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# $4^{th}$ Industrial Revolution

*Workshop*

**Business Opportunities**

13th January 2025

4IR Workshop

Innovating for the Future

This presentation may contain certain forward-looking statements. All statements other than statements relating to historical facts are, or may be deemed to be, forward-looking statements. Forward-looking statements include, but are not limited to, statements related to future events or to the company's future financial or operating performance such as the company's expectations and projections regarding its growth, initiatives and strategies, capital expenditures and investments, customer and partner relationships, major projects and product development. These statements may generally, but not always, be identified by the use of words such as "target," "goal," "aim," "believe," "expect," "commit," "anticipate," "intend," "estimate," "should," "will," "shall," "may," "likely," "plan," "strategy," "initiative," "project," "outlook" or similar expressions, including variations and the negatives thereof.

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# iktva Program Overview (1/2)

The In-Kingdom Total Value Add (iktva) program is designed to drive increased investment, economic diversification, job creation, and workforce development within the Kingdom

## Saudi Aramco aims to achieve 70% localization of all spending

### iktva in Procurement

- 2000+ Service contracts
- 290+ Corporate purchase agreements

### Business Opportunities

- 12 Sectors
- 210 Business Opportunities
- $28 bn Annual Market Size

### Anchor Projects

6 Anchor projects

- IMI
- SPARK
- Tuwaiq

### Local Workforce Development

- 16 National training centers
- 90+ Programs

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Note: IMI = International Maritime Industries; SPARK = King Salman Energy Park

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# iktva Program Overview (2/2)

Non-exhaustive

## iktva Business Development Team Support

- Market Analysis
- Technical Engagement
- Operational Support and Advisory Services[1]

## Government/Semi-government key enablers

- Financial Support
- Fiscal Incentives
- Land Solutions
- HR Development
- Regulatory Enablers





1. Includes broad range of support services provided by the team: user requirements, advisory on available financial and fiscal incentives, guidance on localization process in line with local regulations and standards, action plan development etc.

# Why invest in KSA?

Non-exhaustive

| Strong GDP growth and healthy economy | Big market and game-changing opportunities | Government incentives and enablers | Ease of doing business | Strategic global location | Favorable demographics |
|---|---|---|---|---|---|
| **Top 20** economies globally | **5** Special Economic Zones drive innovation | **$1.3T+** invested in private sector by 2030 | one of world's most rewarding tax systems | **12-15%** of global trade passes via Red Sea | **17%** population growth from 2013-2023 |
| **GDP growth** among highest projected in 2025 in top economies | **6** giga projects driving urbanization and industry | **5.7%** contribution of FDI to GDP by 2030 | **Top 5** in the MENA region for ease of doing business | KSA container ports are among the most efficient globally | **67%** of population below the age of 35 |



Note: FDI = Foreign Direct Investment
Source: IMF; MISA; Vision 2030 Key Performance Indicators; Shareek Program; World Bank

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# 4IR Market Overview

## KSA 4IR

**$4029MM**

*18% CAGR*[1]

2024 KSA market size for opportunities in today's workshop

## Five opportunities to be discussed today

1. AR & VR
2. AI & GenAI
3. Industrial Internet of Things Devices
4. Blockchain
5. Robotics & UAV



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1. 5-year forecasted KSA CAGR (2024-2029)

# How do we define what is an opportunity?

## 1

## Growing market

*High growth high spend markets*

## 2

## Limited local players & import driven

*Markets with few local contributors and high import resilience*

## 3

## Technological & labor feasibility

*Markets with accessible or standardized technology and available skilled labor* iktva Forum & Exhibition 2025

# AR & VR

*Saud Alshammari*

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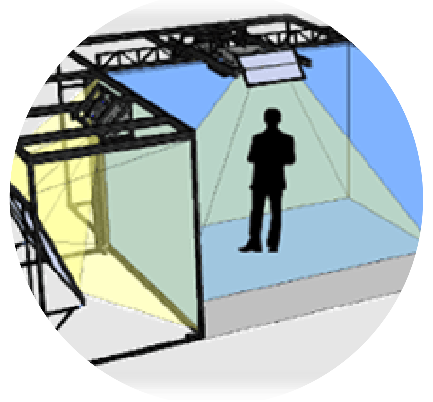
# Opportunity profile – AR & VR

## 1 KSA needing AR/VR to meet growing demand across multiple industries

### Types


Wearables


Hand-held


Projected

### Potential Use Cases

- Real-time expert support for field workers
- Optimize complex repair processes using virtual assistance
- Virtual employee trainings
- Virtual project management utilizing digital twins

## 2 AR/VR market is expected to show strong growth in the next 5 years

**108** Estimated 2024 KSA market size. $MM

**9%** Forecasted 5-year CAGR

## 3 Attractive investment opportunities in the value chain

### KSA value chain opportunities

R&D

Ecosystem Mfg.

OEM Mfg.

Deployment & Mgmt.

### KSA enablers

- Critical machinery exempt from import duty
- Financing available (Kafalah, Tanafusiya)
- 1M+ AI-trained Saudi nationals
- Tax exempt exports
- Accelerated setup and licensing

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Note: $MM = USD Millions
Source: Statista; Expert interviews; Team analysis

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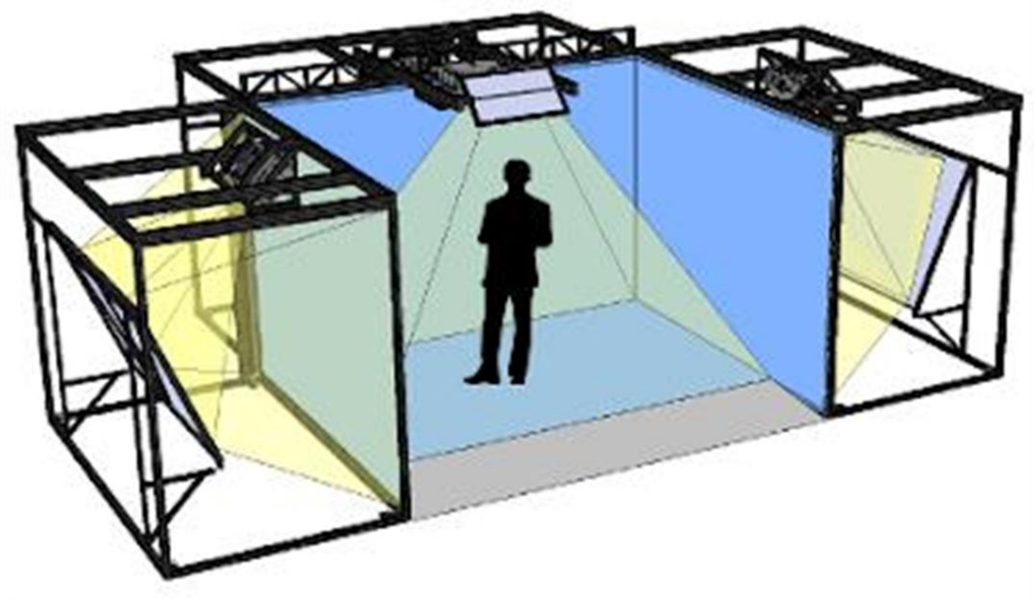
# AR & VR categories

Non-exhaustive

| | Wearables | Hand-held | Projected |
|---|---|---|---|
| |  |   |  |
| Applications | • Remote maintenance support<br>• Operational monitoring<br>• Safety enhancement | • Field navigation<br>• Training and education<br>• Digital documentation | • Event simulations<br>• Team visualizations<br>• Product/process prototyping |



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Source: Team analysis

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# Use cases

| Business case | Description | Key users | Key technology | Key benefits |
|---|---|---|---|---|
| Remote assistance | • Solution connecting field workers to supervisors or AI-enabled bots for task-specific assistance<br>• Provides real-time video for assisting parties and allows hands-free interaction via voice or video through smart glasses | | | |
| Maintenance digital work through | • AR-powered solution that helps operators perform complex repairs with virtual guidance and real-time data | | | |

Engineer · All Employees · Maintenance Technician · Operator · AR/VR · Improves Operations Performance and Productivity

Safety Officer · Security officer · Better Error Avoidance · Modeling · Mobility · AI · Better Knowledge Transfer

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# Use cases

| Business case | Description | Key users | Key technology | Key benefits |
|---|---|---|---|---|
| Virtual trainings | • VR-driven solution offering interactive training in a virtual environment with 3D visualization and real-time user interaction | All Employees | Modeling, AR/VR | Improve Training Effectiveness |
| Virtual project management | • Digital twin of construction projects that integrates with existing systems to capture all asset data and updates real time to accommodate changes in real plant | Engineer, Maintenance Technician, Operator | Intelligent Sensing, Analytics, Modeling | Better Error Avoidance, Accelerate Project Execution, Improve Design Accuracy |

Engineer | All Employees | Maintenance Technician | Operator | Modeling | AR/VR | Improve Training Effectiveness | Better Error Avoidance | Accelerate Project Execution | Analytics | Intelligent Sensing | Improve Design Accuracy

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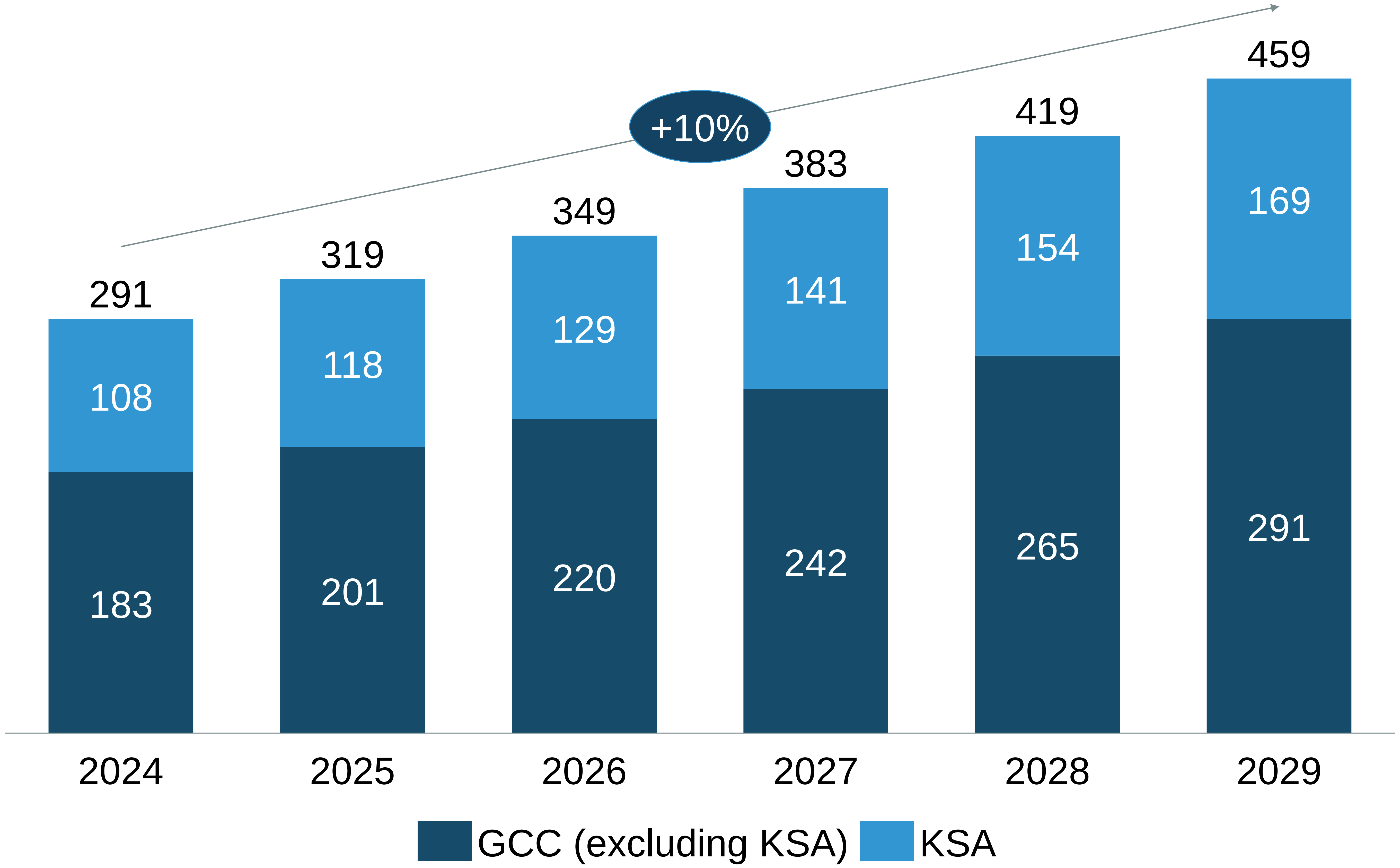
# Robotics and UAV localized categories

Forecasted GCC AR & VR market 2024-2029 ($MM)




## Potential customers in KSA

- Oil & gas
- Industrial manufacturing
- Healthcare

## Key KSA demand drivers

- Technological advancements: Use of AR &VR in streamlining industrial operations and growth as a consumer product leading to an increased demand for the product
- Economic & demographic factors: KSA aims to foster growth and increase the economic contribution of 4IR to 12% of GDP by 2030

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Note: $MM = USD Millions
Source: Statista; Zawya; Expert interviews; Team analysis

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# Value chain and key localization opportunities

| | R&D | Supplier & Ecosystem Manufacturing | OEM Manufacturing | Deployment & Management |
|---|---|---|---|---|
| Local saturation | Few players | Few players | Few players | Few players |
| Current KSA value chain | • Conduct R&D for AR/VR products tailored to local product and service needs | • Produce AR/VR device components | • Manufacture AR/VR devices | • Develop AR/VR service hub – e.g., virtual training, project mgmt., and remote assistance |
| | Opportunity | Opportunity | Opportunity | Opportunity |
| **Key success factors** | | | | |
| Technology | Computing infra., prototyping equipment available for import | Precision CNC machines available for import | CNC machines, testing equipment available for import | Deployment tools, communications devices available for import |
| Labor | Hardware, software engineers available | Hardware engineers, technicians available | Production engineers, technicians available | Field engineers, support technicians available |

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Note: CNC = Computer Numerical Control
Source: Expert inputs; Team analysis

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# Investment opportunity and enablers

## Key enablers in KSA to drive success

Financial incentives: Financing up to 75% of setup costs available through SIDF

Tax exempt exports: Export revenue is not subject to tax

Trained workforce: 1M+ Saudis trained in AI, data science, or Blockchain

## Where is the opportunity

**R&D**
Conduct R&D for AR/VR products tailored to local product and service needs

**Supplier & Ecosystem Manufacturing**
Produce AR/VR device components

**OEM Manufacturing**
Manufacture AR/VR devices

**Deployment & Management**
Develop AR/VR service hub – e.g., virtual training, project mgmt., and remote assistance



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Note: SIDF = Saudi Industrial Development Fund
Source: MISA; SIDF; NIT; Local Content & Government procurement authority; Team analysis

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# AI & Gen AI

*Lama Alabdulkareem*

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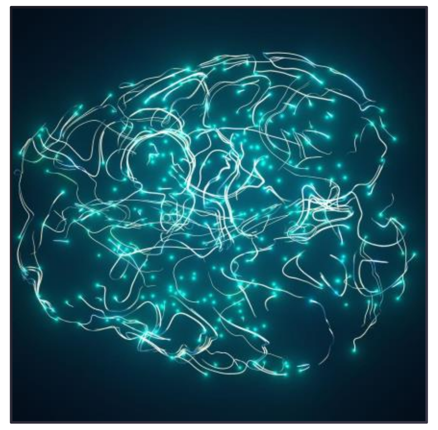
# Opportunity profile – AI & Gen AI

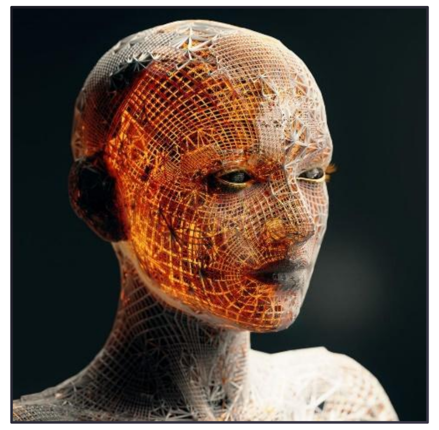
1

## AI expected to accelerate growth across multiple industries in KSA

### Types



Artificial Intelligence



Generative AI

### Potential Use Cases

- Simplify media archiving with AI
- Optimize supply chain operations, improve visibility, and drive data-driven decisions
- Automate contract drafting
- Optimize loan decisions using AI

2

## AI market is a rapidly growing market, KSA to lead GCC demand

**330** Estimated 2024 KSA market size. $MM

**23%** Forecasted 5-year CAGR

3

## Attractive investment opportunities in the value chain

### KSA value chain opportunities

- R&D
- Solution Development and Deployment

### KSA enablers

- Financing available (Kafalah)
- Data science training from national universities
- 1M+ AI-trained Saudi nationals
- Tax exempt exports
- Accelerated setup and licensing

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Note: $MM = USD Millions
Source: Expert interviews; Statista; Team analysis

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# AI & Gen AI applications

Non-exhaustive

## Artificial Intelligence

**Prediction Analytics:** Leverage historical data for outcome predictions

**Optimization:** Optimize decision-making under constraints

**Computer Vision:** Extract insights from digital images and videos

**Natural Language Processing:** Enable machines to process human language effectively

## Generative Artificial Intelligence

**Chatbot Models:** Conversational tools used for customer support, training simulations, and operational efficiency

**Content Creation:** Generate marketing content, technical documentation, and personalized learning materials

**Document Processing:** Automate complex workflows like legal contract drafting and compliance reporting

**AI-Driven Design Tools:** Generate designs for architecture and industrial layouts



Source: Team analysis

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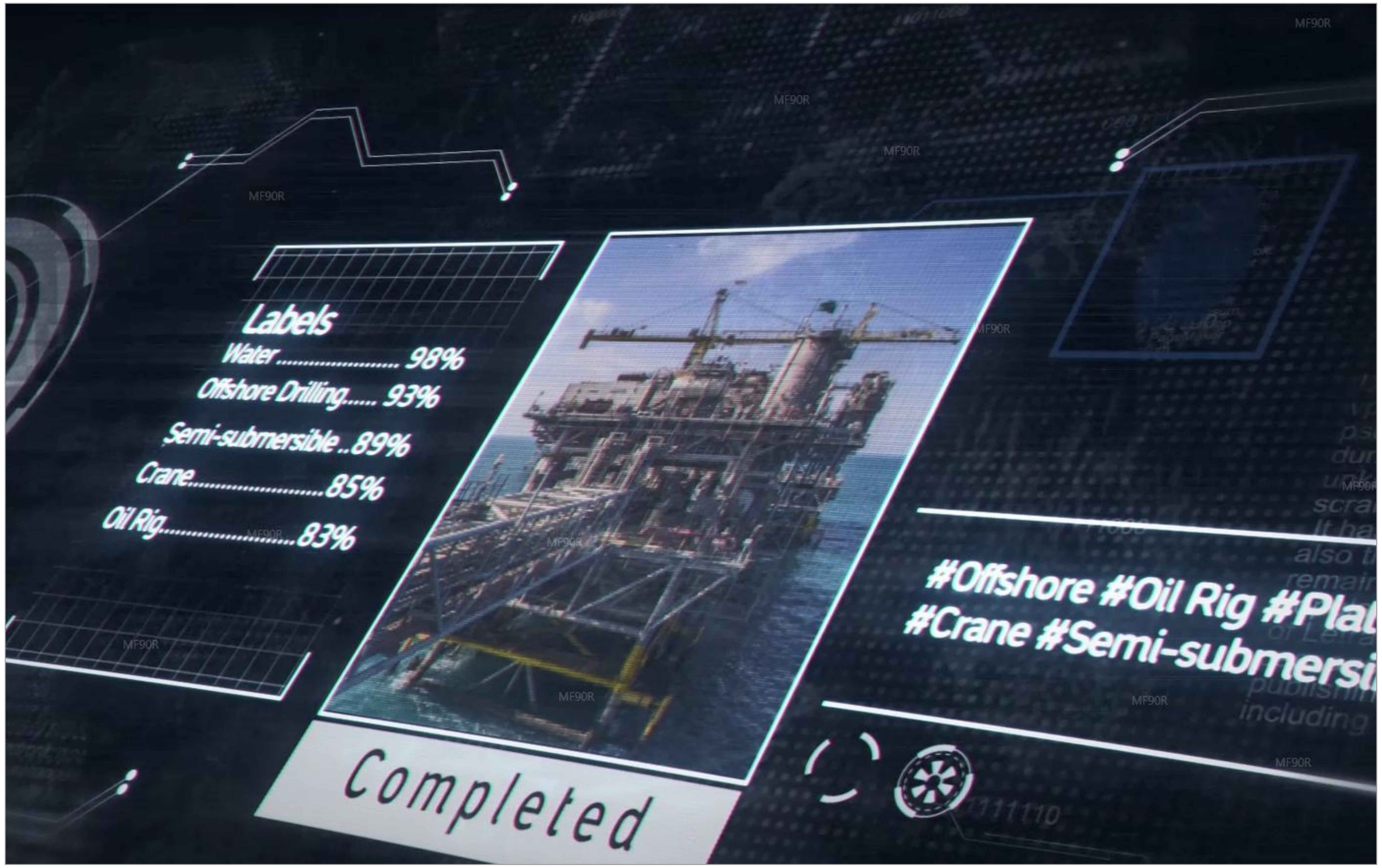
# Use Case | AramcoLens: AI-Driven Media Archive Solution




## Overview

Consolidate existing media and digitize analogue materials, ensuring accessibility and long-term preservation & employ computer vision and generative AI to identify objects and generate captions, enabling improved search and user experience

## Added Value

- Improved accessibility and preservation
- Enhanced search functionality
- Streamlined workflows for archivists
- Elevated user experience



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Source: Team analysis

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# Use Case | Supply Chain Intelligence (Control Tower)

## Overview

Using AI to analyze and visualize data in the Supply Chain Control Tower; processing 5 billion records, fed into 43 analytical solutions, 30 real-time and proactive alerts, and 27 performance management KPIs

## Added Value

- Utilizing machine learning and AI in different use cases such as inventory growth prediction and supplier on-time delivery
- Analyzing huge datasets to determine issues of highest importance



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Source: Expert inputs; Team analysis

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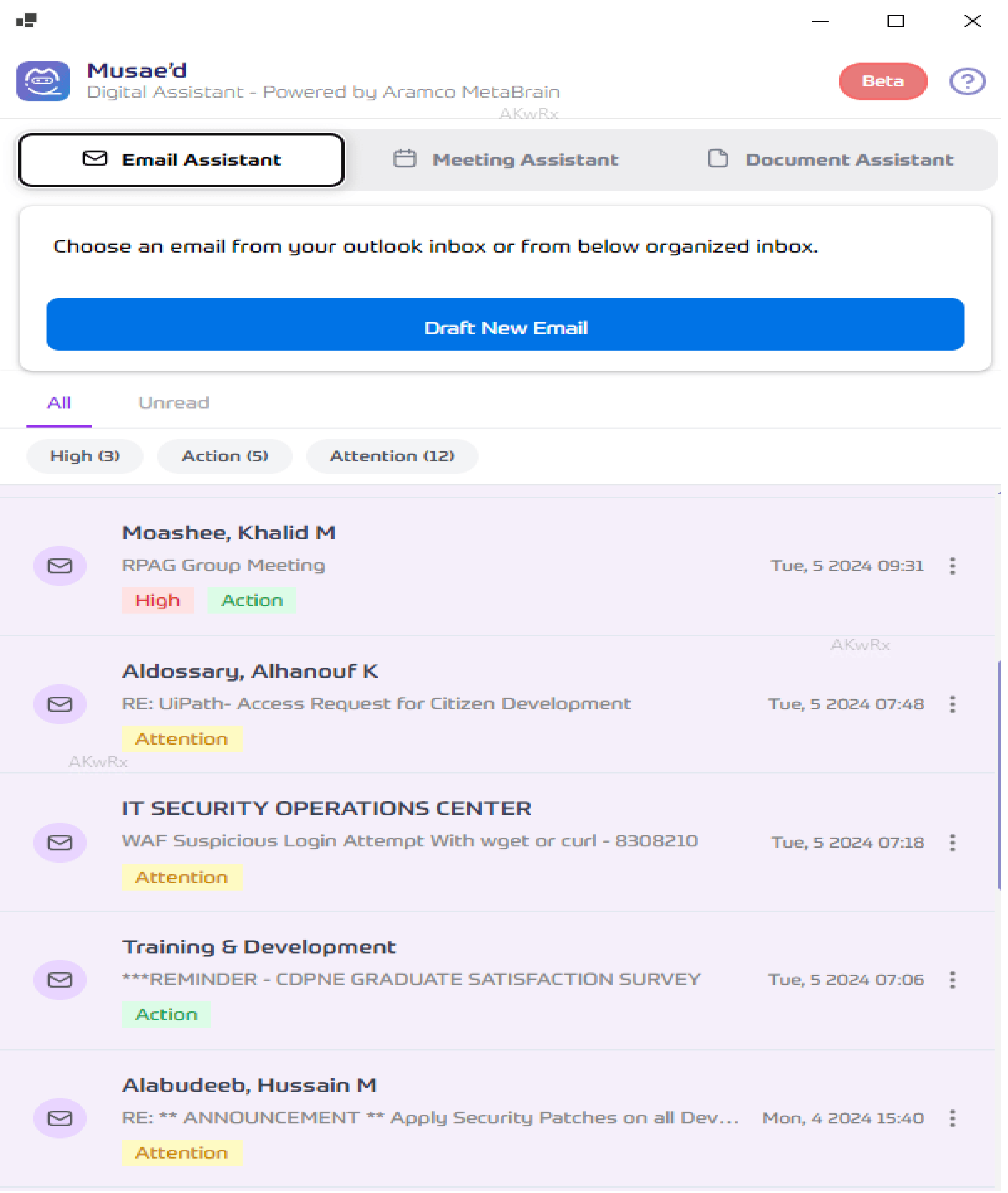
# Use Case | Musae’d




## Overview

Musae'd is a corporate AI-powered desktop solution that leverages Robotic Process Automation (RPA), Artificial Intelligence (AI), and Aramco GenAI “AramcoMetaBrain" to boost the productivity of Aramco employees by supporting them with their daily activities

## Solution Features

- Email Assistance
- Document Summarization
- Presentation Generation
- myLetters Assistance
- Workflow Assistance
- Report Generation
- Task Automation
- Meeting Ambassador

## Added Value

- Boosts employee productivity
- Automates daily tasks and activities
- Enhances employee assistance and support

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Source: Expert inputs; Team analysis

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# Use Case | Crude Shipping Optimization

## Overview

The objective is to acquire an AI powered Digital Planner, which extracts trends from historical data and uses both historical trends along with operational requirements to optimize both the crude oil exports monthly lifting schedules as well as the four-day ship to berth assignment

## Added Value

- Optimizes crude oil exports scheduling
- Enhances ship-to-berth assignment efficiency
- Utilizes historical trends for informed decision-making



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Source: Expert inputs; Team analysis

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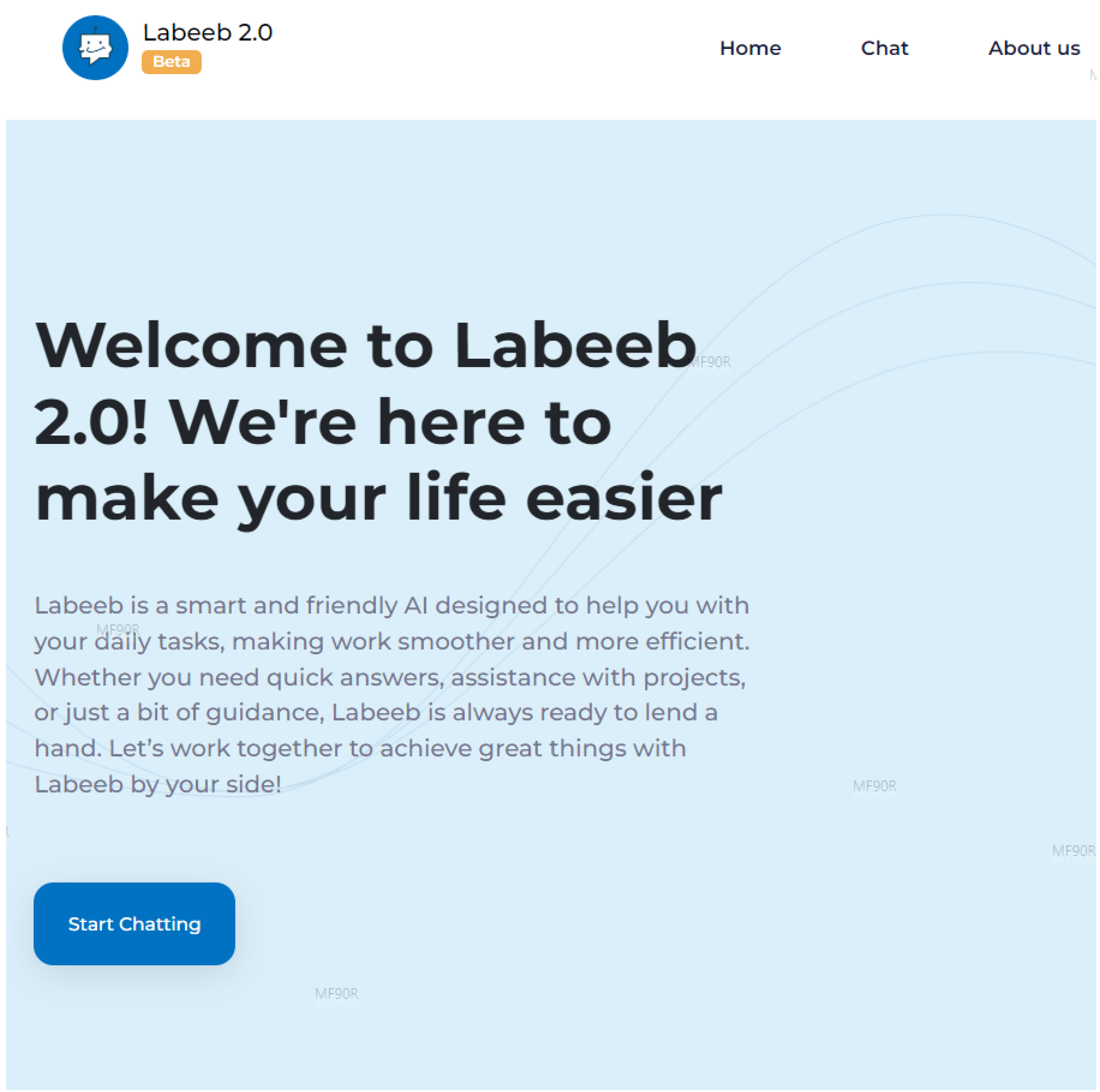
# Use Case | LABEEB

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## Overview

Labeeb is a GenAI-powered conversational assistant that created to increase productivity in day-to-day activities - it is trained on a vast range of knowledge from the web, enabling it to perform a variety of tasks and provide valuable assistance to users

## Applications

- YLAB Survey Analysis: uses Labeeb for employee feedback analysis
- CHATIR: Gen-AI application for Investor Relations
- Bayan: Conversational AI for Data Governance
- Operator Copilot: Operator Copilot integrates GenAI with PI systems
- Maarefa: Gen-AI application for knowledge sharing

## Added Value

- Increases productivity
- Automates day-to-day tasks
- Provides intelligent answers and content generation
- Enhances document management and analysis

Source: Expert inputs; Team analysis

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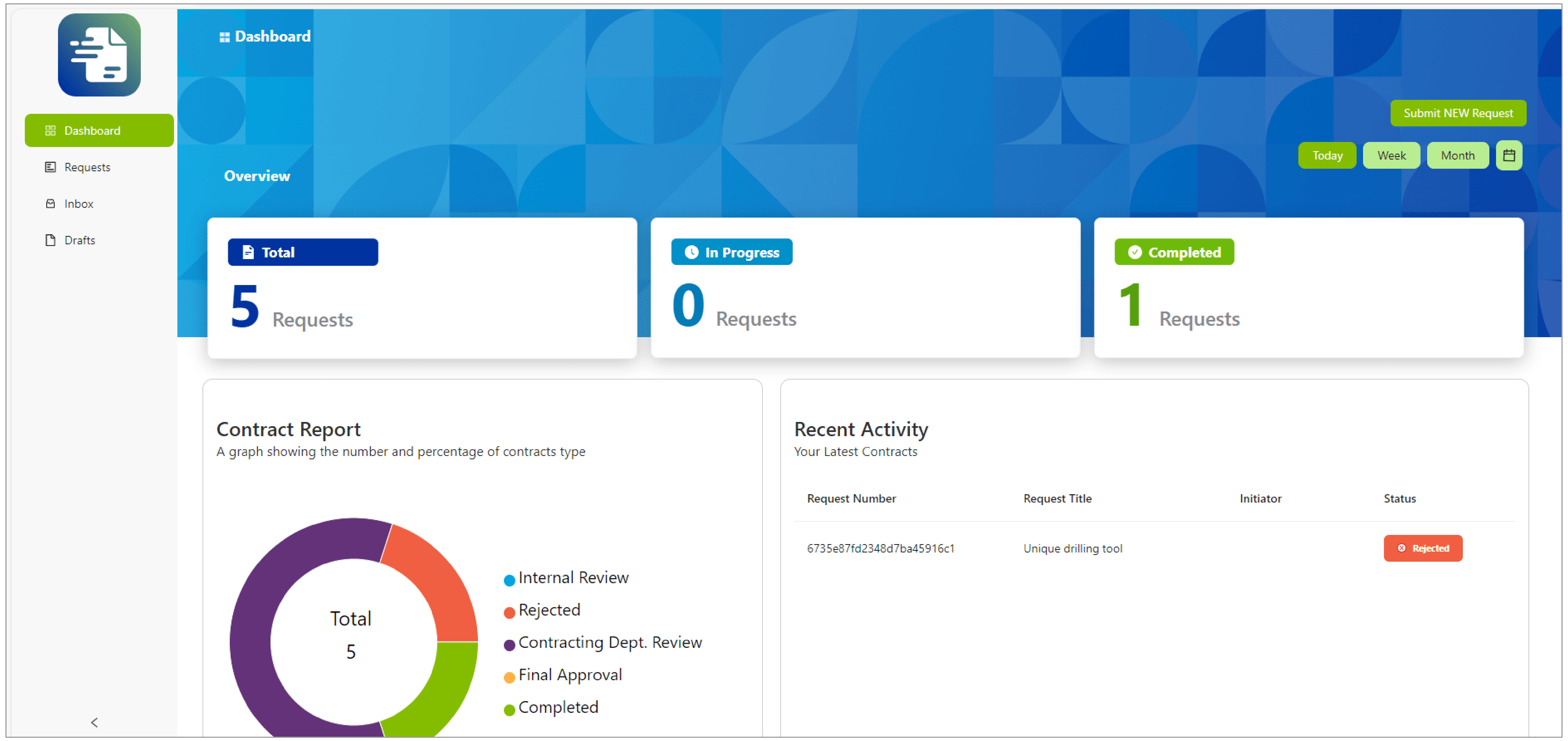
# Use Case | ContractAI




## Overview

An LLM-based contract documentation expert system assisting contract advisors in creating contract drafts in record time - this tool supports advisors in generating various types of Scope of Work (SOW) documents resulting in substantial productivity increase across the board

## Added Value

- Maximize productivity of contract advisors
- Significantly reduce review time
- Significantly reduce human errors



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Source: Expert inputs; Team analysis

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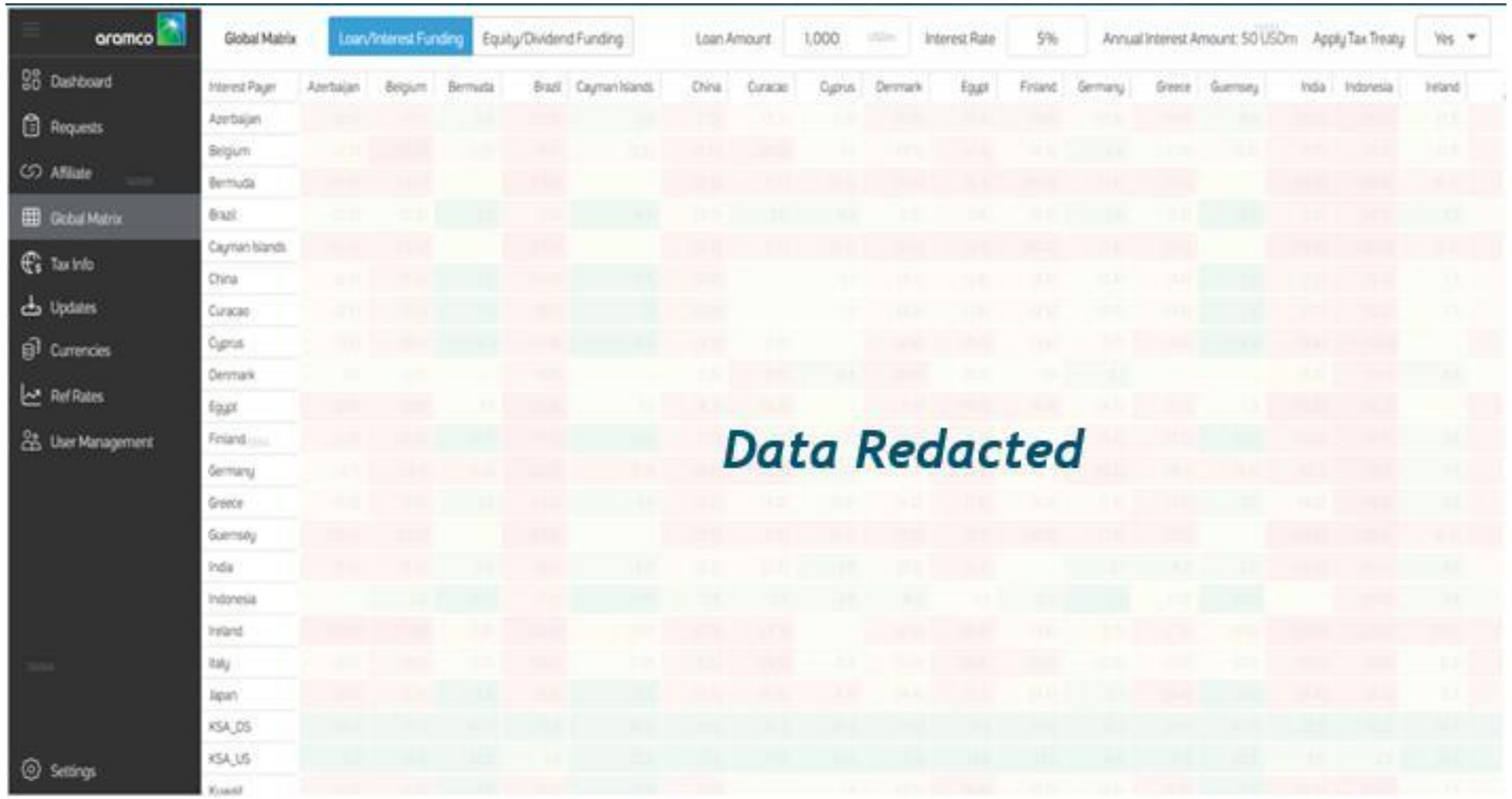
# Use Case | Loan Sourcing Expert System




## Overview

An AI model trained on vast amounts of unstructured data is leveraged to aid treasury professionals in optimizing loan sourcing by automatically analyzing and considering all relevant input factors for each loan case

## Added Value

- Maximize productivity of financial analysts
- Significantly reduce review time
- Reduce value loss caused by non-optimal loan sourcing decisions

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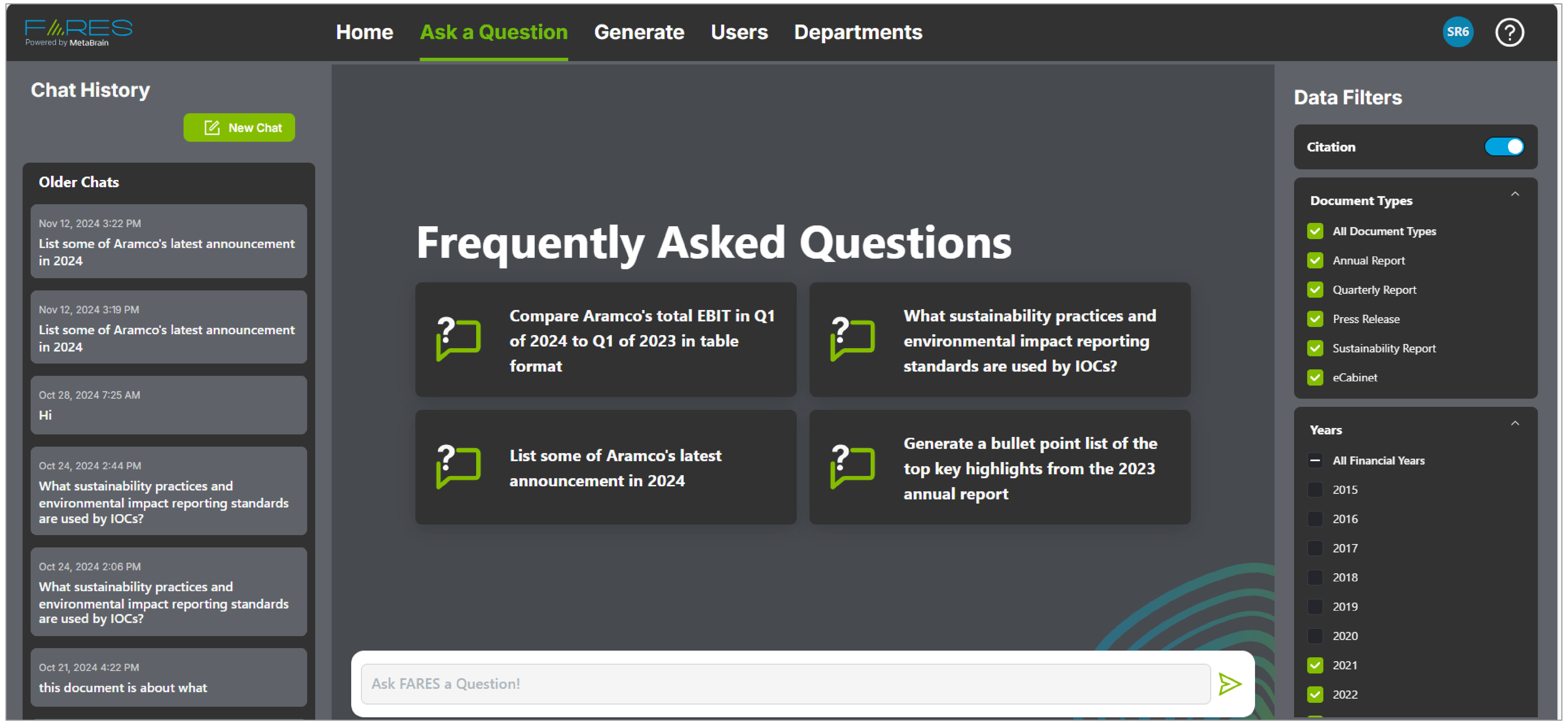
# Use Case | Finance AI Report Enablement Solution (FARES)




## Overview

An LLM-based financial expert capable of generating annual financial reports, answering benchmarking questions quickly and effectively, and enquiring about peer companies, public press releases, and internal financial data-  the system is integrated with trusted public data sources, to ensure maximum accuracy in addressing financial inquiries

## Added Value

- Maximize productivity of financial analysts
- Significantly reduce manhours spent
- Significantly reduce human error and increase accuracy

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Source: Expert inputs; Team analysis

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# Use Case | GenAI-Powered Data Synthesis for Safety Scenarios


## Overview

A GenAI-based data synthesis and generation tool capable of generating image and video datasets for various safety scenarios - the lack of readily available safety violation training datasets is a real  challenge for organizations and enterprises - this tool helps in generating required datasets for AI applications to improve safety posture of the organizations

## Added Value

- Eliminate lack of data availability
- Augment existing datasets to build better, more complex AI models
- Increase accuracy and generalizability of AI models

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Source: Expert inputs; Team analysis

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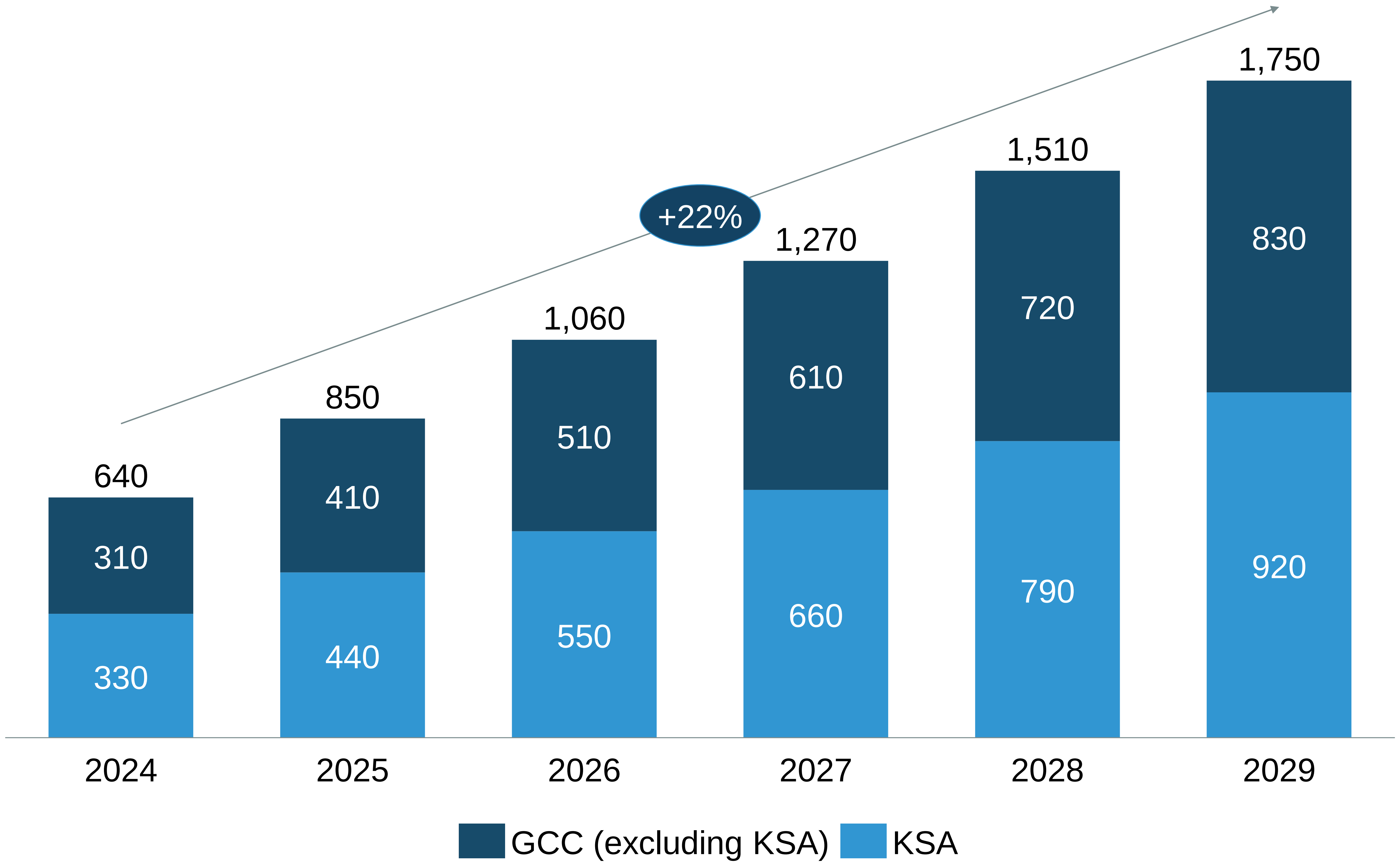
# AI & Gen AI demand, customers, and drivers

Forecasted GCC AI & Gen AI market 2024-2029 ($MM)




## Potential customers in KSA

- Government and public sector
- Oil & gas players
- Healthcare

## Key KSA demand drivers

- Consumer industry trends: Demand for Smart City solutions in the Kingdom's Giga projects with a focus on next-generation AI technologies
- Economic & demographic factors: KSA aims to foster growth and increase the economic contribution of the 4IR and AI sectors to 12% of its GDP by 2030

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Note: $MM = USD Millions
Source: Statista; Expert interviews; Team analysis

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# Value chain and key localization opportunities

| | R&D | Solution Development & Deployment |
|---|---|---|
| Local saturation | Few players | Few players |
| Current KSA value chain | • Provide R&D for AI and GenAI services tailored to local service needs – e.g., structural defect identification, predictive maintenance tools | • Develop AI and GenAI service hub for high-value industrial applications – including product identification, tool development, deployment, and training |
| | Opportunity | Opportunity |
| **Key success factors** | | |
| Technology | HPC infrastructure equipment available for import | Deployment tools, cloud and edge devices available for import |
| Labor | Data scientists, software engineers available | Software developers available, AI trainers required |

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Note: HPC = High-Performance Computing
Source: Expert inputs; Team analysis

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# Investment opportunity and enablers

## Key enablers in KSA to drive success

**Financial incentives:** Financing up to 75% of setup costs available through SIDF

**Tax exempt exports:** Export revenue is not subject to tax

**Trained workforce:** 1M+ Saudis trained in AI, data science, or Blockchain

## Where is the opportunity

### R&D

Provide R&D for AI and GenAI services tailored to local service needs – e.g., structural defect identification, predictive maintenance tools

### Solution Development & Deployment

Develop AI and GenAI service hub for high-value industrial applications – including product identification, tool development, deployment, and training



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Note: SIDF = Saudi Industrial Development Fund
Source: SIDF; MISA; NIT; Local Content & Government procurement authority; Team analysis

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# Industrial Internet of Things Devices

*Mohammed Albeaik*

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# Opportunity profile – Industrial Internet of Things (IIoT)

## 1

### KSA requires IIoT to meet current industrial expansion

**Components**


IIOT Sensors


IIoT Connectivity


Solution Integrators


Others[1]

**Potential Use Cases**

- Asset condition monitoring
- Leak Detection, Emission Reduction & Decarbonization Technologies
- Wastewater Management
- Industrial Buildings
- Process Safety

## 2

### IIoT market is nascent with rapid forecasted growth

**1620** Estimated 2024 KSA market size. $MM

**14%** Forecasted 5-year CAGR

## 3

### Attractive investment opportunities in value chain

**KSA value chain opportunities**

- R&D
- Ecosystem Mfg.
- OEM Mfg.

**KSA enablers**

- R&D project financing available
- Corporate tax incentives available
- Qualified system integration talent from NIT

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1. Others = Edge Devices, Routers, Repeaters, Gateway; Note: $MM = USD Millions; NIT = National Information Technology Academy

Source: Expert inputs; Statista; Team analysis

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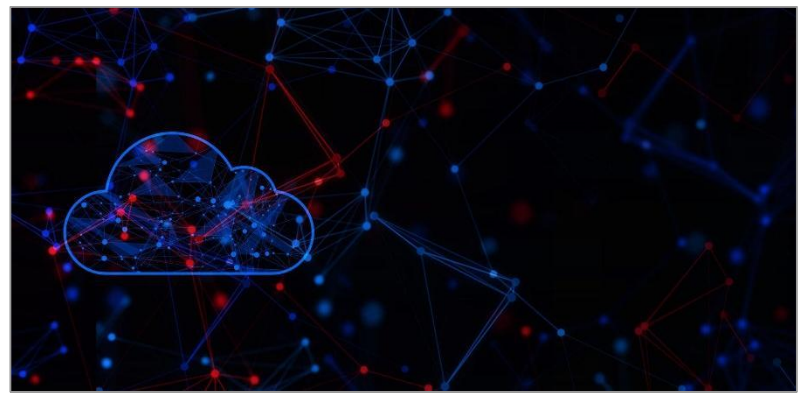
# Industrial Internet of Things devices and selected use case overview

Non-exhaustive

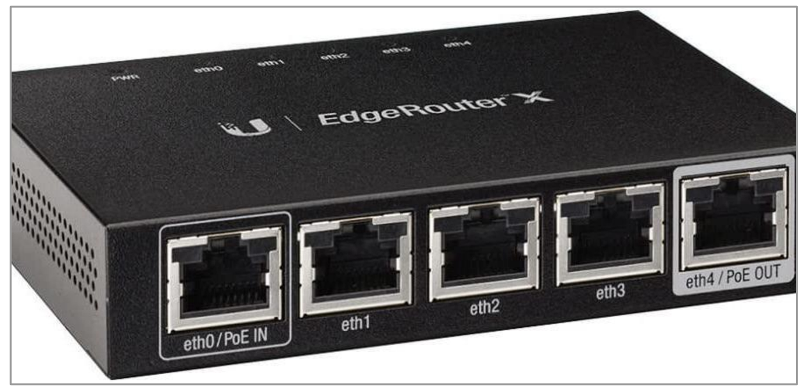
## Components

IIoT sensors
- Non-intrusive
- Power harvesting
- Nano sensors

IIoT Connectivity
- LPWAN, LoRaWAN, 4G/5G, & Satellite



Cloud and IIoT platform




Edge Devices, Routers, Repeaters, Gateway

## Potential use cases

- Asset Condition Monitoring
- Leak Detection, Emission Reduction & Decarbonization Technologies
- Wastewater Management
- Industrial Buildings
- Process Safety

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Source: Expert inputs; Team analysis

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# Use Case | Asset Condition Monitoring

## Applications

- Monitor asset condition and predict performance
- Enable AI and ML through big data gathering

## Benefits

- Support scalability and maintainability
- Aid circular economy



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Source: Expert inputs; Team analysis

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# Use Case | Leak Detection, Emission Reduction & Decarbonization Technologies

## Applications

- Provide carbon emissions measurement and forecasting
- Detect and identify the source of gas leaks
- Detect and identify the source of liquid leaks

## Benefits

- Support Net Zero mission
- Aid circular economy





Source: Expert inputs; Team analysis

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# Use Case | Wastewater Management


## Applications

- Provide a unified solution to monitor and control wastewater
- Leverage AI and Edge computing technologies to contribute to reusable irrigation water supply

## Benefits

- Effective use of wastewater
- Support forestation and Saudi Green Initiative



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Source: Expert inputs; Team analysis

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# Use Case | Industrial Buildings

## Applications

- Monitor temperature, humidity, and emissions inside industrial buildings
- Measure power consumption

## Benefits

- Enable live monitoring with alerting system
- Support decarbonization goals
- Aid energy optimization



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Source: Expert inputs; Team analysis

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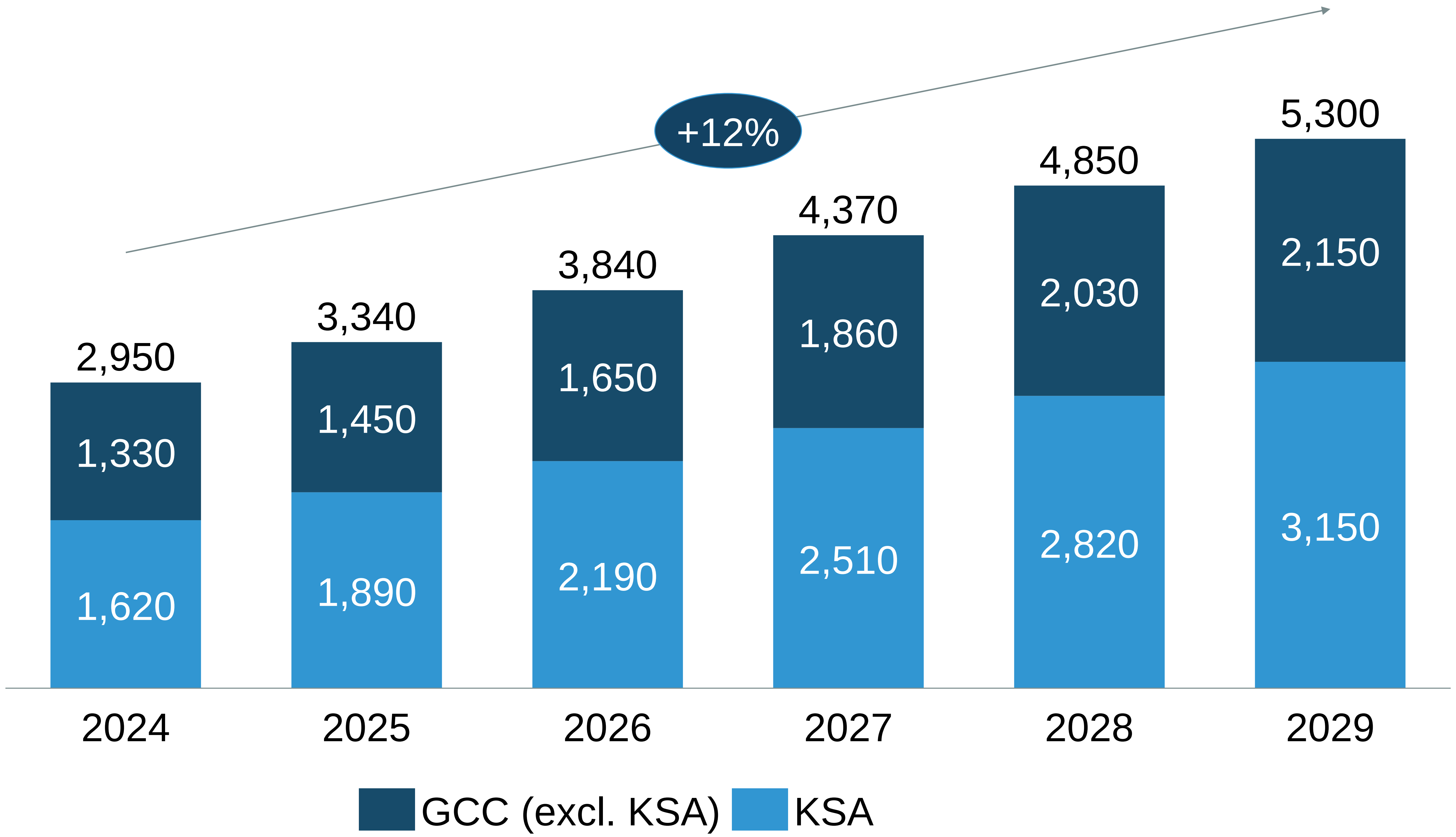
# Industrial Internet of Things demand, customers, and drivers

Forecasted KSA and other GCC IIoT market 2024-2029 ($MM)




## Typical IIoT customers in KSA

- Oil & Gas
- Manufacturing
- Energy and utilities

## Key KSA demand drivers

- Industrial expansion: Increase in IIoT adoption driven by rising role of manufacturing – 4,000 fully automated factories expected by 2035
- Regulatory Frameworks: Policies that encourage public and private sectors to prioritize cloud adoption

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Note: $MM = USD Millions
Source: Arab News; Expert inputs; Statista; Team analysis

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# Value chain and key localization opportunities

| | R&D | Supplier & Ecosystem Manufacturing | OEM Manufacturing | Deployment & Management |
|---|---|---|---|---|
| Local saturation | Few players | Few players | Few players | Many players |
| Current KSA value chain | • Conduct R&D for IIoT tailored to local product and service needs | • Produce IIoT device components | • Manufacture IIoT devices | • Several solution integrators to deploy IIoT devices, provide monitoring and analytics services |
| | Opportunity | Opportunity | Opportunity | |
| **Key success factors** | | | | |
| Technology | Prototyping tools, software labs available | SMT equipment, precision CNC machines available for import | CNC machines, testing equipment available for import | |
| Labor | Data scientists, software engineers available | Hardware engineers, technicians available | Production engineers, technicians available | |

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Note: SMT = Surface-mount technology
Source: Expert inputs; Team analysis

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# Blockchain

*Sattam Almuzaini*

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# Opportunity profile - Blockchain

1

## KSA is actively integrating blockchain across sectors to enhance efficiency

**Potential Use Cases**

- Transparent and reliable invoicing solutions
- Automated sensor readings
- Automated system entries

2

## Blockchain market is sizeable with strong forecasted growth

**1521** Estimated 2024 KSA market size. $MM

**21%** Forecasted 5-year CAGR

3

## Attractive investment opportunities in the value chain

**KSA value chain opportunities**

- R&D
- Solution Development and Deployment

**KSA enablers**

- Financing available (Kafalah)
- Blockchain training from national universities
- 1M+ AI-trained Saudi nationals
- Tax exempt exports
- Accelerated setup and licensing





Note: $MM = USD Millions
Source: Expert interviews; Statista; Team analysis

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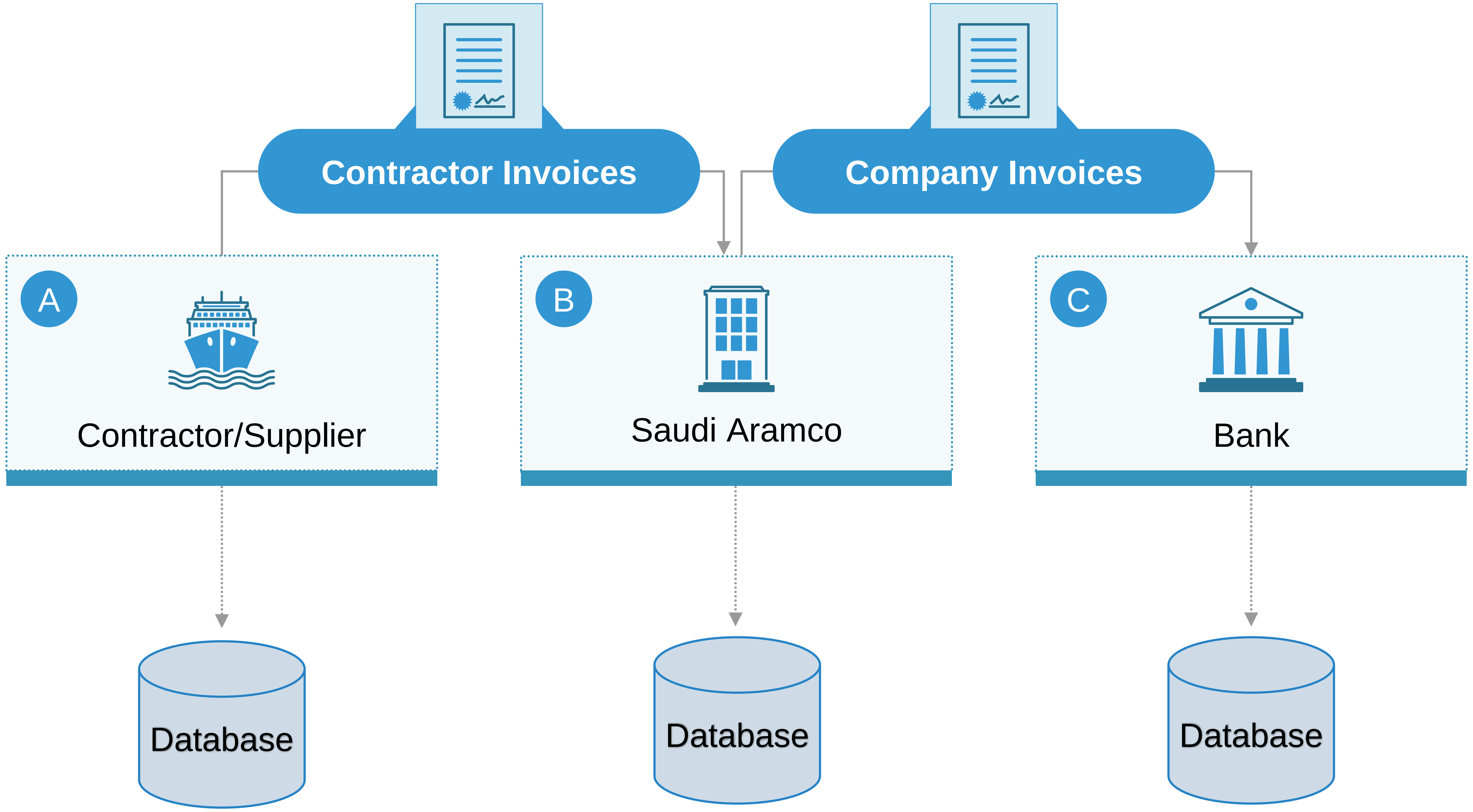
# Blockchain overview and applications




## Challenges

- Duplicate Records
- Lengthy Processing Time
- Lack of Transparency
- Potential Disputes

Source: Business Market Insights; Expert interviews; Team analysis

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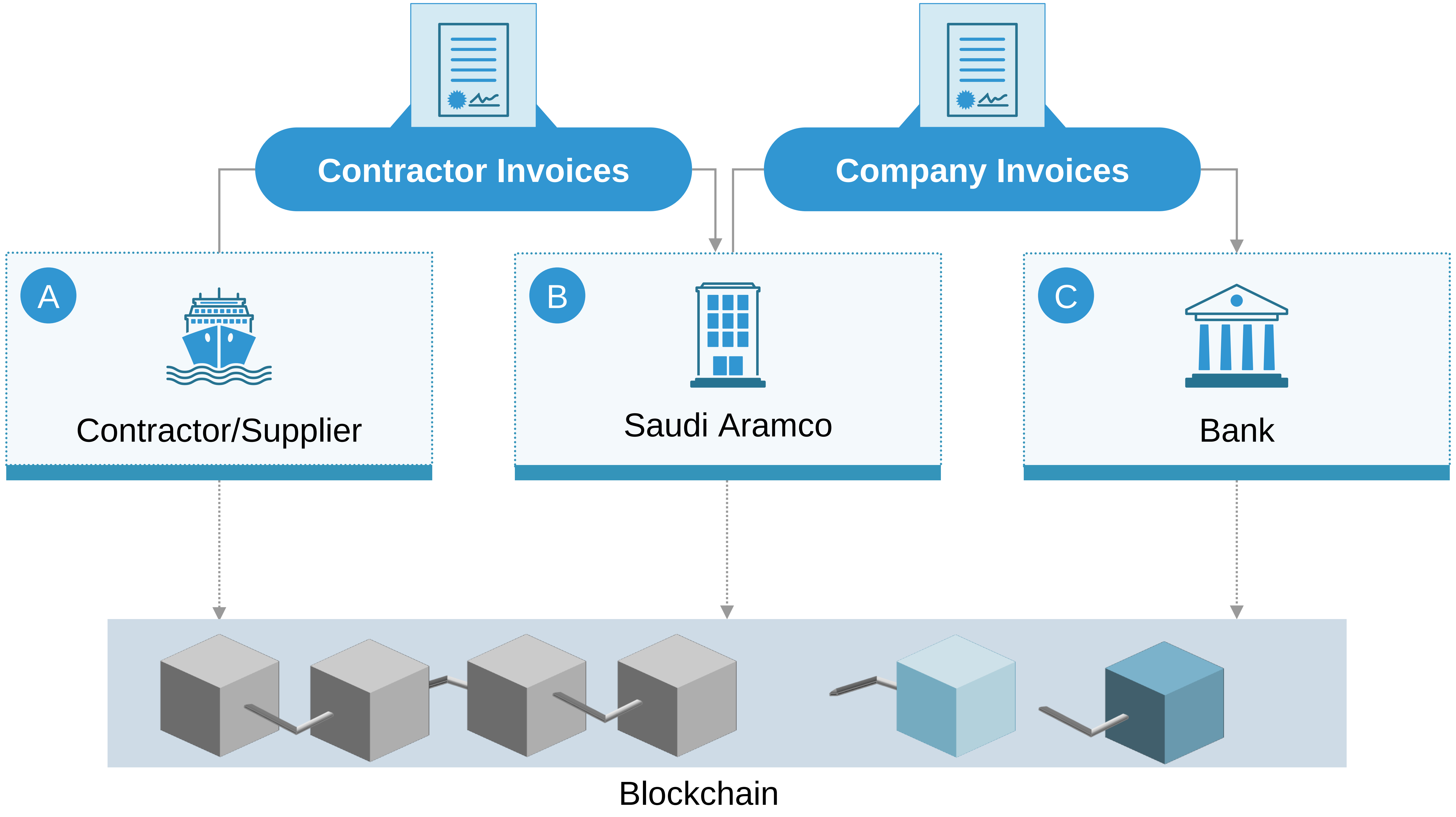
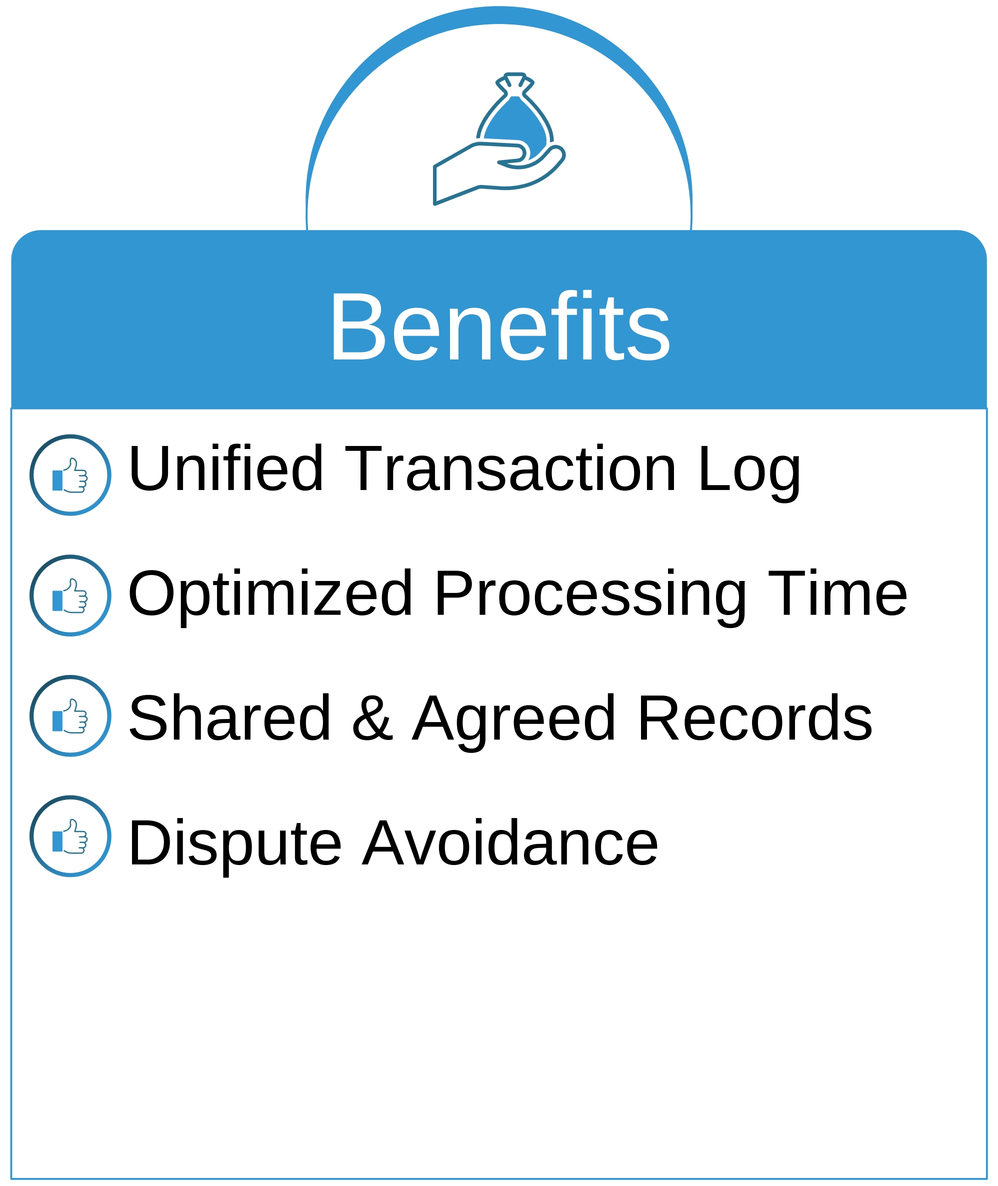
# Blockchain overview and applications








Source: Business Market Insights; Expert interviews; Team analysis

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# Use Case | Trusted Invoice Blockchain

## Description

- Trusted Invoice Blockchain is an invoicing solution that onboard Aramco and its vendors into a blockchain platform.
- Invoices processed with all entities involved in one platform.
- Invoices recorded on blockchain with visibility.

## Solution Benefits

- Massive optimization in processing time
- Mitigated Disputes

## Industry

- Any B2B business with frequent disputes

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# Use Case | Hydrocarbon Custody Transfer

## Description

- Hydrocarbon Custody Transfer or Custody Sales blockchain system is a system that connects Aramco with its customers using a blockchain network
- Custody Sales uses the properties of blockchain technology which to enable the company to perform transactions with customers on a shared distributed ledger.
- Custody Sales stores transactions in an append-only model and is alter-proof as it uses cryptography that prevents any unauthorized or illegitimate alterations.

## Solution Benefits

- Mitigated Disputes
- Processing time optimized by 90%

## Industry

- Supply chain & Logistics (Traceability & Authenticity)





Source: Team analysis

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# Use Case | TrueCerts Blockchain

## Description

- TrueCerts is an innovative solution that leverages blockchain technology to revolutionize the way certificates are verified
- TrueCerts utilizes cutting-edge technology which ensures the authenticity and integrity of certificates, preventing tampering or falsification by third parties

## Solution Benefits

- Streamlines the entire certification process
- Automates document verification and ensures authenticity

## Industry

- Any B2B business that requires document management system.



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Source: Team analysis

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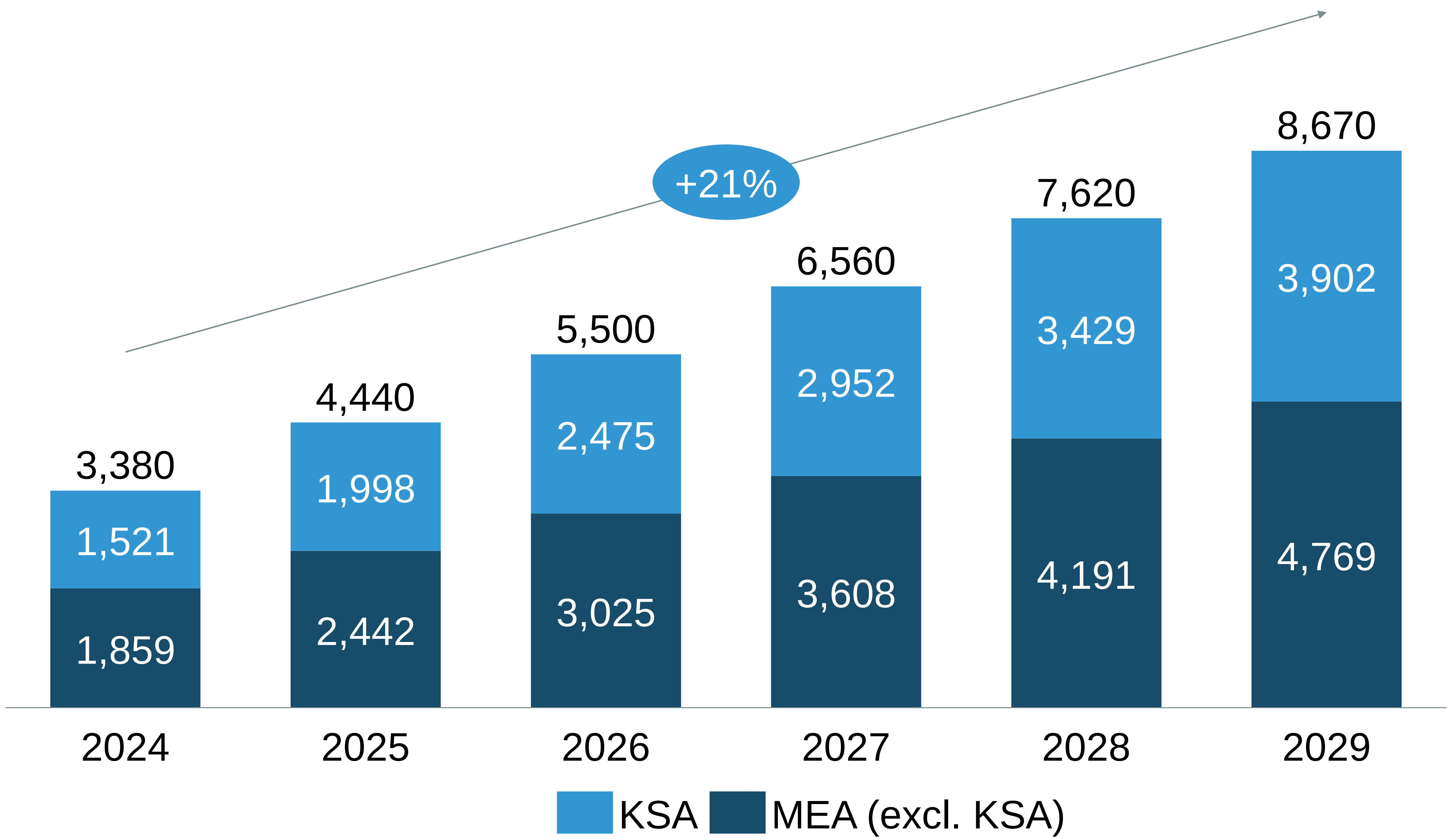
# Blockchain demand, customers, and drivers

Forecasted Middle East and Africa Blockchain market '24-'29 ($MM)




## Potential customers in KSA

- Oil & gas players
- Government and public sector
- Financial sector

## Key KSA demand drivers

- Consumer industry trends: Growing interest in decentralized finance (DeFi) and smart contracts with new initiatives such as Project Aber by SAMA in KSA
- Economic & demographic factors: KSA aims to foster growth and increase the economic contribution of 4IR to 12% of GDP by 2030





Notes: SAMA = Saudi Central Bank; $MM = USD Millions
Source: Business Market Insights; Expert interviews; Team analysis

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# Value chain and key localization opportunities

| | R&D | Solution Development & Deployment |
|---|---|---|
| Local saturation | Few players | Few players |
| Current KSA value chain | • Conduct R&D for Blockchain services | – Establish Blockchain service hub for training, deployment, and support for Blockchain services |
| | Opportunity | Opportunity |
| **Key success factors** | | |
| Technology | Research Institutions | Node hosting services, Blockchain Solution providers, dApp development, and BaaS. |
| Labor | Blockchain Researchers | Blockchain trainers, Blockchain architecture & Integration experts, Blockchain developers. |

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Note: HPC = High-Performance Computing
Source: Business Market Insights; Expert interviews; Team analysis

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# Investment opportunity and enablers

## Key enablers in KSA to drive success

**Financial incentives:** Financing up to 75% of setup costs available through SIDF

**Tax exempt exports:** Export revenue is not subject to tax

**Trained workforce:** 1M+ Saudis trained in AI, data science, or Blockchain

## Where is the opportunity

**R&D**
Conduct R&D for Blockchain services

**Solution Development & Deployment**
Establish Blockchain service hub for training, deployment, and support for Blockchain services



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Note: SIDF = Saudi Industrial Development Fund
Source: SIDF; MISA; NIT; Local Content & Government procurement authority; Team analysis

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# Robotics and Unmanned Aerial Vehicles (UAV)

*Soliman Walaie, Alaa Benmahfoudh, Khaled AbuSaleem*

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# Opportunity profile – Robotics and UAV

## 1
### KSA needing robotics and UAV to meet current industrial expansion

**Types**

Inspection

Maintenance

Repair

**Potential Use Cases**

- Inspection of pipelines for corrosion, leaks, and structural integrity
- Assisting geological surveys and pre-drilling site assessment
- Inspection and asset monitoring to minimize downtime
- Surveillance of critical infrastructure

## 2
### Robotics and UAV market is sizeable with strong forecasted growth

**450** Estimated 2024 KSA market size. $MM

**20%** Forecasted 5-year CAGR

## 3
### Attractive investment opportunities in the value chain

**KSA value chain opportunities**

- R&D
- Ecosystem Solution Devt.
- OEM Solution Devt.

**KSA enablers**

- Critical machinery exempt from import duty
- Financing available (Kafalah, Tanafusiya)
- 1M+ AI-trained Saudi nationals
- Tax exempt exports
- Accelerated setup and licensing

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Note: $MM = USD Millions; UAV = Unmanned Aerial Vehicle
Source: Statista; Expert interviews; Team analysis

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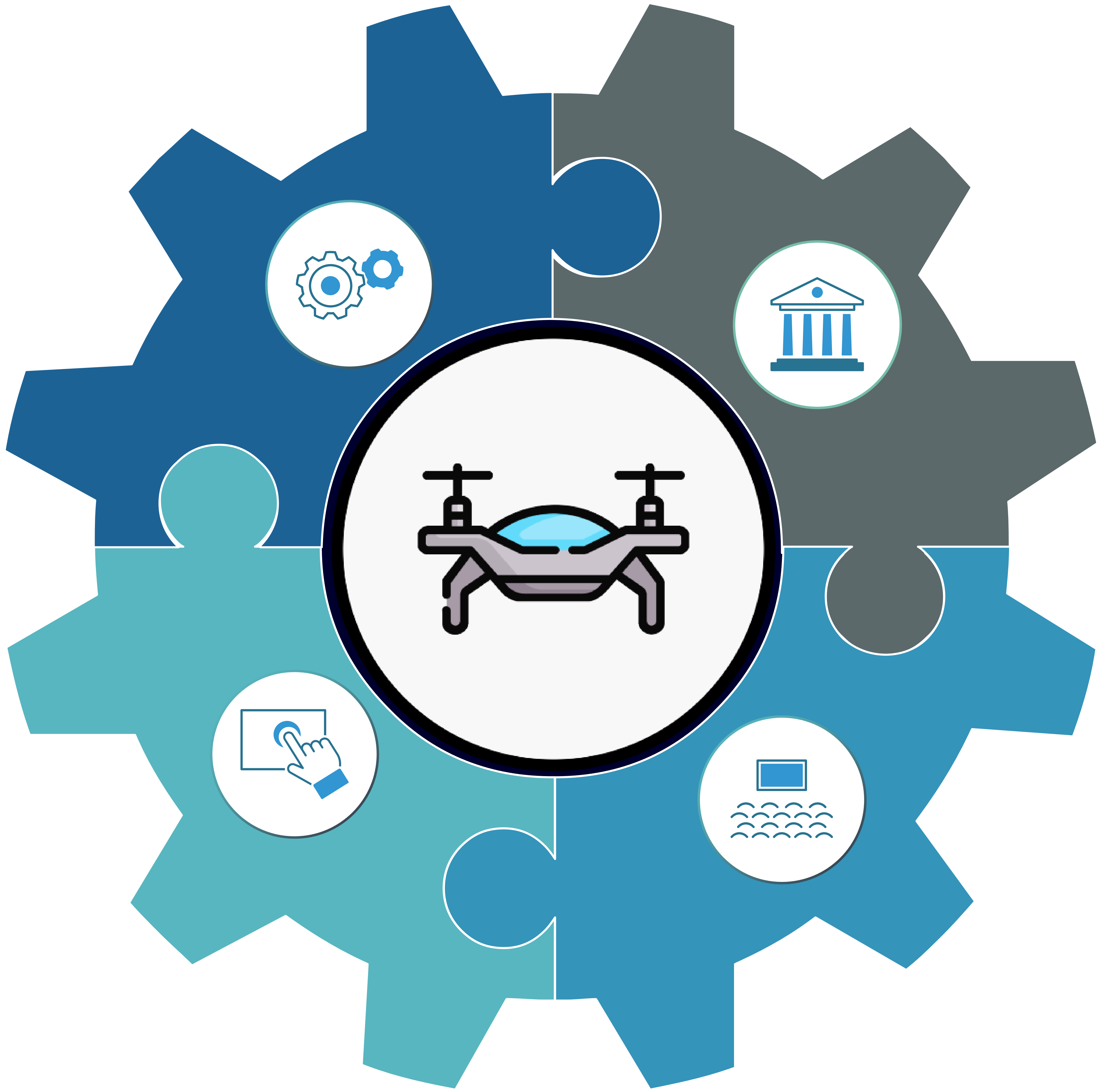
# Saudi Aramco Robotics Strategy

## Technologies

- NDT Inspection Drones
- VTOL Fixed-Wing Drones
- Gas Emission Survey Drone
- Autonomous Drone-in-a-Box
- Delivery Drone



## Governance

- UAV & Robotics Standards Committee
- SAEP-80, SACS-039, 34-SAMSS-950
- Blanket Approval (76 sites)
- Corporate Fleet Management Platform

## Digitalization

- BI-51 and DT BI-19
- Onboard AI/ML
- Corporate “Drone-as-a-Service” model

## HR & Talents

- CMAP
- Training & Certifications
- Patents (4)
- International engagement



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Source: Team analysis

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# Robotics and UAV localized categories

Non-exhaustive

| Inspection | Maintenance | Repair |
|---|---|---|
|  |  |  |

## Applications

**Inspection**
- Pipeline, tank, flare, and vessel corrosion assessment
- Internal inspections
- Non-destructive testing

**Maintenance**
- Thermal imaging and photogrammetry-based maintenance
- Non-intrusive operations during active production

**Repair**
- Weld repair in hazardous zones (e.g., underwater)
- Remote cladding, sealing, and coating
- Treatment spraying





Note: Aramco material number 6000016532
Source: Team analysis

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# Use Case | Inspection, Maintenance, and Repair (IMR)

## Challenge

- Maintenance and repair of inaccessible equipment/asset such as underwater assets, storage tanks, boilers, and vessels among the main assets that need to be maintained over time to help ensure a longer service life and a safe environment
- Activities include repair, coating, blasting, sludge cleaning, welding

## Status Quo

Conventional Method:

- Manual effort consumes additional time and cost
- Confined space entry
- Health and safety risk and environmental impact

## Solution

- Leverage robotic technologies to robotize the welding, coating, blasting, cleaning maintenance activities utilizing autonomous blasting and coating robots working concurrently

## Benefits

- Enhance quality of work and asset integrity
- Enhance safety of maintenance operators and fabricators
- Reduce time required for IMR
- Cut costs

## Technologies

## Users

Project Mgmt. Team

Maintenance Org.

Fabrication Shops

Robotics

Intelligent Sensing

Artificial Intelligence



Source: Team analysis

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# Use Case | Remote Autonomous Inspection & Surveillance

## Challenge

- Offshore and onshore remote unmanned sites imposes risk and cost on operators at remote scattered locations
- Some of the tasks does not require physical existence such as reading gauge

## Solution

- Utilize robotic technologies to automate remote operation for unmanned and offshore facilities

## Status Quo

Conventional Method:

- Operation conducts frequent visits to offshore unmanned facilities and remote areas via helicopters, boats, and cars
- Conventional methods require extended patrolling (up to several days)

## Benefits

- Enhance operational efficiency
- Improve workplace safety
- Eliminate costly patrolling and site visits

## Technologies

## Users





Plant Operators Robotics Intelligent Sensing Artificial Intelligence

Source: Team analysis

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# Use Case | AI for Robotic Technologies

## Challenge

- Multiple drone and robotic technologies that conduct routine activities such as security and inspection
- These technologies are yet to be equipped with AI capabilities to carry out the required processing of images and capture inspection or security items which will unleash the technologies' full potential

## Status Quo

### Conventional Method:

- Experts and SMEs review drones and robotic images and streaming to capture findings related to their functions

## Solution

- AI-Powered robots are capable of performing complex tasks such as autonomous navigation, real-time data analysis, and decision making
- These advancements enable robots to efficiently inspection assets and survey sites, identify potential issues, and enhance security and inspection measures

## Benefits

- Optimize resource utilization
- Enhance efficiency of inspection and security
- Enable continuous operational up-time
- Cut costs

## Technologies

## Users





Plant Inspectors
Plant Operators
Security
Robotics
Intelligent Sensing
Artificial Intelligence

Source: Team analysis

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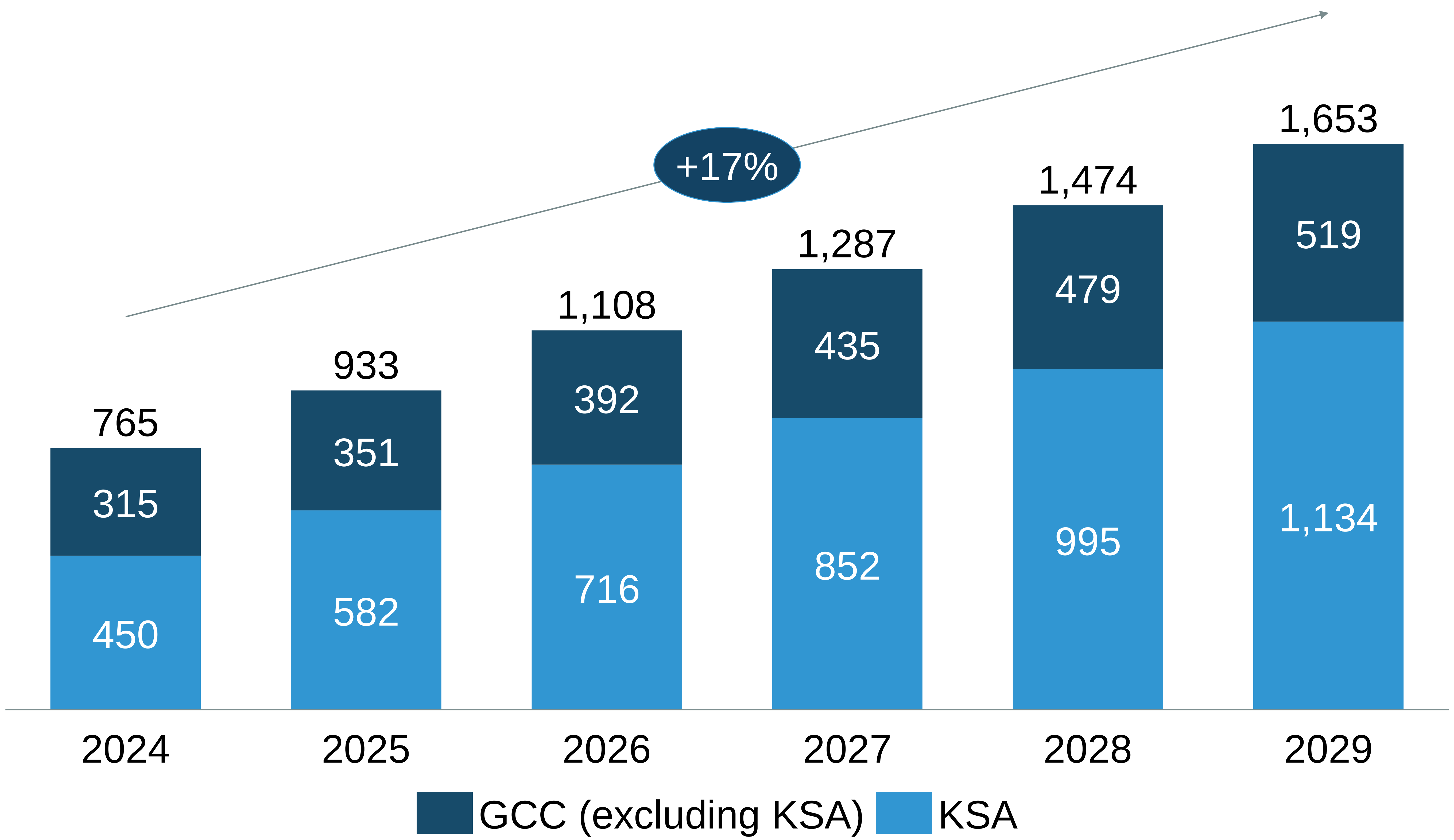
# Robotics and UAV demand, customers, and drivers

Forecasted GCC robotics and UAV market 2024-2029 ($MM)

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## Typical IIoT customers in KSA

- Oil & Gas
- Utilities and power generation
- Construction and real estate

## Key KSA demand drivers

- Infrastructure and Mega Projects: Large-scale projects like NEOM incorporate advanced robotics and UAVs for construction, maintenance, and operational efficiency
- Pipeline and remote site inspections: UAV demand bolstered by need to optimize pipeline and remote facility inspections and reduce logistics burden

Note: $MM = USD Millions; UAV = Unmanned Aerial Vehicle
Source: Statista; Expert interviews; Team analysis

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# Value chain and key localization opportunities

| | R&D | Supplier & Ecosystem Solution Development | OEM Solution Development | Deployment & Management |
|---|---|---|---|---|
| Local saturation | Few players | Few players | Few players | Many players[1] |
| Current KSA value chain | • Conduct R&D for robotics & UAV products tailored to KSA needs | • Produce robotics components and materials – e.g., actuators, composites | • Develop robotics and UAV solutions – e.g., remote inspection and autonomous navigation | • Establish robotics & UAV service hub incl. surveying, audits, and maintenance |
| | Opportunity | Opportunity | Opportunity | |
| **Key success factors** | | | | |
| Technology | Prototyping tools, testing facilities available | Precision CNC, laser cutters, PCB machines available for import | Vibration test, load and endurance testing rigs available for import | |
| Labor | Mechanical, electrical, and test engineers available | Hardware engineers, technicians available | Production, test engineers available | |

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1. Several players expanding operations; Note: CNC = Computer Numerical Control; PCB = Printed Circuit Board; IMR = Inspection, Maintenance, and Repair; UAV = Unmanned Aerial Vehicle

Source: Statista; Expert inputs; Team analysis

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# Investment opportunity and enablers

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Financial incentives: Financing up to 75% of setup costs available through SIDF

Tax exempt exports: Export revenue is not subject to tax

Trained workforce: 1M+ Saudis trained in AI, data science, or Blockchain

## Where is the opportunity

R&D
Conduct R&D for robotics & UAV products tailored to KSA needs

Supplier & Ecosystem Solution Development
Produce robotics components and materials – e.g., actuators, composite materials

OEM Solution Development
Develop tailored robotics and UAV solutions for large industry players



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Note: SIDF = Saudi Industrial Development Fund
Source: SIDF; MISA; NIT; Local Content & Government procurement authority; Team analysis

# Please direct Business Opportunities inquiries below:

We invite you to engage with us and send us your Expression of Interest by scanning the QR code or visiting:

**Website: https://iktva.sa/english/opportunities/opportunity-submission-form**

**Email: local-content@Aramco.com**

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# Thank You

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