Development of an Holistic OT Security Management Concept

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Cybercrime is becoming a rapidly growing threat worldwide. The economic impact of cyber attacks is in the billion range only for the German industry sector. Therefore, cyber crime is a huge risk factor for enterprises and it will still increase because of the process of digitalization. Industry 4.0 leads to a raising networking in the industry. Attacks more and more concern not only the information technology (IT) sector, but also the operation technology (OT) sector of the companies. In the past there was a fixed separation of the IT and OT network, but nowadays IT and OT are connected and the industrial sector comes into the focus of cybercrime. Hence, OT security management is one important factor to protect industrial control systems. In considering the OT security management tasks, it is essential to take note of the legal and normative requirements, e.g. the German IT-Security Act from 2015 or the IEC 62443, which is the standard concerning industrial security. The research focus of this work is the development of a holistic OT security management concept. This means, among other things, the creation of a data structure that can be used in every step of the management process, such as the structure analysis or the risk assessment process. The concept leads to automating of manual tasks and to a more efficient security management process.

Motivation

OT Security

- Cybercrime develops to an rapidly increasing risk factor for companies
- Damage for the German industry is in the range of billions every year [1]
- Digitalization (Industry 4.0, Big Data, etc.) leads to a massive increase of the degree of networking in the industrial sector
- OT security goals:
  - Availability
  - Integrity
  - Confidentiality

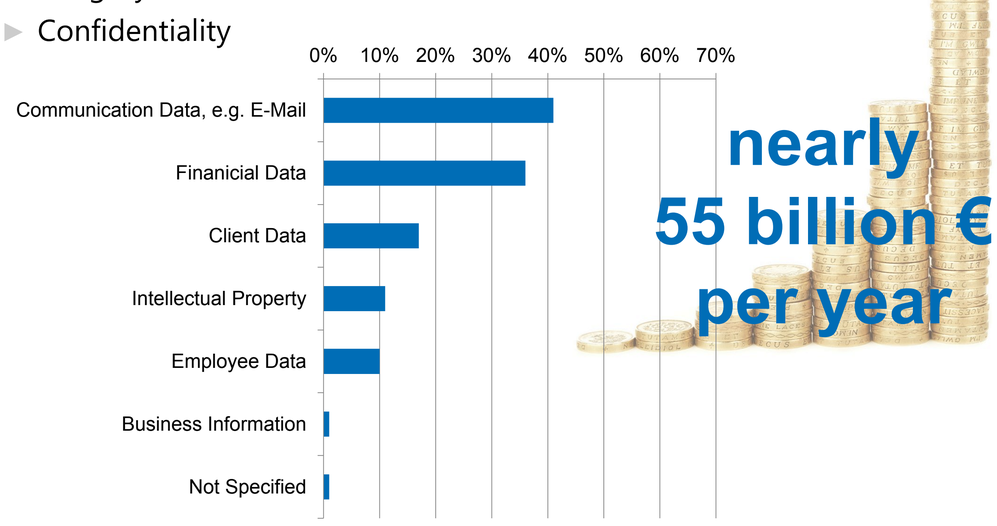


Fig. 1. Bitkom study. What kind of digital data was stolen and what is the economic damage for Germany. [1]

Requirements

IT/OT Differences

	OT	IT
Lifetime	10-20 years	3-5 years
Updates	depends on usage	regular/planned
Security Awareness	raising	high
Confidentiality	low - middle	high
Integrity	high	middle
Availability	24 x 365 x …	short delays ok

Fig. 2. Overview IT/OT characteristics.

Legal and Normative Requirements

- It's essential to consider the legal and normative requirements in the context of Information Security:
  - German IT Security Act
    Focus on minimum standards for critical infrastructures (KRITIS) and on the cooperation with the German Federal Office for Information Security (BSI).
  - German NIS Implementation Act
    Complement of the IT Security Act for the implementation of the EU directive.
  - ISO/IEC 27001
    International standard with focus on the installation and operation of an Information-Security Management System (ISMS).
  - IEC 62443
    Standard in the context industrial security. Defines fundamental concepts, e.g. security level, zones and conduits.

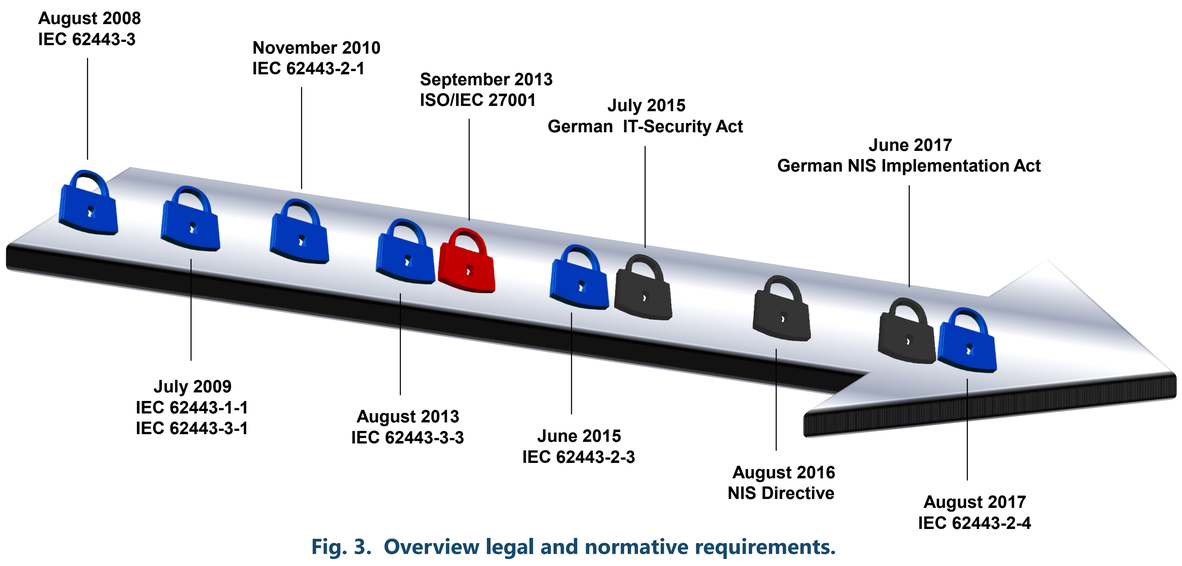
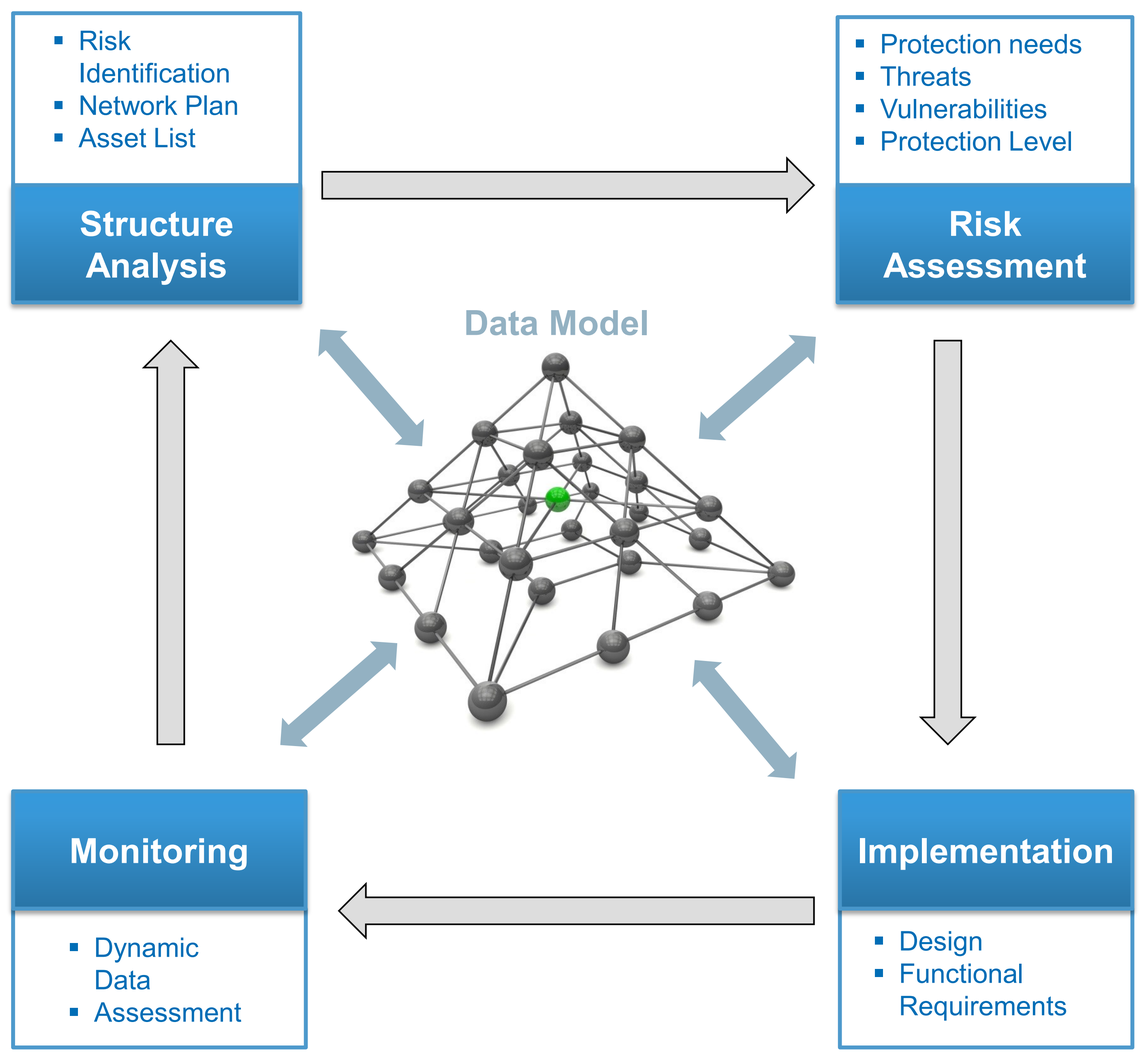


Fig. 3. Overview legal and normative requirements.

OT Security Management Concept

Holistic OT Security Management Process



Partner

- KORAMIS GmbH, Saarbrücken
- ZeMA - Zentrum für Mechatronik und Automatisierungstechnik gGmbH, Saarbrücken

References

[1] Bitkom e.V. 2017. Wirtschaftsschutz in der digitalen Welt, Retrieved September 24, 2018., from https://www.bitkom.org/Presse/Anhaenge-an-PIs/2017/07-Juli/Bitkom-Charts-Wirtschaftsschutz-in-der-digitalen-Welt-21-07-2017.pdf.

List of publications related to the topic

Conference papers

Adamczyk H.; Siegwart, C.; Krammel, M.; Frey, G.: Anomalieerkennung in der Kommunikation industrieller Anlagen. Proceedings of the Kongress Automation 2017, ISBN 978-3-18-092293-5, VDI-Verlag, June 2017.

Siegwart, C.; Adamczyk, H.; Frey, G.: Industrial Security - IEC62443 in der I4.0-Analyse. Proceedings of the Kongress Automation 2018, VDI-Berichte Nr. 2330, VDI-Verlag, pp. 369-382, Baden-Baden, Germany, July 2018.