



3D METROLOGY
CONFERENCE



INSPIHERE

Metrology as the Fundamental Enabler for
Industry 4.0 and the Future of Manufacturing

Ben Adeline, CEO – Insphere Ltd

The innovators of 'Value Added Metrology'

Our Mission

Metrology Integrators
providing a unique
blend of expertise in
**high-value
manufacturing &
metrology...**

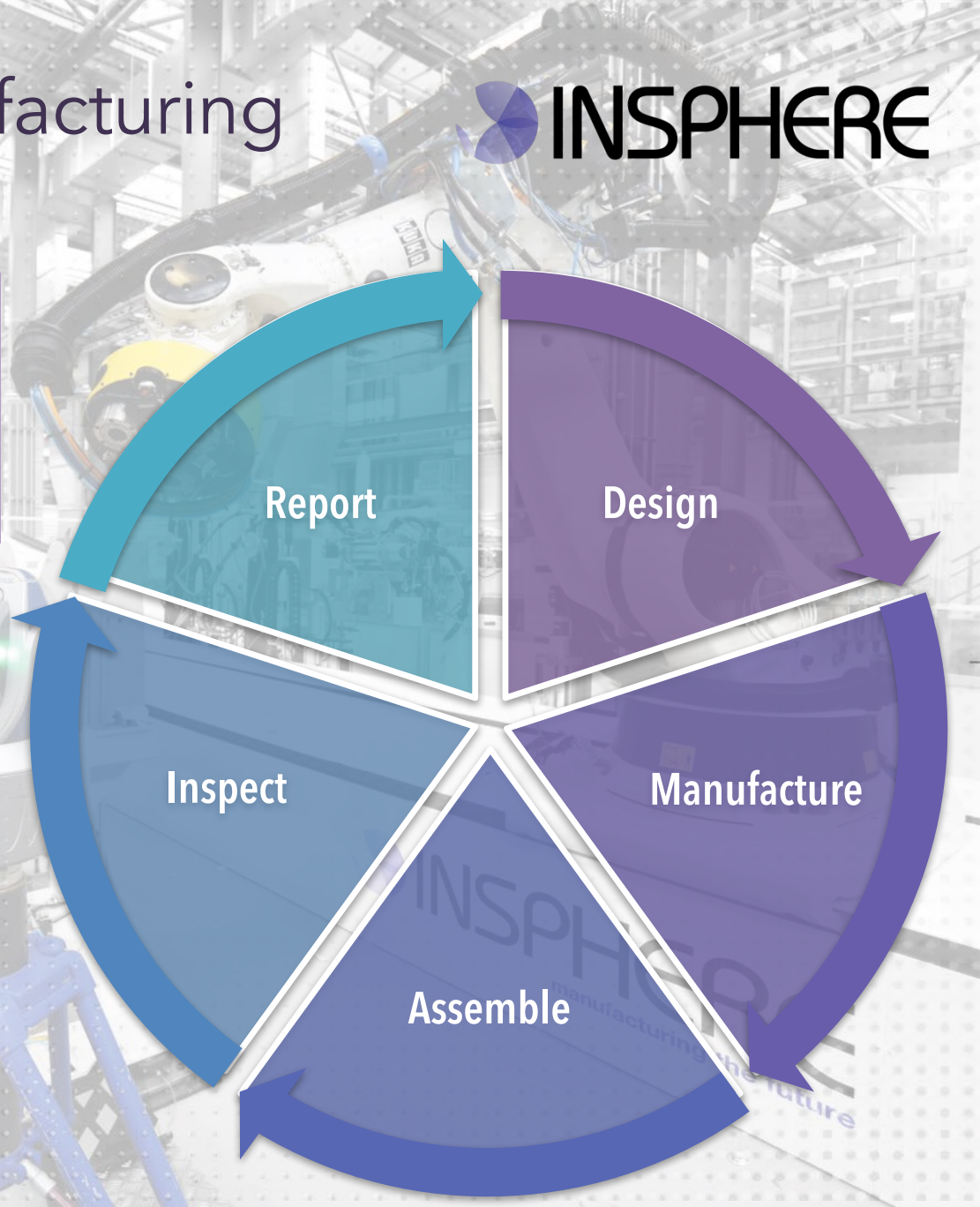
... with the principal
aim of providing **value
added metrology**
solutions



Metrology in Manufacturing

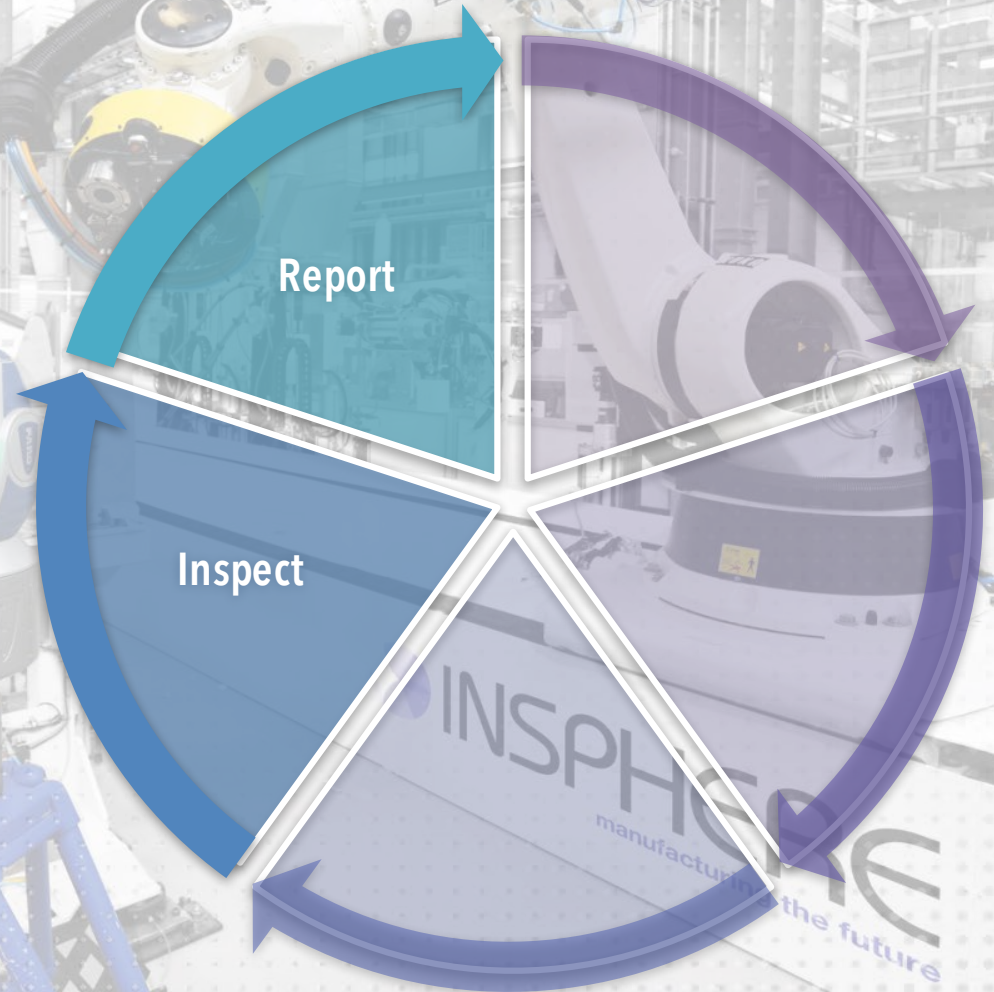


Our approach integrates the use of metrology data throughout the complete manufacturing process in a value added manner



Non-Value Added Metrology

Often mandated by customers for verification against specification, but adds no inherent value to the product

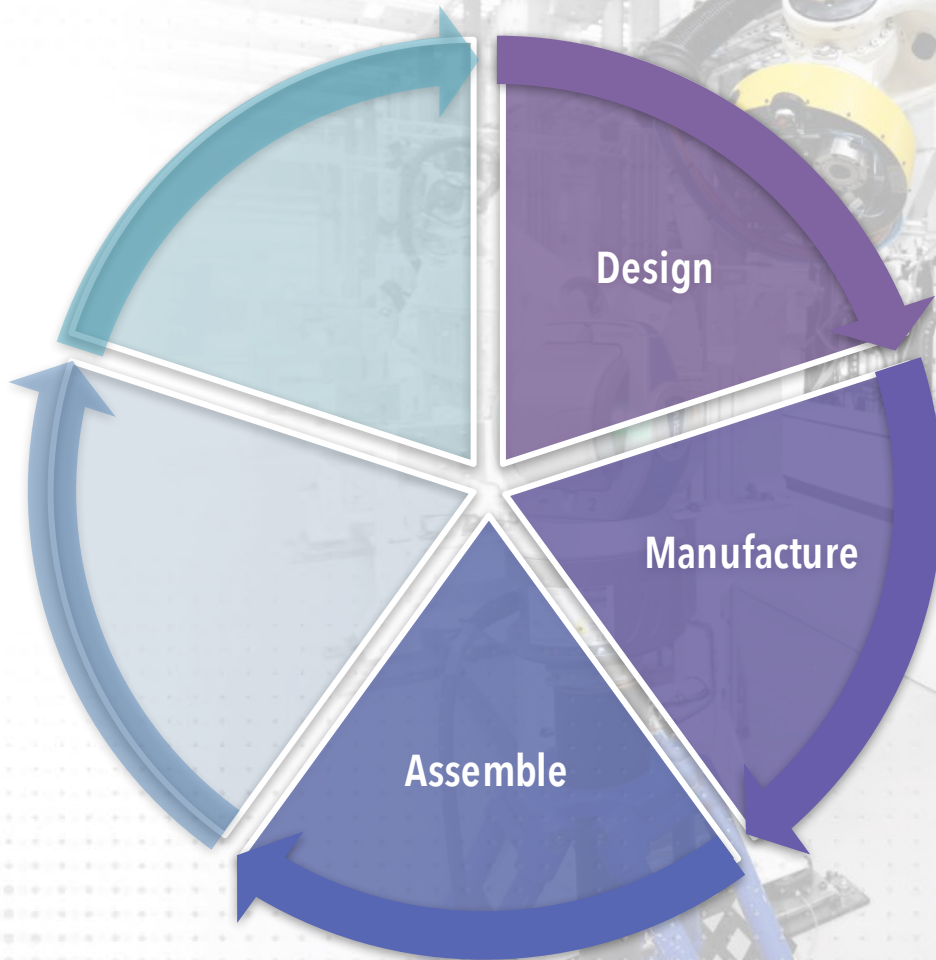


Metrology in Manufacturing



Value added metrology

Validate and improve manufacturing process performance prior to cutting metal



INSPIHERE
manufacturing the future

Metrology in Manufacturing

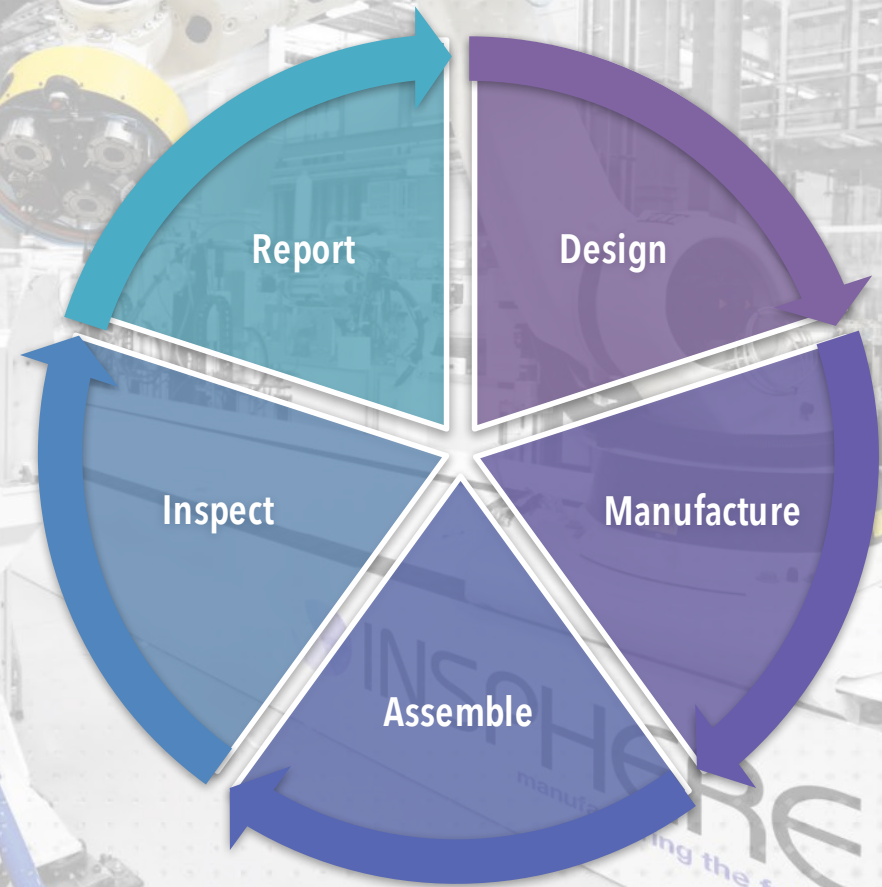


An integrated measurement system ensures the flow of data in correlated, common formats throughout the manufacturing cycle

Correlation between process and part data allows for powerful insights into manufacturing performance

This integrated system provides the data architecture needed to capitalise on emerging Industry 4.0 philosophies

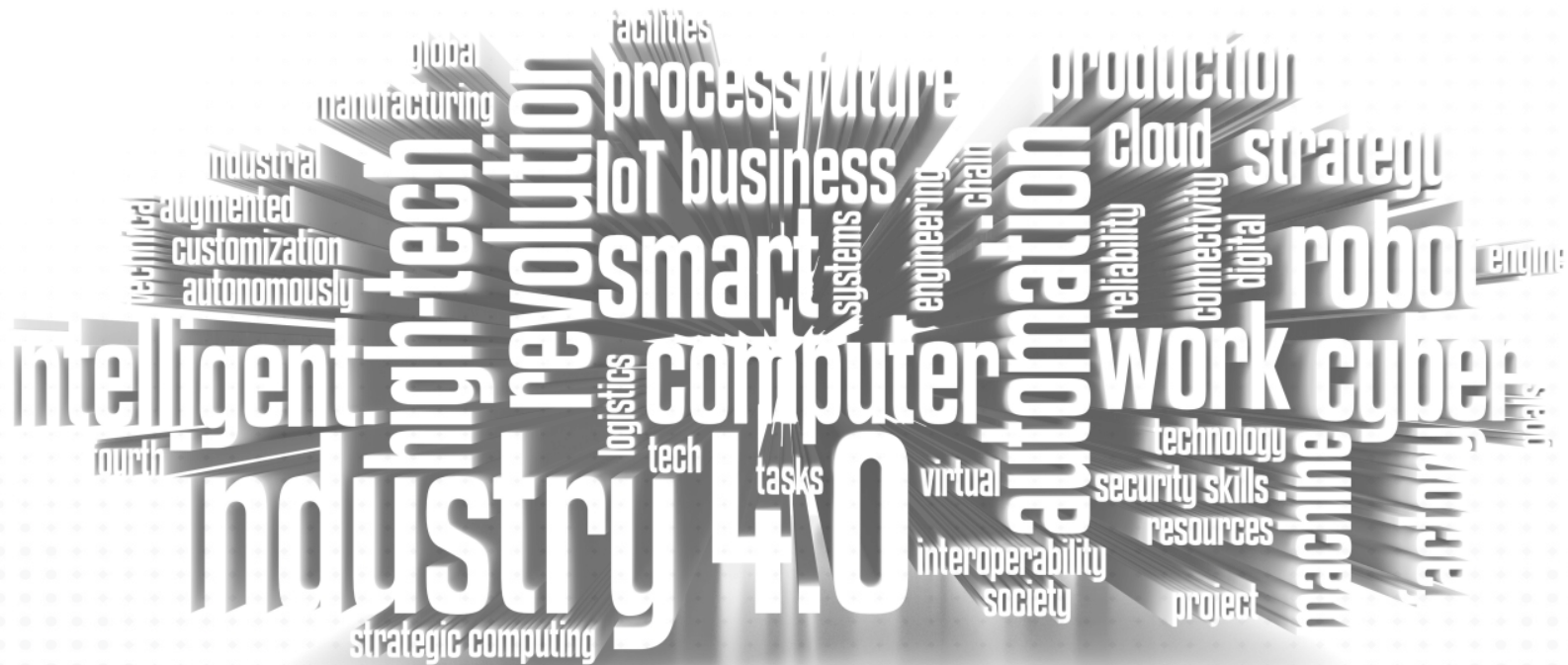
Actionable data derived from metrology processes can be used to drive quality, productivity and profitability improvement.



Industry 4.0 – What's the goal?



- Growth! - Increase production output and grow GDP
 - Three Levers – *Capital, Labour, Productivity*



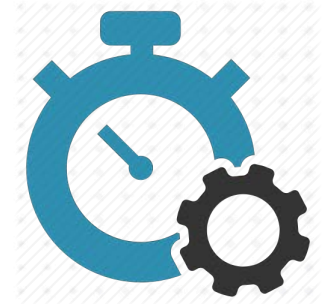
Industry 4.0 – What's the goal?



- Greater Efficiency and Productivity
 - Achieving more output with the same or fewer inputs
- Increase Flexibility
 - Product Customisation
 - Markets responsive and customer demand
 - Production flexibility to enhance productivity
- Shorten time to market
 - Innovation and product launch cycle



PRODUCTIVITY

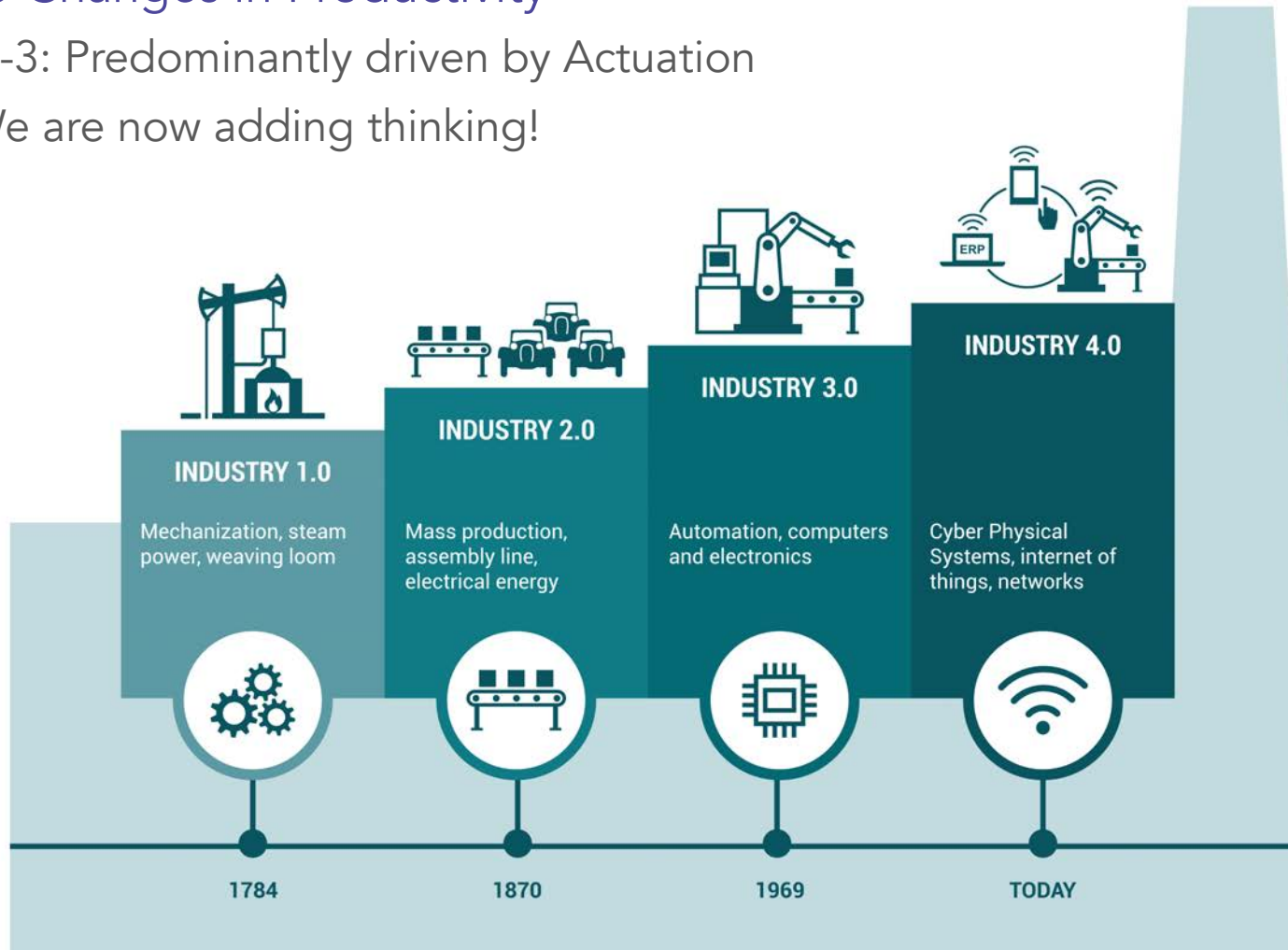


Beyond Productivity – Better quality, unique products

Industry 4.0 – How???

Step Changes in Productivity

- i1-3: Predominantly driven by Actuation
- We are now adding thinking!



i4.0 – Core Principles

The Industry 4.0 System



Enabling Technologies



CYBERSECURITY



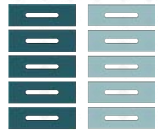
AUGMENTED REALITY



AUTONOMOUS ROBOTS



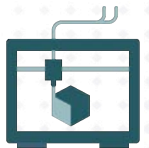
CLOUD COMPUTING



BIG DATA



INTERNET OF THINGS



ADDITIVE MANUFACTURING



SYSTEM INTEGRATION



DIGITAL TWIN



SIMULATION

Source: KPMG International, i4.0 framework 2017

i4.0 – Core Principles



Where does metrology feature?...

...Metrology will form the basis of the 'data' that is used through every process

"Data analytics and digital trust are the foundation of Industry 4.0"
- PWC 2016, Global Industry 4.0 Survey



CYBERSECURITY



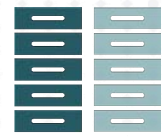
AUGMENTED REALITY



AUTONOMOUS ROBOTS



CLOUD COMPUTING



BIG DATA



INTERNET OF THINGS



ADDITIVE MANUFACTURING



SYSTEM INTEGRATION

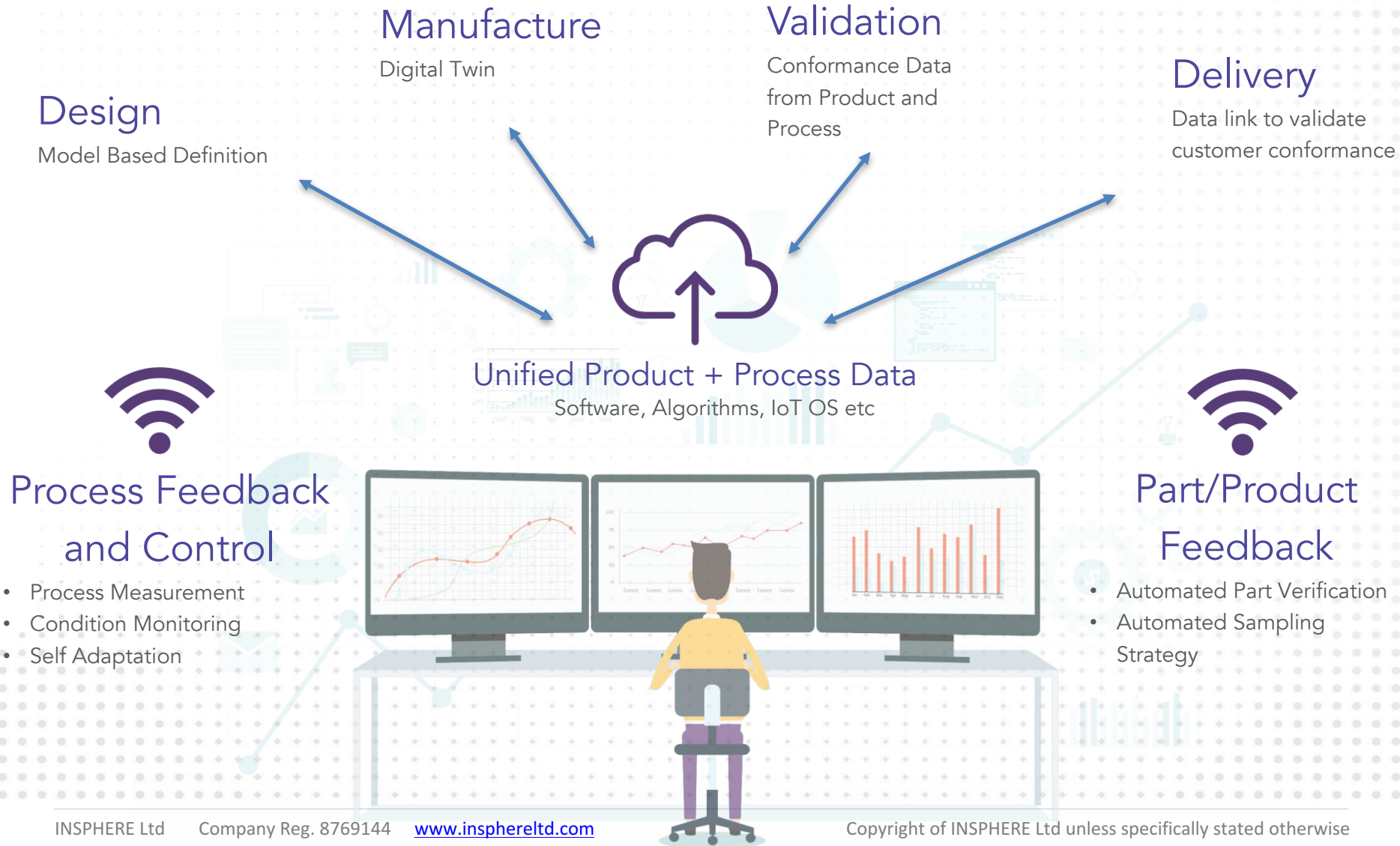


DIGITAL TWIN



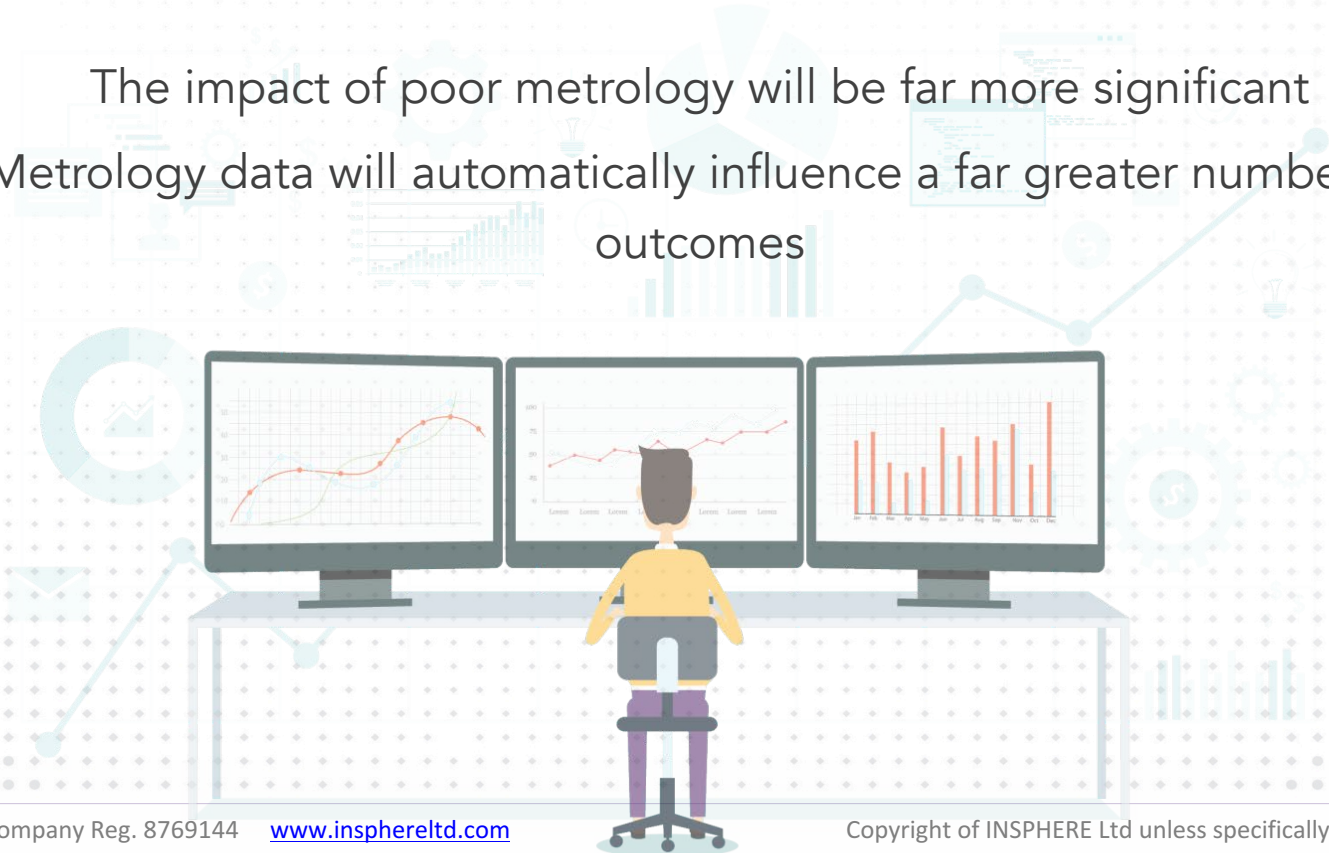
SIMULATION

i4.0 – Metrology Architecture



But... This is not without challenges

The impact of poor metrology will be far more significant
Metrology data will automatically influence a far greater number of
outcomes



i4.0 Metrology Technologies



- No more end of line inspection
 - Real time data – No more labs, no more queues, no more run of bad parts
- Integrated, Shop-floor Metrology systems
 - Speed, Robustness, Miniaturisation, Accuracy, Traceability, Cost Effective
- Single platform metrology
 - multiple sensors, combined reporting
- Embedded, dedicated systems
 - Continual, live streaming
- Data reporting
 - For human decision making
 - For automated machine action



i4.0 Metrology Community



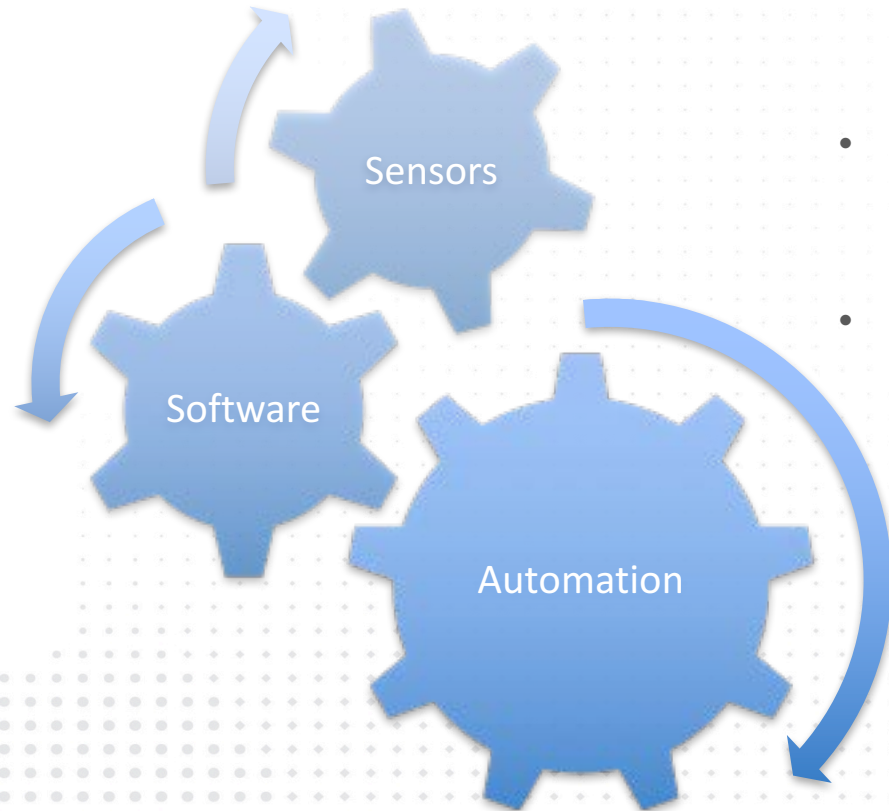
- Are the current Data language, Communication and Standards adequate?
 - Design intent, process monitoring, product verification
- What skills is the future metrologist going to need?
 - Understand data requirements, how to generate data and the software and network architecture to analyse and utilise data
- Organisational challenges to be overcome
 - Metrology falls through the gaps today
- Apply current best practice
 - Significant gains towards an industry 4.0 philosophy can be generated from simple best practices



i4.0 – Metrology Integration

An integrated 'Systems Thinking' Metrology approach will yield the ultimate benefits

- No one technology or vendor can provide a complete solution to an Industry 4.0 approach
- The core of utilising metrology as an enabler for Industry 4.0 is an exercise in integration
- Specialist metrology integrators will be critical in the success of industry 4.0



"The real value of i4.0 comes not from the component technologies or capabilities but rather through the integration of automation, data, analytics, manufacturing and products"

- KPMG, International i4.0 Framework 2017



INDUSTRY 4.0

(R)evolution?

- Best practice today is first step
- Measurement Strategy – Lean Principles
- Digital Models (Model Based Definition)
- Digital Data (+Reliable Data)
- Communication/Connectivity
- Metrology Sensor + Deployment Technology
- Software Architecture – IoT OS
- Data Analytics, Algorithms, Closed Feedback
- Metrology Integration!



Measurement

Automation

Services

Training

Consultancy

Like what you've seen? Get in touch to find out more...

info@insphereltd.com

www.insphereltd.com