



# Bosch Software and Digital Solutions

Reimagining the Future

Invented for life



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# SDS Digital Enterprise Services

Enabling Transformation for a  
Resilient Future

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# Digital industry solutions

## Harnessing the IT advantage

The integration of AI-led tools and technologies in the quest for digital transformation and the pursuit of Industry 4.0 offers numerous tangible benefits to businesses. Future-facing enterprises can enjoy increased efficiency, better decision-making, improved customer experiences, and sustainable practices. Embracing these technologies can lead to a competitive edge and pave the way for a more connected and efficient future.

### Charting the trends and benefits of AI-led solutions



AI-driven forecasting models can reduce supply chain management errors by up to 50%.<sup>1</sup>



Surveys have shown that a large percentage of employees (81%) report AI improving their overall performance and productivity.<sup>2</sup>



Automating revenue management for pricing optimization has conclusively led to a 5% improvement in the overall revenue.<sup>3</sup>



Market predictions state that by 2023, remote industrial IoT capabilities will be pervasive across 20% of all industrial equipment.<sup>4</sup>



The global market for AI in industries such as the retail is expected to be worth \$55.53 billion by 2030.<sup>5</sup>



Similar growth trends can be observed in the manufacturing market, where the global AI market size is expected to reach \$68.36 billion by 2032.<sup>6</sup>



# From barriers to breakthroughs

## Addressing adoption challenges

Despite a myriad of benefits, enterprises often struggle to adopt digital solutions and innovations in alignment with their long-term goals and business objectives.

Some of the most common challenges include:



Complexity of adoption and integration



High cost of technology and concerns with ROI



Skill gaps and workforce readiness



Scalability and performance



Change management



Security, privacy, and regulatory concerns

This is where experienced technology implementation experts like Bosch can help enterprises adopt digital innovations to chart a path of continuous evolution.



# Enterprise core services

## An overview

Bosch's digital enterprise offerings are focused on revolutionizing operations with future-ready technology enablement, agile methodologies, and holistic transformation.

The first step toward that is strengthening the enterprise core with:



Enterprise application  
implementation



Intelligent application  
support















Integrated supply chain  
services



# Enterprise application implementation

## Putting systems to work

Based on the principles of outcome-based transformation and efficient business process mining and harmonization, Bosch helps organizations build on their core functionalities with our industry-vetted enterprise application services.

Enterprise application services			
Consultation	Implementation	Build	Run
 Architecture design	 Industry templates	 Rollouts	 Developments
 Business transformation	 Greenfield and brownfield implementations	 Technical migrations	 Change requests
 Analytical solutions	 System conversions	 Upgrades	 ODC services

### Service highlights

- 
**5+ templates** developed across industries
- 
**70+ rollouts** in 25 countries
- 
**350+ business requests** every year



Our **D365 ERP offerings** include core finance, project management and accounting, and template rollouts for global subsidiaries of large enterprises.













Similarly, for **RISE with SAP**, our services include S/4HANA implementation, rollouts, upgrades, developments and extensions, BTP developments, and custom applications.








# Intelligent application support

## Next-level assistance

Bosch offers intelligent support for SAP Application Management Services (AMS) with a four-pronged approach to **discovering, stabilizing, nurturing, and accelerating** business growth. This approach, coupled with our intelligent application support services, translates to **seamless transitions, stabilization and optimization, practitioner perspectives, and flexible and scalable working models.**

Intelligent application support (SAP AMS)			
Incident resolution	Change request management	Monitoring and administration	Working models and value additions
 <p>A Level-2 team of generalists</p>	 <p>A Level-3 team of specialists</p>	 <p>Systems monitoring and background operations</p>	 <p>Pooled and dedicated working models</p>
 <p>Break fixes, defect remediation, and SLA adherence</p>	 <p>Change request handling</p>	 <p>Database administration</p>	 <p>Knowledge database maintenance and training</p>
 <p>Service request support</p>	 <p>RCA for problem tickets</p>	 <p>System refresh and backups</p>	 <p>Automation with in-house AI/ML applications</p>

### Service highlights

- 
 Deep **industry knowledge** and **expert perspectives**
- 
 Production support for **250+ systems** in **64 countries**
- 
 Resolution of **10,500+ tickets** every month
- 
**300,000+ users** serviced globally
- 
**ITSM** tool and language support





# Integrated supply chain services

## Streamlining logistics

Bosch's enterprise core offerings are also focused on integrating supply chains with **new-age innovations for future-ready operations**. In that quest, our supply chain services are aligned with **SAP** and **D365**.

SAP services			
Warehouse management	Transportation management	Planning solution	Procurement solution
<b>SAP EWM</b> Cutting-edge warehouse management for improved efficiency and transparency	<b>SAP TM</b> Integrated transportation management for improved supply chain efficiency	<b>SAP IBP</b> End-to-end planning for comprehensive data-driven decision-making	<b>SAP Ariba</b> Holistic procurement approach for improved supply chain resiliency and efficiency

D365 services			
Dealership management	Retail POS	Solution for subsidiaries	Manufacturing solution
<b>Bosch DMS</b> Implementation of DMS for automotive and spare parts dealers for scalable digitization of large dealer networks	<b>D365 Commerce</b> Modern retail system for improved efficiency, scalability, and support across geographies	<b>Smart market solution</b> Template-based rollout for smaller subsidiaries of large enterprises	<b>D365 Manufacturing</b> Implementation of D365 to provide best-in-class ERP for manufacturing companies

### Service highlights

At Bosch, our extensive supply chain expertise comes from overseeing our global network, encompassing **over 280 plants** and **750 warehouses** in **60+ countries**. These solutions have undergone rigorous testing within our own facilities, enabling us to offer our customers a practitioner's perspective.



Preparation of **global templates for EWM, TM, and multi-country** rollout



**Planning solutions** for discrete manufacturing



Microsoft D365-based **supply chain solutions** for smaller subsidiaries



**Dealership management solutions** for automotive companies



**End-to-end solution** for retail industries

# Custom applications, cloud, and infrastructure services

## Building digital fortitude

Besides the enterprise core services, Bosch has a host of secondary services that are aimed at building digital resiliency for forward-thinking companies.



Custom applications services



Cloud services



Infrastructural services



IT security services



BPO services



Customer experience services

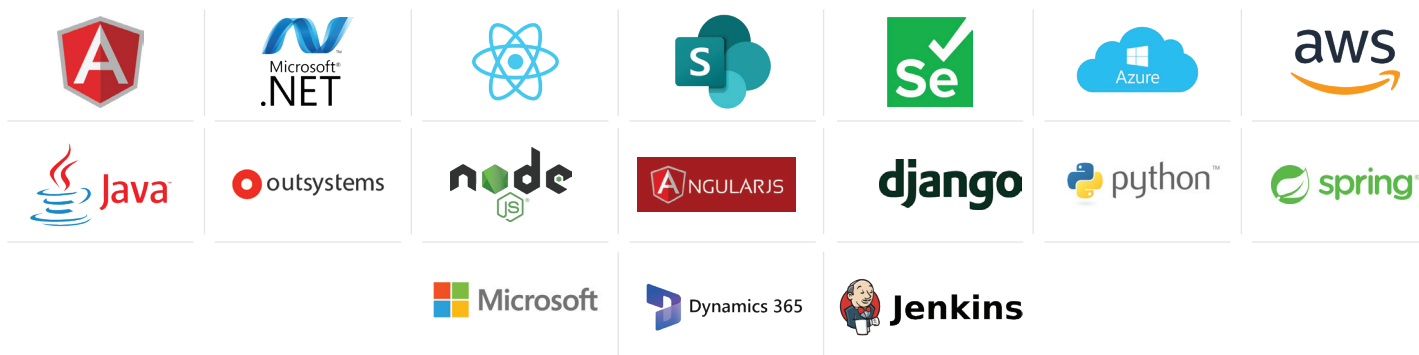


# Custom applications services








## Accelerating business evolution

Bosch offers an array of solutions aimed at custom applications, which are critical for businesses in their operational endeavors.

Custom applications services	
<b>Consulting</b>	Domain- and technology-agnostic business transformation consulting for various functions such as finance, operations, procurement, supply chain, sales and marketing, human resources, and information technology.
<b>Application portfolio rationalization</b>	Continuous application modernization for business agility and proprietary methodologies and tools to assess application portfolio and identify the best approach for portfolio rationalization.
<b>Application development</b>	Development of diverse and complex applications at lower costs and fast response to requests for new functionalities and requirements.
<b>Application maintenance and support</b>	Full lifecycle AMS delivering a wide range of application management and development support services.
<b>Open-source development and migration</b>	Recognition and implementation of the right approach and solution to scale the adoption of open-source development.



### Service highlights

-  **Global reach** with a presence in the APAC, EU, UK, and NA regions
-  Gold/360° partnership with **Microsoft**
-  Setting up and managing **large-scale ODCs**
-  Frameworks to enable **faster development and migrations**
-  **Reusable components** (accelerators) and in-built tools
-  **Dedicated CoEs** for core technologies
-  **500+ certified consultants** specializing in Microsoft and other technologies

# Cloud services

## Transitioning to the next-generation platform

In the digital journeys of businesses, the cloud has emerged as a key enabler. At Bosch, we recognize the need for well-rounded **cloud services** in helping enterprises revolutionize their operations and offerings. Our cloud services cater to domains such as **mobility, manufacturing, utilities, retail, and Industry 4.0.**

### Service offerings



Cloud advisory



Cloud building and migration



DevOps and automation



Cloud governance and security



Managed services



Modern integration services

### Service highlights



**Cross-domain and diverse**  
technological expertise



**Agility**



**One Security**



**Global delivery**  
and scalability



Microsoft  
Azure



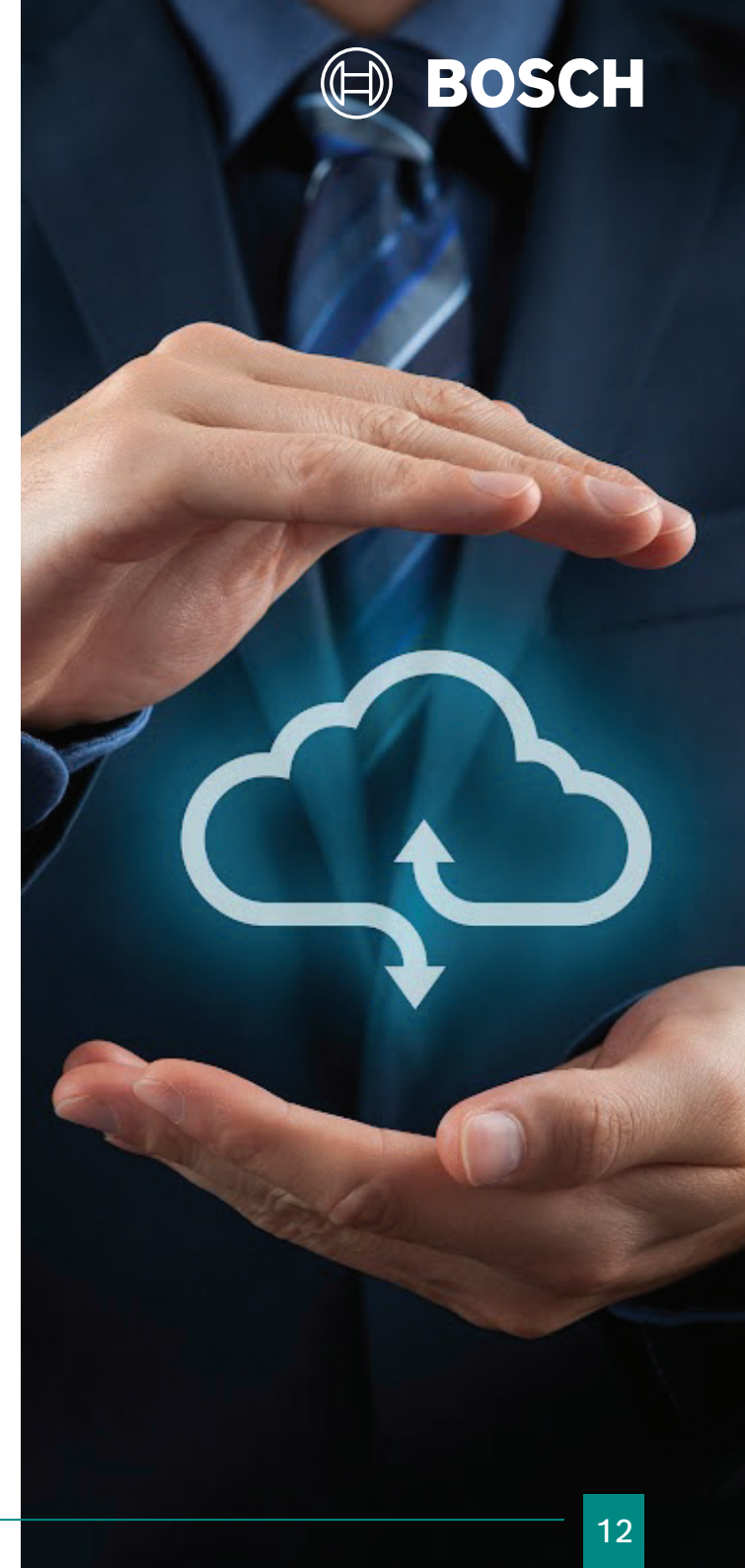
Google Cloud



vmware®



SAP Cloud  
Platform



# Infrastructure services

Adding excellence from the ground up

Bosch offers a diverse set of **infrastructure services** to provide **operational agility, improved productivity, and reduced costs.**

## Service offerings



Cloud



Unified communication



End-user computing



Email and messaging



Database management and big data



Migration to Windows 10



Middleware services



Network and security



Datacenter services

## Service highlights



**3,000+ ERP systems** managed



**300TB+ enterprise data** managed



**450+ distribution servers** managed



**5,000+ databases** managed



**Bosch automation platform**



**4.5 million+ middleware transactions** managed monthly



**80,000+ servers** managed



**500,000 AD objects and mailboxes** administered



**6.2 million+ connected devices** managed by using Bosch IoT Cloud



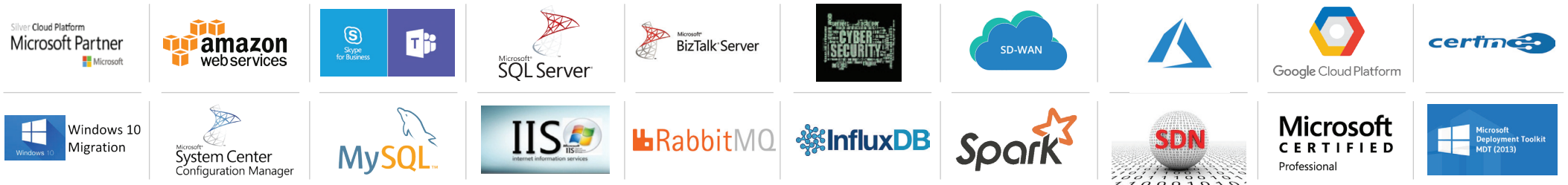
**500,000 client systems** supported



More than **6 million job runs** monitored daily



**100+ massive scalable big data clusters**







# IT security services

## Keeping connections secure and productive

Bosch delivers a wide range of **business and technology benefits** by empowering enterprise IT with various **IT security services**.

IT security services			
Basic security services	Advanced security services	Security consulting	OT-IoT security shield
<p><b>24/7 managed SOC</b></p> <ul style="list-style-type: none"> <li>Proactive threat and alert monitoring, detection, and triaging</li> <li>Incident management</li> <li>Threat intelligence</li> </ul> <p><b>Content management</b></p> <ul style="list-style-type: none"> <li>Use case factory</li> <li>Security playbooks</li> <li>Standard operating procedures</li> </ul> <p><b>Security platform management</b></p> <ul style="list-style-type: none"> <li>Security platform engineering</li> </ul>	<p><b>Monitoring and threat analysis</b></p> <ul style="list-style-type: none"> <li>Managed EDR</li> <li>Proactive monitoring and detection</li> <li>InfoSec platform management</li> <li>Security incident handling</li> <li>Threat hunting</li> </ul> <p><b>Vulnerability management forensic investigations</b></p> <ul style="list-style-type: none"> <li>Malware reverse engineering</li> </ul> <p><b>DevSecOps services</b></p> <ul style="list-style-type: none"> <li>VAPT and dynamic assessment</li> </ul> <p><b>Security engineering services</b></p> <ul style="list-style-type: none"> <li>Cloud security consulting and engineering</li> <li>Cloud security posture management</li> </ul>	<p><b>Cybersecurity compliance</b></p> <ul style="list-style-type: none"> <li>Cybersecurity advisory</li> <li>Security compliance consulting</li> <li>Cloud security consulting and engineering</li> <li>Data protection and privacy</li> </ul> <p><b>Threat and risk assessment</b></p> <ul style="list-style-type: none"> <li>Third-party security risk assessment</li> </ul>	<p><b>Asset security management</b></p> <ul style="list-style-type: none"> <li>Security intelligence and asset visibility</li> <li>Threat detection and response with active and passive monitoring</li> <li>Vulnerability management</li> </ul>

### Service highlights

- 
**Security operation center as a service** plug-and-play operation (ISO 27001 SOC-II 24\*7 SOC service with flexible delivery) model
- 
 Securing AI/ML models for the edge and cloud with **Bosch AIShield**
- 
**Cybersecurity** research and validation lab
- 
**Reusable solution assets**, blueprint references, and solution integration



# BPO services

## Expanding your footprint

Bosch offers cutting-edge **BPO services** to help enterprises **unlock fresh opportunities, optimize operations, and reduce costs.**

### Service offerings



Customer experience services



Mobility services



Monitoring services

### Service highlights

More than  
**13,000/hour**  
customer requests

Saved  
**~45,000**  
in accidents

More than  
**15 million**  
connected vehicles

More than  
**20 million**  
phone calls

**~54,000**  
connected elevators

Connected  
**~3,000 trucks**

Around  
**3.5 million**  
concierge calls

Rescued  
**~30,000**  
individuals in  
stuck elevators

Deployed more than  
**100 bots**

# Customer experience services

## Making a difference

Bosch offers **end-to-end consulting, implementation, rollouts, upgrades, migrations, development and support**, and **testing** for enterprises to enhance the experiences of their customers.

### Experience management



#### Contextual intelligent marketing

- Dynamic customer profiling
- Segmentation, campaigns, and journeys
- Commerce marketing
- Lead management
- Marketing planning and performance
- Marketing analytics



#### High-touch sales experience

- Sales planning, performance, and forecasting
- Configure-price-quote (CPQ)
- Salesforce automation
- Partner relationship management
- Sales quotation and contract management
- Mobile-first offerings



#### Omnichannel e-commerce

- Experience management
- Product content and data management, CMS
- Context-driven services
- Omnichannel commerce management
- B2C, B2B, and B2B2C commerce
- Headless and composable commerce



#### Customer-for-life focused services

- Self-service
- Customer service and support
- Field service management
- Mobile-first offerings



#### Customer data and experience management

- Customer identity and profile management
- Enterprise consent management
- Customer insights and analytics
- Experience management

### Service highlights



**Social analytics** and user experience focused personalization



Immersive mobile apps



Cutting-edge **AI/ML, AR/VR, and RPA** implementations



**Microservices**, open and agile innovations, and integrations








# Industry 4.0 services

## Gearing up for the next industrial revolution

Bosch's Industry 4.0 service offerings are focused on revolutionizing **operations**, **user experiences**, and **productivity**.

### The services include:



Industry 4.0-specific offerings



XR solutions



Distributed ledger services



Data science services



Data engineering services



# Industry 4.0 offerings

## Aligning technologies with shifting tides

Bosch's Industry 4.0-focused offerings are aimed at empowering forward-thinking enterprises in their **technology-enabled, digital-first business endeavors**.

### Service offerings



#### Digital Twin

This is an end-to-end intelligent asset management solution targeted at driving a proactive approach to asset maintenance, reliability-based inspection, and mechanical integrity.



#### Indus 4.0

This is a scalable, modular, and bundled cloud and on-premises solution that addresses the entire spectrum of Industry 4.0 with pre-configured apps. It can be tailored and delivered to suit customer requirements.



#### Custom and COTS MES

This solution leverages Bosch's experience in the manufacturing domain and applies our best practices during implementation and rollouts.



#### DeviceBridge

This is an I4.0 software solution that connects a wide variety of shop-floor devices, acquires process/machine data seamlessly, and delivers to top-floor systems such as MES, database, cloud, etc.



#### WMLite

This is a digitized inventory management application designed to manage inventory in warehouses. The system offers real-time visibility of inventory, increases the efficiency of warehouse operations, and maintains high inventory accuracy.



#### BOSCH DEEPSights

This is a digital suite targeted at energy and utility conservation and sustainability. It connects and monitors assets to optimize energy and utility consumption and accelerate carbon-neutrality initiatives.



#### AR/VR solutions

Our enterprise-grade AR/VR solutions empower frontline operators to be safe and agile, and reduce errors. Immersive training solutions enable learning in simulated environments. AR/VR solutions guide operators with contextual information, including remote expert assistance in hands-free formats.

### Service highlights



**End-to-end solutions that synergize sensors, software, and services**



**Manufacturing process knowledge and domain expertise**



**Lighthouse factories**



**100+ cloud trained on Industry 4.0 practices**



**50+ edge specialists**



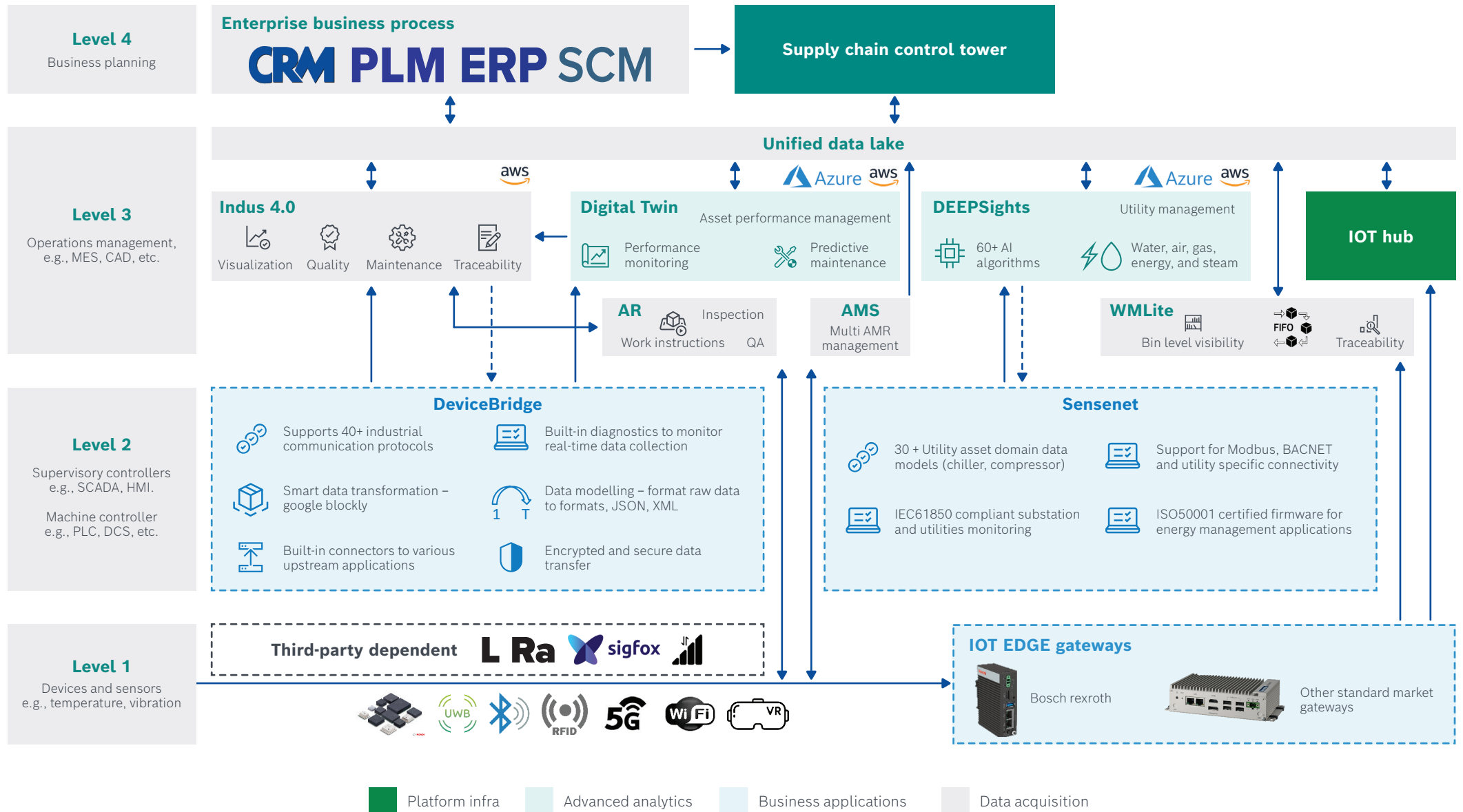
**500+ implementations**



**140+ use cases**

# Industry 4.0 solution stack

## Transforming enterprise functions



# XR solutions

## Revamping CX and EX

Bosch's XR solutions are targeted at the automotive, retail, manufacturing, transportation, oil and gas, and healthcare industries. These solutions are built on the frameworks of **VR training, AR bridge commerce, and VR city.**

### Enterprise-grade XR solutions



#### Immersive trainings

- Virtual facility/factory walkthrough
- Industrial safety, operating, and maintenance trainings
- Daily life skills trainings, soft skills trainings



#### Manufacturing services

- Visual, guided work instructions for operations, repairs, and maintenance
- Remote assistance and mentoring
- Visualized IoT/digital twin data in AR/VR
- Light-guided solution for quality inspection



#### Sales and marketing services

- Virtual showrooms/product presentations
- Interactive product catalogs for e-commerce
- Interactive product user manuals

### Service highlights



Domain and technological **expertise**



**Solution as a service**



**Agility and scalability**



Accelerators and strategic **alliances**



# Distributed ledger services

## Harnessing the power of blockchain

Bosch's distributed ledger services seamlessly incorporate the blockchain technology into supply chains within the automotive, food, and pharmaceutical sectors. The Bosch **Provenance Platform** plays a pivotal role in shaping these services. Bosch possesses significant expertise in smart contract development, establishing a genuinely **decentralized architecture**, offering both cloud and on-premises solutions. This expertise empowers our clients to formulate effective business strategies, plans, and budgets. The distributed applications on our platform are available through the **Azure and AWS marketplaces**, ensuring accessibility and scalability.

## Distributed ledger services



### Product implementation

- Use case definition and solution design
- Product customization, enterprise integration, and pilot and production rollouts
- Both decentralized and centralized frameworks of deployment



### Managed services

- Blockchain network operations support for L1/L2/L3
- Blockchain services such as member onboarding, enhancements, etc.

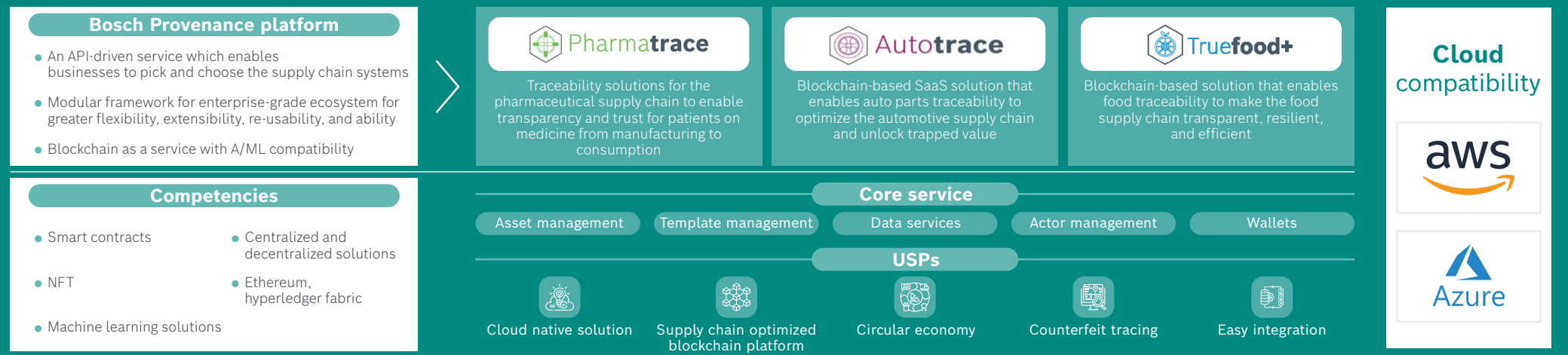


### Custom projects

- Blockchain consulting
- Blockchain co-innovation
- Implementation of custom distributed apps
- Implementation of e-wallets
- Consortium building assistance for specific use cases

## Service highlights

**Our offerings:** Accelerators that truly enable decentralized supply chain processes through track and trace solutions



# Data science services

## Making the most of information

Bosch's team of exceptionally skilled AI/ML-qualified data specialists bring substantial value to enterprises through purpose-specific data science services. Our expertise lies in the **conception, creation, and implementation of ML algorithms** capable of revealing profound insights. Additionally, we possess an MLOps control center that facilitates the real-time monitoring of deployed ML models, promptly triggering alerts, or retraining procedures when data or model deviations occur. Within the realm of data science, our competencies span various domains, including the **development of convolutional neural networks, deep learning, AIOT, reinforcement learning, and explainable and ethical AI**.

### Data science services



#### Mobility

- Prognosis
- EV analytics
- Route optimization
- Tire level inspection
- Fleet management



#### Industry 4.0

- Scrap reduction
- Predictive maintenance
- VQI
- Health and safety
- Monitoring and surveillance



#### Healthcare

- Virus classification
- Pattern discovery
- Clinical imaging
- Disease prediction
- Chromatography



#### Supply chain

- Sales forecasting
- Predictive analytics
- Inventory accounting
- Churn analysis
- Stock optimization

### Service highlights



250+ case studies and  
5+ invention reports



Data-driven architecture  
and automated workflows



Enterprise-scalable and  
plug-and-play ML models



Reduced turnaround  
time and costs



# Data engineering services

## Building the foundation for data-driven success

Bosch offers varied data engineering services based on the principles of **data ingestion, data processing, data lake house, data platforms, and data governance**. Our offerings are designed to facilitate the creation of centralized data platforms for disparate source systems, serving as a foundation for various analytics use cases. Data engineering comprises multiple sub-processes such as:

**Data processing:** Data pipelines are created to ingest source data into the data storage platforms, undergoing cleansing and transformation steps in the process.

**Data management:** Our data management capabilities across data platforms include multiple features such as data governance, data cataloging, data quality, metadata management, data lineage, and DataOps.

**Data storage:** We have the capability to implement multiple data storage solutions across cloud and on premises, including data lake, data warehouse, data lakehouse, data fabric, data mesh, data marts, and data aggregates.

## Data science services



### Mobility

- Anomaly detection
- Tire reports and analytics
- Time series forecasting
- Demand and supply analytics
- Warranty claims and analytics
- Predictive maintenance



### Industry 4.0

- Scrap reduction
- Condition monitoring and predictive analytics
- Enterprise data lake
- Inventory management
- Recommendation engine
- Automated quality assurance



### Healthcare

- DLT implementation
- Synthetic data generation
- Data management for medical devices
- Cloud-based data lake
- Hazardous gas leakage detection



### Others

- Knowledge graphs
- Tax-filing analytics
- Supply chain analytics
- Surveillance assistance
- Cybersecurity asset management

## Service highlights



115+ certifications and  
125+ case studies



Cloud architecture



Data mesh, lakes, lake house, and hub

Azure Databricks



amazon  
web services

Google Cloud

SAP Analytics Cloud

SAP Lumira

snowflake

amazon  
EMR



Azure  
Synapse  
Analytics

# Data visualization services

## Unveiling a new norm for data narration

Bosch excels in data visualization by delivering clear and intuitive insights to clients through various means, including **dashboards, charts, graphs, geographical visualizations, and infographics.**

### Data visualization services



#### Report and dashboard development

- Leadership dashboard
- Sales and marketing dashboard
- IT and HR dashboard
- Operations dashboard



#### Data visualization and migration

- Visualization porting
- Data completeness and evaluation
- Automated integration



#### BI platform development

- Data pipeline dashboard
- Data quality checks
- Automated data visualization
- Self-service analytics

### Service highlights

 **120+**  
professionals

 **1500+**  
dashboards

 **100+**  
engagements

### Key tools and technologies





# Digital transformation services

## Intelligence augmented automation

Digital transformation encompasses several key areas, including business process automation, cognitive automation, and generative AI, which contribute toward the optimization of business processes. This approach aids in cost reduction, enhances accuracy, and frees up human resources from repetitive tasks that can be automated by bots. Our expertise spans various domains, including **smart information management systems, purchase management, HR processes, finance processes, logistical planning, and engineering**. To achieve these transformations, our team utilizes a variety of tools. These include the **Elastic stack, Ansible automation tools, UiPath platform, Automation Anywhere tools, Power Automate flows, and the Dialog Flow console**.

## Digital transformation services



### Process automation

- PR-PO process automation
- HR service automation
- Order to cash
- Record to report
- Remittance accounting
- Vendor reconciliation



### Cognitive automation

- Chatbots
- Quality bots
- Workflow automation
- GenAI
- Safety and surveillance



### Product

- Bosch automation platform
- Low-code automation
- Bring-your-own model
- Conversation system and recommendation engine

## Service highlights



**240+**  
automation



**450+**  
bots running 24\*7



**408+**  
man-month saving

## Key tools and technologies









# Data annotation services

## Adding labels or metadata to raw data for machines

Bosch provides a highly structured and systematic set of data annotation services designed to enhance **data comprehensibility and usability for machines**. This facilitates the development and training of algorithms across a wide range of tasks, including **image recognition, natural language processing, speech recognition, and more**. Annotated data plays a pivotal role in **supervised learning**, where models are trained to make predictions based on labeled examples.








## Digital transformation services

 <p><b>Image</b></p> <ul style="list-style-type: none"> <li>• 2D BB</li> <li>• 3D BB</li> <li>• Polygon</li> <li>• Semantic segmentation</li> <li>• Polyline tagging</li> </ul>	 <p><b>Video</b></p> <ul style="list-style-type: none"> <li>• 2D BB</li> <li>• 3D BB</li> <li>• Polygon</li> <li>• Semantic segmentation</li> <li>• Polyline tagging</li> </ul>
 <p><b>Radar</b></p> <ul style="list-style-type: none"> <li>• 2D BB</li> <li>• 3D BB</li> <li>• Polyline tagging</li> </ul>	 <p><b>Lidar</b></p> <ul style="list-style-type: none"> <li>• 3D BB</li> <li>• Multi-sensor labeling</li> </ul>
 <p><b>Ultrasonic</b></p> <ul style="list-style-type: none"> <li>• 3DBB</li> <li>• Semantic segmentation</li> </ul>	 <p><b>Audio</b></p> <ul style="list-style-type: none"> <li>• Audio segmentation</li> </ul>

### Service highlights

 <p><b>510+</b> professionals</p>	 <p><b>175+</b> case studies</p>
 <p><b>6+</b> data types</p>	

### Tech stacks

# SDS Engineering Offerings

Transforming Products through Digital Innovation and Product Engineering

Invented for life



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# Engineering solutions

## Digital transformation of products and product engineering



From building experience concepts to developing connected technologies, our engineering portfolio enables the identification of customers' problems and ensures a rapid turnaround of complex solutions. We also reinforce the ecosystem by optimizing processes and essential toolchains, which are deeply rooted in Bosch's culture of innovation. Our legacy of consistent innovation and market disruption has spanned over a century.

### The SDS engineering solutions include:



**Product engineering offerings**



**IoT offerings**



**Cybersecurity offerings**



**Design studio and UX offerings**



**HMI engineering offerings**



**Validation engineering offerings**



**Engineering IT offerings**








**PLM offerings**

# Product engineering offerings

## Redefining design and development






Bosch's comprehensive product engineering offerings cater to a cross-section of global organizations in their endeavor of **optimizing value, maximizing production capabilities, and improving user experiences.**

### Solution snapshot

 <p>Complete additive manufacturing, including quality check</p>	 <p>Design for additive manufacturing (DfAM)</p>	 <p>Technical consulting</p>	 <p>Complete post processing</p>	 <p>Reverse engineering with or without 3D scanner</p>
---	---	---	---	---

Product engineering offerings	
Design	Build
<p><b>Electronic hardware design</b> Power electronics, digital, mixed signal and industrialization, and design for manufacturing</p>	<p><b>Cost engineering and benchmarking</b> Positioning the product</p>
<p><b>Embedded software</b> Software development across technology platforms, frameworks, and methodologies</p>	<p><b>Mechanical hardware design</b> Complete component and hardware design and development</p>
<p><b>Testing and validation</b> Product reliability confirmation</p>	<p><b>Structural and thermal simulation</b> Virtual product analysis with realistic simulations</p>
<p><b>Labs and certifications</b> World-class facilities accredited by TUV for compliance with global standards such as CE, UL, and IEC. Partnerships with major labs across the globe for quick turnaround.</p>	<p><b>Prototype development</b> Mechanical part and electronic sample manufacturing</p>

### Solution highlights

 <p><b>State-of-the-art infrastructure</b>, including high-voltage, EMI, EMC, and reliability labs</p>	 <p><b>Bosch quality process and CoEs</b> for benchmarking</p>
 <p><b>State-of-the-art sample shops and additive manufacturing</b> methodologies</p>	 <p><b>Cutting-edge simulation tools</b></p>
 <p><b>Safety and security-compliant</b> design and development operations</p>	

# IoT solutions

## Connected solutions for the future, on the cloud and at the edge

Bosch's IoT offerings foster a transformative impact on operations, efficiency, and customer experiences. The technology connects devices, sensors, and systems to enable **real-time data collection, analysis, and automation**. This leads to better decision-making, predictive maintenance, enhanced resource utilization, and personalized services, making it a **fundamental enabler of modern digital products**.

IoT capabilities				
Product engineering	Edge devices	Cloud deployment	AI/ML	Business integrations
Hardware and sensor fusion and integration	Edge device management and cloud connectivity	Hosting connected products and digital twin solution	Asset performance insights	Enterprise system integrations (SAP)
Mechanical and electronic design	Data collection, logging, and alerts	Data ingestion, storage, and processing	Predictive maintenance	UI and reporting for stakeholders
EMI/EMC, reliability, NVH digital labs	Edge analytics and visualization	Custom applications and APIs	Statistical analysis and performance monitoring	Field services integration
Prototype development	Smart devices gateway administration	Cybersecurity and data privacy	Risk and failure analysis	Web and mobile applications
Embedded firmware services		Remote device management	Workforce utilization insights	

### Solution highlights



A **diverse range of expertise**, encompassing fields like tire mechanics and battery chemistry, is employed to bolster edge capabilities and improve data visualization



**Ready-to-deploy assets** across various product domains, including consumer goods, industrial solutions, the sporting industry, and more.

# Cybersecurity offerings

## Safeguarding assets and processes

Bosch's comprehensive hardware and software security module is aimed at firewalling the operations of forward-thinking enterprises.

### Product engineering solutions

Device security		Firmware security		Communication security	
<b>Hardware root of trust</b> personalization and integration	<b>Verified bootloader</b> (NXP i.MX, Microchip SAMDxx/SAMLxx, Intel® x86, and more)	<b>TLS/DTLS stack security</b> evaluation and integration (WolfSSL, LibreSSL, and more)	<b>IoT protocols</b> such as MQTT, CoAP, AMQP, and more	<b>Server authentication</b>	<b>Healthcare data exchange</b> such as DICOM, HL7, and FHIR
<b>Secure key storage</b>	<b>Kernel verification</b> (FIT image, SoC-specific mechanisms)	<b>Messaging security assessments</b>	<b>Industrial protocols</b> such as DNP3, Modbus, S7, Fox, and more		
<b>Device identity</b> and authentication	<b>Root file system verifications</b> (dm-verity, IMA/EVM, FIT image)	Cloud security		Lifecycle security	
<b>Secure element, trusted platform module</b> (TPM) integrations	<b>Security optimizations</b> for real-time constraints	<b>Cloud-agnostic security solutions</b>	<b>Security lifecycle management</b>		
<b>Trusted execution environment</b> (TEE) using Arm TrustZone and OP-TEE	<b>Security testing and automation</b> for embedded systems	<ul style="list-style-type: none"> <li>Certificate and key management</li> <li>Cloud HSM integration</li> </ul>	<ul style="list-style-type: none"> <li>Secure device credential creation, distribution, and enrollment (SCEP, EST)</li> </ul>		
<b>Data protection</b> using encryption		<b>Cloud security posture management</b> via CASB, CWPP	<b>Secure over-the-air (OTA) update service</b> for embedded systems		
<b>Verification and validation solutions</b>			<ul style="list-style-type: none"> <li>Package updates</li> <li>Full OS updates</li> <li>Signing of packages and images</li> </ul>	<b>Threat and risk assessment</b>	
				<ul style="list-style-type: none"> <li>Systems/cloud-web/mobile</li> </ul>	

### Solution highlights



**Turnkey solutions** for chip-to-cloud security covering policies, vulnerability management, and SOC



**PROSSEC** for automated vulnerability management



Digital trust for connected X spanning **IoT security consulting, PenTaaS, and SOC**



**Cybersecurity university** for education and cultural internalization of **DevSecOps**



Pioneers of and contributors to industrial standards such as **ISO21434** (Bosch-VW), **SAE J 3061**, **ISO65224** (industrial/maritime), **ISO27001**, and **TISAX**



Innovations such as **AIShield**, shared **SOC**, **Security Building Blocks (SBBs)**



# Design studio and UX

## Reinventing user experiences

We create **human-centered, design-driven, and technology-enabled solutions** for the businesses of tomorrow.

### Solution scope



**Discover valuable insights** that help you identify the right solutions for your business.

*Actionable user insights and strategically aligned areas of opportunity*



**Design and launch** delightful and intuitive products, services, and spaces.

*Digital experiences, tangible products, end-to-end services, and physical spaces*



**Enable rapid innovation** with Bosch technology that helps you stay ahead of the curve.

*Immersive experiences, pervasive and phygital systems, intelligent and adaptive solutions, new human-machine relationships*



**Jumpstart a meaningful shift** toward design and user-centricity within your organization.

*5+ years of experience in hosting design thinking and design strategy workshops tailored for leadership teams*

### Solution highlights



User research



Service design



Interaction design



Design thinking



Usability testing



Prototyping



Visual design



Industrial design

# HMI engineering offerings

## Easing human-machine communication

Bosch understands the significance of **seamless collaboration between humans and machines**, and our HMI-focused offerings are aimed at harmonizing communications efficiently.

### Solution scope

#### UX/UI solutions

- UX/UI research
- Asset design
- Rapid prototyping
- HMI requirements engineering

#### Automated HMI V&V

- Graphics test system
- Automated test equipment
- IoT HMI testing with cryptTA
- HMI V&V as a service

### HMI software development

#### HMI application development



#### Tools and solutions

**LeapX**  
A cloud-based collaborative HMI rapid development solution

#### HMI analytics framework

Intelligent analytics framework to turn user preference and interactions into information and insight

#### HMI suite for connected products

HMI tools, micro-services, and SDKs to enhance UX

#### Value added offerings

PoCs and demos

Architectural consulting

Code refactoring

Performance optimization

### Solution highlights



**Automated testing environment**  
to ensure exhaustive test coverage



**LeapX** to ease collaboration during development

# Validation engineering offerings

## Taking testing and virtualization to the next level

Bosch has unlocked the next-generation validation engineering solution by partnering with **global automotive OEMs, off-highway OEMs, and new-age mobility companies** across North America, Europe, China, Japan, and India.

### Validation engineering solutions

#### Verification and validation

- HIL, SIL, and MIL
- System testing
- Module testing
- Vehicle/box car testing

#### Plant modeling

- Vehicle dynamics
- Sensor simulations
- Vehicle integration
- Integration with HIL

#### Design and development

- HIL infrastructure
- Custom test equipment
- Test automation
- Wire harness

#### E2E test solution

- Functional validation
- Interoperability
- Security
- MNO testing
- Scalability testing

#### Virtualization

- vECU/FMU creation
- Simulation environment
- Integration
- Test automation
- CX solutions

#### Hardware validation

- EMI/EMC testing
- Reliability
- NVH testing
- Mechanical testing

### Test automation tools and frameworks

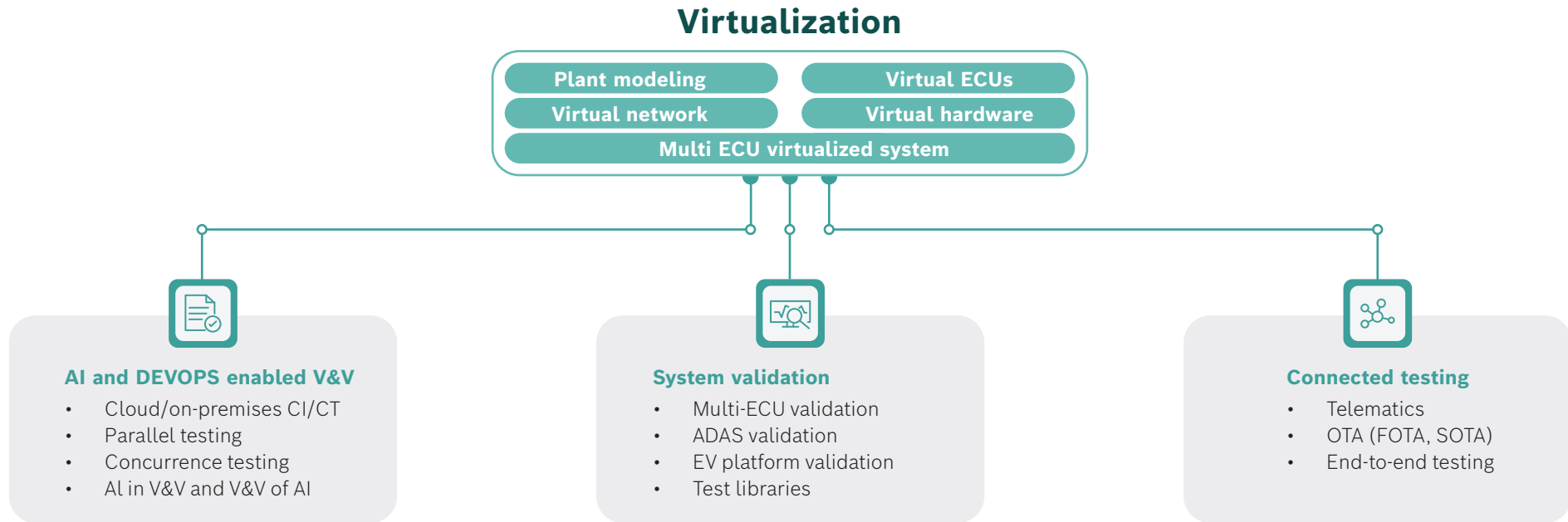
- **ECU test**
- **Robot framework**
- **Automation desk (dSpace)**
- **vTest studio (Vector)**
- **Custom frameworks**

### Accelerators and enablers


- **REMOTED** (remote testing and test farm)
- **ARiSE** (auto-generation test case)
- **fasTest** (auto-generation test script)
- **GTS** (graphical test system)
- **TSG** (test scripts for unit testing)
- **CTC** (connectivity test center)
- **Req2test** (requirement to test)
- **AI-4-DeM** (defect prediction)
- **SVENTA** (AI-based NVH tester)

# Validation engineering offerings


Taking testing and virtualization to the next level



## Solution highlights



fasTest, a rule-based test script generation engine for quick turnaround in automation



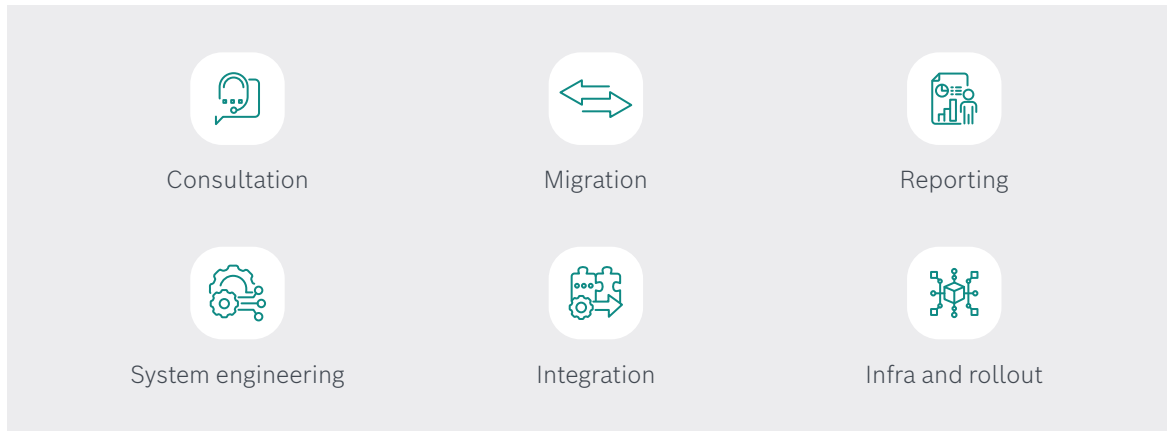
Tool- and supplier-agnostic validation portfolio that supports all levels of testing

# Engineering IT offerings

## Transforming enterprise IT

Bosch's engineering IT offerings are aimed at delivering unparalleled value across enterprise IT. We combine our **deep domain knowledge, state-of-the-art facilities, and cutting-edge IT solutions** to drive engineering transformation.

### Solution snapshot

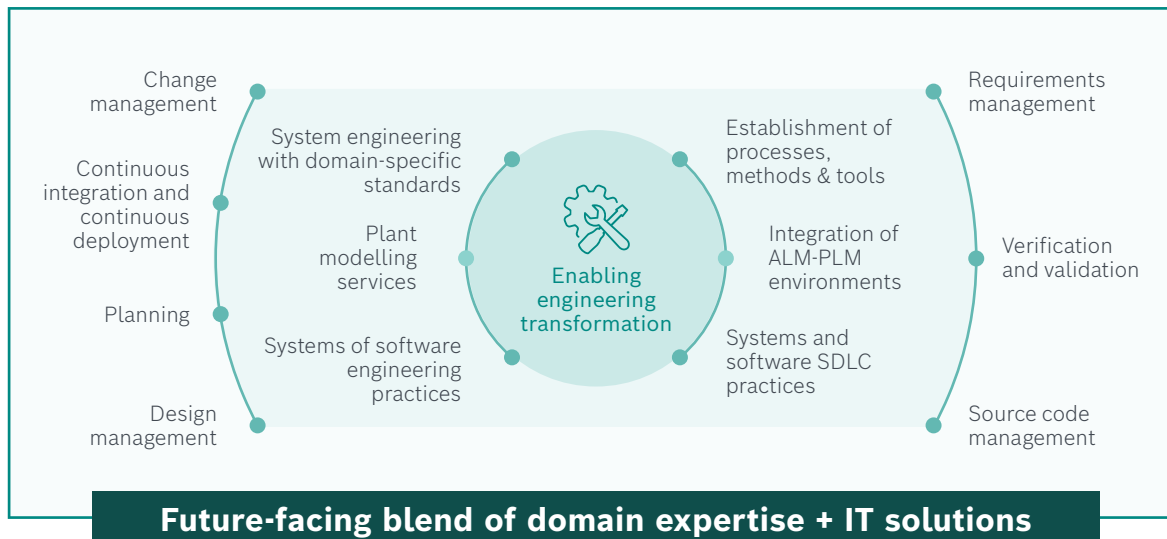


### Engineering process expertise

- **Product development** and **systems engineering**
- Engineering **industry-specific** processes and **best practices**
- Conformance with **domain-specific** standards

### Engineering IT expertise

- **CMMi L5, ASPICE L3, and ISO** certifications
- **Large IT** infra and license management
- Toolchain development and **large rollouts**
- Partnership with **IBM, PTC, OASIS**, etc.



### Key differentiators



**125+** extensive multidisciplinary engineering products



**Diverse custom** toolchain development expertise

# PLM offerings

Bringing an edge to business consulting and system integration

Bosch's PLM practice takes a fresh approach to modernizing production and maintenance processes with an eye on **end-to-end transformation**.

## PLM solutions

### Business consulting



#### Strategy

- PLM advisory
- Roadmap and strategy
- Business process consulting



#### Consulting

- Digital engineering excellence
- As-is, to-be, gap analysis
- Assessment and recommendation

### System integration



#### Design

- Engineering data management
- Configuration, customization, and management
- Technical analysis and MVS



#### Build

- Technical development
- Data migration
- Project management



#### Test

- Unit, regression, integration testing
- Performance testing
- User acceptance testing



#### Deploy and support

- Adoption training
- Infant care
- Application maintenance and management

### Key differentiators

- Cross-industry and multi-product experience
- Engineering process **templates and library**
- **Best practices** and lessons learnt
- Assets, tools, and blended approach
- Product **alliances** and technology **CoEs**
- Solutioning **frameworks** and **accelerators**
- Migration tools and **PLM, ALM domain CoEs**
- **Global** deployment and partner ecosystem

**7,000+ users**  
on PTC PLM

**5,000+ users**  
on SAP PLM

**45+ global customers**  
with successful PLM transformations

**Proven methods,**  
frameworks, practices, and tools

**30,000+ users**  
on Siemens PLM

Technology **CoEs and labs**

**15+ years**  
of global experience













- <sup>1</sup> <https://www.mckinsey.com/capabilities/operations/our-insights/ai-driven-operations-forecasting-in-data-light-environments>
- <sup>2</sup> <https://www.snaplogic.com/resources/infographics/employees-want-more-ai-in-the-workplace>
- <sup>3</sup> <https://www.bcg.com/capabilities/business-transformation/how-to-grow-revenue-quickly-and-sustainably-in-transformations>
- <sup>4</sup> <https://www.gartner.com/en/newsroom/press-releases/2021-07-28-gartner-identifies-top5-manufacturing-trends-2021>
- <sup>5</sup> <https://www.fortunebusinessinsights.com/artificial-intelligence-ai-in-retail-market-101968>
- <sup>6</sup> <https://www.precedenceresearch.com/artificial-intelligence-in-manufacturing-market>

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