

Machine learning and data pyramid

MACHINE LEARNING FOR BUSINESS



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Machine Learning applications

ML is applying statistical or computer science methods on data to:

1. Draw causal insights

"What is causing our customers to cancel their subscription to our services?"*

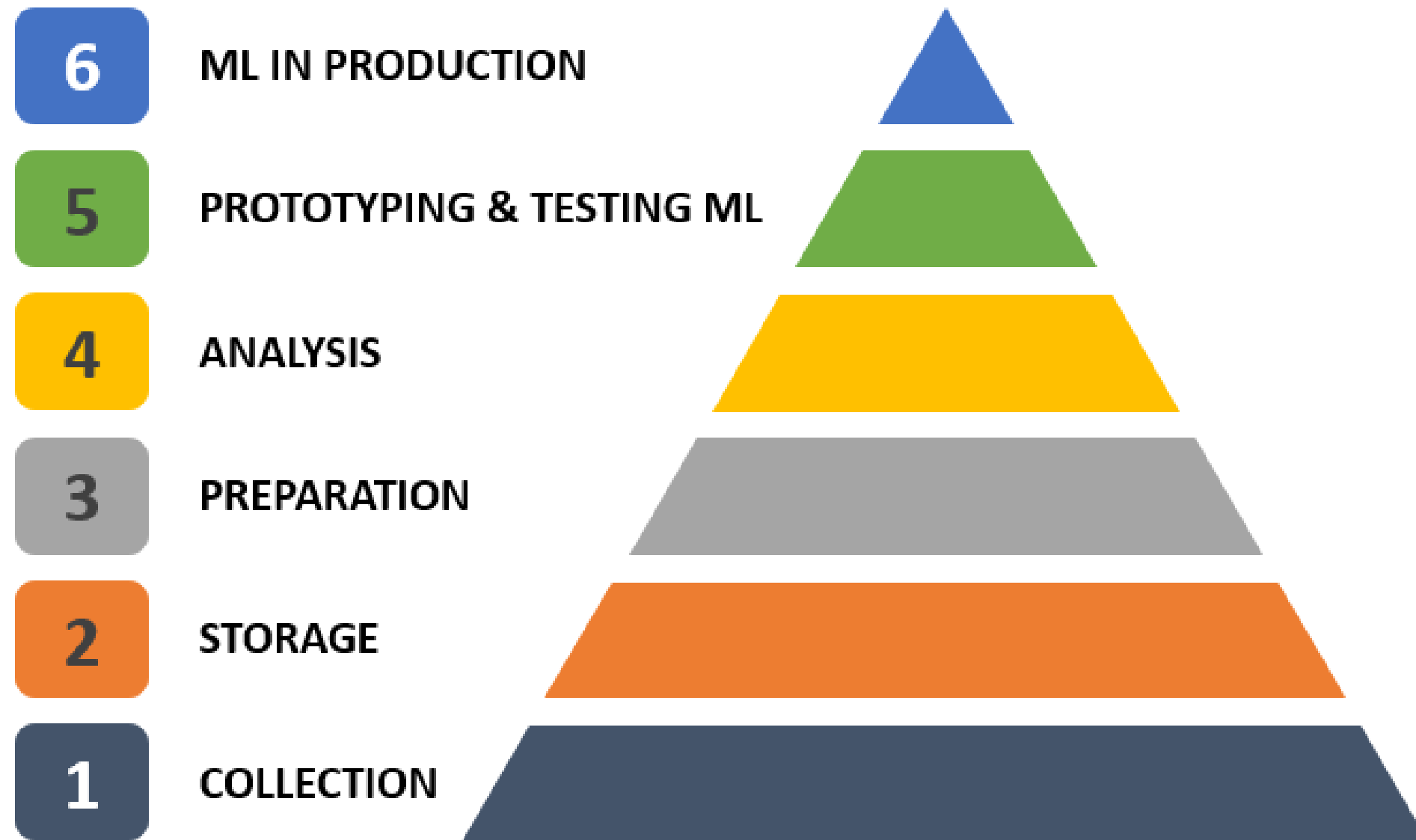
2. Predict future events

"Which customers are likely to cancel their subscription next month?"*

3. Understand patterns in data

"Are there groups of customers who are similar and use our services in a similar way?"*

Data hierarchy of needs



Collection

1

COLLECTION



Extract data from source systems

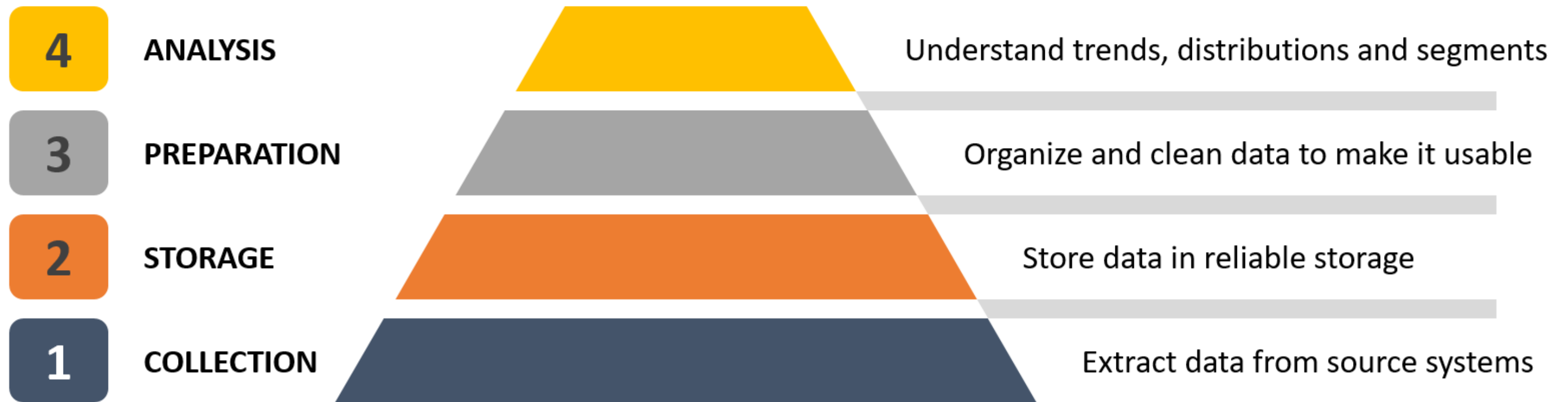
Storage



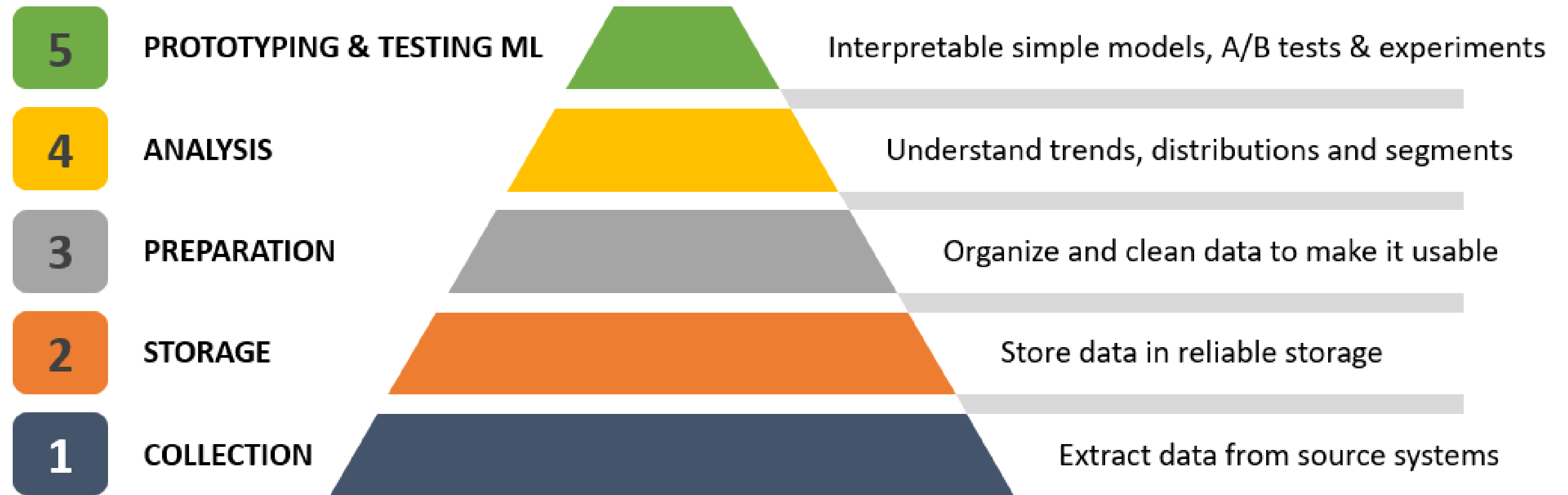
Preparation



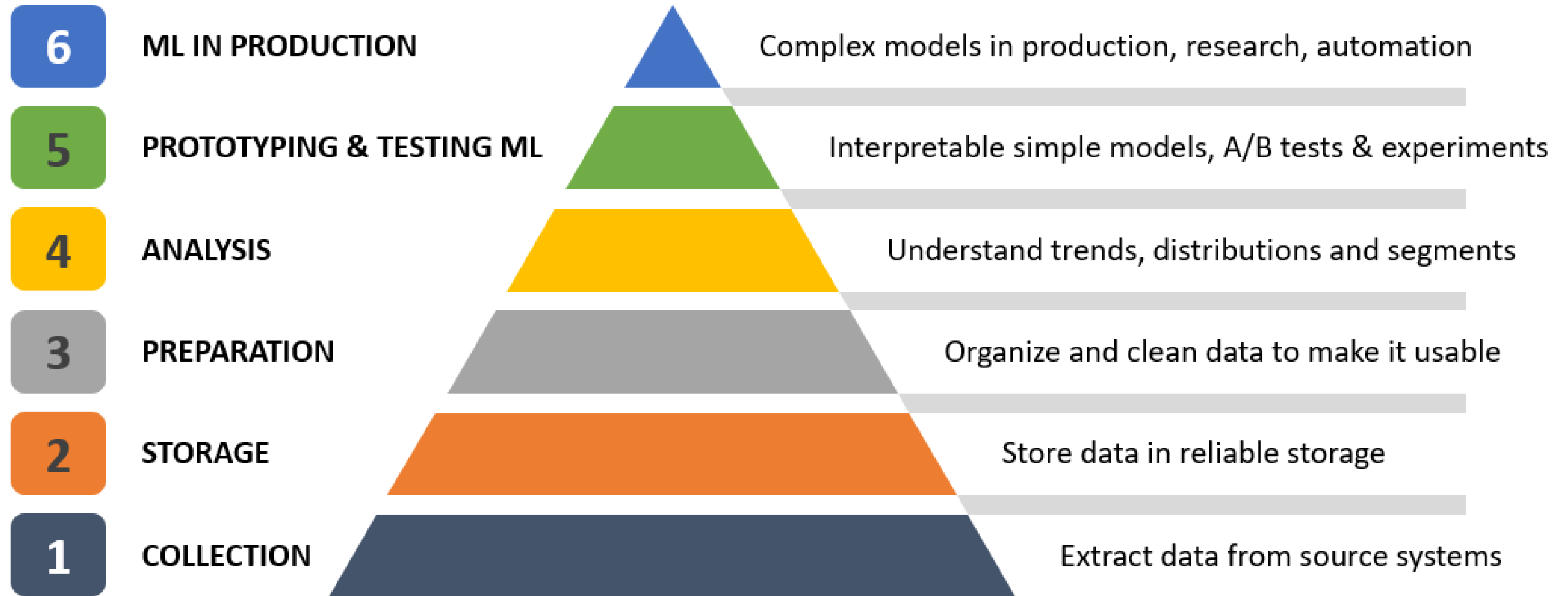
Analysis



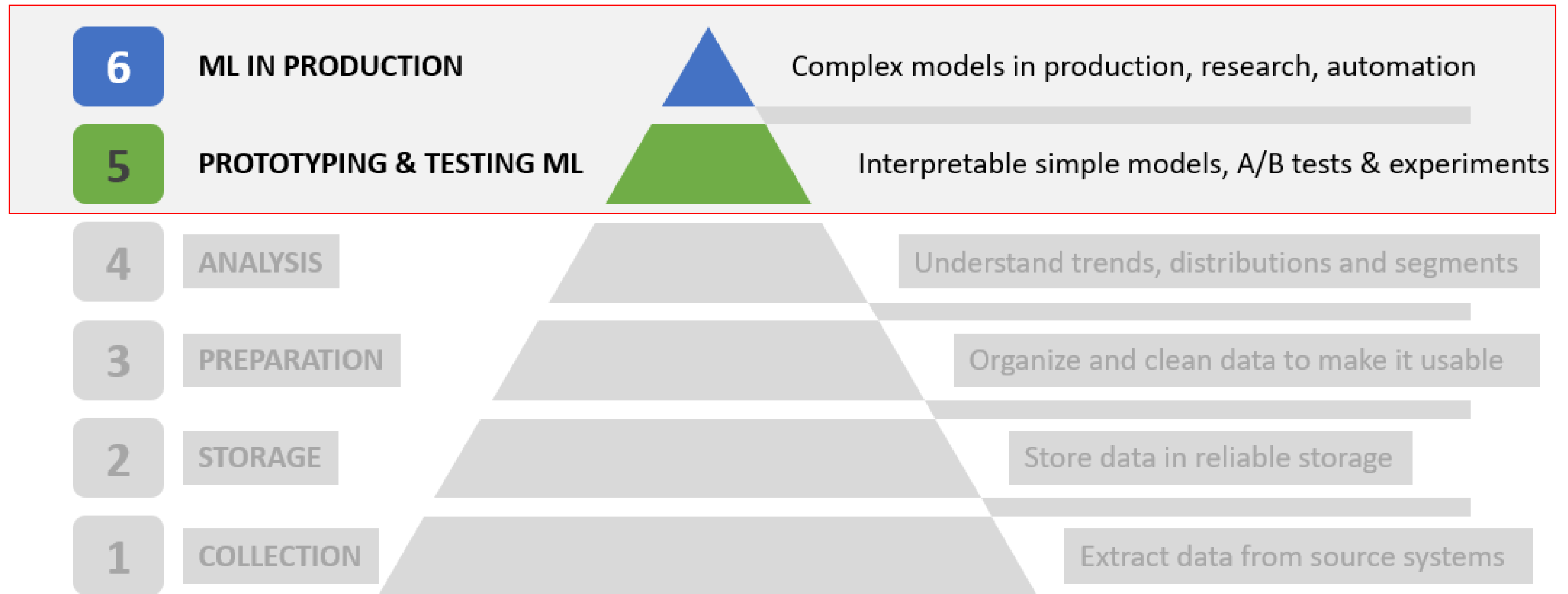
Model prototyping and testing



ML in production



Focus



Let's practice!

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Machine learning principles

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Machine learning types

Machine learning - applying statistical or computer science methods on data to:

1. Draw causal insights

*"**What is causing** our customers to cancel their subscription to our services?"*

2. Predict future events

*"**Which customers** are likely to cancel their subscription next month?"*

3. Understand patterns in data

*"**Are there groups of customers** who are similar and use our services in a similar way?"*

Supervised vs. unsupervised ML

Machine learning - applying statistical or computer science methods on data to:

1. Draw causal insights

SUPERVISED Machine Learning

2. Predict future events

SUPERVISED Machine Learning

3. Understand patterns in data

UNSUPERVISED Machine Learning

Supervised ML data structure

	Transaction data A	Transaction data B	Transaction data C	Transaction data D		Fraud probability
Transaction 1						
Transaction 2						
Transaction 3						
Transaction ...						
Transaction N						

Target variable

Transaction 1
Transaction 2
Transaction 3
Transaction ...
Transaction N

Transaction data A	Transaction data B	Transaction data C	Transaction data D

Target variable

Fraud probability

Input features

Data about transactions that the business collected
(input features)

	Transaction data A	Transaction data B	Transaction data C	Transaction data D
Transaction 1				
Transaction 2				
Transaction 3				
Transaction ...				
Transaction N				

Target variable

Fraud probability

Example input features

	Past fraud count	Time of transaction	Declined in T-30 days	Amount
Transaction 1	20	3 am	Yes	5.25 USD
Transaction 2	1	9 pm	Yes	19.5 USD
Transaction 3	0	9.30 am	No	500 USD
Transaction ...				
Transaction N				

Fraud
Yes
Yes
No

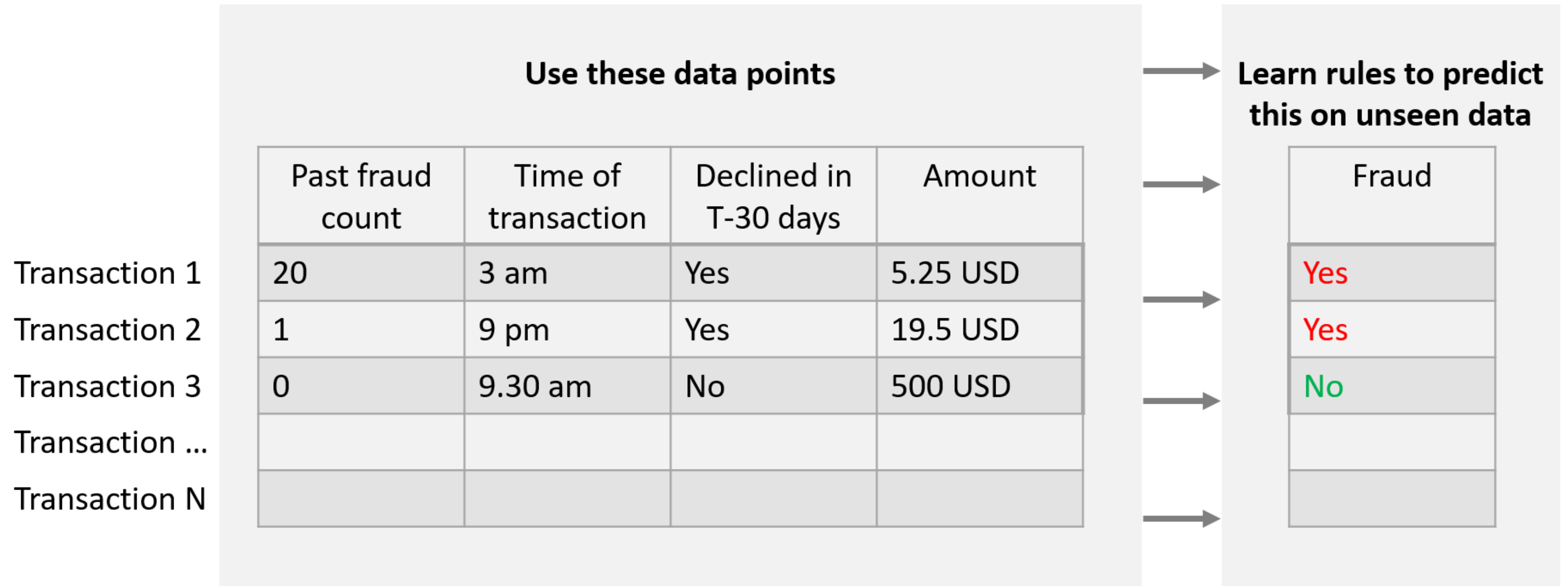
Using input features

Use these data points

	Past fraud count	Time of transaction	Declined in T-30 days	Amount
Transaction 1	20	3 am	Yes	5.25 USD
Transaction 2	1	9 pm	Yes	19.5 USD
Transaction 3	0	9.30 am	No	500 USD
Transaction ...				
Transaction N				

Fraud
Yes
Yes
No

Predicting target variable



Unsupervised ML data structure

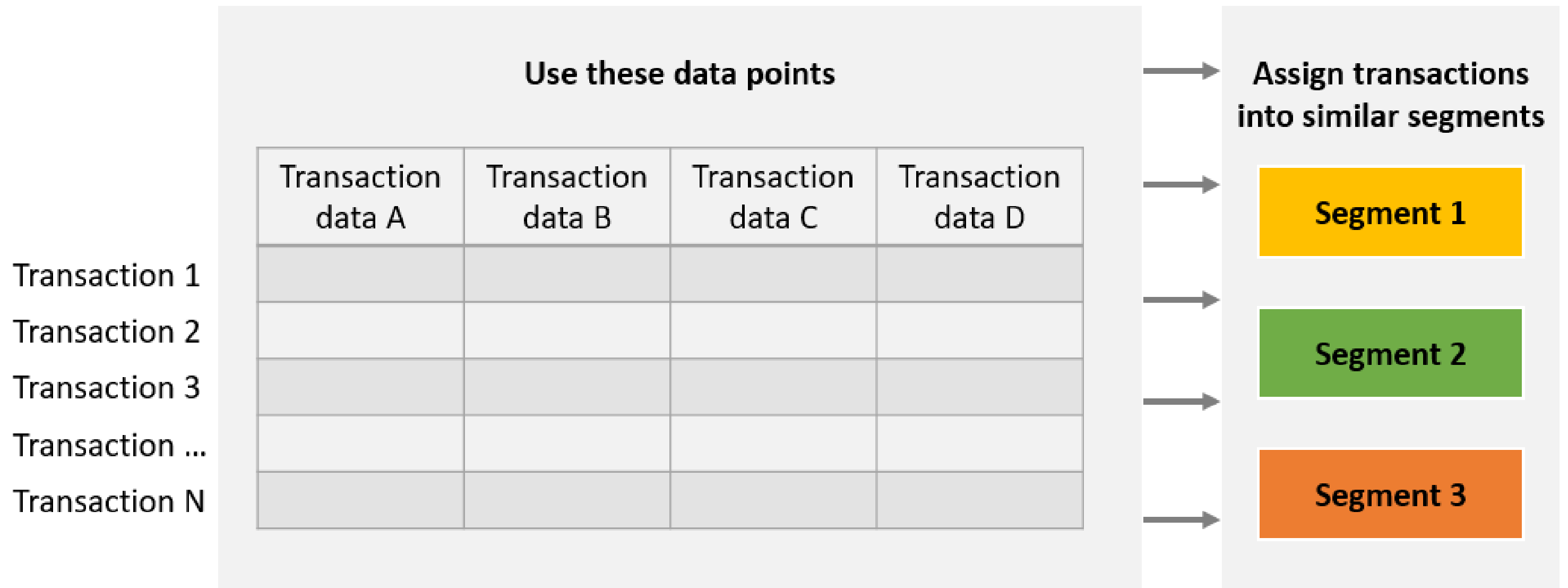
	Transaction data A	Transaction data B	Transaction data C	Transaction data D
Transaction 1				
Transaction 2				
Transaction 3				
Transaction ...				
Transaction N				

Unsupervised input features

Use these data points

	Transaction data A	Transaction data B	Transaction data C	Transaction data D
Transaction 1				
Transaction 2				
Transaction 3				
Transaction ...				
Transaction N				

Unsupervised ML results



ML examples - Marketing

SUPERVISED Machine Learning:

- Predict which customers are likely to purchase next month
- Predict each customer's expected lifetime value

UNSUPERVISED Machine Learning:

- Group customers into segments based on their past purchases

ML examples - Finance

SUPERVISED Machine Learning:

- Identify key transaction attributes that indicate a potential fraud
- Predict which customers will default on their mortgage payments

UNSUPERVISED Machine Learning:

- Group transactions into segments based on their attributes to understand which segments are the most profitable

ML examples - Manufacturing

SUPERVISED Machine Learning:

- Predict which items in production are likely faulty and should be manually inspected
- Predict which machines are likely to break and need maintenance

UNSUPERVISED Machine Learning:

- Group readings from machine sensors and identify anomalies for potential manufacturing malfunctions

ML examples - Transportation

SUPERVISED Machine Learning:

- Predict the expected delivery of the parcel
- Identify the fastest route for driving
- Predict product demand to prepare enough stock, rent/buy vehicles and hire workers

Let's practice!

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Job roles, tools and technologies

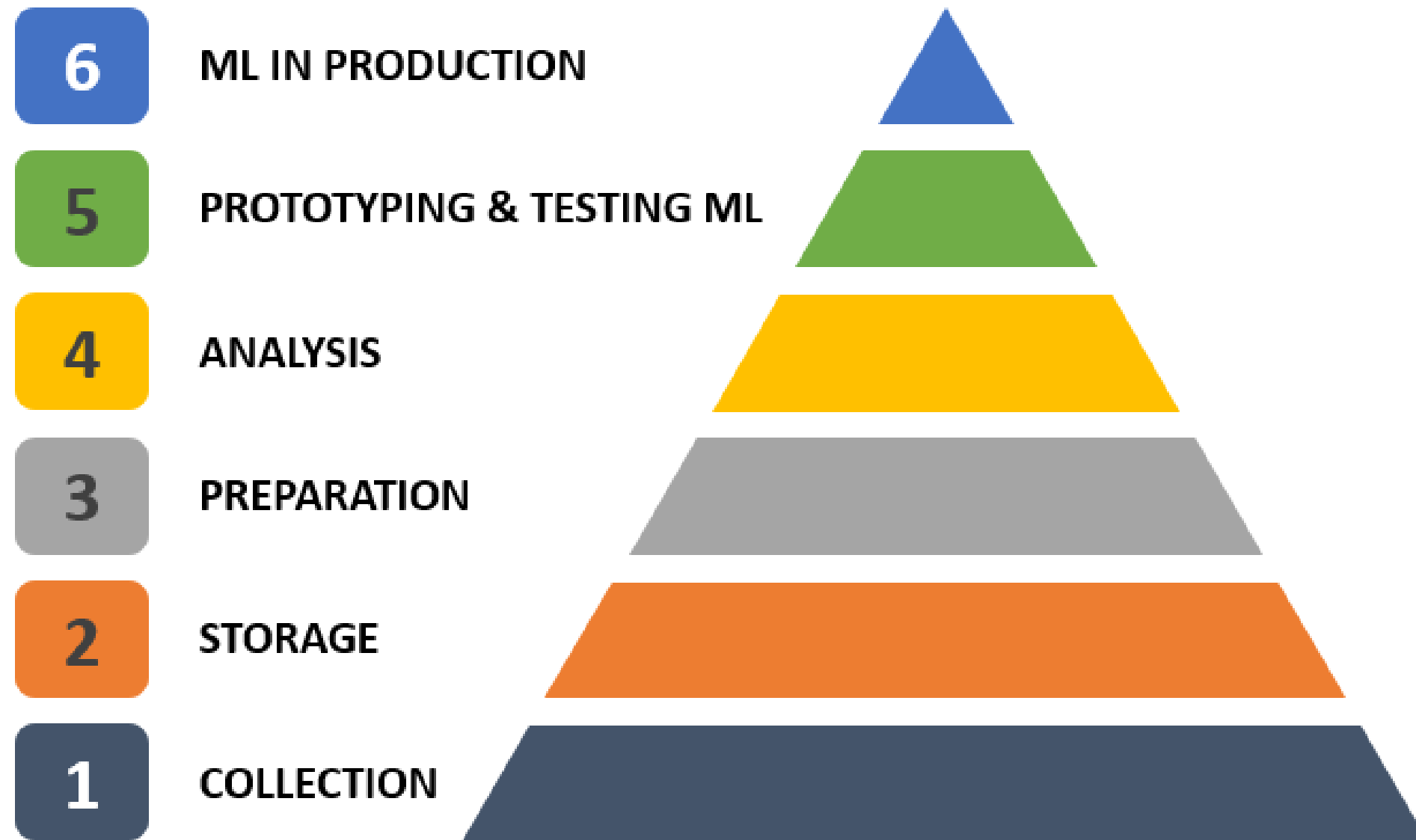
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Data pyramid and roles



Infrastructure owner

1

COLLECTION



Infrastructure owners

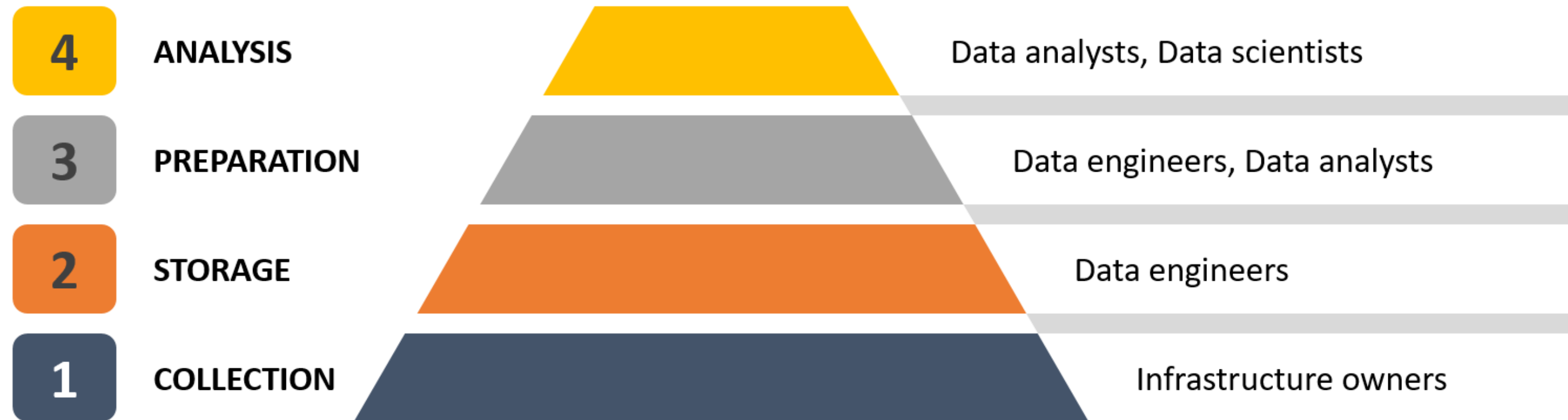
Data Engineer



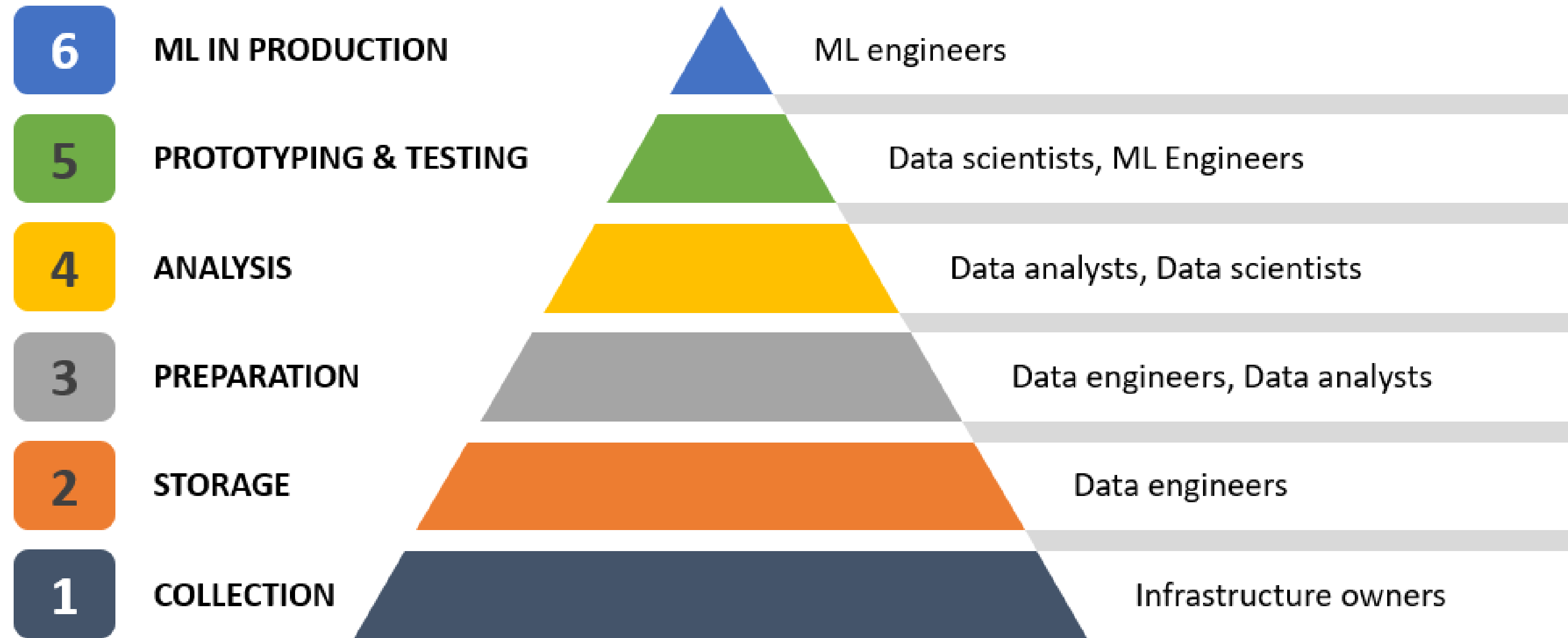
Data Analyst



Data Scientist



Machine Learning Engineer



Team structure

1. **Centralized**
2. **Decentralized (or embedded)**
3. **Hybrid**

Team structure comparison

1. **Centralized** - all data functions in one central team. Works well for small companies, startups, new organizations. Gets slow once business matures and requires focus
2. **Decentralized** - each business unit, geography or department have their own data functions. Works well for larger companies. Introduces issues with data governance, differences in definitions, redundancies, and added complexity
3. **Hybrid** - infrastructure, definitions, methods and tooling are **centralized**, while application and prototyping **decentralized**

Let's practice!

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