



# Industrial Internet Consortium Webinar

*Ensuring Trustworthiness during Digital  
Transformation: Focus on Reliability*  
*2020-Jun-03*

[www.iiconsortium.org](http://www.iiconsortium.org)



# Trustworthiness Webinar Series (First of Five webinars)



## *Ensuring Trustworthiness during Digital Transformation*

Focus on Reliability

June Interactive Webinar

3  
2020

12:00 EDT



# Housekeeping

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- Today's presentation available
- Q&A at the end of the Webinar
- Send unanswered questions to
  - [info@iiconsortium.org](mailto:info@iiconsortium.org)
  - Discussions/questions to continue in the IIC Community Forum
  - <https://community.iiconsortium.org/>
- Additional resources available as attachments and on demand



The graphic features a cityscape with a globe and data points. A red vertical bar with the word 'Reliability' is prominent. The Industrial Internet Consortium logo is in the top right. The text 'Ensuring Trustworthiness during Digital Transformation' is centered, with 'Focus on Reliability' below it. The date 'June 3 2020' and time '12:00 EDT' are displayed in a red bar at the bottom.

 industrial internet  
CONSORTIUM

*Ensuring Trustworthiness during  
Digital Transformation*

Focus on Reliability

June Interactive Webinar

**3**  
2020

12:00 EDT



# Introducing the Speakers

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**WIBU**  
SYSTEMS



## **Marcellus Buchheit**

President & CEO at Wibu-Systems USA Inc.  
and Co-Owner, Wibu-Systems AG  
Co-Chair IIC Trustworthiness Task Group

**MITRE**



## **Robert Martin**

Senior Principal Engineer at MITRE, IIC  
Steering Committee Member, & Co-Chair  
IIC Trustworthiness Task Group

 **FARALLON**  
TECHNOLOGY GROUP



## **Keao Caindec**

CEO & Principal Analyst at  
Farallon Technology Group



# Accelerating Industrial IoT

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- Founded in 2014
- A global, open membership consortium spanning 30+ countries
- Members work together to accelerate the development of Industrial IoT and commercialize tested solutions.







# Industrial IoT is Becoming Pervasive

## Medical



## Vehicles



## Buildings

Temperature, Humidity, CO2

Motion Sensor

AC, Chiller

Electric power

Elevator

Entrance gate

## Aeronautics



## Energy



## Manufacturing



## Shipping





# What is new in IIoT systems versus traditional capabilities?

IT Risk

Operational Risk & Dependence



Loss of data or capability

Loss of safety or reliability

Loss of property or lives

Scratch Built Software

Assembled Software

Majority of products built with no 3<sup>rd</sup> Party dependencies

Use of open source and 3<sup>rd</sup> party libraries, modules, frameworks, and services  
Multi-party software updating/patching

Traditional Computers

Software Enabled Everything

Servers  
Desktops  
Laptops  
Tablets  
Switches  
Databases  
Office apps  
E-mail  
Browsers  
Routers

Healthcare  
Aeronautics  
Smart Energy  
Oil & Gas  
Microgrids

Implantable Medical  
Smart Manufacturing  
Water Treatment  
Hydro Power  
Smart Cities

Smart Munitions  
Intelligent Vehicles  
Intelligent Shipping  
Dam Management  
Building Management  
Autonomous Systems



# Defining Trustworthiness

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**Trustworthiness** = degree of *confidence* one has that the

system performs as expected with characteristics

*Characteristics*

including *safety, security, privacy, reliability and resilience*

in the face of *environmental disturbances, human errors,*

*system faults and attacks.*

*Threats and Hazards*

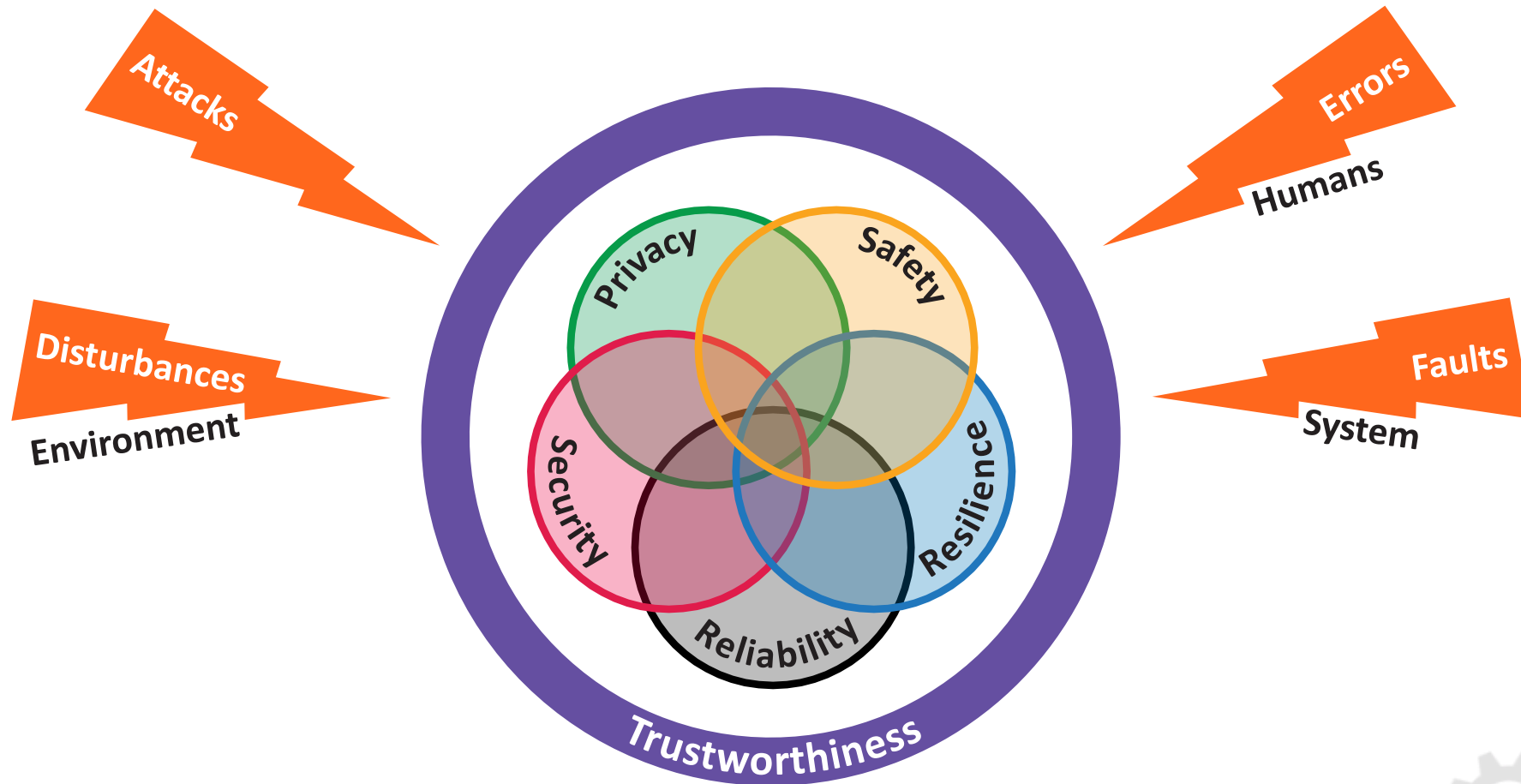
(IIC vocabulary V2.2, <https://www.iiconsortium.org/vocab/>)





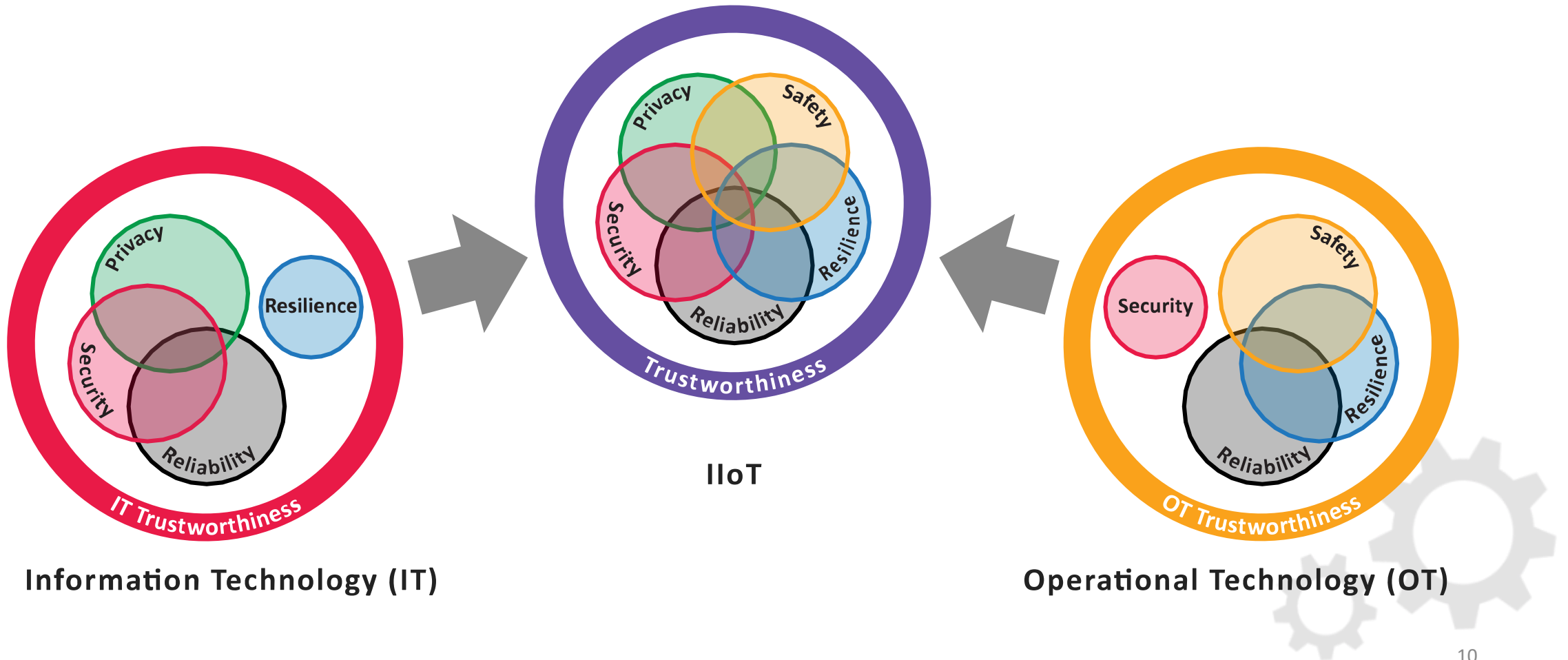
# Trustworthiness: The Symbol

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# Trustworthiness: in the IIoT World

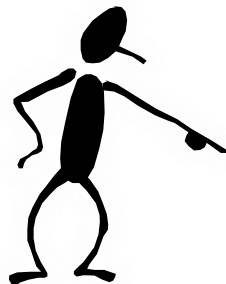




# Different Perspectives on Assurance of Trustworthiness

## Researcher

What technology is needed to ensure trust?



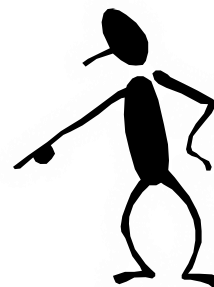
## Insurer

How do I underwrite it?



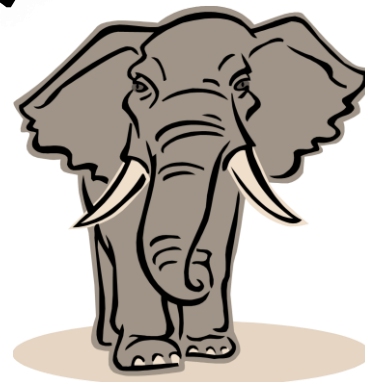
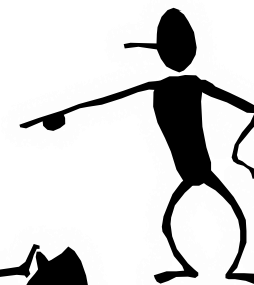
## Operator

- How do I use this?
- Can I trust it?
- Am I responsible if it makes a mistake?
- Will it keep working?



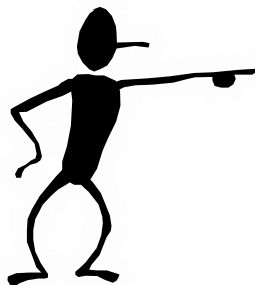
## Commander/Manager

- Can I reliably use in operations?
- What changes operationally?



## Creator

- How should I design and build?
- Will I be liable for problems?



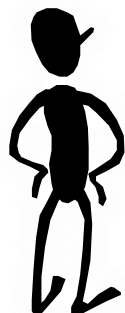
## Regulator

Is it safe and secure?



## Acquirer

- How do I express requirements?
- Will it work they way it should?



## Patron

- Is it safe?
- Should I use it?
- Can I count on it to protect my privacy?

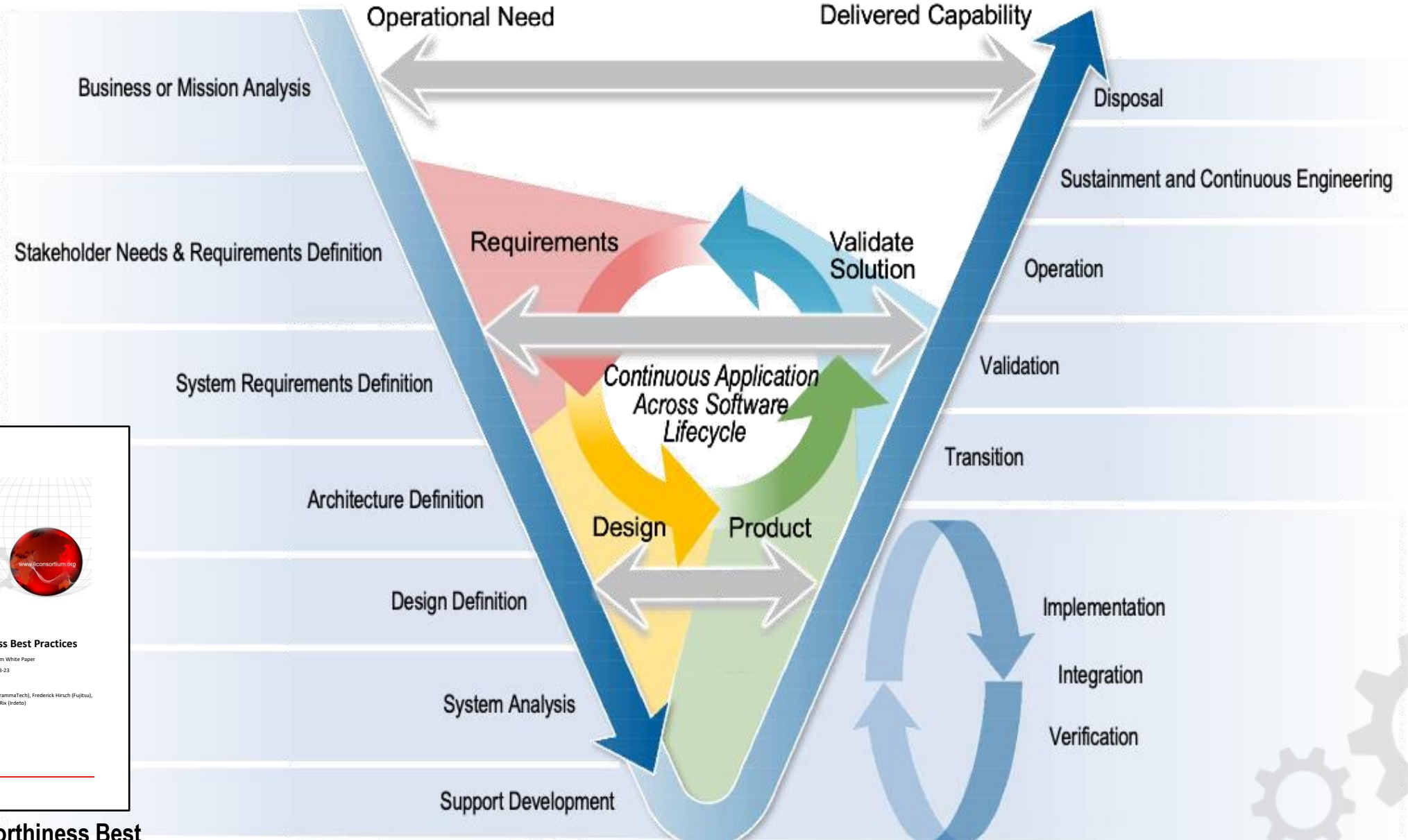


## Community

- Do I want this in my backyard?
- Can I count on it?



# System Lifecycle – Operational Need mapping to Delivered Capability



**Industrial Internet Consortium**  
www.iiconsortium.org

**Software Trustworthiness Best Practices**  
An Industrial Internet Consortium White Paper  
Version 1.0 – 2020-03-23

Marcellus Buchheit (Wibu-Systems), Mark Hermeling (GrammaTech), Frederick Hirsch (Fujitsu), Bob Martin (MITRE), Simon Rex (Indeto)





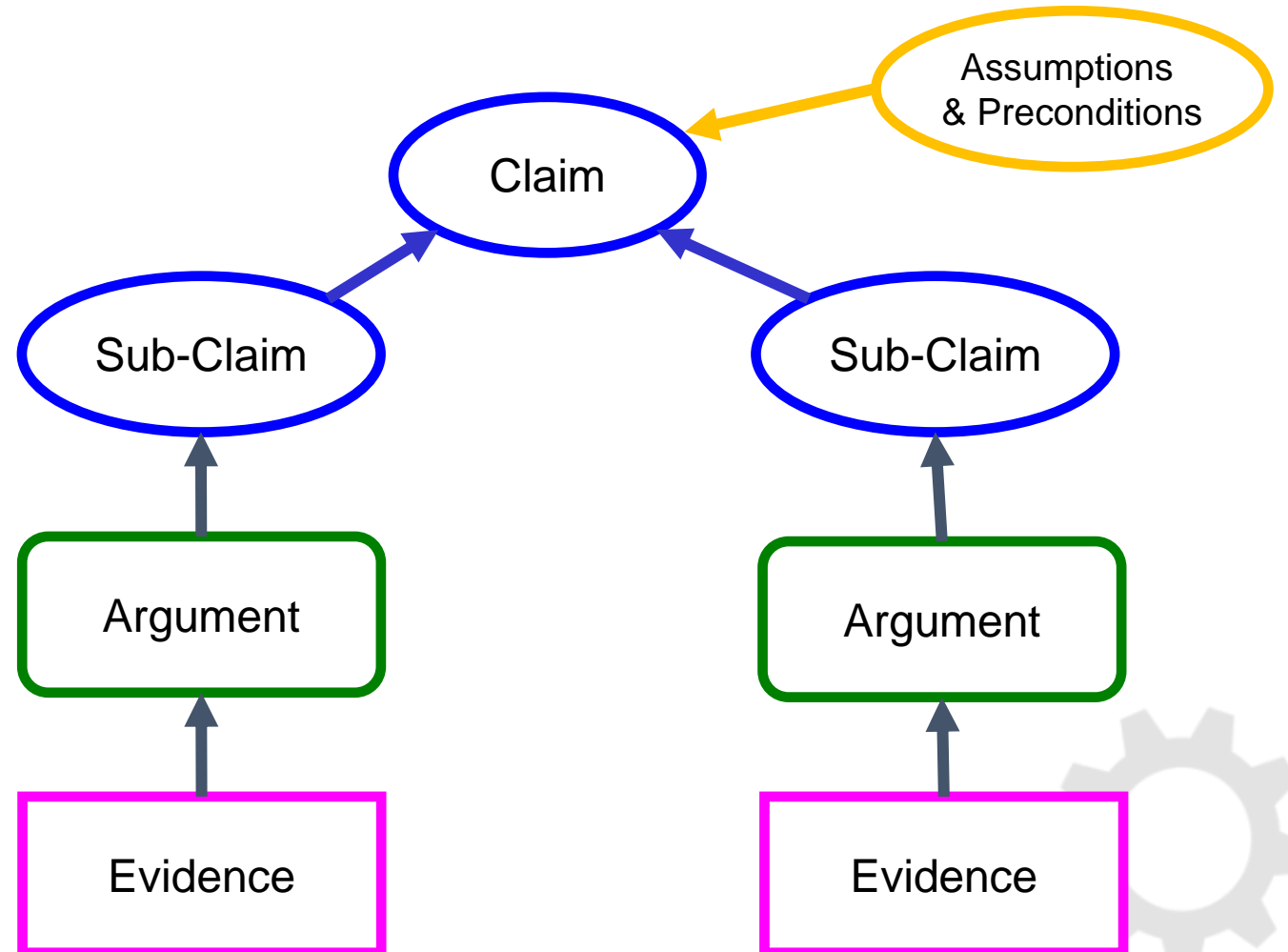


# Composing Assurance Cases

**Claim =  
assertion to be proven**

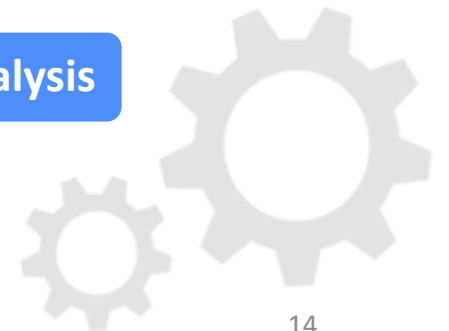
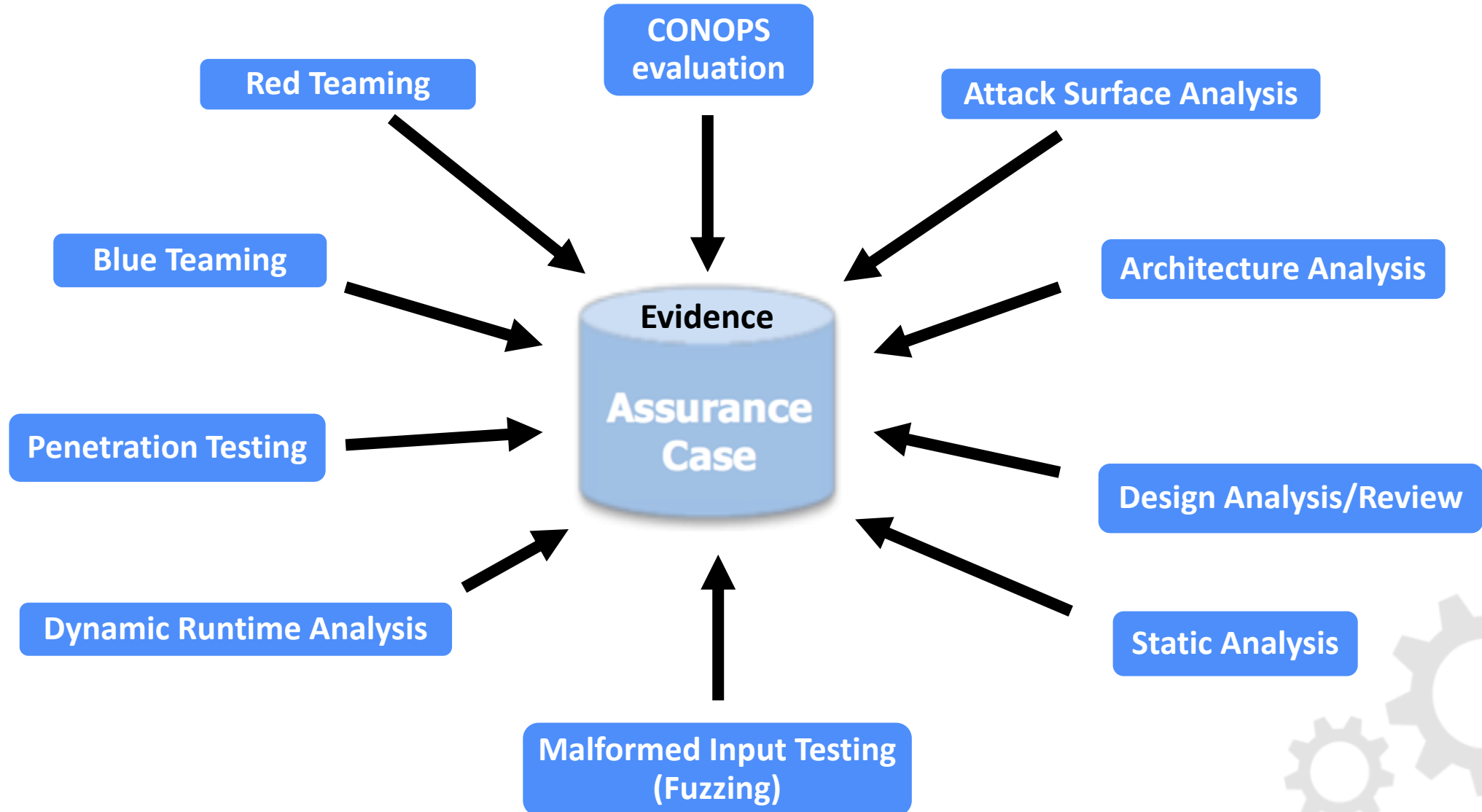
**Argument =  
how evidence supports claim**

**Evidence =  
required documentation**



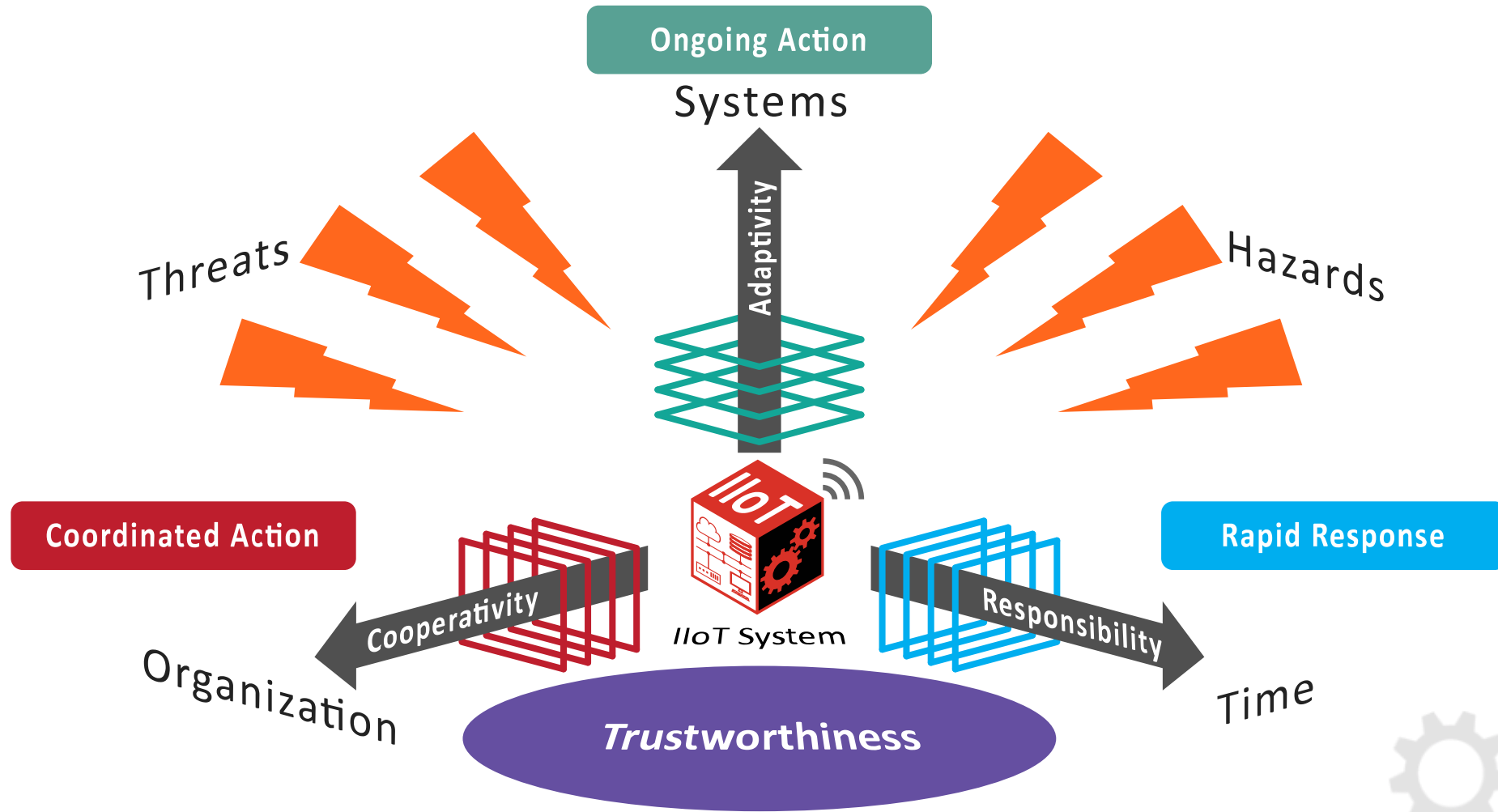


# Multiple Sources of Assurance Evidence from Throughout the Lifecycle of the item(s) needing Assurance.





# Trustworthiness: Management Considerations

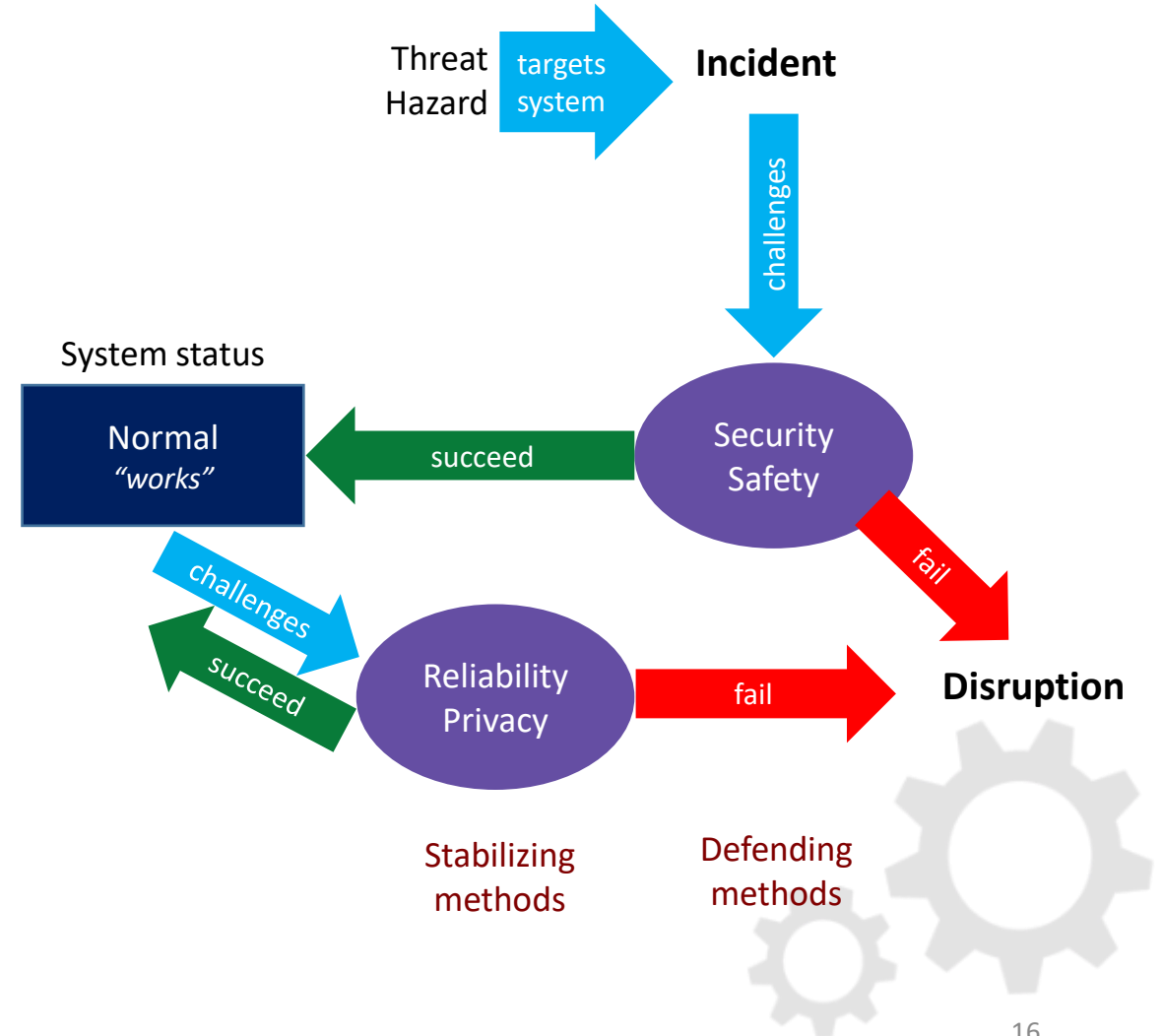




# Definition of *Reliability*

**Reliability** = ability of a system or component to perform its required functions under *stated conditions* for a *specified period of time*.

(IIC vocabulary V2.2,  
<https://www.iiconsortium.org/vocab/>)







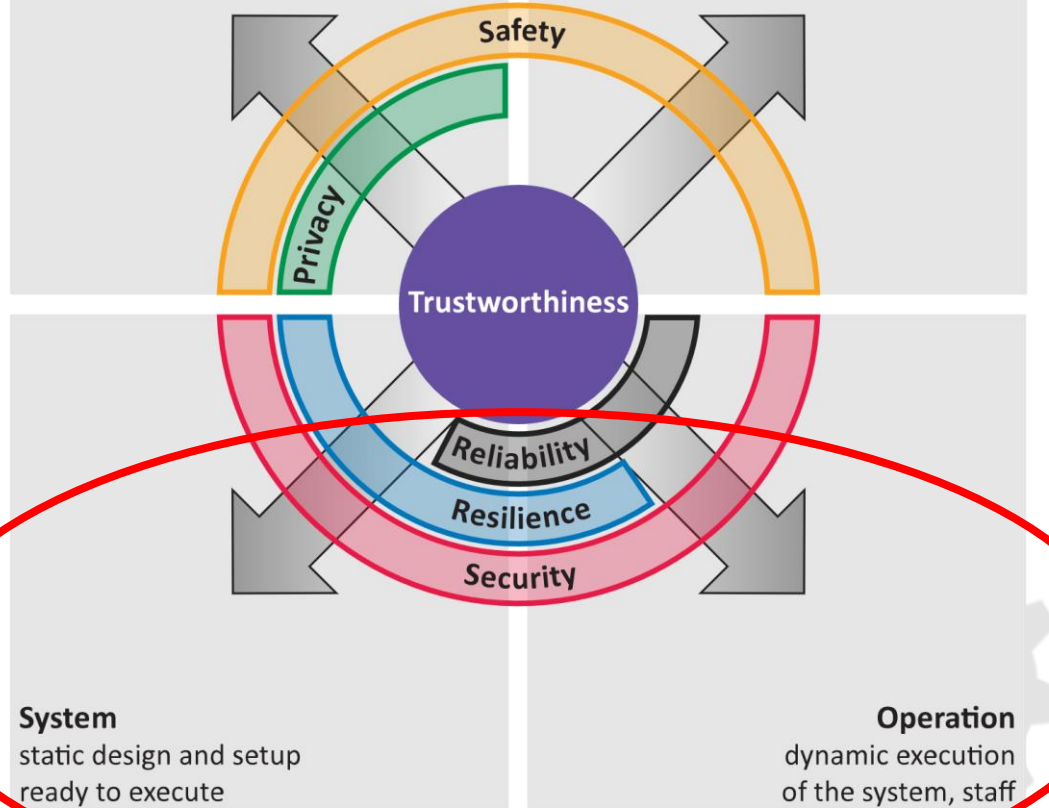
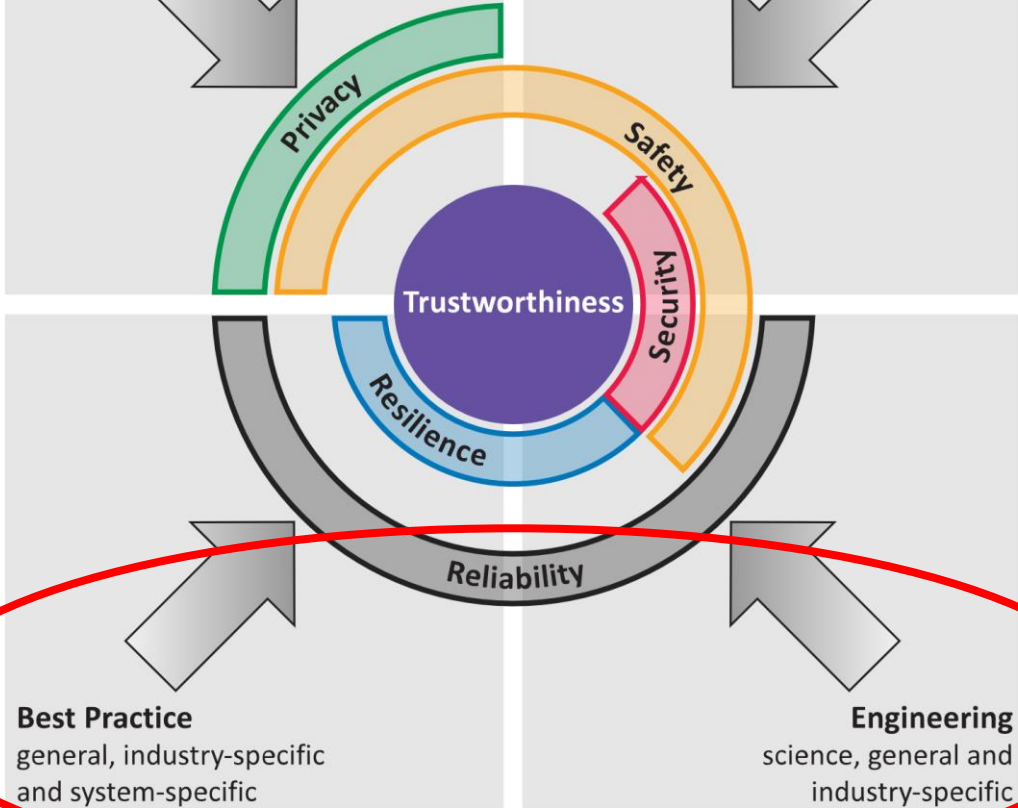
# Reliability: Foundation and Targets

**Government Law and Regulations**  
national and international  
(USA, EU, UN etc.)

**Industrial Standards**  
standards and guidelines  
(ISO, IEC, IEEE etc.)

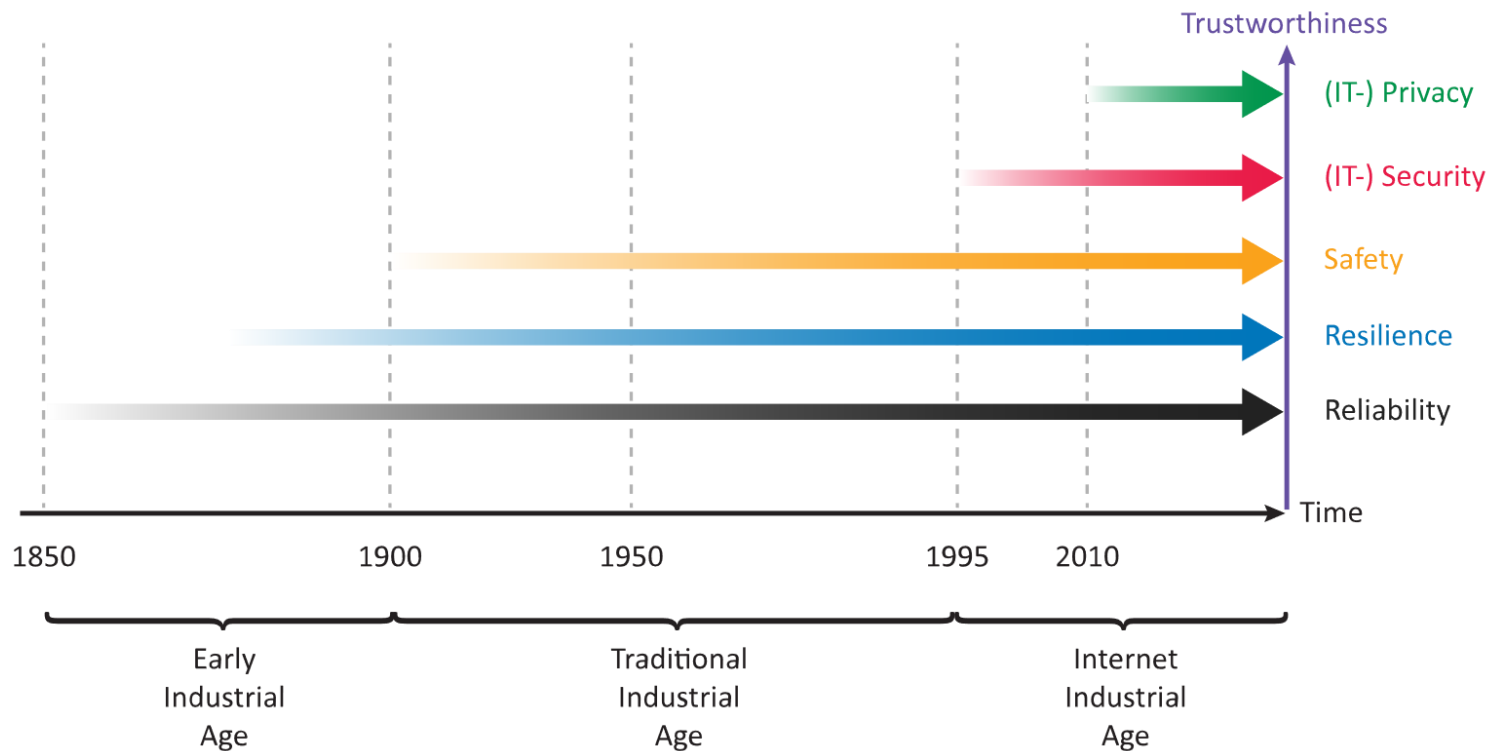
**Humans**  
employees, customers,  
visitors, guests

**Environment**  
nature, neighbor systems,  
public infrastructure



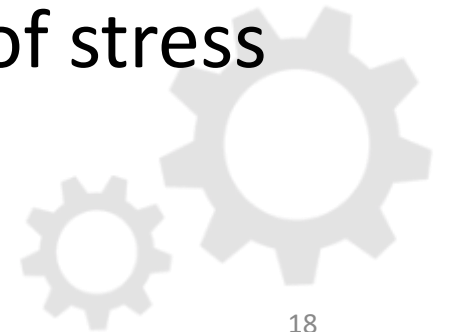


# Trustworthiness: Importance of Reliability



Reliability is driven by:

- **Business:** investors and other stakeholders
- **Customers:** availability, precision and stability
- **Employees:** stability and avoidance of stress





# Implementing Reliability: Examples

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- Every **activity** to keep a system **running** (*outside* of incidents)
- Predicted and spontaneous **maintenance**
- Implementing **redundancy** at critical points
  - Example IT: **RAID-systems** for hard disks, **backup** for data
- Usage of **statistical** methods:
  - Predicting *early failure* and *sunset*: **Bathtub** curves
  - **MTTF** (Mean Time To Failures)
  - **MTBF** (Mean Time Between Failures)



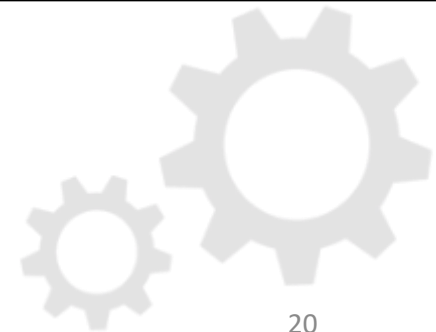
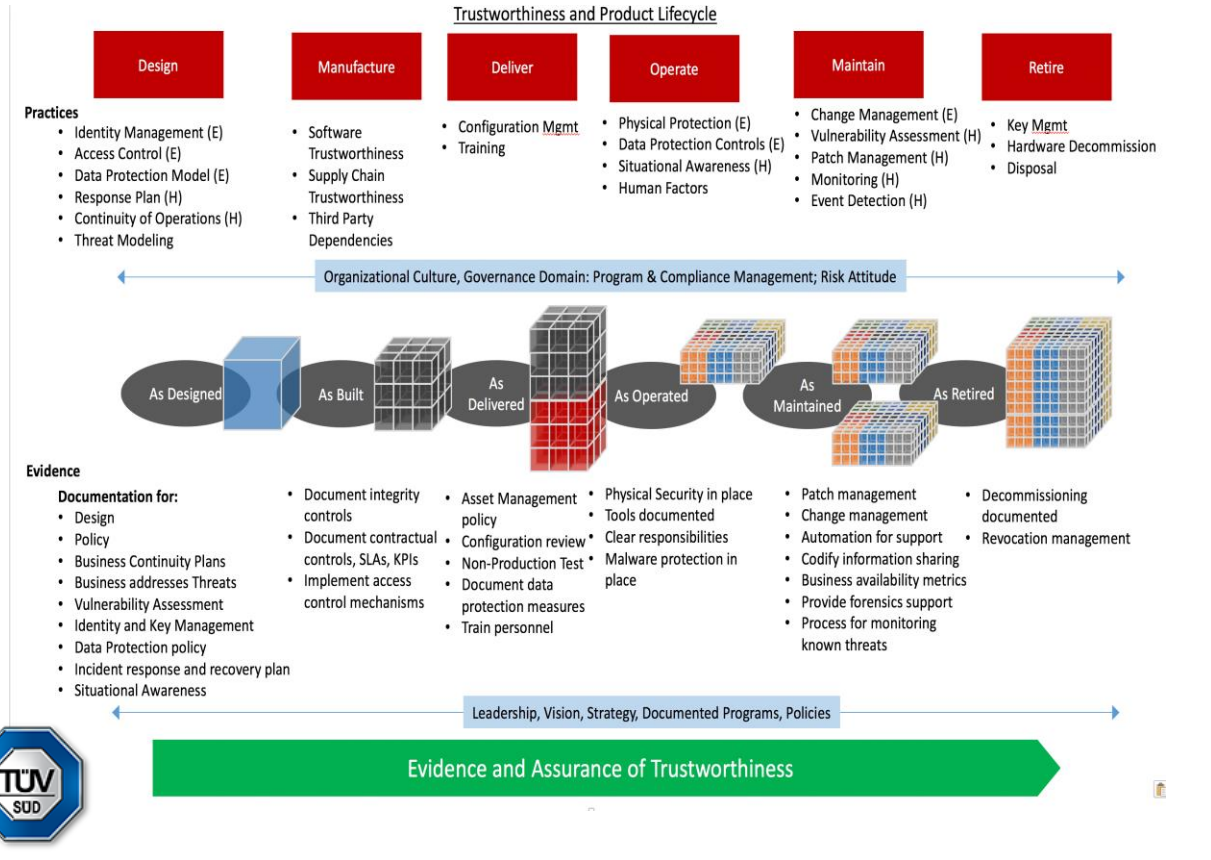
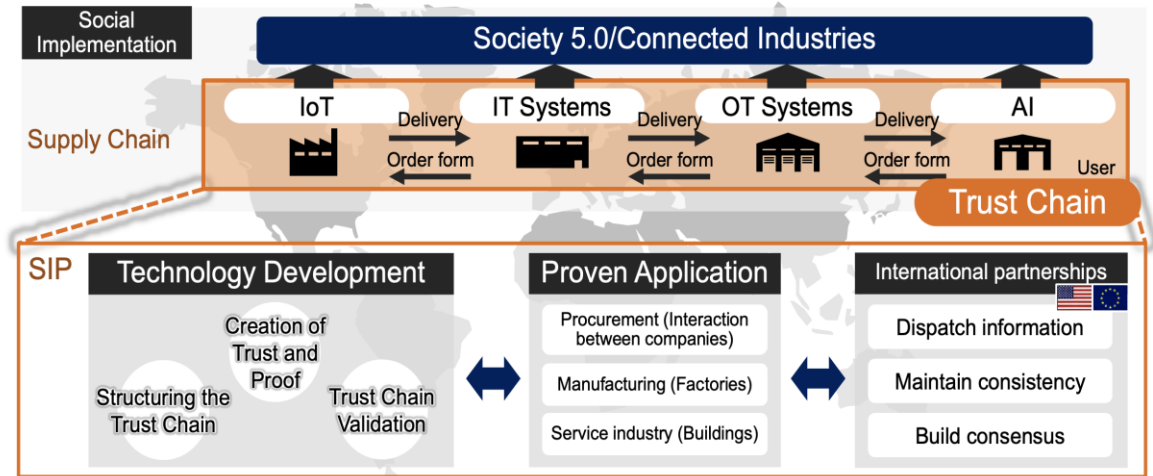
# Working across the World to Establish Trustworthiness

Integrating efforts and ideas from Industrie Plattform 4.0, Society 5.0, NIST, ISO, and others.

## 4.5 Initiatives to ensure the trustworthiness of supply chains



- To ensure the trustworthiness of supply chains, we strive to apply feedback on a continual basis through "Technology Development" and "Proven Application".
- Research results are socially implemented aiming for a safe and secure society where Society 5.0 and Connected Industries are a reality.







# Learn more!

- [IIC Webinars](#)
- [Events](#)
- [Membership information](#)
- Join the discussions on [community.iiconsortium.org](http://community.iiconsortium.org)
- Contact us: [info@iiconsortium.org](mailto:info@iiconsortium.org)



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# Thank you!



- Additional resources available as links & attachments
- Questions, audience comments?  
[community.iiconsortium.org](http://community.iiconsortium.org)

[www.iiconsortium.org](http://www.iiconsortium.org)



**Community. Collaboration. Convergence.**

We are *THE* Industry IoT Consortium