

# Integrating AI into your Organization

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# Outline

- Intro
- Data-driven organization
- Template for AI integration
- AI + business analytics applications

# Bio

- **Education**

- **Ph.D. ME:** Georgia Institute of Technology, ATL
  - ▶ Applied Numerics
  - ▶ Computational PDEs
  - ▶ High Performance Computing

- **Professional**

- **Principal Data Scientist:** Jet.com, NYC

- ▶ **Optimization:**

- Randomization Algorithms
    - Controlled Experimentation
    - Treatment Effects
    - Bayesian Bandit systems

- ▶ **Deep Learning:**

- Exponential Family Embeddings

- ▶ **NLP:**

- Chatbot
    - Text Analytics

# Becoming a data-driven organization

# Data-Driven Organization

- Becoming **data-driven** is about making **data** and **analytics** part of:
  - **business strategy**
    - formulate
  - **systems & process**
    - execute, assess + feedback loop
  - **company culture**
- It's about creating a mindset in which **analytics**
  - forms the basis of all **fact-based** business **decisions**
  - is embraced by **all levels** of the organization.

# Why ?

- Data has become an **enterprise asset** that is **revolutionizing** the world.
- With data companies can build
  - **better + faster + cheaper** business processes == **operational excellence**.
  - **competitive advantage**
    - ▶ data-driven orgs. gather data concerning **all business aspects**
    - ▶ having right data @ right time @ all employee levels can foster **conclusive decision-making**
    - ▶ culture becomes part of the companies' **competitive advantage**



# How ?



# Template for AI integration

# Template for AI Integration

1. Formulate Successful AI strategy
2. Understand the Basics of AI
3. Identify AI Opportunities
4. AI Implementation
5. Integrate AI into Analytical Strategy

# 1. Formulate Strategy

- **Leadership & Vision**
  - Incorporating new technologies like **AI** into business processes requires **significant leadership** and **effective direction** that all stakeholders can easily understand.
  - Key **objectives** must be **defined** and **communicated** throughout the organization.

# 1. Formulate Strategy

- **Data Strategy**

- Data strategy must be defined **within context** of the larger business strategy.
- A **road-map** for an organization's potential to harness data-dependent capabilities.
  - Umbrella for all **domain-specific strategies**, e.g. master data management, business intelligence
- Good enterprise data strategy is:
  - Practical, Relevant, Evolutionary and Integrated

## 2. Understand AI Basics

- Invest in an **initial immersion** into AI, Machine Learning, and Deep Learning
- Understand the **core AI technologies** and their implications for business
- Deep dives into industry and competitive **best practices**.
- Be clear about the role of data and analytics in driving your strategy

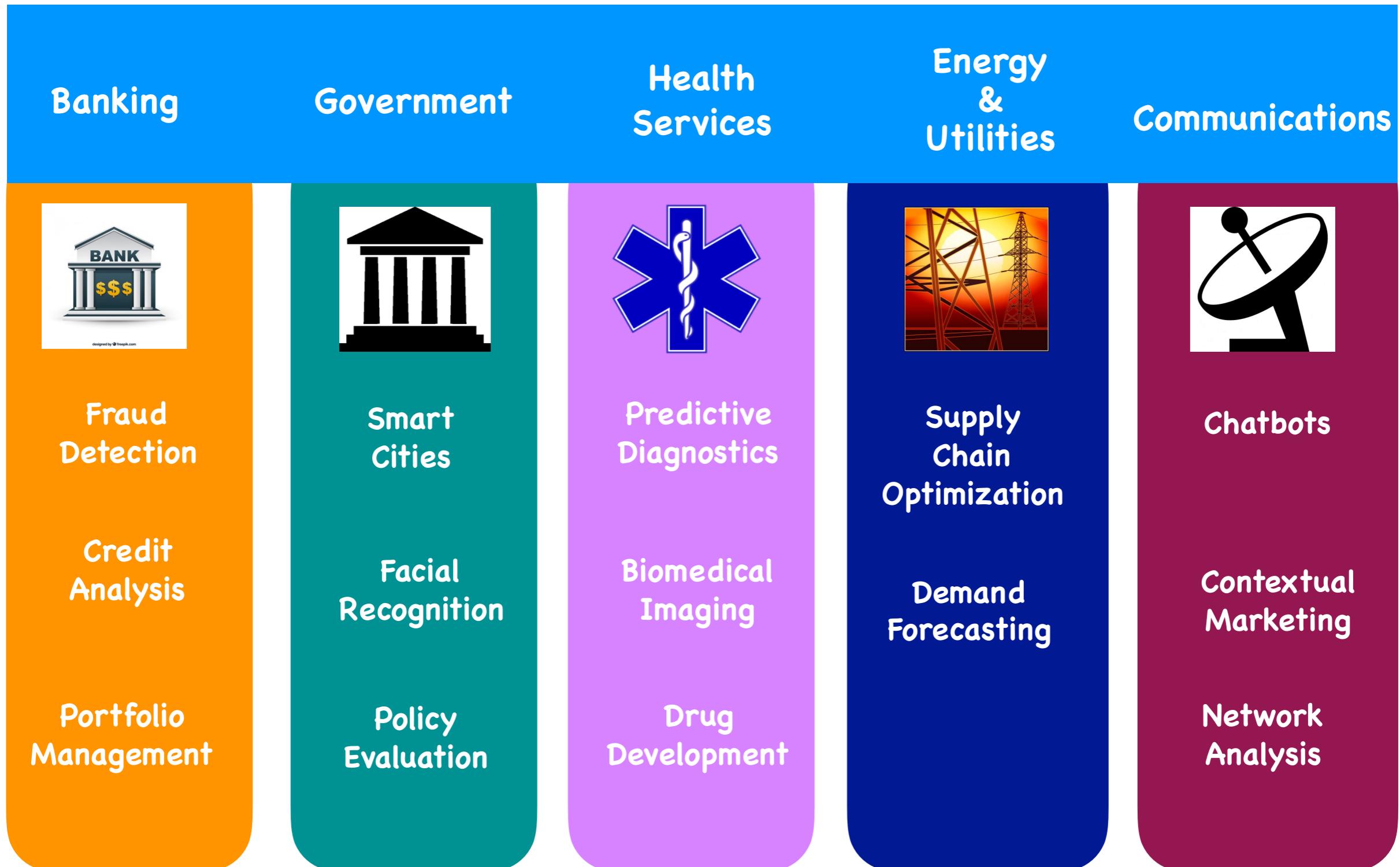
## 2. Understand AI Basics

- **Pattern recognition:** understand customer financial transactions and spot anomalies
- **Prediction:** forecasting
- **Image recognition:** determine if nodes on a raw CT scan are malignant or benign.
- **Speech to text:** transcribe customer voice messages to text for sentiment and text analysis.
- **Cognitive search:** personalized recommendations to online shoppers.
- **Natural language interaction:** automated generation of report on sales revenue predictions.

# 3. Identify AI Opportunities

- Ensure your efforts are **not caught up in silos**:
  - AI **adoption** and **projects** need to be:
    - cross-functional
    - across leadership levels
    - collaborative
  - AI projects require a **synthesis** of:
    - AI expertise
    - domain knowledge
    - business acumen
    - corporate strategy and vision

# 3. Identify AI Opportunities



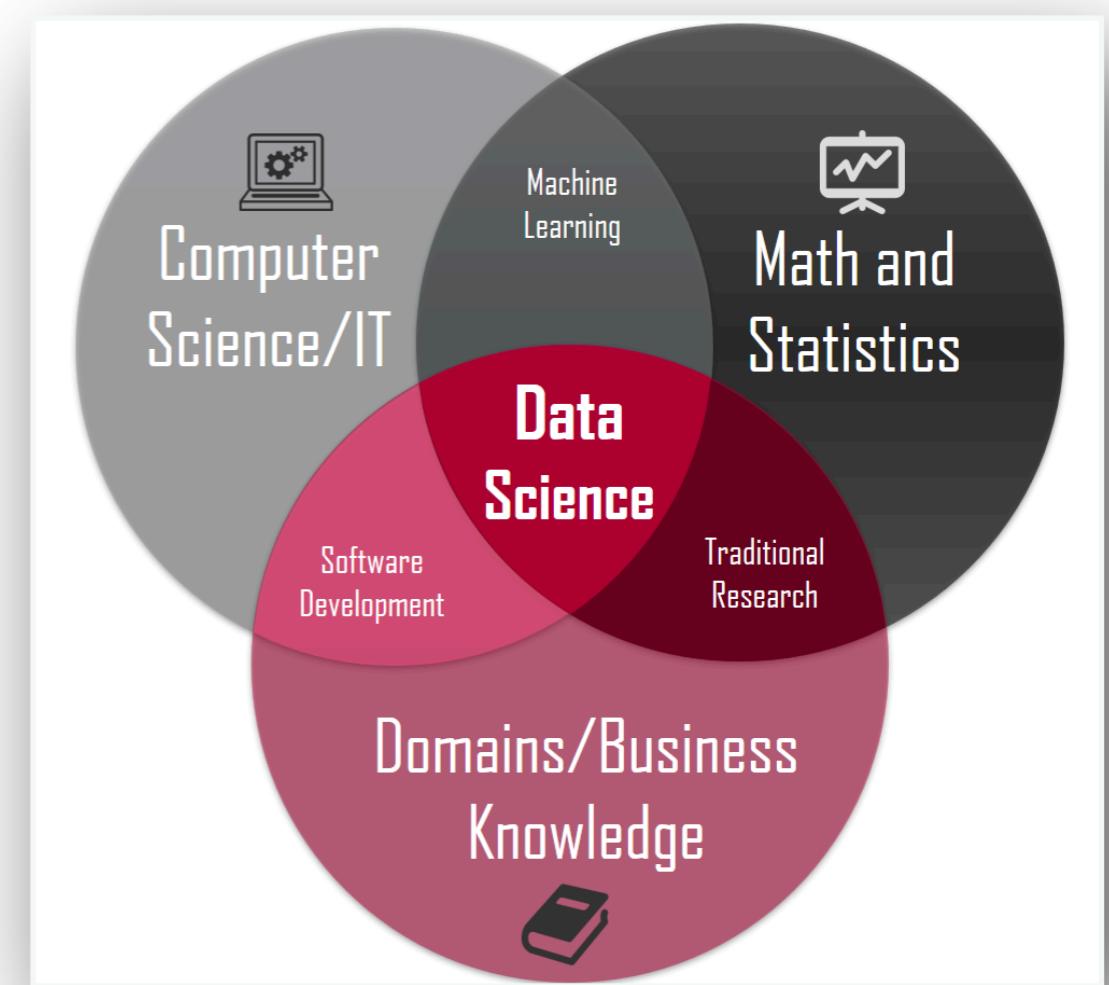
# 4. Implementation

- Successful integration of AI would require convergence of **people, process & technology**.
- **People** - your most important resource
  - Leaders need to ask if they have the **right talent** in their organization to make it all happen
  - You **must invest** in:
    - **Data scientists** - build machine learning applications
    - **Data engineers** - build appropriate infrastructure to support AI applications
    - **Solution architects**: oversee enterprise implementation

# 4. Implementation

## Data Science:

- Interdisciplinary field that uses **scientific methods & algorithms** to extract **knowledge & insight** from data.
- **Effective data scientists:**
  - high-level **technical** skills
  - build complex **quantitative** algorithms
  - **coding** knowledge
  - organize and synthesize **large** amounts of data
  - drive **strategy**
  - translate results into **solutions**
  - **communicate** findings
- These skills are required in almost all industries.

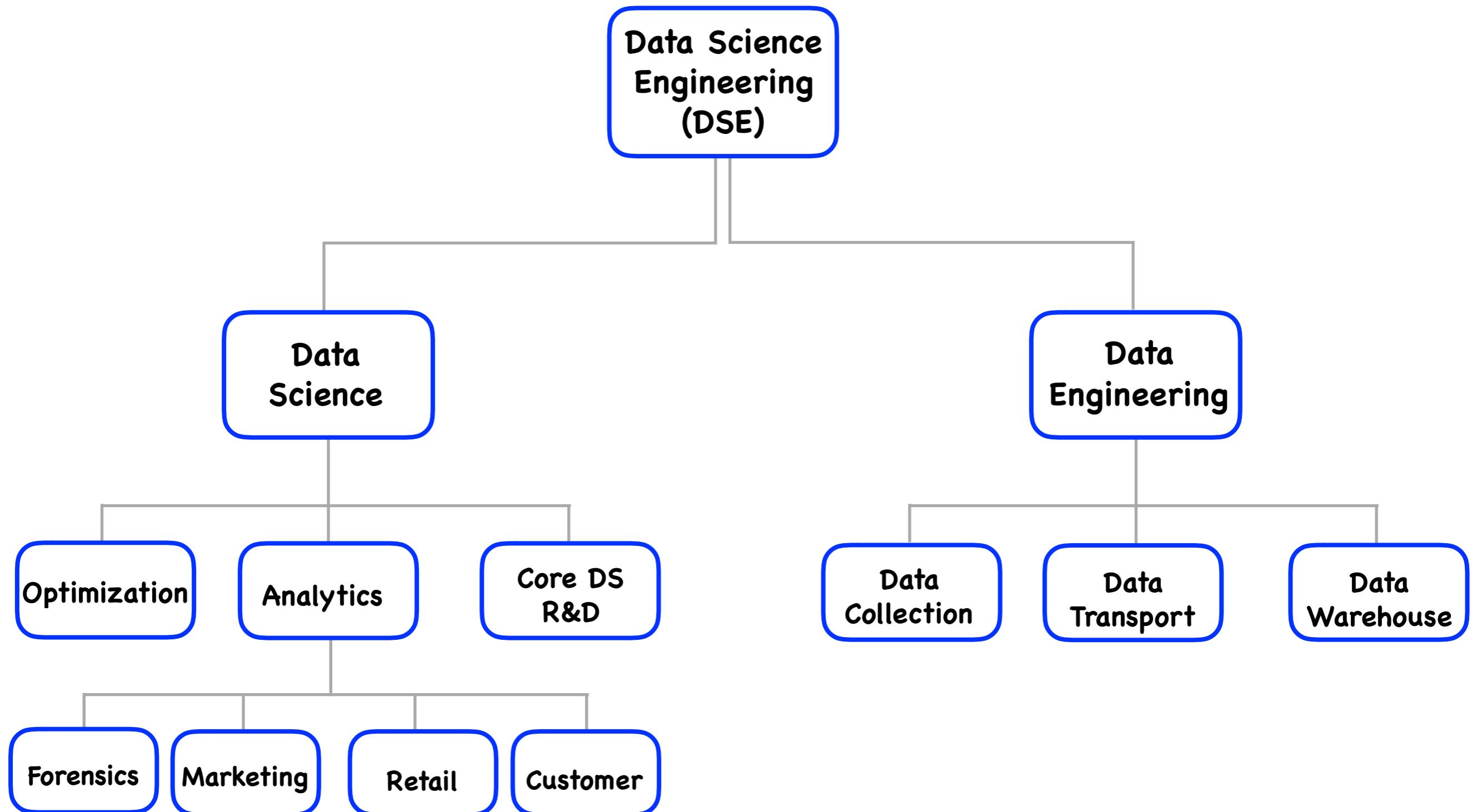


“...The ability to take data — to be able to understand it, to process it, to communicate it — that is going to be a hugely important skill in the next decades...”

— Hal Varian

*Chief economist at Google & UC Berkeley emeritus professor of information sciences, business & economics*

# 4. Implementation



# 4. Implementation

- **Process** - framework that supports your data strategy
  - **organizational & cultural** changes e.g. decision-making authority for data **governance & management**
  - **Productionizing** models:
    - cohesion between devs and IT for timely **model deployment**
  - **Training** data & **feature** engineering:
    - easy **access** to tons of **rich, relevant** high **integrity** data.
  - Setting the right **expectations** for users:
    - Know what to do with **output** from AI applications
  - **Simplicity** and Symbiosis
    - Process should be simple and tailored to overall business strategy

# 4. Implementation

- **Technology** - of all three, the easiest to tackle
  - Abundance of data solutions - companies struggle to find a good fit.
    - Identify **best-fitting** technologies for your needs
    - Deploy and ensure **staff access** to this technology
  - Tech **requirements**:
    - HPC, collection, transport, processing, storage, streaming, etc
  - Tech **philosophy**: master data == central single source of truth.
  - **Barriers** to adoption and implementation sit within **people & processes**
    - make sure those areas receive a great deal of focus

# 4. Implementation



# 5. AI + Analytical Strategy



# 5. AI + Analytical Strategy

- **AI** is **not** the correct **solution** to **every** problem.
  - Understand **where, when** and **how** to apply AI capabilities
- **AI** should not be a **black-box** tool.
- **AI** should not **operate separate** from your overall strategy.
- **But wherever there is data there must be analytics!**
- Continuous performance assessment, evaluation & reviews
  - Feedback and recommendations

**Does this apply  
to my organization?**

# Use Case I:

## Customer Lifetime Value

- What is **CLV**?

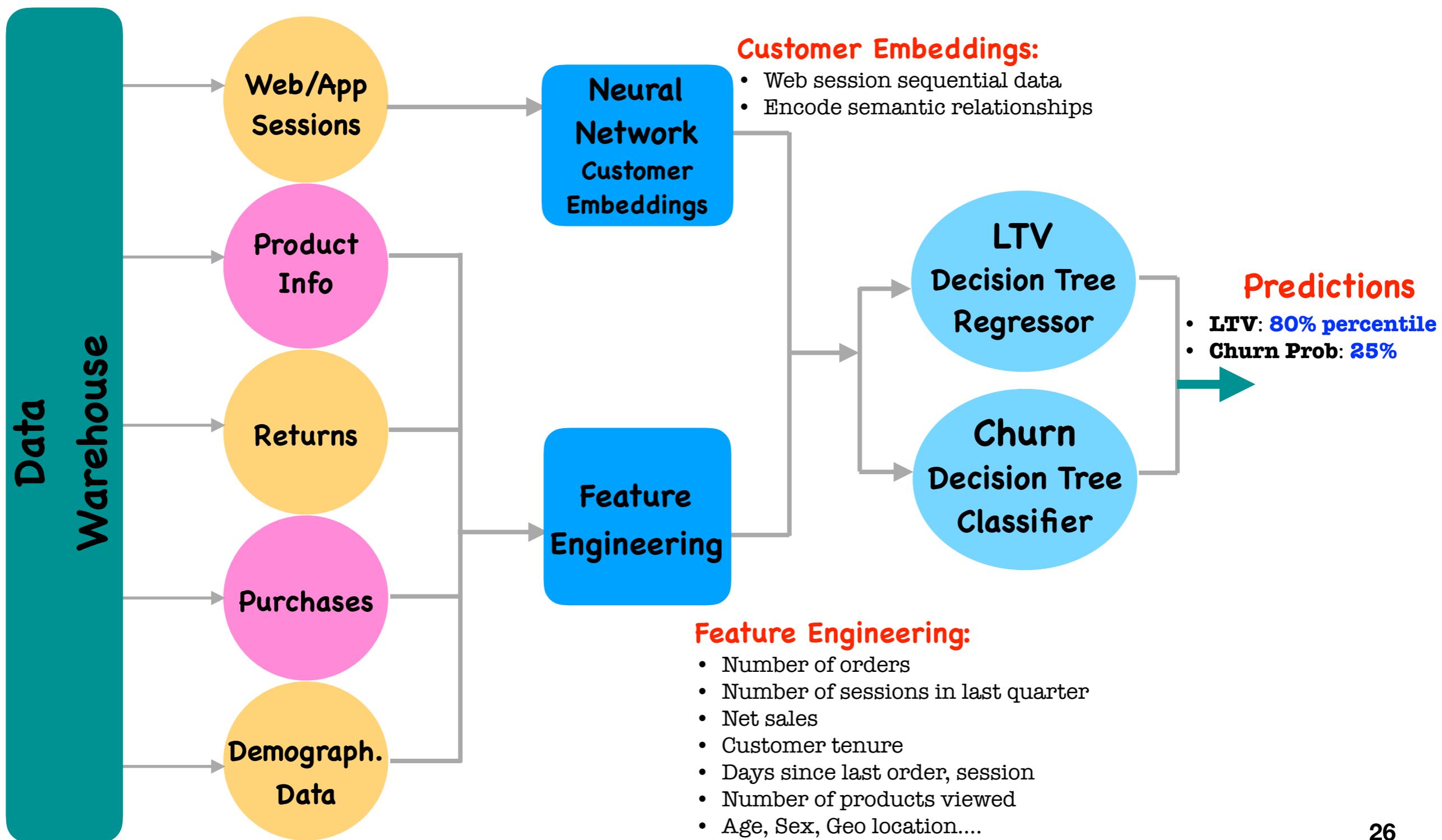
- ▶ The **value** of a **customer** to your business over the **entire length** of your **relationship** with the customer
  - e.g sales net of returns over a time period, say one year.

- What is **Churn Probability**?

- ▶ **Likelihood** of a customer **not buying** from you over a time period
- **CLV** & **Churn** are critical **marketing metrics** particularly so for e-Commerce businesses
  - ▶ **Customer relationship management**: high-valued customers retention
  - ▶ **Marketing strategy**: budgeting, targeted campaigns

# Use Case I:

## Customer Lifetime Value

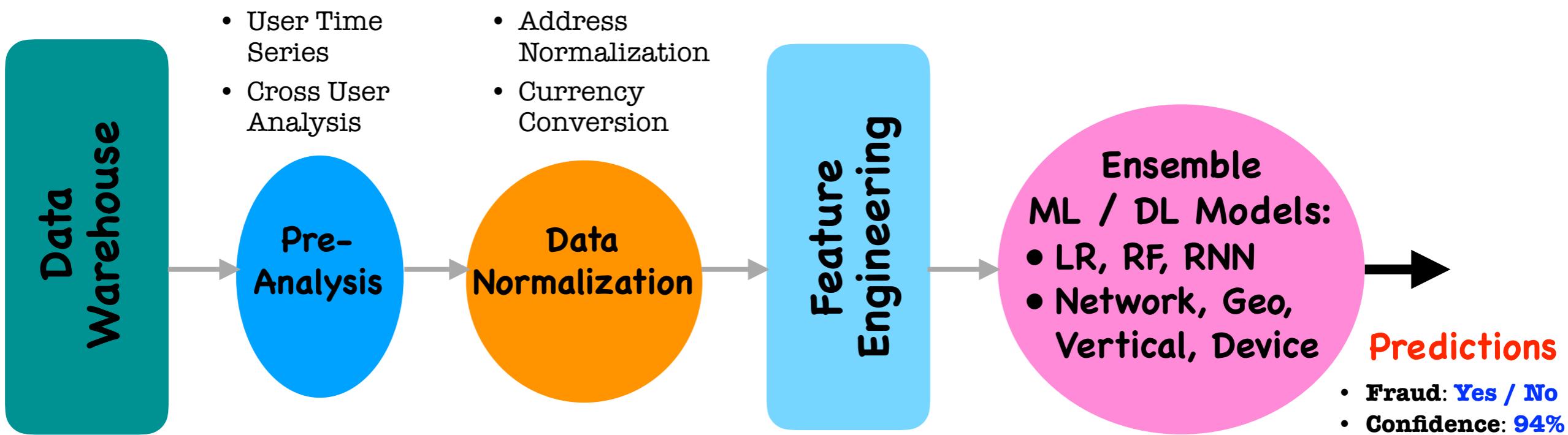


# Use Case II: Fraud Detection

- Fraud detection is challenging!
  - ▶ Fraudulent transactions are rare
  - ▶ small sample but potentially significant losses
  - ▶ Fraudsters are crafty and fast evolving
- Most companies use rule-based systems
  - ▶ Effective if pattern is already known
  - ▶ Cannot uncover unknown schemes
  - ▶ Cannot adapt to new fraud patterns or techniques
- ML models can learn, adapt and uncover emerging fraud patterns

# Use Case II:

## Fraud Detection



### Data Types:

- User identity
- Behavioral patterns
- Locational data
- Device & network
- Business Unique Data
- Business Decisions
- Transactions
- Third Party Data

### Feature Types:

- Event feature
- Geo feature
- Temporal feature
- Identity feature
- Velocity feature
- Behavior feature

Feature Types are categorical & continuous.

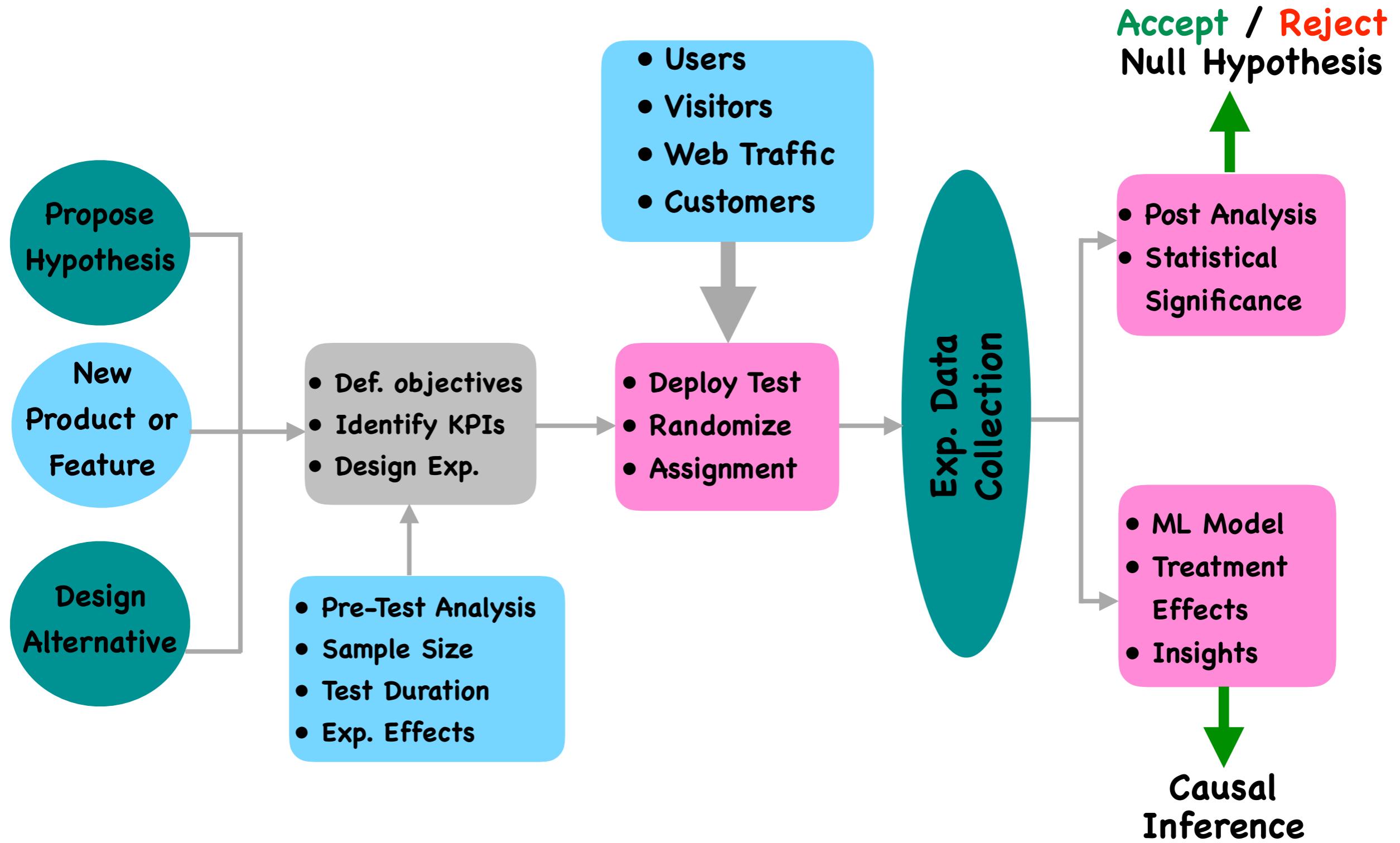
# Use Case III:

## A/B Testing

- **Customer addition & satisfaction** is critical for business success:
  - ▶ How do you **attract new** customers?
  - ▶ How do you **retain existing** customers?
  - ▶ How do you **roll out new** products or experiences?
- **Experimentation** - how big tech companies improve **customer experience**.
  - ▶ Test **hypothesis**
  - ▶ Determine **causality**
  - ▶ Launch, debug, measure and monitor effects of:
    - **enhancements**, product **features**, marketing **campaigns**
    - backend **models** e.g. search, recommendations, pricing algorithms

# Use Case III:

## A/B Testing



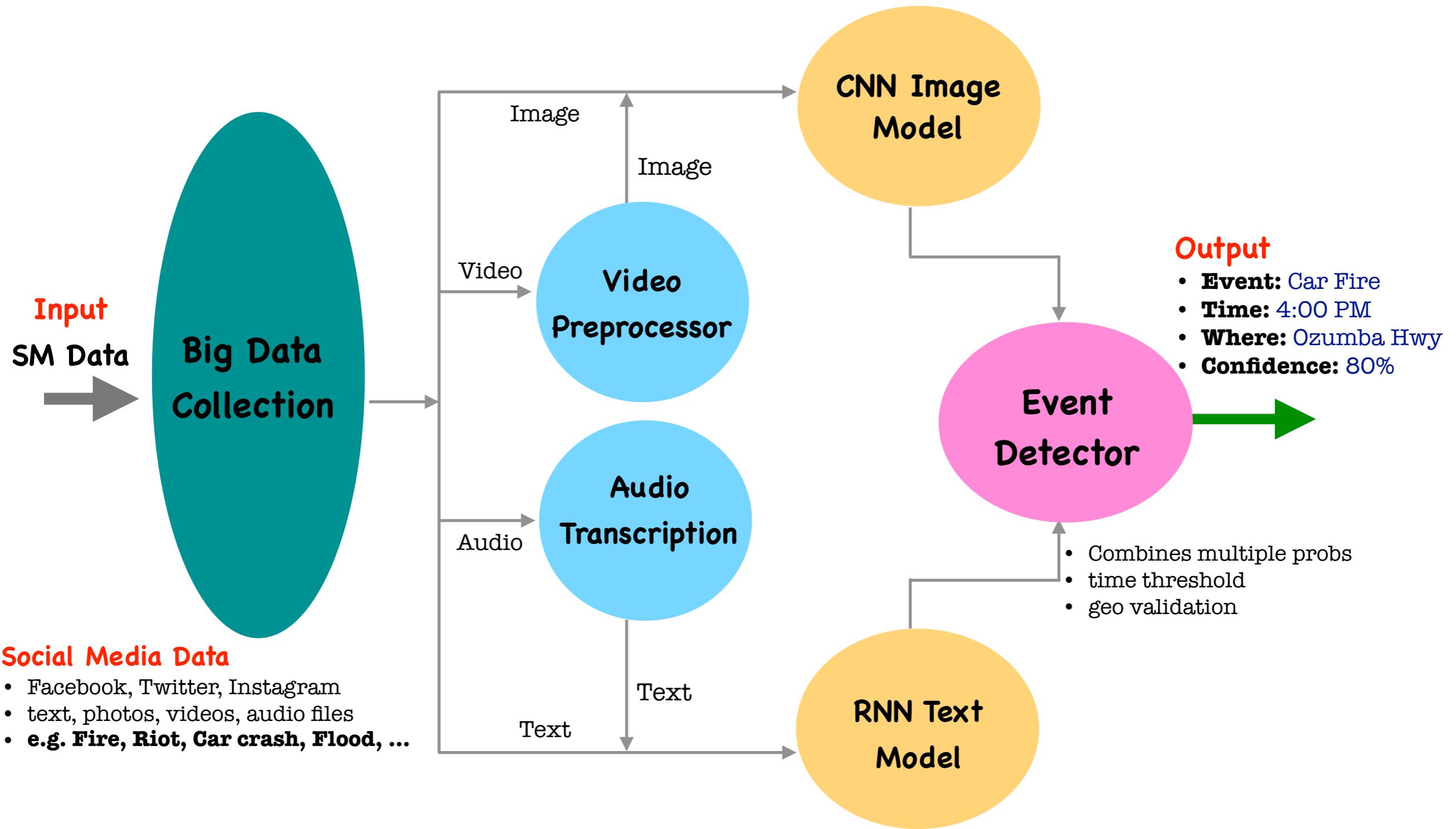
# Use Case IV:

## Real Time Event Detection

- Signals from **Social Media** Data
  - ▶ **Texts** and **images** as input to **predictive models** for near real time events detection e.g.
  - ▶ crash, riots, concerts, severe weather, fire, police activities, political events
- Potential **Use Cases?**
  - ▶ **breaking news** items especially in **remote** locations
  - ▶ **rapid response** planning for **crisis** situations
  - ▶ **monitoring election** voting centers
  - ▶ inputs to **security systems** for monitoring **companies' critical** assets
  - ▶ inputs to ride sharing algorithms for **adaptive pricing**

# Use Case IV:

## Real Time Event Detection



# **So now what?**

# Well...

- **It is imperative to get started, even if you start small.**
  - Start with a **proof of concept project** to build strategic understanding and successes.
  - **Quick wins** help bring confidence to technological change.
  - AI has **accelerating effect** -- combination of
    - faster hardware
    - more data
    - new algorithms
    - translates into new models trainable in 3 hours, not 30 days. This opens up **wholly new applications**
- **Those who do not get started now will likely be left behind.**

**Thank  
You**

