



# Industrijski Internet stvari in kognitivna proizvodnja

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# The world is being reinvented in code.

**100,000,000**

lines of code in a new car

**5,000,000**

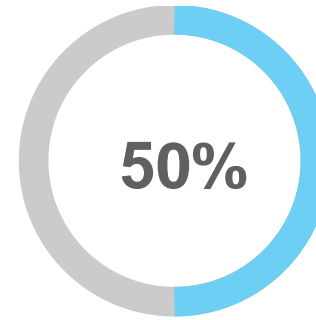
lines of code in smart appliances

**1,200,000**

lines of code in a smartphone

**80,000**

lines of code in a pacemaker



of **B2B collaboration** will take place through **web APIs** next year.

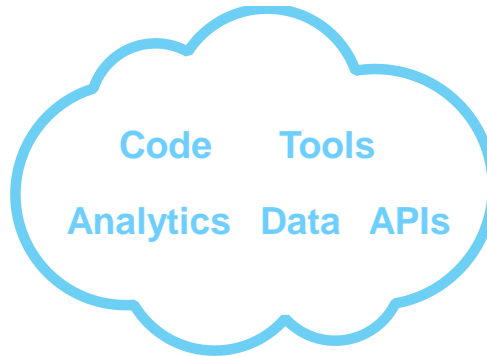
**Smart TVs** represented 27% of all TV sales in 2012; by 2018, they will represent 82%.



Sensors for **industrial asset monitoring and management** will grow from just over 15M units in 2014 to over 40M units in 2018



**Smart LED lighting** will grow from 6M units in 2015 to 570M units in 2020, used for safety communication, health, pollution and personalized services.



By 2020, there will be 925M **smart meters** installed worldwide, more than double the 400M in 2014.



By 2017, there will be 1B connected things in **smart homes**, including appliances, smoke detectors and cameras.



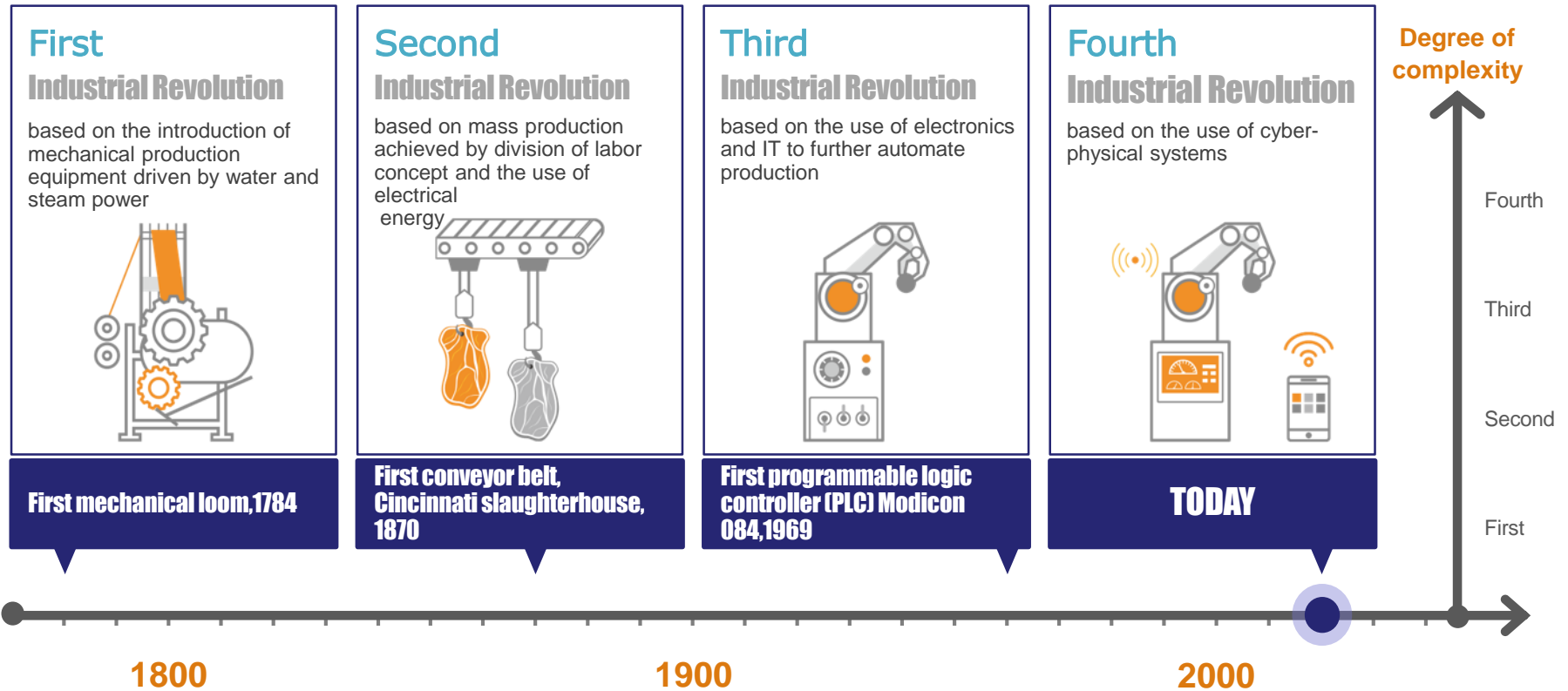
**Smart traffic sensors** and other devices installed in smart cities will grow from 237M units in 2015 to 371M in 2017.



Revenues for **smart grid sensors** will grow ten-fold from 2014 to 2021.

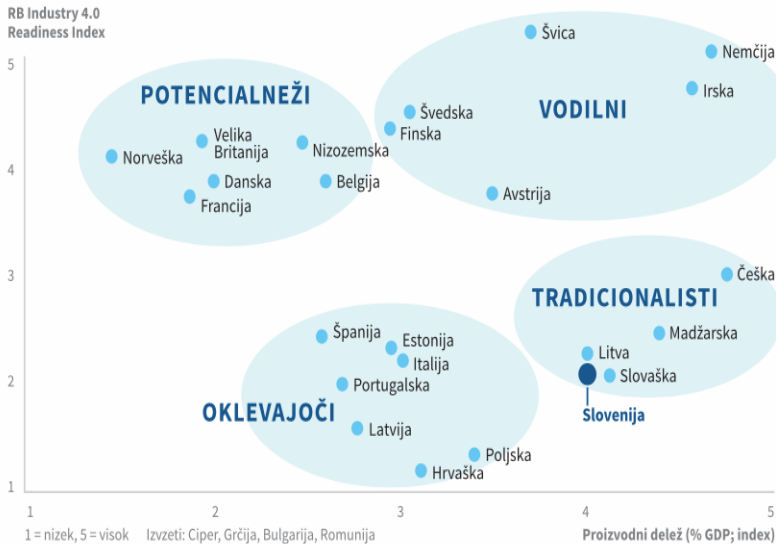


## HOW DOES THIS APPLY TO MANUFACTURING?



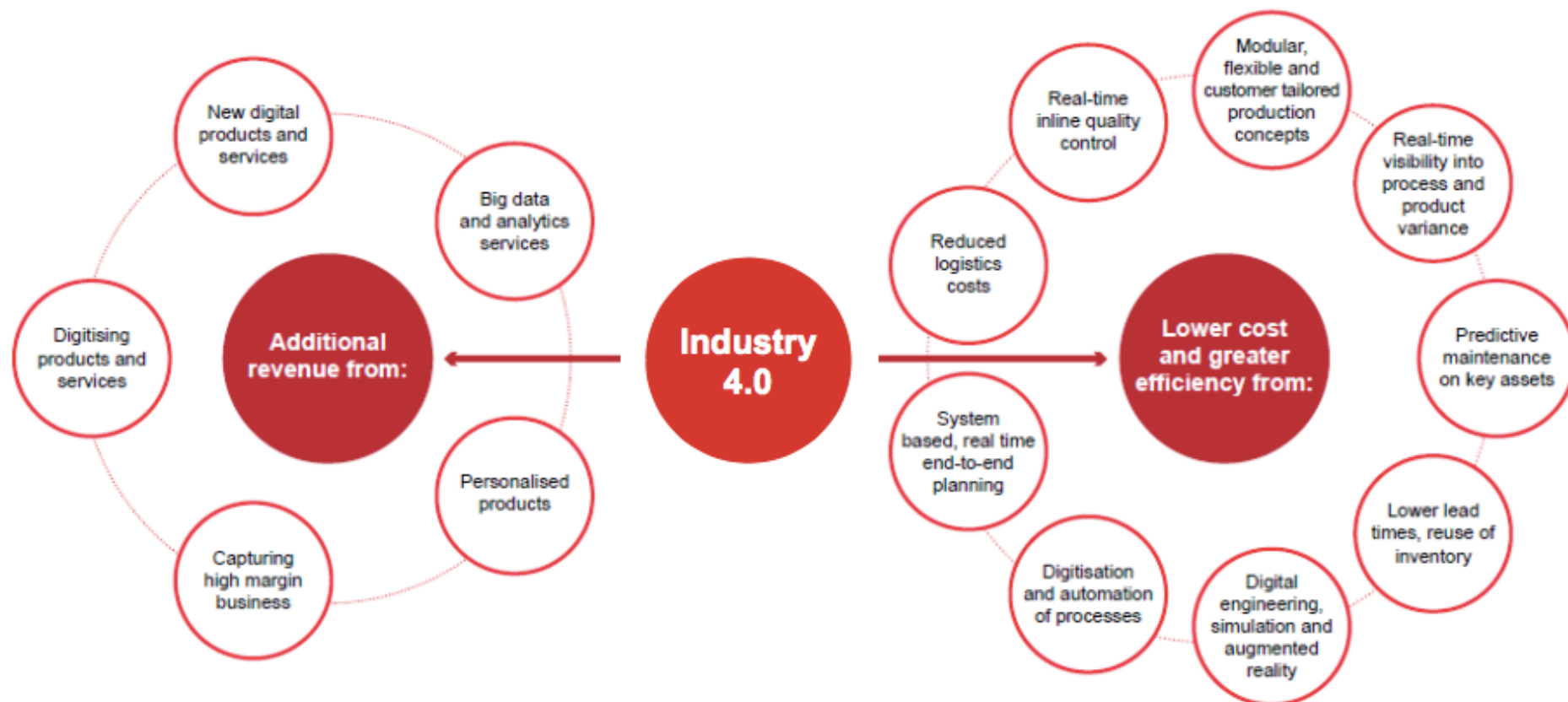
*Data, Code, Cognition ... Industry 4.0*

# Industry 4.0 is a journey towards value chain transformation driven by new technologies and new collaborative business models



## Industry 4.0 is delivering revenue, cost and efficiency gains

The window of opportunity is short, but exporting Swiss SMEs are used to adapt quickly



Source: PwC Strategy&

# KJE NA POTI DO INDUSTRIJE 4.0 JE VAŠE PODJETJE?

## Kakšno je stanje v industriji?

V svetu dan danes ni enotnega načina določevanja stopnje razvitosti z vidika Industrije 4.0 in verjetno še manj, kar se tiče digitalne preobrazbe. V tem trenutku je pomembno, da podjetja predvsem za Industrijo 4.0 slišijo in vsaj v osnovi vedo, kaj pomeni, prinaša in predstavlja. To je pomembno zato, da se čim prej, če se že niso, začno tudi sama ukvarjati z lastnimi načrti in izvedbo, torej uvajanjem Industrije 4.0 v prakso.

## Kaj je I4.0 Readiness Index?

V poskusu iskanja načina ali metode, ki bi pomagala podjetjem na relativno enostaven a še vedno dovolj zanesljiv in uporaben način določiti, kje v resnici so pri uvajanju Industrije 4.0, se v svetu ni prišlo prav daleč. Ob nekaterih akademskih poskusih, je za izpostavitev nekaj bolj praktično uporabnih primerov, ki so lahko v pomoč in korist srednjim in malim, pogosto pa tudi velikim proizvodnim podjetjem.

I4.0 Readiness Index za podjetja ne obstaja, ga je pa za države pred leti predstavilo in določilo podjetje Roland Berger.

Tisto, kar je zanimivo in uporabno tudi za podjetja je, da je iz njega mogoče videti, kakšno je povprečno ali pa splošno industrijsko okolje v katerem delujejo. To je pomembno zato, ker so pogosto industrijske verige vrednosti še vedno precej tradicionalne in poudarjeno regionalno povezane znotraj ene države.



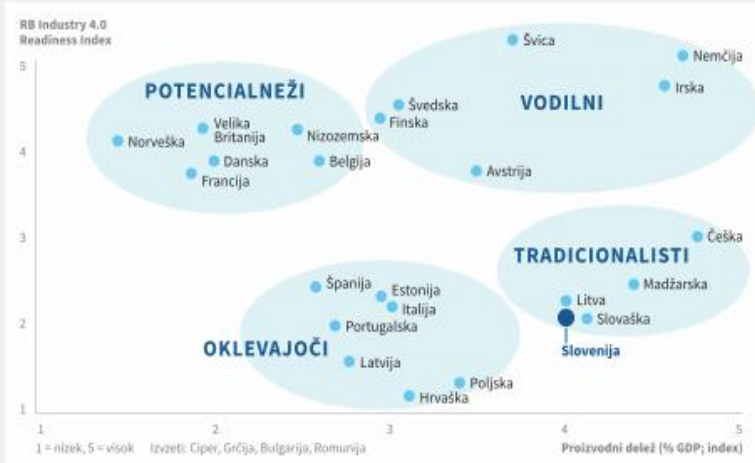
## Kako izmeriti I4.0 Readiness Index za vaše podjetje?

Čeprav univerzalnega ali splošnega merila za stanje pri uvajanju I4.0 za podjetja ni, pa je nekaj načinov, ki omogočajo podjetjem vsaj okvirno izmeriti ali določiti svoj položaj.

poglobljeno z digitalizacijo in Industrijo 4.0. Uporaben je tudi zato, ker je model nemški, saj koncept I4.0 izvira iz Nemčije in tudi mnoga podjetja ne samo iz Slovenije, so del nemških verig vrednosti, na primer v avtomobilski industriji.

### Grozdi in poslovni ekosistemi

Drug način ocenjevanja stanja ali stopnje pripravljenosti na Industrijo 4.0 je sodelovanje in povezovanje podjetja v okolja, ki se načrtno ukvarjajo



### Združenja in svetovanje

V Nemčiji je na področju praktične uporabe zelo aktivno združenje VDMA, ki v državi povezuje proizvajalce strojev in naprav. Združenje je za različne potrebe ustanovilo tudi posebno fundacijo oziroma inštitut, ki se ukvarja s strateškimi vprašanji in vključuje tudi področje Industrije 4.0. Ta ponuja pregleden model, ki so ga poimenovali "Industry 4.0 Scorecard". Gre za ocenjevalni list z vprašanji razdeljenimi na šest večjih skupin. Rezultat na koncu pa predstavlja nivo na katerem se v danem trenutku glede na podane odgovore nahaja podjetje. Stopenj oziroma nivojev je prav tako šest od 0, kar pomeni, da se podjetje praktično sploh ne zaveda Industrije 4.0 in je čisti outsider pa vse do najvišje stopnje 5. ta pomeni, da gre za vodilno podjetje na področju Industrije 4.0 in ga imenuje "top performer". Na njihovi spletni strani je na voljo test, ki pomaga opraviti samoočeno.

Čeprav subjektiven in z določenimi omejitvami opisani model daje relativno dobra osnovna izhodišča podjetjem, da se prično resneje ukvarjati ali pa še bolj

z izobraževanjem, projekti in sodelovanjem med različnimi organizacijami, ki imajo za skupen poslovni in tehnološki cilj digitalizacijo in Industrijo 4.0. Taksi primeri so TECOS – Slovenski orodjarski grozd, Tehnološka mreža ICT ter IoTInno – IoT inovacijski center.

### Evropski projekti

Dodatna oblika, ki ima velik evropski pomen pa so regionalni evropski projekti na temo digitalizacije in Industrije 4.0 v MSP, kjer se povezujejo zbornice, agencije, ustanove, tehnološki parki in interesna združenja ter industrijska podjetja iz držav področja Mediterana in Alp, od Slovenije, Italije in Avstrije pa do Švice, Nemčije, Francije in Španije. Torej vodilnih regij in držav s področja I4.0. Omeniti velja projekta BiFocAlps in Smart Spaces, v katerih ima eno vodilnih vlog Tehnološki park Ljubljana;

## GSMA “Connected Life” forecast **\$4.5T in 2020**



Connected Car	<b>\$600 billion</b>
Clinical Remote Monitoring	<b>\$350 billion</b>
Assisted Living	<b>\$270 billion</b>
Home and Building Security	<b>\$250 billion</b>
Pay-As-You-Drive Car Insurance	<b>\$245 billion</b>
New Business Models for Car Usage	<b>\$225 billion</b>
Smart Meters	<b>\$105 billion</b>
Traffic Management	<b>\$100 billion</b>
Electric Vehicle Charging	<b>\$75 billion</b>
Building Automation	<b>\$40 billion</b>



**“The Internet of [Things] could raise the level of U.S. gross domestic product by 2%-5% by 2025.**

This gain... if realized, would boost the annual U.S. GDP growth rate by **0.2%-0.4%** points over this period, bringing growth closer to **3%** per year.” – *US Progressive Policy Institute*

# Unlocking the potential of the Internet of Things

McKinsey & Company  
Digital McKinsey

## McKinsey Global Institute

- Operations and equipment optimization in the factory setting can generate up to \$3.7T of value in 2025
- IoT has a total potential economic impact of \$4 trillion to \$11 trillion a year by 2025.

The Internet of Things becomes the Internet that thinks with Watson IoT

✓ Make Watson IoT Platform the hub of your enterprise IoT

Watson IoT Platform

### Nine settings where value may accrue

Size in 2025, \$ trillion<sup>1</sup>

Low estimate High estimate

**Factories**—eg, operations management, predictive maintenance



**Cities**—eg, public safety and health, traffic control, resource management



**Human**—eg, monitoring and managing illness, improving wellness



**Retail**—eg, self-checkout, layout optimization, smart customer-relationship management



**Outside**—eg, logistics routing, autonomous (self-driving) vehicles, navigation



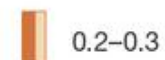
**Work sites**—eg, operations management, equipment maintenance, health and safety



**Vehicles**—eg, condition-based maintenance, reduced insurance



**Homes**—eg, energy management, safety and security, chore automation



**Offices**—eg, organizational redesign and worker monitoring, augmented reality for training







**strategy+business**

In the **PwC study of Industry 4.0**, the most commonly cited difficulty in **building an analytical capability** was **the lack of people with the expertise** to conduct the analysis.

Other prominent concerns:

- poor data quality,
- lack of access to the right data
- lack of top-level support

**If you can't make sense of that data** and use it to boost efficiency, grow closer to your supply chain partners, and develop products and services your customers actually want, ...

... much of the **effort is wasted.**

## Cognitive Computing

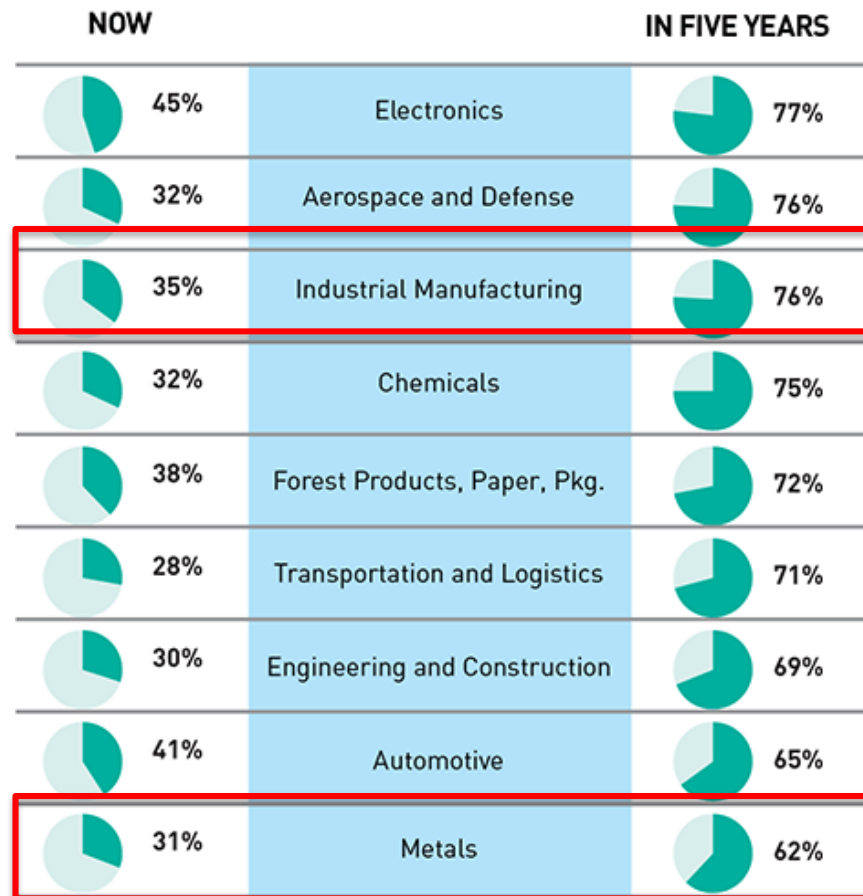
- understands structured and unstructured data
- reasons to create hypotheses
- learns from collaboration
- interacts with humans in natural way



IBM Watson

### Exhibit 1: Adoption of Industry 4.0, by Sector

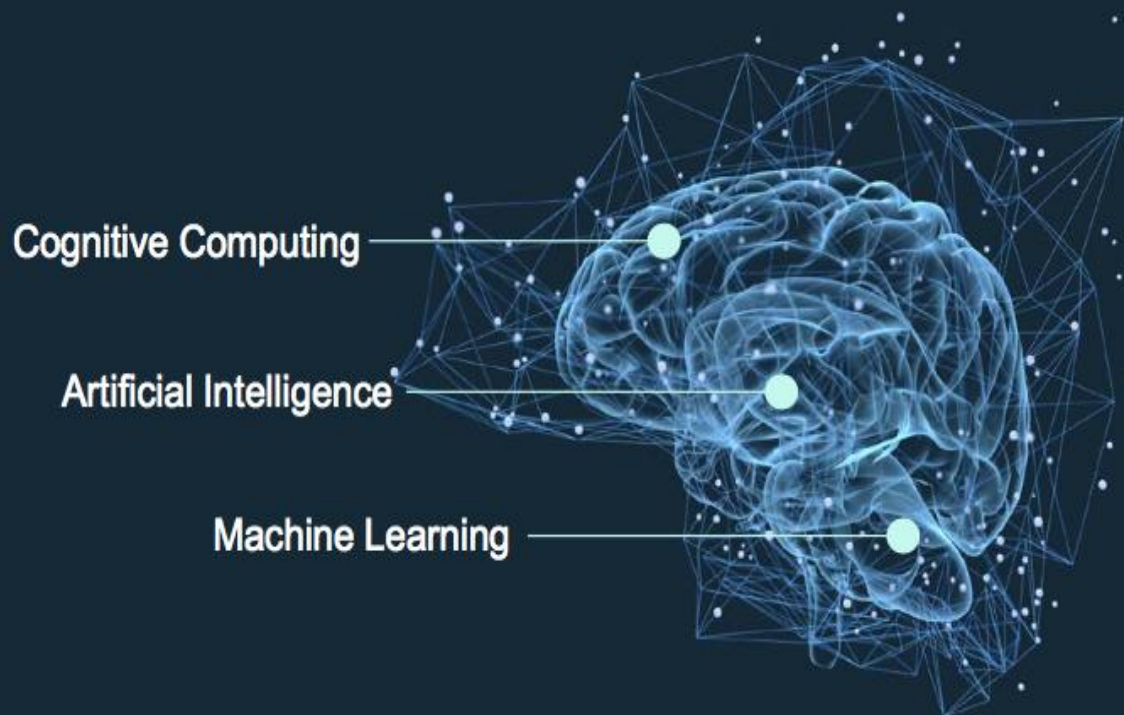
Respondents were asked: "How would you classify the current level of digitization and integration [in operations, supply chain, and related activities] in your company? What levels are you expecting in the next five years?"



Source: "Industry 4.0: Building the Digital Enterprise," PwC



Cognitive is driving new capability. . .



# Cognitive Systems Can...

## Understand



Adapt and make sense of all data;  
“read” text, “see” images and  
“hear” natural speech with context

## Reason



Interpret information, organize it  
and offer explanations of what it  
means, with rationale for the  
conclusions

## Learn



Accumulate data and derive  
insight at every interaction,  
perpetually



When your business thinks, you can **out**think. It is time for cognitive manufacturing, from design through manufacture to service.

Transforming manufacturing through:

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Intelligent  
assets and  
equipment

---

Cognitive  
processes  
and operations

---

Smarter  
resources and  
optimization

## INTELLIGENT ASSETS AND EQUIPMENT

**Intelligent assets and equipment utilizes IoT and cognitive capabilities to sense, communicate and self-diagnose issues** so they can optimize their performance and reduce unnecessary downtime

- ✓ Gain better visibility of the performance of equipment and assets
- ✓ Minimize downtime by preventing asset failures with predictive maintenance
- ✓ Optimize asset performance with comprehensive asset management

Utilizing IoT technology can reduce unplanned downtime by

**47%**

**SmartIS**  
PAMETNI INFORMACIJS

**UTEK**  
ELEKTRONIKA

**libelium**

**BTC**



A US based global automaker utilized cognitive IoT to gain a 360-degree of equipment status, identify pending failure and automatically generate maintenance plans. The manufacturer wanted to gain better visibility into both real-time and historical plant data and combine this with other forms of data to predict failures and equipment downtimes so that they could act preemptively

**7-10% decrease in plant and maintenance costs**

## COGNITIVE PROCESSES AND OPERATIONS

**Cognitive operations and processes bring more certainty to business** by analyzing a variety of information from workflows, context and environment to drive quality, enhance operations and decision-making.

- ✓ Reduce time to quality with modeling and verification of design
- ✓ Improve quality monitoring and get earlier alerts to quality issues
- ✓ Expedite service calls and repairs and reduce warranty costs

Utilizing IoT technology in manufacturing setting can reduce rate of defect by

**48%**

 analitica



IN516HT



Daimler worked with IBM Watson IoT to analyze more than 500 performance variables using predictive models to identify specific parts of the production line that needed adjustment. Historical and real-time manufacturing variables including machine setting, material temperature and equipment maintenance activities all contributed to prediction engine for decision support

**25% increase in overall productivity of manufacturing line**





## SMARTER RESOURCES AND OPTIMIZATION

**Utilize IoT and cognitive insight to optimize resources (worker, energy, expertise) using geolocation data, individual data, usage data and environmental conditions.**

- ✓ Improve worker safety and gain better workforce management
- ✓ Reduce energy consumption of your facilities and buildings
- ✓ Optimize shop floor and labor efficiency with equipment, labor, and expertise data

In U.S. workers' compensation costs for overexertion and falls account for more than

**\$25 B**

**SPICA**

**UTEK**  
ELEKTRONIKA

**solopex**

**Solvera Lynx**


















North Star Bluescope Steel, a global steel producer uses IBM Watson IoT to help employees stay safer in dangerous environments. The solution provides real-time alerts to employees and employers enabling preventive measures if physical well-being is compromised or safety procedures have not been applied. The value of cognitive lies with the ability to detect hazardous combinations that individually may be overlooked.

**Detecting hazards to help employees stay safer**

## The technology of IBM Watson can improve carefully selected use cases within the whole Daimler IT

Dr. Siegmar Haasis  
 Director IT Group Research & MBC  
 Development  
 siegmar.haasis@daimler.com

		Description of use case	Status of selected use case	Department	
		Call center agent advisor	Idea — Planned — PoC — PoC done — Deployed	Finance IT	 
		Maintenance Advisor "EMIL"	Idea — Planned — PoC — PoC done — Deployed	Production IT	 
		Cognitive Assistant "CARL"	Idea — Planned — PoC — PoC done	Marketing and Sales IT	 
Engineering	Change Management	Analysis of Engineering Changes	Idea — Planned — PoC	R&D IT	 
	Systems Engineering	DOORS AMS-Support	Idea — Planned — PoC	R&D IT	 
	Systems Engineering	Live analysis of specifications/links	Idea — Planned — PoC	R&D IT	 

Detailed on next slide

On this slide, 6 out of over 30 use cases are depicted.



## EMBRACING COGNITIVE MANUFACTURING

### 1. A foundation of data

Determine what data you need, which processes and operations would you like to improve. Collect and curate the right data—data you own, data across your systems, both structured and unstructured. Connect additional sensors to bring in real-time data that you currently do not have

### 2. Visualize the patterns

Visualize your data on a platform. Quickly build up dashboards and use simple analytics to determine patterns. Supplement with external sources of data and analyze causation between variables that impact the process and operation you would like to improve.

### 3. Advance to analytics

Apply advanced analytics to gain new insights from your data. Developed specific models, experiment with a combination of variables and utilize the prediction engine to generate better recommendations

### 4. Infuse with Cognitive

Determine how you want to utilize cognitive. Do you want to refine your corpus of knowledge and make even better predictions? Do you want to process recommendations and actions with better human engagement and interaction?



# Cognitive Manufacturing is powered by IBM Watson IoT.



## Secure, scalable, and open platform where leaders everywhere can build and innovate with cognitive

Connect and experiment in a matter of minutes. Watson IoT provides companies and organizations with simple connectivity elements and flexible building blocks to bring sophisticated new ideas to reality.

## Sophisticated edge and predictive analytics combined with cognitive IoT technology

Watson IoT combines the the data ingestion power of internet of things with advanced analytics in our applications and the problem solving system of Watson to analyze, reason and learn on a scale that we never thought possible.

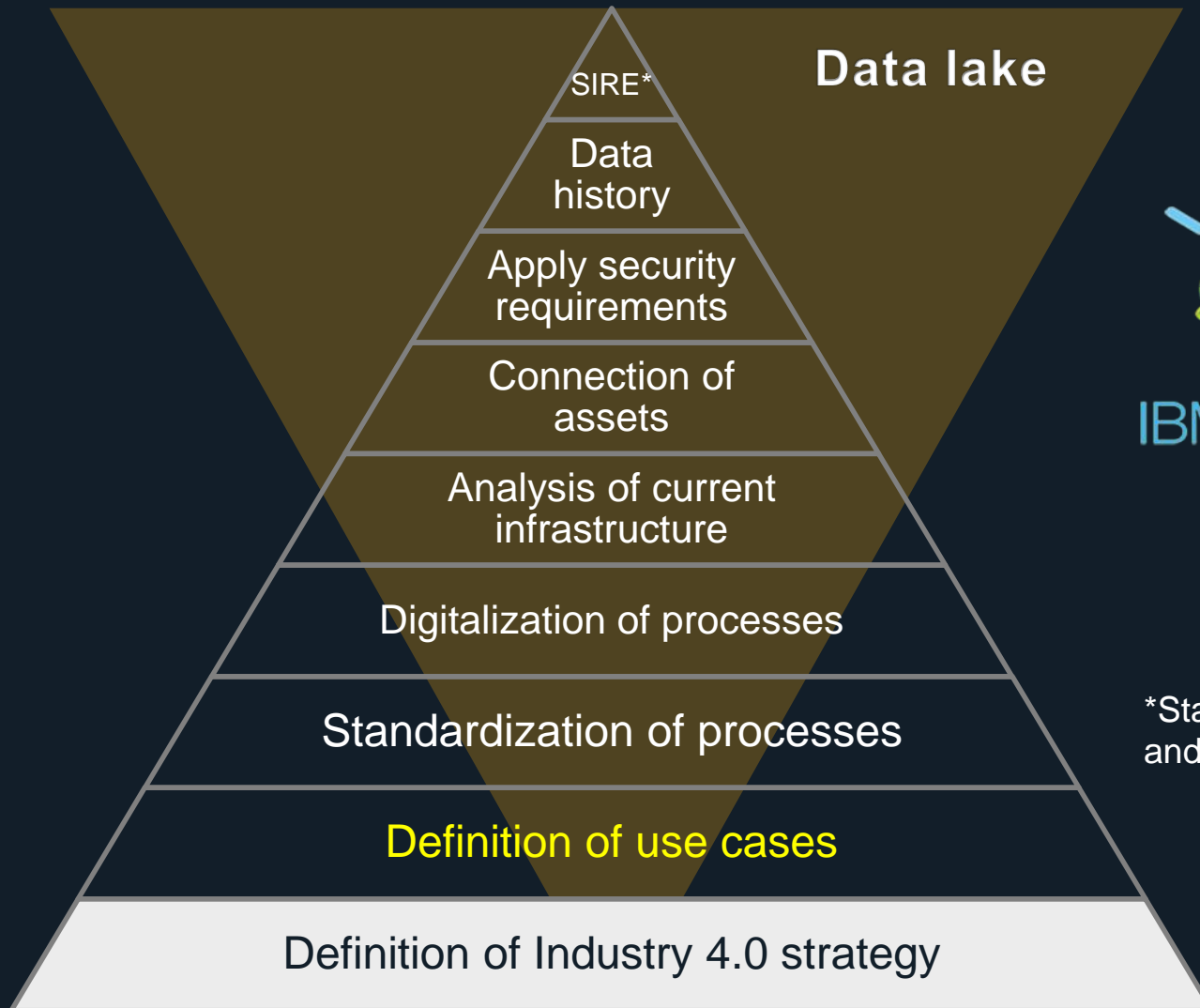
## Expertise in industries and professional domains to every cognitive endeavor.

As a leading industry solution provider, we help clients apply advanced technologies such as IoT and cognitive within the context of an industry or profession to produce meaningful outcomes.





# Cognitive transformation process





# IBM WATSON IOT ECOSYSTEM



IBM Bluemix

Unique elements of Watson IoT technology and ecosystem

## Partnered Innovation

Open ecosystem  
Device partnerships  
Embedded security  
Edge Analytics  
Industry 4.0 solutions

**IBM**  
Innovation  
Center  
Ljubljana

## Data Integration

Weather data  
Social data  
Application data  
Platform of platforms

## Advanced Analytics

Predictive Analytics  
Real-time Analytics  
Data Mining  
Optimization

## Cognitive Technology

Natural Language Processing  
Machine Learning  
Textual Analytics  
Video/Image Analytics



IBM Watson



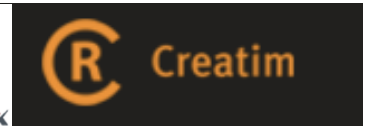
**SmartIS**  
PAMETNI INFORMACIJSKI SISTEMI



**Alcad**



**Living bits and things**





## QUESTIONS?

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