

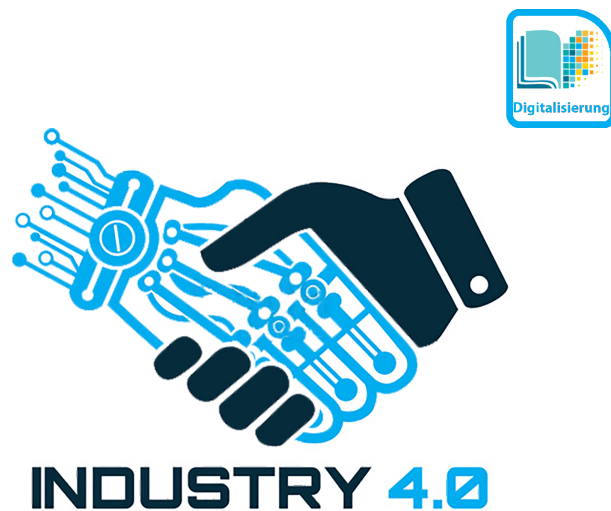
- Comprehension Questions -

Industry 4.0 - Digital Transformation TWIE24

Industrial Engineering and Management Program

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CHAPTER 1

Digital Transformation

1.1 Comprehension Questions

1. How do Big Data and Smart Data differ?

2. Name the three stages in which digital transformation takes effect from a company's point of view:

3. What was the starting point for digital transformation?

4. Name three examples of enabler technologies:

5. In which five steps can digital transformation be successfully implemented in companies?

6. What is meant by predictive analytics?

7. Name the four levers through which digital transformation operates:

CHAPTER 2

Disruptive Technologies

2.1 Comprehension Questions

1. Describe in your own words the theory of disruptive technologies.

2. According to which two types are disruptive technologies categorized?

3. Name three examples of disruptive technologies.

4. How can already established market participants protect themselves against disruptive innovations ?

5. What alternative model regarding innovation management do you know?

CHAPTER 3

Artificial Intelligence

3.1 Comprehension Questions

1. What are the most important subfields of artificial intelligence?

2. What does the "Turing Test" state?

3. According to Mainzer, when is a system considered intelligent?

4. How does a weak AI differ from a strong AI?

5. What three learning approaches exist within Machine Learning?

6. When is Deep Learning preferred over Machine Learning?

7. What does the field of Neural Networks take as its model?

8. What three main types of modeling does Data Mining include?

CHAPTER 4

Autonomous Driving and Risk Ethics

4.1 Comprehension Questions

1. How is the term „autonomy“ to be understood in the field of autonomous driving?

2. How can the decline in road fatalities be explained? Please name at least 3 examples.

3. What does the concept named „Semulin“ deal with?

4. What question arises from the risk-ethical consideration of the causes of error in road traffic with regard to the use of autonomous vehicles?

5. How will the form of decision-making change in autonomous driving?

6. What is meant by the term „crash optimization “?

CHAPTER 5

Extended Reality (XR)

5.1 Comprehension Questions

1. What is meant by the term "immersion"?

2. What do "AR" and "VR" mean, and how does the representation of objects differ between the two technologies?

3. How is the term reality defined, from which language is the term derived, and how does it differ from virtuality?

4. What area does XR technology come from, and what factors have enabled its wider use?

5. Name one commercial application of AR and one advantage that results from its use.

6. Name one field of application in industry for each of VR, MR and AR technology, and explain 3 advantages of one of the three fields of application.

7. Explain a concrete example from industry in which a company benefited from the implementation of XR technology.

8. Name two opportunities that arise from the use of XR and one risk. Suggest a way in which the risk could be counteracted.

CHAPTER 6

Blockchain Technology

6.1 Comprehension Questions

1. What is meant by a distributed network?

2. In which areas is blockchain used?

3. How can transactions be authorized and identified?

4. Which two concepts are most commonly used for reaching consensus?

5. How is a new block created in the cryptocurrency Bitcoin?

6. What does the term DAO mean?

7. Name two opportunities and two risks of blockchain technology, respectively.

CHAPTER 7

Cryptocurrencies

7.1 Comprehension Questions

1. Why are cryptocurrencies, by definition, not a currency?

2. Explain the term „scalability“ in connection with cryptocurrencies in your own words.
Why is scalability important?

3. Explain the possibilities of M2M transactions using an example of your own choosing:

4. Name four possible areas of application for self-sovereign identity management:

5. What time limit applies to the taxation of profits from trading in cryptocurrencies?

6. Name one risk of cryptocurrencies and explain it.

CHAPTER 8

The Working World of the Future - Work 4.0

8.1 Comprehension Questions

1. What challenges arise from demographic change?

2. Which fields of activity are least affected/threatened by automation and digitalization?

3. How can the concept of social partnership help enable a socially sustainable transition to Working World 4.0?

CHAPTER 9

Big Data

9.1 Comprehension Questions

1. How is Big Data defined?

2. What is an algorithm?

3. What advantages result from Big Data? Name two, with a brief explanation.

4. What is the greatest risk that Big Data brings with it? (Brief justification)

5. What is Predictive Analytics?

6. Name three examples of where Big Data is used.

CHAPTER 10

Medicine 4.0

10.1 Comprehension Questions

1. Explain why digitalization of the healthcare system will be indispensable in future.

2. Name three challenges of digitalization in the healthcare system!

3. Define the term **interoperability**.

4. Name the 5 areas into which eHealth can be divided.

5. How many euros could be saved annually in Germany through a digitalized healthcare system?

6. Describe the changes that have taken place from Clinic 1.0 to Clinic 4.0.

7. Explain how the role of the physician will change in Clinic 4.0.

8. Name 4 systems present in nursing care in a digitalized hospital.

9. Describe the risks that arise with the digitalization of the healthcare system.

10. Name the three areas of telemedicine.

11. How will the digitalization of the healthcare system develop in future?

CHAPTER 11

Digital Administration

11.1 Comprehension Questions

1. Describe in your own words what is understood by digital administration.

2. What advantages does e-government offer the population?

3. Name two laws that enable digitalization?

4. How can the transition to a fully digital administration in Germany succeed?

5. Which technologies do you know that are transferable to state administration?

6. Explain to what extent blockchain is of interest for administration.

CHAPTER 12

Digitalization of Culture

12.1 Comprehension Questions

1. What is "Kultur Digital"?

2. What are digital serious games?

3. How does the value of NFTs behave?

4. What can simply be said about the ownership of a digital work of art?

5. What is the question that arose at the end of the #vorstellungsänderung experiment?

6. What types of funding does the "German Federal Cultural Foundation" (Kulturstiftung des Bundes) offer?

7. What is the Soundgraph 3.0?

CHAPTER 13

Cloud Computing

13.1 Comprehension Questions

1. Which 5 technological characteristics define Cloud Computing?

2. What do the abbreviations SaaS / PaaS / IaaS mean?

3. How is Cloud Computing structured?

- ---
- ---
- ---

4. What other technologies exist alongside Cloud Computing?

5. What does the abbreviation ADV stand for?

CHAPTER 14

Digital Resilience

14.1 Comprehension Questions

1. How should the term „Digital Resilience” be understood?

2. Justify the relevance of cyber security solutions.
Also name three goals with regard to the resilience strategy.

3. Name two advantages of the smart container project „DProdLog”.

4. Why should one not rely solely on cloud computing?
Address the advantages of edge computing in your answer.

5. What do disaster recovery systems aim to achieve?

6. Show the differences between edge and cloud computing.

CHAPTER 15

Additive Manufacturing in Industry 4.0

15.1 Comprehension Questions

1. What is meant by additive manufacturing?

2. How does additive manufacturing differ from subtractive processes?

3. Which file forms the basis for additive manufacturing?

4. Nennen Sie zwei Vorteile der additiven Fertigung im Vergleich zu traditionellen Fertigungsverfahren.

5. What is meant by Rapid Prototyping (RP)?

6. Beschreiben Sie kurz das Funktionsprinzip des Material Jetting.

7. Welche Rolle spielt das Pulverbett beim Binder Jetting und Powder Bed Fusion?

8. What challenges exist in industrial series production with additive manufacturing?

9. How does additive manufacturing support Industry 4.0?

10. Nennen Sie die vier Hauptgruppen von Werkstoffen in der additiven Fertigung.

11. Vergleichen Sie Powder Bed Fusion (PBF) und Directed Energy Deposition (DED) hinsichtlich Präzision, Bauraum und Anwendungen.

12. Why are support structures necessary for some processes, and how can they be implemented?

13. Which factors influence the mechanical properties of additively manufactured parts?

14. Diskutieren Sie die ökologischen Vorteile additiver Fertigung und deren Grenzen.

15. Wie verändert die Additive Fertigung die Wertschöpfungskette im Vergleich zu klassischen Produktionsverfahren?