



Opportunities and Risk of a large scale Software Project

Abstract: Using public articles we discuss opportunities and complexity of the introduction of new software products within a large technical project. A discussion of the legal risks in relation to different legal systems will be provided.

Seminar presentation

Juristisches IT-Projektmanagement

Lecture Wintersemester 2017 / 2018

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 - Project Management
 - Timeline
 - Supply Chain
 - Electrical System
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Introduction of Project

- Aircraft Development – all new commercial airplane

- **Timeline**

- (1) (2)



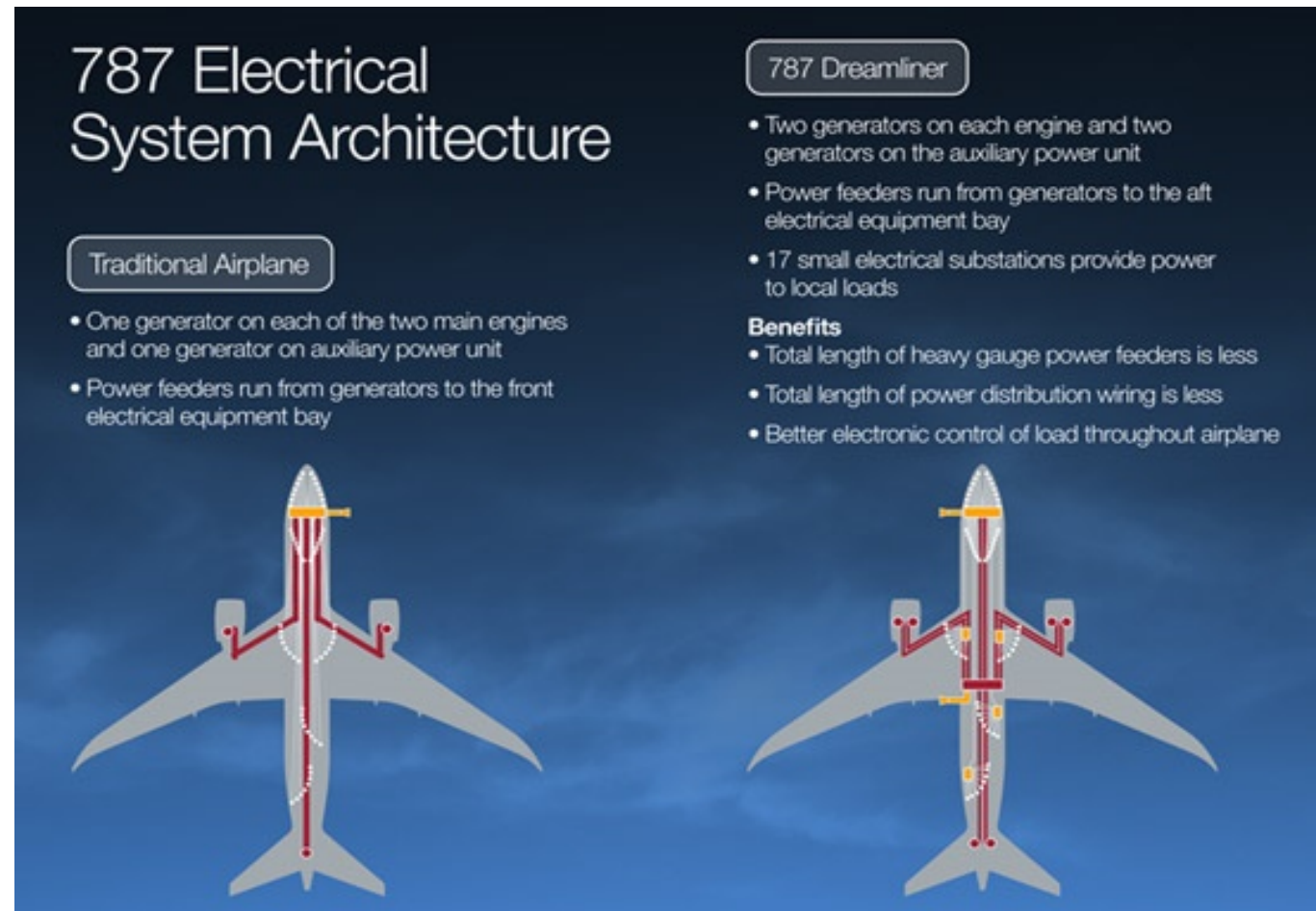
Introduction of Project

- Aircraft Development – all new commercial airplane
 - Supply Chain
 - (3)



Introduction of Project

- Aircraft Development – all new commercial airplane
 - **Electrical System**
 - (4)



Introduction of Project

- Aircraft Development – all new commercial airplane
 - **Composites**
 - (5,6)



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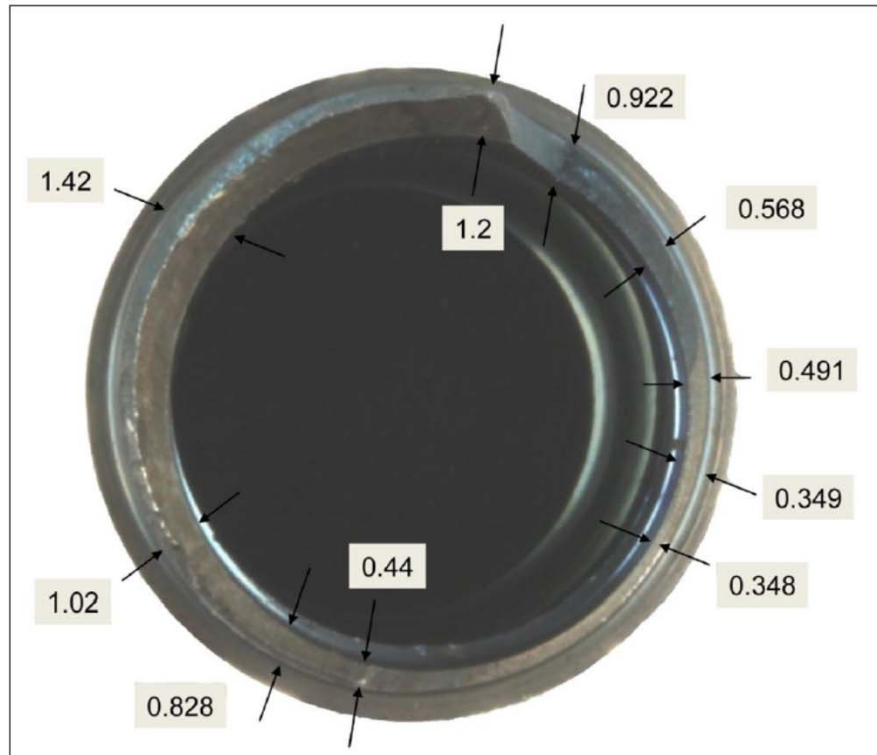
Technical Requirements

- Experiences from the past
 - Engine Failure (1)
 - (7)



Figure 43: Oil feed stub pipe fracture

Figure 45: Fractured oil feed stub pipe wall measurements



Technical Requirements

- Experiences from the past
 - **Engine Failure (2)**
 - Process Failures, Loss of Inspection Data, Not Understanding Data
- In 2007, the manufacturer identified that a number of components had left the facility with unreported non-conformances and carried out a major quality investigation. After that investigation, a number of newly manufactured non-conforming oil feed stub pipe counter bores were identified and reported by manufacturing personnel. However, due to a difference between the reference datum used by the manufacturer's automated measuring machines and the datum specified on the drawings, the engineers assessing the effect of the non-conformance misunderstood how the non-conformance would affect the wall thickness of the oil feed stub pipe.
- In March 2009, a manufacturing engineer identified that oil feed stub pipe counter bores were misaligned in previously manufactured and released HP/IP bearing support assemblies. The engineer was the first to identify the effect that misalignment of the counter bore had on the wall thickness of the pipe.
- ... (7)

Technical Requirements

- Experiences from the past
 - **Wiring A380**
- (8)



Technical Requirements

- Experiences from the past
 - **Wiring A380**
- (9) – Incompatible Computer Systems

Meeting this timeline demanded state-of-the art computer-assisted design technology. Since the early 1990s, Airbus sites in France, where the A380's nose and central fuselage sections are built, have used a package of two powerful three-dimensional computer modeling programs called **Catia** and Circe. Developed by the French software maker Dassault Systèmes, they were used successfully on the A340 and, according to Williams, the Airbus programs chief, "were constantly being improved."

German engineers preferred to work with an older design software made by a U.S. company, **Computervision**. The program had been the gold standard of industrial design tools in the 1980s but was only capable of producing two-dimensional blueprints.

"The wiring wasn't following the expected routing through the fuselage, so when we got to the end they weren't long enough to meet up with the connectors on the next section," said one German mechanic, who said he arrived in Toulouse in early 2005. He asked not to be identified out of fear that he might lose his job. "The calculations were wrong," he said. "Everything had to be ripped out and replaced from scratch."

Technical Requirements

- Experiences from the past
 - **Separation Requirements**
- (10-12)
- This AD (ed. Airworthiness Directive) was prompted by wire harness chafing on the electro-mechanical actuators (EMAs) for certain spoilers due to **insufficient separation** with adjacent structure.



Primary Flight Control System

- ① Aileron Servoactuator
- ② Flaperon Actuator and Control Module
- ③ Inboard Spoiler Servoactuator
- ④ Outboard Spoiler Servoactuator
- ⑤ Electromechanical Spoiler Actuator and Motor Control Unit
- ⑥ Horizontal Stabilizer Trim Actuator and Motor Control Unit
- ⑦ Elevator Servoactuator
- ⑧ Rudder Servoactuator

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 - Legal Requirements
 - Federal Aviation Administration
 - Department of State
 - Export Laws of other nations
 - Other Rules

Legal Requirements

- Federal Aviation Administration (1)
 - **Code of Federal Regulation Title 14 Part 21: CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS: Samples:**
 - § 21.31 Type design. The type design consists of— (a) The drawings and specifications, and a listing of those drawings and specifications, necessary to define the configuration and the design features of the product shown to comply with the requirements of that part of this subchapter applicable to the product; (b) Information on ... (c) The Airworthiness Limitations ... (d) For primary category aircraft, if desired, a special inspection and preventive maintenance program ... (e) Any other data ...
 - § 21.137 Quality system. Each applicant for or holder of a production certificate must establish and describe in writing a quality system that ensures that each product and article conforms to its approved design and is in a condition for safe operation...

Legal Requirements

- Federal Aviation Administration (2)
 - **Example Advisory Circular AC 21-43, Production Under 14 CFR Part 21, Subparts F, G, K, and O. (14)**
 - This AC guides PAHs in developing and maintaining quality systems for the products and articles they produce.
 - **5. Design Data and Configuration Control.**
 - **a.** Identify the design data package provided by the PAH, including all pertinent data required for the supplied article(s) to be identified, manufactured, inspected, used, and maintained.
 - **b.** Establish procedures for managing design changes.

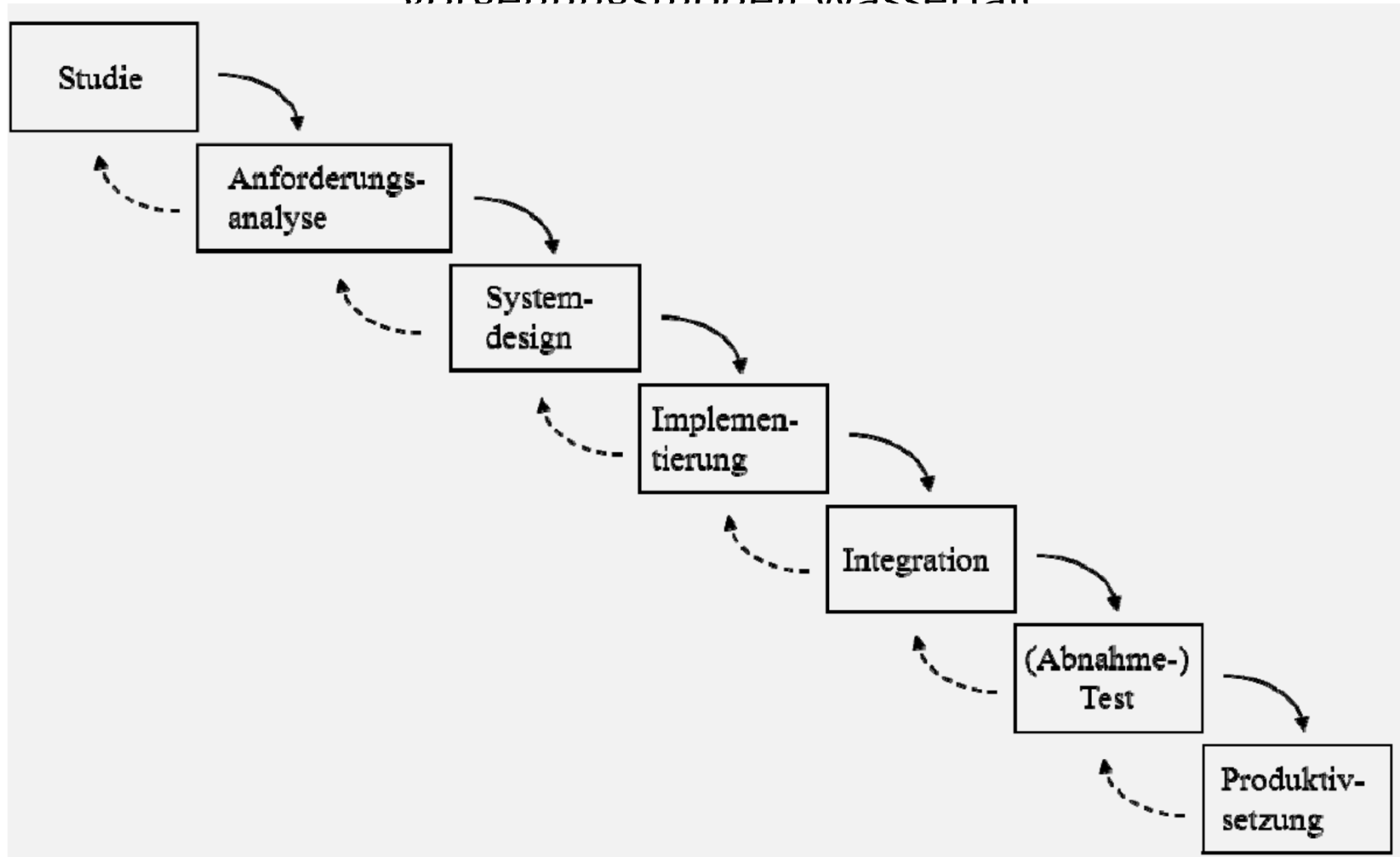
Legal Requirements

- Department of State
 - **The International Traffic in Arms Regulations (ITAR)**
 - §120.16 Foreign person. Foreign person means any natural person who is not a lawful permanent resident as defined by 8 U.S.C. 1101(a)(20) or who is not a protected individual as defined by 8 U.S.C. 1324b(a)(3). It also means any foreign corporation, business association, partnership, trust, society or any other entity or group that is not incorporated or organized to do business in the United States, as well as international organizations, foreign governments and any agency or subdivision of foreign governments (e.g., diplomatic missions)..
 - §120.17 Export (a) Except as set forth in §126.16 or §126.17, export means: ... (2) Releasing or otherwise transferring technical data to a foreign person in the United States (a “deemed export”); ... (b) Any release in the United States of technical data to a foreign person is deemed to be an export to all countries in which the foreign person **has held** or holds citizenship or holds permanent residency.

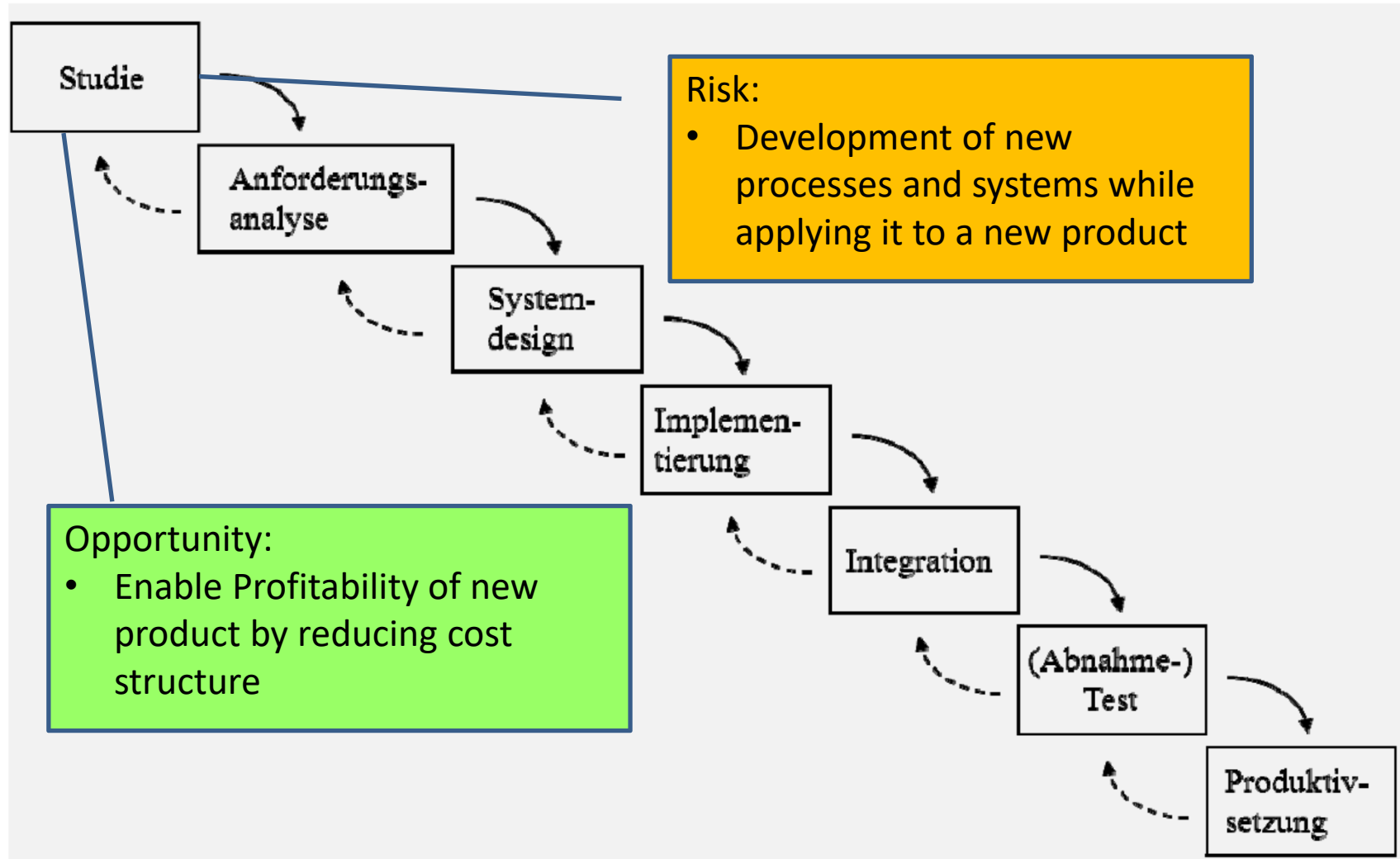
Legal Requirements

- Export Controls of other nations
 - Sample List
 - UN: <https://www.un.org/disarmament/wmd/export-controls/>
 - Deutschland:
http://www.bafa.de/EN/Foreign_Trade/Export_Control/export_control_node.html
 - EU: http://ec.europa.eu/trade/import-and-export-rules/export-from-eu/dual-use-controls/index_en.htm
 - India: <http://mea.gov.in/in-focus-article.htm?18843/Indias+System+of+Controls+over+Exports+of+Strategic+Goods+and+Technology>
- Other Rules
 - Bribery
 - Data Protection
 - Tax
 - Customs
 - ...

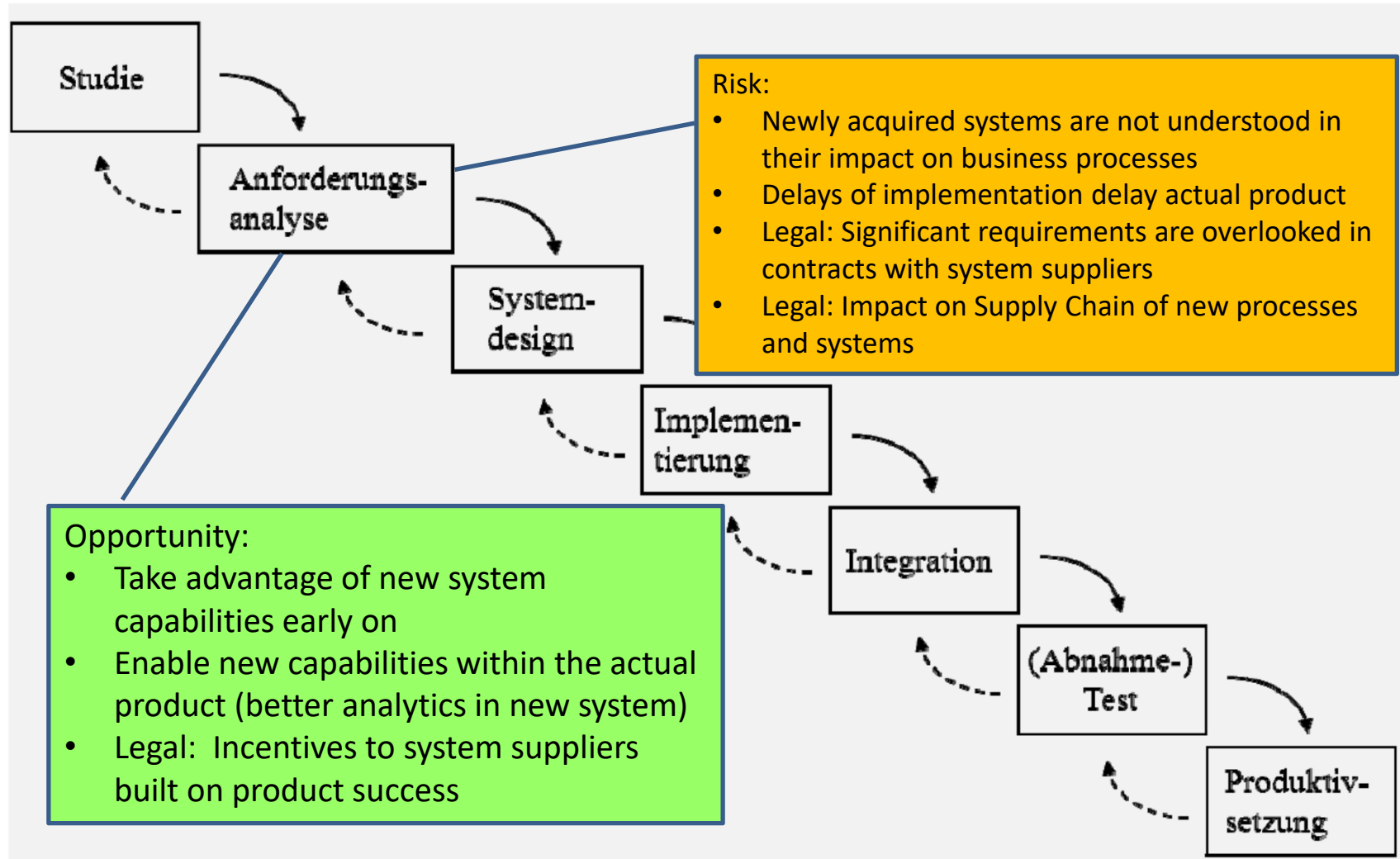
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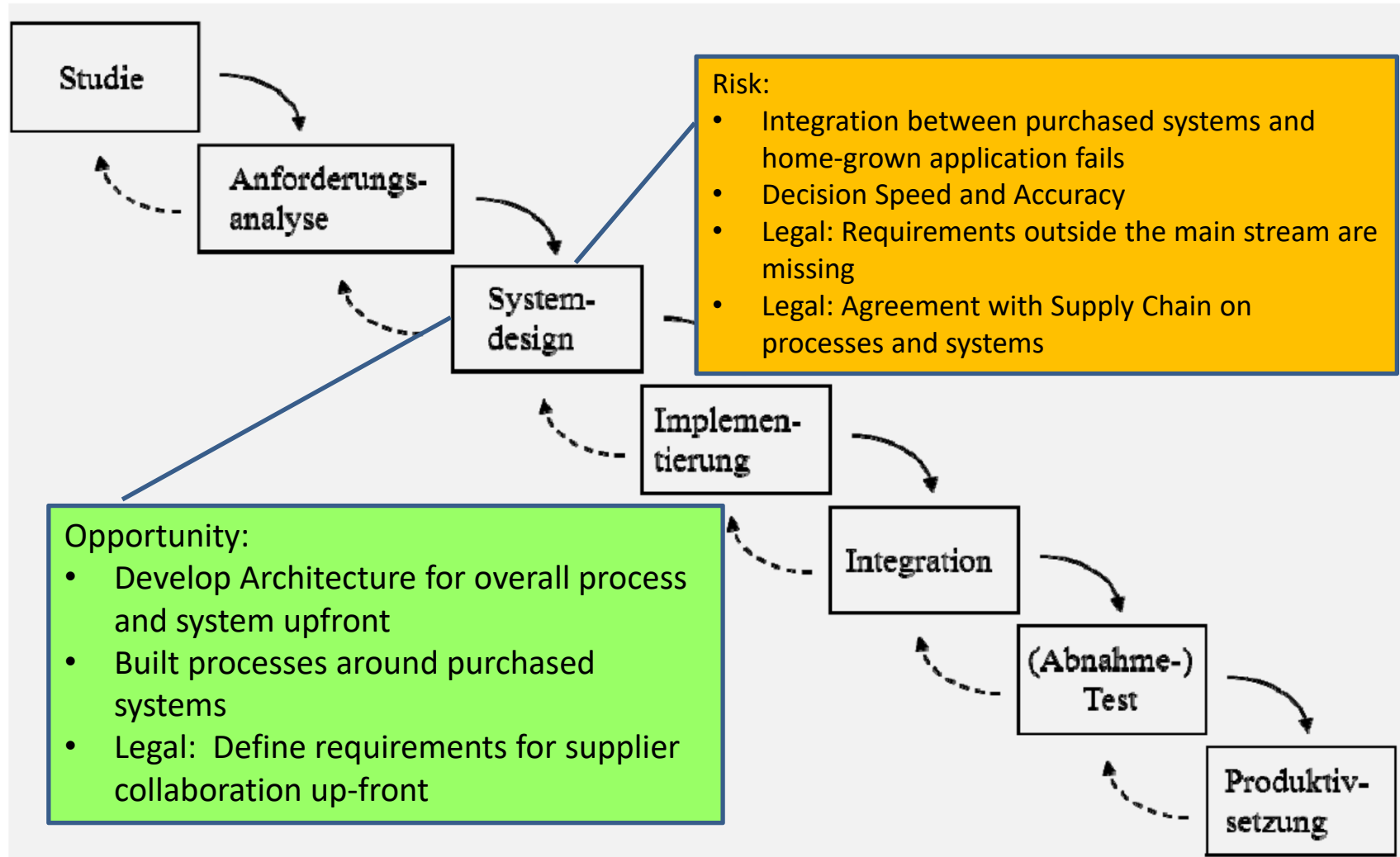
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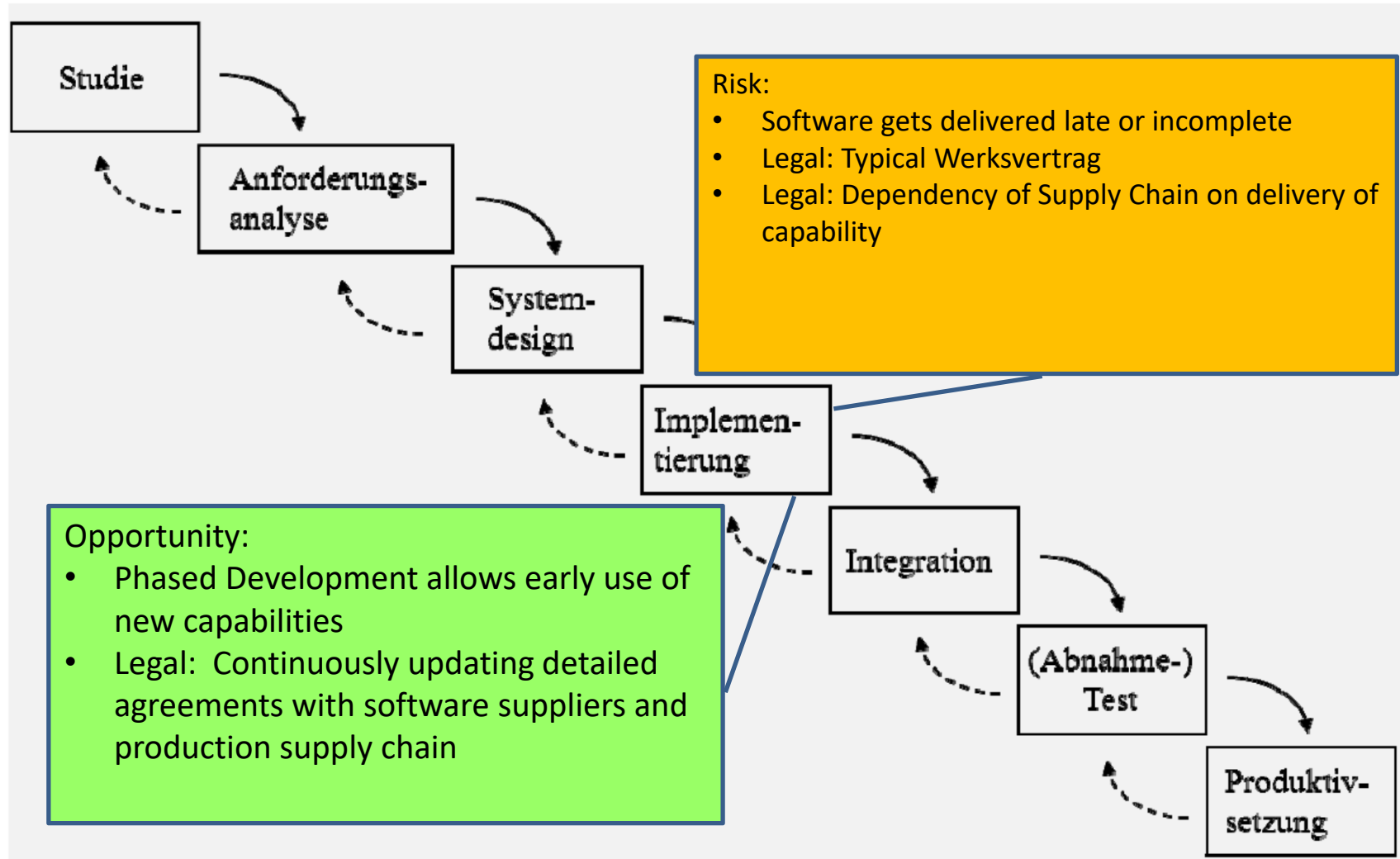
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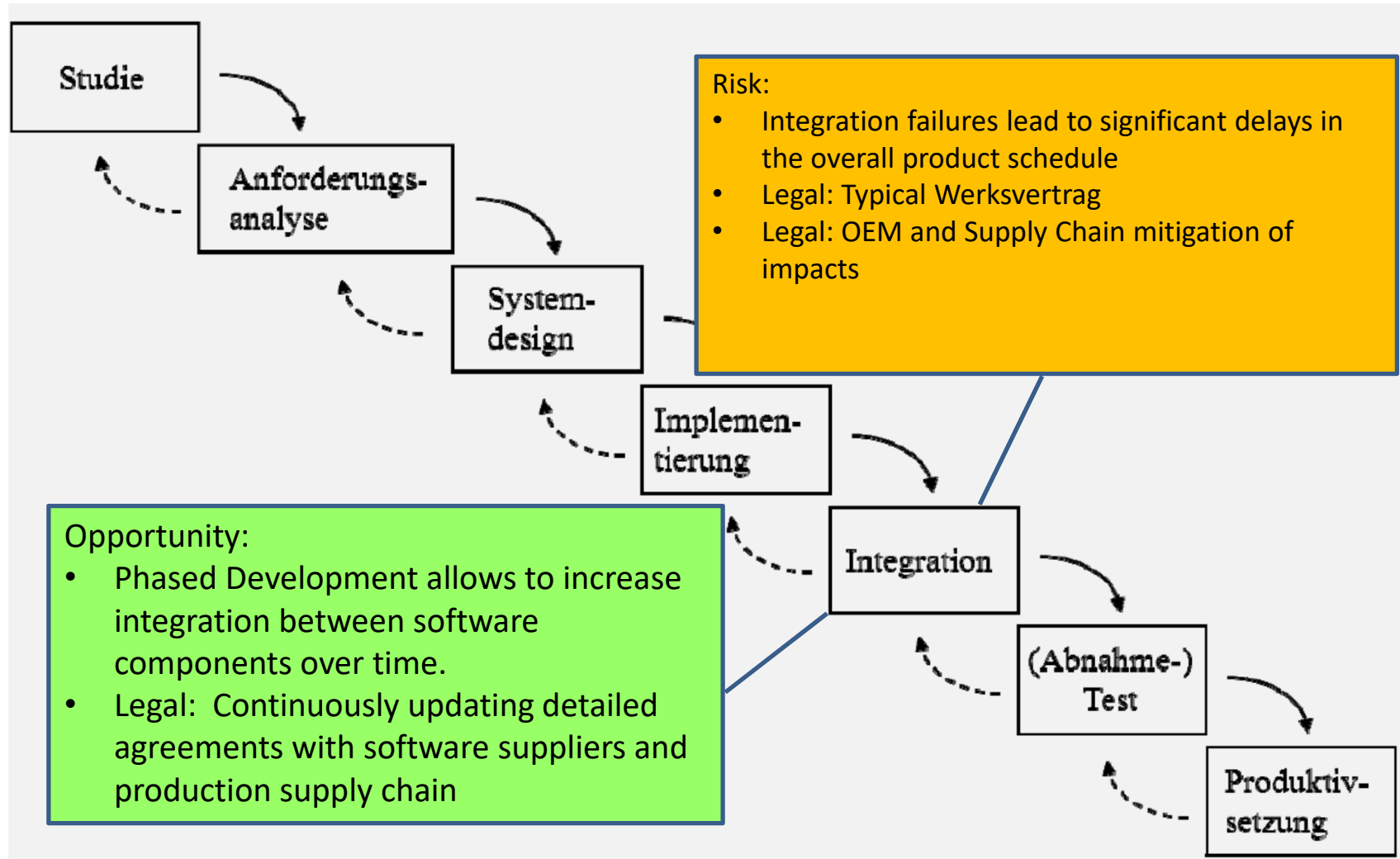
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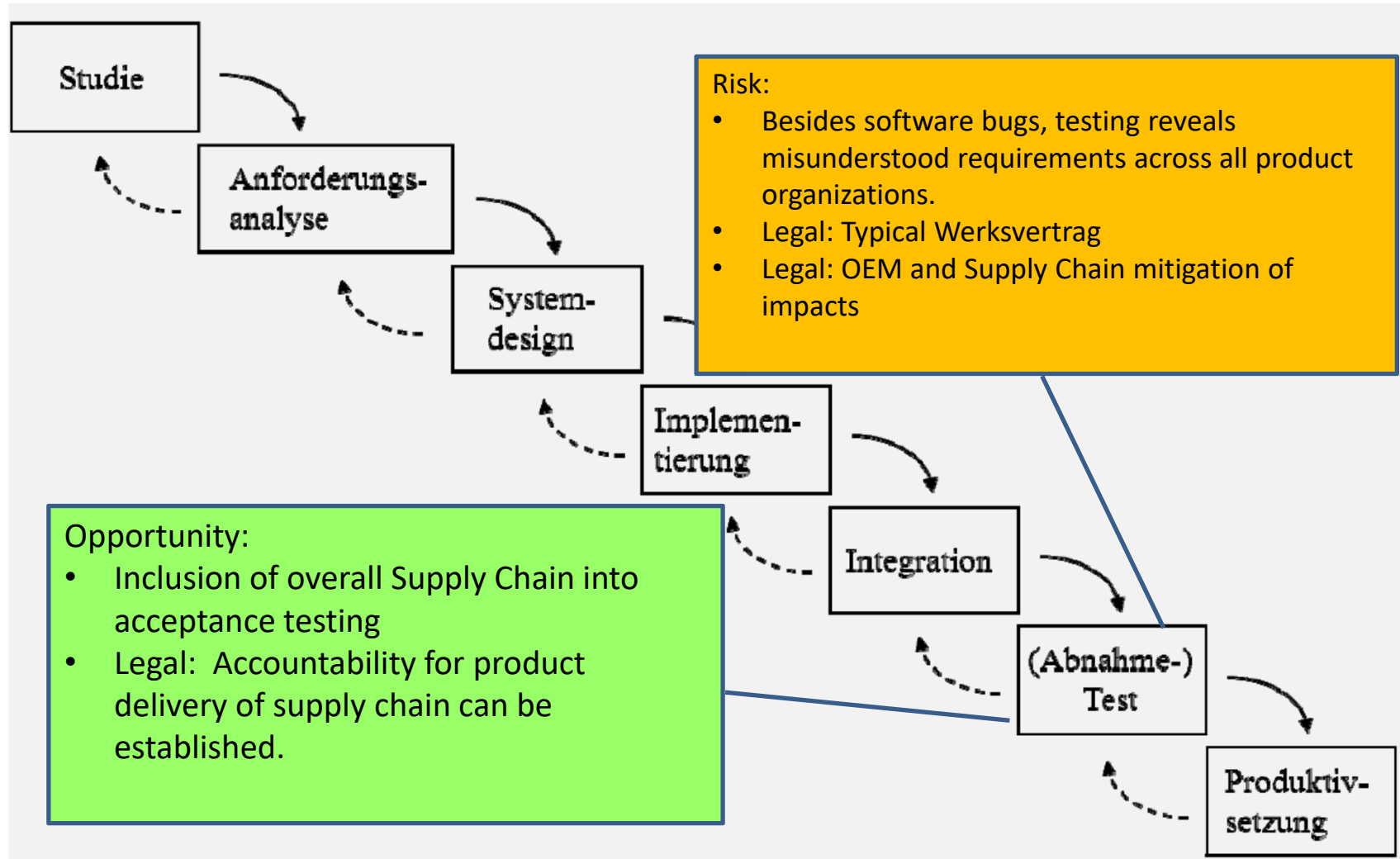
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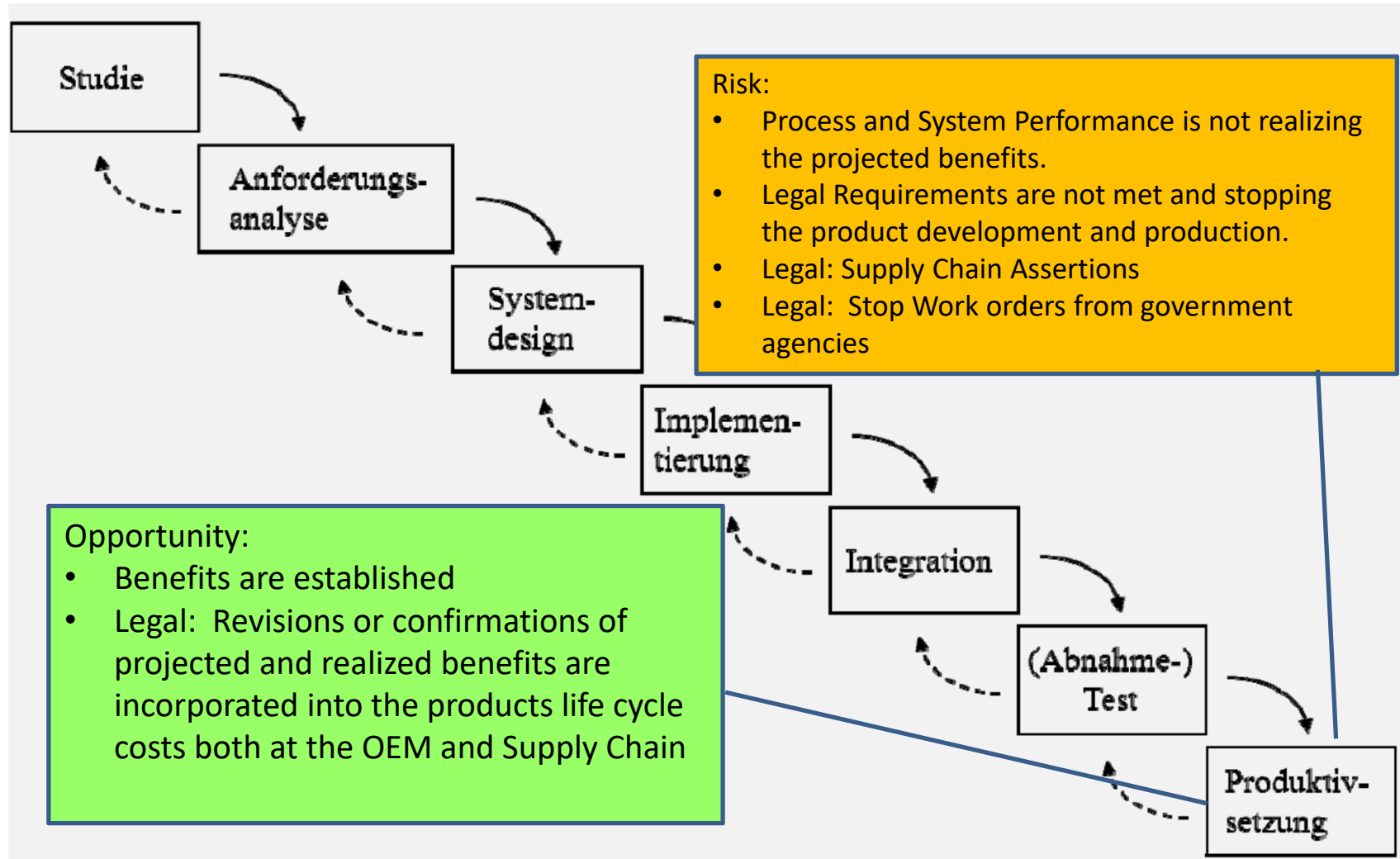
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