BOSCH CONNECTED INDUSTRY

LERNREISE BLAICHACH

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Bosch Connected Industry
I4.0 movies

- Future Production with Industry 4.0
- https://www.youtube.com/watch?v=ISk64bJ35yM&feature=youtu.be

- Industry 4.0 – Solutions at Bosch
- https://www.youtube.com/watch?v=RN3Ud2O5xxA&feature=youtu.be

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Important changes in recent years

Low priced **sensors** available

Data mining: Analyse big data close to real-time

Internet is available worldwide

Increase in soft-/hardware **usability**

CPU is available cheap and unlimited

Performance advantages by **decentralized networking**

Worldwide **GPS** localization is possible

Storage is available cheap and unlimited

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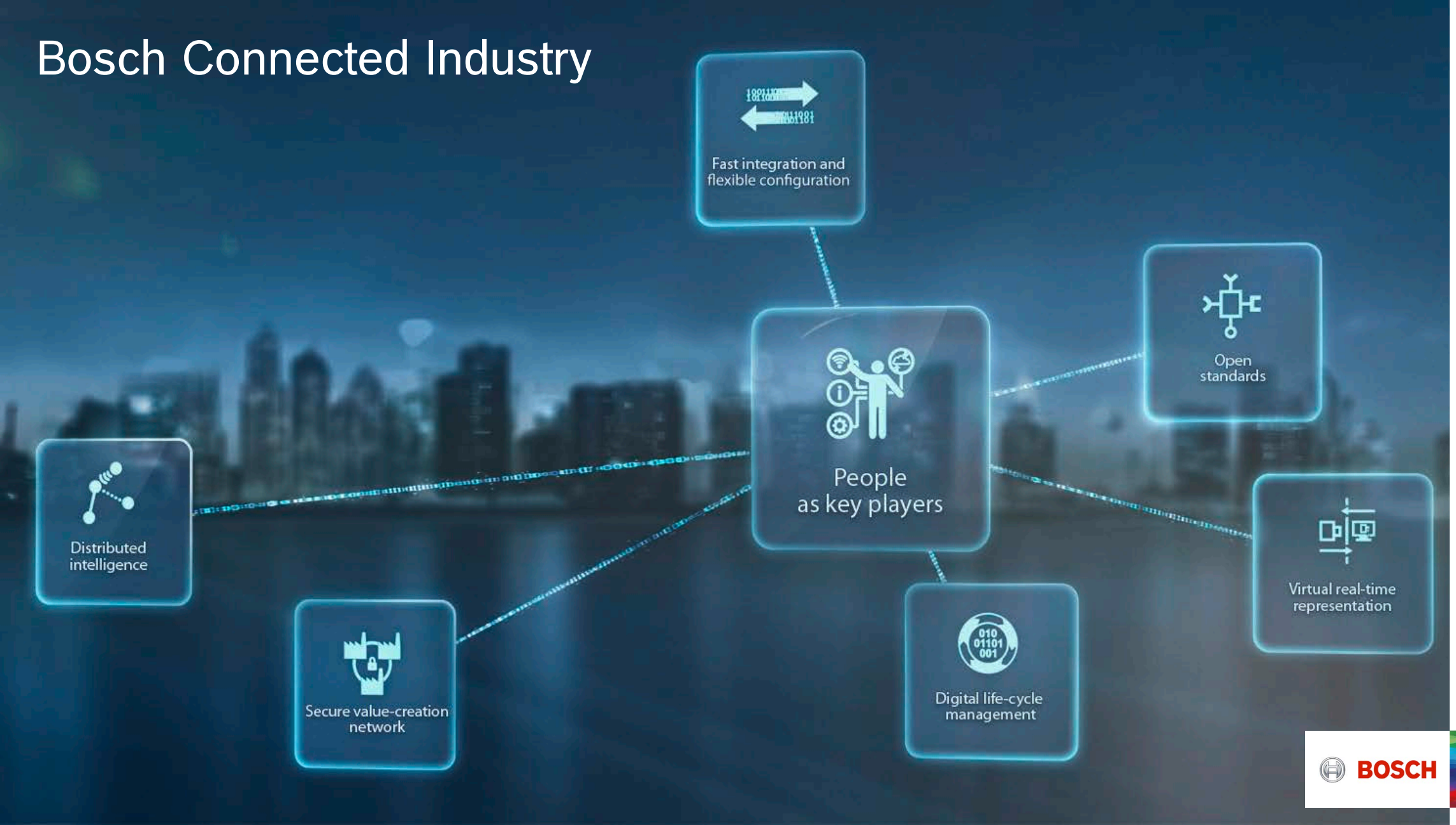
Neuer Geschäftsbereich für Industrie 4.0-Software und -Services

Bosch Connected Industry

- Anbieter von Industrie 4.0-Software und -Services für die vernetzte Fertigung und Logistik
- Entstanden aus dem Bosch Innovationscluster Connected Industry sowie der Bosch Software Innovations GmbH und der Robert Bosch Manufacturing Solutions GmbH
- 500 Mitarbeiter in Berlin, Immenstaad, Stuttgart (Deutschland), Budapest (Ungarn) und Suzhou (China)
- Interne sowie externe Kunden und Partner aus den Branchen Automotive, Maschinenbau, Consulting und Versicherung

Bosch Connected Industry



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Dual strategy for Connected Industry

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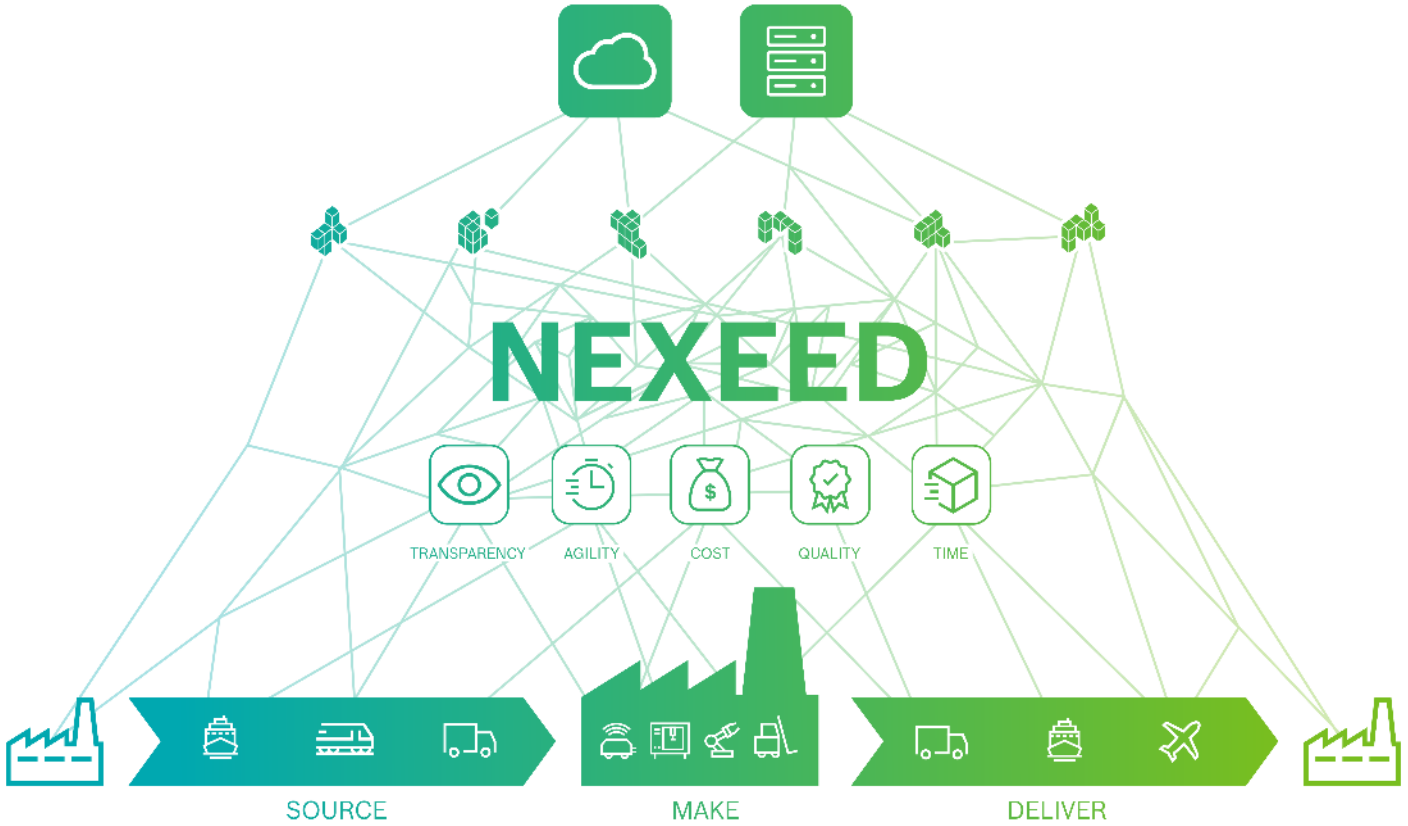
NEXEED – software solutions for the connected value stream



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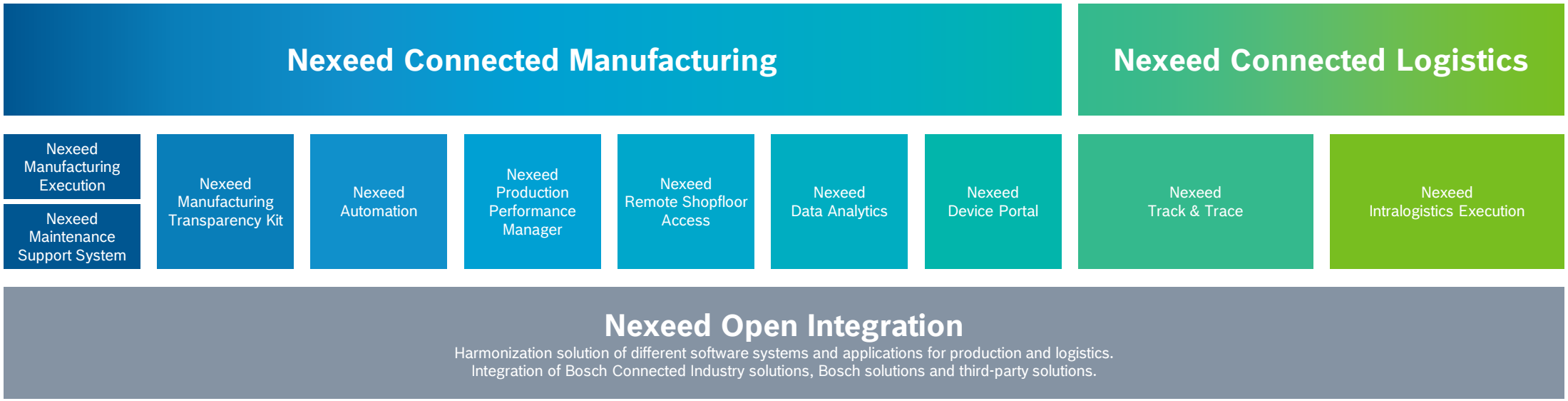
Nexeed Portfolio

NEXEED

Portfolio overview



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CONNECTED MANUFACTURING

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Smart Solutions Production Area

i4.0 CONNECTED INDUSTRY

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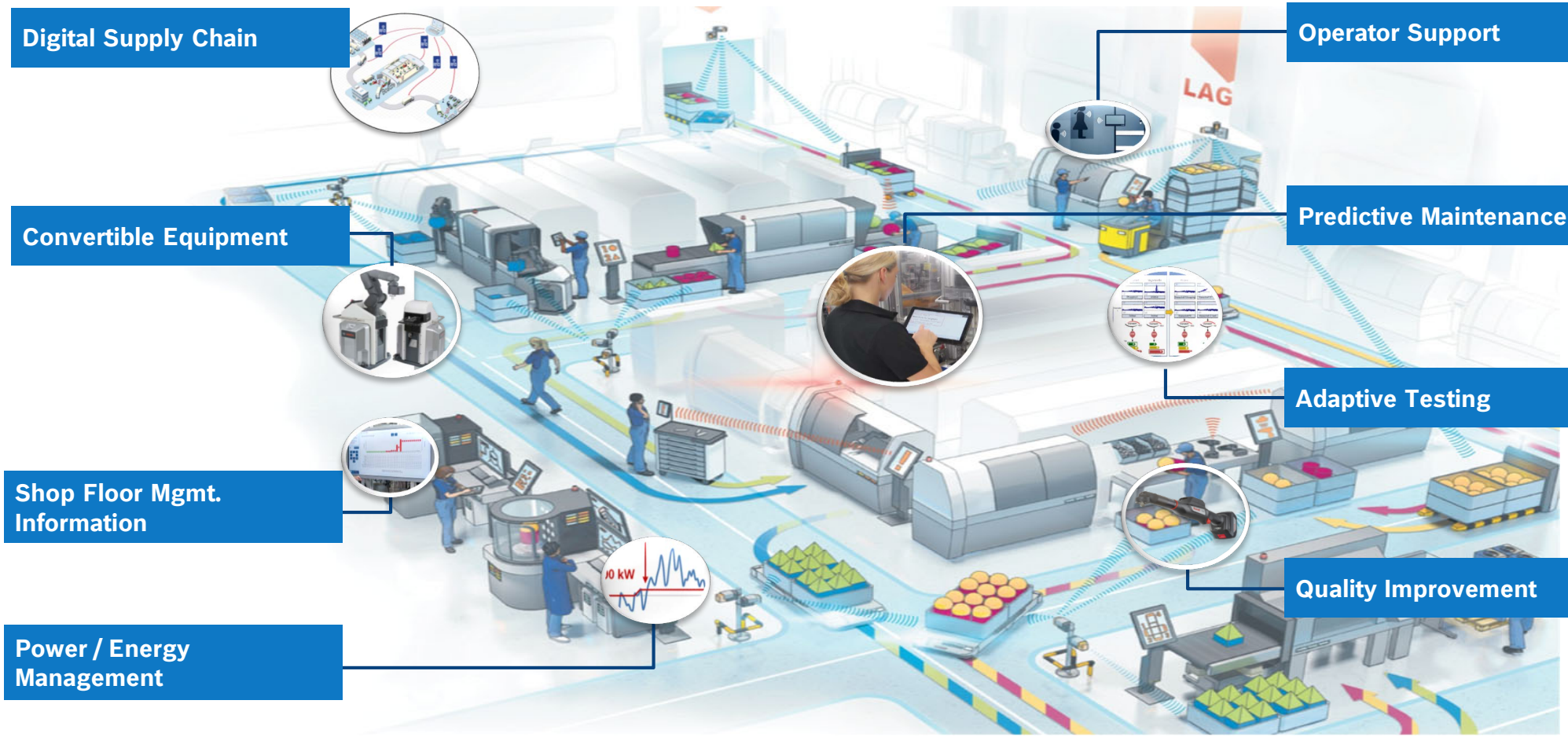
Production-related Use Cases



APAS: Autonomous Production Assistant, M2H: Machine to Human, OEE: Overall Equipment Effectiveness

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CONNECTED LOGISTICS

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Logistics Area

Smart Solutions

i4.0 CONNECTED INDUSTRY

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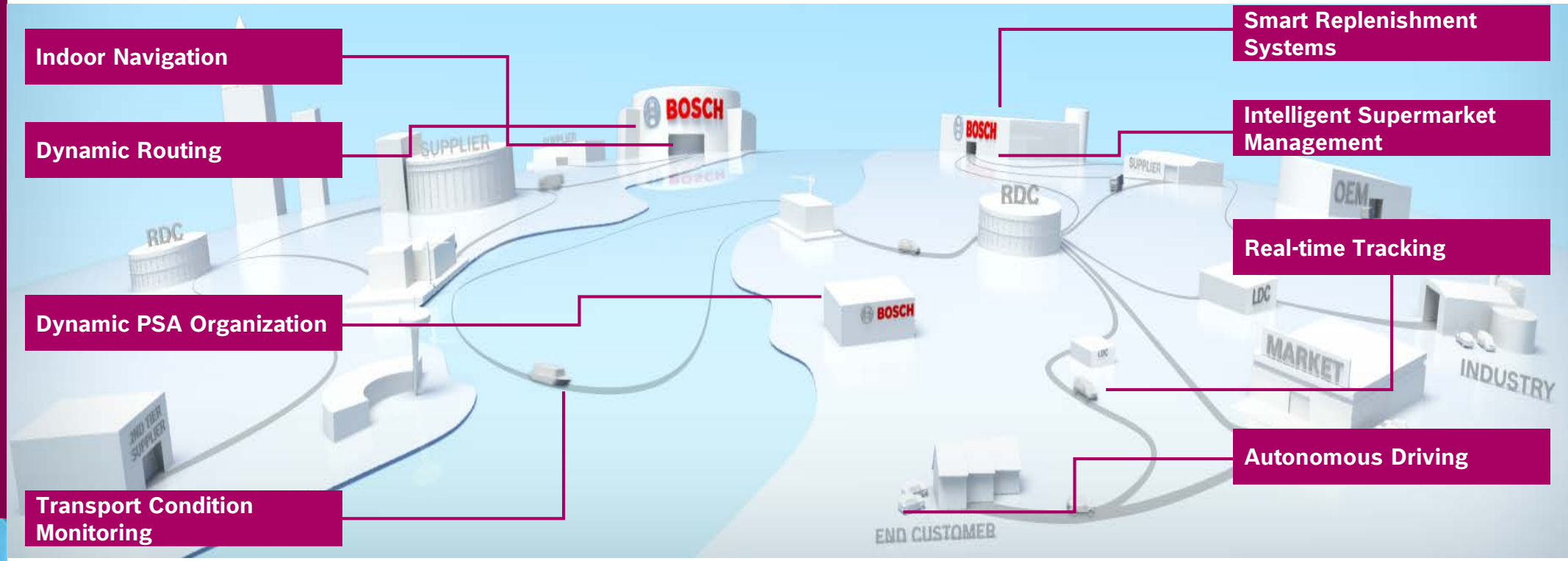
Logistics-related Use Cases



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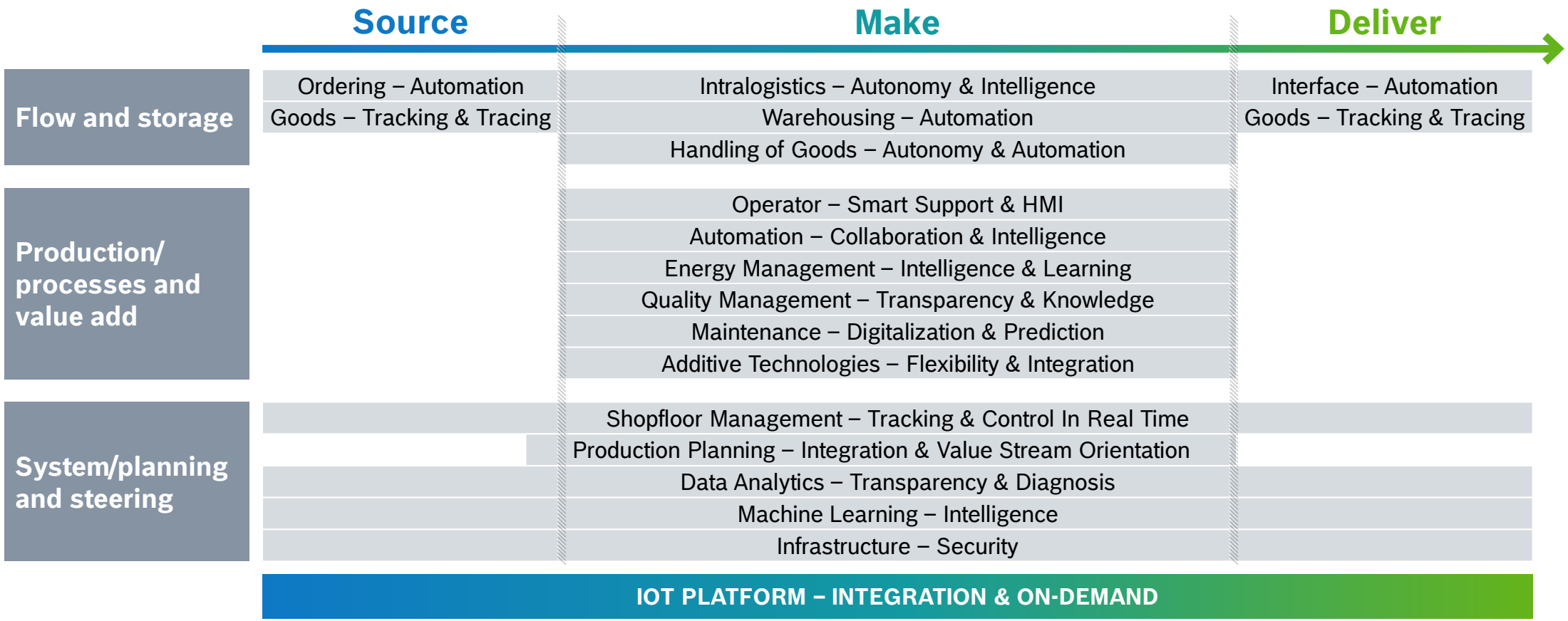
Use cases become solutions



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BOSCH INDUSTRY CONSULTING

WHO ARE WE?

Our mission

We make production easier.

Bosch Industry Consulting
Leading User becomes Leading Provider

Sensors

Drive & Controls

Software & Data Analytics

Machinery & Robotics

Logistics

Services

Leading Provider
70+ Solutions

By 2020
EUR ~1bn
extra turnover

Leading User
270+ Bosch Plants
700+ storages
Worldwide

By 2020
EUR ~1bn
extra savings

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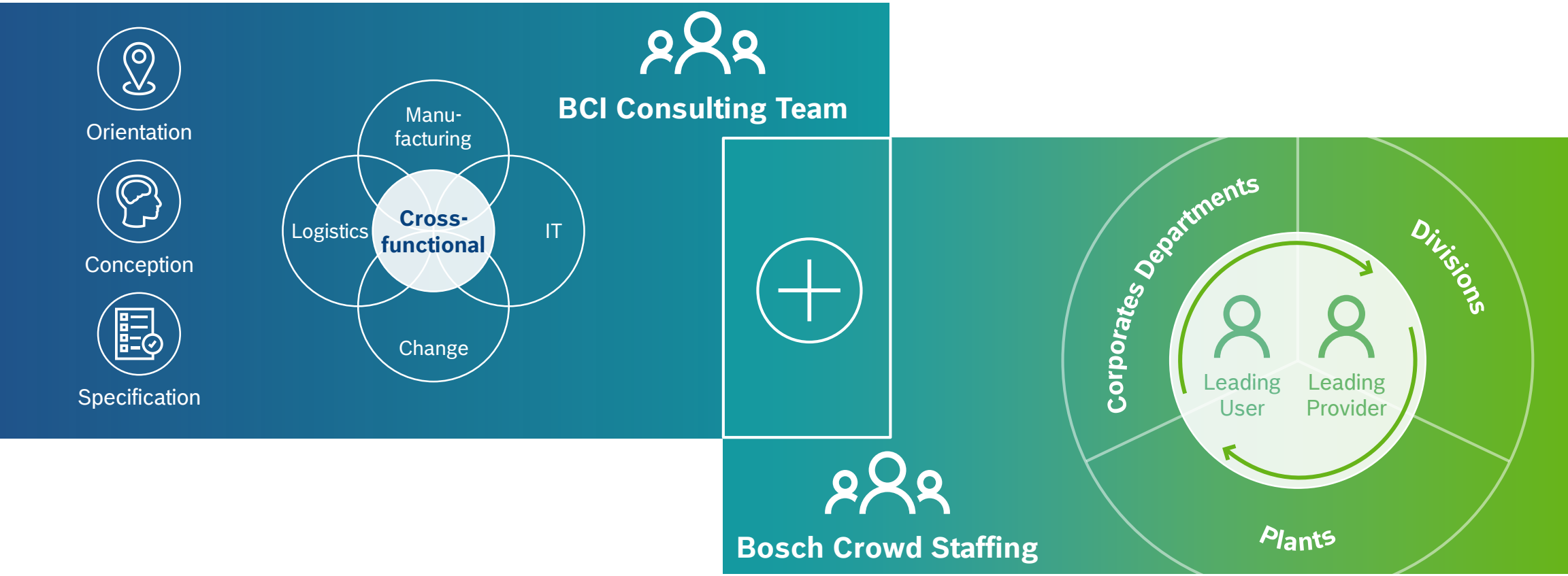
Bosch Industry Consulting
Interdisciplinary Teams and Bosch Group Crowd Staffing



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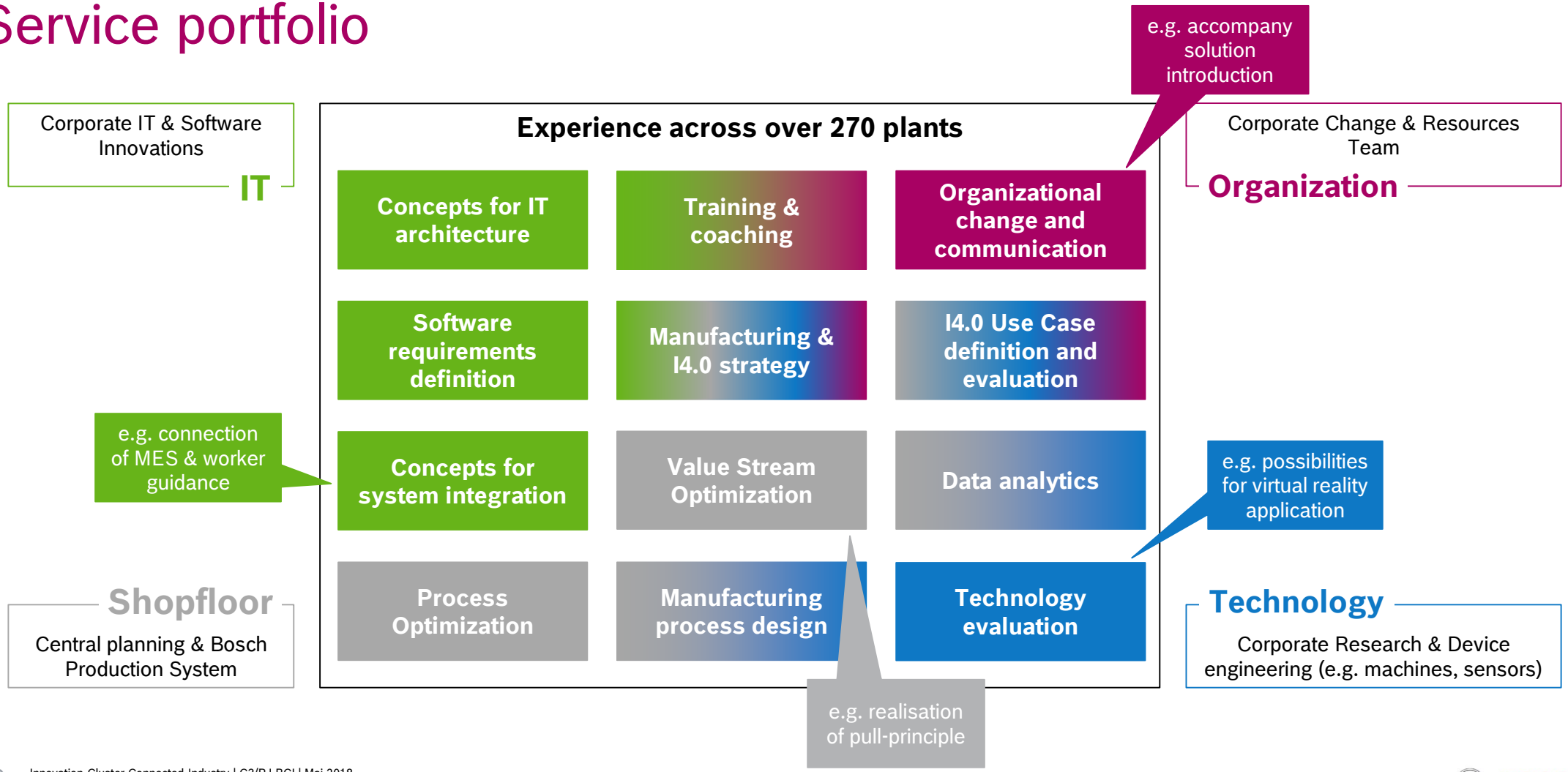
Service portfolio



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Bosch Industry Consulting
Why Our Customers Award Us

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WHAT DO WE DO?

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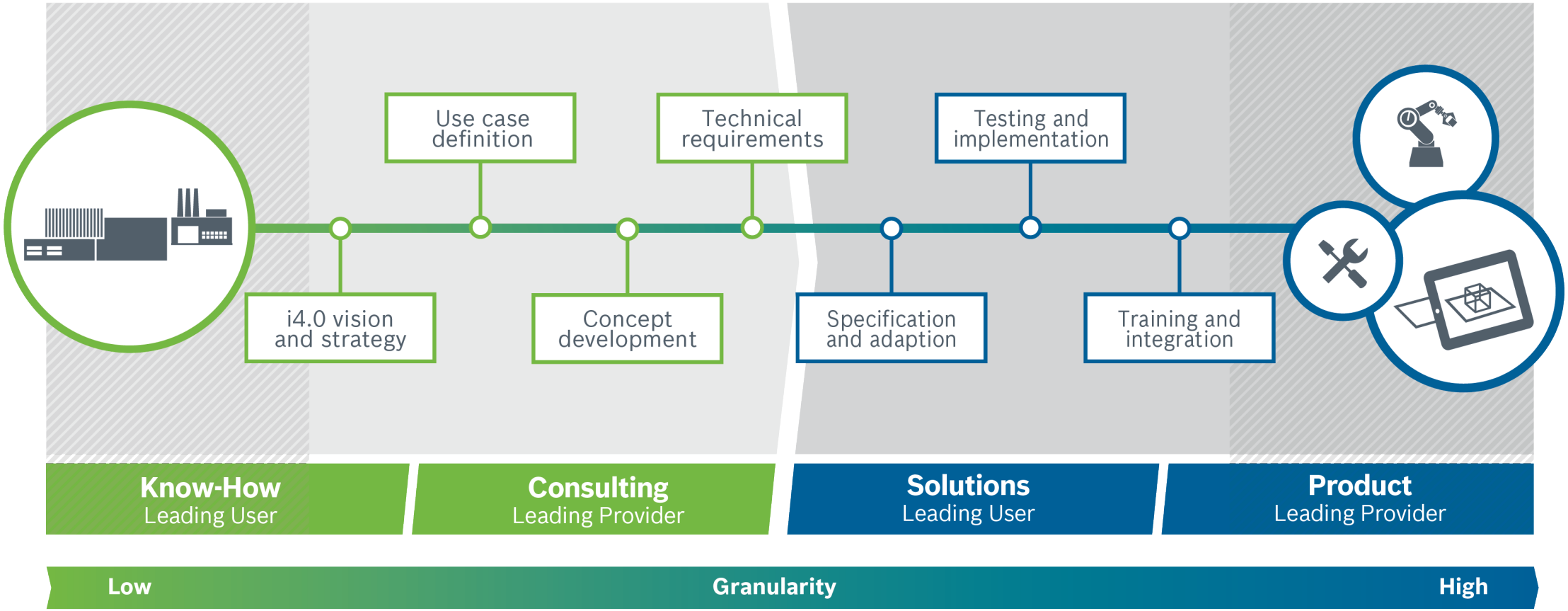
Industry 4.0 roadmap – Where is your current position?



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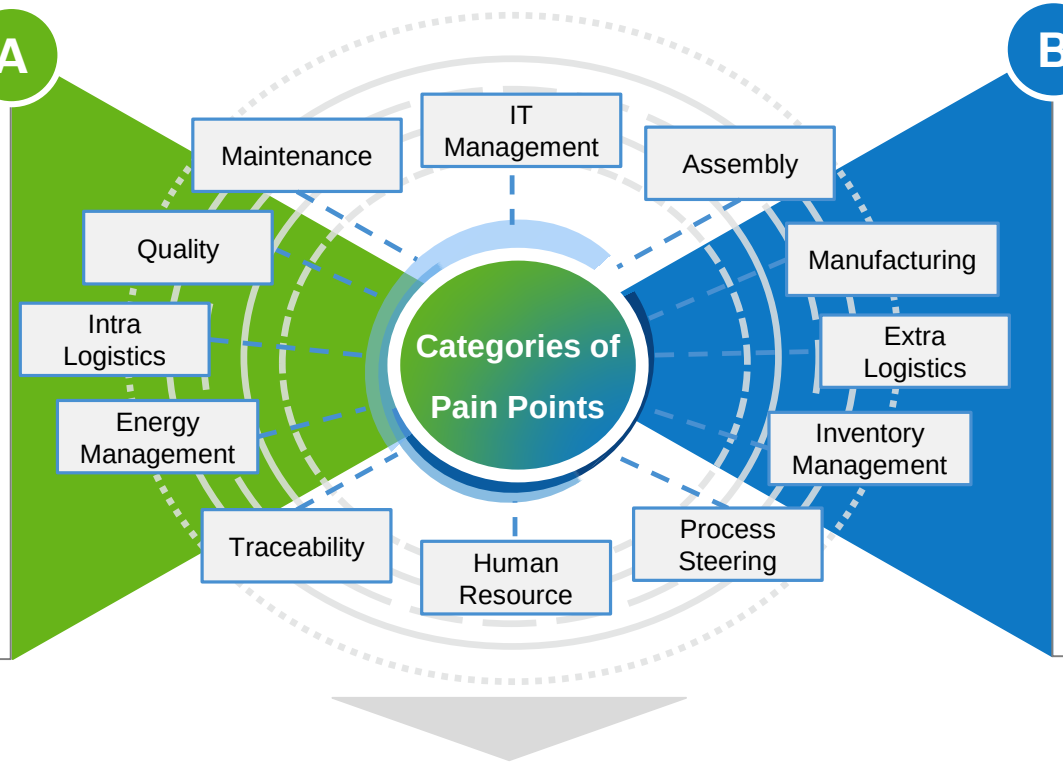
Our approach combines process and user perspective

A

Value Stream
Perspective

- **Pull principle**
- **Fault prevention**
- **Process orientation**
- **Flexibility**
- **Standardization**
- **Transparency**
- **Continuous improvement**
- **Personal responsibility**



B

User & Operator
Perspective

- **Ubiquity**
  Access to digital technologies
- **Reliability**
  Availability ensured any time
- **Speed**
  Information or support to the right time
- **Usability**
  Easy to apply in the selected context
- **Skill**
  Effort for training

Readiness assessment and definition of fields of action with related use cases* to solve pain points

*Use case: Neutral description of a problem solving approach regarding current and target process (e.g. autonomous guided vehicles for replenishment of a production line)

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Content and purpose of workshop steps

1

Plant Check

- What are the product, manufacturing and logistics characteristics?
- How does the value stream look like?
- Which KPIs are the most important indicators regarding performance?
- Which pains are most relevant and urgent?

Questionnaire

2

Strategic Use Case Selection

- Which use case clusters are relevant to increase maturity and relieve pains?
- Which specific use cases are useful?
- Which use cases have synergies at the plant?

Use Case Map

3

A

Maturity

- What is the actual state of Industrie 4.0 concerning specific use cases?
- How far is lean implemented as a base for stable processes?

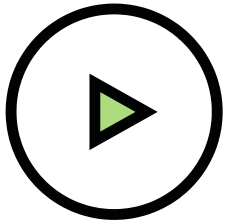
B

KPIs & Pains

- How high is the influence of a specific use case on KPIs?
- To what extent can a use case relief pains?

Use Case Assessment

4

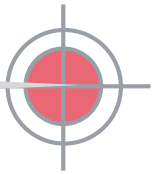


Use Case Prioritization

- Which use cases align best with company specific requirements?
- Which use cases are necessary to be able to compete?
- Which use cases should be implemented asap?

Decision Matrix & Roadmap

From a ”Big Picture” to a specific and suitable solution



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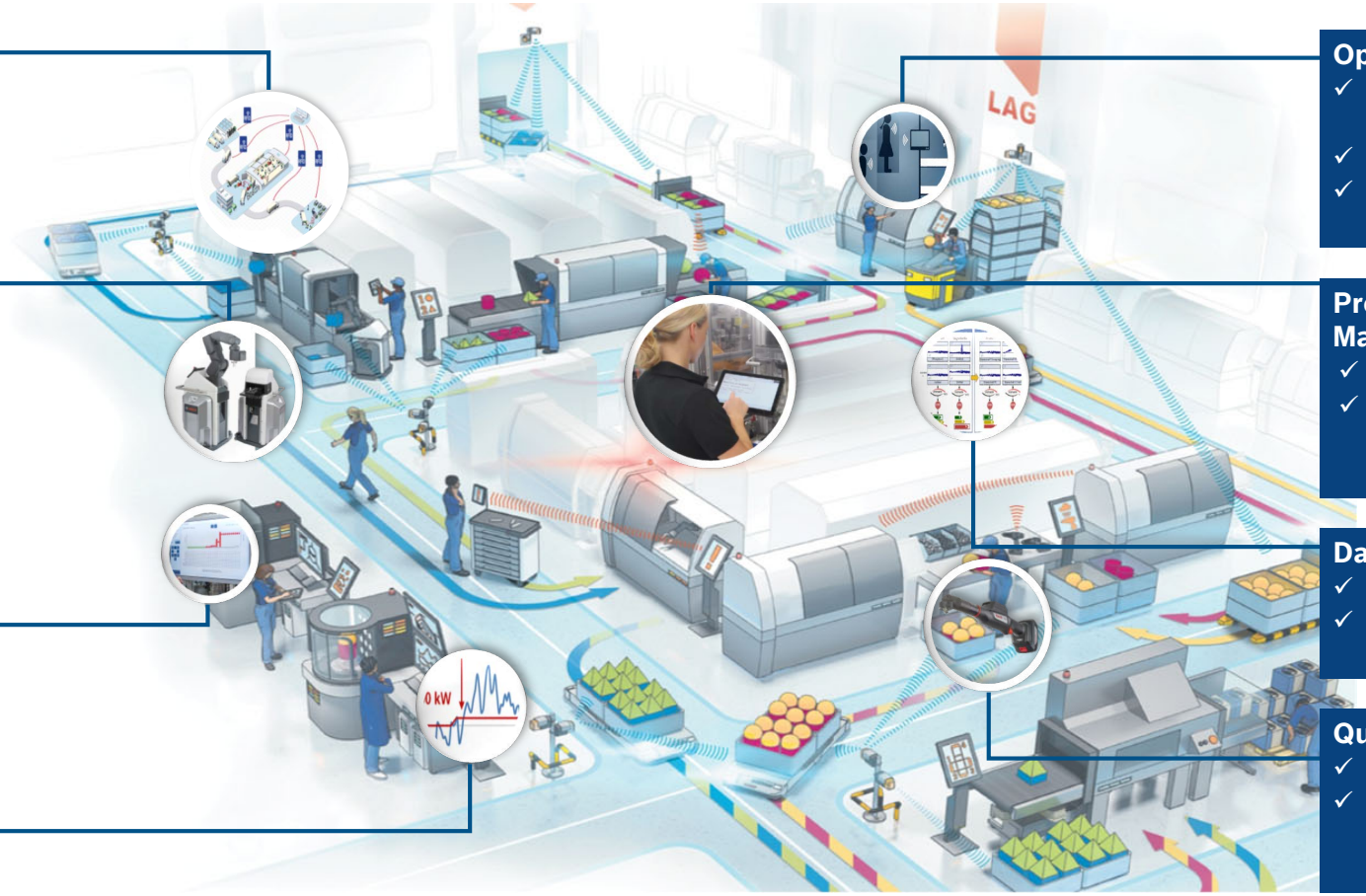
Use Cases as a basis for i4.0 concepts

Digital supply chain
- ✓ Transparency
- ✓ Decrease of inventory
- ✓ Efficiency increase

Flexible equipment
- ✓ Reduction of fix costs
- ✓ Efficient collaboration between operator and machines
- ✓ Increase in ergonomics

Shop Floor Mgmt. Information
- ✓ Real-time
- ✓ Fast escalation
- ✓ paperless

Power- & Energy Management
- ✓ Intelligent Use Cases
- ✓ Savings in energy cost and CO_2- emission



Operator support
- ✓ Fast reaction and reliability
- ✓ Quality increase
- ✓ Efficiency increase

Predictive Maintenance
- ✓ OEE-improvement
- ✓ No unexpected downtimes

Data Analytics
- ✓ Efficiency increase
- ✓ Root cause elimination

Quality management
- ✓ Direct feedback
- ✓ Traceability to error sources

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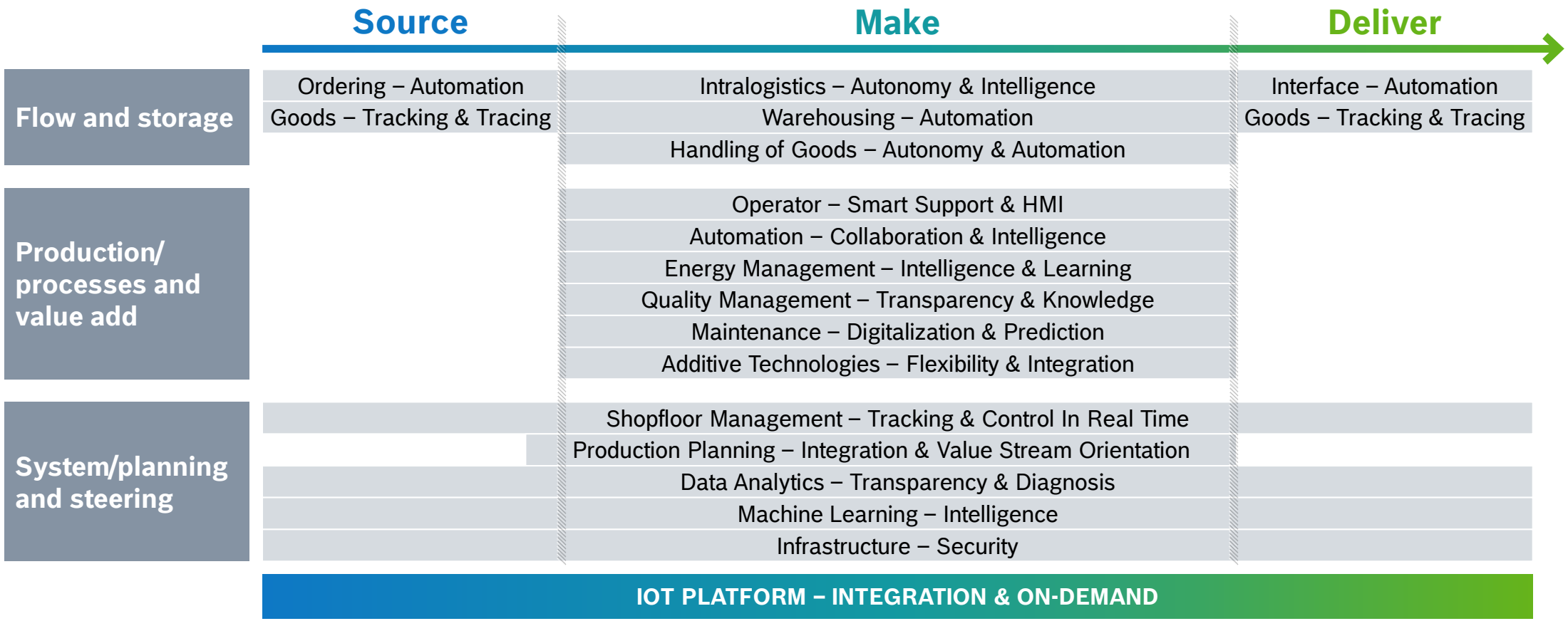
Use cases become solutions



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I4.0 Solutions Overview

Solutions along the entire value stream

	Logistics		Production		System
Source	eMAT-Label	*Make*	ActiveCockpit	*Source*	Event Monitoring
	iHUB (Intralogistics Hub)		ActiveAssist		I4.0 Platform
	RFID Bosch internal/external		APAS assistant & inspector		Remote Shopfloor Access
	Track & Trace		Augmented Assist		ProCon
Make	iHUB (Intralogistics Hub)		iGlove	*Make*	Energy Platform
	ActiveShuttle		Improvidus		Event Monitoring
	RFID Production and Transport Kanban		Maintenance Support System (MSS)		I4.0 Platform
	Smart Replenishment Service (SrS)		Manufacturing Analytics Tools & Services		IoT Gateway
	iSupermarket (Intelligent Supermarket)		MES Starter Kit		ProCon
Deliver	eMAT-Label		OpCon MES (Shopfloor Management)		i4.0 Analytics Platform
	iHUB (Intralogistics Hub)		OpCon Control Plus (Shopfloor Automation)		Remote Shopfloor Access
	RFID Bosch internal		Production Performance Manager (PPM)	*Deliver*	Event Monitoring
	Track & Trace		Nexo Nutrunner		I4.0 Platform
	OEM Data Exchange		Molding Tool Manager		Remote Shopfloor Access

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Bosch Connected Industry
Services for external market

“Panorama-Package”

We explore the path of industry 4.0 together with you from the beginning until the end.

“First Insights” — FREE – 1 Day

We visit your plant on site to do a high level assessment including interviews regarding potential fields of improvement with you.

“Orientation-Express” — 15-20k – 3 to 5 Days

Practical assessment of your plant or value stream. This is including action fields as well as Use Cases we see from our Bosch experience for industry 4.0 and lean aligned in a high level roadmap. Guided Tours in our plants serve as a reference point for you.

“Suitability Check” — Individual Project

Detailed assessment of identified Use Cases regarding the benefits for you and the feasibility as well as risks. This will enable you to decide which Use Cases are the right ones for your production. This included suggestions for solution providers

“Deep Dive” — Individual Project

Once you have decided which Use Cases are supposed to be implemented we develop a concept for the implementation together with you. Here we have a very strong network of experts all across the Bosch World who have hands-on experienc

“The Coach” — Individual Project

During the implementation or rollout regarding i4.0 or lean actions we provide you with continuous support in form of regular reviews and advice. We make sure that your ideas are realized successful.

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REFERENCE PROJECTS

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Reference project with OEM

Strategic pre-project → **Evaluation wave I** → **Evaluation wave II**

I

Production (incl. MRK[1])

- Analysis of material supply within production
- Identification and analysis of possible places for introduction of AGV
- Evaluation of technologies, benefits and risks

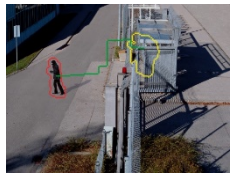
Energy Management

- Measuring concept
- Integration of energy data and IT infrastructure
- Intelligence within the system (‘Regelkreise’)

HR

- Examination of HR related processes
- GAP analysis towards digital processes
- Selection of systems

II

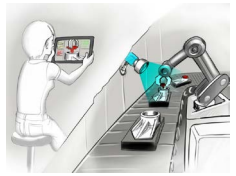


Security

- Analysis of hazards
- Selection of suitable use cases
- Integration into a security concept

Facility Management

- Examine facility management processes
- Perform GAP analysis towards digital tools
- Suggestion of digital solutions for facility management



Quality Management

- Analyze as is situation in existing plants
- Detail predefined use cases to increase quality
- Provide base for implementation decision

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1) Mensch-Roboter-Kollaboration / man-robot-collaboration

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Reference project with tier 1

Use case evaluation → **Use case analysis** → **Implementation**

AGV

- Analysis of material supply within production
- Identification and analysis of possible places for introduction of AGV
- Evaluation of technologies, benefits and risks

Energy Platform

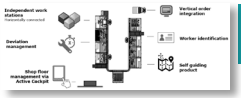
- Measuring concept
- Integration of energy data and IT infrastructure
- Rollout concept for all plants worldwide
- Evaluation of technologies, benefits and risks

Collaborative robots

- Automation level VS. manual process steps
- Ergonomic situation within workplaces
- Integration possibilities into Multi-Product-Line
- Evaluation of technologies, benefits and risks

RFID

- Analysis of different value streams
- Identification of possible benefits and risks
- Evaluation of technologies and hardware
- Evaluation of technologies, benefits and risks



Multi-Product-Line

- Assembly character: high variety, low volumes
- Creation of high flexible assembly line concept
- Evaluation of technologies, benefits and risks

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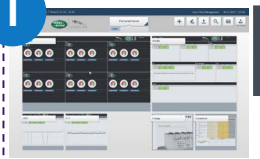
Reference project with UK OEM

Project overview

Strategic pre-project → **Evaluation** → **Implementation preparation**

I



Shopfloor visualization

- Understand current system
- Recommendation regarding key functionalities

Energy Management

- Evaluation of potential
- Definition of use cases

Real time maintenance

- Review of existing process
- Understanding of systems involved

II

Shopfloor visualization

- Functional requirement
- Technical requirement
- Implementation concept

Energy Management

- Measurement concept
- Technical requirement
- Implementation concept

Real time maintenance

- Gap analysis
- Technical requirement
- Implementation concept

IT architecture

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1) Mensch-Roboter-Kollaboration / man-robot-collaboration

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Umfassende Unterstützung für eine vernetzte Produktion

Bosch Industry Consulting ist der Partner für den vernetzten Wertstrom. Wir unterstützen Kunden dabei, ihre Prozesse schlanker und die Produktion effizienter zu gestalten. Wir machen nicht nur Vorschläge: Wir entwickeln konkrete Lösungen – und wir helfen bei deren Implementierung, wobei wir auf die umfangreiche Erfahrung von Bosch als Leitanwender und Leitanbieter für Industrie 4.0 zurückgreifen können.

Praxisorientierte Beratungsdienstleistungen auf der Basis umfassender Erfahrung in verschiedenen Bereichen

Großes Expertenteam mit operativer Erfahrung

Partner für den gesamten digitalen Wandel von Fertigung und Logistik

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