th><th>During</th><th>After</th></tr>
<tr><td>People</td><td rowspan="2">Assess Current State</td><td rowspan="2">Monitor the Adaption to the AI Model's Introduction</td><td rowspan="2">Evaluate Changes and Evolution</td></tr>
<tr><td>Processes</td></tr>
</table>

Don’t forget the people

	Status Quo (Before Deployment)	During Deployment	After Deployment
Decision-Makers			
Users			
People Affected			

Don’t forget the people

	Status Quo (Before Deployment)	During Deployment	After Deployment
Decision-Makers	What are the key objectives? What is the budget?	How will ROI be managed during this phase? What are the milestones?	Is the solution meeting its objective? What are the maintenance costs?
Users	What is the current workflow What are the pain points?	What training is needed? How will the transition be managed?	Is the solution user-friendly? Are there any new pain points?
People Affected	How will this change current roles? What are the concerns?	What communication is needed? How will feeback be collected?	How has the role changed? Are the initial concerns adressed?

Don’t forget the people

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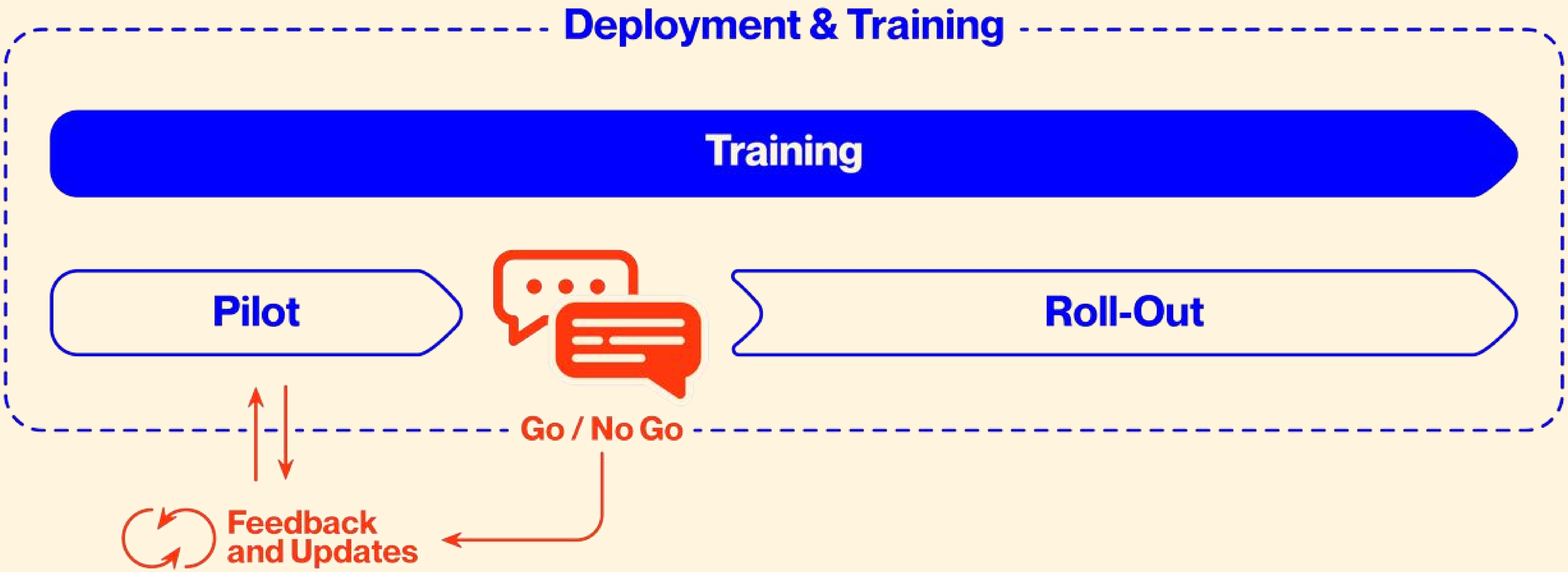
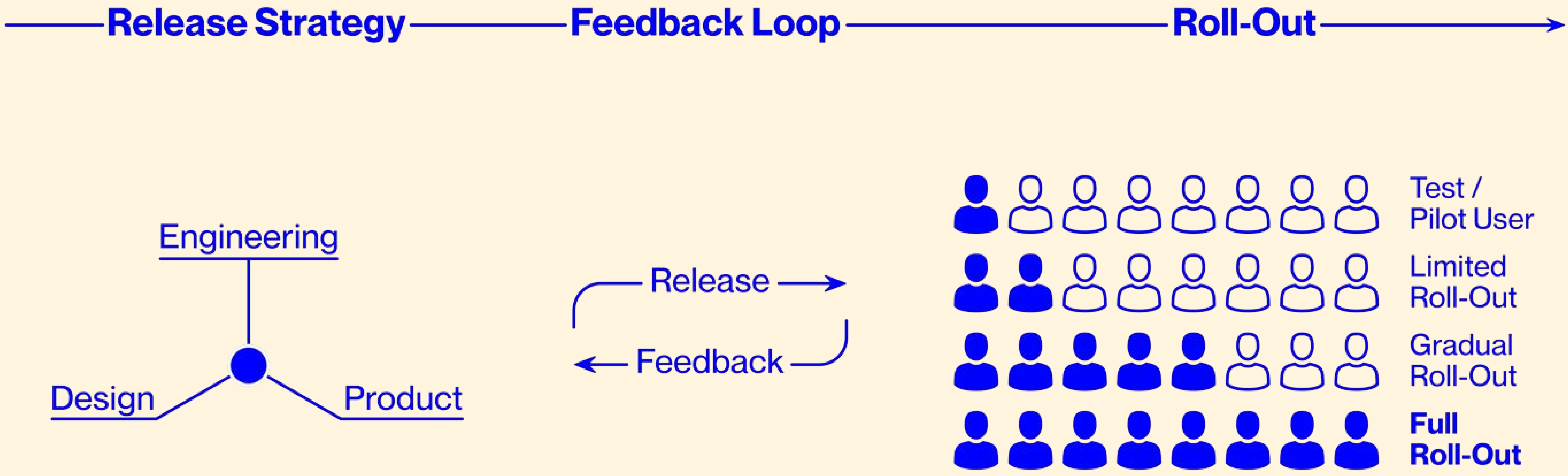
IMPLEMENTERS

Starting with a Pilot



Importance of a Release Strategy



Engineering, Product and Design teams continuously collaborate on release and roll-out strategy, assessing user and performance feedback along the way

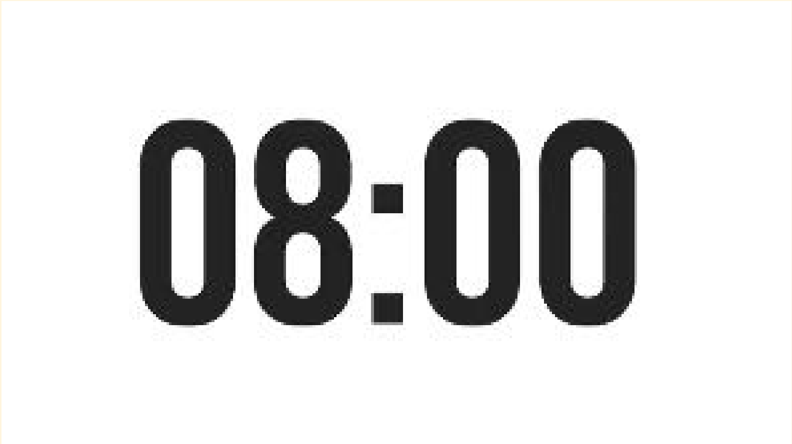
Rollout

PARIS
Maine-et-Loire
Morbihan
FRANCE
Haute-Savoie
Vendée
Rhône
Alpes-Maritimes


euronews.

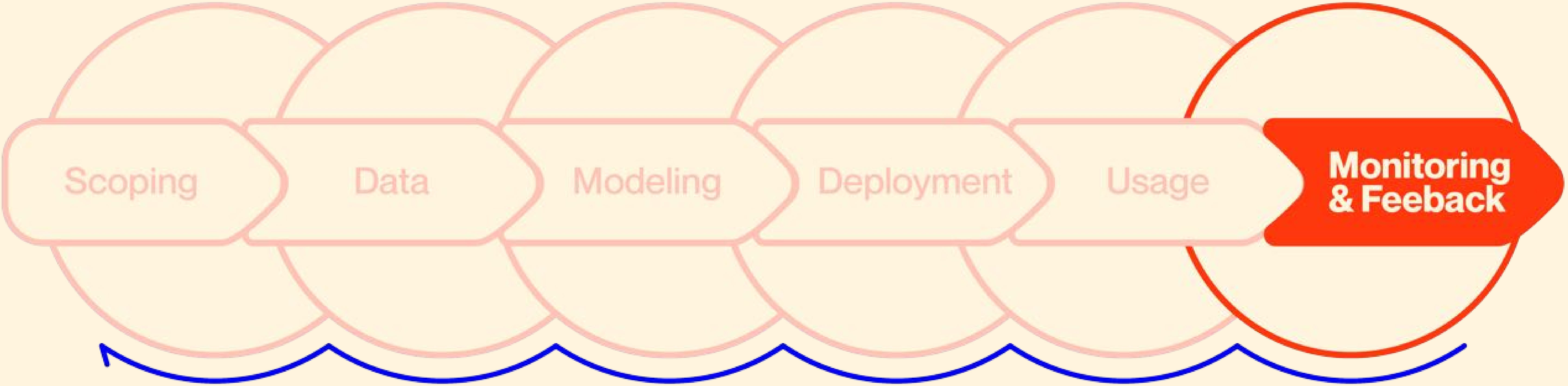
Deployment/Usage

- Describe the final product
- Who are the different stakeholders?
- How are stakeholders affected differently by the solution?
- How would the process look like where the solution is used?
- How would you measure success?



Monitoring

Human Centric ML Lifecycle



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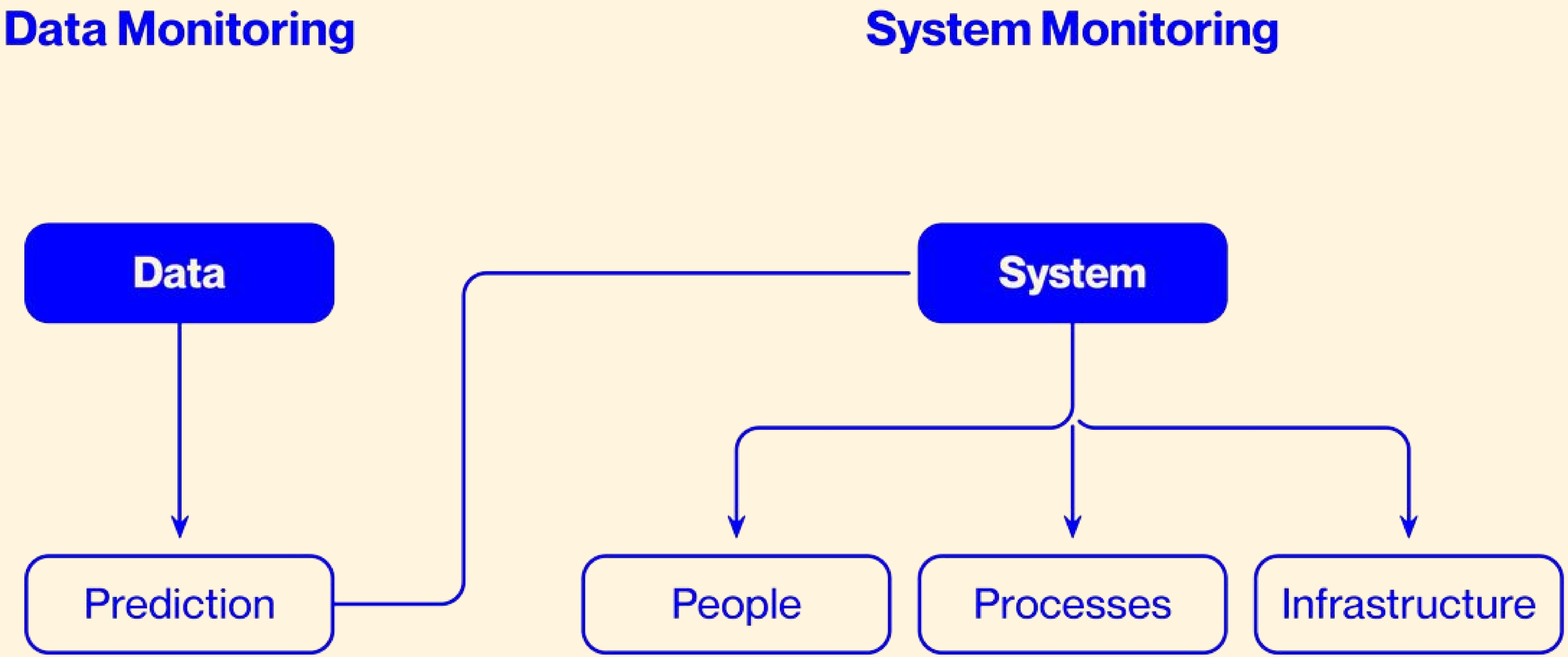
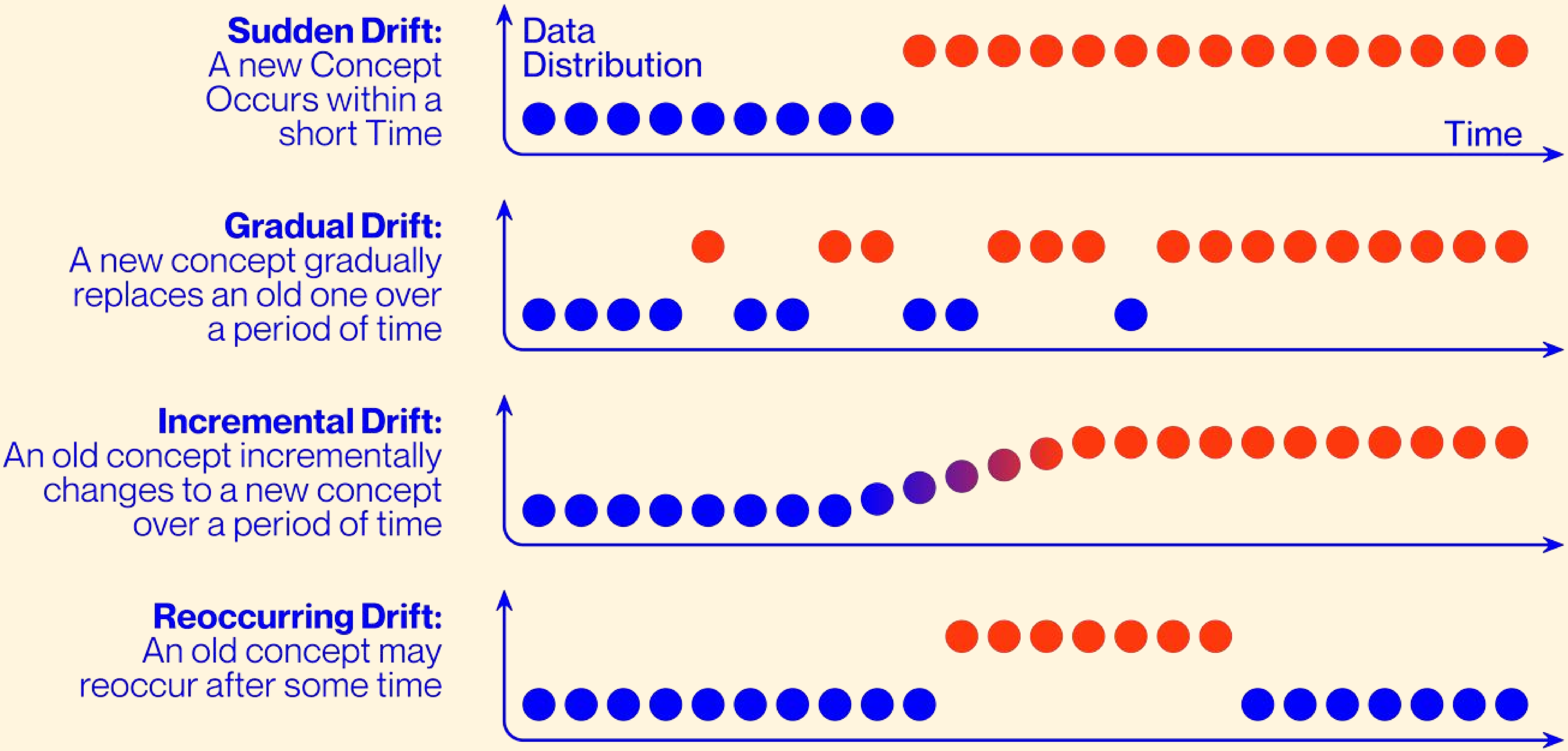
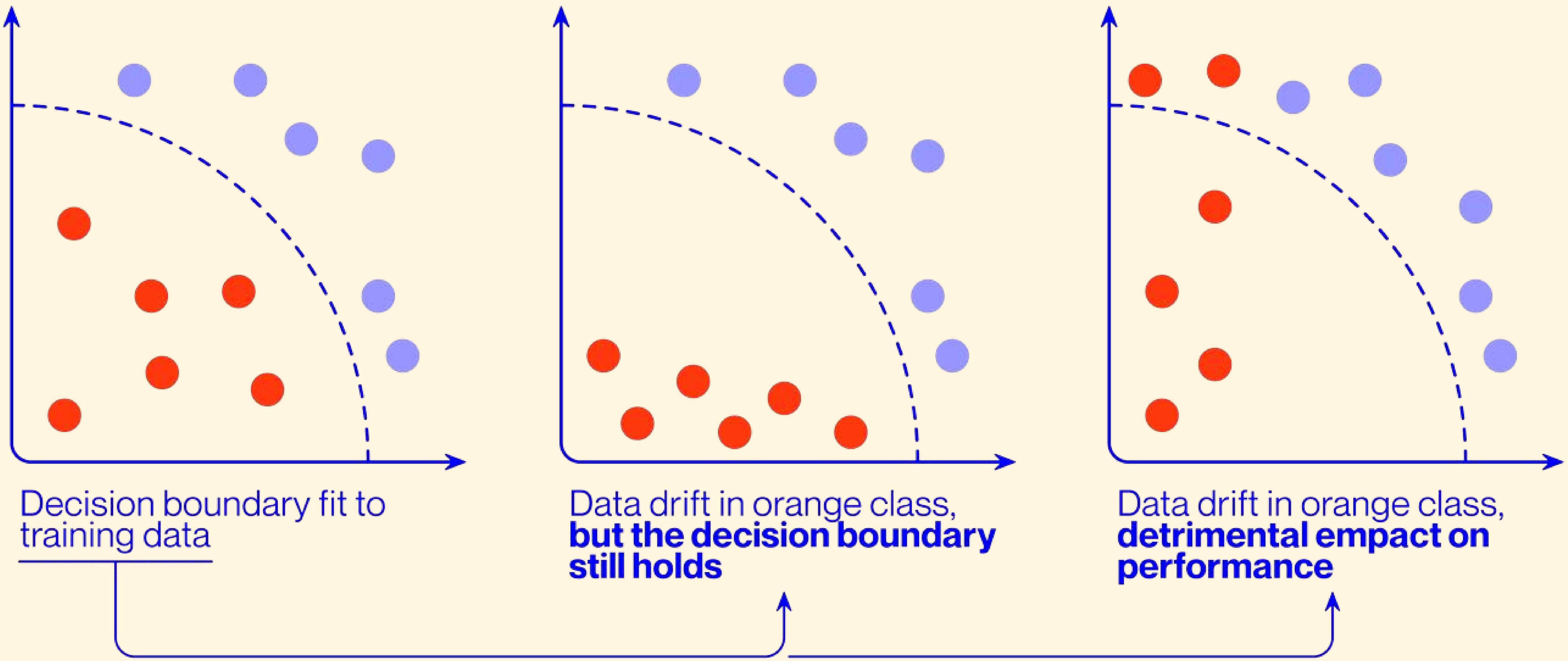
Monitoring


Data Monitoring
System Monitoring
Data
System
Prediction
People
Processes
Infrastructure

Data Drift


Sudden Drift:
A new Concept Occurs within a short Time
Data Distribution
Time
Gradual Drift:
A new concept gradually replaces an old one over a period of time
Incremental Drift:
An old concept incrementally changes to a new concept over a period of time
Reoccurring Drift:
An old concept may reoccur after some time

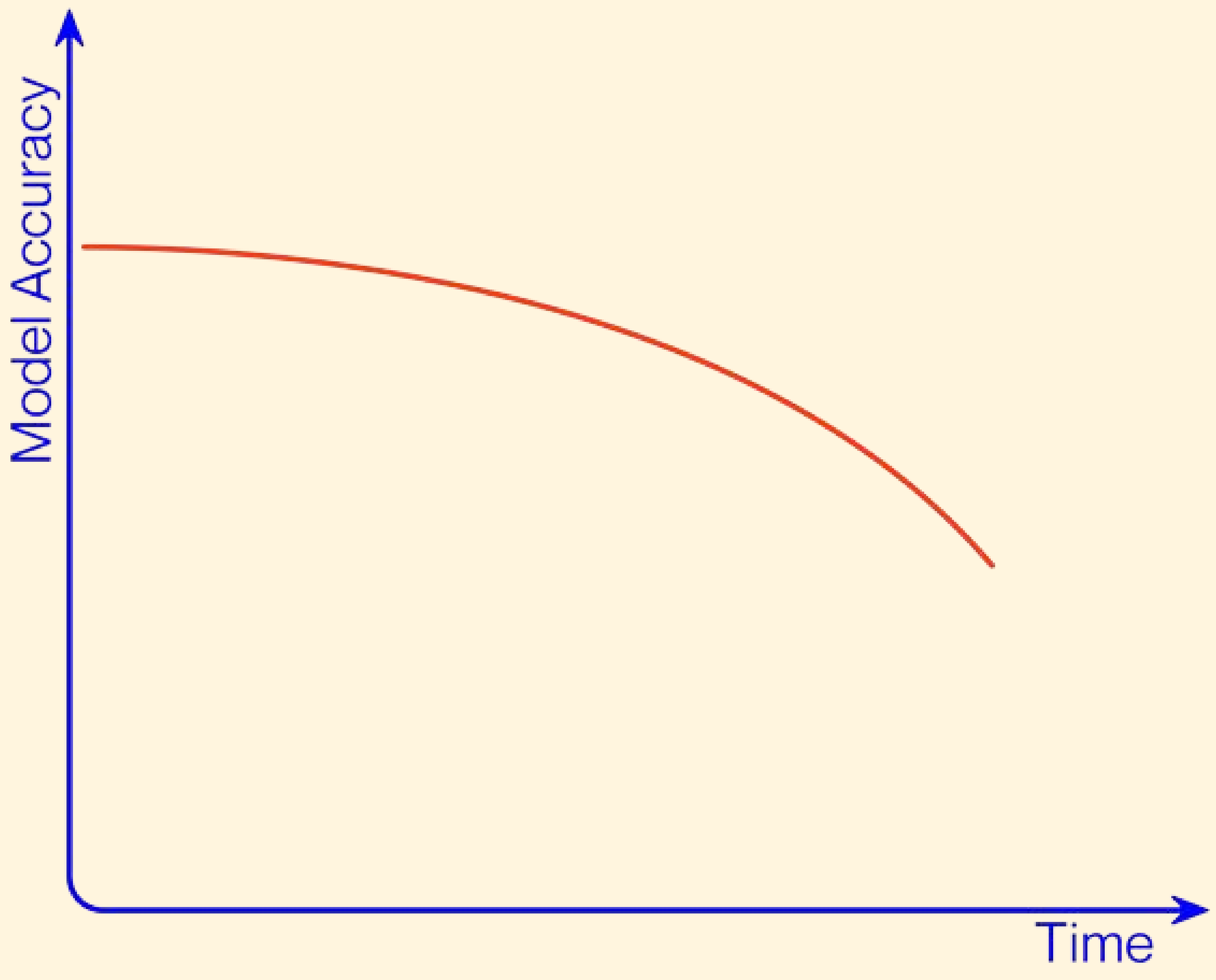
Data Drift


Decision boundary fit to training data
Data drift in orange class, **but the decision boundary still holds**
Data drift in orange class, **detrimental empact on performance**

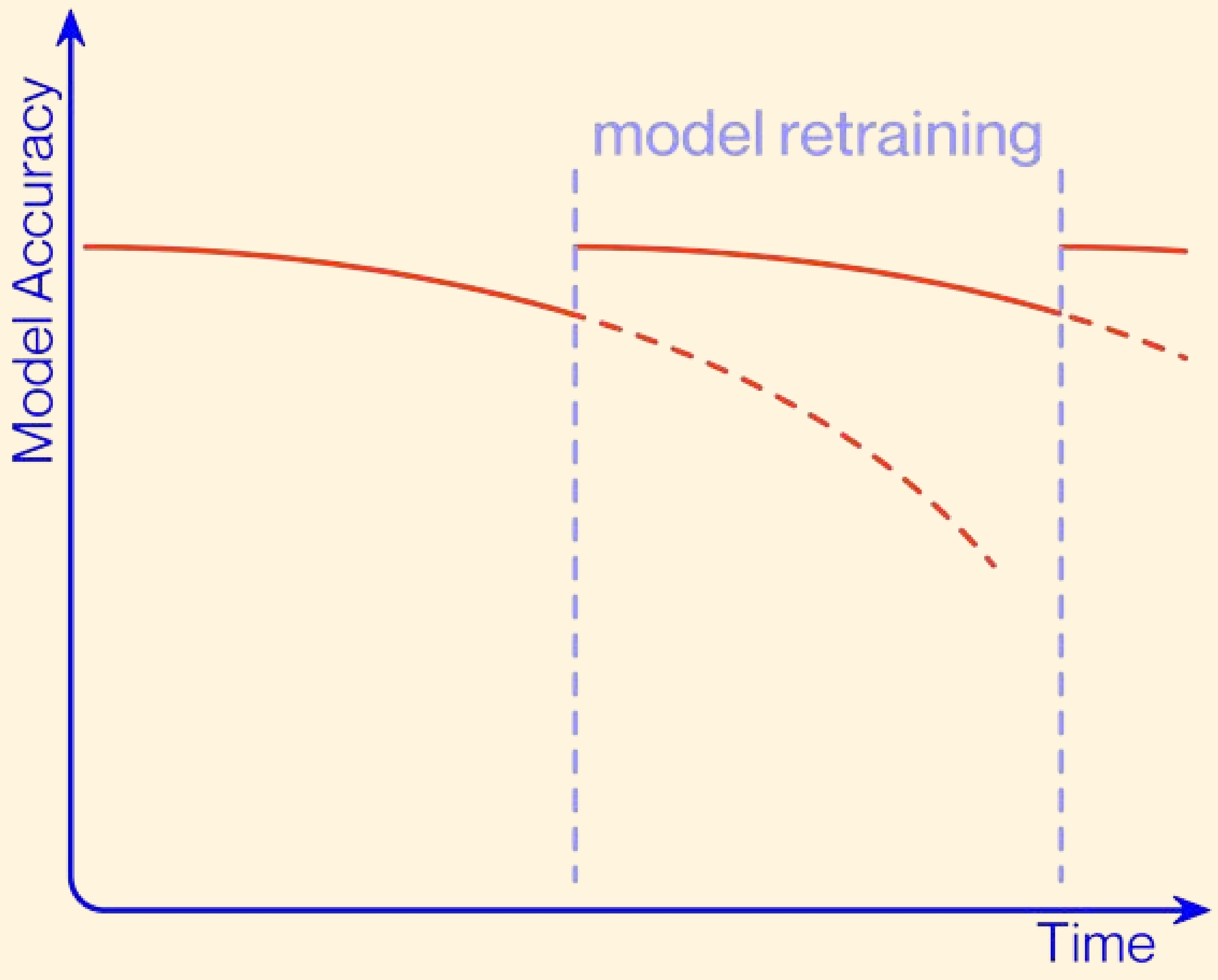
The dangers of AI model drift: lessons to be learned from the case of Zillow Offers

In the past three years, Zillow invested hundreds of millions of dollars into Zillow Offers, its AI-enabled home-flipping program. The company intended to use ML models to buy up thousands of houses per month, whereupon the homes would be renovated and sold for a profit. Unfortunately, things didn't go to plan. Recently, news came out that the company is shutting down its iBuying program that overpaid thousands of houses this summer, along with laying off 25 percent of its staff. Zillow CEO Rich Barton said the company failed to predict house price appreciation accurately: "We've determined the unpredictability in forecasting home prices far exceeds what we anticipated."

Retraining



Model decay over time



Regularly updated model

System Monitoring in MLOps

1. Objectives of System Monitoring

- Ensure Reliability

- Maintain Security

- Optimize Performance

2. Key Areas to Monitor

- Technical Glitches: Hardware & Software

- User Behavior: Usage Patterns & Feedback

- Security: Breach Detection & Data Integrity

System Monitoring in MLOps

1. Objectives of System Monitoring
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2. Key Areas to Monitor
- Technical Glitches: Hardware & Software
- User Behavior: Usage Patterns & Feedback
- Security: Breach Detection & Data Integrity

3. Tools for Monitoring**
- Application Performance Monitoring (APM)
- Security Information and Event Management (SIEM)
- User Activity Logs

4. Why It's Crucial
- Quick Issue Identification
- Timely Fixes & Updates
- Adapt to Changing Conditions

5. Next Steps
- Regular Audits
- Periodic Reporting
- Stakeholder Communication

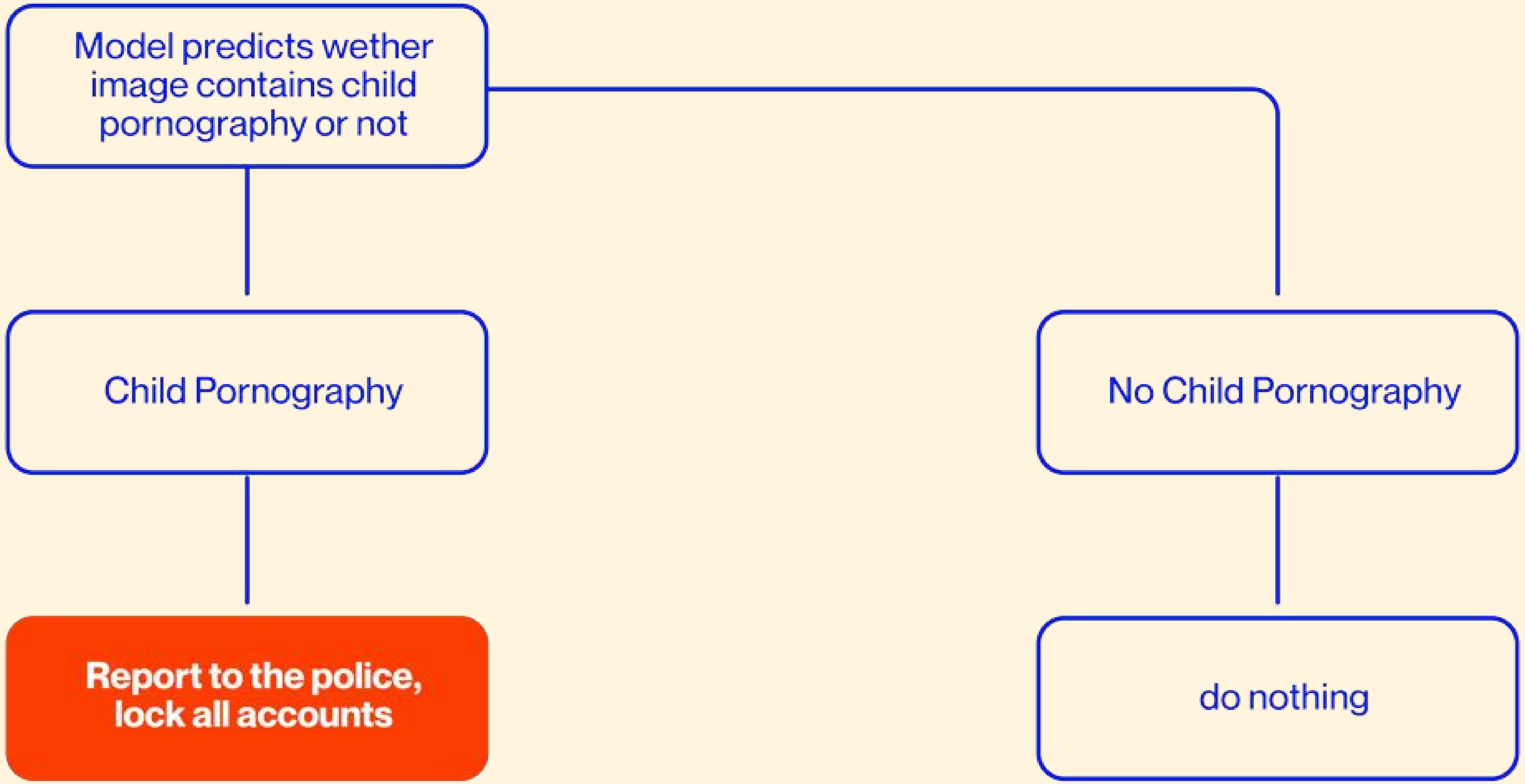
BUSINESS INSIDER

AUGUST 21 2022

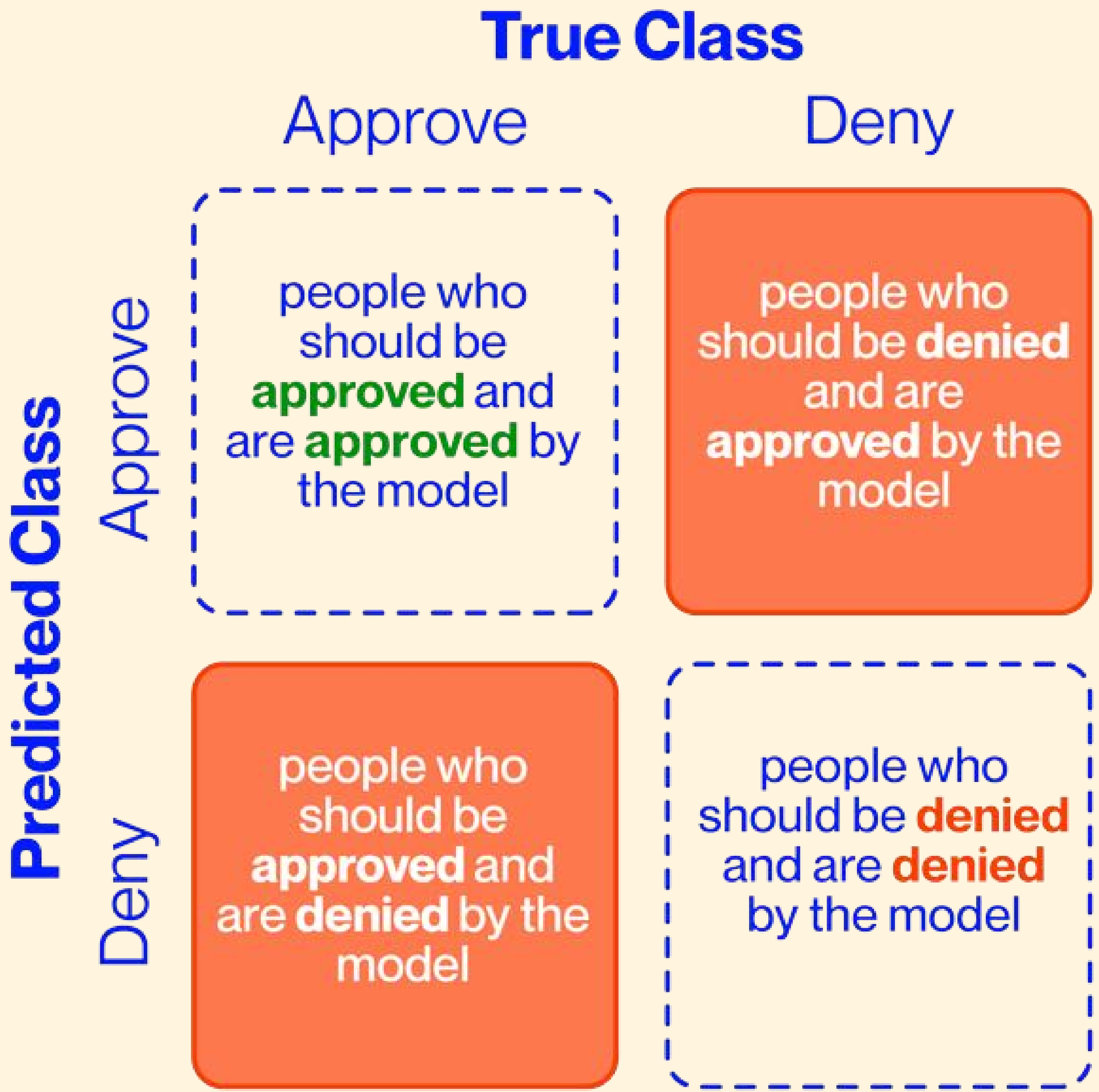
A DAD TOOK PHOTOS OF HIS NAKED TODDLER FOR THE DOCTOR. GOOGLE FLAGGED HIM AS A CRIMINAL.

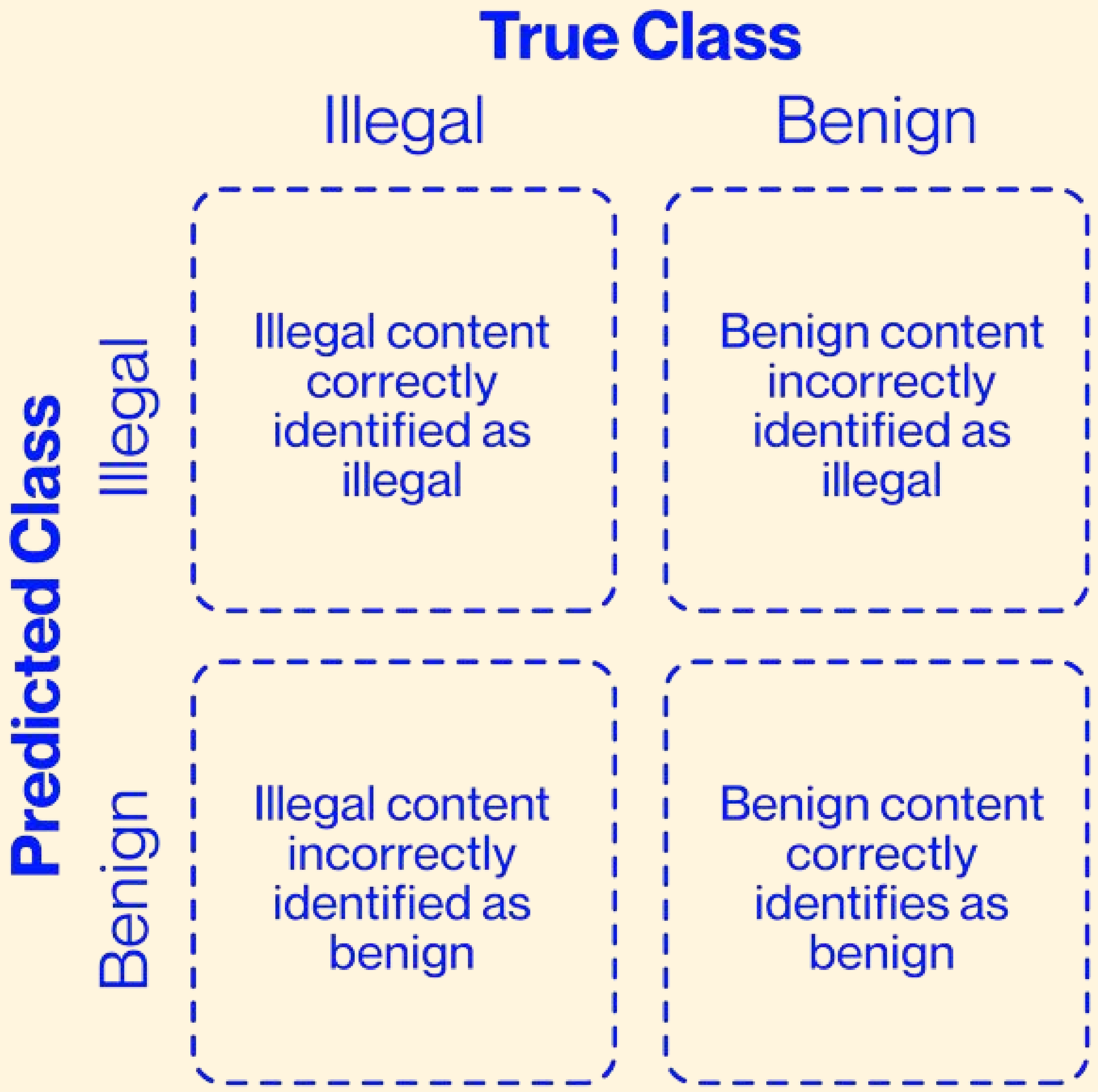
Google has an automated tool to detect abusive images of children. But the system can get it wrong, and the consequences are serious.

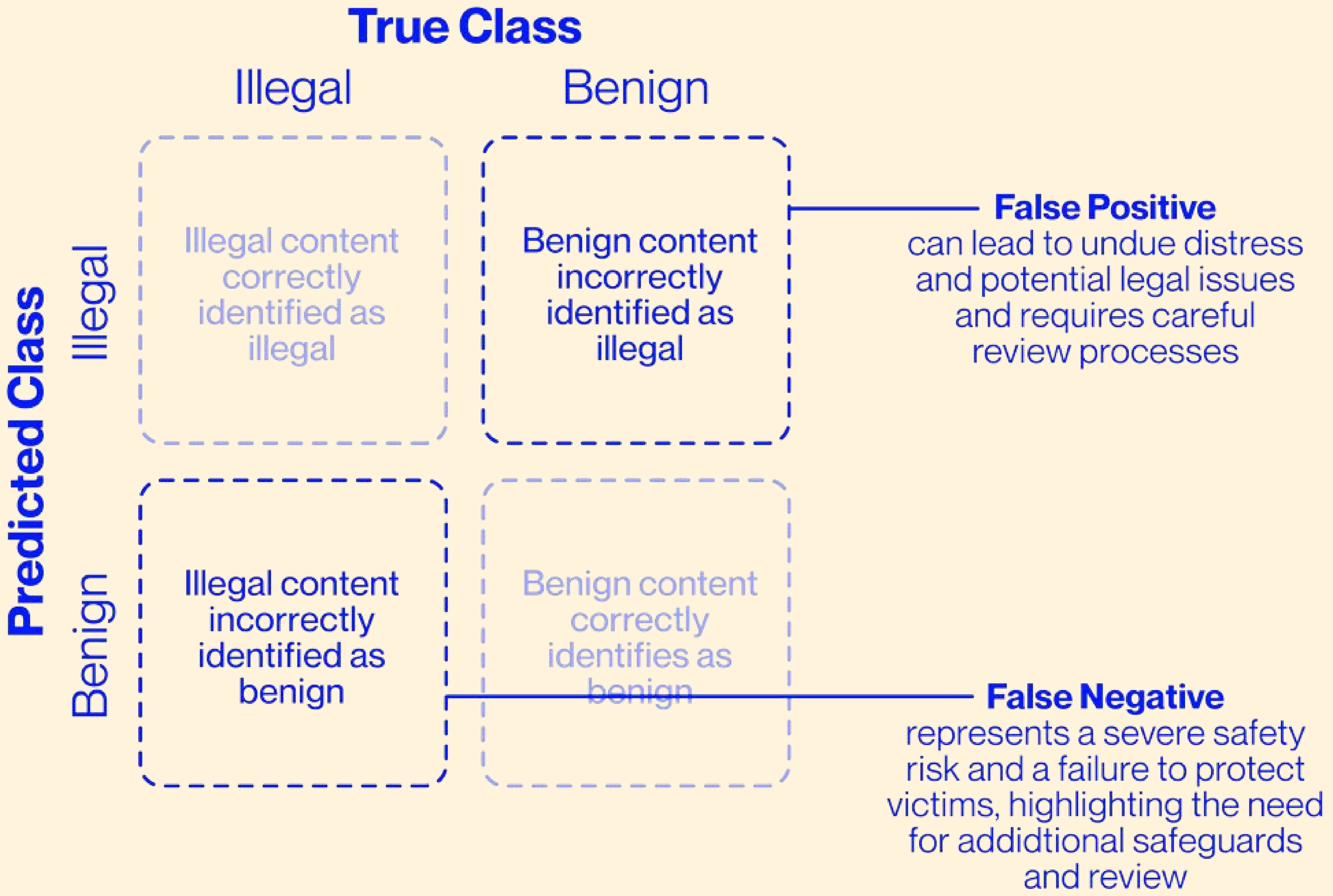
Mark noticed something amiss with his toddler. His son's penis looked swollen and was hurting him. Mark, a stay-at-home dad in San Francisco, grabbed his Android smartphone and took photos to document the problem


Model predicts wether image contains child pornography or not
Child Pornography
No Child Pornography
Report to the police, lock all accounts
do nothing

		True Class	
		Approve	Deny
Predicted Class	Approve	people who should be **approved** and are **approved** by the model	people who should be **denied** and are **approved** by the model
	Deny	people who should be **approved** and are **denied** by the model	people who should be **denied** and are **denied** by the model

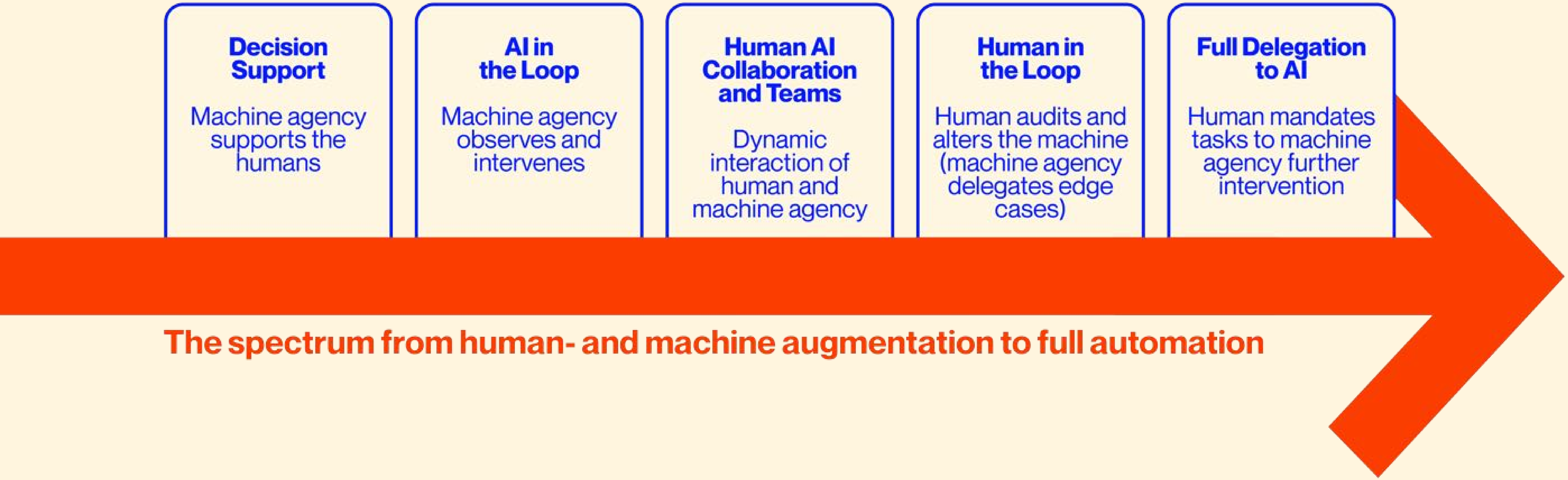

True Class
Approve
Deny
Predicted Class
Approve
Deny
people who should be approved and are approved by the model
people who should be denied and are approved by the model
people who should be approved and are denied by the model
people who should be denied and are denied by the model


True Class
Illegal
Benign
Predicted Class
Illegal
Benign
Illegal content correctly identified as illegal
Benign content incorrectly identified as illegal
Illegal content incorrectly identified as benign
Benign content correctly identifies as benign



True Class
Illegal
Benign
Predicted Class
Illegal
Benign
Illegal content correctly identified as illegal
Benign content incorrectly identified as illegal
Illegal content incorrectly identified as benign
Benign content correctly identifies as benign
False Positive
can lead to undue distress and potential legal issues and requires careful review processes
False Negative
represents a severe safety risk and a failure to protect victims, highlighting the need for addidtional safeguards and review

Increasing Degree of Automation

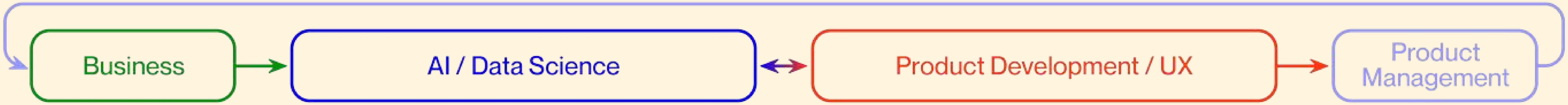


Monitoring

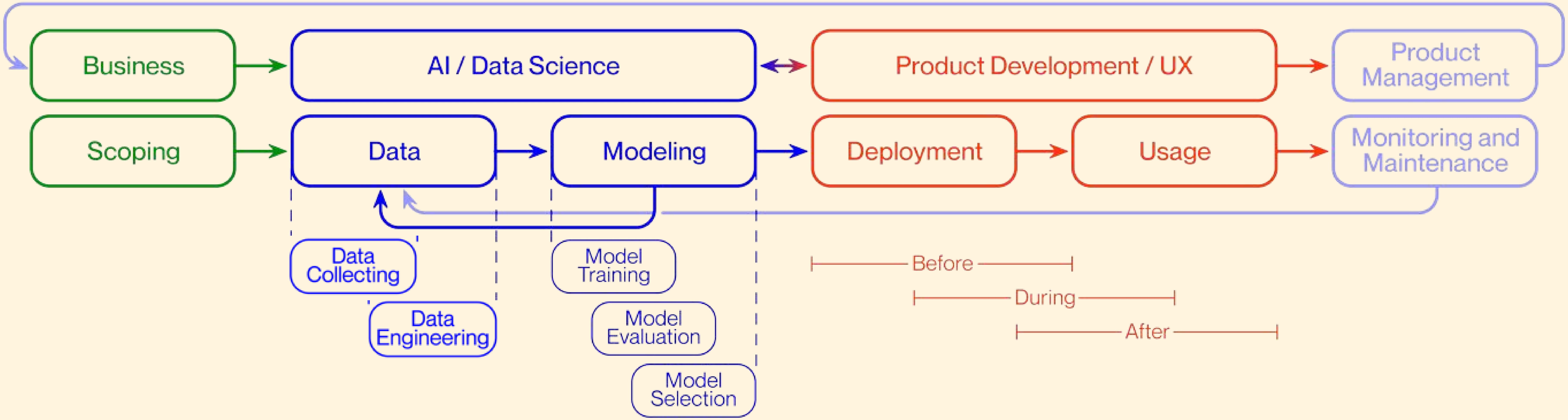
- What could go wrong?
- Who might suffer from errors?
- What could you do to avoid errors and improve the product over time?
- How could you make sure to reverse or mitigate harm once it has happened?

08:00

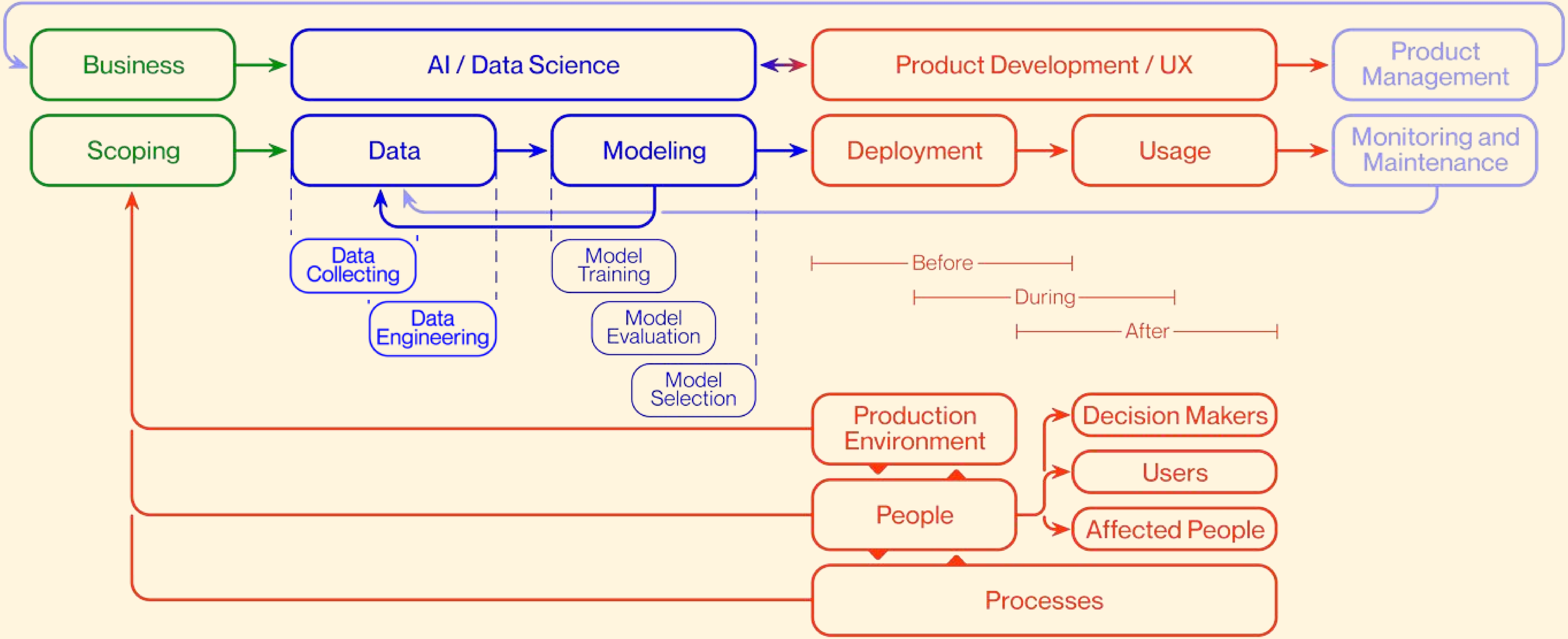
Human Centric MLOps



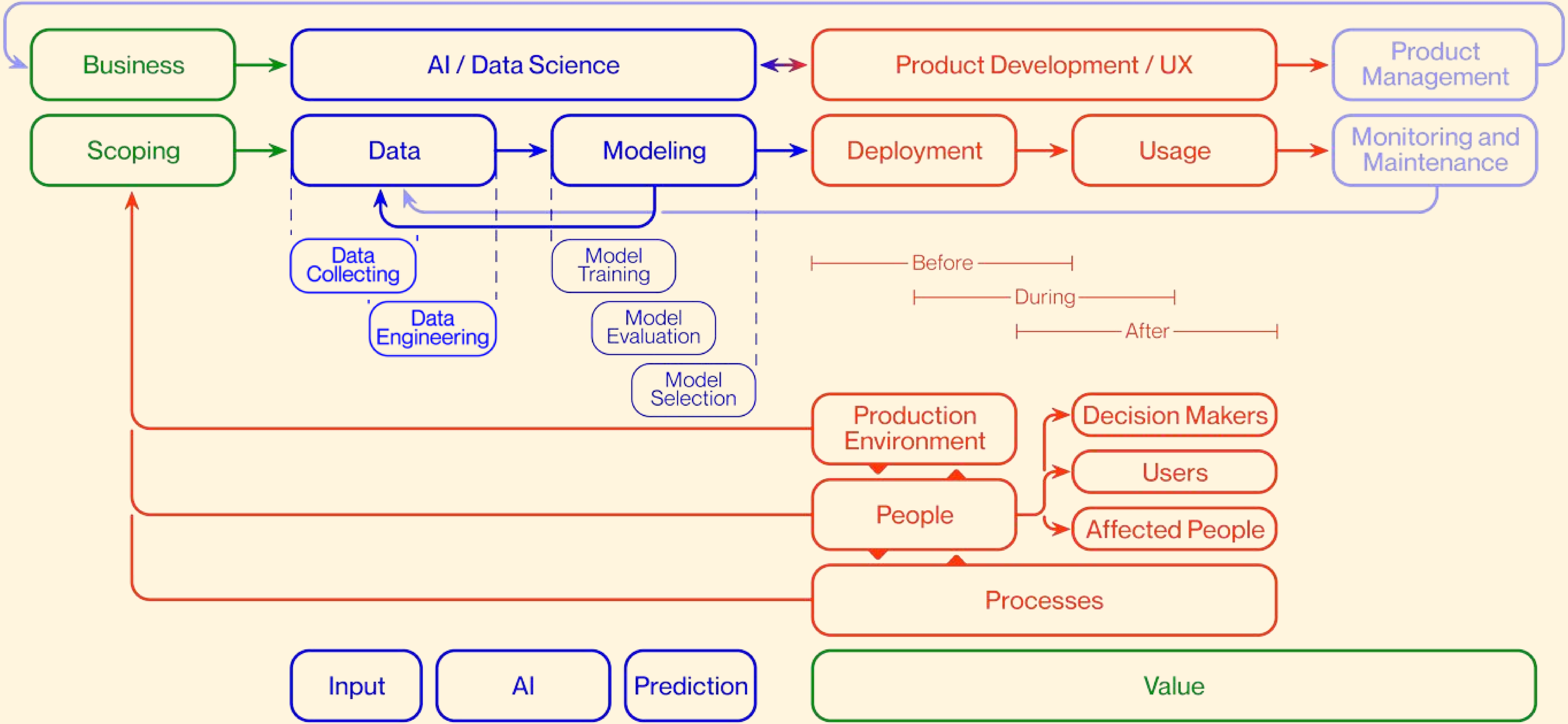
Human Centric MLOps



Human Centric MLOps



Human Centric MLOps



Human Centric MLOps