# Data Science Cheat Sheet for Business Leaders

## Data Science Basics

### Types of Data Science

→ **Descriptive Analytics (Business Intelligence):** Get useful data in front of the right people in the form of dashboards, reports, and emails
- Which customers have churned?
- Which homes have sold in a given location, and do homes of a certain size sell more quickly?

→ **Predictive Analytics (Machine Learning):** Put data science models continuously into production
- Which customers may churn?
- How much will a home sell for, given its location and number of rooms?

→ **Prescriptive Analytics (Decision Science):** Use data to help a company make decisions
- What should we do about the particular types of customers that are prone to churn?
- How should we market a home to sell quickly, given its location and number of rooms?

### The Standard Data Science Workflow

1. **Data Collection:** Compile data from different sources and store it for efficient access

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2. **Exploration and Visualization:** Explore and visualize data through dashboards

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3. **Experimentation and Prediction:** The buzziest topic in data science—machine learning!

### Building a Data Science Team

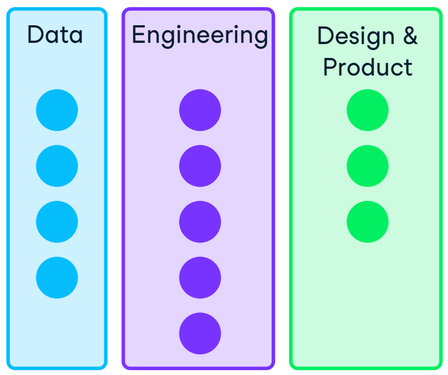
Your data team members require different skills for different purposes.

| Data Engineer | Data Analyst | Machine Learning Engineer | Data Scientist |
|---|---|---|---|
| Store and maintain data | Visualize and describe data | Write production-level code to predict with data | Build custom models to drive business decisions |
| SQL/Java/Scala/ Python | SQL + BI Tools + Spreadsheets | Python/Java/R | Python/R/SQL |

### Data Science Team Organizational Models

**Centralized/isolated**

The data team is the owner of data and answers requests from other teams

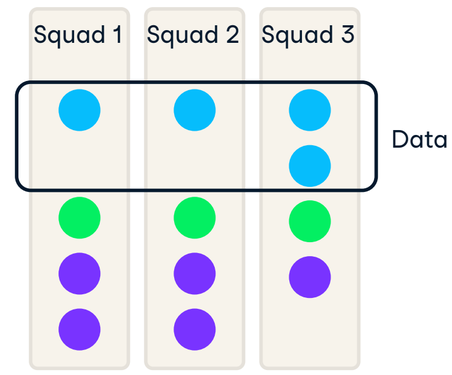



**Embedded**

Data experts are dispersed across an organization and report to functional leaders


**Hybrid**

Data experts sit with functional teams and also report to the Chief Data Scientist—so data is an organizational priority

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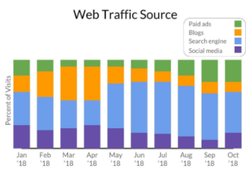
# Exploration and Visualization

The type of dashboard you should use depends on what you'll be using it for.

## Common Dashboard Elements

| Type | What is it best for? | Example |
|---|---|---|
| Time series | Tracking a value over time |   |
| Stacked bar chart | Tracking composition over time |   |
| Bar chart | Categorical comparison |   |

## Popular Dashboard Tools

| Spreadsheets | BI Tools | Customized Tools |
|---|---|---|
| Excel | Power BI | R Shiny |
| Sheets | Tableau | d3.js |
| | Looker | |

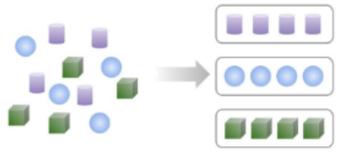
## When You Should Request a Dashboard

- When you'll use it multiple times
- When you'll need the information updated regularly
- When the request will always be the same

# Experimentation and Prediction

## Machine Learning

Machine learning is an application of artificial intelligence (AI) that builds algorithms and statistical models to train data to address specific questions without explicit instructions.

| | Supervised Machine Learning | Unsupervised Machine Learning |
|---|---|---|
| **Purpose** | Makes predictions from data with labels and features | Makes predictions by clustering data with no labels into categories |
| **Example** | Recommendation systems, email subject optimization, churn prediction   | Image segmentation, customer segmentation  |

## Special Topics in Machine Learning

- **Time Series Forecasting** is a technique for predicting events through a sequence of time and can capture seasonality or periodic events.
- **Natural Language Processing (NLP)** allows computers to process and analyze large amounts of natural language data.
  - Text as input data
  - Word counts track the important words in a text
  - Word embeddings create features that group similar words

| | |
|---|---|
| **Deep Learning / Neural Networks** enables unsupervised machine learning using data that is unstructured or unlabeled. | **Explainable AI** is an emerging field in machine learning that applies AI such that results can be easily understood. |
| Highly accurate predictions | Understandable by humans |
| Better for "What?" | Better for "Why?" |