

# **PHARMA 4.0- EVOLUTION OR REVOLUTION**

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WHEN YOU NEED TO MEET A HIGHER STANDARD™

# AGENDA

- Part 1- What is Pharma 4.0
- Part 2- Trends and Why is it coming a reality
- Part 3 –Holistic process control strategy
- Part 4 –What is reality now ?



# INTRODUCTIONS

- B.Sc Biotechnology
- PhD Cancer Research multiple drug resistance
- Masters in Project Management
- 9+ Years – Sandoz/Novartis
- 13\* years Professional Engineering and CQV services.
- 6+ years VP for CAI.
- 2 Years on ISPE International Board of Directors
- 7 Years on the C&Q COP
- SME for CQV, Technology Transfer, QRM / Risk Based C&Q Topics



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# COMMISSIONING AGENTS, INC.

**480+**  
**Agents**  
Global  
Presence

**9**  
**Business**  
**Areas**

**\$060M+**  
Services  
delivered

**190**  
**Active**  
**Projects**

**22 Years**  
Of safety  
excellence

A global partner in providing professional services to enhance **operational performance** and **reliability**.



**GLOBAL IMPACT**



Asset Management &  
Reliability



Automation & Information  
Technology



BioVoke™ eVLM



Building Commissioning



Commissioning &  
Qualification



Full Scale Operations™



Human Performance



Owner's Project  
Management



Process & Manufacturing  
Technologies



Quality, Compliance, &  
Regulatory

## LOCAL SERVICES

# PHARMA 4.0



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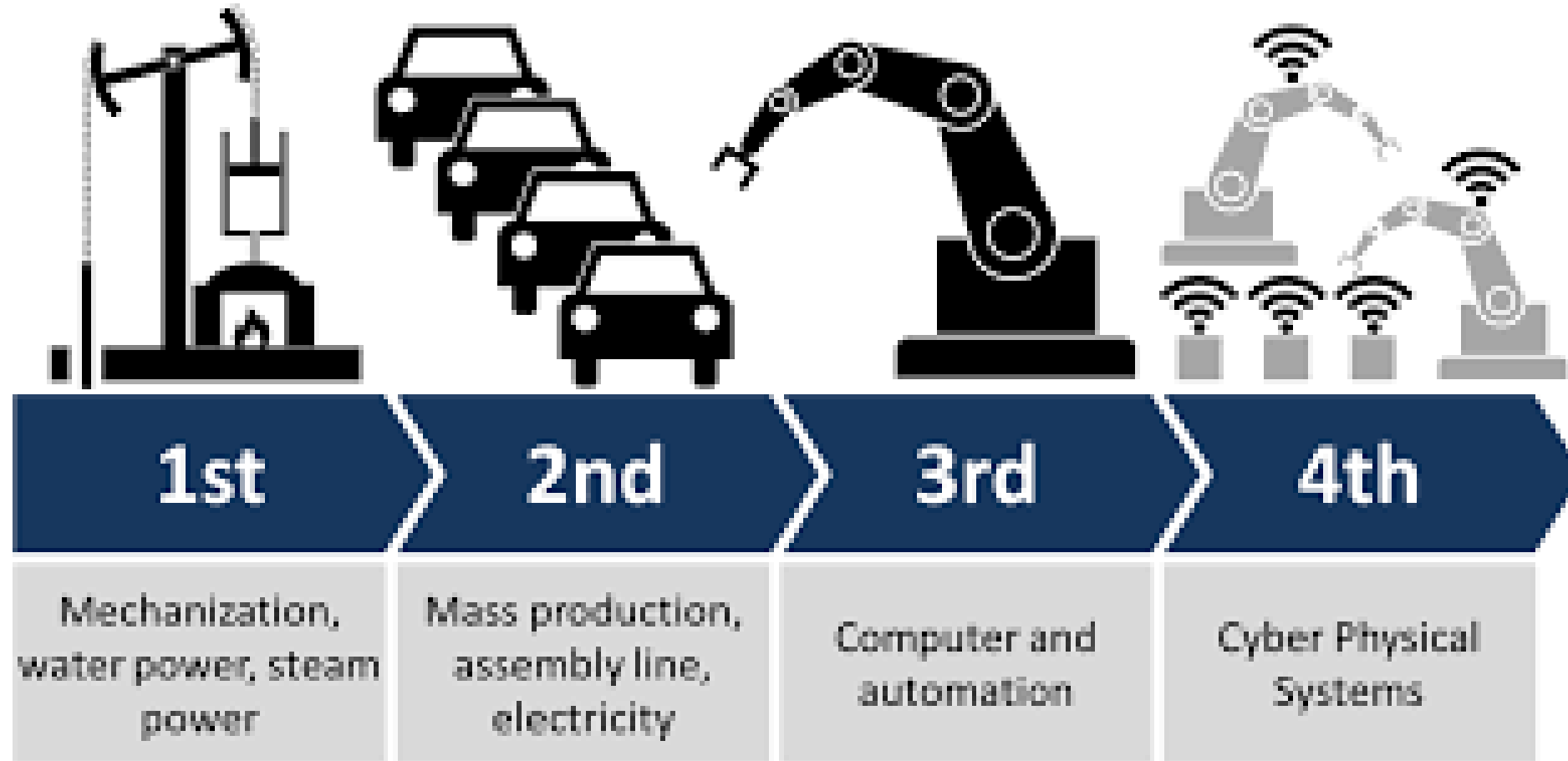
# THE ORIGIN & DEFINITION OF PHARMA 4.0

Industry 4.0 was originally a German concept, so it is fitting that the International Society for Pharmaceutical Engineering's Germany/Austria/Switzerland (ISPE D/A/CH) affiliate introduced the concept of "Pharma 4.0" to apply Industry 4.0 concepts to pharmaceutical manufacturing and formed the ISPE Pharma 4.0 special interest group (SIG) in 2017.

Pharma 4.0 envisions highly efficient automated processes—which could be continuous, batch, or a hybrid of these—driven by an integrated manufacturing control strategy

Pharma 4.0 represents a shift away from focusing on producing to a fixed specification. Instead, Pharma 4.0 revolves around a system of real-time monitoring, simulation and control of manufacturing processes

# ORIGIN OF PHARMA 4.0 WAS INDUSTRY 4.0



# AIM OF PHARMA 4.0

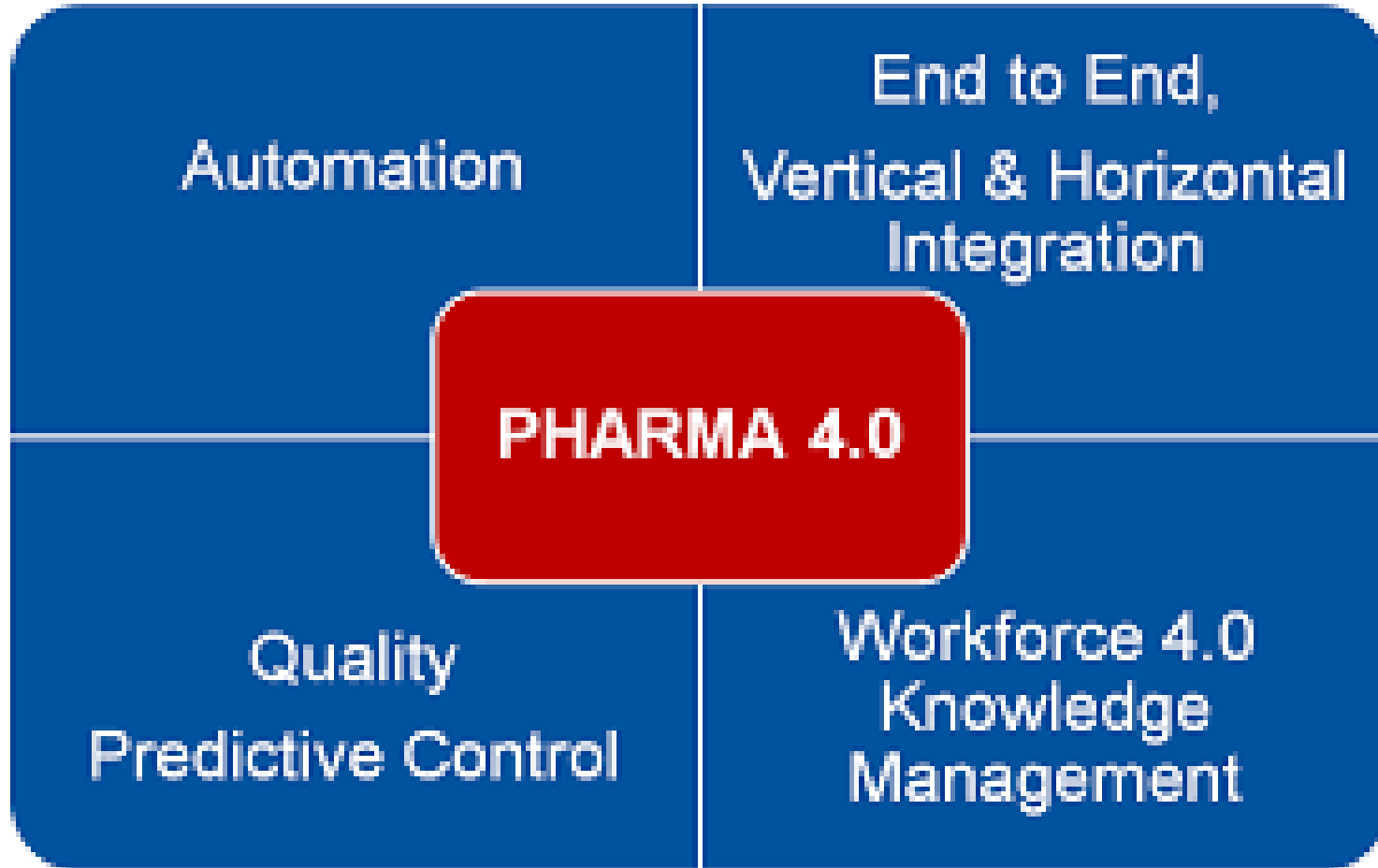
To obtain the efficient, robust, and flexible manufacturing operations envisioned in Pharma 4.0, the manufacturing control strategy must be integrated with all parts of the manufacturing process as well as with quality and business functions

*“Vertical integration—the manufacturing floor up to manufacturing execution and enterprise resource planning systems—allows real-time, data-driven decisions. Horizontal integration of laboratory systems with manufacturing process, equipment, and facility systems allows feedforward and backward controls.”*

The availability of data from across the product lifecycle allows data-driven process control and predictive product quality that increases process robustness and improves quality



# PHARMA 4.0



# CURRENT TRENDS

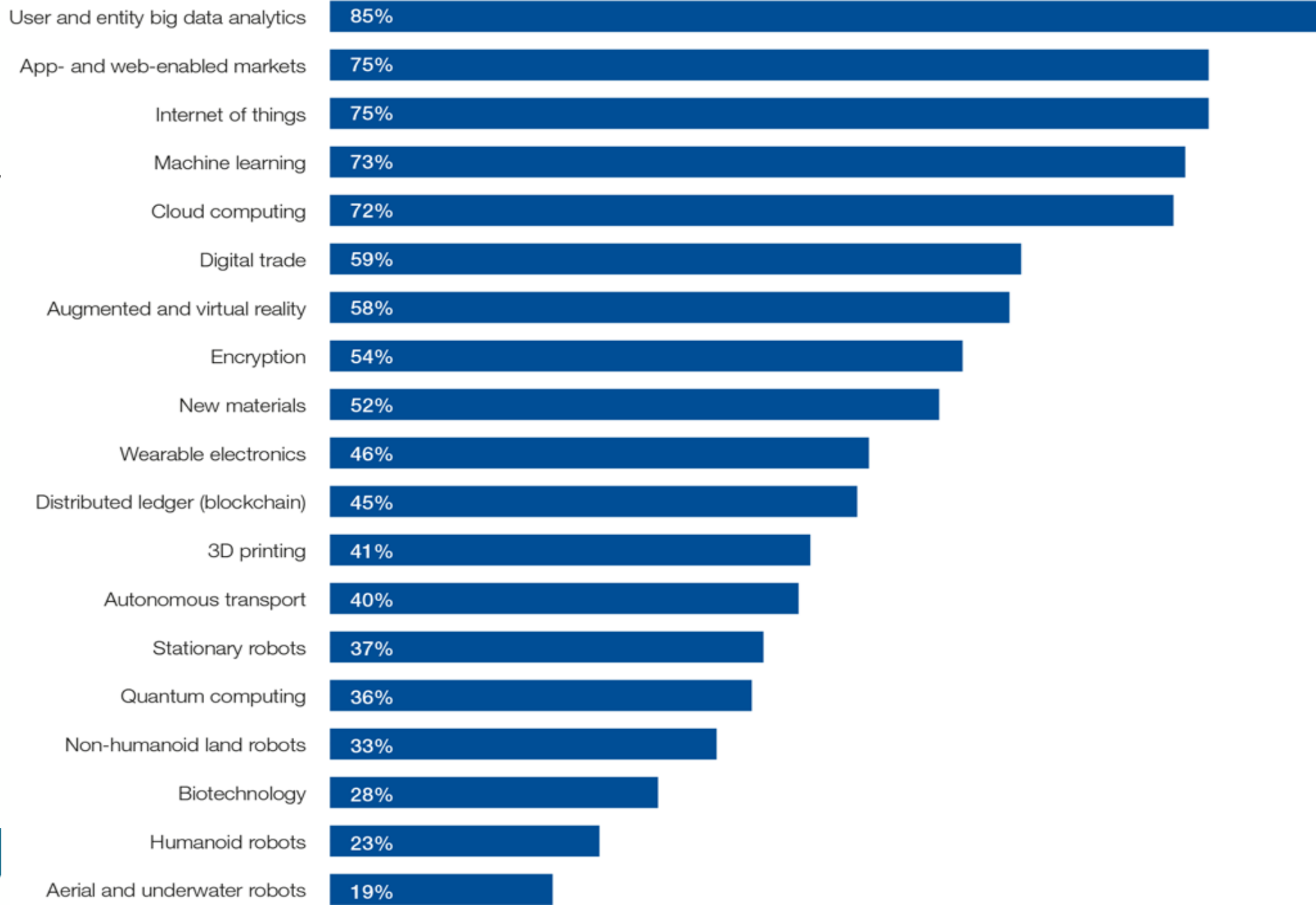


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# LET'S PUT THIS ALL INTO CONTEXT

Trends set to positively impact business growth up to 2022	Trends set to negatively impact business growth up to 2022
Increasing adoption of new technology	Increasing protectionism
Increasing availability of big data	Increase of cyber threats
Advances in mobile internet	Shifts in government policy
Advances in artificial intelligence	Effects of climate change
Advances in cloud technology	Increasingly ageing societies
Shifts in national economic growth	Shifts in legislation on talent migration
Expansion of affluence in developing economies	Shifts in national economic growth
Expansion of education	Shifts of mindset among the new generation
Advances in new energy supplies and technologies	Shifts in global macroeconomic growth
Expansion of the middle classes	Advances in artificial intelligence

# Technologies by proportion of companies likely to adopt them by 2022 (projected)





## Revolution or Evolution



# WHAT IS THE FORMULA





# HOLISTIC PROCESS CONTROL STRATEGY



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# CURRENT PROBLEM STATEMENT

Submissions based on  
QTTP

Omission of  
GMP, facilities, utilities,  
equipment and other  
production-specific  
controls to mitigate risk  
and ensure an effective,  
reliable, and stable  
production process

Effect of unknown  
process parameters, raw  
material attributes, and  
impurities usually are not  
sufficiently addressed in  
the control strategy  
lifecycle management

Pharma 4.0



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# HOLISTIC PROCESS CONTROL STRATEGY (HPCS)

- Is a set of enablers and elements that provides a holistic view of production to ensure a flexible, agile, sustainable, and reliable pharmaceutical production that mitigates the risk to patients, products, processes, and the business.
- Covers products and materials designed for fully automated processes. It requires an educated workforce to manage integrated processes and data flows as well as modern platforms, machines, and facilities designed for digitalization and automation.
- Supports business processes with integrated GxP IT systems along the supply chain.
- Requires management to establish and foster an adequate framework and organizational culture for Pharma 4.0.

# WHAT NEEDS ATTENTION ?

Three main areas need attention:

- **Leadership:** Senior management understanding, ownership, and responsibility for cross-functional stakeholder management.
- **Capabilities:** Cross-divisional knowledge, understanding, and collaboration.
- **Toolbox:** Identify, implement, and train methods and best practices to implement an advanced Holistic Production Control Strategy.

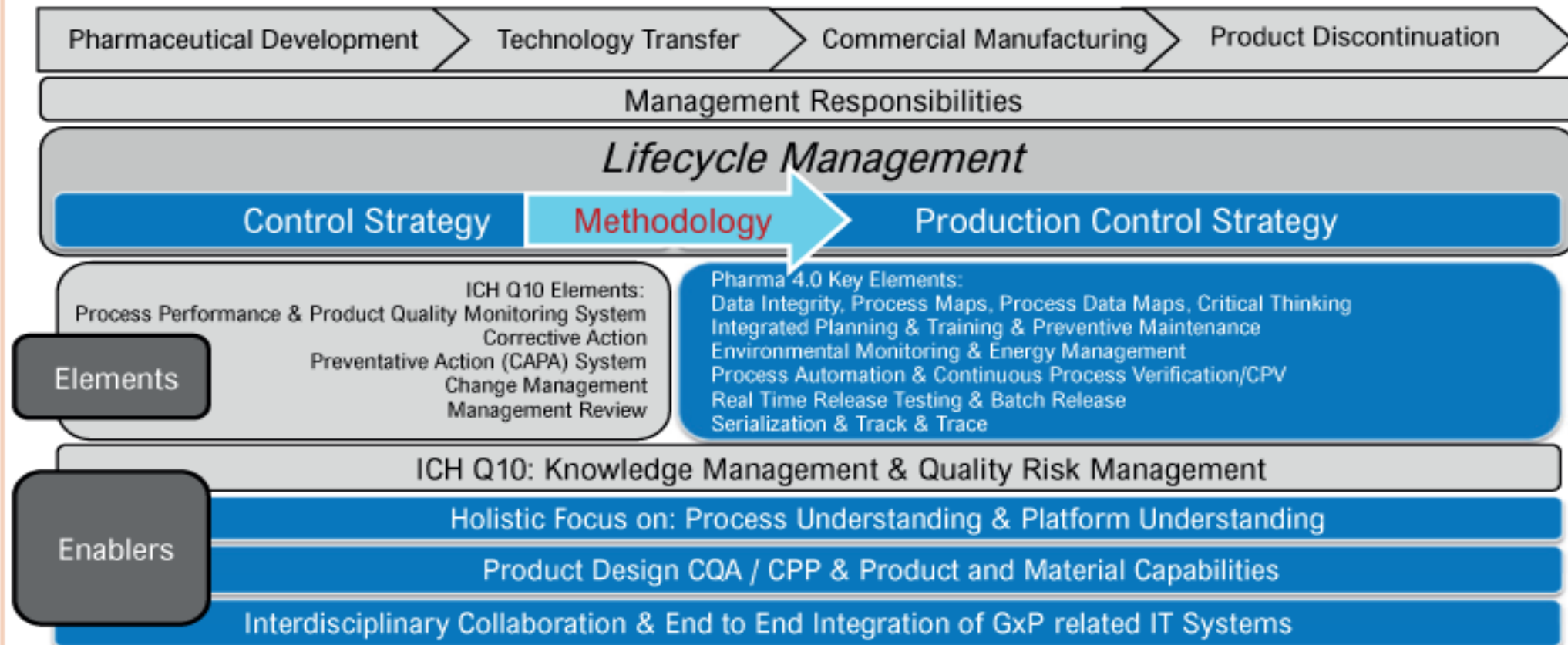
# WHERE DOES Q10 FIT IN ?

Figure 1: ICH Q10—Pharmaceutical quality system



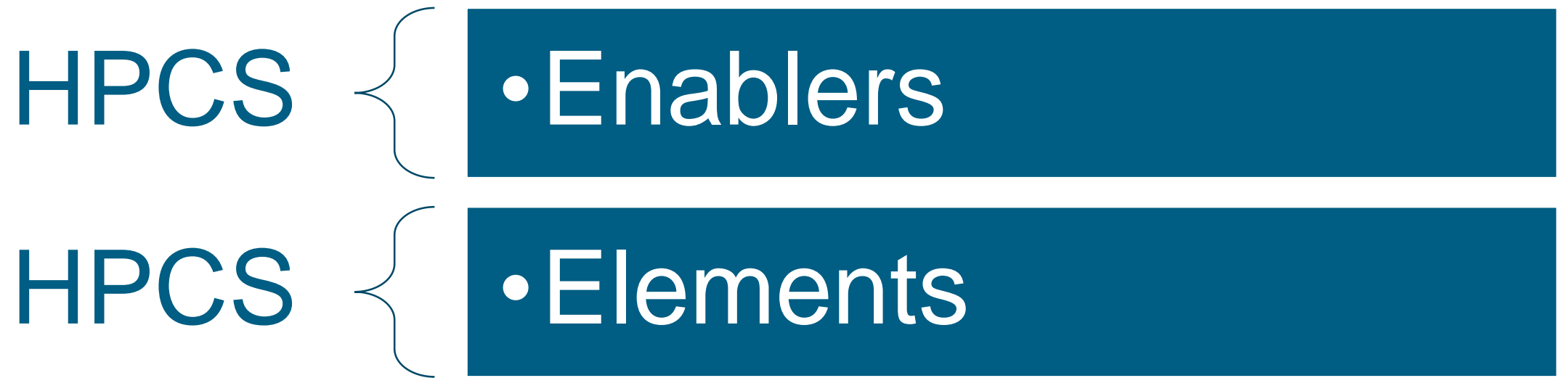
# ENABLERS AND ELEMENTS: FLEXIBLE AND ROBUST HOLISTIC PRODUCTION CONTROL STRATEGY

Figure 2: From ICH Q10 to Pharma 4.0—holistic production control





# Tackling the problem

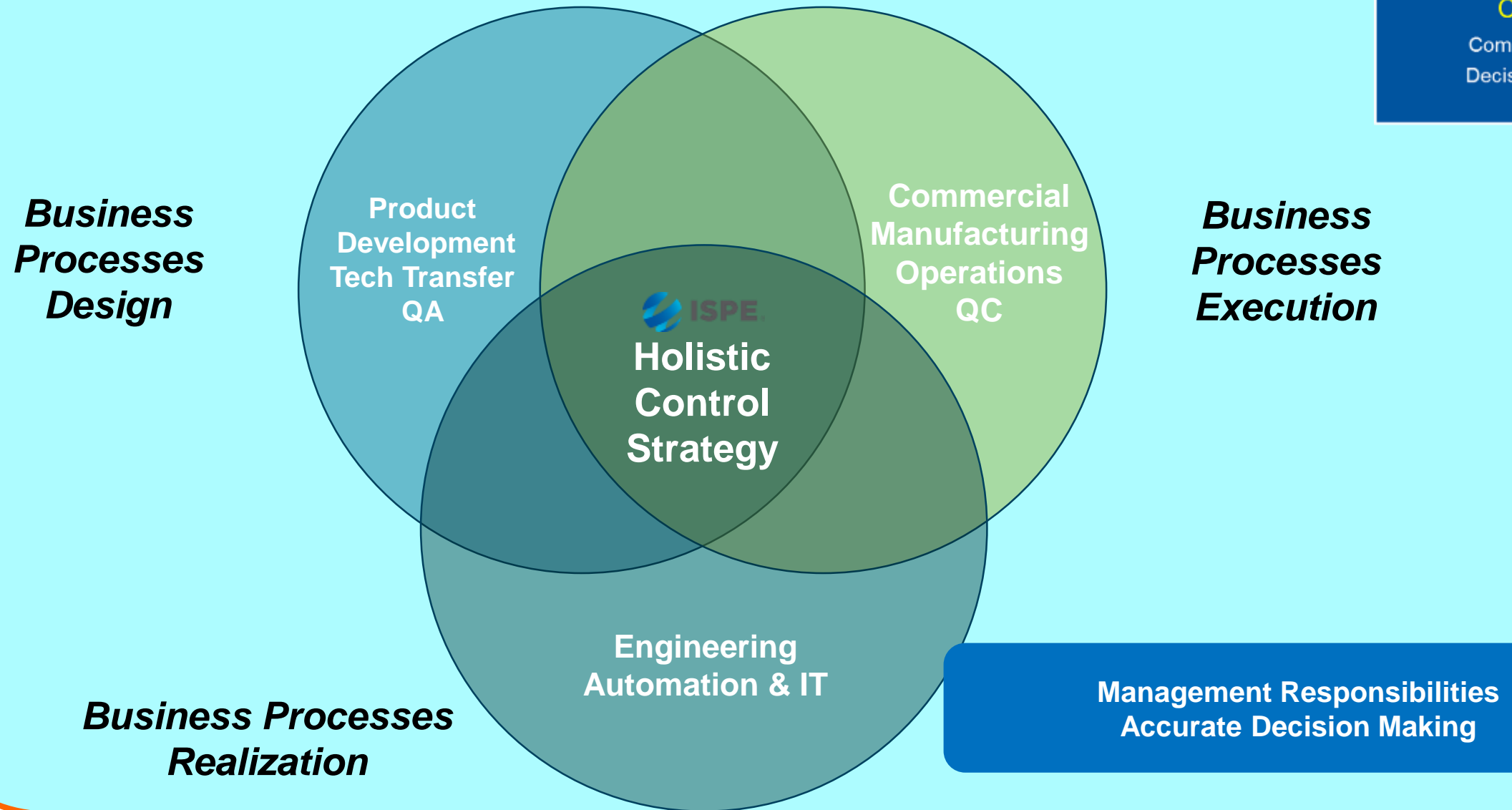


# HOLISTIC PROCESS CONTROL STRATEGY

Figure 3: Understanding the scope of the HPCS



- Breaking the Silos...is key



# WHAT IS REALITY NOW?



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# CURRENT REALITY

- Most companies still rely on paper systems to produce the right product at the right quality and cost. This is problematic, because paper systems often create operational problems related to a lack of timely or accurate information.
- The current reality for many production and quality managers is that they are forced to work under constant stress to release products, and they spend a great deal of time fire-fighting issues. They do not have the information needed to decipher the root causes of problems and sufficiently address negative trends and unreliable cycle times.

# PHARMA 4.0 IN REALITY...

ZURICH, September 28, 2018 /PRNewswire/ --

- Vifor Pharma Group today announced that the company and partner Goodly Innovations were awarded the 2018 Pharma 4.0 Award for the innovation of the year in manufacturing execution systems in the pharma industry

Vifor Pharma was the first company to pilot a dynamic team-based augmented reality system (Goodly Innovations' OptiworX) in a pilot project at its site in St. Gallen, Switzerland, in 2017. Augmented reality uses optical devices to create a "mixed reality" (i.e. real and virtual) 3D holographic information, like superimposed text and graphics over the real environment



# PHARMA 4.0 IN REALITY...

- Many Registered Continuous manufacturing products.
  - Vertex- Symdeko (tezacaftor/ivacaftor and ivacaftor)
  - Janssen - Prezista (darunavir) 600-mg tablets
- Emerging Technologies are prime candidates.

# THE MARKET (PATIENT AND INDUSTRY) NEED PHARMA 4.0

While many companies may have a long way to go, it is imperative that they start the Pharma 4.0 journey.

As data integrity expectations for regulators increase, and demand for more flexible manufacturing such as QbD, personalised medicine, smaller batch sizes and continuous manufacturing grows, it seems quite clear that it's time to move away from recording, managing and extracting information from data that is locked away on paper records.

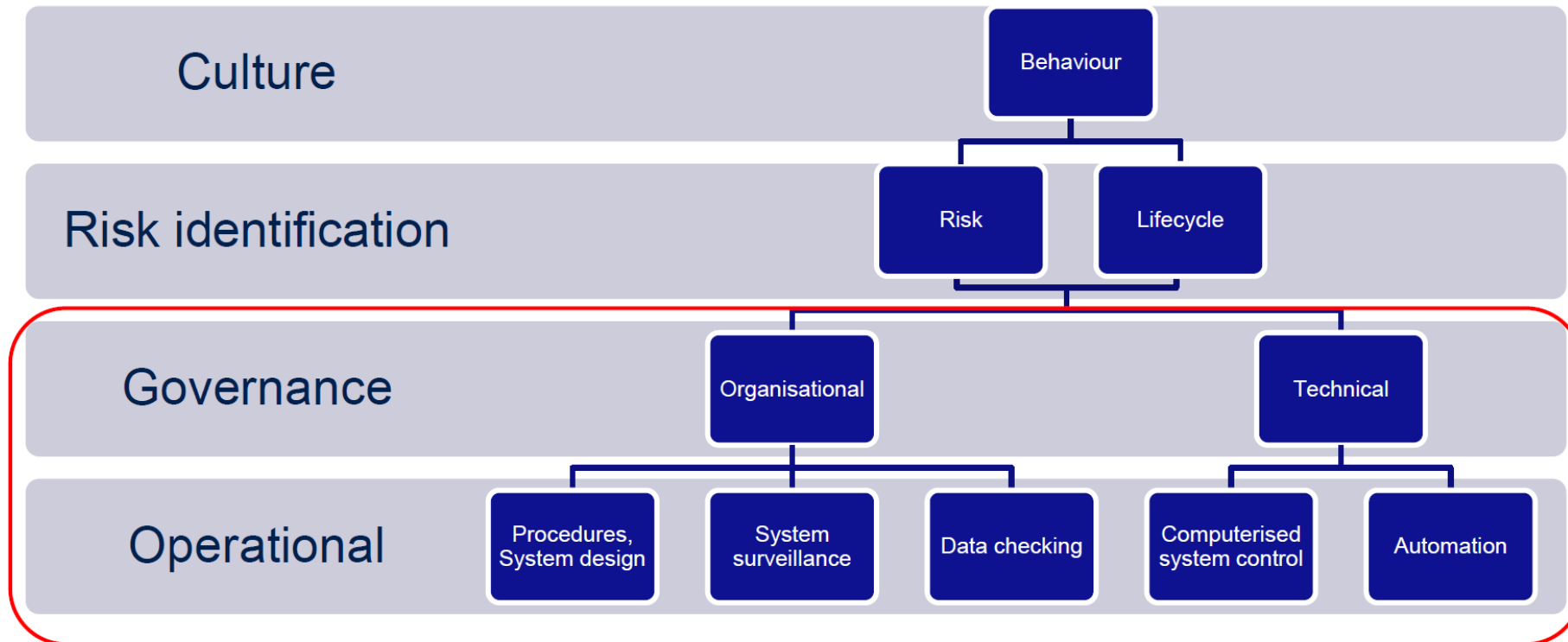
# TREAT- HUMAN PERFORMANCE/TALENT

- Do we have the Global Education and talent for
  - Big Data analytics
  - App
  - Web Development



*The workforce of the future will look very different*

# TREATS- DATA INTEGRITY- GOVERNANCE



**GMPs; Data Integrity Guidance documents**

# TREAT: CYBERSECURITY



## JUNE 30 – FURTHER UPDATE ON CYBER ATTACK

We have made good progress in our response to the June 27 global cyber attack. We have implemented business continuity plans and continue to ship orders and meet patients' needs.

We and our external partners see no indication that the company's data have been compromised.

Government authorities working with us have confirmed that the malware responsible for the attack contained a unique combination of characteristics that enabled it to infect company systems despite installation of recent software patches.



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# HOW DID THE MERCK ATTACH HAPPEN?

An Email was opened.....





# What will Enable Pharma 4.0?

- Cost
  - Management of Big Data is getting cheap
  - PAT Systems affordable
  - **Benefit: IT projects have a better business case**
- Digitalization of the ICH Q10 PQS
  - Change Management from paper based to electronic processes
  - Impact on Business & Pharmaceutical Processes – Digital Maturity
  - Benefit: Real time predictive quality control
- Regulatory
  - Regulators are looking closely to the manufacturing data, IT systems, processes & data
  - Data Integrity is building the Business Case
  - Benefit: Change from a Compliance to a Quality based approach



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# PHARMA 4.0 SIG- WHAT'S NEXT

The Pharma 4.0 SIG is working on pharma-specific maturity models, as well as those already defined in other industries, via its five subgroups:

- Holistic manufacturing control strategy based on ICH Q 10: Pharma 4.0 road map
- Pharma-specific impact and maturity model
- Process mapping and data integrity by design
- Automation and continuous process verification
- Plug-and-play automation



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# REFERENCES

Prof. Christoph Herwig, PhD, Christian Wölbeling, and Thomas Zimmer, PhD—authors of the 2017 Article of the Year.

Their article "A Holistic Approach to Production Control: From Industry 4.0 to Pharma 4.0" as published in the [May-June 2017 issue of Pharmaceutical Engineering® magazine](#)

[Pharma 4.0 SIG presentations- ISPE Rome 2018](#)

# IRELAND & SOUTH AFRICA TRIVIA



- We both Love Rugby  
Played 26 times – Ireland won 7 SA 18 – 1 draw
- Nelson Mandela visited our country 3 times- I was at the conferring where he was given an honorary PhD in 2003
- It is the most frequent place Irish couples go for honeymoon

# THANK YOU-QUESTIONS ?

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