

# The digital transformation of SMEs – challenges and opportunities

Hochschule Pforzheim

Prof. Dr. Bernhard Kölmel

# Bernhard Kölmel

---

- KIT – Industrial Engineering & Software Engineering
- Silicon Valley Start-up Initiative
- Own companies (VR/AR, AI, ...)
- FZI Karlsruhe
  - Technology Transfer
  - Business Process Management
  - Semantic Web/AI
- > 10 years Executive Management Software Company
- Pforzheim University
  - IoS3
  - Transfer Management
  - Quality Management
- Supervisory Boards High-tech companies
- ...
- Rapporteur, Evaluator & Reviewer European Programmes (> 100 appointments)
- Rapporteur & Reviewer KIC
- Coordination & project participation > 50 European projects and 30 German projects
- Scientific Coordinator of regional transfer programmes
  - Digital Black Forrest
  - AI Competence Center
  - Digital Hub
  - Lifelong-learning
- SME 4.0 Competence Center Stuttgart
- Scientific coordination Metropolitan Region Stuttgart
- Coordinator Smart City Initiative
- ...

# Relevant technologies in a totally connected world



- INTERNET
- SOCIAL
- MOBILE
- CLOUD
- BIG DATA
- 3D PRINTING
- RENEWABLE ENERGY
- INTERNET OF THINGS
- COGNITIVE SYSTEMS
- DRONES
- AUGMENTED REALITY
- GENOMICS
- BLOCKCHAIN
- ROBOTICS
- NANOTECH
- VIRTUAL REALITY
- PRECISION AGRICULTURE
- VERTICAL FARMING
- ENERGY STORAGE
- QUANTUM COMPUTING
- ADVANCED MATERIALS
- GENETIC ENGINEERING
- SYNTHETIC BIOLOGY
- PHOTONICS
- BIOPHOTONICS
- BIOELECTRONICS
- VISIBLE LIGHT COMMUNICATIONS
- 4D PRINTING
- HYPERLOOP
- BIOMETRIC SENSORS
- AQUAPONICS
- REUSABLE ROCKETS
- ARTIFICIAL PHOTOSYNTHESIS
- FLYING CARS
- BRAIN-COMPUTER INTERFACE
- WIRELESS POWER TRANSMISSION
- SOLAR POWER SATELLITES
- LAB GROWN MEAT
- GEOENGINEERING
- BRAIN-TO-BRAIN COMMUNICATION
- EXOSKELETONS
- REGENERATIVE MEDICINE
- FULL BRAIN SIMULATION
- CRYONICS





# SOCIETAL FACTORS

BUSINESS

SCIENCE

ENVIRONMENT

ECONOMY

SOCIETY

TECHNOLOGY

DISEASE

MILLENNIAL FOCUS ON PURPOSE

SHIFTING VIEWS OF RETIREMENT

ELDER CARE

OWNERSHIP TO ACCESS

INCREASED LIFESPANS

RE-SKILLING SOCIETY

TRADE

DECLINING MIDDLE CLASS

CORRUPTION

GLOBALIZATION

NATURAL DISASTERS

RESOURCE SCARCITY

TECHNOLOGICAL UNEMPLOYMENT

INDEPENDENT WORKERS

THE RISE OF ALTERNATIVE LIVING

THE CHANGING NOTION OF WORK

MARRIED LATER

FIVE GENERATIONS OF WORKERS

URBANIZATION

SUICIDE RATE

POVERTY

POWER TO THE INDIVIDUAL

VIOLENCE

FALL IN WORKING AGE POPULATION

DECLINE IN FERTILITY RATES

TERRORISM

IMMIGRATION

GENERATION Z

RACISM

RISING ENERGY DEMAND

LONELINESS AND ISOLATION

GENERATIONAL DIFFERENCES

DISABILITY

AGING POPULATION

ABUNDANCE

EMERGING MIDDLE CLASS

GLOBAL INEQUALITY

REVERSE BRAIN DRAIN

RISE OF THE CROWD

NATIONALISM

POPULATION GROWTH

CLIMATE CHANGE



# Disruptions and Failures

## Foxconn the carmaker? Disruption in the era of electric vehicles

17 mins | May 24, 2021



We are reaching a new crossroads in industrial history.

The company that has been making Apple iPhones for more than a decade is ready to make cars. The arrival of electric vehicles is transforming their inner workings and is creating a newfound unification between the auto and electronic industries.

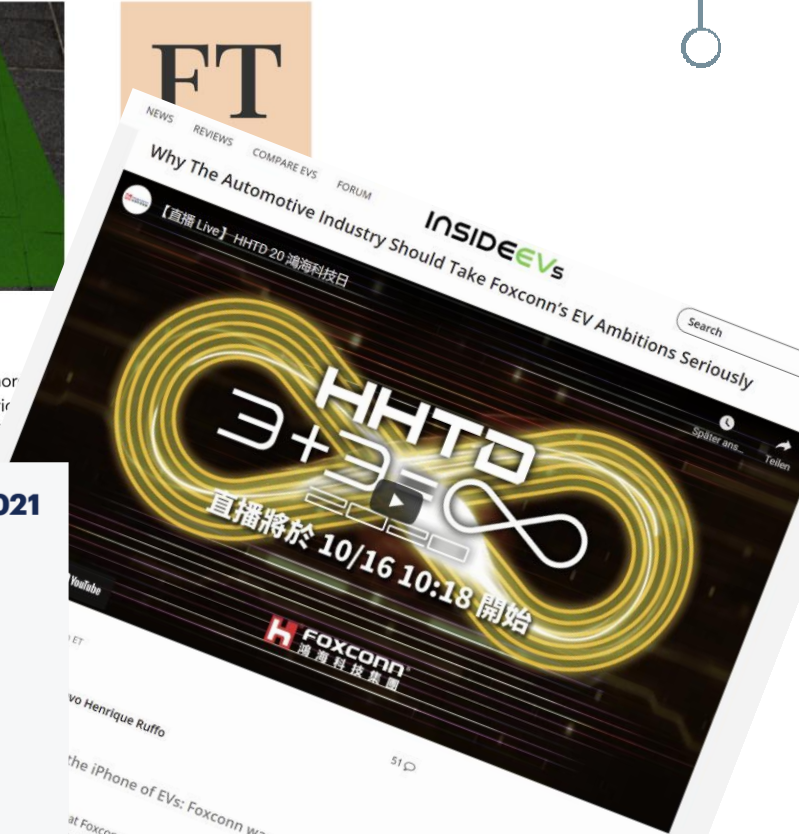
### Hype Cycle for Emerging Technologies, 2021



gartner.com

Gartner.

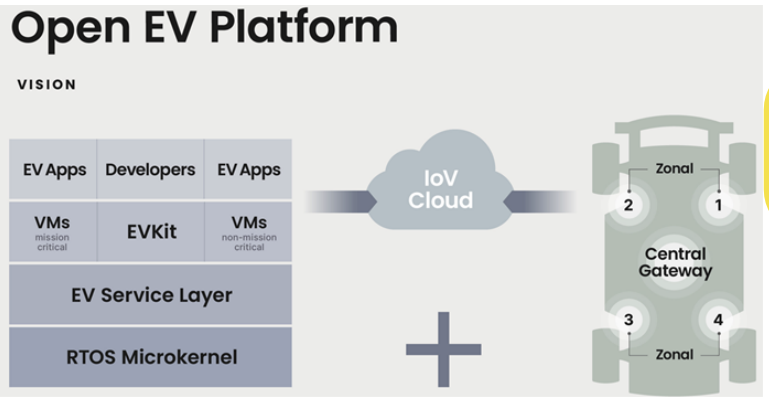
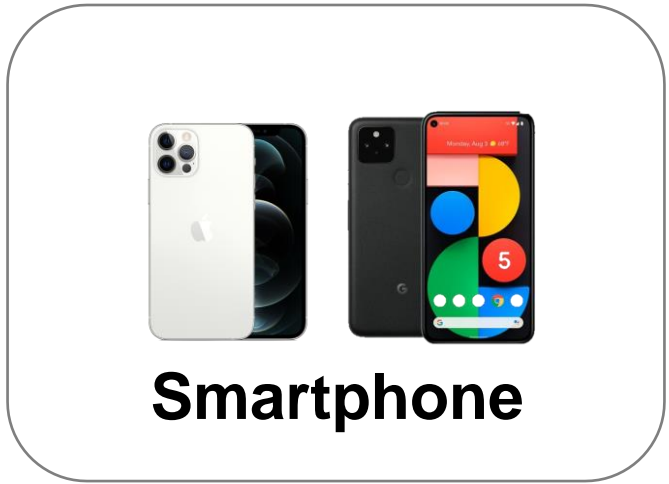
Source: Gartner. © 2021 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner and Hype Cycle are registered trademarks of Gartner, Inc. and its affiliates in the U.S. 1448000



at Foxconn wanted to have ten percent of the electric sideEVs tried to learn more about that. In the process, 'onn being 'just a smartphone manufacturer.' We also 'w Foxconn - or Hon Hai, as it seems to prefer to be by the whole automotive industry, including s once referred to as "the iPhone of EVs." There sla fans get in long lines to get the company's both eagerly wait for the new software h "closed systems;" only their products can



# New era: Platform economy

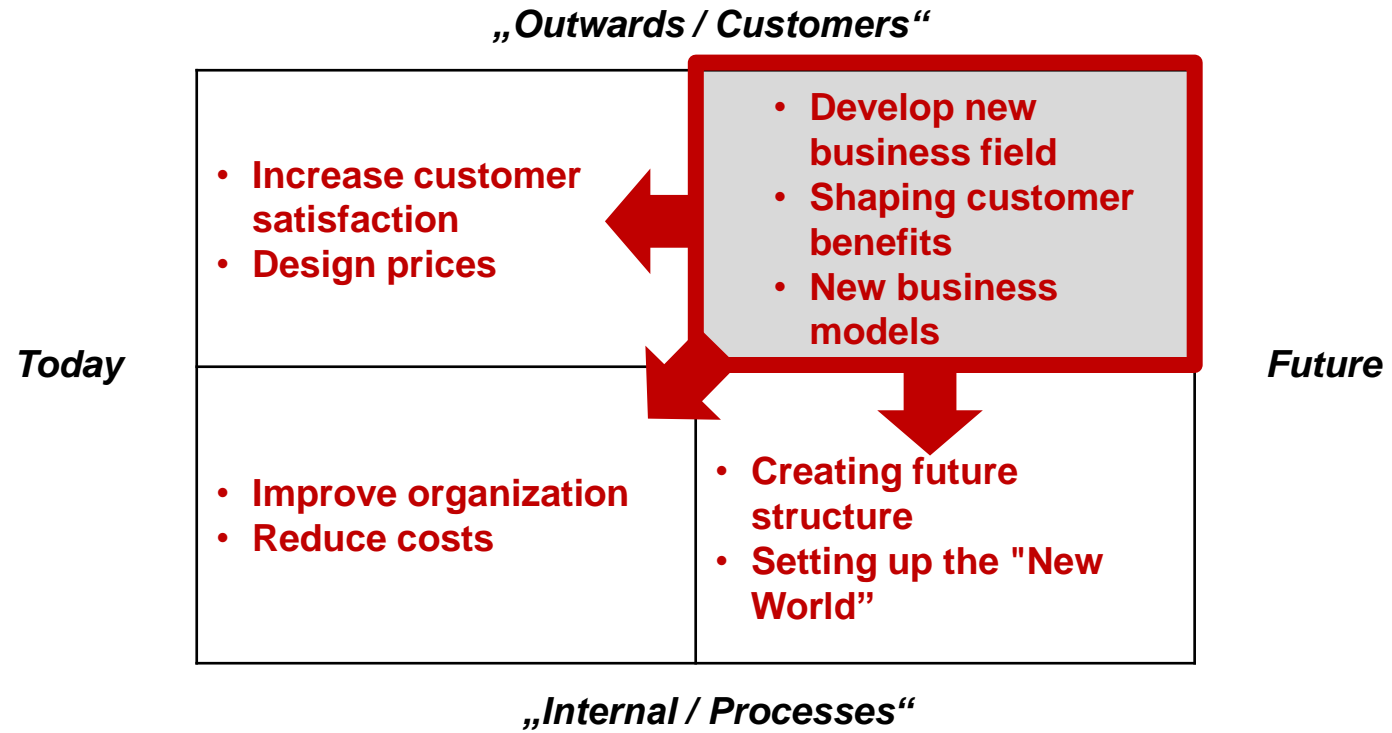




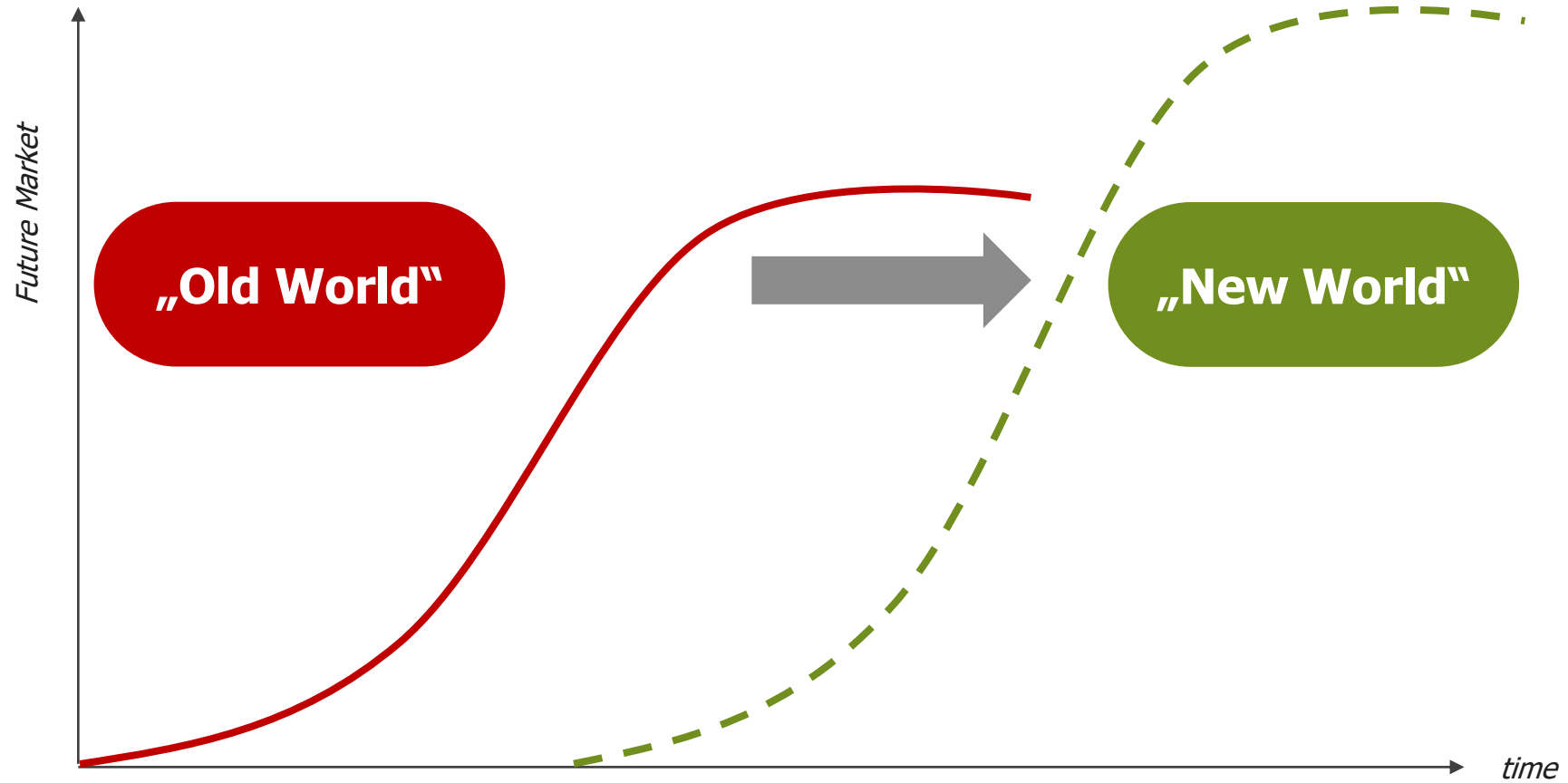
The company's/stakeholder's/region's capacity for change ( $CC^C$ ) must be at least as great as the rate of change of the market ( $CR^M$ ).

$$CC^C \geq CR^M$$

# Future-Proof



# Future-Proof



# „Future-proof“ Approach

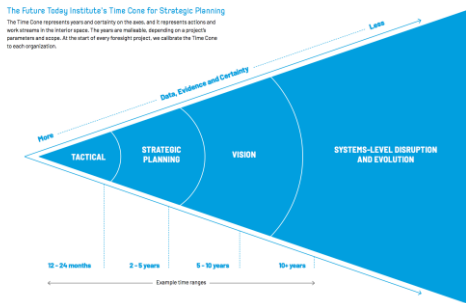
What is possible in the future?



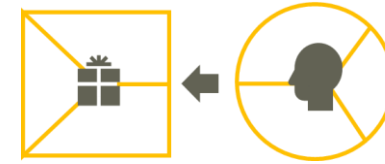
What do the stakeholders/customers really want?

Ideen & Erkenntnisse

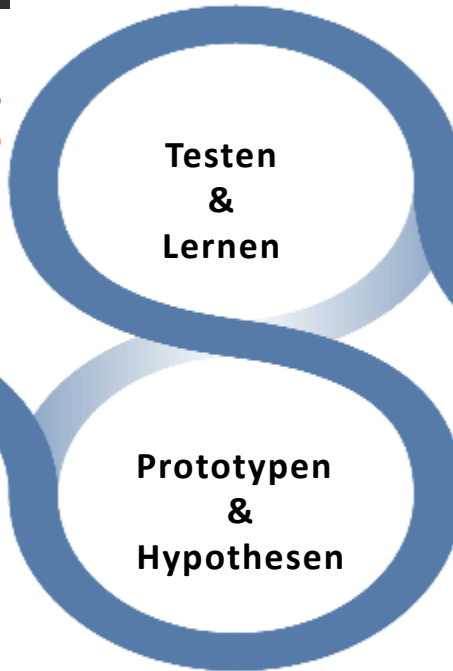
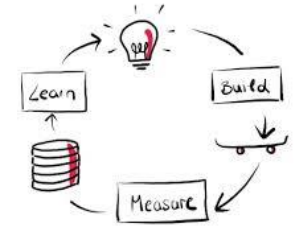
Which horizon are we working on?



What offer do we derive from this?



In which iterations do we reach the goal?



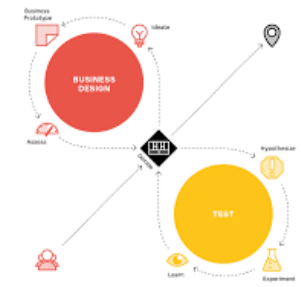
Testen & Lernen

Prototypen & Hypothesen

Umsetzen & Optimieren

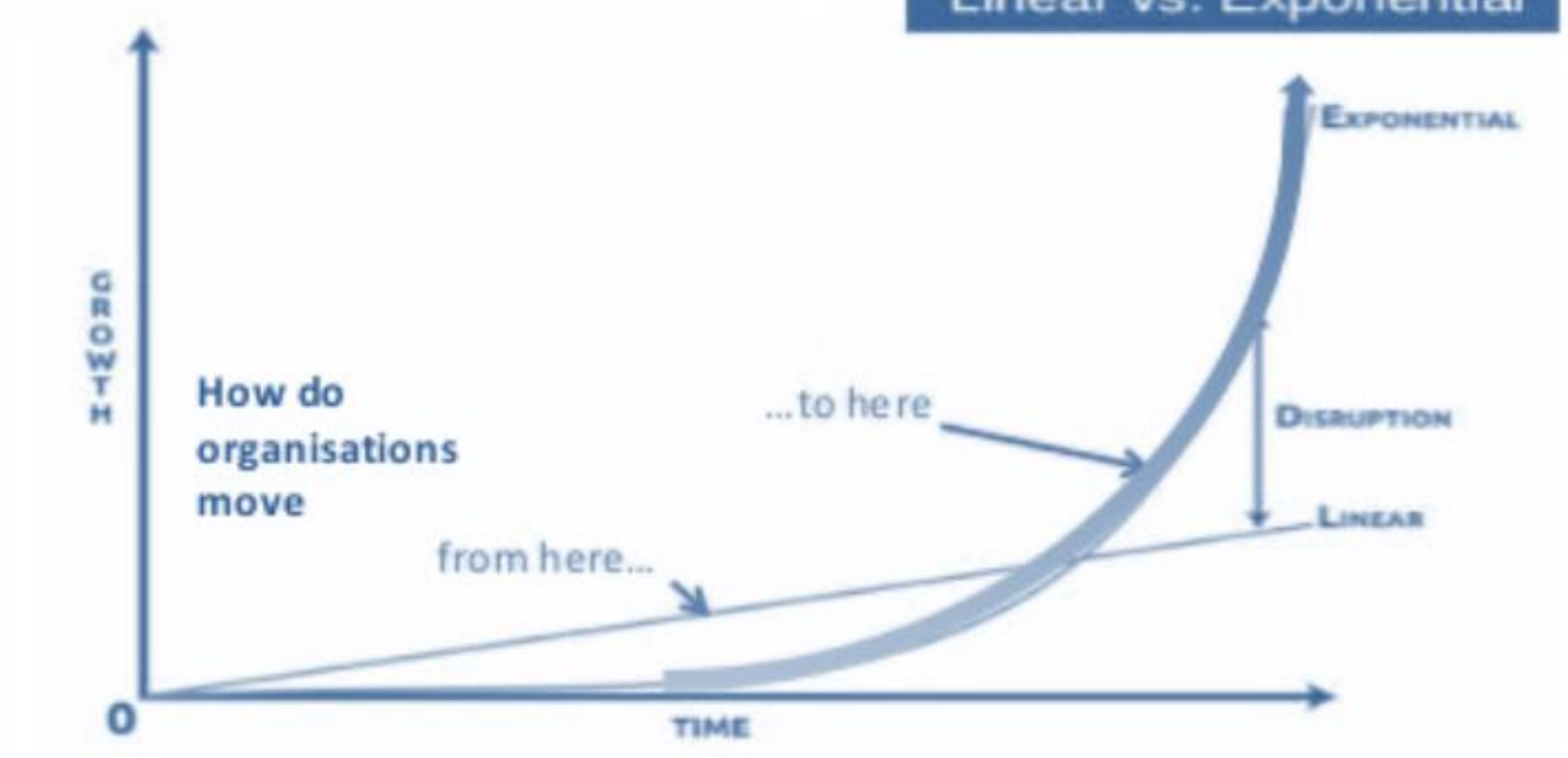
Is the offer

- technically/organisationally/... feasible?
- economically sensible?
- attractive for customers?

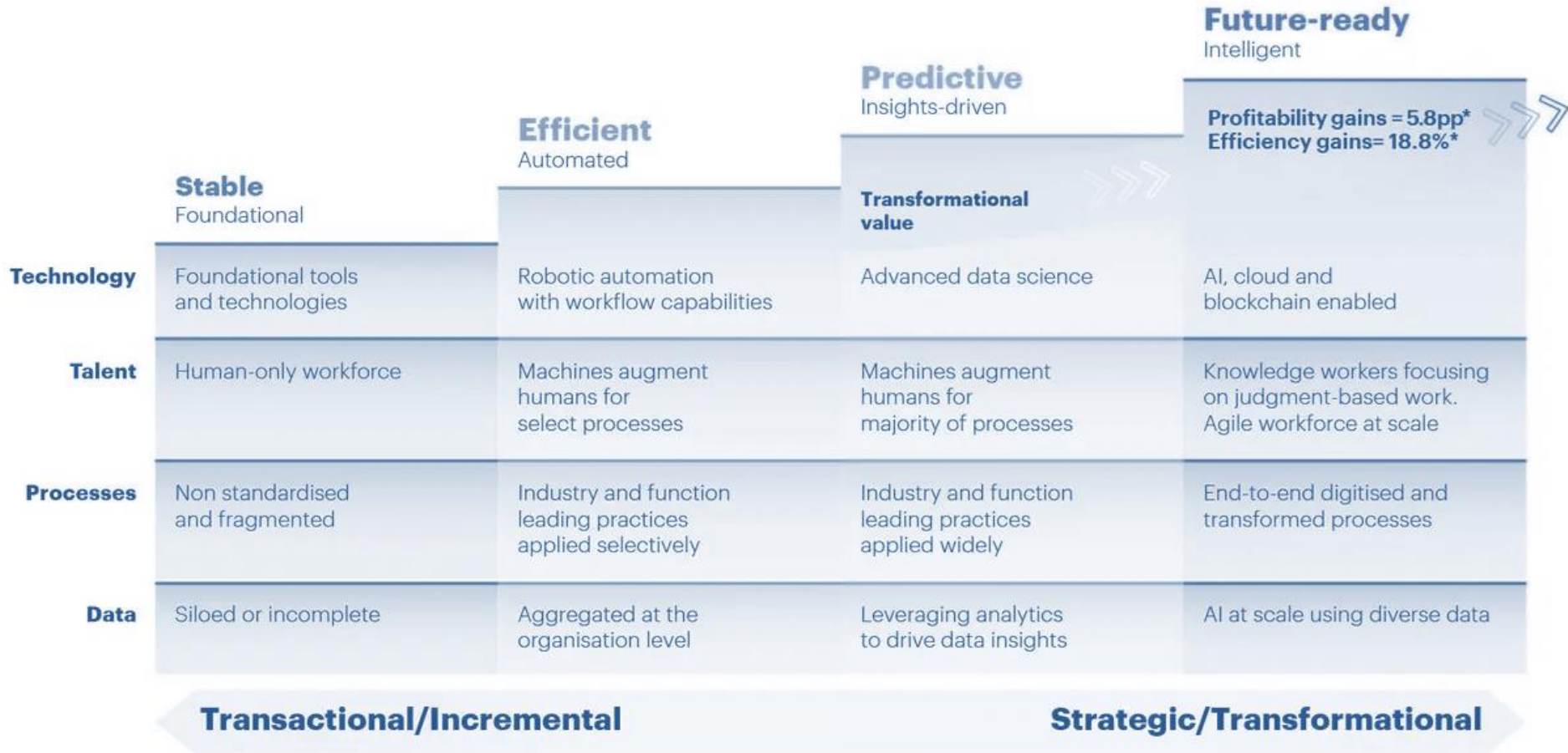


# Linear vs. Exponential ...

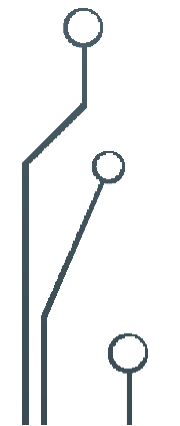
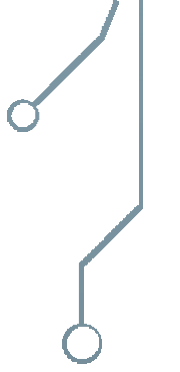
## Linear vs. Exponential



# Future Readiness



\*Accenture Research and Oxford Economics Intelligent Operations Survey, 2020  
Accenture experience shows that additional productivity and efficiency gains up to 50% can be seen in organisations displaying future-ready characteristics



# Digital Europe - recap the main objectives

*strategic autonomy*



## Compete globally

Other regions of the world invest huge amount of public capital in advanced technologies. For example, the US and China spend € 10-20 billion annually on AI alone



## Better address Europe's economic and societal challenges

E.g. climate, health, mobility and public services



## Achieve scale through collective co-investments

Given the size of investments needed, scale required and risks involved Europe needs to pool the resources together



## Ensure broad take-up of digital technologies across all regions of EU

In deploying latest technologies to offer best services to citizens and business



## Regain control over Europe's value chains

and ensure Europe's technological sovereignty



## Support SMEs to acquire or access the latest technologies and skills

More than 400,000 EU vacancies in these fields



# Digital Europe is complementary to other programmes with investments in digital



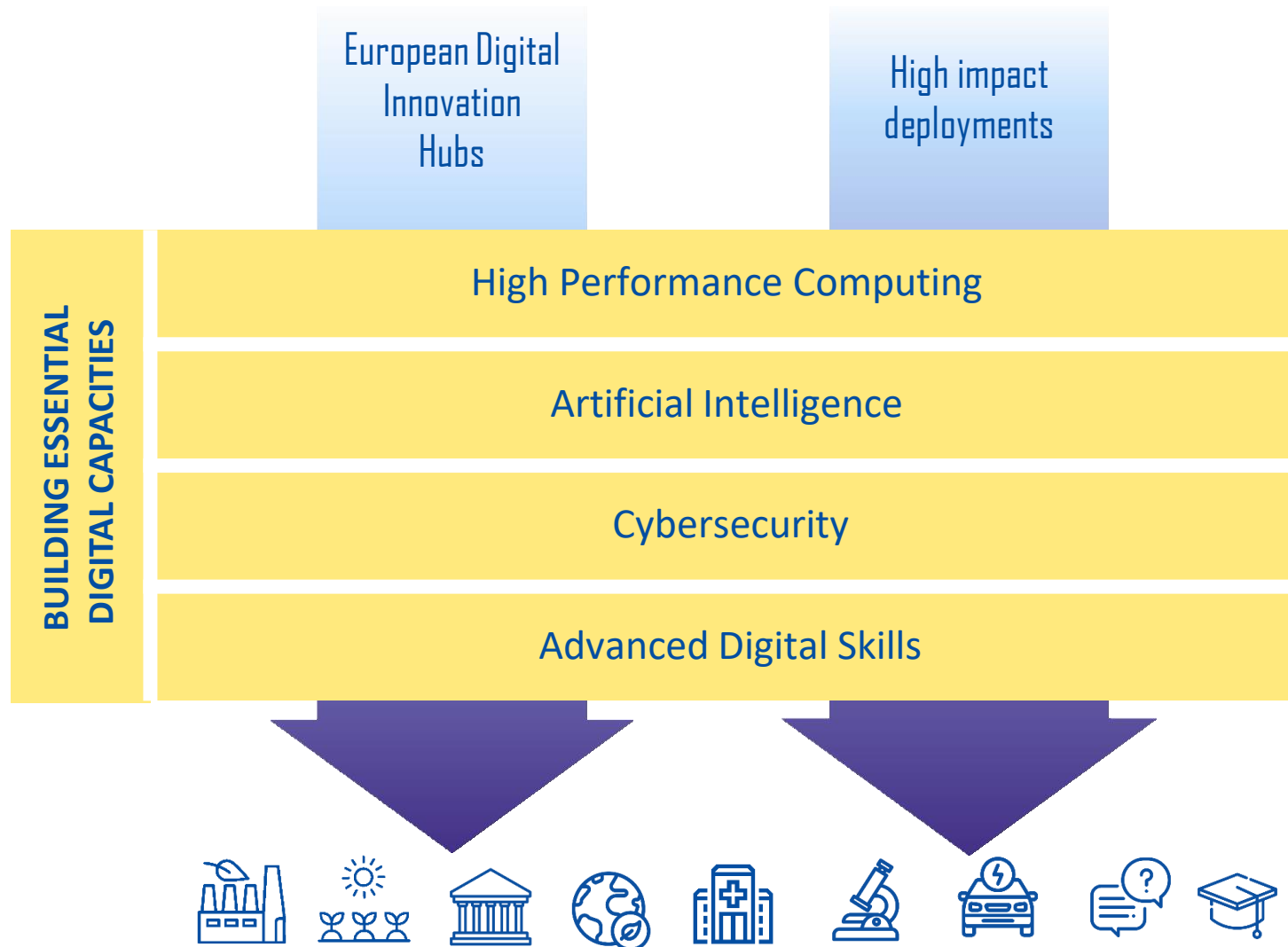
EU-wide collective effort					National regional and local			Financial instrument
Horizon Europe	Digital Europe	CEF	Creative Europe	Health	Cohesion	Agriculture Funds	RRF	InvestEU
Research Innovation	Strategic capacities: computing, data, testbeds, etc. Advanced digital skills EU-Wide deployment	Broadband and 5G roll out Connecting Communities	Creative industry Media	Telemedicine eHDSI	Digital connectivity in white and grey areas Support to enterprises in line with Smart specialisation Digital skills for all citizens	Making use of Big Data for CAP monitoring Broadband rollout in rural areas	Connect Scale-up Modernise Reskill and Upskill 20% digital	Leverage private capital for investments in SMEs, research, digital, infrastructure, skills...

# Digital Europe "deliverables"

- Focus is on delivery actual results. It will make use of the most recent research results, but it will not support research.
- For example, the programmes will support:
  - The acquisition of HPC machines
  - The set-up of sectorial data spaces, eg manufacturing
  - The building or reinforcing of Testing and Experimentation Facilities
  - The set up and delivery of Master courses in key advanced digital technologies
  - The set-up, interoperability, operations and maintenance of a number of services in the eGov area

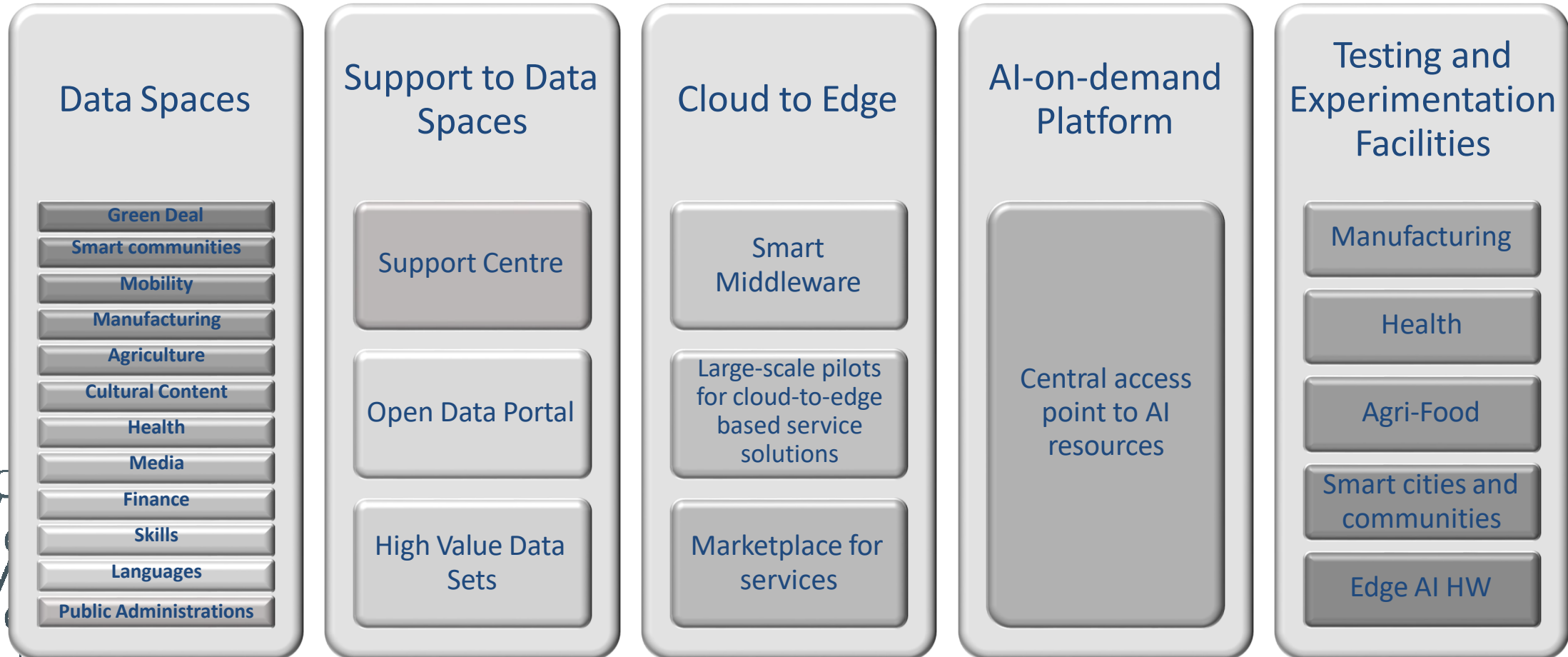
# Digital Europe programme structure

ACCELERATING THE BEST USE OF DIGITAL TECHNOLOGIES





# Artificial intelligence, data and cloud



Most of the actions will be managed directly by CNECT

# Accelerating the best use of digital technologies



Actions will be managed through HaDEA, with the exception of the EDIH, which will be managed by CNECT

## EDIH

European Digital Innovation Hubs: one per region

## Green Deal

Destination Earth

Urban digital twins for smart communities

Digital Product Passport

## Blockchain

European Blockchain Service Infrastructure

## European Digital Government Eco System

Core services from CEF and ISA2

Interop. Knowledge & Support Centre

Once only Principle

Digital Identity

GovTech

Justice and Consumer Protection

Law enforcement

## Enhancing Confidence in Digital Transformation

Safer Internet

European Digital Media Observatory

# In summary

## High-performance computing

- Procure exascale machines
- Upgrade existing supercomputers
- Quantum computing
- Widen the access to and use of supercomputing

## Artificial intelligence

- Data4EU : common Data Spaces, clouds, platforms and infrastructure
- Large Testing and Experimentation Facilities for Agriculture, health, mobility, manufacturing and AI edge HW
- AI-on-demand platform

## Cybersecurity

- Deploy competence centers network
- Cybersecurity shield, quantum communication infrastructure - QCI
- Certification schemes
- Cybersecurity tools

## Advanced digital skills

- Master courses
- Short term trainings
- Job placements
- Platform for Skills and Jobs

## European digital innovation hubs

- At least one per MS or associated country

## Deployments : emphasis on

- Destination Earth
- Actions in support to Green Deal
- New Digital Identity and further investments (CEF – ISA2) & Interoperability
- Blockchain
- Enhancing confidence in the digital transformation



- [Digital Programme | Shaping Europe's digital future \(europa.eu\)](#)
- Participants portal - Funding & tender opportunities
  - <https://ec.europa.eu/info/funding-tenders/opportunities/portal>