



International Society of Automation
Setting the Standard for Automation™

*ISA99
Committee*

Working Draft

Industrial Automation and Controls Systems Cybersecurity

The ISA99 Committee and
the 62443 Standards



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Purpose

Introduce the ISA99 committee and the ISA and IEC 62443 series of standards on Industrial Automation and Control Systems Security.

Working Draft



Topics

1. Who are we?
2. How do we work?
3. What are our work products?
4. Who is using them?
5. What are the standards based on?
6. Where do things stand?



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Committee Description

The International Society of Automation (ISA)
Committee on Security for Industrial Automation &
Control Systems

- Members from around the world
- Multiple sectors and stakeholders
- Working in collaboration with IEC TC65 WG10
- Consistent leadership since c. 2002





Committee Scope^(*)

“... automation and control systems whose compromise could result in any or all of the following situations:

- endangerment of public or employee safety
- environmental protection
- loss of public confidence
- violation of regulatory requirements
- loss of proprietary or confidential information
- economic loss
- impact on entity, local, state, or national security”

^(*) Taken from the original committee scope description



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Industry Contribution and Application

Reflects expertise from many sectors, including:

- Chemicals, Oil and Gas
- Food and Beverage
- Energy
- Pharmaceuticals
- Water
- Manufacturing
- Transportation
- ICS suppliers
- Government



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Collaborative Development

- ISA-62443 (and IEC 62443); a series of standards developed primarily by ISA and published by two groups:
 - ISA99 → ANSI/ISA-62443
 - IEC TC65/WG10 → IEC 62443
- In consultation with:
 - ISO/IEC JTC1/SC27 → ISO/IEC 2700x





Partners for Related Topics

- ISA84 (Process Safety & Security)
- ISA108 (Intelligent device Management)
- ISCI (Certification)
- ISA GCA (Communications & Advocacy)
- NIST (Security Frameworks)
- IIC (IIoT)





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Documents by Subject

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General	Policy and Process	Technical	Guidance	Application
62443-1-1 Terminology, concepts and models	62443-2-1 Security program requirements for IACS asset owners	62443-3-2 Security risk assessment and system design		TR 62443-5-1 Applying ISA/IEC 62443 to the industrial internet of things (IIoT)
62443-1-3 <i>Performance metrics for IACS security</i>	62443-2-4 Security program requirements for IACS service providers	62443-3-3 <i>Technical security requirements for IACS systems and automation solutions</i>		
	62443-4-1 <i>Security lifecycle requirements for IACS products</i>	62443-4-2 Technical security requirements for IACS components	TR 62443-3-1 Use of security technologies in the IACS environment	
	62443-2-2 <i>Evaluation of IACS security protection</i>			
62443-1-6 ★ Requirements for the development of IEC 62443 profiles	62443-2-3 <i>Security update (patch) management in the IACS environment</i>			



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Traditional Application Sectors

- Chemical and Process Industries (CPI)
 - Chemical Processing
 - Refining
- Pipelines
- Manufacturing
- Energy





But Perhaps Also...

- Transportation (Rail)
- Building Automation
- Medical and Healthcare Systems
- And more...





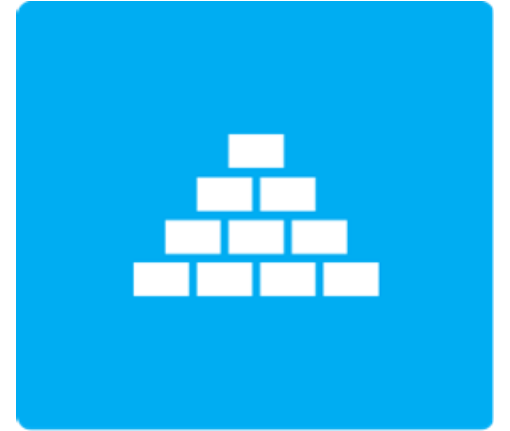
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The Pillars of the Standards

- Principal Roles
- Life Cycles and Processes
- System Under Consideration
- General Security Concepts
- Operations Security Concepts
- Foundational Requirements



Principal Roles

- Asset Owner
- Product Supplier
- Maintenance Service Provider
- Integration Service Provider





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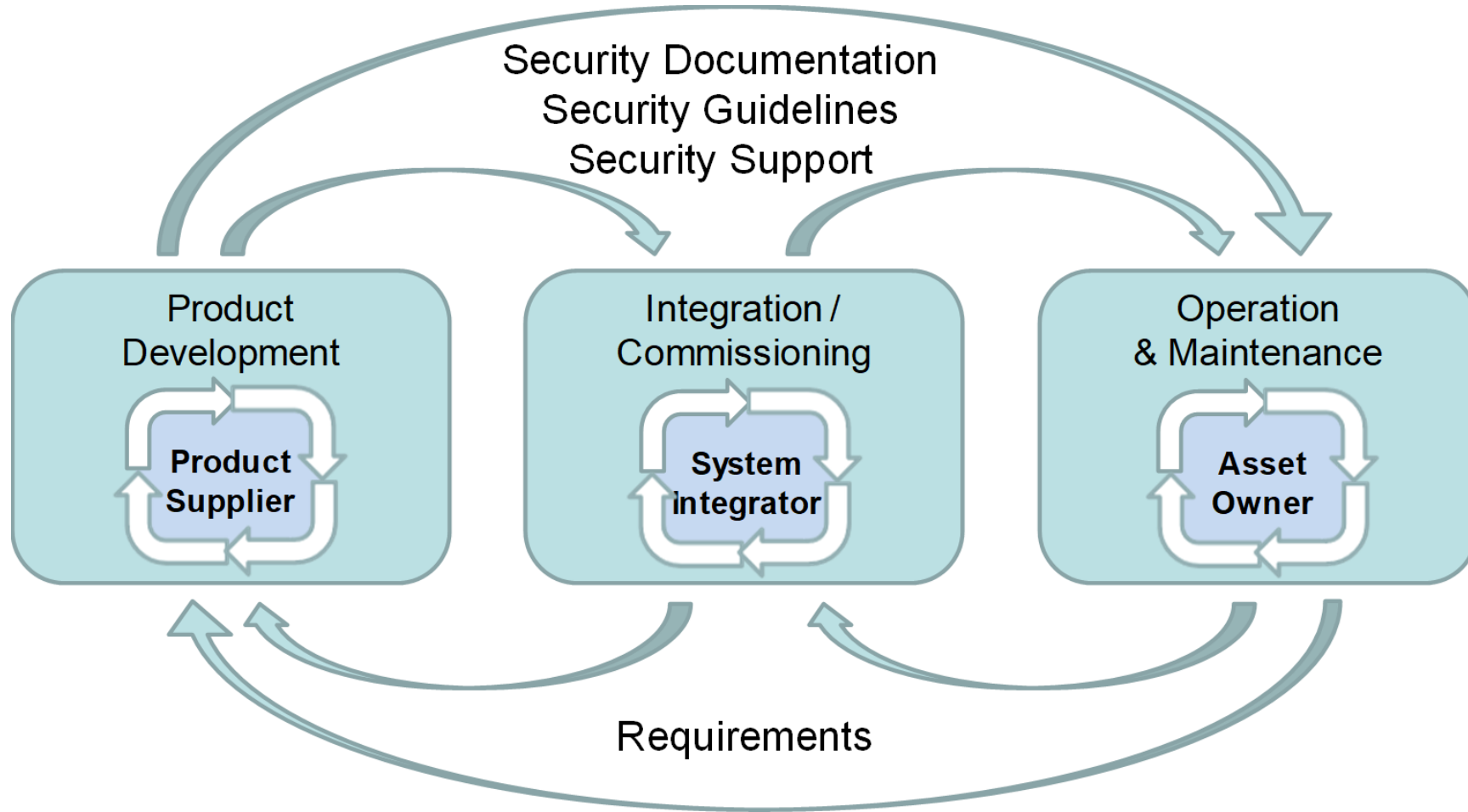
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Associated Roles

- Asset Operator
- Regulatory Authority
- Compliance Authority



Related Life Cycles



Based on VDI 2182



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System Under Consideration

- Describes the scope of the system being addressed by the security response
- Must be defined by the asset owner for the specific situation

Operations Security Concepts

- Security Element Grouping
- System Taxonomy
- Safety, Integrity, Availability, Confidentiality
- Zones and Conduits
- Security Levels
- Maturity Levels
- Security Protection Scheme
- Security Protection Rating
- Security and Functional Safety



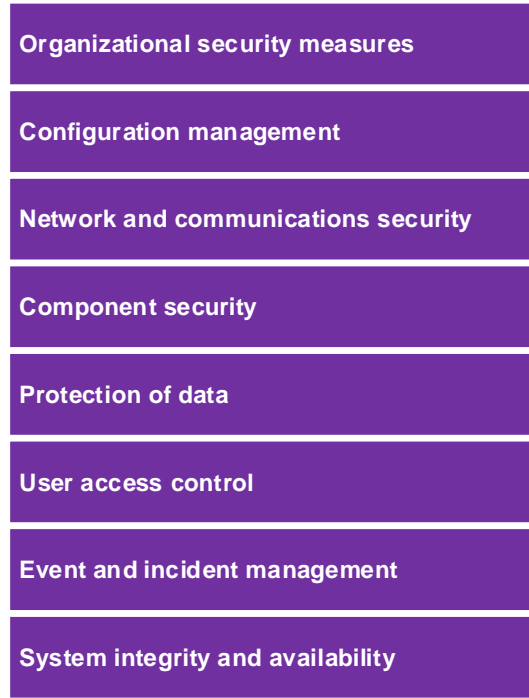
Source: ISA-62443-1-1, 2nd Edition (Under development)



Security Element Grouping

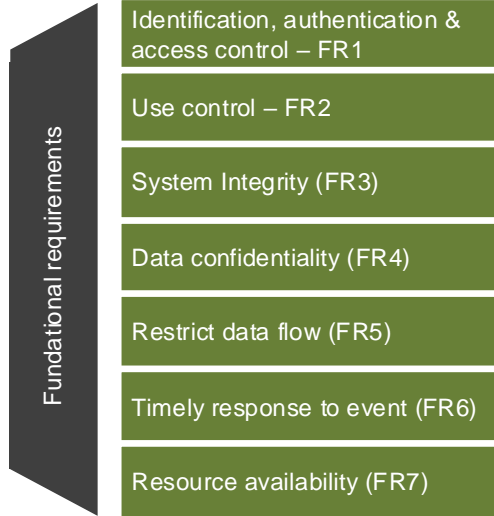
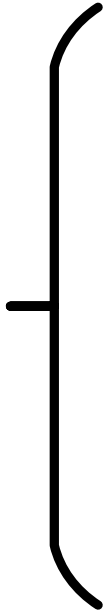
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Security program requirements

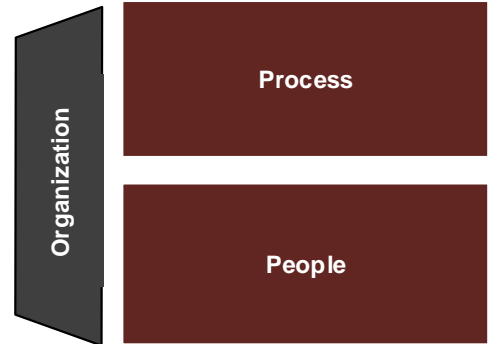
ISA/IEC 62443-2-1
ISA/IEC 62443-2-2



Functional requirements

Technical Requirements

ISA/IEC 62443-3-3
ISA/IEC 62443-4-2



Organization

Organizational requirements

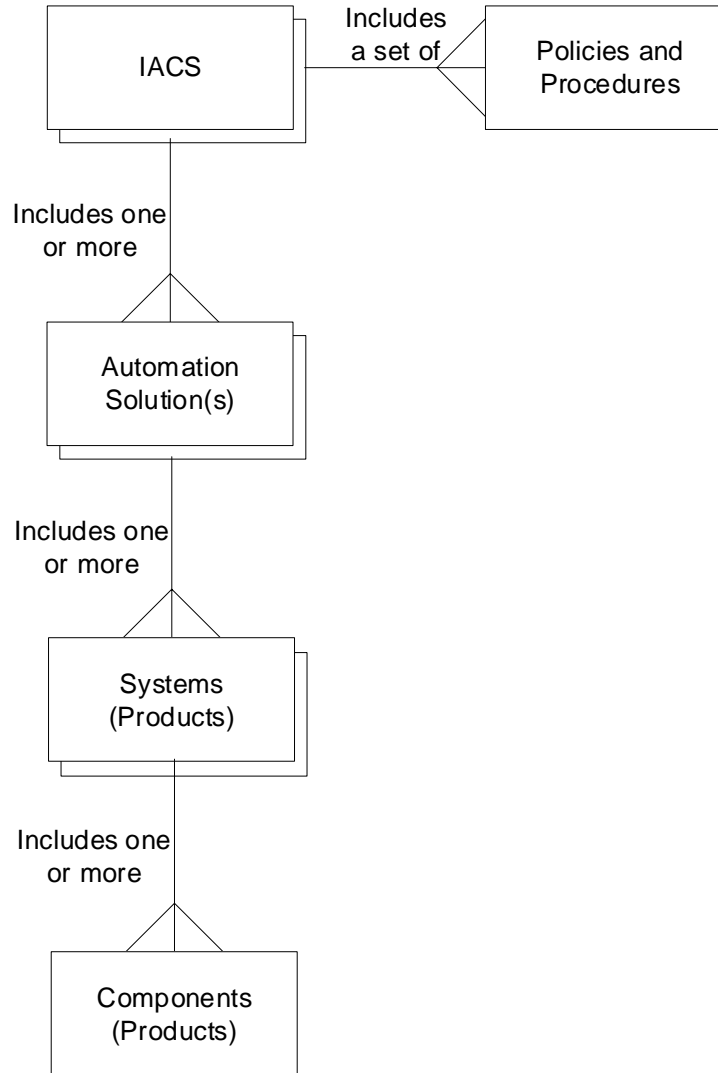
ISA/IEC 62443-2-4
ISA/IEC 62443-4-1
ISO 27001 & other ISMS



System Taxonomy

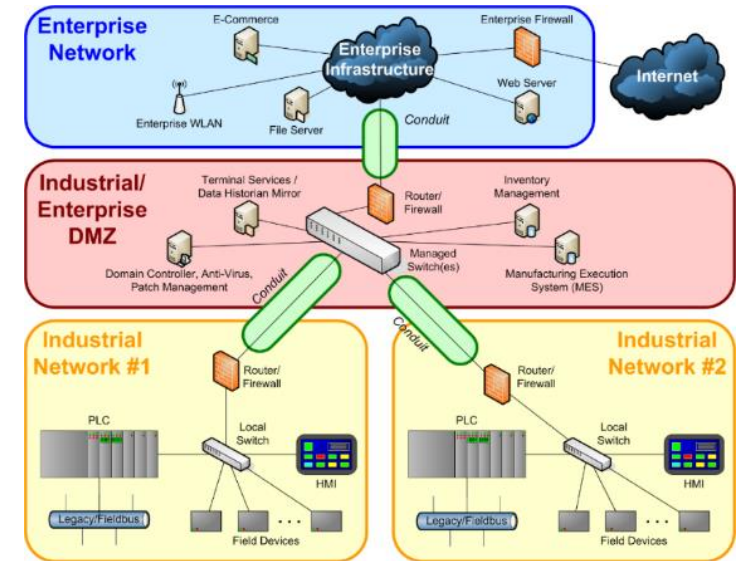
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Zones and Conduits

- A means for defining...
 - How different systems interact
 - Where information flows between systems
 - What form that information takes
 - What devices communicate
 - How those devices communicate
 - The security differences between system components
- Technology helps, but architecture is more important





Security Levels

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Protection against...

- 4 Intentional Violation Using Sophisticated Means with Extended Resources, IACS Specific Skills & High Motivation
- 3 Intentional Violation Using Sophisticated Means with Moderate Resources, IACS Specific Skills & Moderate Motivation
- 2 Intentional Violation Using Simple Means with Low Resources, Generic Skills & Low Motivation
- 1 Casual or Coincidental Violation

Maturity Levels

- A means of assessing capability
- An evolving concept in the standards
- Progressive levels of achievement
 - Initial
 - Managed
 - Practiced
 - Improving





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Foundational Requirements

- FR 1 – Identification & authentication control
- FR 2 – Use control
- FR 3 – System integrity
- FR 4 – Data confidentiality
- FR 5 – Restricted data flow
- FR 6 – Timely response to events
- FR 7 – Resource availability





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Other important concepts

- Safety, Integrity, Availability, Confidentiality
 - Addition of safety
- Functional Safety and Security
 - Coordinated approach to risk assessment

August 2021

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Other important concepts

- Security Protection Scheme (SPS)
 - a set of technical and organizational security measures for protecting the system against cyberthreats during operation
- Security Protection Rating (SPR)
 - used when assessing the fulfillment by the SPS of the security requirements



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Current Activity

- WG2 (Security Program)
 - Readyng 2nd edition of 62443-2-1 for final vote
- WG3 (Concepts & Models)
 - Preparing 2nd edition of 62443-1-1
- WG3TG3 (Protection Ratings)
 - Readyng 62443-2-2 for further comment



Current Activity

- WG4TG2 (Requirements and Security Levels)
 - Considering changes for a 2nd edition of 62443-3-3
- WG6 (Patch Management)
 - Collecting and responding to comments on 62443-2-3
- WG9 (IIoT Implications)
 - Preparing a technical report on IIoT



Current Activity

- WG12 (Metrics)
 - Soon to release 62443-1-3 for review and comment
- WG13 (Learning)
 - Developing various learning materials





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WG5TG3: Consistency Assessment

- Separate group (WG5TG3) for this purpose
- Recommend improvements with respect to:
 - Structure
 - Terminology
 - Foundational Concepts
 - Models
 - Requirements
- Propose series roadmap

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Next to come...

- Draft for comment of 2nd edition of 62443-1-1 (Concepts and Models)
- Draft for comment of 62443-1-3 (Metrics)
- Final vote on 2nd edition of 62443-2-1
- 2nd draft for comment of 62443-2-2



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Review

- ✓ Who are we?
- ✓ How do we work?
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Conclusion





More Information...

- ISA99 committee page: <http://www.isa.org/isa99>
- Twitter: [@ISA99Chair](https://twitter.com/ISA99Chair)
- Committee Co-Chairs: isa99chair@gmail.com
 - Eric Cosman
 - Jim Gilsinn
- Managing Director
 - Joe Weiss
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 - Eliana Brazda ebrazda@isa.org
- Please provide contact information & area of expertise or interest





Questions

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