

3 Deployment Challenges



Challenges of building AI systems

Any software application comes with many **challenges**.

AI/ML brings around a couple of **extra** ones:

- **Data** is difficult to manage and resource consuming
- **Iteration** is necessary but slow
- The **expertise** needed is abundant and diverse
- **Scaling** quickly becomes an issue
- **Maintenance** becomes particularly difficult
- Selecting the right **tool** is not always so easy



Data is an investment

Having **easily available** and **high quality** data is **expensive**

Why invest in data?

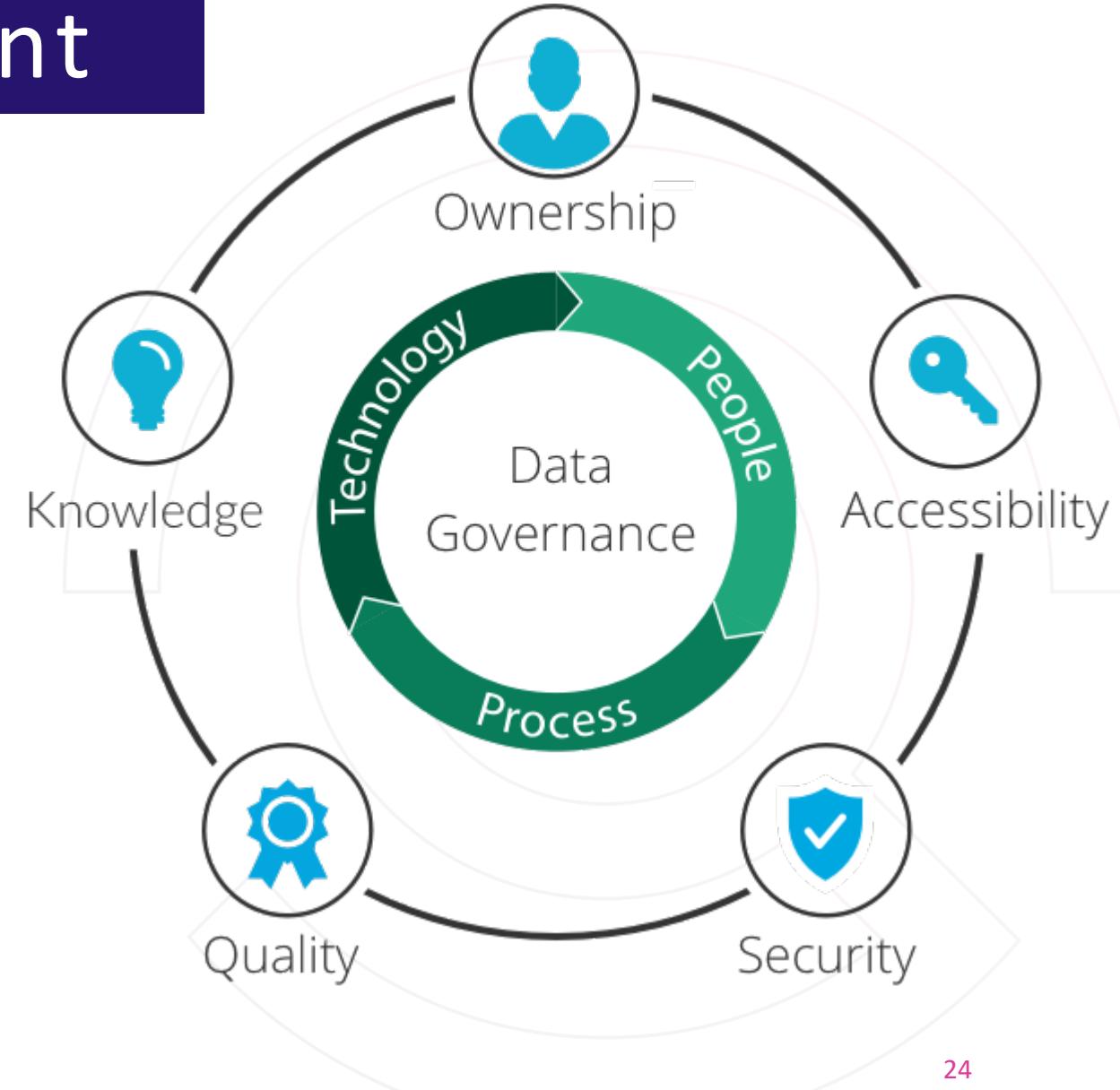
- Model quality depends on data quality
- Data is needed after deployment
- Data is worthless if not usable
- Data is at the core of the AI system
- Bad data increases complexity → need easy access to high quality data



Data is an investment

Data governance is key

- Being **data driven** is more than just buying expensive data
- Having the **processes** is as valuable as having the right tool
- Having a **cohesive data strategy** is the key to success.
- **Data governance** is not the same as Data management





Iteration is a must



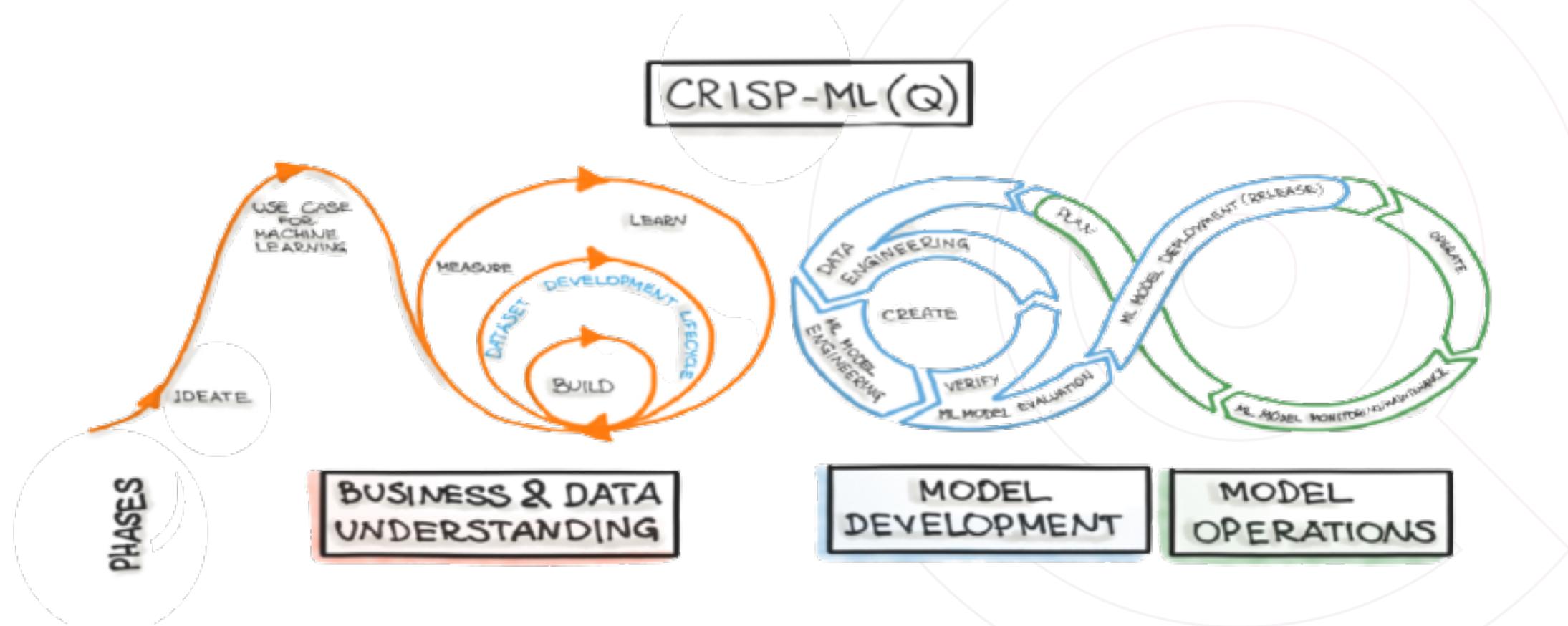
Be ready to iterate over:

- What does the business need?
- Do we have data as needed?
- Is data ready for modelling?
- What model should we build?
- Is our model good enough?
- How do we make results available?



Iteration is a must

As complexity of the environment increases, so does the workflow





Business and Technical Leaders

Aligning business and technical leaders is **not always easy**.

But it is necessary to **bridge the gap**:

Business leaders

- Update their Data/AI literacy
- Understand the uncertainty around AI systems

Technical leader

- Set right expectations ahead of time
- Plan resources efficiently



Business and Technical Leaders

If deploying AI for the **first time**:

- Start small
- Look for low hanging fruits
- Look for problems with visible value

AI is not going to replace managers, but managers that use AI will replace those that do not

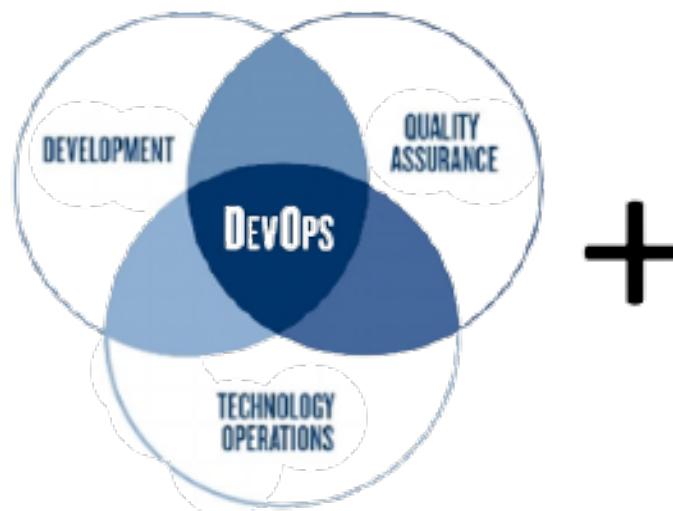
Remember: AI is not bulletproof, but when used correctly can be an extremely powerful tool



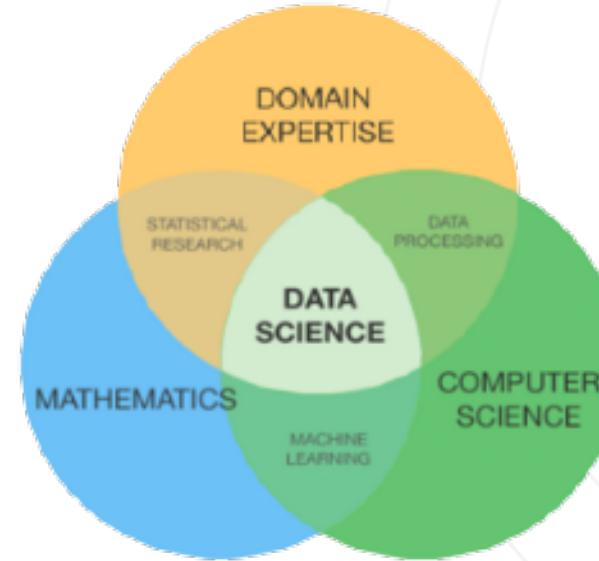
Technical teams working together

DevOps, IT and Data Scientist often **organized in silos** at organizations.

These silos must be connected* for AI. *Unless you found a **unicorn** that can do everything



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Technical teams working together



When working in silos:

- Impossible to have a high-level overview of the solution
- Constant blaming across teams
- Can't tackle complex problems (e.g. real time applications)
- Maintenance rapidly becomes a nightmare



Think about scaling

Scaling AI solutions is **not easy nor cheap**

Technical Performance

Computing cost become restrictive at scale

Computing time offline might not be acceptable in production

Storage requirements can grow beyond capacity

Data Management

Larger volumes of data implies more state-of-the-art solutions

Data cleaning and preparation becomes extensive and resource consuming

Security implications regarding the storage of the data

Extensive and well define data governance is needed



Think about scaling

Not only about **money** or **resources** but also about **processes** and **behaviour**

Handling Unexpected Behaviour

Supporting business that were not observed in production

Unexpected behaviour can arise anywhere, and is difficult to prepare for

Unintended business consequences based on AI solution

Processes

When adding or changing functionality, Business support is necessary

For customer facing systems, the solutions should be ready to deal with customer feedback

Non technical people needs to be prepared to use an AI tool



Data can significantly change

Data distributions can shift.

Assumption that past data is representative of future data is **broken**.

Data Drift

- Distribution of the features or target changes
- Past performance does not guarantee future results
- Models are not ever lasting but speed of decay increases

Concept Drift

- Occurs when patterns learned by the model no longer holds
- It might happen over time or suddenly
- Is more difficult to correct as is related to fundamentals



Maintaining AI solutions

“As the machine learning (ML) community continues to accumulate years of experience with live systems, a wide-spread and uncomfortable trend has emerged: developing and deploying ML systems is relatively fast and cheap, but maintaining them over time is difficult and expensive.”

Sculley et al.



Maintaining AI solutions





Selecting right technology

Selecting the **right tool** for the problem at hand is not always simple, as the technology supporting AI is

- Diverse
- Fast growing
- Tailored

Remember: Don't marry yourself to a tool. Tools are just means to an end.





Selecting right technology

Some general tips on selecting the right technology

Integration should be easy

- You are already on an ecosystem, new tools need to be easily integrable.

Flexibility is key

- Tools should easy to use and flexible to customization

Scalability is your friend

- Not all tools scale well for all problems

Right tool for the right job

- There are many tools available, no need to overspend

Support is important

- Having good support and a large community behind is key



AI Ecosystem is crowded

