

# Innovation for Better Governance

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**AIC**

**Applied Innovation Center**  
Ministry of Communications and IT



# Outline

1. Introduction – Innovation and Governance
2. IT and AI
3. Government and AI
4. Innovation in Governance
5. Applying AI in the Egyptian Government
6. Q&A



# Introduction



# Innovation is a Natural Human Activity

1. We have been developing novel technologies since our creation
2. Technology is **essential** to our existence
3. Technology is **scary** because it usually induces change
4. New applications of emerging technologies have always triggered the urge to formulate **new laws and regulations**
5. The evolution of technology changes the global landscape -economic and political, creating an **environment for possible changes** in prosperity and international leadership
6. Dealing with technology:
  - **Protective**: block it, whether fully or partially
  - **Adventurous**: accept risk-reward, allow open innovation



# Raison d'être of any Government

Government is essentially responsible for **creating** and **enforcing** the rules to:

- **Ensure (internal functions)**
  - a) The prosperity and welfare of the citizens
  - b) The social order and harmony
  - c) The management of common resources
- **Protect (international functions)**
  - a) The national territory
  - b) The national Interests
  - c) The citizens abroad



**IT & AI**



# Evolution of IT

1. **Numeric** Computing (scientific, census, payroll, inventory, taxes, etc.)
2. **Databases** (save, structure, and analyze data)
3. Office Automation (**document** production and exchange)
4. IS (backend & workflow: make existing **processes** faster and more efficient )
5. **UX** (frontend: the online revolution: eCommerce, eServices)
6. Digital Transformation (seamless **integration**, user-centric processes)
7. **VR/AR/XR/Metaverse** (fusing information into the real world)
8. **Modern AI (ML, DL, GenAI)**



# AI, just another step in technological progress?

- AI and previous game changers
- The magnitude of opportunities and threats
- The multiplying factor in the evolution and impact of other emerging technologies





# Government and AI



# Impact of the AI Force

- Global Scale
  - Employment and Society
  - Business and Economics
  - Environment
- National Scale
  - Government
  - Business and Economics
  - Employment and Society
- International Scale
  - Dependence, Protection, and Alliances



# AI – Focus on Egypt

- Current Status
  - Awareness
  - Skills
  - Tools
  - Data
  - Governance
- Serious Threats
  - Jobs!
  - Security
- Seizing Local/Global Opportunities



# Innovation in Governance



# Digital Innovation for Government

- All **businesses innovate** in order to survive and thrive
  - Their objective is to improve their core business and better meet the changing demands of their target customers
- **Governments rarely have their own Dedicated Applied R&D**, despite the fact that, in their respective countries, governments are :
  - **Largest** customer base (the entire country!)
  - **Largest** impact on the population and future of the nation
  - **Largest** employer
  - **Largest** contributor to the GDP
  - **Largest** budget
  - **Largest** diversity of activities: national infrastructure, law & order, military, public healthcare, public education, public transportation, welfare, food security, protection of national resources, regulation and monitoring of all other activities, etc.



# Evolution of Digital Government

1. Computers are used to crunch data (census, taxes, etc.)
2. Databases are used to save, structure, and analyze data
3. Office automation: Document production and exchange
4. Backend: Execution of existing processes becomes faster and more efficient
5. Frontend: The Online revolution (eServices)
6. Digital Transformation:
  - Seamless integration of backend(s) and frontend(s).
  - Add new, user-centric processes
- 7. More can be done**



# Elements of Success

1. Leading edge users with compelling applications (RoI) and feasible plans
2. Skilled team (scientific, business model, impact analysis, project management, product engineering, maintenance & support, user training, etc.)
3. Development tools & environment (technical, business)
4. Deployment & sustainability (technical skills, infrastructure, financials, etc.)
5. Protection (data, user, society, nation, humanity, environment)

... and a solid **NATIONAL STRATEGY**



# Applying AI in the Egyptian Government





Ministry of Communications and Information Technology

# Applied Innovation Center

An Overview – July 2024



**AIC**

**Applied Innovation Center**  
Ministry of Communications and IT

# AIC – Raison d'être



## Vision

Be the go-to team for addressing the growth and sustainability challenges that face our nation and beyond

## Novel Solutions

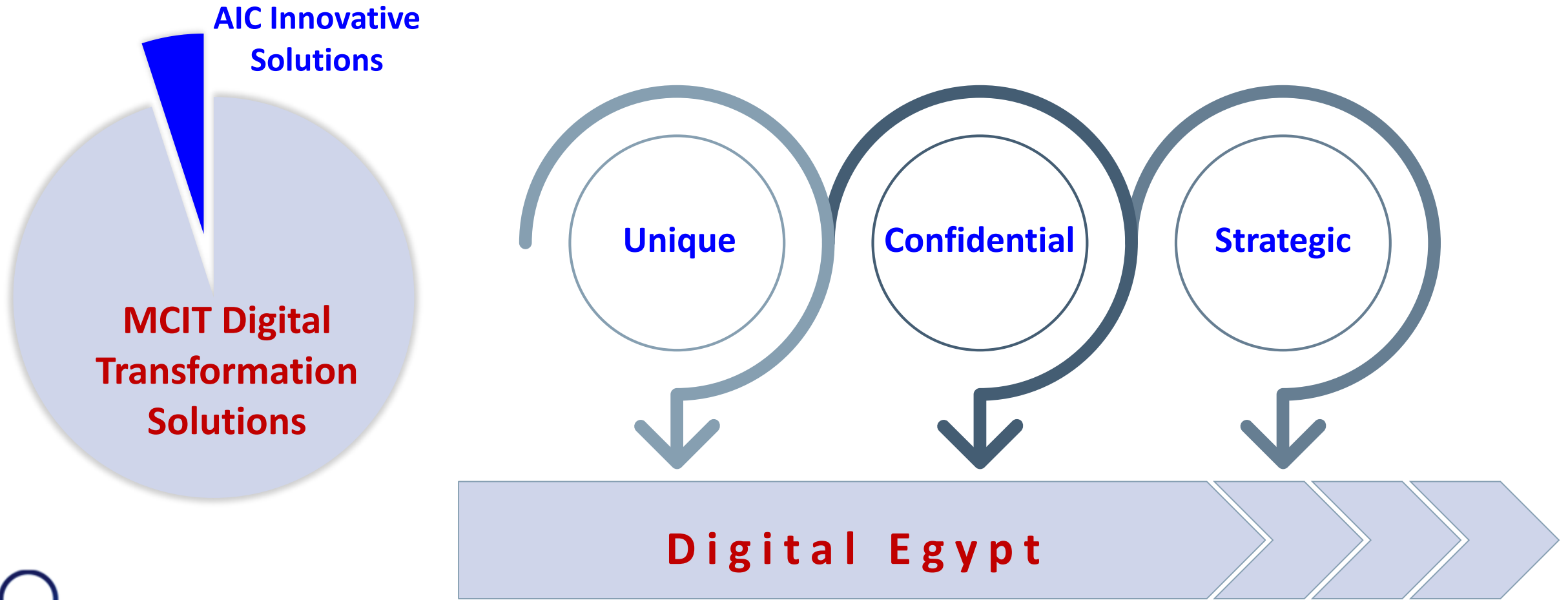
Analyzing and solving national challenges, and delivering leading edge solutions using emerging Information and Communications Technologies (ICT)

## Capacity Building

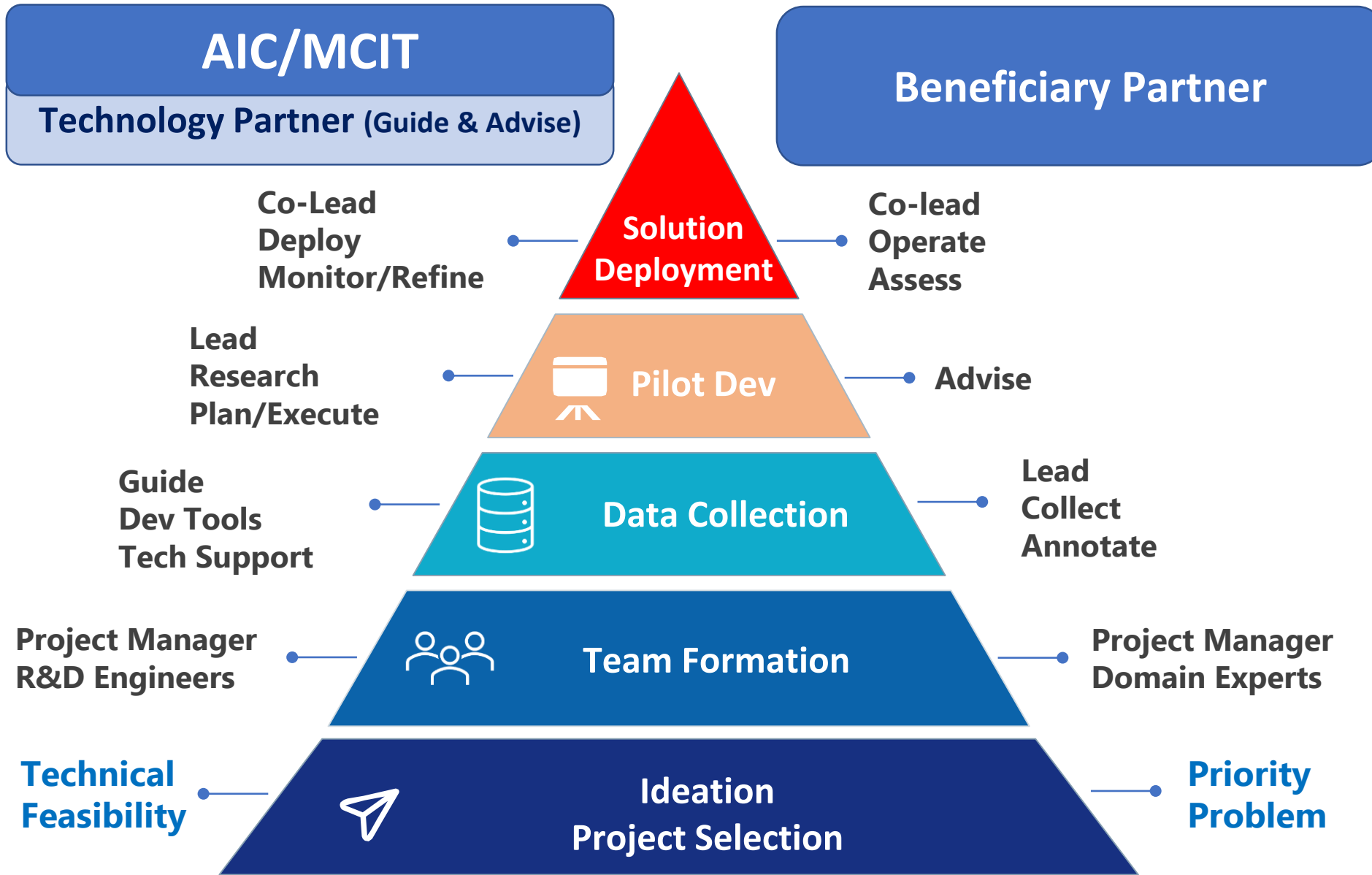
Developing human capital through on-the-job training on real national challenges



# Digital Transformation - AIC Engagement Criteria



# AIC Partnership Model



# AIC Team

**R&D Groups**

**SW Engineering**

**SME & Data specialists**

**HPC Management**

**Project Management Office**

**Core Operations**



**200+ Members**

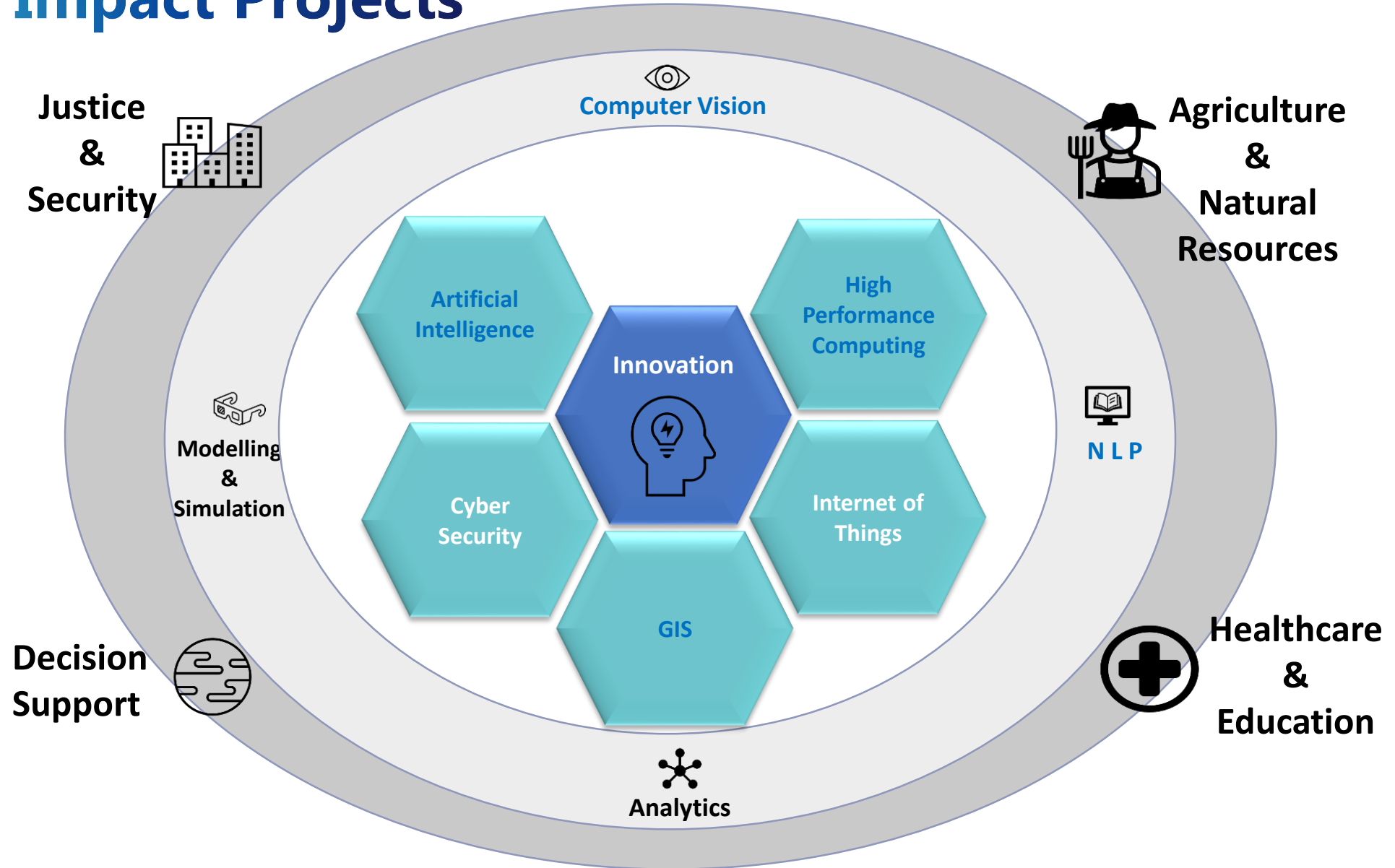
**60+ Engineers**

**8 PHD Holders**

**From 12 Universities**



# High Impact Projects



# AI in Healthcare

➤ Diabetic Retinopathy

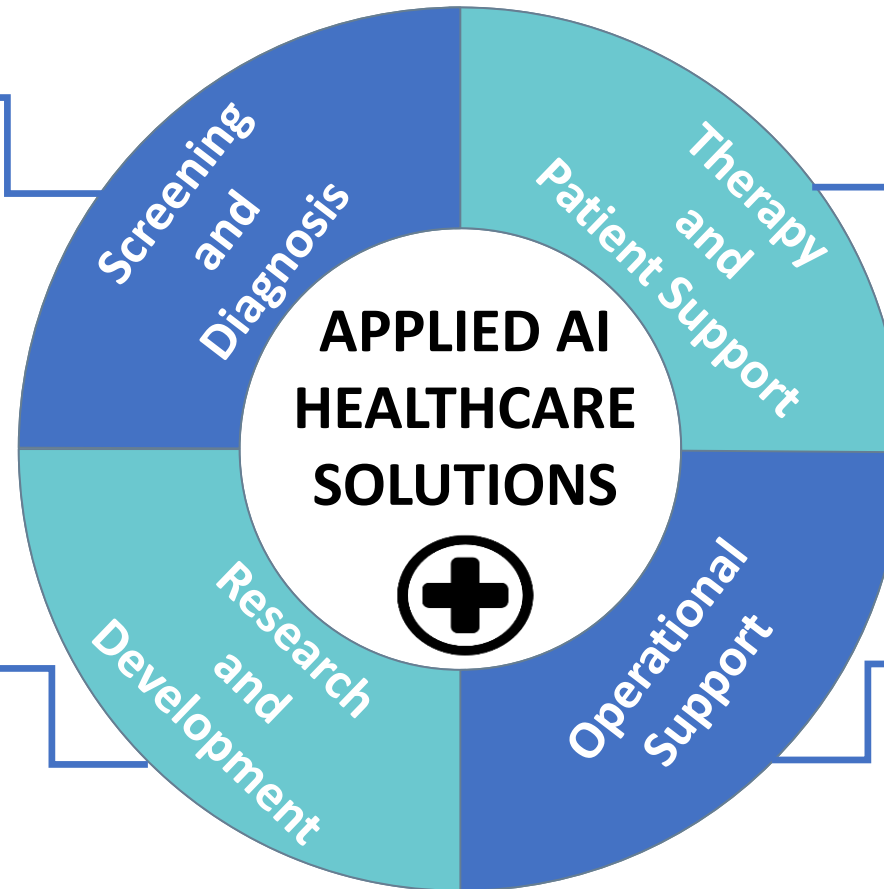
➤ Glaucoma

➤ Macular Edema

➤ Breast Cancer

➤ Early Childhood Caries

➤ Drug Discovery  
& Repurpose



➤ Mental Health - Culture Sensitive Chatbot

➤ Transformative AI for Personalized Cancer Treatment

➤ Electronic Health Records Management



# Some Project Highlights





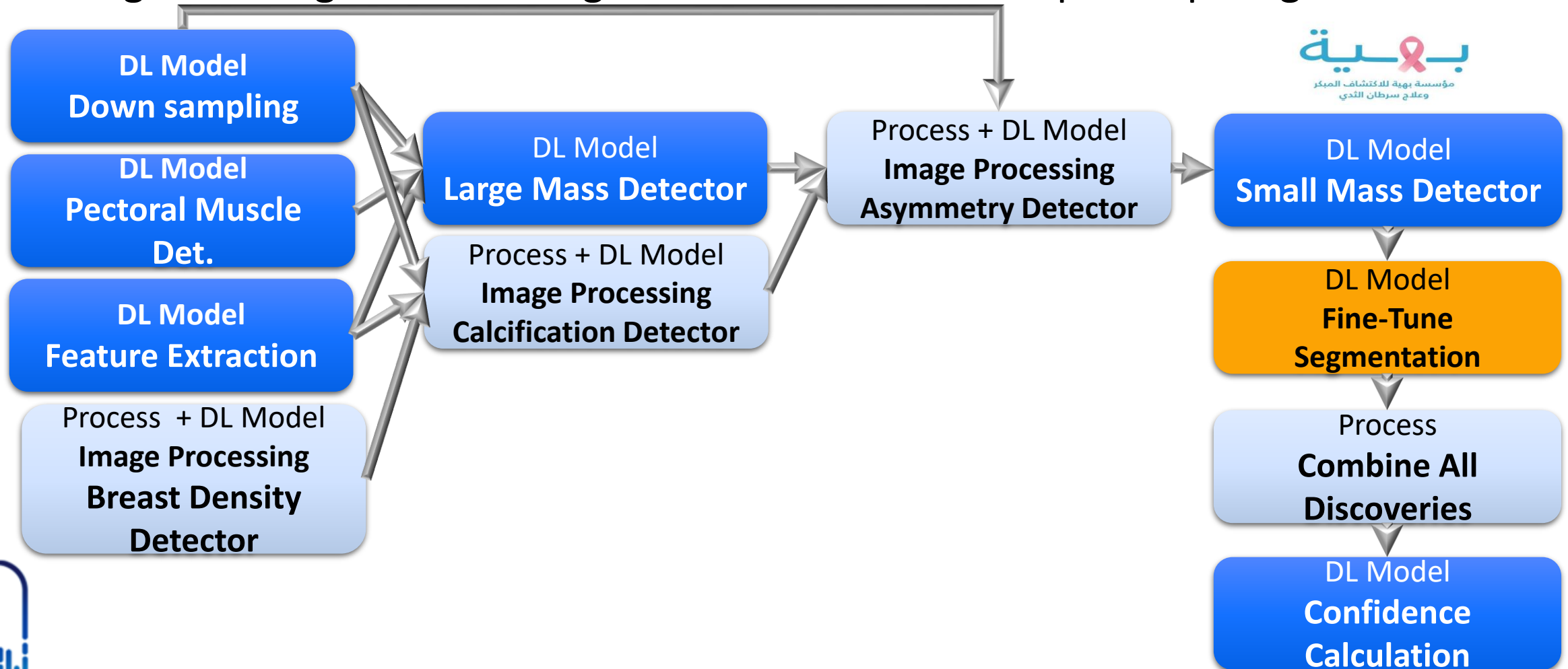
# Diabetic Retinopathy and Macular Edema

- The AI Engine requires only **one** eye fundus image per eye: **fovea centered**, *jpeg format, resolution 768x768 or better.*
- An eye fundus digital camera is used
- Collected and annotated data from ~12,000 Egyptian patients
- Product tested in several location
- Sensitivity = 96.6%
- National initiative for 1 million patient

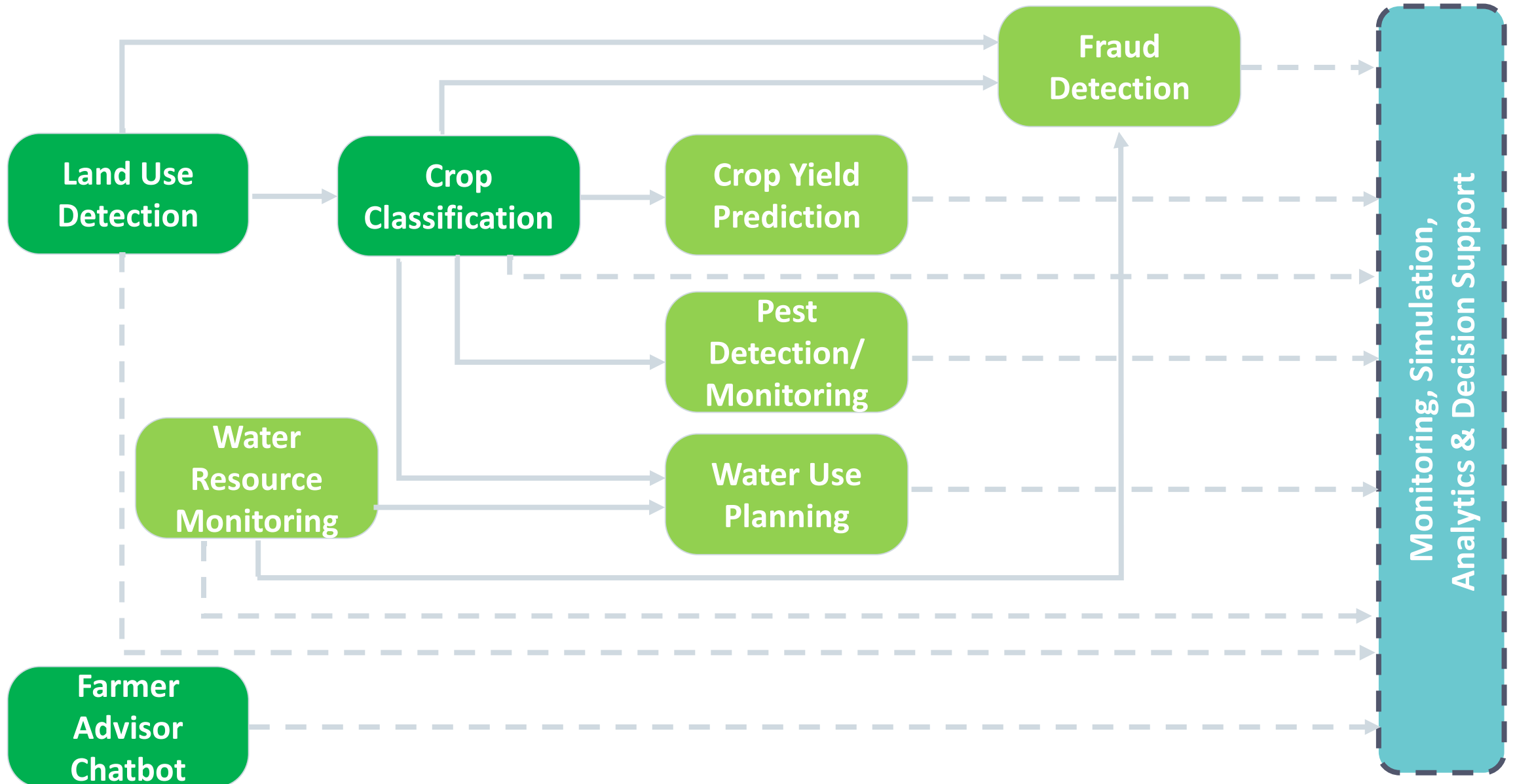


# Breast Cancer Detection - AI Engine Pipeline

An AI solution to assist radiologists & oncologists in breast cancer detection during mammogram screening to reduce overhead & speed up diagnosis



# AI for Agriculture



# AI for Security/Law Enforcement & Judiciary



**Illegal Crops Detection**



**Land Incursion  
Detection**



**Semi-Automated  
Police Call Center**



**Transcription of  
Legal Proceedings**



**Legal Classification  
Decision Support for Judges**



**Legal Drafting Assistant  
Automated Legal Research**

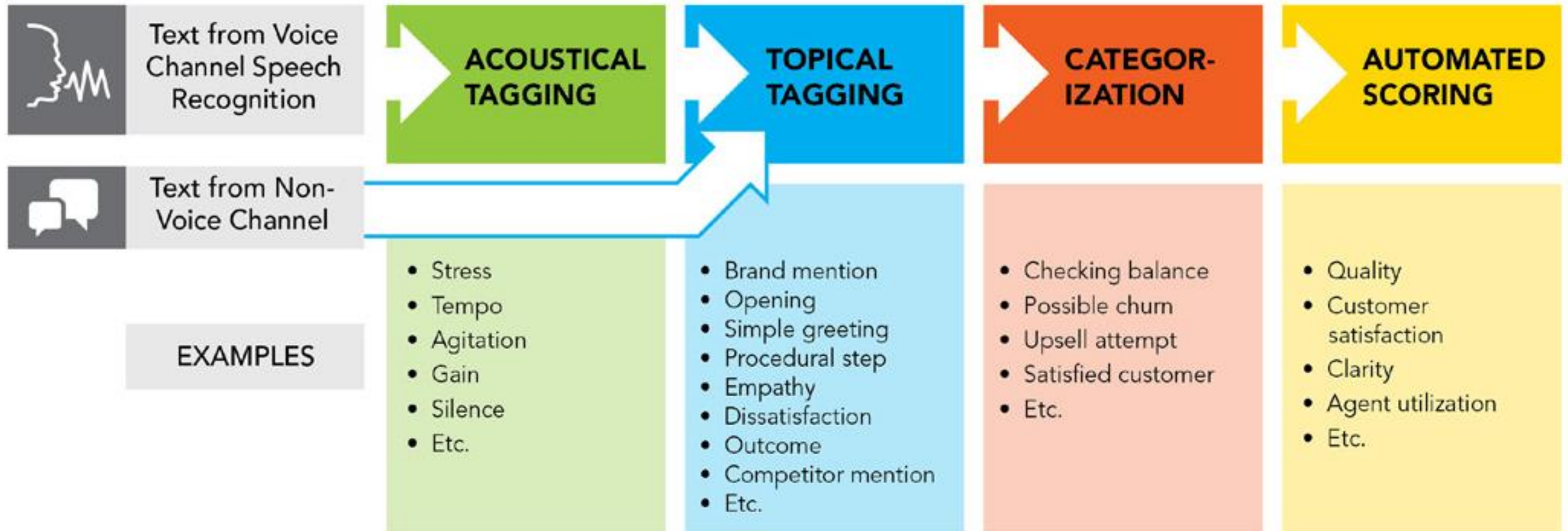


**AI-based Legal Chatbot  
Legal Advice Generation**



# Quality Assurance in Call Centers – Solution Scope

- The proposed solution introduces new metrics and forecasting methods to improve efficiency of the employees and the whole customer service process.
- Metrics can be measured from both voice and text modalities.



# Real Estate Property Tracking

**Scope:** Develop an AI model to:

1. Update Egypt's urban map, which CAPMAS has captured and annotated in 2016
2. Detect and highlight new buildings from Satellite images

**Current Status:**

1. AI model is trained on 14 different building shapes and sizes that correspond to different types of urban areas in Egypt .
2. Our AI model has achieved precision of **85%** and recall of **95%**
3. Ready for use in 10 New Cities





# Example Predictions from Sheikh Zayed: Prediction Analysis

Ground Truth



Predictions



False Positive



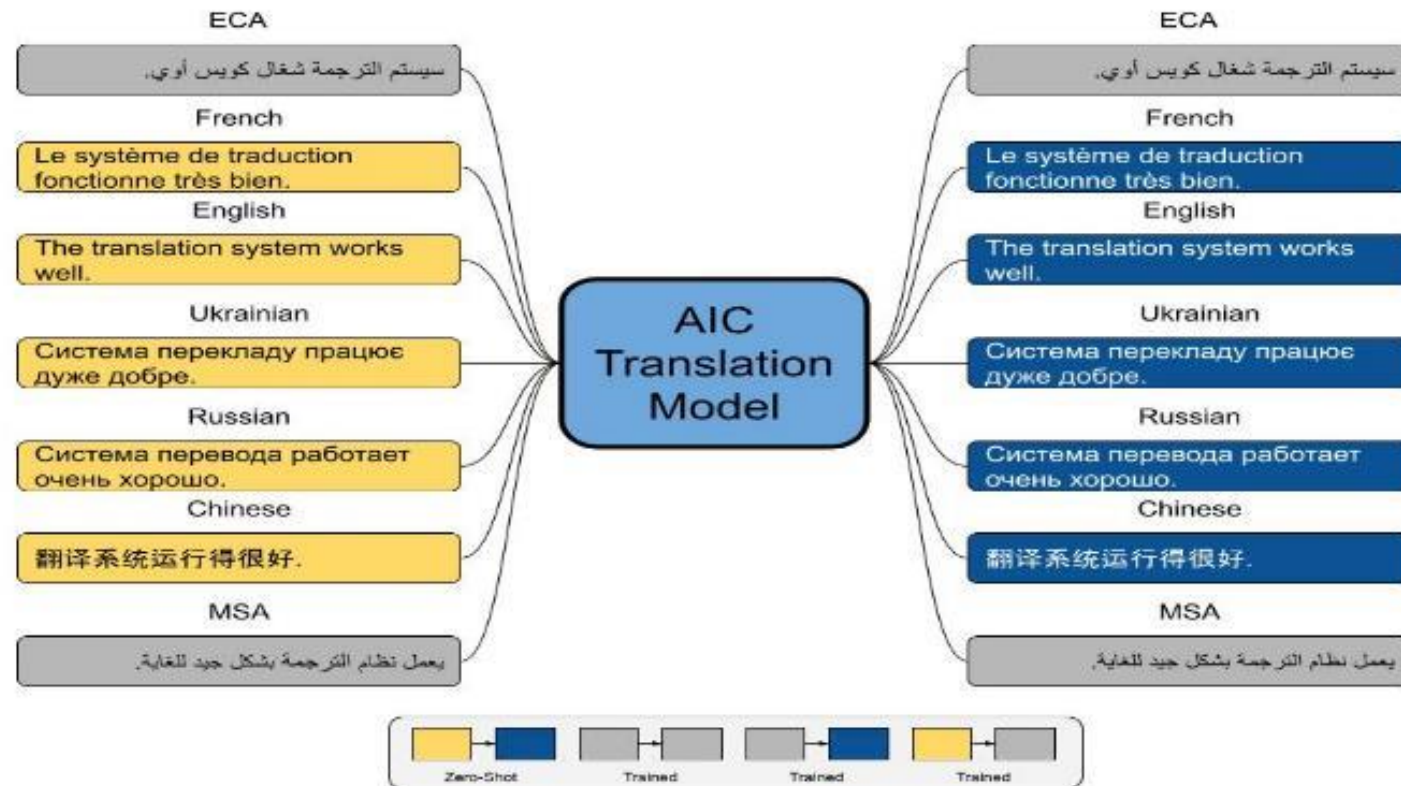
False Negative





# Multilingual Machine Translation

- Increasing the number of available translation directions and enabling translation between pairs (zero shot)
- AIC MT engine handles very large translation directions (100+ languages, 30+ with good accuracy)





# Translation English-Arabic

BLEU Standard

	Meta 600m	Meta 1.3b	Meta 3b	Meta 54b	AIC 400m
EN-MSA	35.7	39.7	40.6	43	43.6
MSA-EN	41.2	44.5	46.6	48.3	45.4
EN-ECA	25.1	29.8	30	32.1	34.3
ECA-EN	33.8	37.9	37.6	40.7	38.5



# Translation German-Arabic

BLEU Standard

	Meta 600m	Meta 1.3b	Meta 3b	Meta 54b	AIC 400m
DE-MSA	27.8	30.6	31.8	34	33.6
MSA-DE	26.8	30.1	32.4	34.6	31.1
DE-ECA	18.2	22.4	22	26.6	26.1
ECA-DE	22.6	26.4	27.8	31.1	26

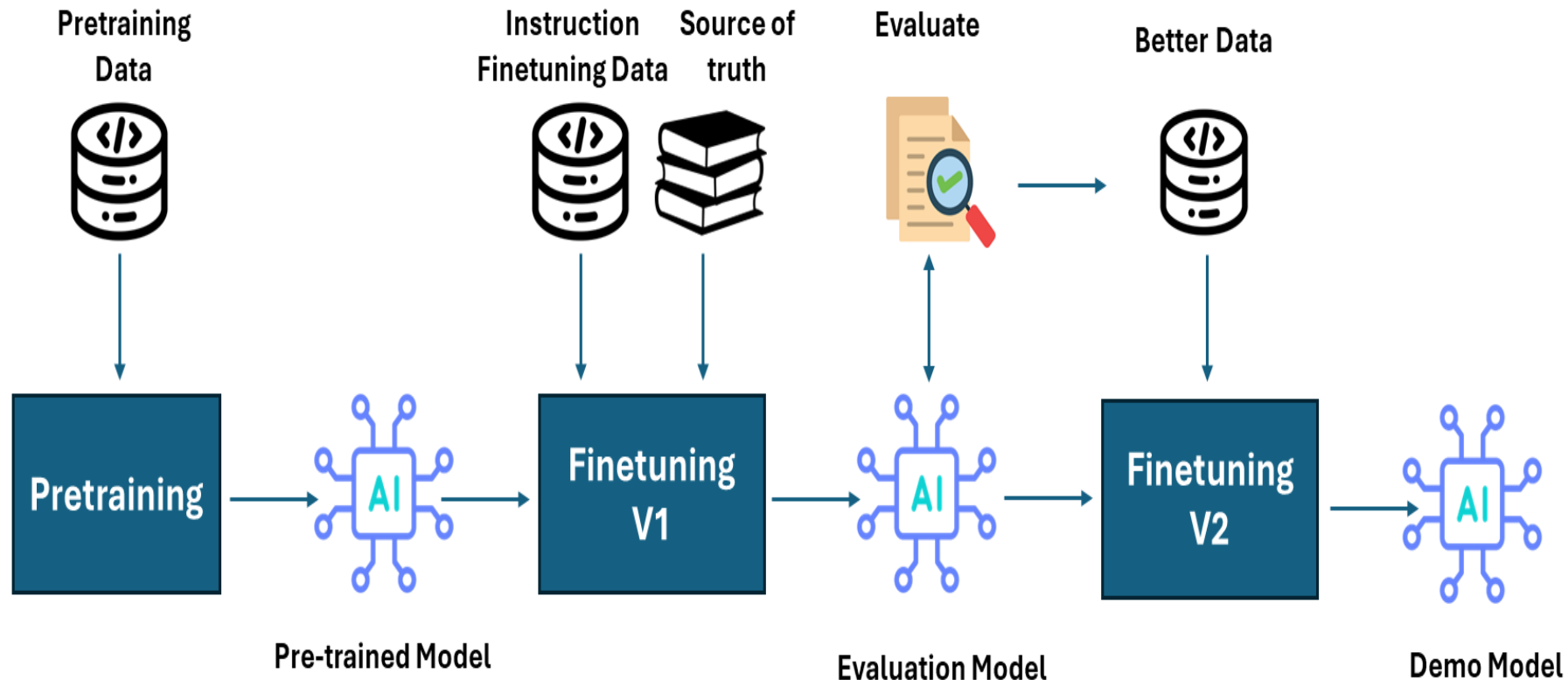


# Large Language Model - LLM

- Although training LLMs from scratch is the most flexible method, it's expensive and time consuming.
- Several powerful LLMs are available to use for free, even for commercial purposes.
- Unfortunately, those models mainly support English and their performance in Arabic is relatively low. For instance, because Arabic was not introduced into most of these models from the beginning, the length of conversation is limited to a small number of words.
- AIC approach
  - Use a powerful pre-trained English model
  - Use AIC high quality Arabic datasets
    - Continue pre-training
    - Instruction Fine-tuning



# AIC Development of an LLM-based System for Combating Misinformation and Disinformation



# AIC-LLM – Example Generation – Multi-lingual Instructions 1/3

## **Given the following text in German:**

Betrachten Sie diesen Beitrag: „Ich bin gerade wirklich aufgeregt und möchte das Beste planen.“ Ich möchte nicht aus Emotionen kaufen, deshalb komme ich hierher, um einen Rat einzuholen. Es war hart und einsam, aber ich habe die beste Form meines Lebens erreicht und fühle mich einfach viel selbstbewusster. Ich weiß, dass ich da rauskomme. Außerdem ist mir aufgefallen, dass Wäschematten ziemlich teuer werden.“  
Frage: Leidet das Poster unter Stress?

## **Do the following in order:**

- 1- Give me the translation to English**
- 2- Give me the answer to the question in Italian**
- 3- Give me your reasoning in French in details**
- 4- Translate your French reasoning to Arabic**



## AIC-LLM – Example Generation – Multi-lingual Instructions 2/3

1- **The given text is already translated into English. Here it is:**

"Consider this post: 'I am really excited right now and want to make the best plans.' I don't want to buy based on emotions, so I come here to get advice. It was hard and lonely, but I have reached the best form of my life and feel much more confident. I know that I will get out of it. Also, I noticed that laundry sheets are quite expensive."

2- **The question asks if the poster is experiencing stress. In Italian, the answer would be:**

"No, il poster non è affetto dallo stress."



# AIC-LLM – Example Generation – Multi-lingual Instructions

## 3/3

### 3- **My reasoning in French would be :**

"Le texte en allemand parle d'une personne qui est excitée et cherche à prendre des décisions sages plutôt que de se baser sur ses émotions. Elle a traversé une période difficile mais est maintenant plus confiante et sûre d'elle. En outre, elle remarque que les serviettes pour le linge sont chères. Il n'y a pas de mention de stress dans ce texte.»

### 4- **Translating my French reasoning to Arabic :**

التفسير الفرنسي يشير إلى أن الشخص الألماني يتحدث عن شعوره  
بالإثارة والرغبة في اتخاذ قرارات عقلانية بدلاً من الاعتماد على  
مشاعره . كما أنه يعبر عن ثقته بنفسه بعد تجاوز فترة صعبة .  
بالإضافة إلى ذلك ، لاحظ ارتفاع أسعار المناشف المخصصة للغسيل .  
لا يوجد ذكر لأي نوع من الضغط النفسي أو التوتر في هذا النص  
/>" . s>الألماني





# Thank you !

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