INDUSTRY 4.0

TRUMPF as key supplier and key user

Andreas Conzelmann
General Manager

Grüsch, 05.10.2016
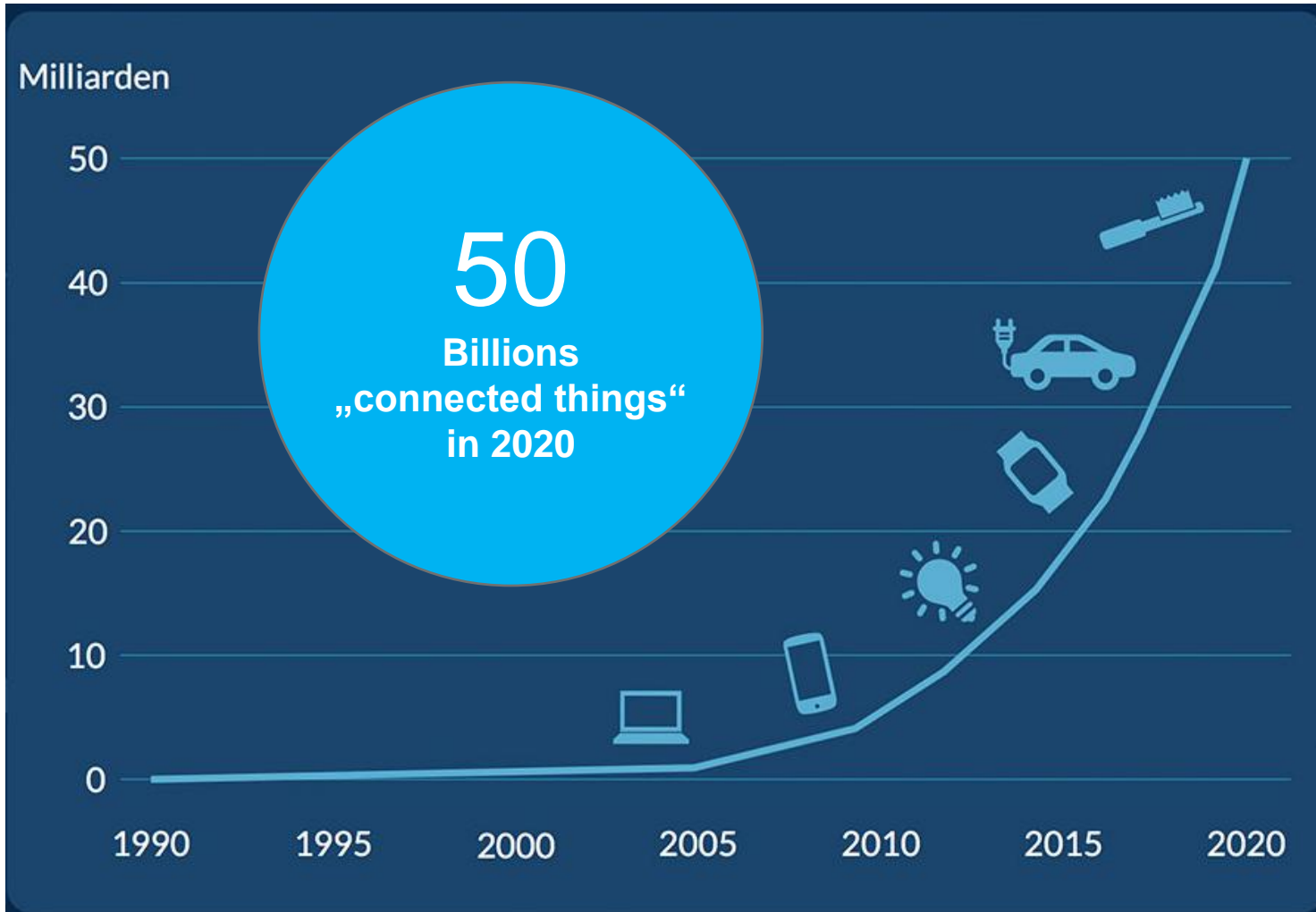
Some statements from global leaders

World Economic Forum, Davos 2016

Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000

Pierre Nanterme
CEO of Accenture

For many people, the smartphone is the first and only computer they have.

Inga Beale
Chief Executive Officer, Lloyd's

There has never been a time of greater promise, or greater peril

Professor Klaus Schwab
Founder and Executive Chairman
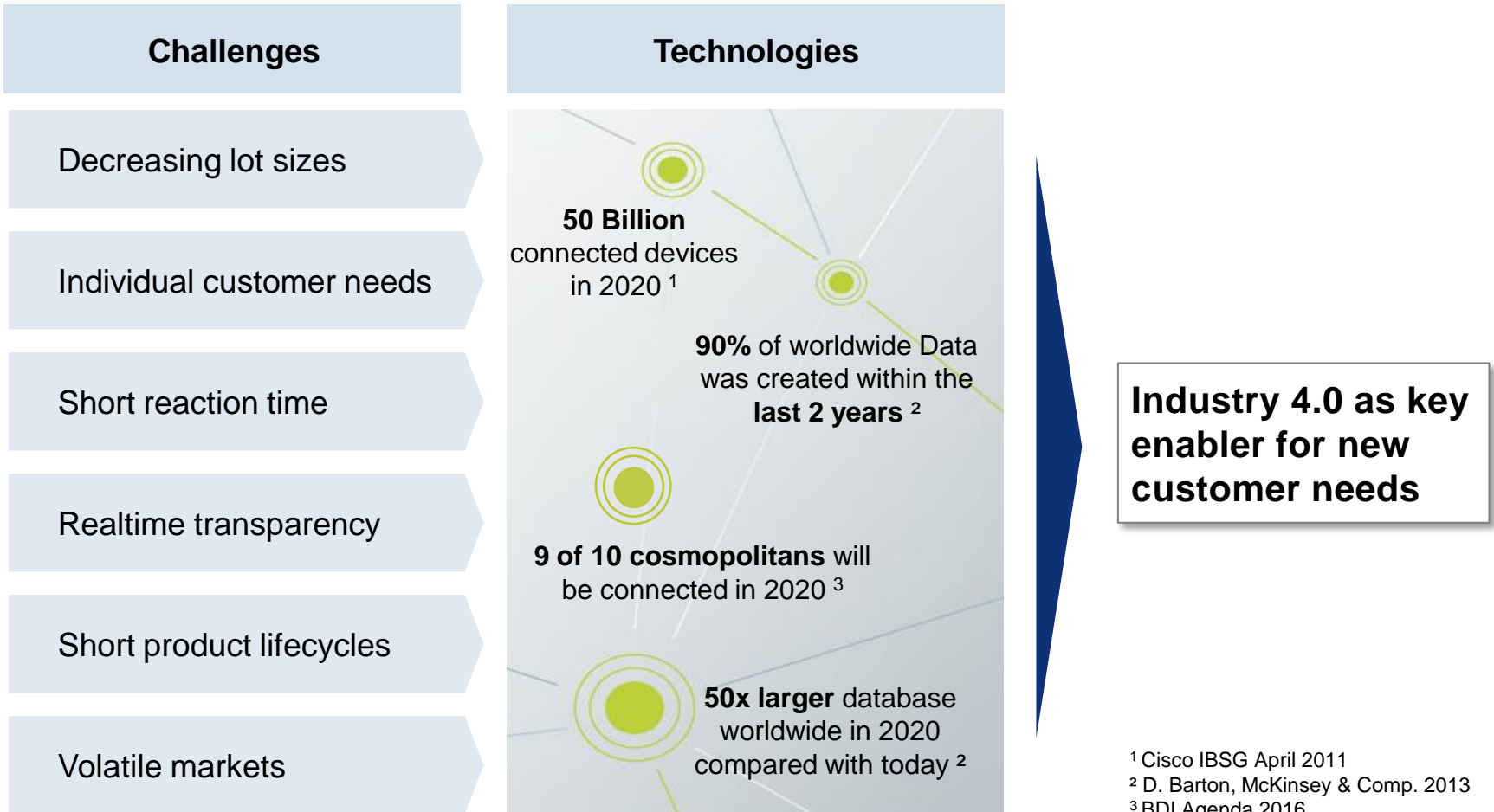of the World Economic Forum

Source: WEF, Davos

Introduction – Number of connected devices

Source: CISCO

Introduction – Motivation for Industrie 4.0

Our customer needs can be enabled by digital technologies

Challenges	Technologies

Decreasing lot sizes

Individual customer needs

Short reaction time

Realtime transparency

Short product lifecycles

Volatile markets

50 Billion connected devices in 2020 [1]

90% of worldwide Data was created within the **last 2 years** [2]

9 of 10 cosmopolitans will be connected in 2020 [3]

50x larger database worldwide in 2020 compared with today [2]

Industry 4.0 as key enabler for new customer needs

[1] Cisco IBSG April 2011
[2] D. Barton, McKinsey & Comp. 2013
[3] BDI Agenda 2016

Industry 4.0 @ TRUMPF
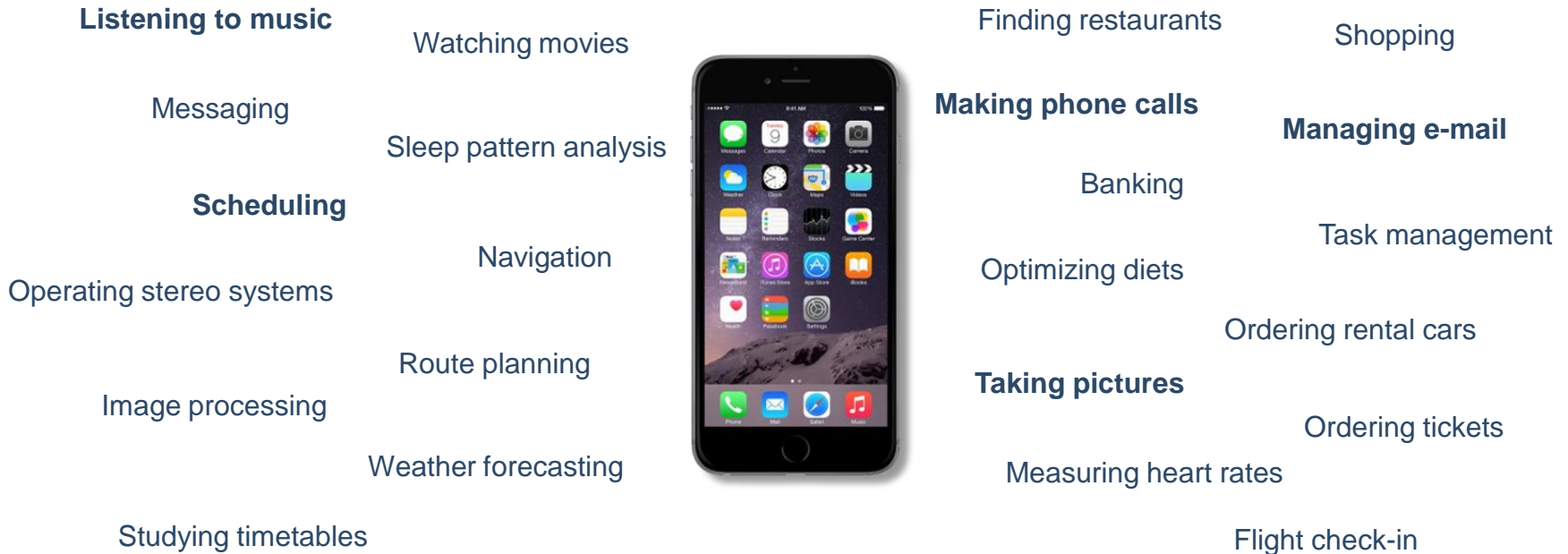
Our understanding

> **Industry 4.0 is to increase the digital networking of production with the aim of overall productivity, flexibility and process stability and to provide enterprise-wide value networks.**

Industrie 4.0
[ɪndʊsˈtʀiː fiːɐ̯ pʊŋkt nʊl]
Substantiv, feminin

Digitale Vernetzung der Produktion mit dem Ziel, Gesamtproduktivität, Flexibilität und Prozess-stabilität zu steigern und unternehmensüber-greifende Wertschöpfungsnetzwerke zu schaffen.

Industry 4.0 @ TRUMPF

1. **Digital networking in everyday private life and production**

2. **Why do we need a smart factory?**

3. **TRUMPF as key supplier**

4. **TRUMPF as key user**

The smartphone has changed people's everyday lives

Opportunities to optimize private processes

Listening to music

Watching movies

Finding restaurants

Shopping

Messaging

Making phone calls

Managing e-mail

Sleep pattern analysis

Banking

Scheduling

Task management

Navigation

Optimizing diets

Operating stereo systems

Ordering rental cars

Route planning

Taking pictures

Image processing

Ordering tickets

Weather forecasting

Measuring heart rates

Studying timetables
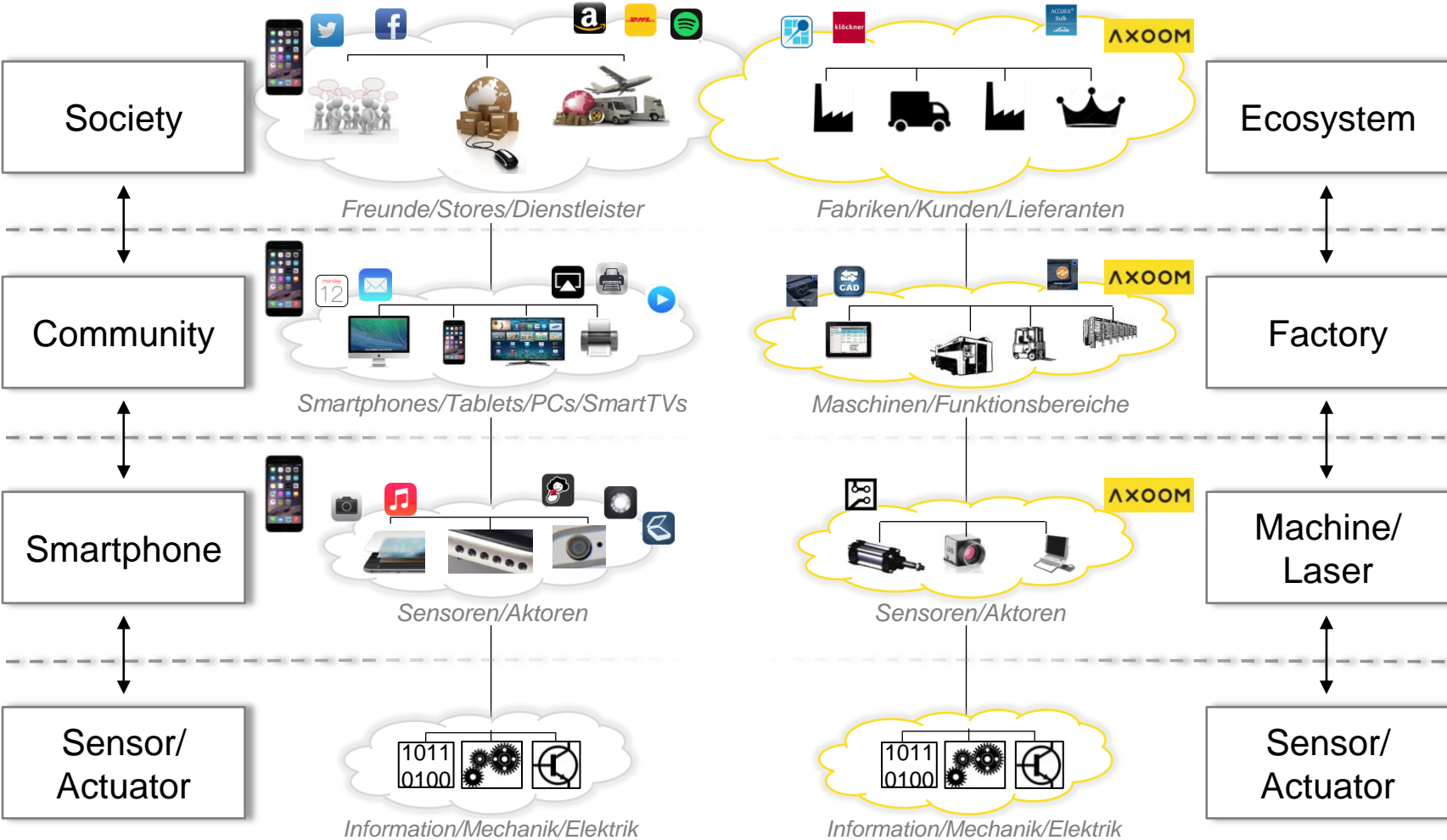
Flight check-in

> The intelligent networking of all applications in a common system is essential for more flexible, faster, better-organized and more controllable everyday processes.

Image source: Apple

The smart factory will change overall production

Smartphone   **Smart Factory**

| Society | | Ecosystem |

Freunde/Stores/Dienstleister   *Fabriken/Kunden/Lieferanten*

| Community | | Factory |

Smartphones/Tablets/PCs/SmartTVs   *Maschinen/Funktionsbereiche*

| Smartphone | | Machine/ Laser |

Sensoren/Aktoren   *Sensoren/Aktoren*

| Sensor/ Actuator | | Sensor/ Actuator |

Information/Mechanik/Elektrik   *Information/Mechanik/Elektrik*

Source: Apple   *Image source: Apple*

Industry 4.0 @ TRUMPF

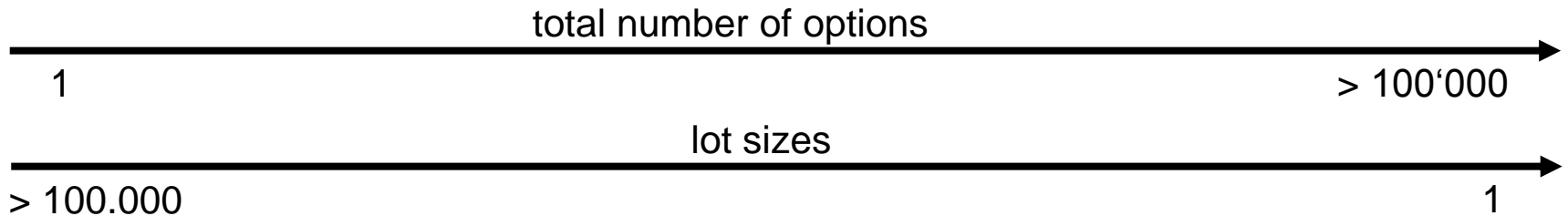1. **Digital networking in everyday private life and production**

2. **Why do we need a smart factory?**

3. **TRUMPF as key supplier**

4. **TRUMPF as key user**

Challenge 1: High variance and lot size flexibility

The trend is shifting towards orders with very low quantities

total number of options

1   > 100'000

lot sizes

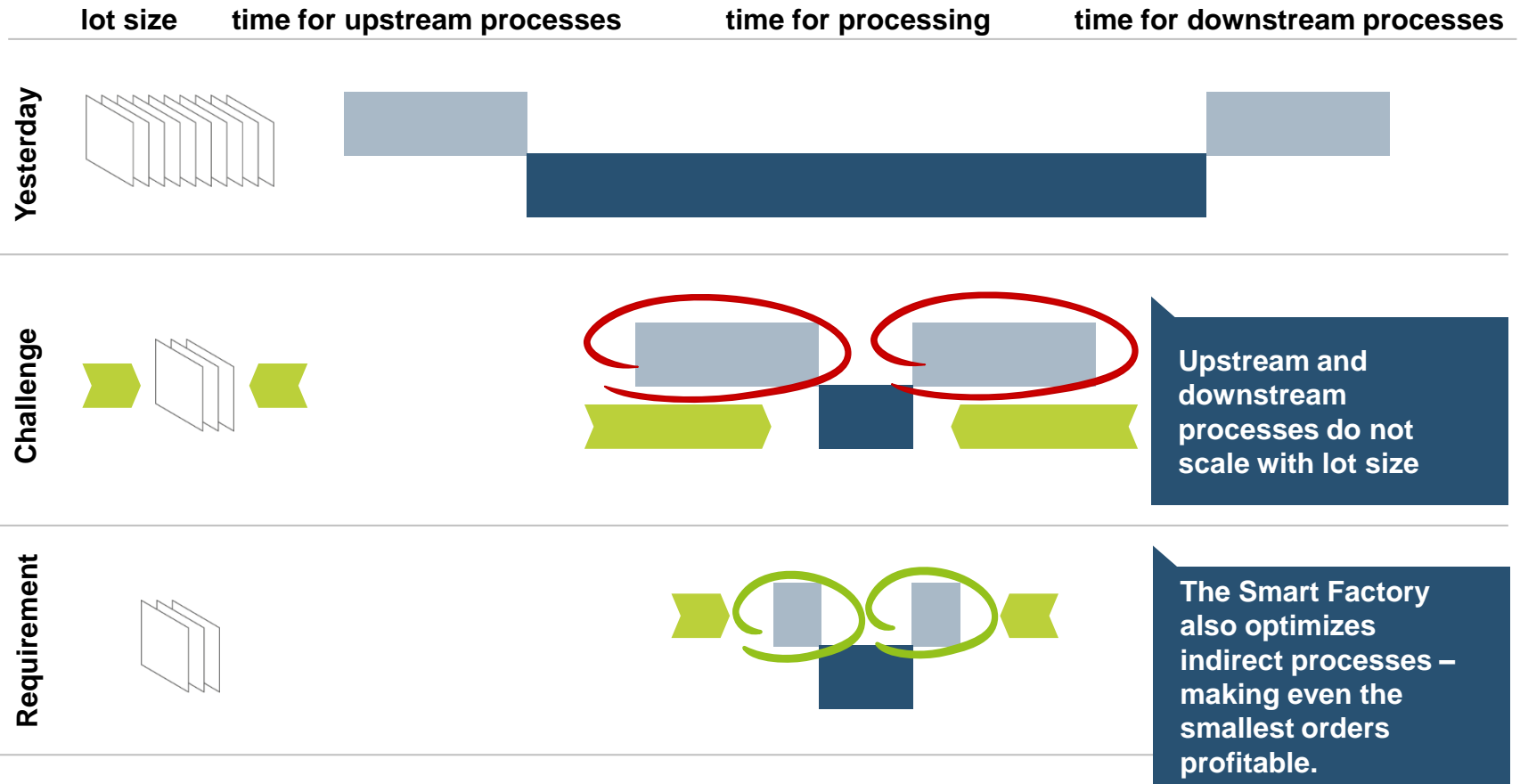> 100.000   1

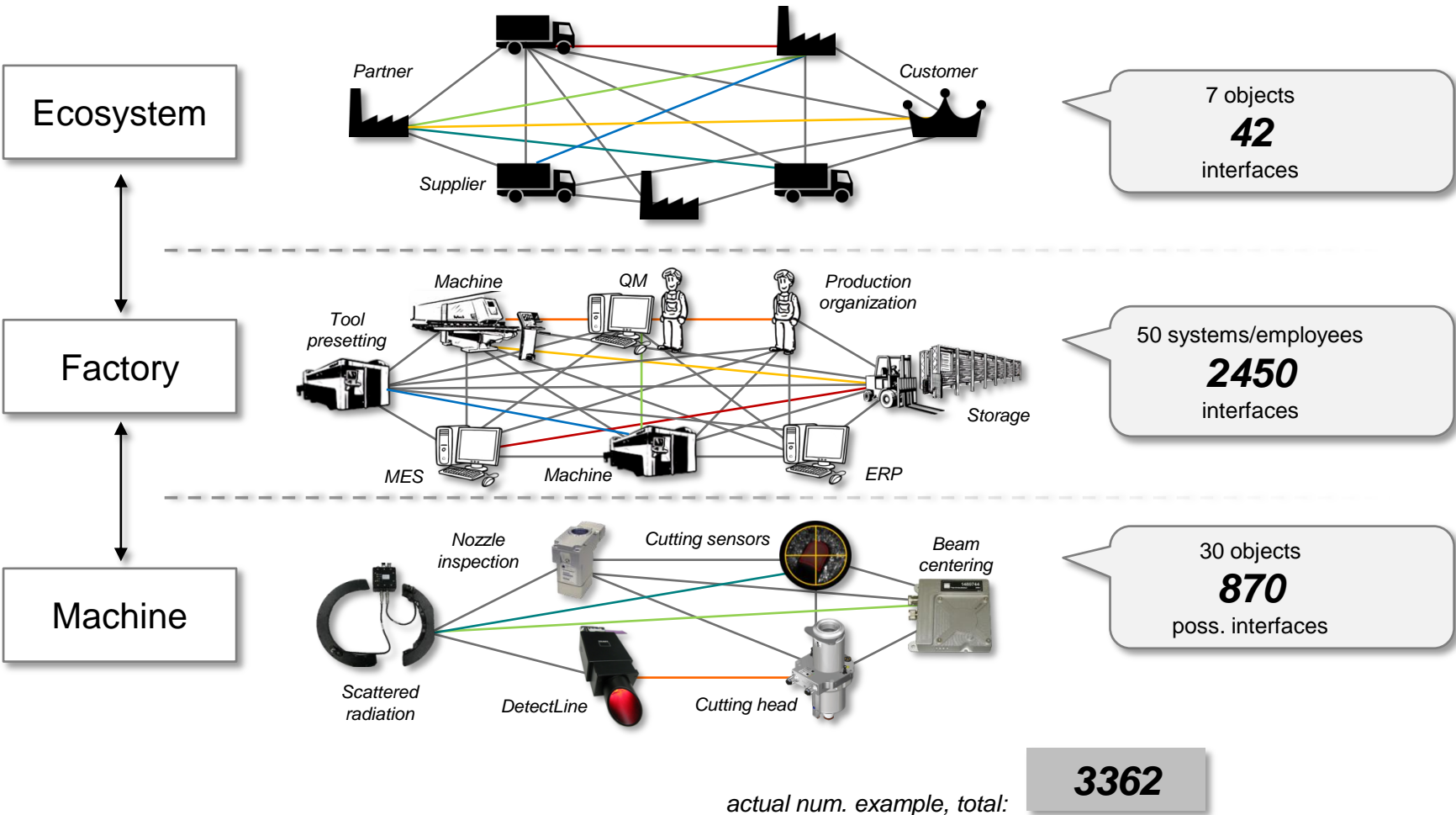**Mass production**   **Flexible production with lasers**

Solution 1: Smart Factory makes small orders economical

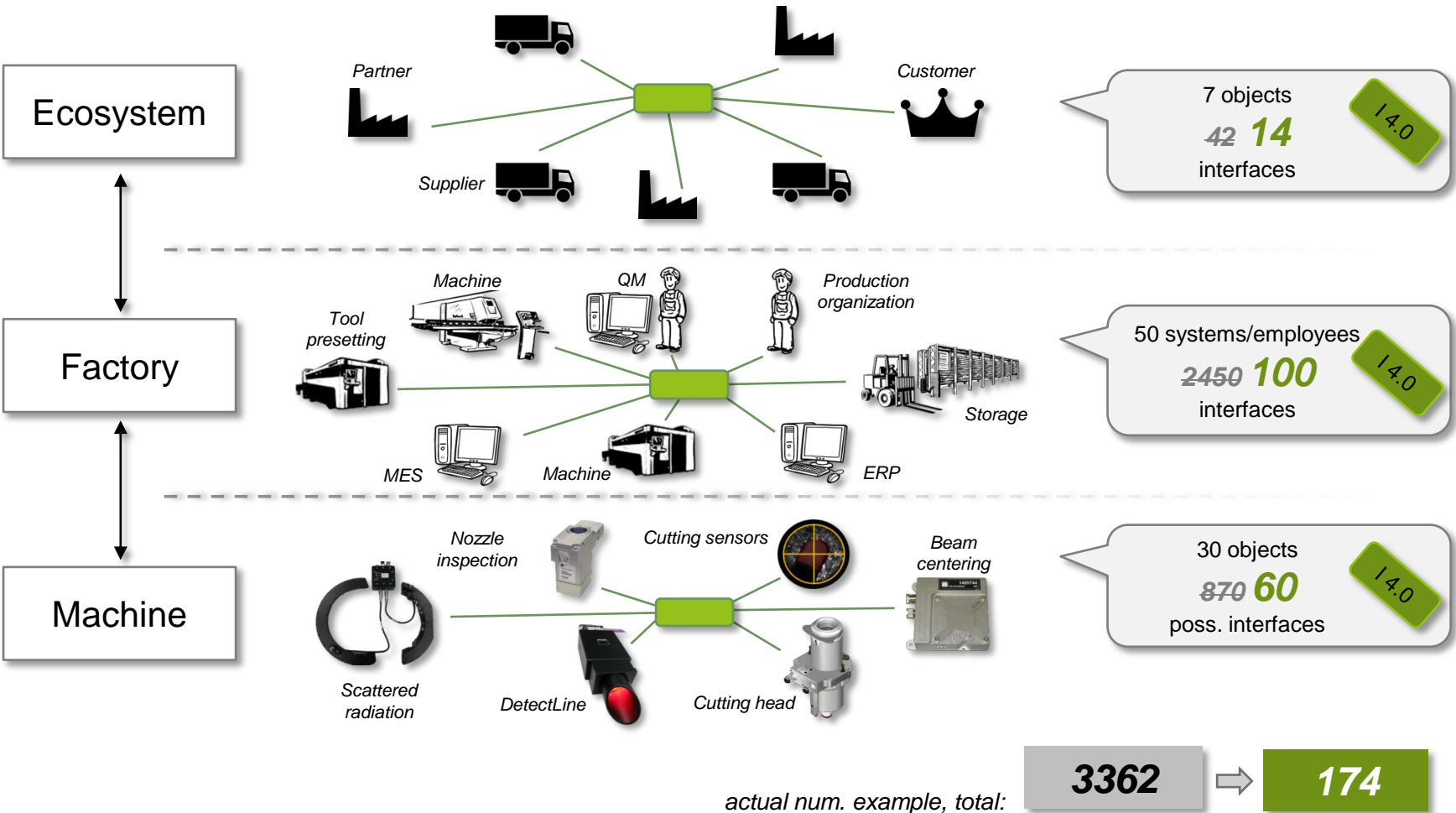## The focus is on indirect processes, both upstream and downstream

	lot size	time for upstream processes	time for processing	time for downstream processes
Yesterday				
Challenge				Upstream and downstream processes do not scale with lot size
Requirement				The Smart Factory also optimizes indirect processes – making even the smallest orders profitable.

Challenge 2: Value chain complexity

Cause: system discontinuities and stand-alone solutions at system limits

Ecosystem

Partner

Customer

Supplier

7 objects
42
interfaces

Factory

Machine

QM

Production organization

Tool presetting

Storage

MES

Machine

ERP

50 systems/employees
2450
interfaces

Machine

Nozzle inspection

Cutting sensors

Beam centering

Scattered radiation

DetectLine

Cutting head

30 objects
870
poss. interfaces

actual num. example, total: *3362*

Solution 2: Value chain complexity

Operational excellence and safe communication

Ecosystem

Partner
Customer
Supplier

7 objects
42 **14**
interfaces
I4.0

Factory

Tool presetting
Machine
QM
Production organization
Storage
MES
Machine
ERP

50 systems/employees
2450 **100**
interfaces
I4.0

Machine

Nozzle inspection
Cutting sensors
Beam centering
Scattered radiation
DetectLine
Cutting head

30 objects
870 **60**
poss. interfaces
I4.0

actual num. example, total: **3362** ⇨ **174**

Solution

The Smart Factory

What digital networking makes possible:

1. Continuous end-to-end processes for the entire factory
2. Improved data collection and evaluation
3. Transparency over performance, cost and processing status
4. Automated business processes
5. Intercompany value chain networks
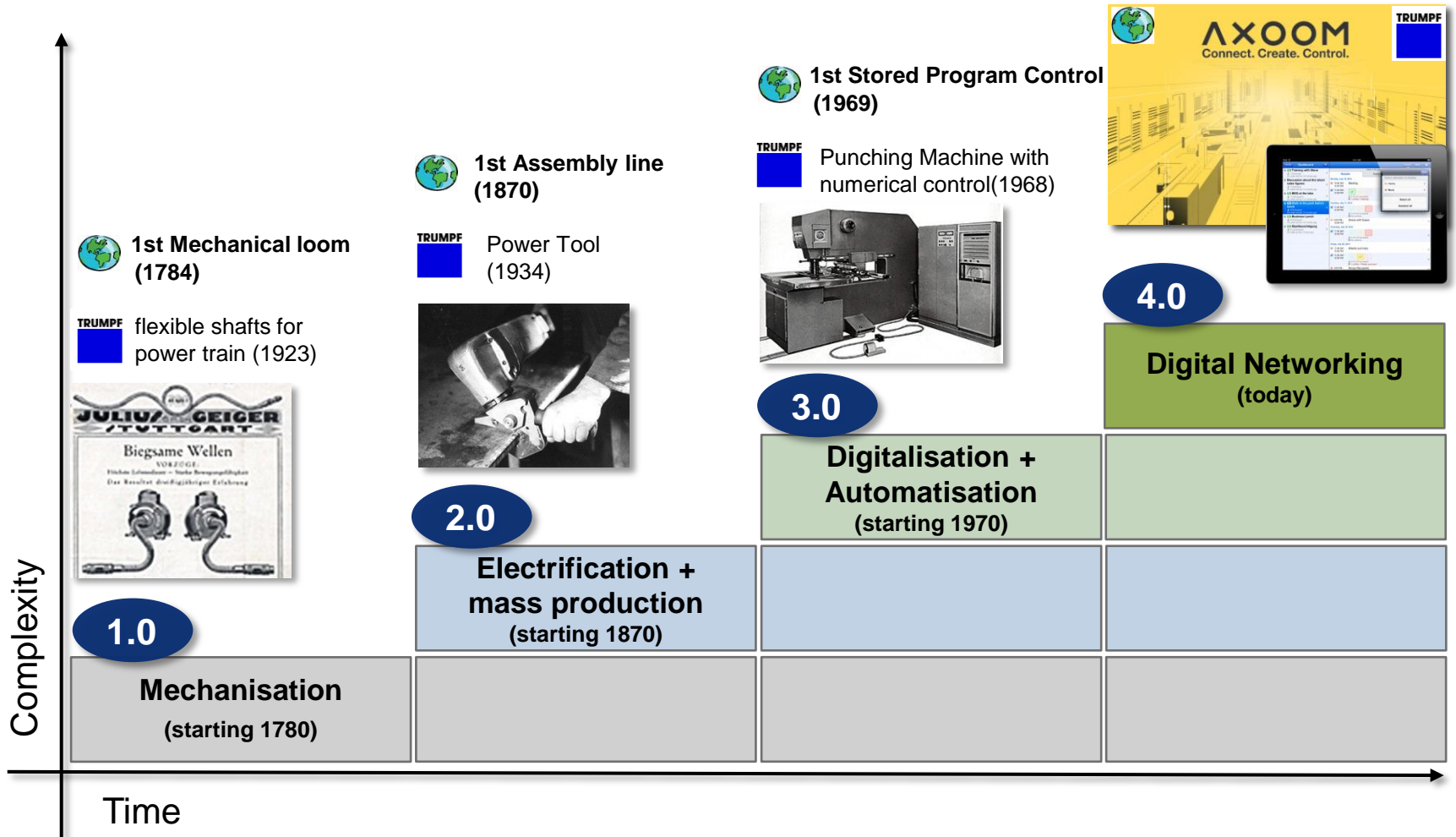6. New partnerships and business models

ADVANTAGES → **Considerable increases in overall productivity, flexibility and process stability.**

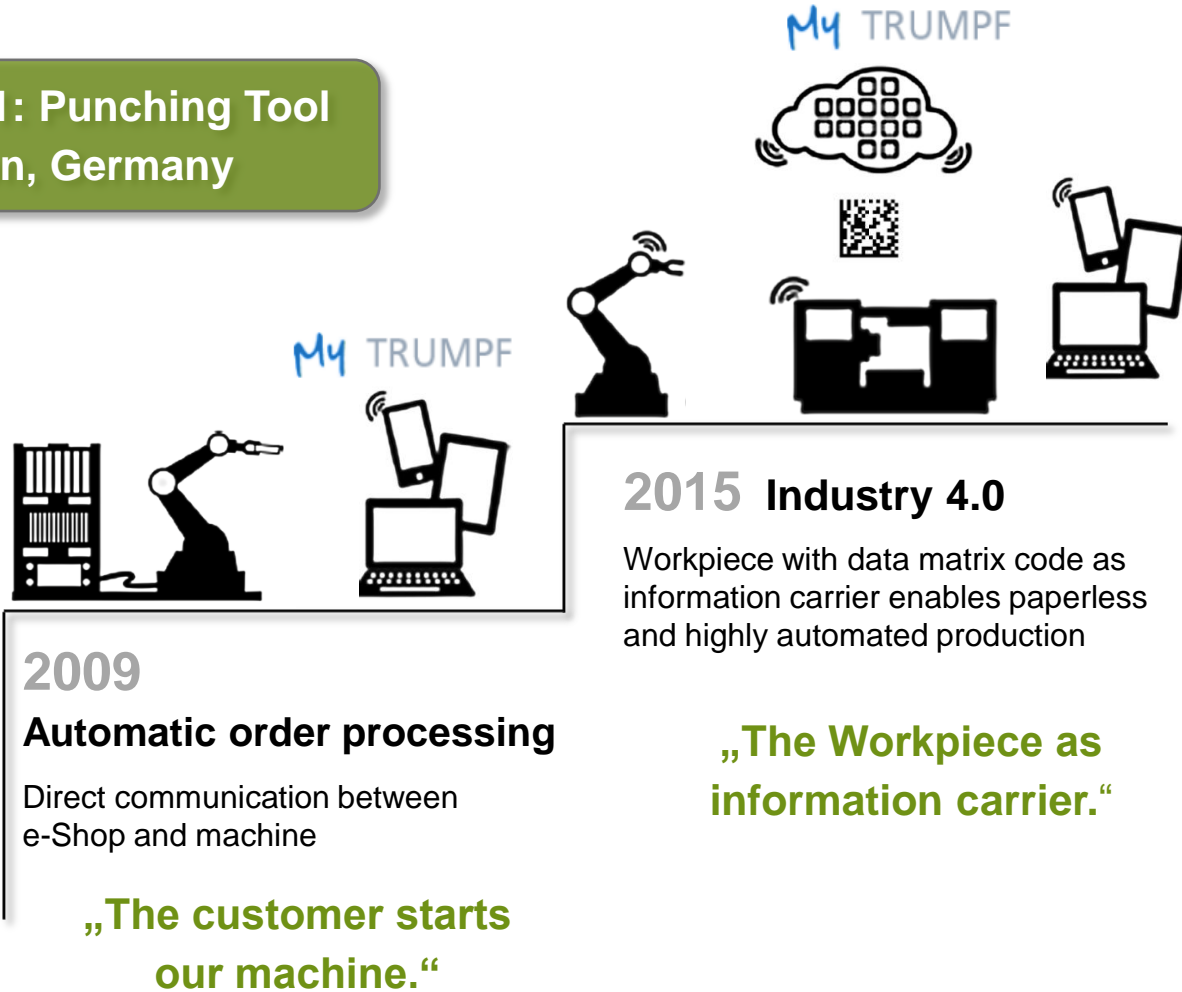# Industry 4.0 @ TRUMPF

1. **Digital networking in everyday private life and production**

2. **Why do we need a smart factory?**

3. **TRUMPF as key supplier**

4. **TRUMPF as key user**

From Industry 1.0 to Industry 4.0

Complexity (y-axis)

Time (x-axis)

1st Mechanical loom (1784)

flexible shafts for power train (1923)

1st Assembly line (1870)

Power Tool (1934)

1st Stored Program Control (1969)

Punching Machine with numerical control(1968)

AXOOM — Connect. Create. Control.

1.0
Mechanisation
(starting 1780)

2.0
Electrification + mass production
(starting 1870)

3.0
Digitalisation + Automatisation
(starting 1970)

4.0
Digital Networking
(today)

AXOOM: A Partner for the entire value chain

Business Platform AXOOM
Maximum Efficiency in Production

1	2	3	4	5	6
Order Entry	**Order Management**	**Procurement**	**Production Planning**	**Shipping**	**Reports & KPIS**
Direct online order and customer acquisition	Digital and 100 % efficient	Instant material purchasing	Fully automated shop floor optimization	Automated and cost efficient logistics	Full business transparency

Industry 4.0 @ TRUMPF

1. **Digital networking in everyday private life and production**

2. **Why do we need a smart factory?**

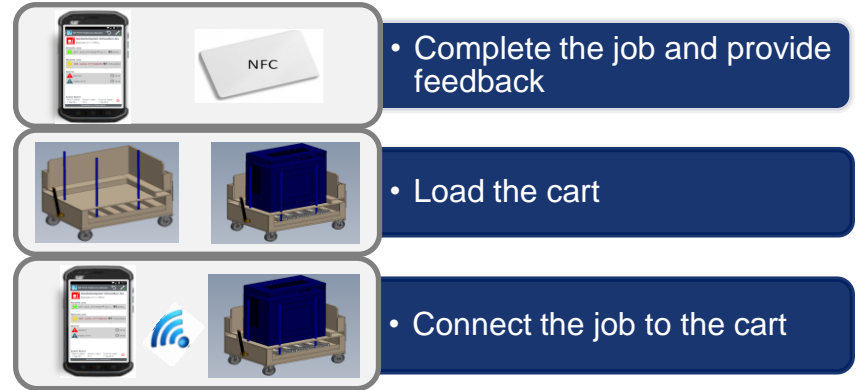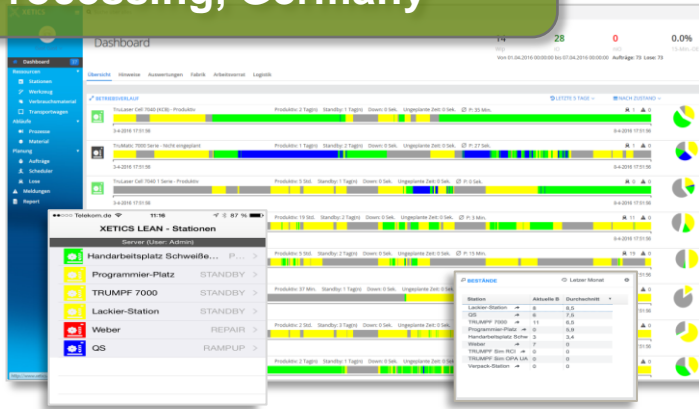3. **TRUMPF as key supplier**

4. **TRUMPF as key user**

TRUMPF as key user

Example 1: Punching Tool Production, Germany

My TRUMPF

My TRUMPF

2015 **Industry 4.0**

Workpiece with data matrix code as information carrier enables paperless and highly automated production

2009

Automatic order processing

Direct communication between e-Shop and machine

„**The customer starts our machine.**"

„**The Workpiece as information carrier.**"

TRUMPF as key user

Example 2: Sheet Metal Processing, Germany

- Complete the job and provide feedback
- Load the cart
- Connect the job to the cart

Shop Floor Management System

Introduction of a powerful MES system with mobile, handheld features:

- Acquire and evaluate machine status
- Register storage locations
- Interactive supporting documents
- Maintenance reports

Optimizing Internal Logistics

Evaluating various localization systems for internal transport:

- Transparency over the position and availability of transport carts
- Quick and error-free deployment

Industry 4.0 @ TRUMPF

We have turned on the lights!

YOUR CONTACT

Andreas Conzelmann
General Manager
+41 81 307 65 52
Andreas.conzelmann@ch.trumpf.com