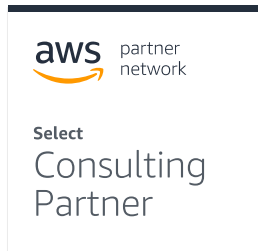# Nextbit presentation

Feb. 2024

www.nextbit.it

# Nextbit – our goal

Increase business productivity and efficiency through innovative digital solutions based on Data Intelligence & Artificial Intelligence
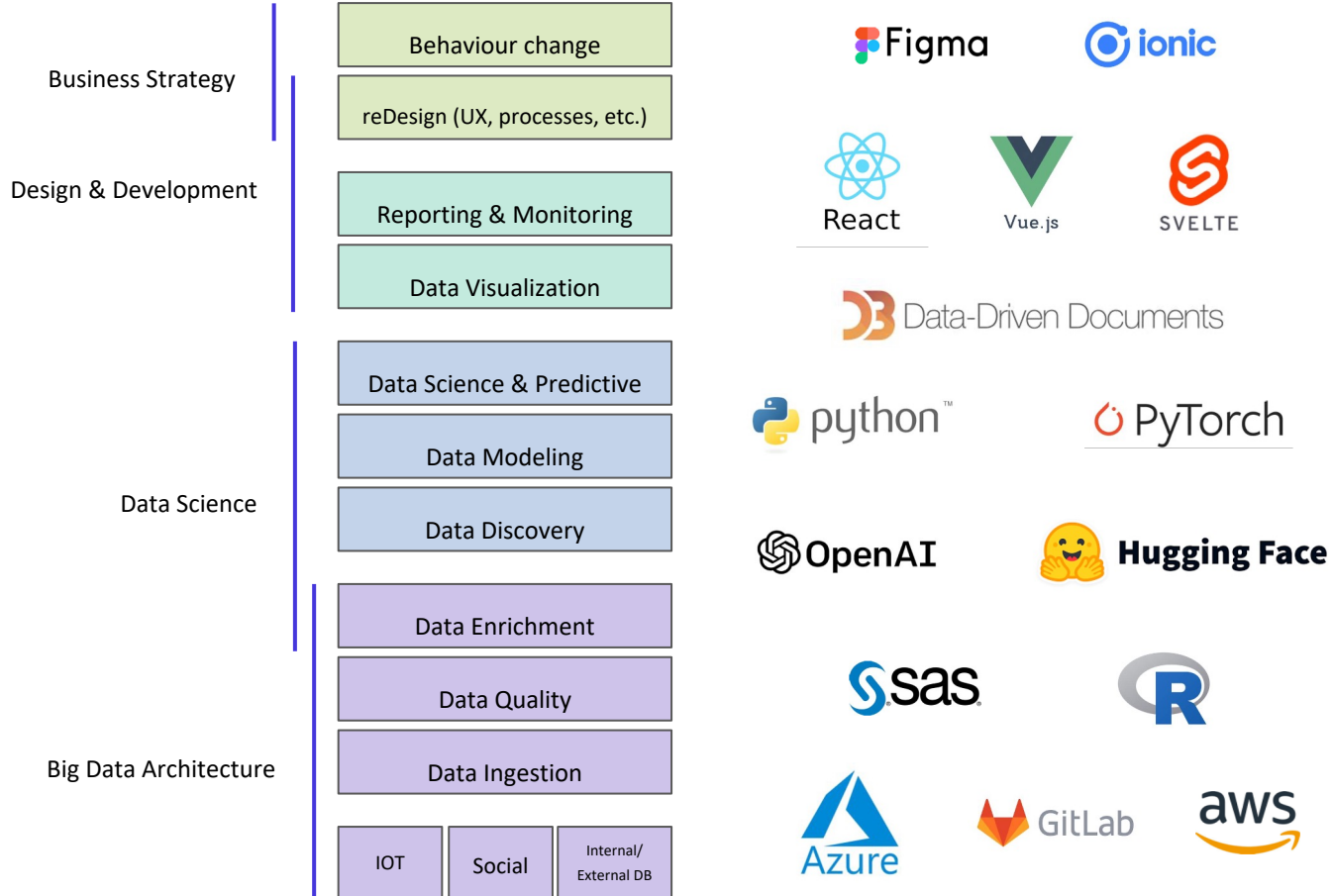
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# Nextbit – how we achieve our goal

Bridge the latest academic research in the analytics field by applying a variety of skills, including **data engineering**, **data science**, **user experience**, **creative digital design**. We use a well-planned and rigorous implementation approach in our solutions to deliver business results; where quality must be at the heart of any project we undertake.

Nextbit has an internal R&D team dedicated to solving complex problems on Data Intelligence.

**DATA ARCHITECTURE**     **DATA SCIENCE**     **DESIGN**     **BUSINESS STRATEGY**

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# Nextbit team: end-to-end skills

**Business Strategy**

- Behaviour change
- reDesign (UX, processes, etc.)

**Design & Development**

- Reporting & Monitoring
- Data Visualization

**Data Science**

- Data Science & Predictive
- Data Modeling
- Data Discovery

**Big Data Architecture**

- Data Enrichment
- Data Quality
- Data Ingestion
- IOT | Social | Internal/External DB

Figma · ionic

React · Vue.js · SVELTE

D3 Data-Driven Documents

python · PyTorch

OpenAI · Hugging Face

SAS · R

Azure · GitLab · aws

# About Nextbit

We have implemented innovative digital solutions for the following clients:

# Nextbit Data Intelligence and A.I. skills

## We have skills and experience in each of the following:
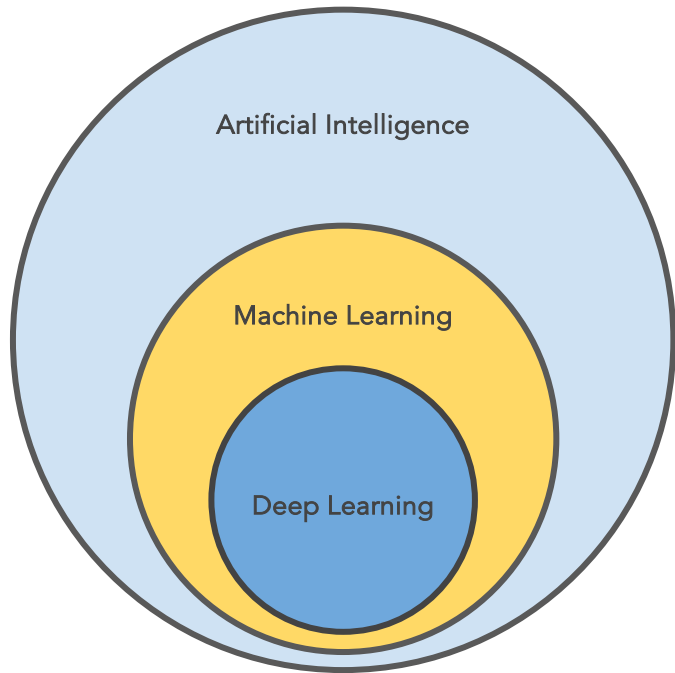


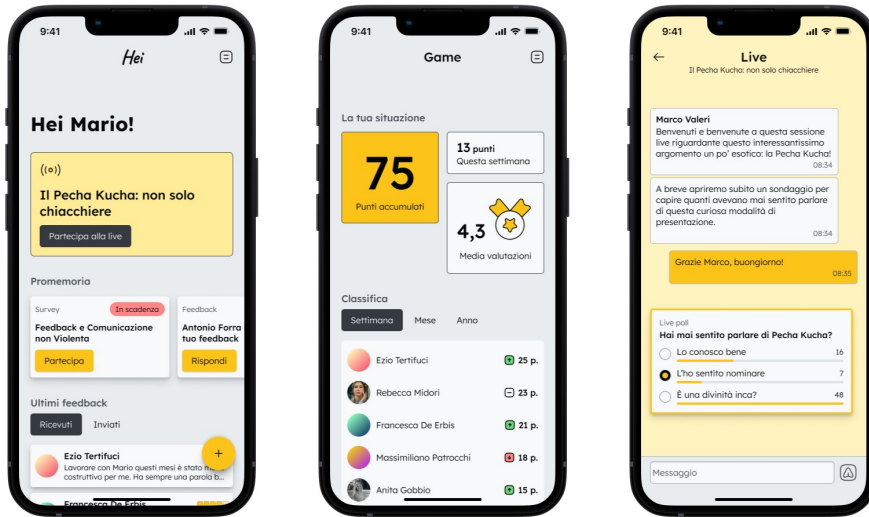| | | |
|---|---|---|
| see | 👁 | Computer Vision |
| listen | | Voice & Speech |
| speak or read | | Natural Language Processing |
| learn | | Human-Machine Interaction & M.L. |
| move | | Robotics |
| identify patterns | | Time-series    Network Analysis |

# Case Study - HEI web App

## HEI – Human Engagement Interactions
*Collective growth through personal enhancement*



Primary APP features:

• Designed for HR aptitude and skills assessment and development (for students, job candidates and employees)

• Aptitude evaluation designed with Bocconi University professors

• Enable a 360 assessment by colleagues and team managers

• Ability to monitor activity / feedbacks at user, team, department and company level

• Link psychological traits (such as personality) with a broad range of organizational and social outcomes, including job performance, person-job fit, team performance.

# ArtiFacts – Personalized Cultural knowledge through GenAI
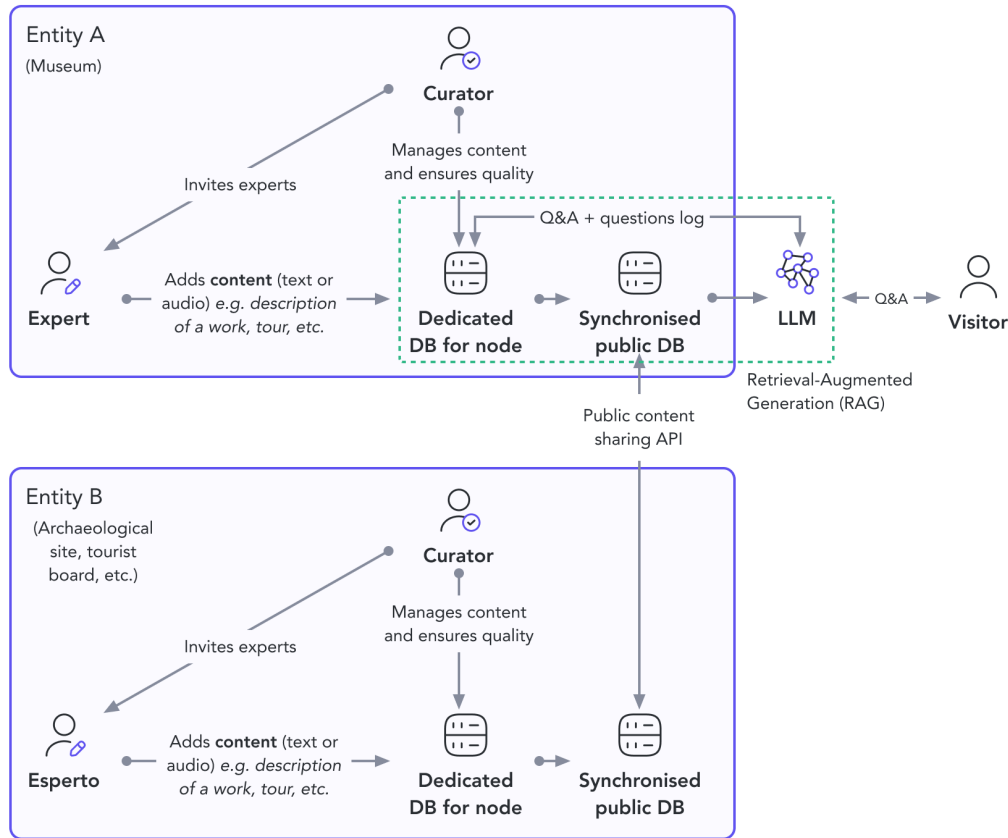


Primary Solution features:

- Designed to collect detailed knowledge from experts as text, voice or any multimedia file using A.I. (e.g. speech-to-text)

- Curator can approve detailed content and share summaries publicly via Generative AI assistant

- Public content updated in real-time among nodes within same cluster (e.g. museums in the catchment area of Florence).

- Ability for visitors, with varying level of expertise, to interrogate private detailed content and public summaries through GenAI (multilingual, appropriate terminology, accessibility)

- Designed in collaboration with national museums and academic institutions specializing in art history
  - IMT for Advanced Studies of Lucca
  - LUISS of Rome

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# Fraud Detection

Using advanced behavioral analysis

Human-Machine Interaction | NLP | Time-series | Computer Vision | Network Analysis | Voice & Speech | Real-time | Big Data

## Objective & Challenges

- Increase level of credit card fraud prevention by x-fold

- Keep transaction score timing under 50 milliseconds

- Score more than 1500 transactions per second

- Manage large amounts of heterogeneous data

## Our Solution

- Used advanced behavioral analysis utilizing deep learning libraries

- Utilizes a vastly enriched dataset

- Deployed on cloud for lower initial investments

- Security & data privacy approved by all banking authorities

python™

## Benefits

- Increase level of credit card fraud prevention by 4-fold

- Transaction score timing of 22 milliseconds

- Ability to score over 5000 transactions per second

- Auto scaling based on seasonality and time of day

- Lower TCO and time-to-market

- Cloud Architecture quickly reproducible via XML

Banking references | nexi | INTESA SANPAOLO

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# Investment Strategy

Natural Language Processing (NLP)

**Human-Machine Interaction** | **NLP** | **Time-series** | **Computer Vision** | **Network Analysis** | **Voice & Speech** | **Real-time** | **Big Data**

## Objective & Challenges

- Introduce innovative NLP algorithms on financial markets news and articles

- Ability to summarize hundreds of daily financial articles

- Multilingual support for Q&A between human analyst and algorithm

## Our Solution

- An automated algorithm that allows users to quickly find trending financial markets themes

- Helps investors to understand the financial markets and support investment/risk decision-making

- Provides summarized relevant information on asset classes and financial topics

python™

## Benefits

- Insights on relevant events and market reactions

- Intuitive Q&A interface for human-machine interaction

- Faster information retrieval

- No IT investment required

Portfolio Investment

GENERALI

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# Anomaly Detection

For Multivariate Time Series

Human-Machine Interaction

NLP

**Time-series**

Computer Vision

Network Analysis

Voice & Speech

**Real-time**

**Big Data**

## Objective & Challenges

- Introduce innovative algorithms to monitor transactional and payment processing data by Merchant

- Identify anomalies using unsupervised models

- Remove model bias in the model by avoiding assumptions

## Our Solution

- Developed a solution based on Machine learning to monitor anomalies in the payment process

- Scalable - analyzes over 10 million transactions per day

**Ssas**   **python**

## Benefits

- Anomaly detection in transactional and payment processing patterns by Merchant

- Ability to use reinforcement learning for model improvement

- No IT investment required

Payment processor   **nexi**

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# Fraud Rings

Fraud detection leveraging graph DB

Human-Machine Interaction

NLP

Time-series

Computer Vision

Network Analysis

Voice & Speech

Real-time

Big Data

## Objective & Challenges

- Uncover fraud rings (organizations with multiple fraudsters) with high degree of accuracy

- Identify recurring patterns across fraudsters

- Provide a GUI to Fraud Prevention Office to simplify fraud detection processes

- Manage very large datasets

## Our Solution

- Manage millions of nodes and relationships

- Use simple to use queries for detecting fraud rings in a graph

- Data is fully masked and GDPR compliant

**python**

## Benefits

- Allows for easy detection of fraud rings

- High performance even with large volumes of data

- Real-time analysis available

- Intuitive GUI allows users to explore, insert annotations / tags, see both aggregated & atomic data, collaborate
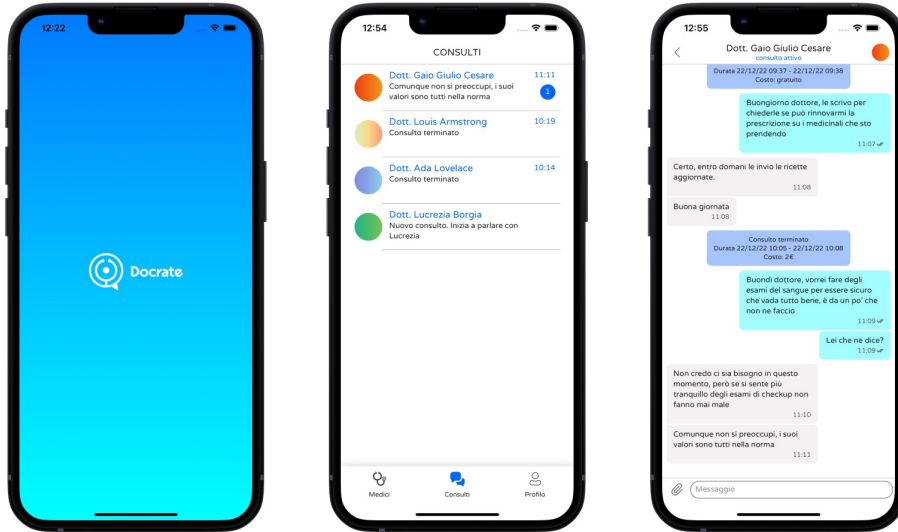
Banking references

CRÉDIT AGRICOLE

Agos DUCATO

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# Case study – Docrate mobile App

## Telemedicine mobile App connecting Doctors to Patients



Primary APP features:

- Designed by doctors for doctors

- Fully GDPR compliant – designed to prevent data breach on sensitive personal data

- Allows for payment of medical consultations

- Connected to SPID for doctor's identity verification

- Simple user interface

# Behavioral Profiling

For Multivariate Time Series

Human-Machine Interaction | NLP | **Time-series** | Computer Vision | Network Analysis | Voice & Speech | Real-time | **Big Data**

## Objective & Challenges

- Introduce innovative algorithms to understand and predict customer behavior

- Identify channel preferences and promotion upsell

- Calculate ROI on online advertising spend

## Our Solution

- Developed a solution based on Machine Learning to segment customers and build customer behavior model

- Analyzed million of customers

- Calculated ROI per single customer

Ssas    python

## Benefits

- Developed a recommender system for Campaigns

- Introduced a detailed customer profiling for predicting customer behavior

- Automated in-store product selection based on catchment area preferences

Retail references:    John Lewis    TESCO    MONDADORI    Banking references:    UniCredit    ING

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# A.I. Recommender

Human-Machine Interaction    NLP    **Time-series**    Computer Vision    Network Analysis    **Voice & Speech**    **Real-time**    Big Data

## Objective & Challenges

- Understand driver & passenger preferences without any historical data from any user

- **Suggest places of interest using voice interaction**

## Our Solution

- Multi-armed bandit algorithm which requires no prior data (reinforcement learning)

- Leverages hyper parameter optimization with Gaussian processes on simulated data

## Benefits

- Fast system initialization

- Short cold start period with immediate results

- Dynamic routing of trip based on users' preferences

- No IT investment required

Automotive reference

Volkswagen

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# SpeaRec

Speaker Voice Verification over mobile

Human-Machine Interaction · NLP · Time-series · Computer Vision · Network Analysis · **Voice & Speech** · **Real-time** · Big Data

## Objective & Challenges

- Verify speaker identity using biometric voice data

- Introduce frictionless Strong Customer Authentication

- Identify speakers within household for improved targeting & recommendations

- Do not store any private or sensitive data

## Our Solution

- Uses biometric voice data with 10 seconds enrollment

- Trained Deep Learning network to distinguish voice footprint by analyzing 30 millisecond frames

- No voice or text data is ever stored – fully GDPR compliant

PyTorch

Google Cloud

## Benefits

- Fast enrollment (closes US competitor requires 45 sec.)

- Reliable in noisy environments / conditions

- Able to identify correctly the 99.7% of audio tracks

- No IT investment required

- Accessible via simple APIs

Banking references **CEDACRI** *GROUP*

Media references **sky**

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# Image Processing

Unsupervised Image Algorithms

Human-Machine Interaction   NLP   Time-series   Computer Vision   Network Analysis   Voice & Speech   Real-time   Big Data

## Objective & Challenges

- Align images and digital information produced by different sensors on the same inspected object to create a comprehensive 3D analytical dashboard

- Infer attributes of objects based on partial information

- Provide business experts a seamless, realistic and intuitive user experience in  3D virtualized environment

## Our Solution

- Used image processing algorithm to analyze texture, shape and correct misaligned images

- Trained algorithm to segment materials and infer missing information

python

PyTorch   Azure

## Benefits

- Provided business user a comprehensive digital platform that gathers all available information

- When information is missing it is inferred by algorithms

- World-wide deployment

Oil and Gas   eni

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# Energy consumption

Predict energy consumption

 Human-Machine Interaction

 NLP

 Time-series

 Computer Vision

 Network Analysis

 Voice & Speech

 Real-time

 Big Data

## Objective & Challenges

- Predict Energy consumption for existing and new clients

- Improve the automatic profiling of hourly measurements

- Reduce complaints and invalid predictions

## Our Solution

- Uses **Machine Learning** techniques to estimate the normalized energy consumption for the customer's available power at quarter of an hour.

- Hundreds of metrics on consumption, weather and personal data were created

- **Agile** methodology employ for model development

## Benefits

- Immediate improvement of the quality of the measurement by improving customer profiling

- Ability to promote estimated measure into real measures

- Reduced number of predicted measures to be corrected

Utility references:

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# Sentext

Identify relevant paragraphs

**Human-Machine Interaction** · **NLP** · Time-series · Computer Vision · Network Analysis · Voice & Speech · **Real-time** · **Big Data**

## Objective & Challenges

- Explore a large amount of legal documents (millions)

- Query the database using natural language

- Find the most relevant part of a document

- Enrich documents metadata with tags and annotations

## Our Solution

- Leverages state-of-the-art *Semantic Retrieval Question Answering* deep learning algorithms

- Allows business users to ask legal questions in natural language and quickly find parts of documents containing appropriate answers

- Allows users to seamlessly enrich documents metadata using the integrated annotation tool

*TensorFlow* · *amazon webservices*

## Benefits

- Business users can query a large collection of documents using natural language, as you would ask any other human

- Annotations and tags can be added through an intuitive graphical user interface

- Scales to millions of documents (billions of relevant paragraphs), on any topic, thanks to product vector quantization techniques

- No IT investment required

Publishing references · *Il Sole 24 ORE*

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# Nextbit – approach to solving business-critical problems

| 1. Ideas & Objective definition | 2. Solution Design | 3. Implementation | 4. Test & evaluation | 5. Production |
|---|---|---|---|---|

**Goal:**
Identify viable application of Solutions or Advanced Algorithms to solve business problems

**Typical Duration:**
1-2 weeks

**Deliverable:**
Presentation of Relevant Case studies

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**Goal:**
Feasibility Study and definition of scope of work for a solution

**Typical Duration:**
1-3 weeks

**Deliverable:**
• Scope of work
• Cost / benefit analysis

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**Goal:**
Implementation of Minimum Viable Product (MVP)

**Typical Duration:**
12 - 24 weeks

**Deliverable:**
• MVP Solution based on sample data
• Performance evaluation

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**Goal:**
Deploy & test the MVP. Extend to multiple business domains, include production requirements. Refine implementation roadmap.

**Typical Duration:**
2 – 5 weeks

**Deliverable:**
• Production architecture
• Test results
• Accountability

---

**Goal:**
Deploy solution on production environment. Documentation and Application Maintenance

**Typical Duration:**
2 - 5 months

**Deliverable:**
• In-production solution
• Documentation
• Application Maintenance plan

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Thank you for your time.