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How machine vision cuts defects on the line by 80% and stabilizes quality beyond the human factor

Ultra-precise detection of microscopic deviations and defects beyond the human eye, with real-time alerts and complete traceability of every check, seamlessly feeding data into your core enterprise systems.

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Our team

Synaptik is a technology company specializing in machine vision and AI solutions for industrial enterprise

We address practical shop-floor challenges with cameras and AI: automated inspection, measurement, recognition and deviation detection without manual checks

About us →

13+ years

working with manufacturing companies

>200 projects

in machinery, metalworking, food production, and more

45+

Software engineers in our team

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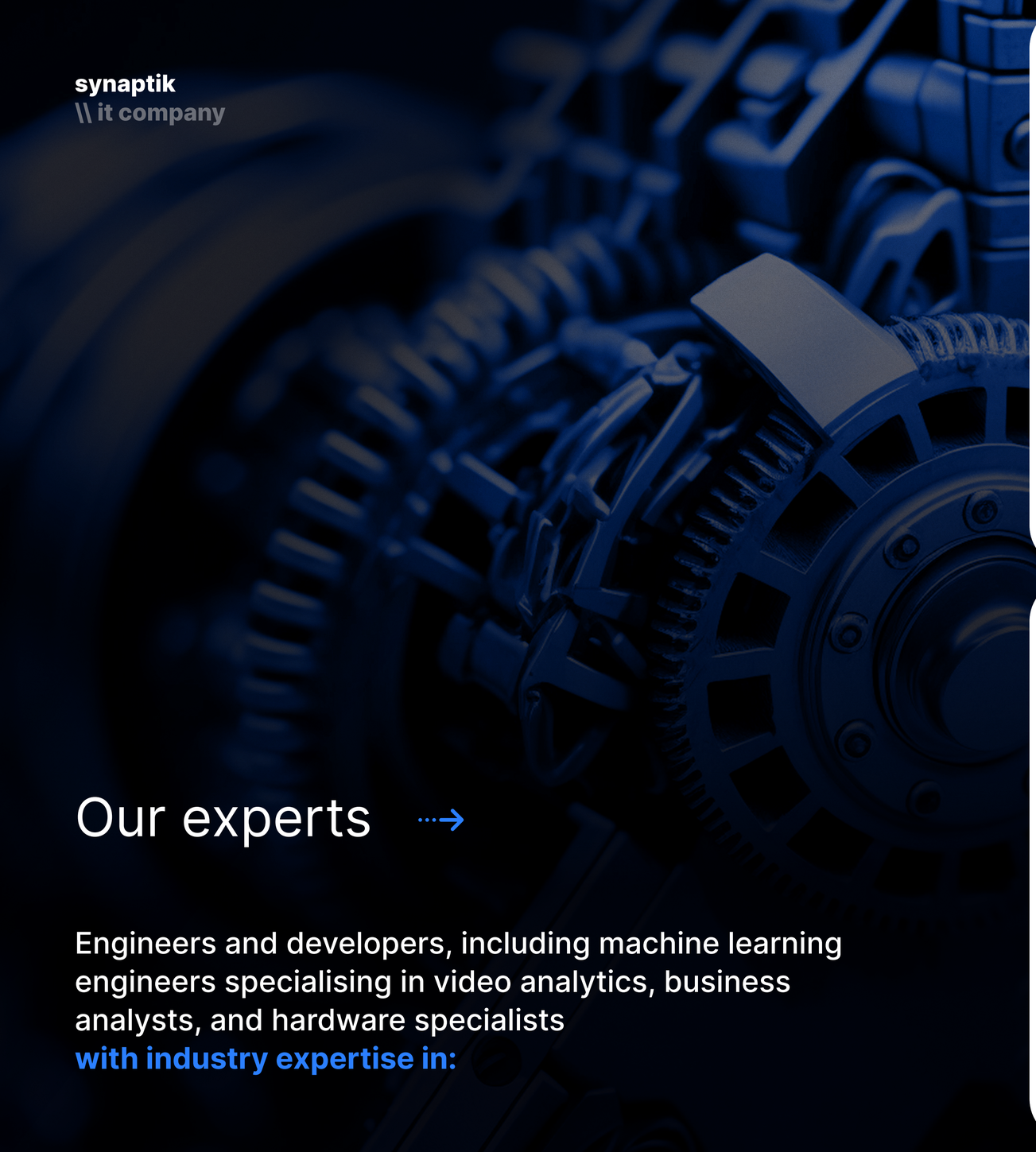

Our experts

Engineers and developers, including machine learning engineers specialising in video analytics, business analysts, and hardware specialists
with industry expertise in:

Instrumentation industry

- Automated quality inspection of products on assembly lines and testing stations using overhead machine vision systems
- Detection of surface and geometric defects, as well as assembly and marking deviations, with photographic and video recording of non-conformities

01

Machinery manufacturing

- Quality control of components and assemblies on conveyor lines and robotic workstations using machine vision
- Detection of cracks, chips, misalignments, incomplete assemblies, and other defects, with automatic rejection of faulty items and operator notification

02

Oil and gas industry

- Monitoring the condition of pipes, tanks, welds, and product packaging on manufacturing and pre-shipment lines
- Detection of corrosion, deformation, loss of integrity, and labelling defects, with frame-based traceability and cumulative defect history recording

03

Mining industry

- Quality control of ore, concentrate, and finished products on processing plant conveyor lines using machine vision
- Analysis of particle size distribution, contamination, foreign matter, and deviations from specified parameters, with quality reports generated for each batch

04

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Target Customer Profile

- Medium-sized and large industrial enterprises engaged in discrete or continuous manufacturing, where reducing defect rates is a key priority
- Companies with annual revenue from 800M+ and staff of 100+ employees
- Industrial facilities operate enterprise management systems such as 1C:ERP and 1C:UPP, along with MES and CAD/PDM platforms, and are equipped to implement intelligent machine vision systems

Owner / CEO	Focused on maximising profitability and ROI while minimising operating costs and business risk through AI-driven insights
Production Director	Focused on optimizing production cycles and deadlines through total operational control and real-time response to any deviations
Shop Foreman	Line downtime is a key concern, creating a need for in-line monitoring and a reduction in human error
Quality Director / Head of Quality Control (QC)	Responsible for quality control at every stage, with a need for a standardised approach, photo and video documentation, and less manual routine
Chief Engineer / Head of HSE	Responsible for production automation and digital transformation, with a focus on solutions that integrate seamlessly into the existing infrastructure (1C, MES, SCADA) and remain easy to support and maintain

Pain points

Prevent Waste and Product Recalls

01.

Defects are detected too late, forcing the batch into rework or partial write-off, resulting in lost materials and labour time

02.

Sorting errors and incorrect assembly are only identified before shipment, causing products to be returned, dispatch to be halted, and staff to spend time tracing the error instead of maintaining output

Timelines and Output

01.

Quality control cannot keep pace with the line: bottlenecks build up at inspection, packaging, or assembly stages, and actual output falls below the level the equipment is capable of delivering

02.

Deadlines are missed because of minor errors in labelling, packing inserts, or product configuration: shipment is held up while the source of the mistake and the person responsible for correcting it are identified.

Quality Control Delays Causing Production Bottlenecks

01.

Quality decisions depend on the shift and the individuals involved: fatigue, visual desensitisation, and workplace conditions lead to inconsistent inspection results despite identical requirements

02.

Instead of full inspection, only sample checks are carried out: a defect slips into the production run and is only detected later, once rework and investigation are already under way

Risk Management and Operational Control

01.

Lack of documented inspection records makes it difficult to identify the stage at which a defect was overlooked

02.

Lack of early deviation alerts means problems are only detected once they have already led to defects, downtime, or customer claims

Key Capabilities

Automated visual inspection on the line

The in-line machine vision system verifies product presence, completeness, assembly accuracy, labelling, orientation, and dimensions

Instant defect alerts

When a deviation is detected, the operator receives an immediate alert and clear instructions to recheck, remove, or send the item for correction before it moves further down the line

Documented inspection records and deviation causes

Each inspection is supported by an image, timestamp, and protocol specifying the type of defect and the inspection outcome

Seamless integration into existing processes

Results are automatically transferred to shift logs, enterprise systems, quality control records, and management reports, eliminating the need for manual data duplication

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Outcomes and impact

More consistent and predictable output of high-quality products: shift supervisors have real-time visibility into actual operations and can make informed decisions immediately

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The Workflow

01

Cameras positioned along the line capture product images at the required stage and transmit them to a machine vision system integrated with the PLC, MES, and enterprise systems

02

Algorithms and neural networks automatically verify dimensions, component presence, assembly quality, labelling, and other parameters by comparing each item against reference standards and tolerances, delivering an **OK / Defect** decision in real time

03

The inspection result is then fed back to the equipment: compliant items continue along the line, defective ones are automatically rejected, and the operator receives a clear notification and intervenes where required in accordance with the procedure

04

All inspections, decisions, and images with highlighted defects are stored in the system and displayed in reports and dashboards, enabling managers and process engineers to identify and analyse the factors driving defects

Behind The Tech:

01.

Inspection point: one or more cameras combined with an industrial PC or edge node installed on the line

02.

Software: a machine vision module, an inspection rules engine, and an event and inspection log

03.

Integrations, where required:

- **1C:ERP / 1C:UPP** — batches, product catalogue, serial numbers, statuses
- **MES** — operations, routing, inspection results
- **SCADA / PLC** — pass/fail signals, stop or divert commands, triggers
- **WMS** — completeness checks, shipping, identification
- **QMS** — quality records, non-conformities

04.

Data and traceability: images, timestamps, and inspection results linked to the product, batch, time, and workstation

05.

Deployment: on-premises within the enterprise environment, with role-based access configuration, redundancy, and archiving in line with information security requirements

How it works

Vision sensors capture products and key process events on the line

The AI-powered vision module analyses each frame against the golden sample, inspection rules, and tolerance thresholds

OK

- The product passes to the next stage.

DEFECT

- Triggers a stack light alert
- Activates an audible alarm
- Pushes a defect notification with the image to the operator Workstation

Inspection results are stored in the event log to support traceability, defect analytics, and process optimisation

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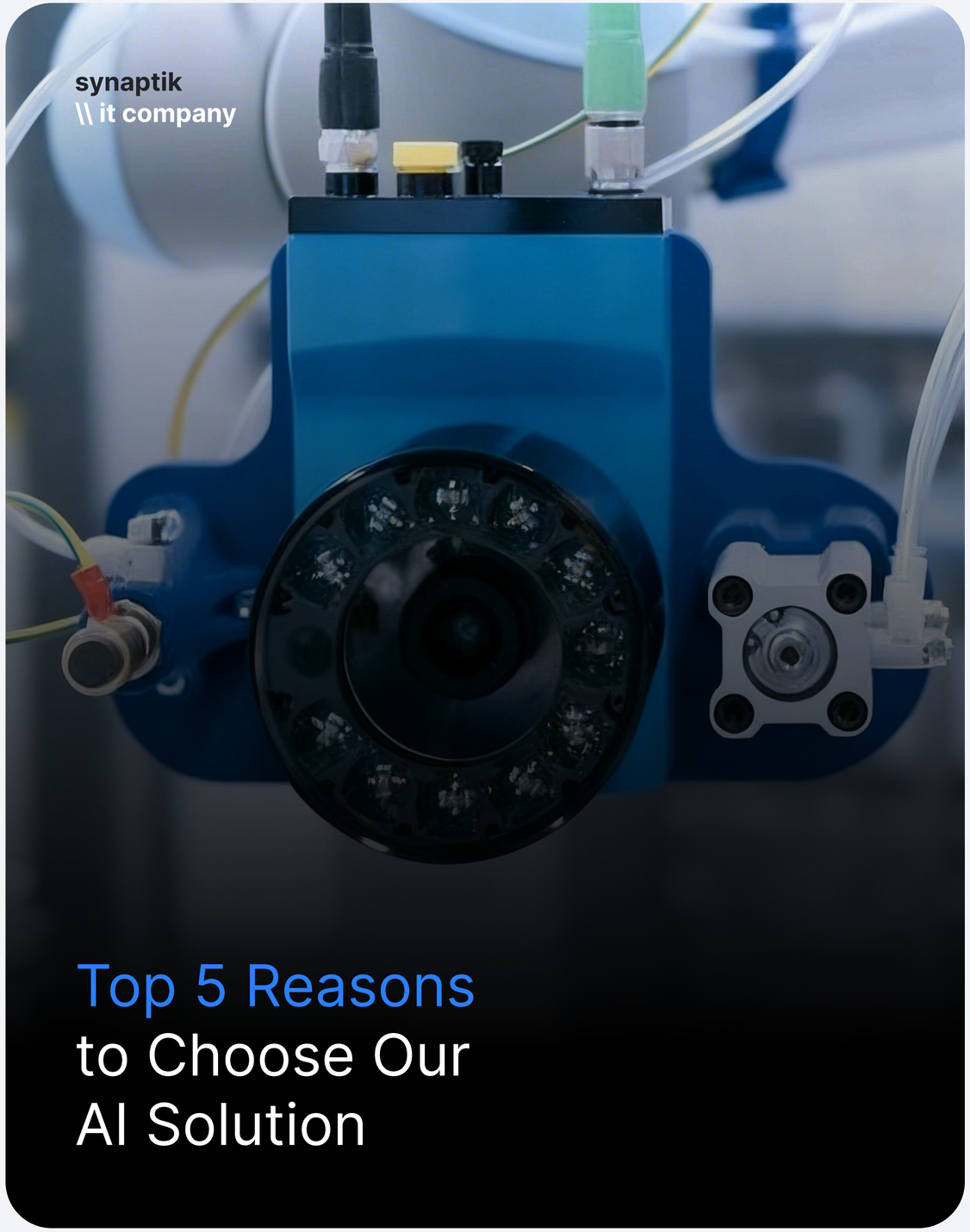

Top 5 Reasons to Choose Our AI Solution

Gets smarter with your production

Machine vision models are trained and continuously refined on your data, allowing the system to become more accurate over time and better adapt to the specifics of your production environment

01

Fast time to value: Results in 8 Weeks

We start with a single operation without stopping the line, taking into account line speed, lighting conditions, contamination, and shift variability. The solution can achieve accuracy of up to **99%**, with results documented and ready for further scale-up

02

Minimal disruption to existing enterprise infrastructure

The solution is integrated on top of existing production lines and enterprise systems, so implementation does not disrupt operations or require costly equipment replacement

03

Delivered to perform reliably on the line

We work as one team with the customer from pilot to full-scale rollout, tailoring the algorithms to the production process, integrating with PLC and MES systems, and supporting the solution until it delivers sustained improvements in product quality

04

A long-term partner in solution development

We adapt the system to new products, packaging formats, and labelling requirements, continuously monitor operational stability, and update the models so that quality gains and reductions in manual inspection continue to grow

05

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Business Impact

60–90% reduction in missed inspection errors within 4–6 weeks

We replace selective visual inspection based on human judgement with automated inspection of every single item

Faster response to deviations, reduced from 30–60 minutes to 1–3 minutes within 2–4 weeks

The system detects issues at the moment they arise, before an entire batch moves to the next production stage

50–80% reduction in sorting and configuration errors within 1–2 months

We verify set completeness, inserts, and labelling before packaging and shipment

30–70% reduction in appearance- and labelling-related claims within 2–3 months

Standardised inspection rules and verified inspection results reduce the number of errors that reach the customer

Payback within 6–12 months

(for a typical output volume of N units per month and current losses from defects, rework, and returns starting from RUB X per month)

The calculation is based on your actual losses from defects, rework, and returns, taking into account current output volume and line speed

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Case Study: Labelling and Completeness Inspection Before Packaging and Shipment

Challenge

- Errors in labelling, inserts, and product completeness were only identified at the packaging stage or during shipment, forcing batches to be sent back through the process
- Inspection results varied by shift, with some teams missing more errors than others, leading to disputes and customer claims

Solutions

- A visual inspection station was installed at the end of the operation to verify labelling and the presence of all required inserts and components
- Inspection results, including images and status, were recorded and automatically transferred to the shift log

Outcome

- **Shipment quality became more consistent**
- **Deviations were identified and contained before reaching packaging or dispatch**
- **The inspection process became less dependent on shift-to-shift variation**

Result

Labelling and completeness errors were reduced **by 65% within 6 weeks**

Response time to deviations was cut **from 20–40 minutes to 1–2 minutes**

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Case Study: Surface and Edge Defect Detection on the Production Line

Challenge

- Defects were detected too late — during packaging, at final quality inspection, or only after reaching the customer — leading to rework, write-offs, and returns
- Manual visual inspection was inconsistent: results varied by shift, operator fatigue, and lighting conditions, causing some defects to go undetected

Solutions

- An inspection station was deployed at the end of the operation to verify labelling accuracy and the presence of all required inserts and components.
- Each inspection result, including an image and status, was recorded and automatically transmitted to the shift log

Outcome

- **Product quality became more consistent due to a significant reduction in missed defects**
- **Defects were identified and contained much earlier in the process**
- **The inspection process became less dependent on manual visual checks**

Result

Missed defects were reduced **by 60–85% within 6–8 weeks**

Defect detection time was reduced **to 1–3 minutes**

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Let’s discuss your Operational Goals

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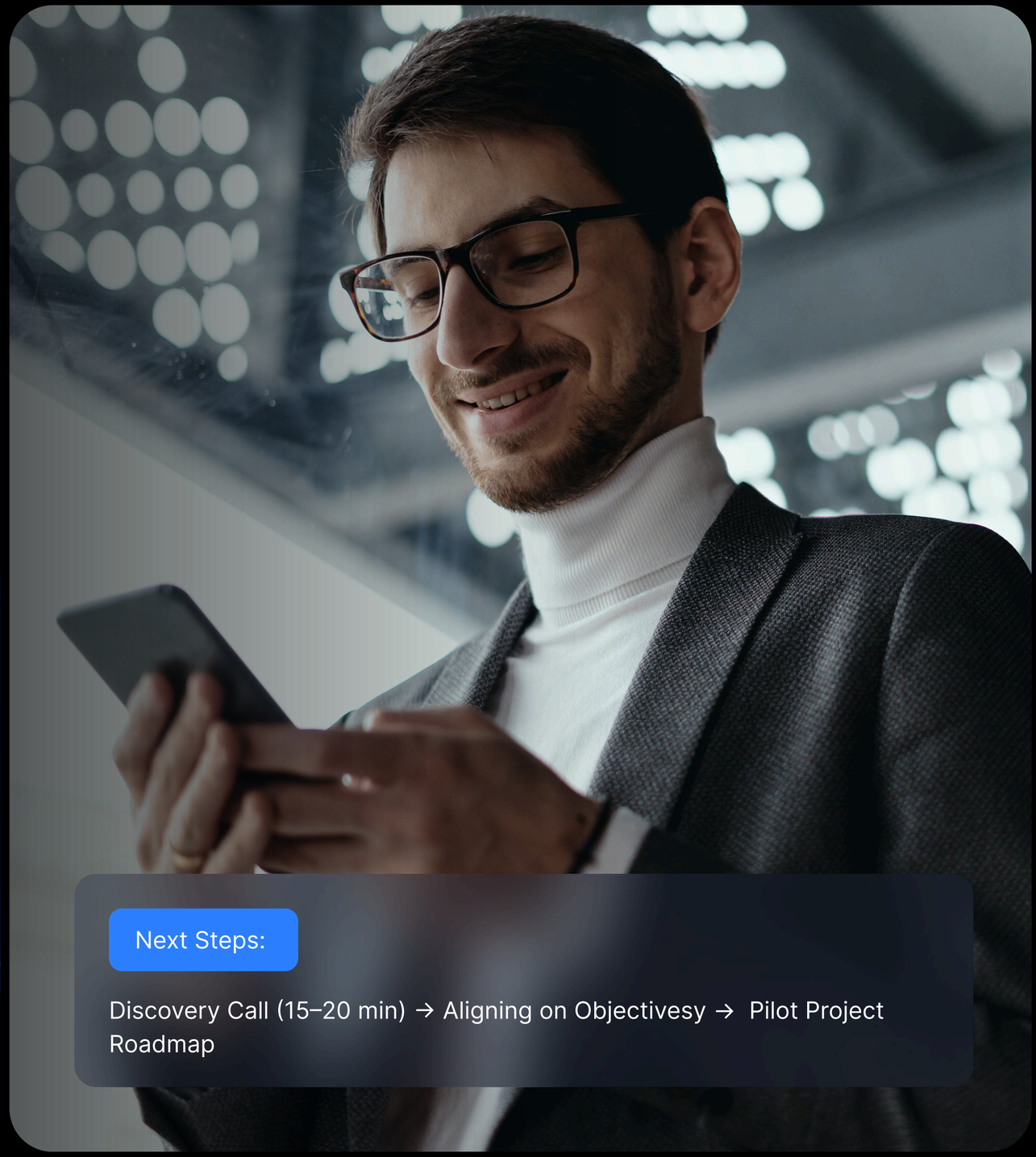

Next Steps:

Discovery Call (15–20 min) → Aligning on Objectivesy → Pilot Project Roadmap