Digital Transformation in the Automotive Industry

Digitale Transformation in der Automobilindustrie

Dr. Michael Nolting

Lecture 2

Tutorials

- Homework will be reading the book from Gene Kim „The Phoenix Project“

The homeworks are optional and not relevant for the exam

Lecture Overview

1. Introduction: Why Digital & Data Transformation	7. Culture & Organization
Homework 1: Reading 60 mins the Phoenix Project	Homework 7: Reading 60 mins the Phoenix Project
2. The World is Changing: ACES & VUCA	8. Examples of Digitalization Projects I
Homework 2: Reading 60 mins the Phoenix Project	Homework 8: Reading 60 mins the Phoenix Project
3. The Technological Disruption	9. Examples of Digitalization Projects II
Homework 3: Reading 60 mins the Phoenix Project	Homework 9: Reading 60 mins the Phoenix Project
4. Challenges for the Transformation - Innovation	10. Strategic Partners & TESLA as THE Digital Player
Homework 4: Reading 60 mins the Phoenix Project	Homework 10: Reading 60 mins the Phoenix Project
5. Challenges for the Transformation - Legacy	11. Q & A – Exam
Homework 5: Reading 60 mins the Phoenix Project	
6. How to Transform Into a Techgiant	
Homework 6: Reading 60 mins the Phoenix Project	

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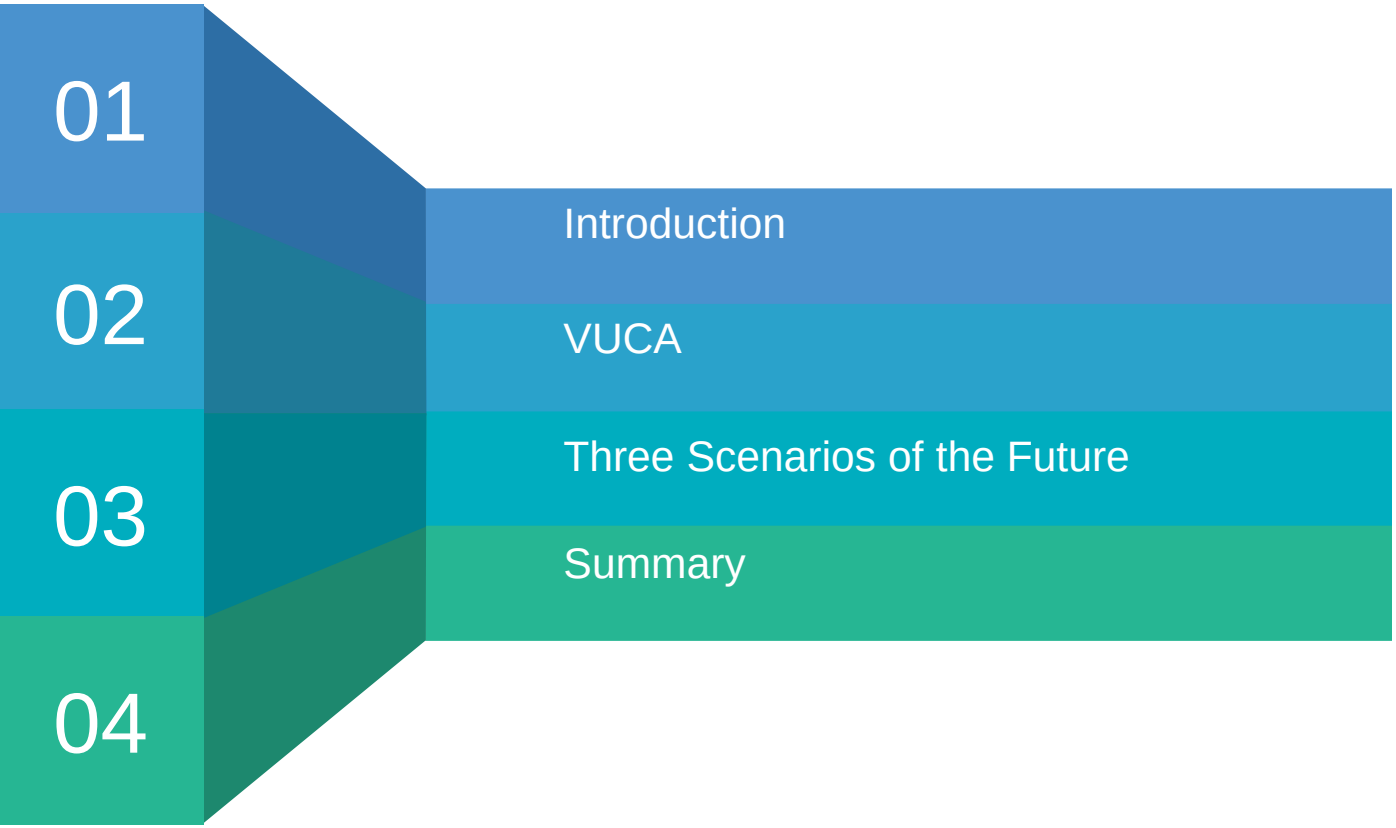
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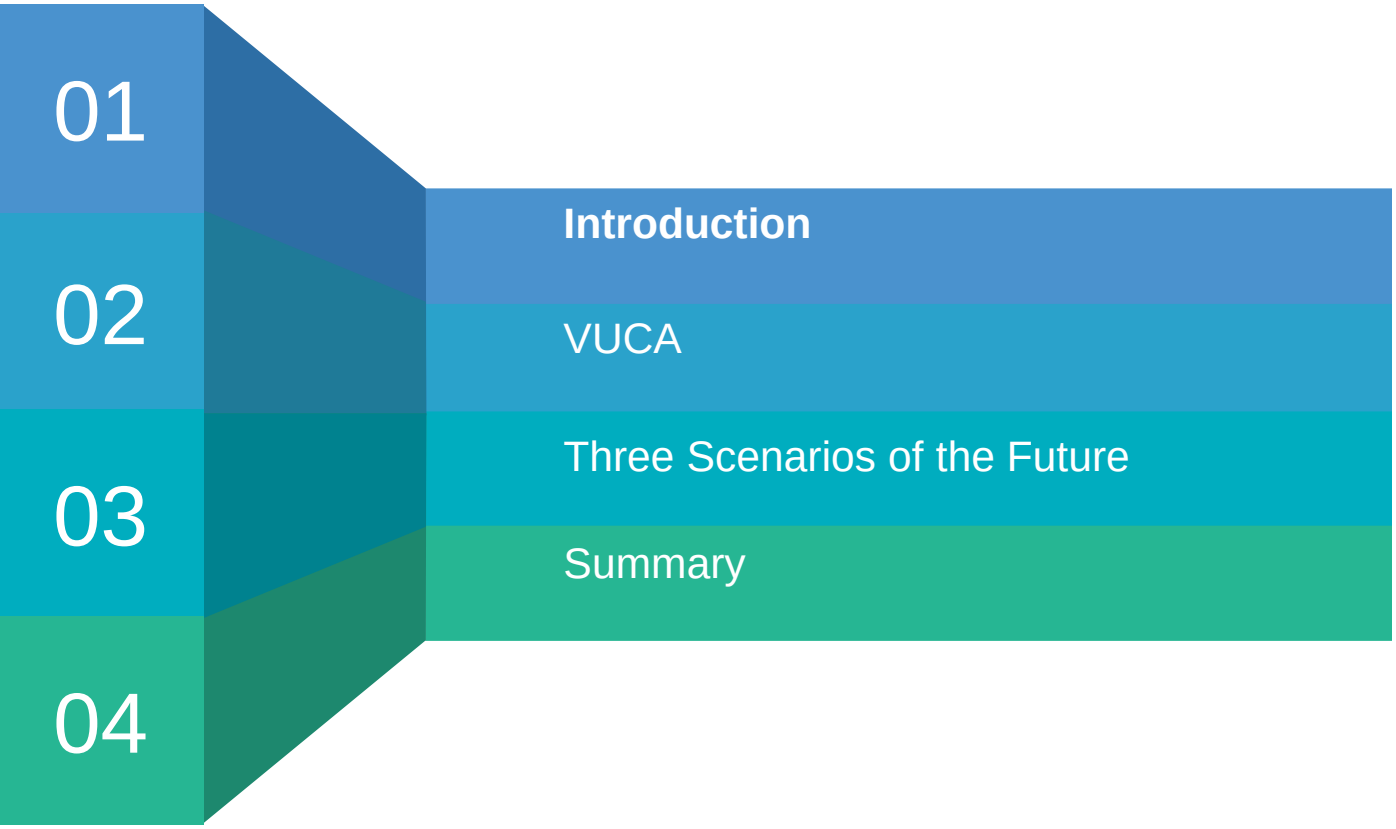
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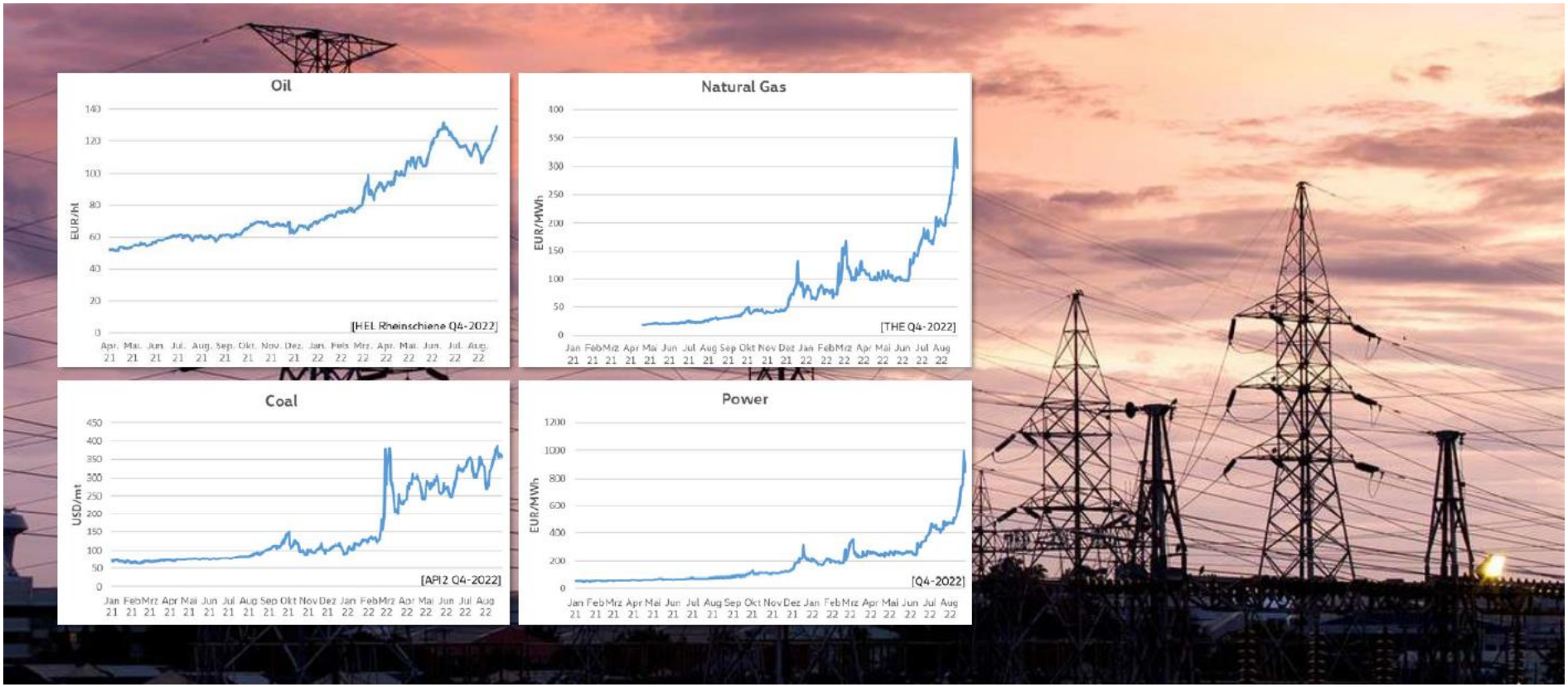
Starting with the Climate Crisis…

Ukraine-Krieg

Halbleitersituation, Energieversorgung & Rohstoffmarkt

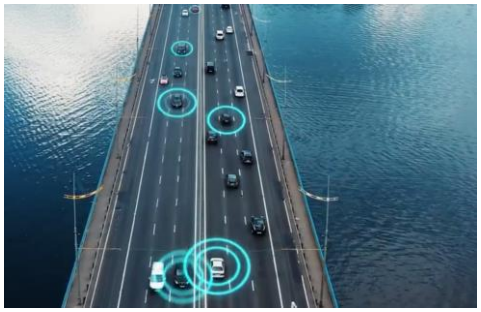
COVID Situation

… and finally: “Hello, Energy Crisis!”



ACES: A Smartphone on 4 Wheels

A – Autonomous Driving



C – Connectivity

E – Electrification

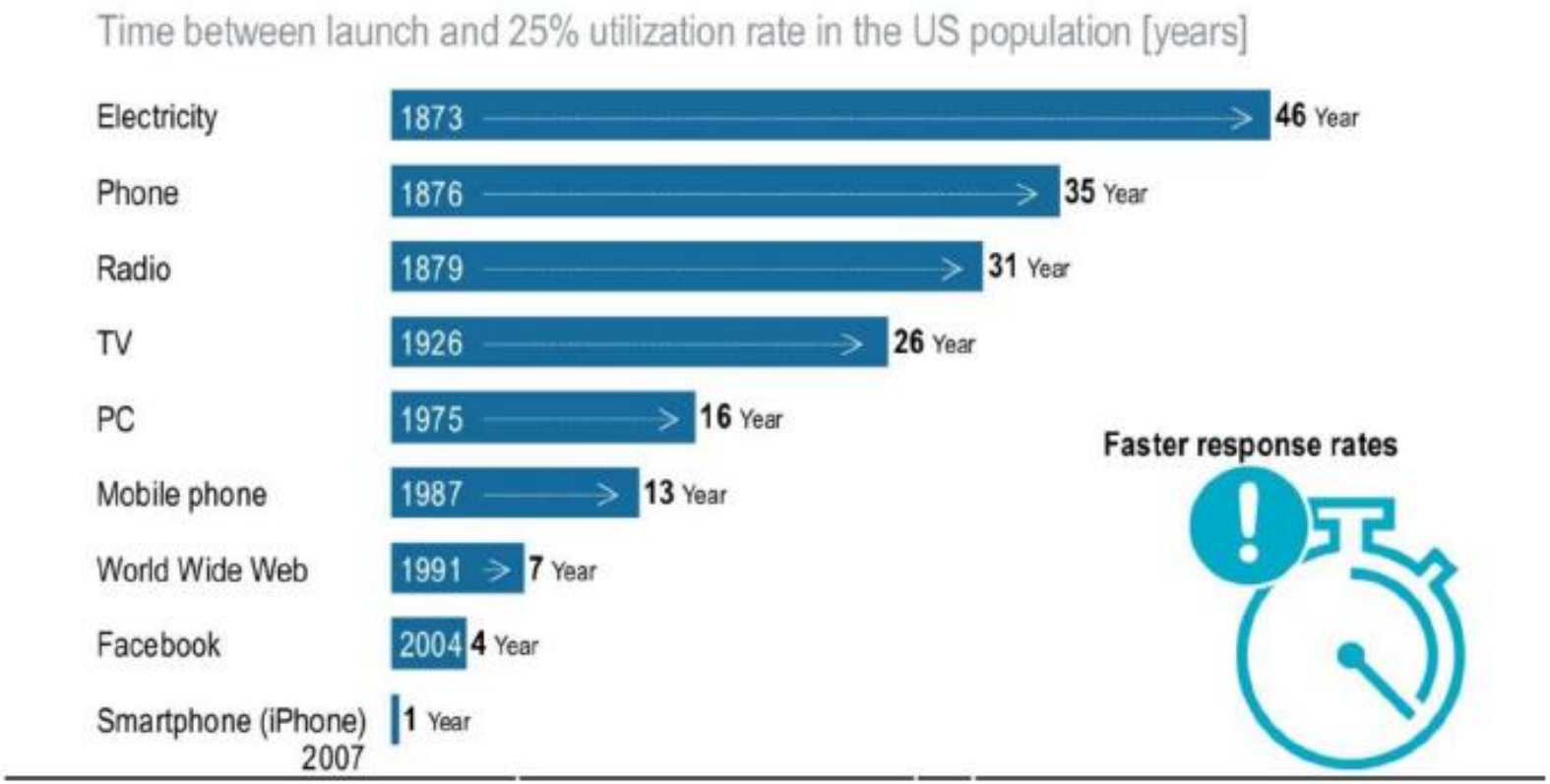
S – Shared Mobility

Source: “The Car – A Computer on Wheels”, Keynote ICSE 2018, Ödgärd Andersson
https://www.icse2018.org/getImage/orig/The+Car+%E2%80%93+computer+on+wheels.pdf

“65 years was the life expectancy of a company on the S&P index in 1920; today it’s just 10 years.”

(Sascha Haghani, CEO Germany and DACH region, Roland Berger)

Time to Market (Penetration Rate US)



*Sources: Roland Berger.

Liquidity of Markets

27.000.000.000 USD*

…in venture capital collected by Uber until 2020.
(i.e., more than the accumulated venture capital that German startups received between 2010 and 2020)

*Sources: EY (2018) Fast growth in Germany: Tech start-ups and investors setting new benchmarks; Crunchbase.com; Spiegel 11/2020.

Assets Do Not Count Any More

Company	Established	Sales revenue 2020	Net income 2020	Market capitalization
Amazon	1994	386,000,000,000	21,330,000,000	1,662,000,000,000
Alphabet	1998	182,500,000,000	40,270,000,000	1,392,000,000,000
Alibaba	1999	72,000,000,000	19,820,000,000	571,000,000,000
Tesla	2003	31,500,000,000	862,000,000	640,000,000,000
Facebook	2004	86,000,000,000	29,150,000,000	759,000,000,000
Uber	2009	11,100,000,000	-6,770,000,000	106,000,000,000
Volkswagen	1937	233,000,000,000	8,820,000,000	102,000,000,000

Source: Companies' annual reports and statista.com (accessed Feb 2021).

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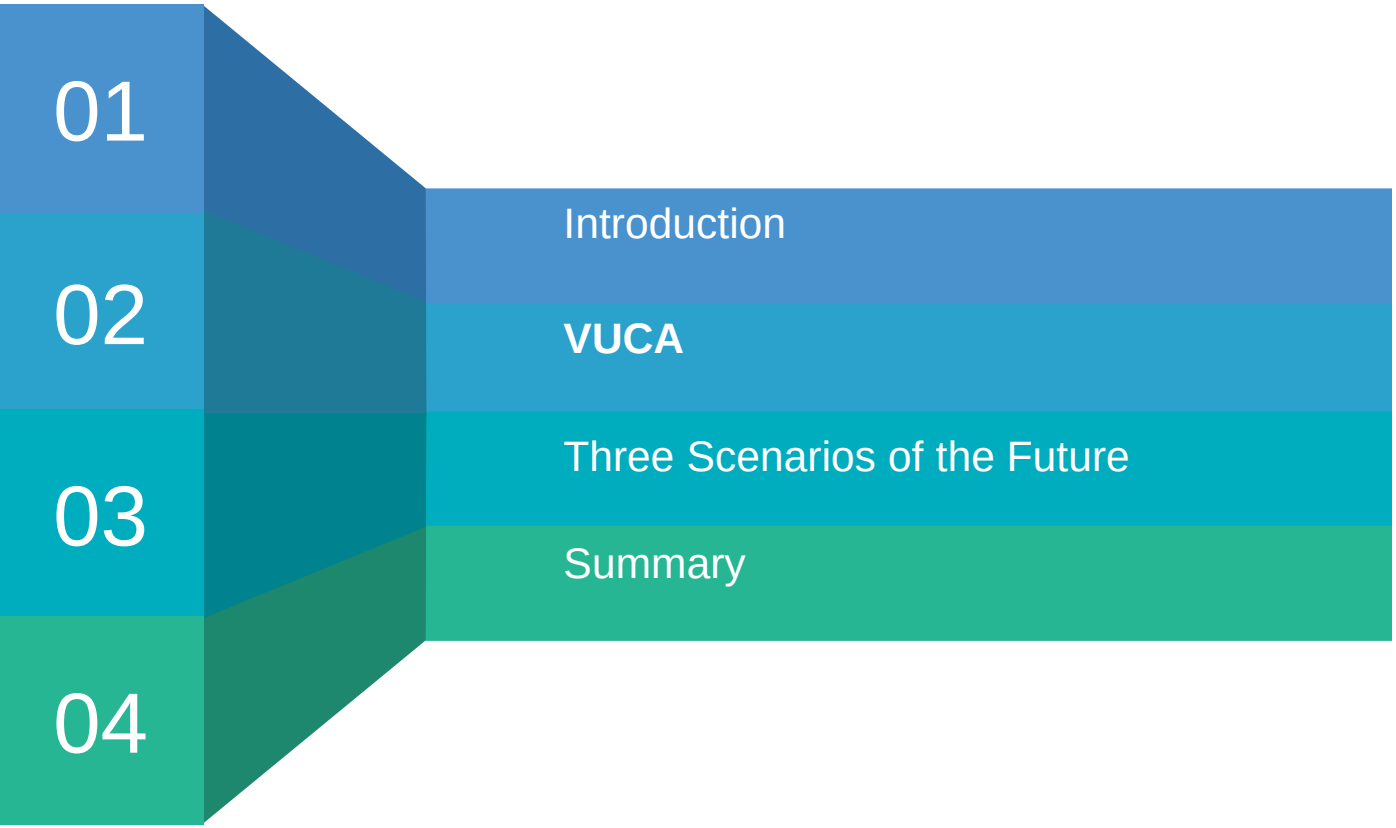
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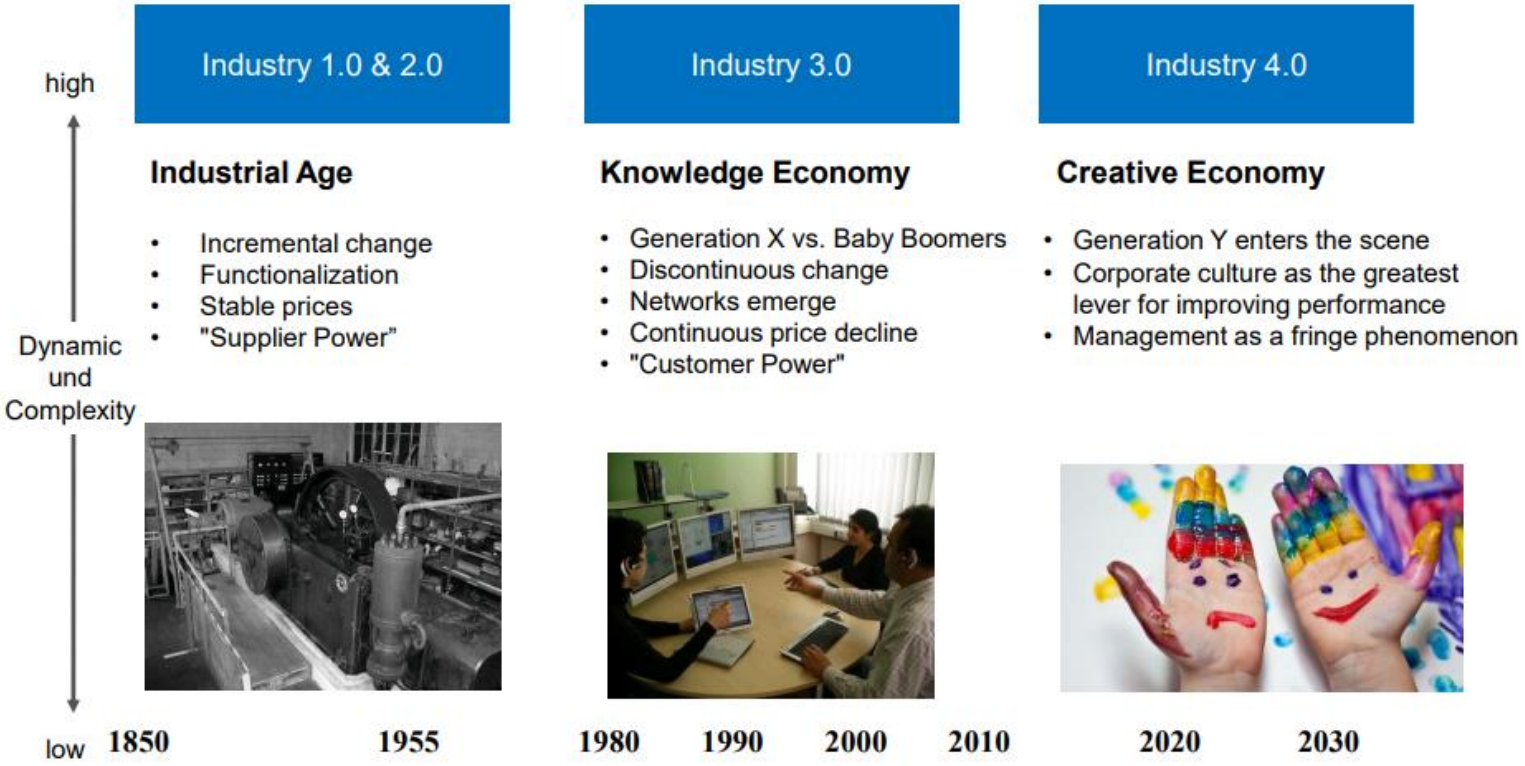
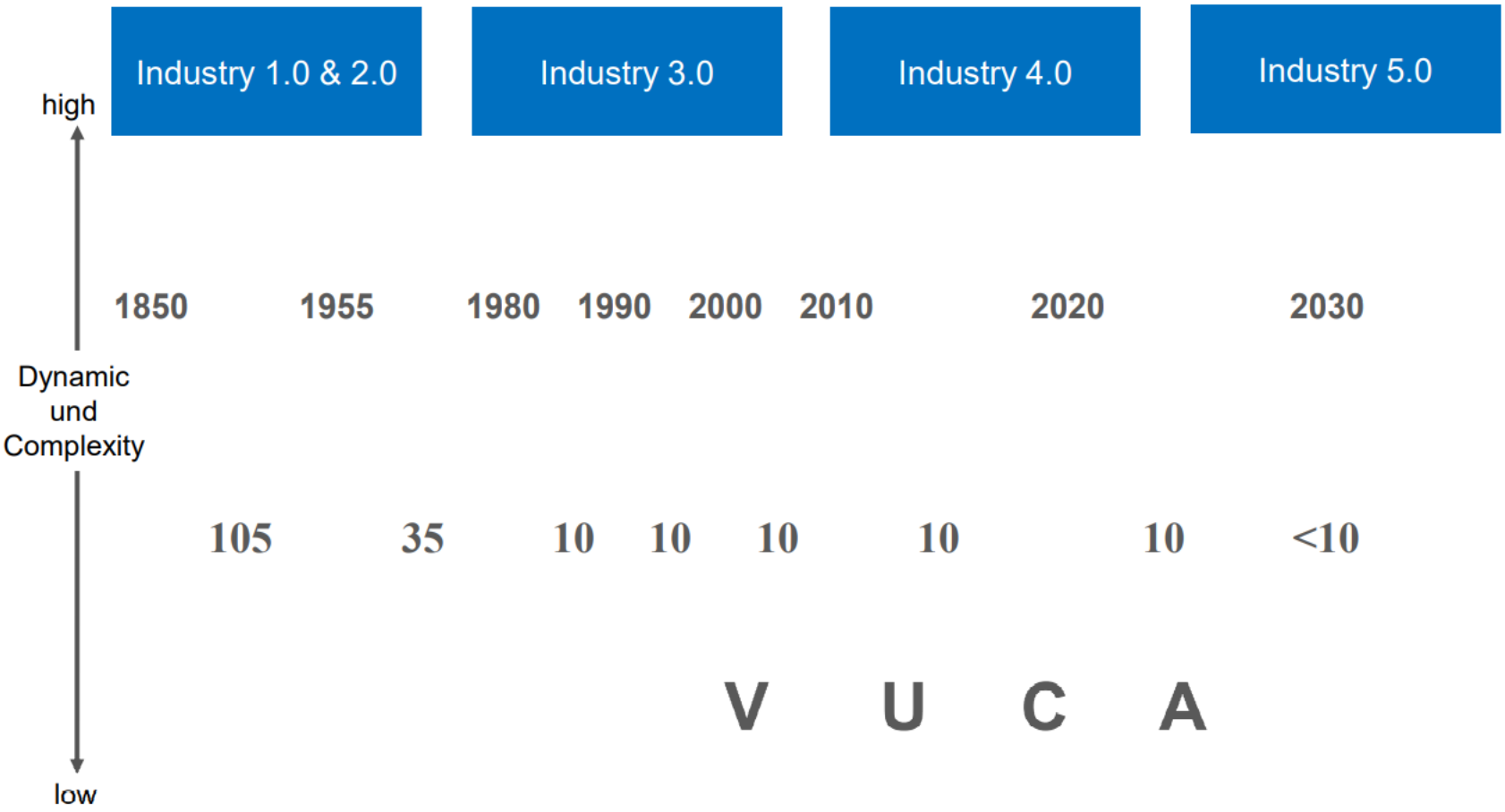
Times are Changing – This is nothing new



[Folie 1 (vuca-world.org)]

So, What is New?



The Term VUCA – its Origin and Purpose

– First used in 1987, based on the leadership theories of Warren Bennis and Burt Nanus

– Picked up by the U.S. military academy in the early 1990s

– Description of a multilateral world after the end of the Cold War

– Spread to other areas of strategic leadership, from education to business

– A term to describe the indescribable and to capture the intangible

– An answer to the circumstance that coalitions of interests are becoming more and more complex and motivations are constantly changing

– An approach to indicate changed conditions for decision-making while information is losing its predictive power

This is What VUCA Stands for

◆ **Volatility**
Speed, scope, intensity and dynamics of change increase, fluctuation and instability increase

◆ **Uncertainty**
Predictability of topics and events decreases, new things emerge out of nowhere, causal relations become more unclear

◆ **Complexity**
The multiplicity, diversity and interconnectedness of elements, systems and levels are increasing, the number of possible courses of action is growing, leading to conflicting interests and dilemmata

◆ **Ambiguity**
The world becomes "blurred", framework conditions and preconditions are more difficult to grasp, information and descriptions can be interpreted in several ways, no "objective" evaluations of a situation.

VUCA and its Challenges

Volatility

Anticipating and responding to the nature and speed of change

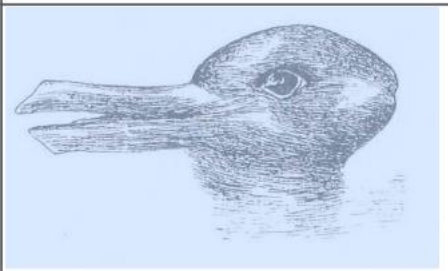
Uncertainty

Acting decisively without always having clear direction and certainty

Complexity

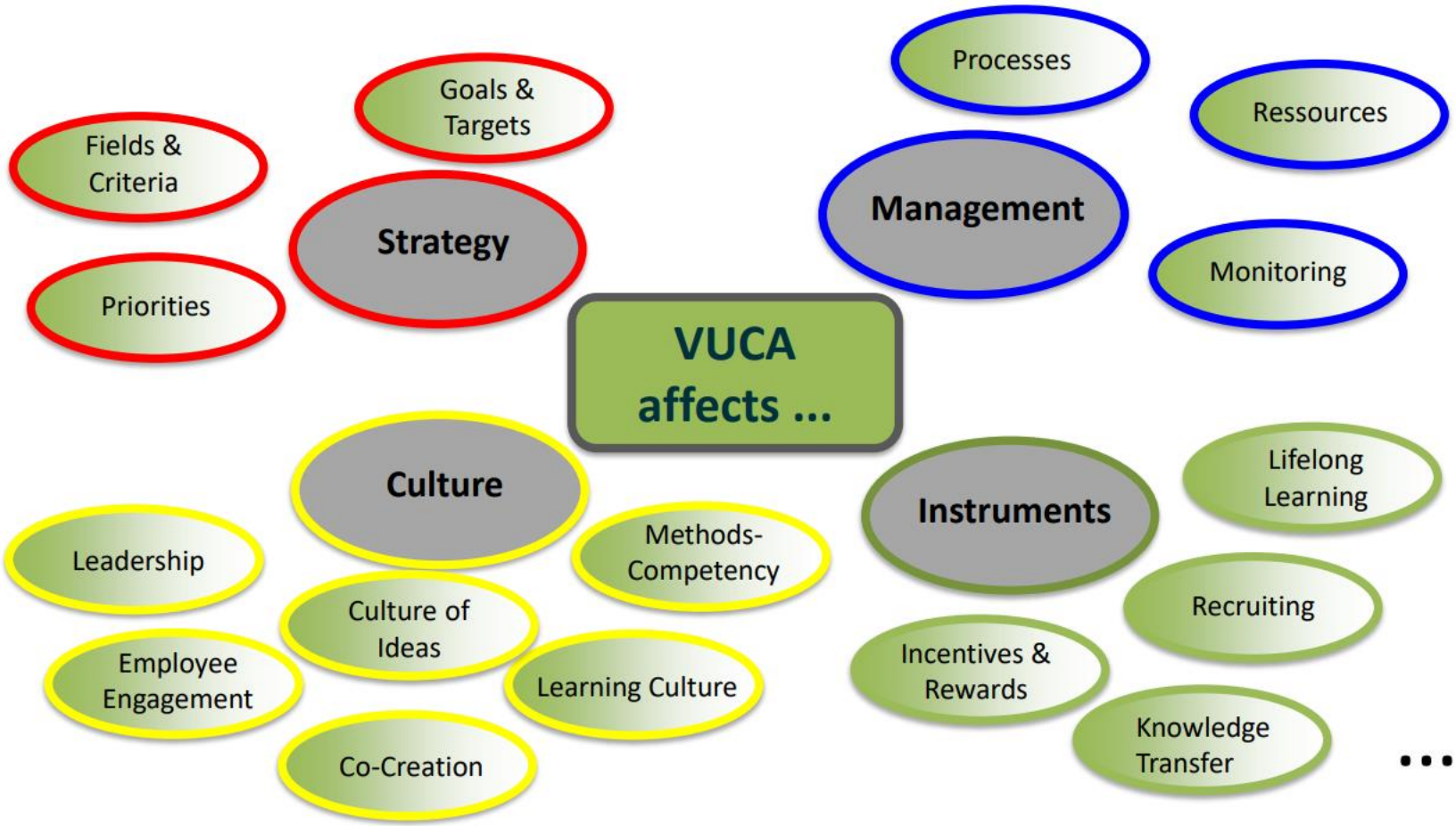
Navigating through complexity, chaos and confusion

Ambiguity



Maintaining effectiveness despite constant surprises and a lack of predictability

VUCA affects



And Even Some More Challenges

5 generations* under one "(company) roof"		**including 5 x different needs and motivations**
◆ Traditionalists	- born up to 1946	work / work
◆ Baby boomers	- born 1946 - 1964	work / work
◆ Generation Golf / X	- born 1965 - 1975	work / life
◆ Generation Y**	- born 1976 - 1997	life / work
◆ Generation Z	- born 1998 and later	life / life

◆ = Individuals who must be taken into consideration.

** **"Since ancient times, the ancients have worried about the supposedly increasingly rude, uneducated, lazy boys and girls - and yet, amazingly, the world still stands."** (Armin Wolf, Austrian Journalist)

VUCA

- VUCA-Welt: Das VUCA-Modell mit Beispielen einfach erklärt | AVANTGARDE Experts (avantgarde-experts.de)

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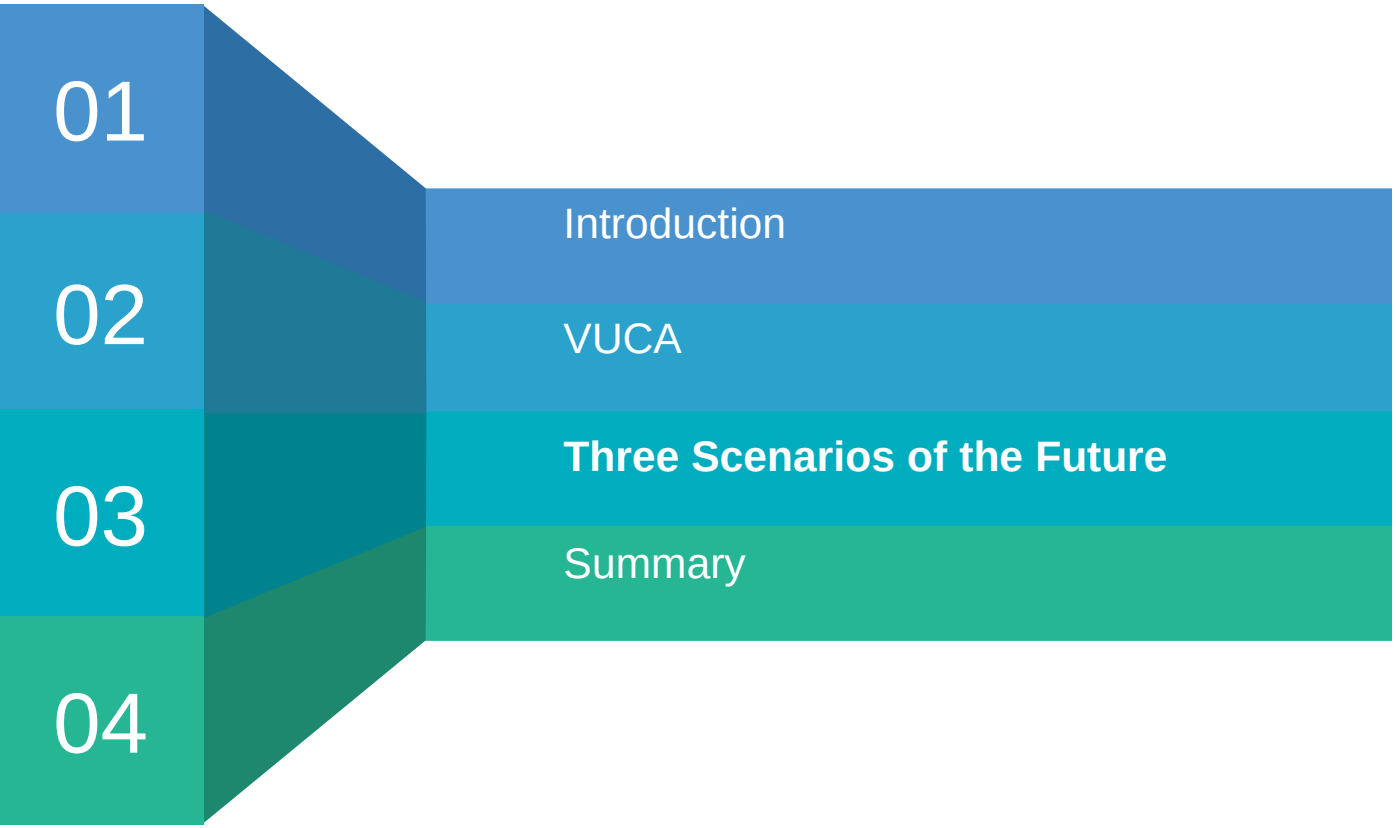
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The future of the world

Three Scenarios of the VUCA Future

1. **Virtual Techgiants:** Data is the most important driver
   - A digital world, which is dominated by a few tech giants. All business markets are occupied by them.
2. **Circular Economy:** Waste is the most important driver
   - A strictly regulated world with a circular economy and local production
3. **Water World:** Water is the most important driver
   - Resources are rare. The world is divided into economical blocks, which are independent from each other

Virtual Techgiants

Virtual Techgiants

Data is the new oil

Assumptions:

- In 2040, we‘ll live fully connected and always online. We‘ll live in a fully connected world. Digitizing is everywhere and produces data all the time…. For DATA is the new OIL!
- Governments are less important
- Markets are global and are dominated by only a handful of ”Virtual Techgiants” like Google, Amazon, Facebook …
- Self-driving cars, drones and quadrocopters enable efficient transport and traveling
- Virtual offerings enable us to work at any place and any time zone in the world

The “Virtual Techgiants”:

- .. own our data and have access to all B2C- and B2B markets
- .. continuously optimize their offerings of mobility solutions (important driver for the ongoing acceleration of our world)
- .. build their own highly-efficient urban areas and infrastructure with integrated business models and solutions
- .. reach out for the most talented people all over the world

Transport Systems of this Scenario

1. **Autonomous cars**
   Cars offer space for the new living. They are work place, mean of transportation and place for leisure time. They are connected, interactive and fast, since they use individual streets and smart decentral mechanisms of coordination.
2. **Innovative high speed trains**
   They move fast, are reliable and offer fully connected a good working environment.
3. **Drones for people**
   Air-borne drones offer the fastest mean of transportation in this world. Quadrocopters offer individual cabins, which are comfortable like business class seats and offer spaces to work.
4. **Commercial drones**
   They transport ordered goods or goods, which might be of interest of customers. They customer can buy them then or withdraw. Algorithms compute before the odds, how likely it is that the good is not withdrawn.
5. **Smart displays**
   Smart displays offer personalized information to the people passing. They serve as navigation systems or as a display for personalized buy recommendations.

Important Constraints of this Scenario

1. **Outer space:** The “Virtual Techgiants” aim for conquering the outer space as enabler for new business models (e.g. high bandwidth internet). They act as first mover and accepts potential risk for planet earth.
2. **AI experts:** The “Virtual Techgiants” need AI experts for many of their business areas. The “war of talents” has started. Corporations, which can not attract and bind them, will loose this war.
3. **Rare earths:** Rare earths are an important constraint for the production of new technologies and products.
4. **Energy:** Energy is another constraint. This is why the “Virtual Techgiants” produce and distribute their own energy to have enough for data processing (similar to cloud computing today)
5. **Data privacy:** Data privacy is luxury. If you want to have it, you have to pay for it – a lot of money.
6. **AI bias:** Bias is everywhere, since data is the driver of this future. This can lead to disadvantages for some populations.
7. **Cyber war:** Data is the new oil. Cyber war the new war of fighting. The “Virtual Techgiants” have to protect themselves against this threat. Cyber security is essential.

Circular Economy

Circular Economy

Waste is the new oil

Assumptions:

- In 2040, companies are no longer driven by capitalism and the maximization of their profit. The economy strives for sustainability and respects nature's limited resources. This is why, they try to give back more than they take.
- Sustainability is a strong driver of society.
- Our world is regulated in many ways (e.g. one car, one mobile phone etc.), which increases the all-over equality.
- The people all over the world share the same mindset to keep our world in balance. We're fighting together the climate change / crisis.
- Working remote and virtually is good for people living in rural areas. Commuting into the city is less needed. The trend of the mega-cities is decreasing.
- Digitalization is used to optimize the distribution of rare resources. Recycling is a crucial driver of the circular economy, which is enabler for the production of (new) products.

Important Characteristics of this Scenario

1. **Autonomous cars**
   Cars offer space for the new living. They are work place, mean of transportation and place for leisure time. They are connected, interactive and fast, since they use individual streets and smart decentral mechanisms of coordination.
2. **Sustainable energy supply**
   This scenario considers renewable energy sources as an important investment in the future.
3. **Recycling**
   Resources are valued and rare. Recycling and circular economy are the most important values of this world.
4. **Green factory**
   This scenario aims for the “zero impact factories” with renewable energies. Roofs and suitable surfaces are equipped with solar panels. Numerous windows leverage daylight as good as possible. "Zero Impact" covers all environmental effects on people, climate and the ecosystem to minimize emissions and waste.
5. **New mobility solutions**
   The air is a space for innovative mobility solutions.

Important Constraints of this Scenario

1. **Independeny:** Corporations and house holds are obliged to generate their own energy, if possible.
2. **Limited property:** Individuals and companies are limited in terms of the possession of property.
3. **Green lifestyle:** The CO2-footprint is an important driver for social activities and leisure time.
4. **Outer space:** The outer space is also regulated in the word.
5. **Time constraints:** Recycling is essential and takes it time. This is why it will be a constrained and the availability of resources is driven by this.
6. **Invest green:** Governments have to perform green investments, e.g. into renewable energies etc.
7. **Product lifetime:** Each product has a life time, which has to be fulfilled before it can be replaced.

Water World

Water is the new oil

Water World

Water is the new oil

Assumptions:

- We'll live in a fragmented world with autonomous urban cells of living. Countries may form market cells (e.g. EU). These market cells protect each other from other market cells. All market cells have their own regulations.
- Mobility and mobility solutions may significantly differ from cell to cell.
- The daily live only happens in the market cell you live in.
- Markets are smaller than today, resources are rare and cells may differ regarding wealth.
- Pandemics have accelerated the creation of these market cells. Wealthy cells are able to manage pandemics better than poor cells.
- So-called block lords will govern these cells / market cells and have replaced our ministers and presidents

-> Water is the most important exchange good between the cells

Drivers of this Scenario

1. **Cells**
   Individual countries may be cells or form with other countries bigger market cells. All cells / market cells have their own regulations. Mobility / mobility concepts are very different from cell to cell. There is no trade between market cells. Products and the production is strongly driven by the availability of the goods within each specific cell / market cell.
2. **Water**
   The only element for cross-cell trading is the good water. Cross-trading water is only done, if both market cells have a significant benefit of doing this.
3. **Mobility**
   Mobility strongly depends on the availability of goods and energy within the cells. Mobility in poor cells is restricted, since people do not have the money to purchase expensive cars. Ride hailing is very popular allowing low-cost mobility.

Important Characteristics of this Scenario

1. **Craftmanship:** Craftmanship is highly appreciated in all cells. However, the higher the maturity level of cells regarding technology the lower appreciated is craftsmanship.
2. **Outer Space:** Each cell / market cell tries to conquer the outer space on their own. Only some of the “block lords” will be able to leverage this eventually.
3. **Space on earth:** The more space a cell / market cell covers, the better. They are needed for the generation of energy.
4. **Rights:** Human rights and the protection of the environment are only pursued as higher goals in democratic, more mature cells / market cells. In totalitarian or economically weak cells, these goals are irrelevant.
5. **War between cells:** A lack of energy is a driver for war and the need to expand the cell. In addition to this, the difference of living quality may be a driver for war or riots.

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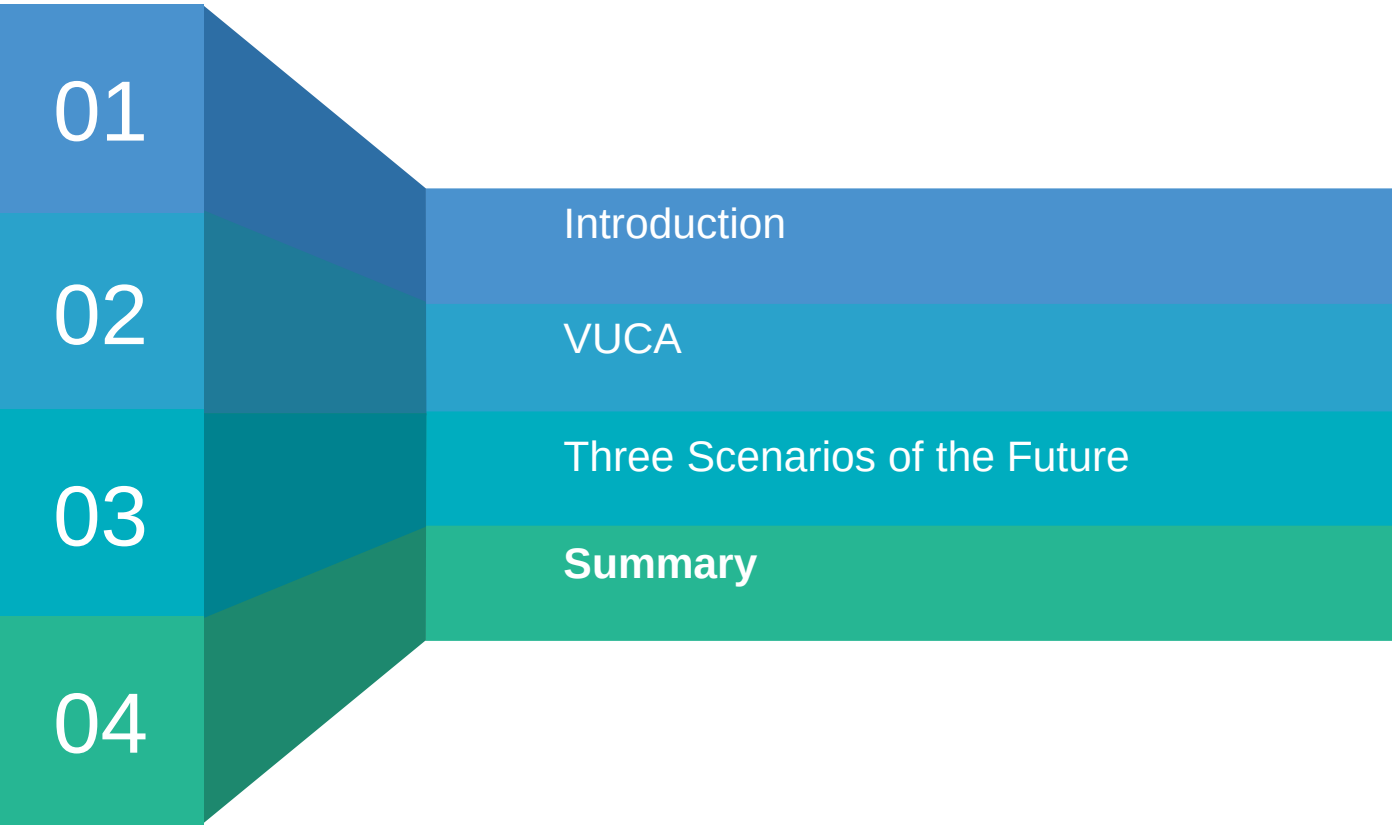
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Summary

1. The next 5– 10 years will probably change the world ☺ but are unclear
2. VUCA means volatile, uncertain, complex and ambigious
3. Due to VUCA we can predict the future only in terms of scenarios and several scenarios or a mix of them is possible and likely