

What will the future look like under Industry 4.0 and digital transformation in the healthcare space?

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Across industries, a technological and a sociological revolution are under way

Trend overview

A TECHNOLOGICAL REVOLUTION



Mobile internet /
democratization of
Smartphone

Potentially infinite storage
capacities – **Cloud**

M2M communication

Decrease of **technologies costs**

EXPONENTIAL TRANSFORMATION

- **INDUSTRY 4.0**
- **DIGITAL TRANSFORMATION**



A SOCIOLOGICAL REVOLUTION

**Faster and faster
penetration of new
technologies**


Increasing success of
**innovative business
models based on free
offerings**

Expectation of **immediate
and continuous availability
of services**


Industry 4.0 can be understood as the full integration and digitalization of the industrial value creation

Definition of Industry 4.0 (not exhaustive)


Digital transformation




Car sharing




Wearables




Mobile devices



Cloud data




Apps




Private robots


Industry 4.0




Smart handbooks




Self-learning robots




Data-based business models




E-Commerce




Contactless pay




Smart Home



Home robotics



Self-optimizing systems

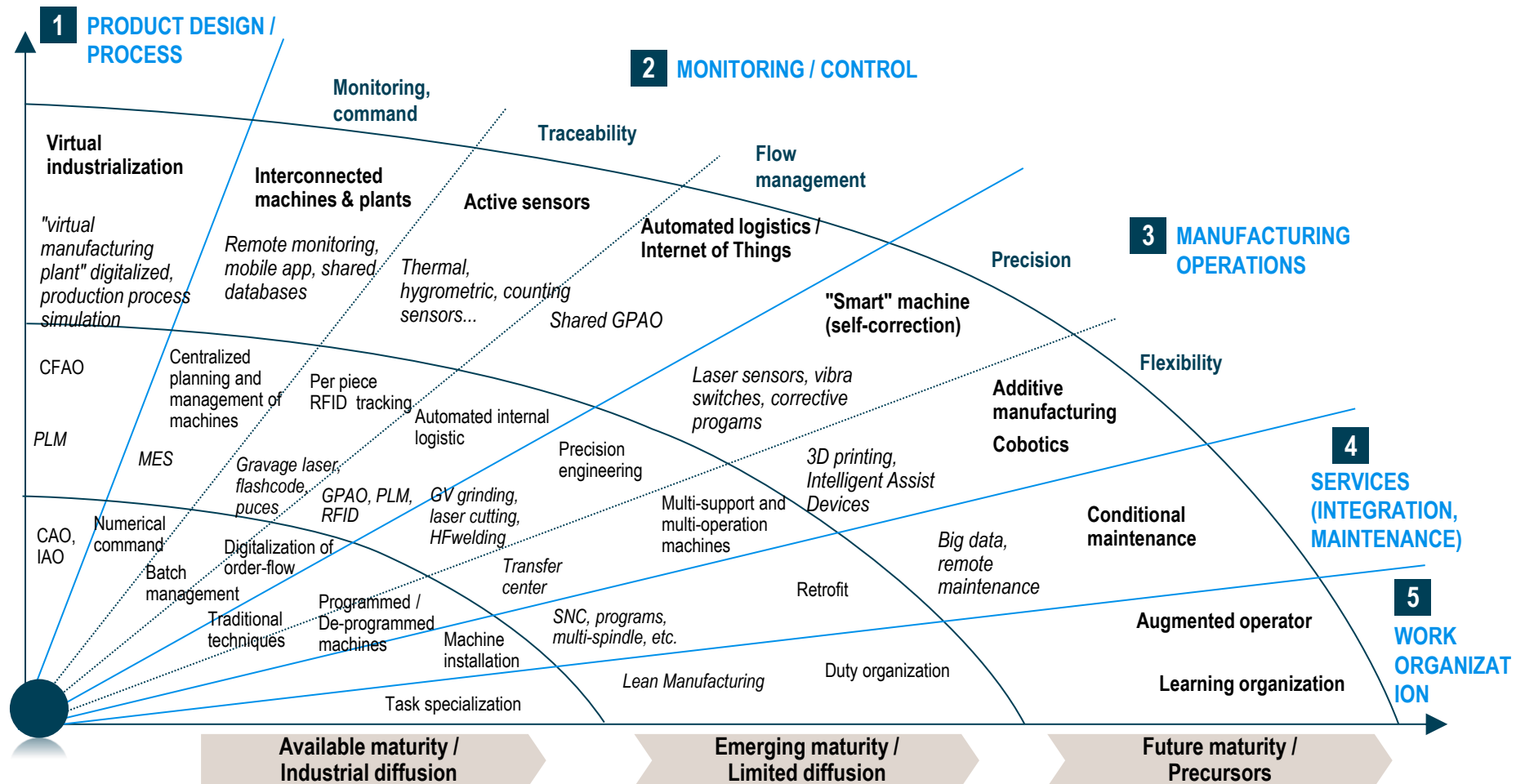


Predictive Maintenance

- > **Digital transformation** refers to the changes associated with the application of digital technologies in all aspects of human society
- > Industry 4.0 is the **industrial application** of the concepts applied in the **digital transformation**, **key elements are:**
 - Complete connectivity with real-time ability
 - Decentralized, intelligent and self optimizing / organizing
 - Modular and reconfigurable
- > Assessment of **Industry 4.0 impact** needs to take **analogies** from **digital transformation** and specifics of the manufacturing industry into account
- > The digital transformation in the **consumer goods sector is much more advanced** than the industrial application – In the **healthcare space**, it has now arrived and **is changing the landscape**

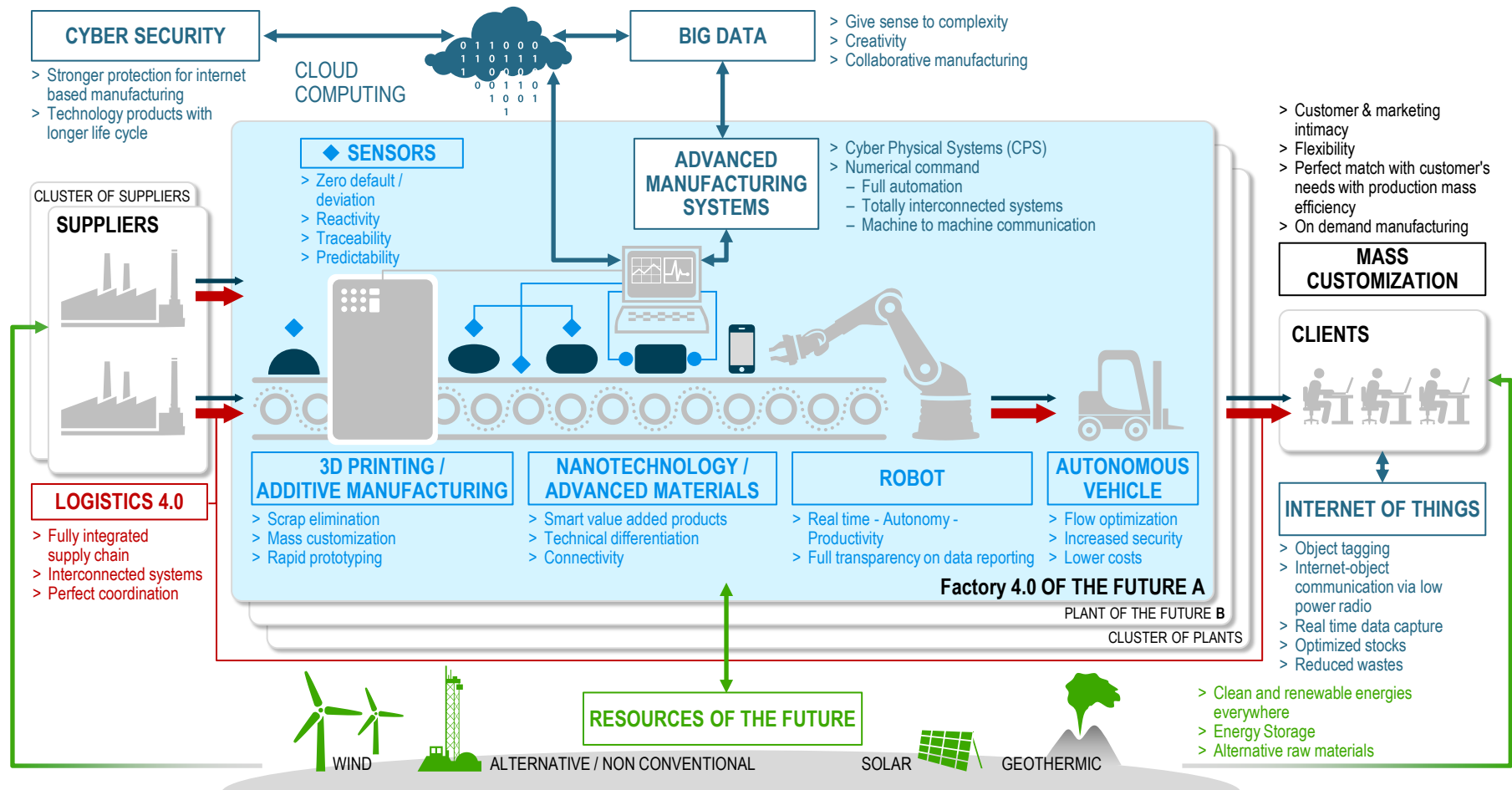
Industry 4.0 combines a wide set of technologies at different stages of maturity

Example of technology mapping – Extract



The Factory 4.0 ecosystem – A set of technologies about to interconnect and disrupt plant operations

Factory 4.0 ecosystem



A smart Factory 4.0 is like a social network – People, machines and resources communicate and interact with each other autonomously

Factory 4.0 – key potential features



Global Facilities

- > The center point of Industry 4.0 is a network of global production facilities
- > **Pooling and bonding with partner companies from the same industry will increase profitability**
- > Interactions between industrial facilities and their environments create socio-economic systems with lots of benefits



Social Machines

- > **Social machines are knowledge-based, sensor supported and spatial distributed unities of autonomous production systems**
- > Social machines share newly gained information with their peers – additional configuration efforts are needless



Augmented Operators

- > **Augmented operators have an virtually extended view on production processes**
- > Smart devices as for example smart phones and tablets help employees to fulfill their tasks
- > The future development will further intensify the socio-technical interactions



Smart Products

- > Smart products are clearly identifiable and always localizable
- > All information about the production process is stored on the product (e.g. by using RFID chips)
- > **Smart products are therefore able to steer their production process autonomously**

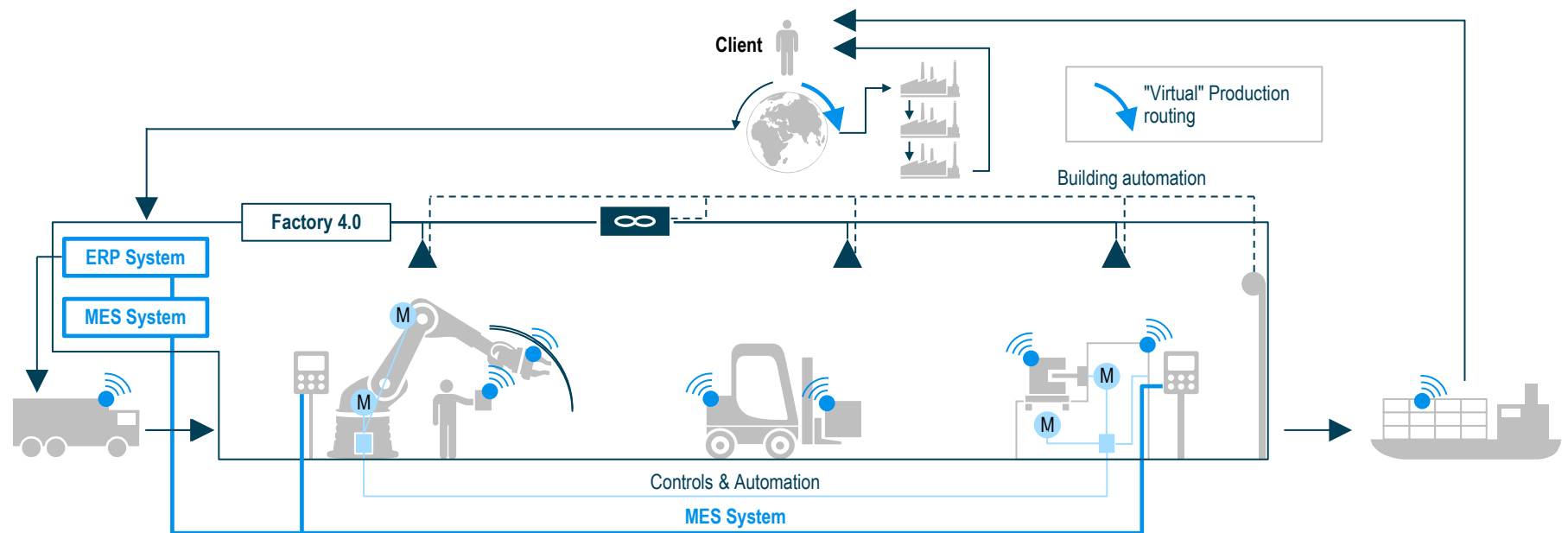


Virtual Productions

- > **A virtual production is characterized by digitalized production systems that interlink all dedicated people, machines and resources**
- > Analysis of existing data and simulation of future states allows an optimized production

Data and communication will be the backbone of Industry 4.0 – Some players with already wide offering and new players entering

Positioning of different players for Industry 4.0 – Factory view

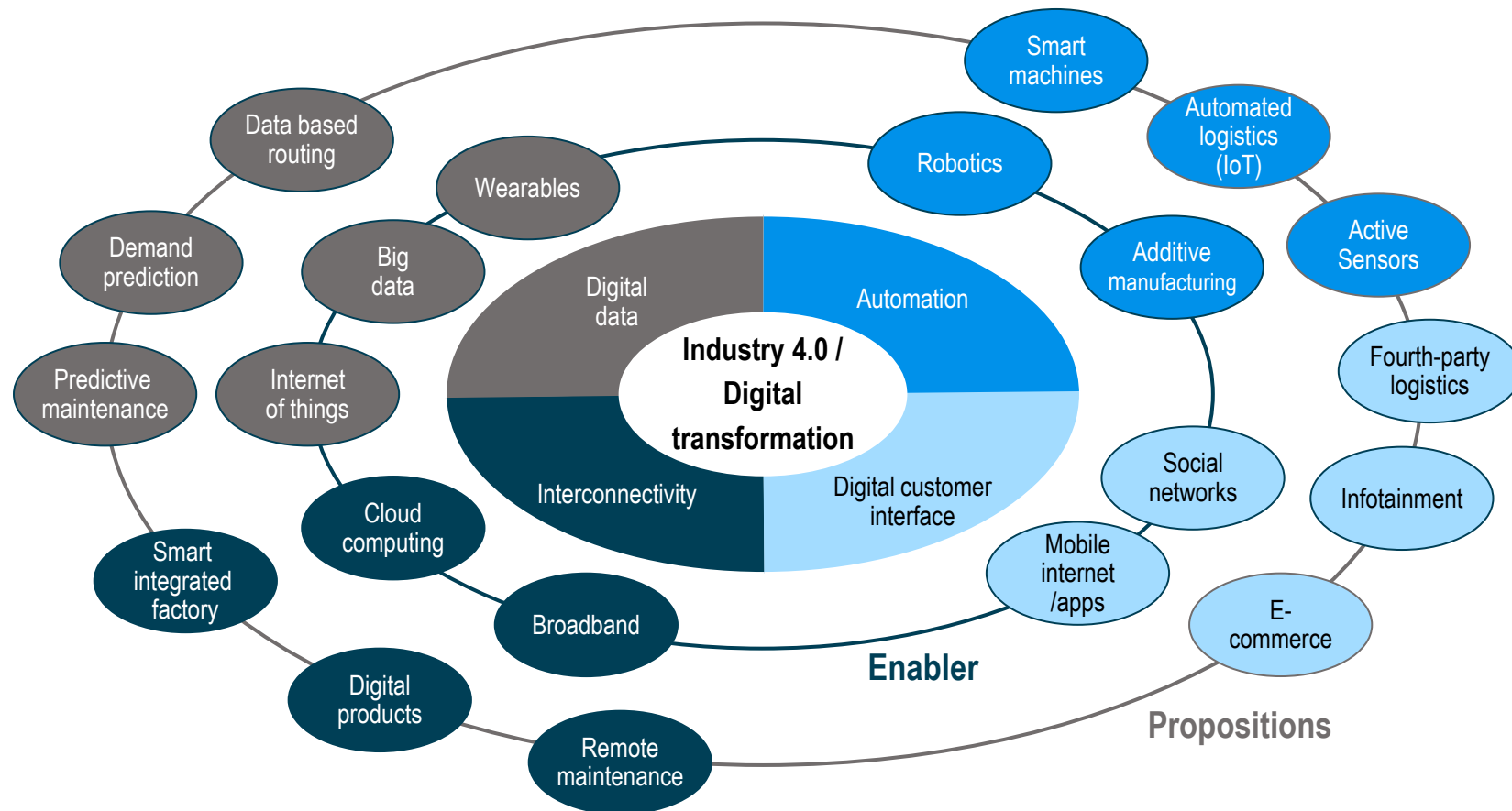


	ERP System	MES System	Sensors/Automation	Building Automation	3D Data	New players - Big Data Services
Data/ Funct.¹⁾	<ul style="list-style-type: none"> > All transaction data > Asset data > Price/cost data 	<ul style="list-style-type: none"> > Shopfloor transaction data > Machine data > Maintenance data > Logistic data 	<ul style="list-style-type: none"> > Sensor status like pressure, position etc., communication with other sensors > Machine control data 	<ul style="list-style-type: none"> > Status of all building data, e.g. temp., light, access control, ventilation 	<ul style="list-style-type: none"> > Product 3D data > Factory 3D data > PLM data 	<ul style="list-style-type: none"> > Storage capacity > Algorithms and analytics > Connectivity
Players¹⁾						

1) Not exhaustive; examples only

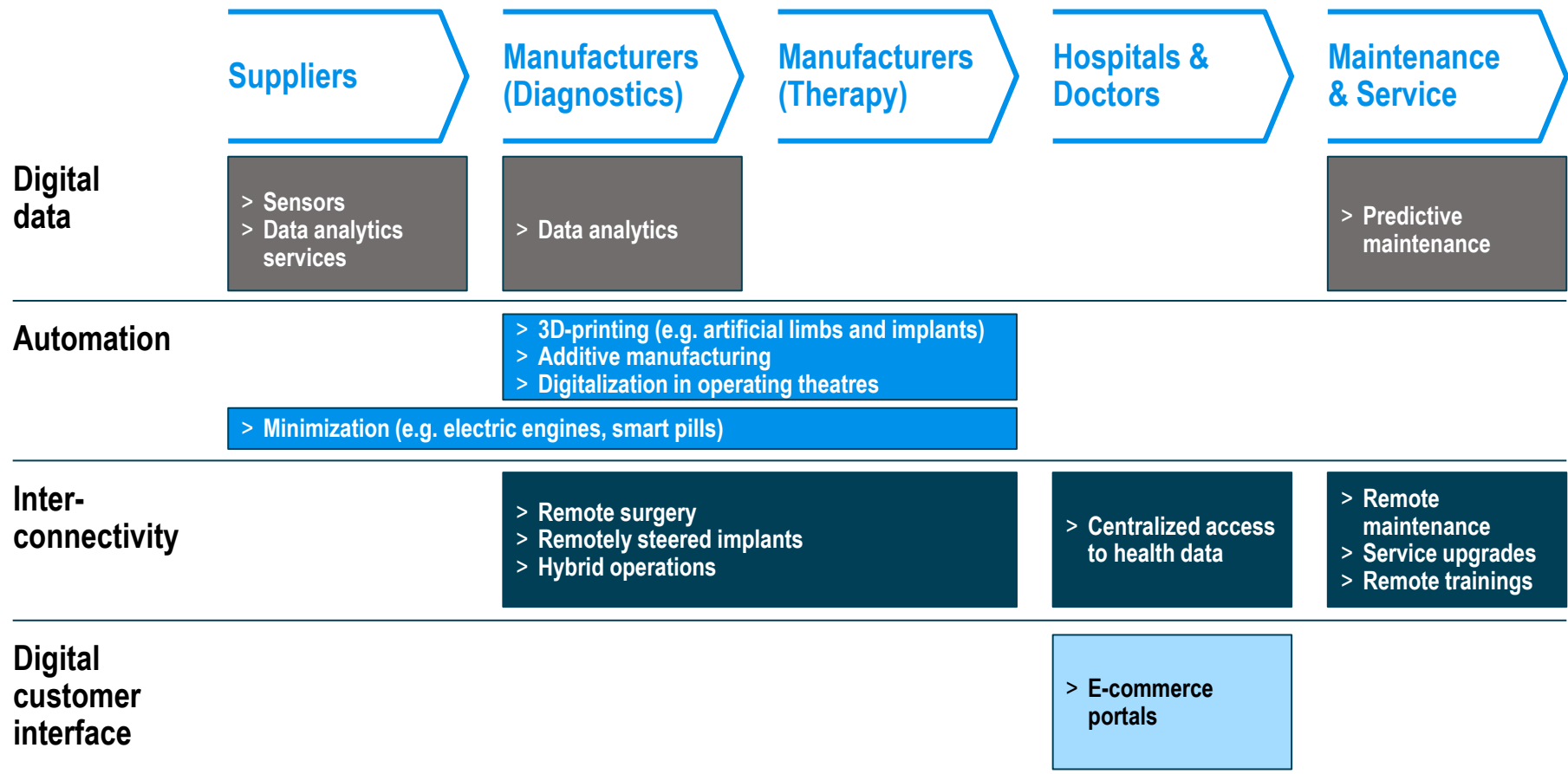
Industry 4.0 and digital transformation work via four levers that are supported by new enabler technologies and propositions

Example of technology mapping - Extract



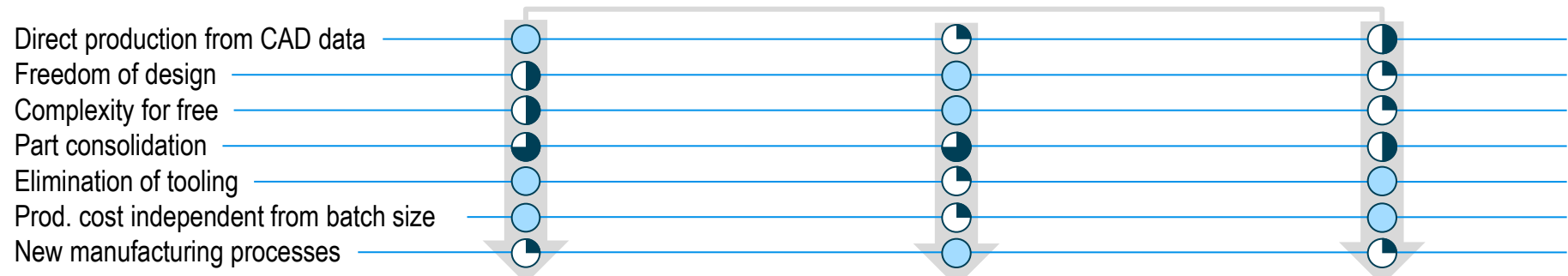
Novel applications along the value chain in MedTech especially from digital data and increased connectivity

Selected use cases from digitalization in the MedTech industry



As an example, Additive Manufacturing brings new options to the manufacturing and materials world – Potential for disruptive change

Paths of disruption for Additive Manufacturing



Path of disruption

Examples

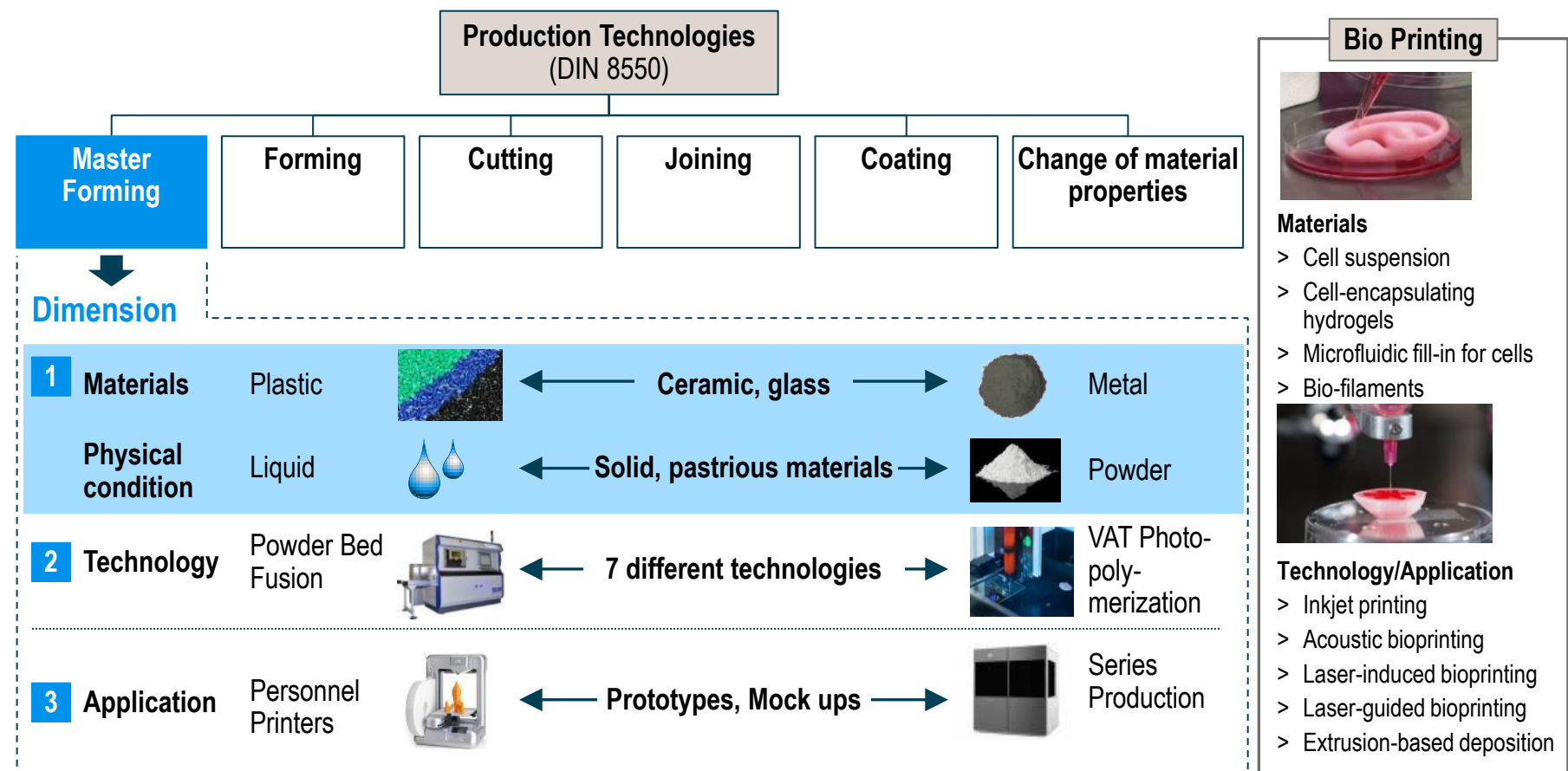
Individual products	New geometries & materials	Decentralized production
 <ul style="list-style-type: none"> > Prototyping > Mass customization <ul style="list-style-type: none"> – Medical products – Jewelry – Gimmicks > Small series production 	 <ul style="list-style-type: none"> > Integration of new, enhanced functionalities (more efficient products) in high tech materials > Development of new materials/material properties > New repair strategies 	 <ul style="list-style-type: none"> > Industrial production on demand <ul style="list-style-type: none"> – production by quantity – by location (decentralized) > Home printing/production > Outsourcing to partners

New business models (B2B, B2C)

 Limited impact
  Strong impact

Within MedTech, "technical" printing as well Bio Printing has found first applications in the area of regenerative medicine

Overview Additive Manufacturing technologies



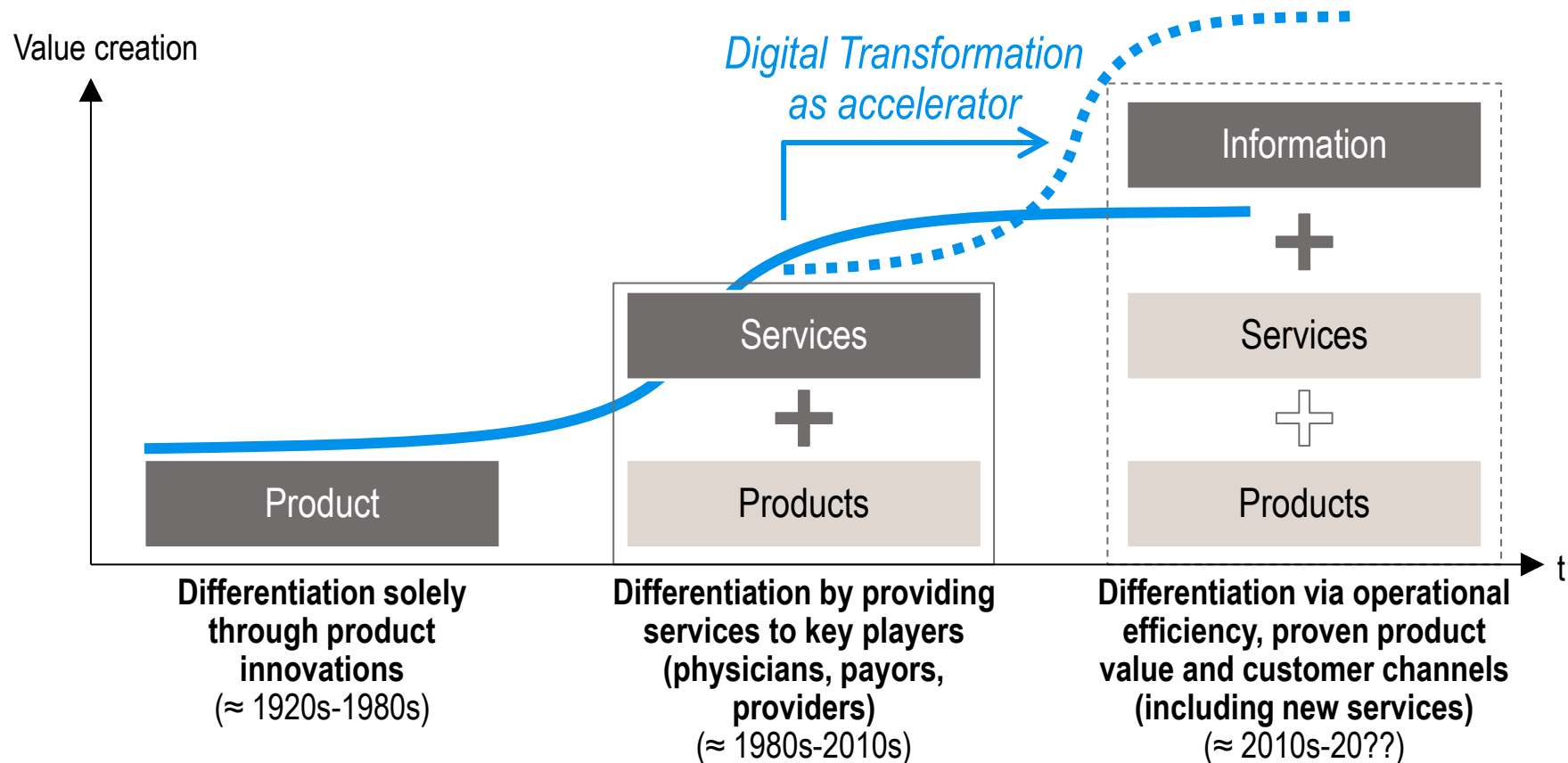
Industry 4.0 will have fundamental impacts on traditional ways of doing

Impacts of Industry 4.0

1	Flexibility / Mass customization	<ul style="list-style-type: none"> > Ability to reduce changeover time – seamless production change > Dynamic product schedules allowing to adapt real-time to customer needs
2	Direct client relationship	<ul style="list-style-type: none"> > Closer relationship between producer and customers > Disintermediation and change of business rules
3	De-laborization	<ul style="list-style-type: none"> > Reduced share of labor cost – Reduced dependency to LCC
4	Asset rotation	<ul style="list-style-type: none"> > Increase machine open time & utilization, reduce breakdown time thanks to conditional maintenance > Reduce stocks along the value chain
5	Decentralization / Regionalization	<ul style="list-style-type: none"> > Reduce impact of size / scale effect – Ability to decentralize processes > Possibility to relocate production process close to customer needs
6	Fast-product launch	<ul style="list-style-type: none"> > New product industrialization is performed seamlessly and without disruption > People are guided through virtual tools to adopt new products
7	Shift of skillset	<ul style="list-style-type: none"> > Less working forces in daily operations thanks to automated robotics > Maintain of needs for medium-qualified workers due to simplified Human-Machine Interface

Moreover, digital transformation impacts the healthcare space far beyond the product only by tapping into the information dimension

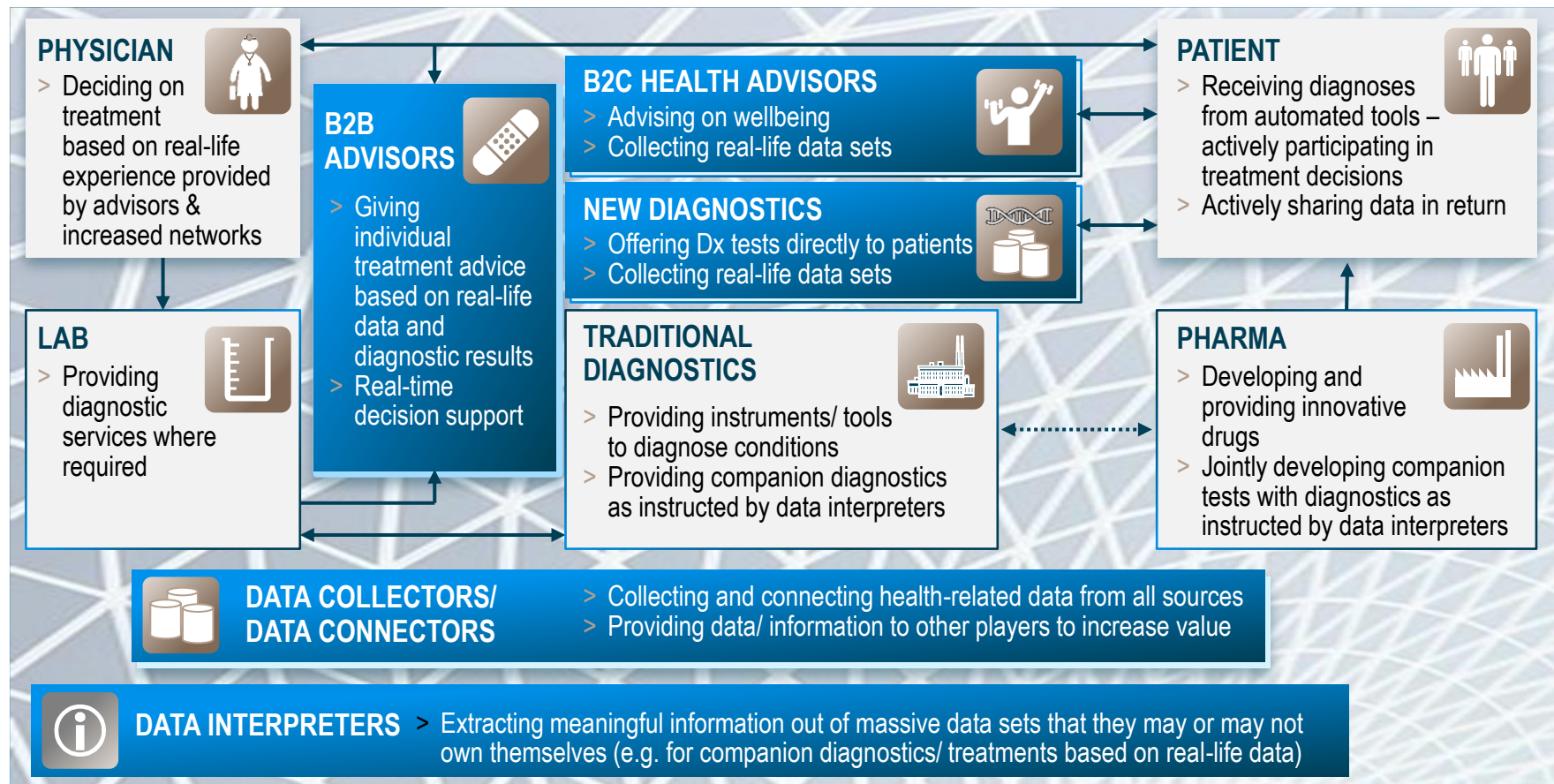
Evolution of healthcare product business offering



■ Value creation

Data-driven business models have the potential to re-shape the customer landscape for MedTech and healthcare players

Healthcare market 2020 with data-driven business models – Simplified view

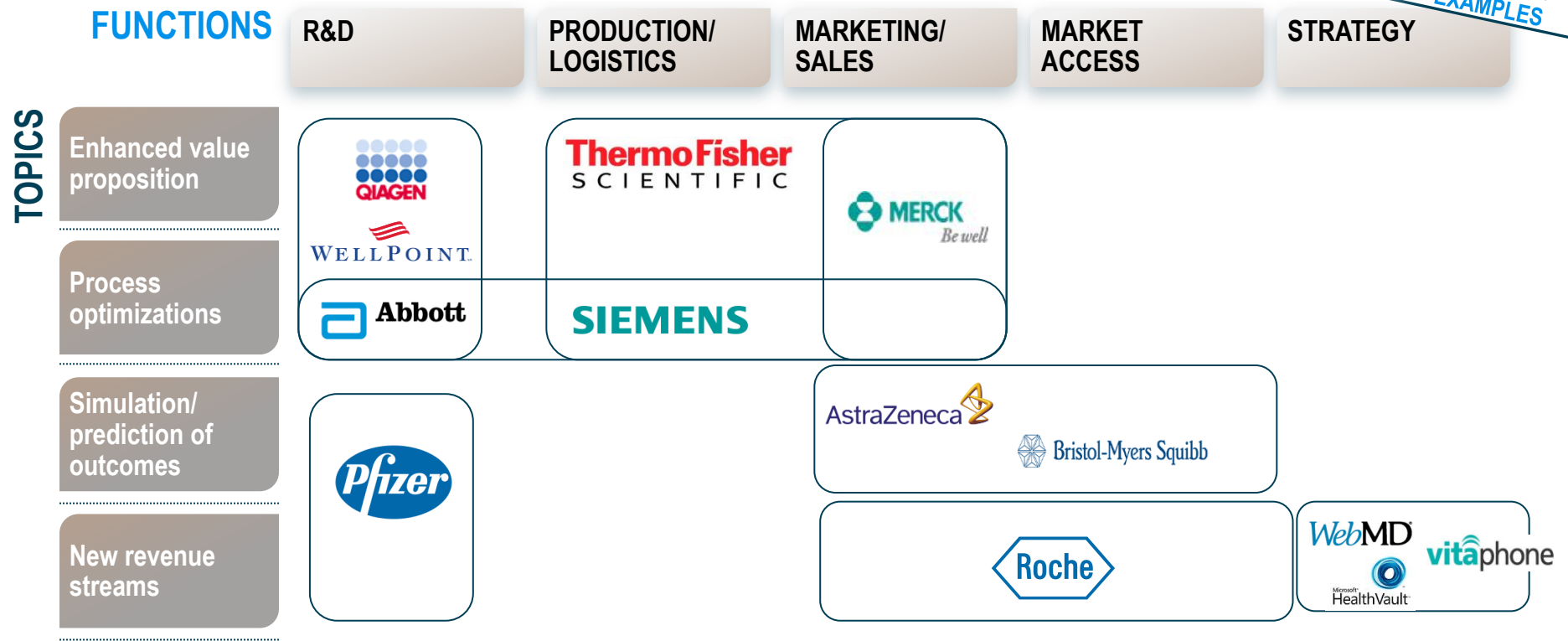


□ Traditional established players ■ New players from digital transformation

Leading MedTech players have already understood the value of data and started to leverage extra value for their business

MedTech players having started to leverage digital transformation

SELECTIVE EXAMPLES



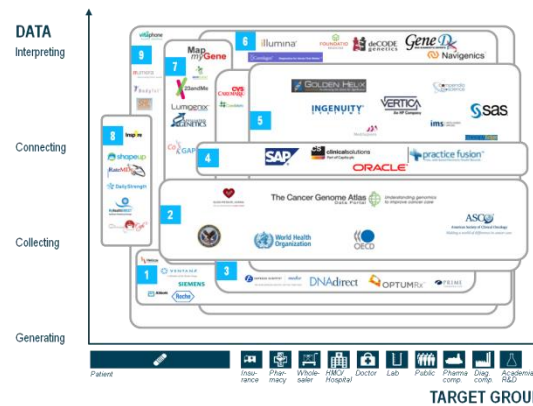
The key to success is knowing **how to get access** to the required data (generating or collecting) and **how to generate value** out of it (connecting the dots or interpreting the results)

Analyzing this space, Roland Berger has developed a data-based business model landscape in healthcare

Data-based business model landscape in healthcare

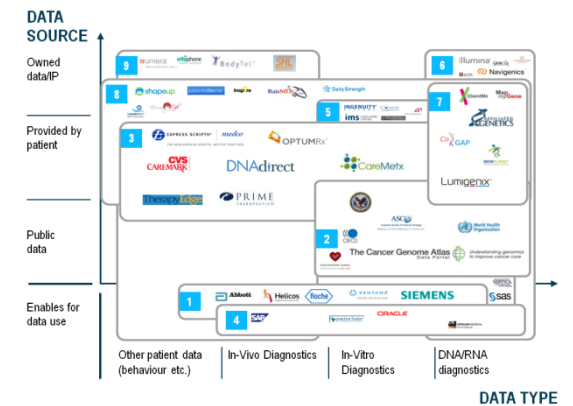
Database with +290 existing business models and market approaches

FIRST MATRIX



Stakeholder and data activity matrix

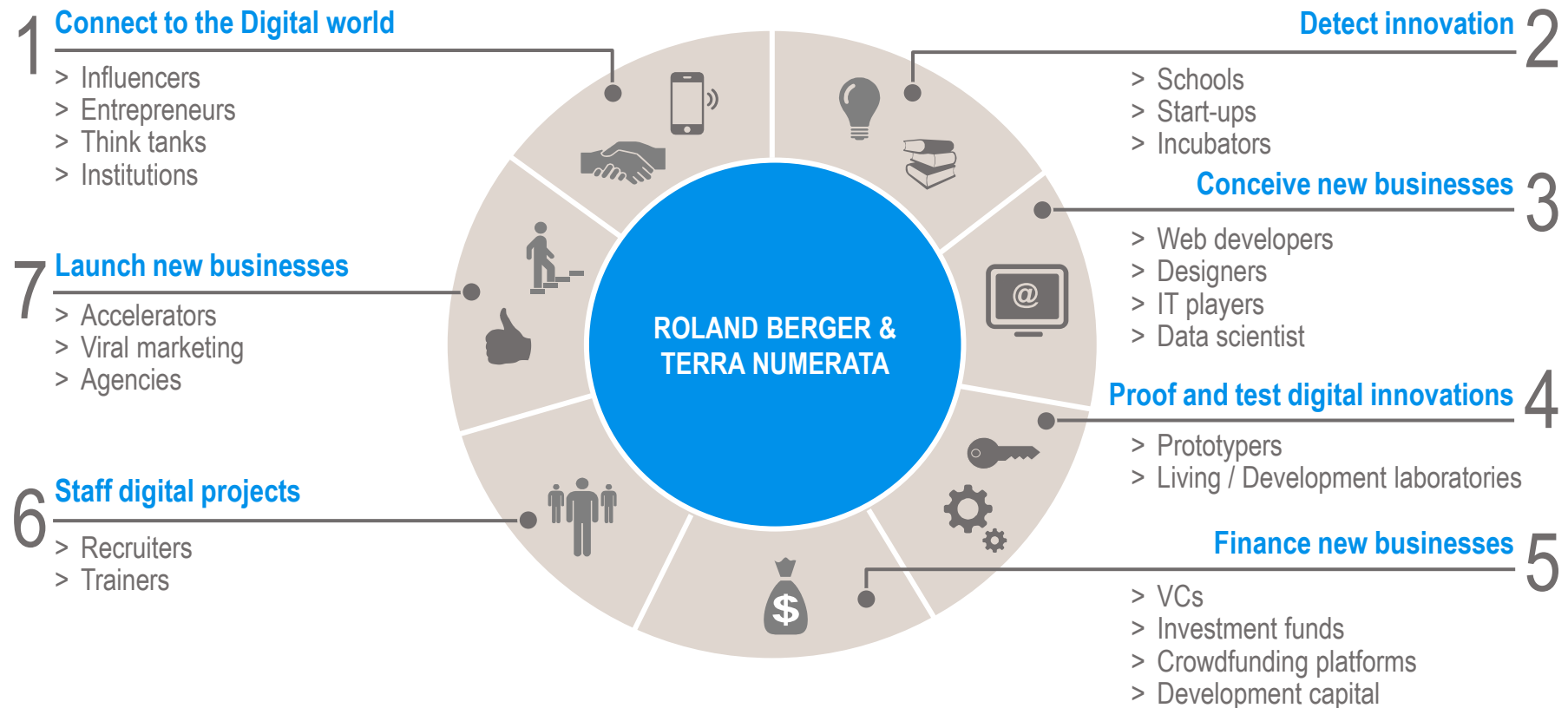
SECOND MATRIX



Data type and data source matrix

Leveraging digital transformation requires many different areas of expertise, hard to find under one roof...

Digital transformation requirements



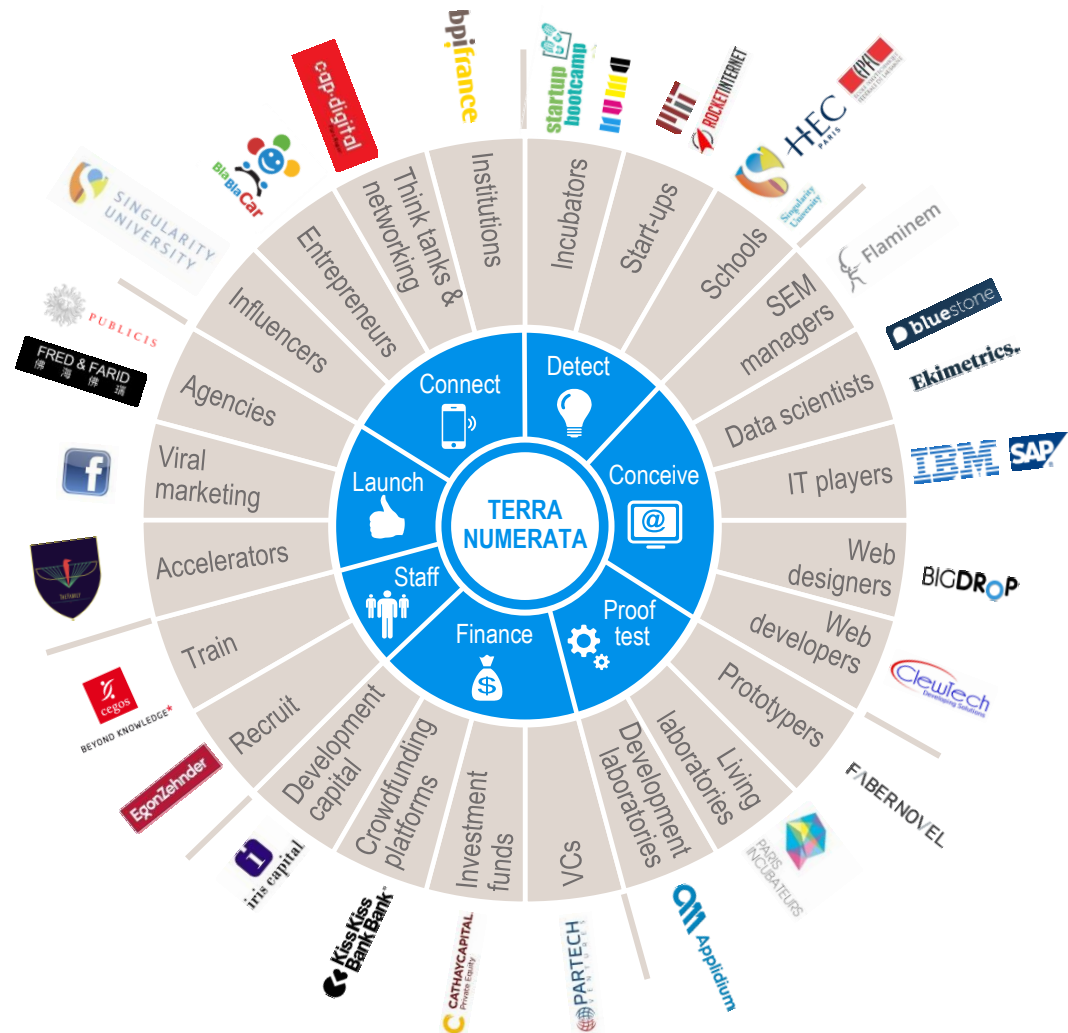
...this is why Roland Berger launched Terra Numerata through partnerships and alliances

Terra Numerata



- > Covering the **entire value chain** and meeting clients' needs
 - Consulting
 - Investment
 - Technical platforms with partnerships
 - Specific expertise (cloud, data scientists, developer, etc.)

- > Playing the role of an architect within Terra Numerata offer by **ensuring the quality of services** for each part of the value chain thanks to **partnerships with digital leaders** steered by Roland Berger digital experts



Your contact for further information



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Let's think:
act!

Roland Berger
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