

# MANUFATURA AVANÇADA

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Um ponto de inflexão



# Qual o cenário?

60,000 anos  
1860: 850 milhões  
2020: 7.8 bilhões

# Pirâmide de valor



- Self transcendence — Fun
- Provides hope — Self actualization
- Meets basic needs — Convenience
- Motivate

**Value to the individual**  
How does it change my life?



- Sustainability — Economic growth
- Inclusiveness — Wellness
- Job creation

**Value to society**  
What value does it bring to society?



- Improves access — Integrates
- Enlarges the pie — Connects
- Organizes

**Value to Industry**  
How does it change industry dynamics and supply networks?



- Better offering — Reduces risk
- Additional business — Improves margins
- Innovation — New business models

**Value to the Firm**  
What does it do to production operations?



- Safety — Saves time — Avoids hassles
- Health — Simplifies — Reduces cost
- Environment — Reduces effort — Quality

**Value on the Factory Floor**  
What does it do to production operations?

Source: WEF, Nov. 2016. NY, USA. Disruptive technologies shaping the future of production.

Tecnologias exponenciais baratas X gap de materiais e mecanismos

# Modelos de plantas



## **Melhorar produtividade do *brownfield***

(melhorar uso da informação, diminuir ineficiências desde matéria prima até fim do ciclo)

## **Plantas inteligentes para alta escala (*greenfields*)**

## **Plantas para customização em massa**

## ***E-plants***

A Saúde: aprox. 10% PIB



- Desenvolvimento de equipamentos de monitoramento
- Analytics
- Medicamentos Biológicos

# Efeitos Tecnológicos – LEI DE MOORE!!!

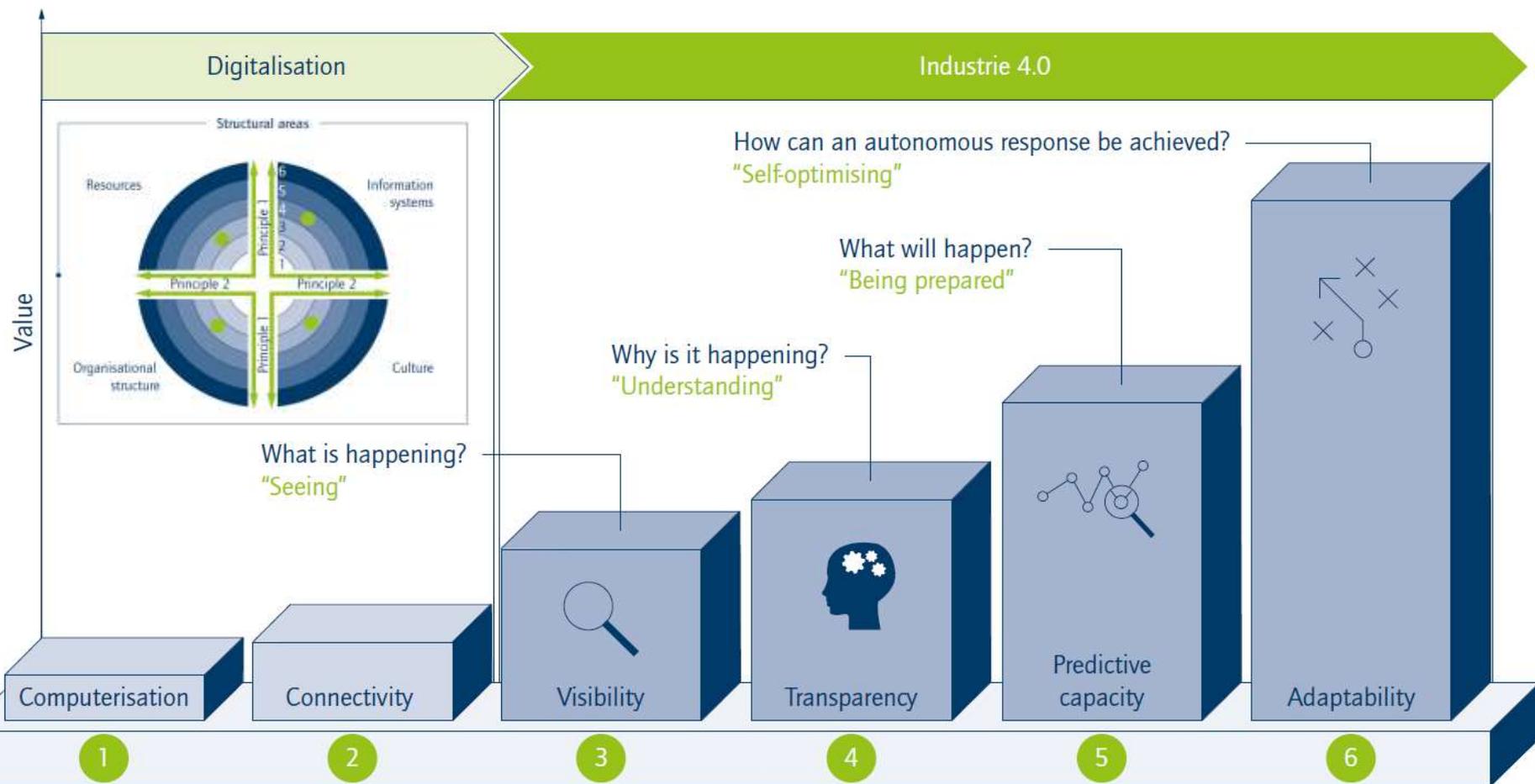
Dos primórdios da Indústria à Indústria  
Avançada: rumo à 4ª revolução industrial



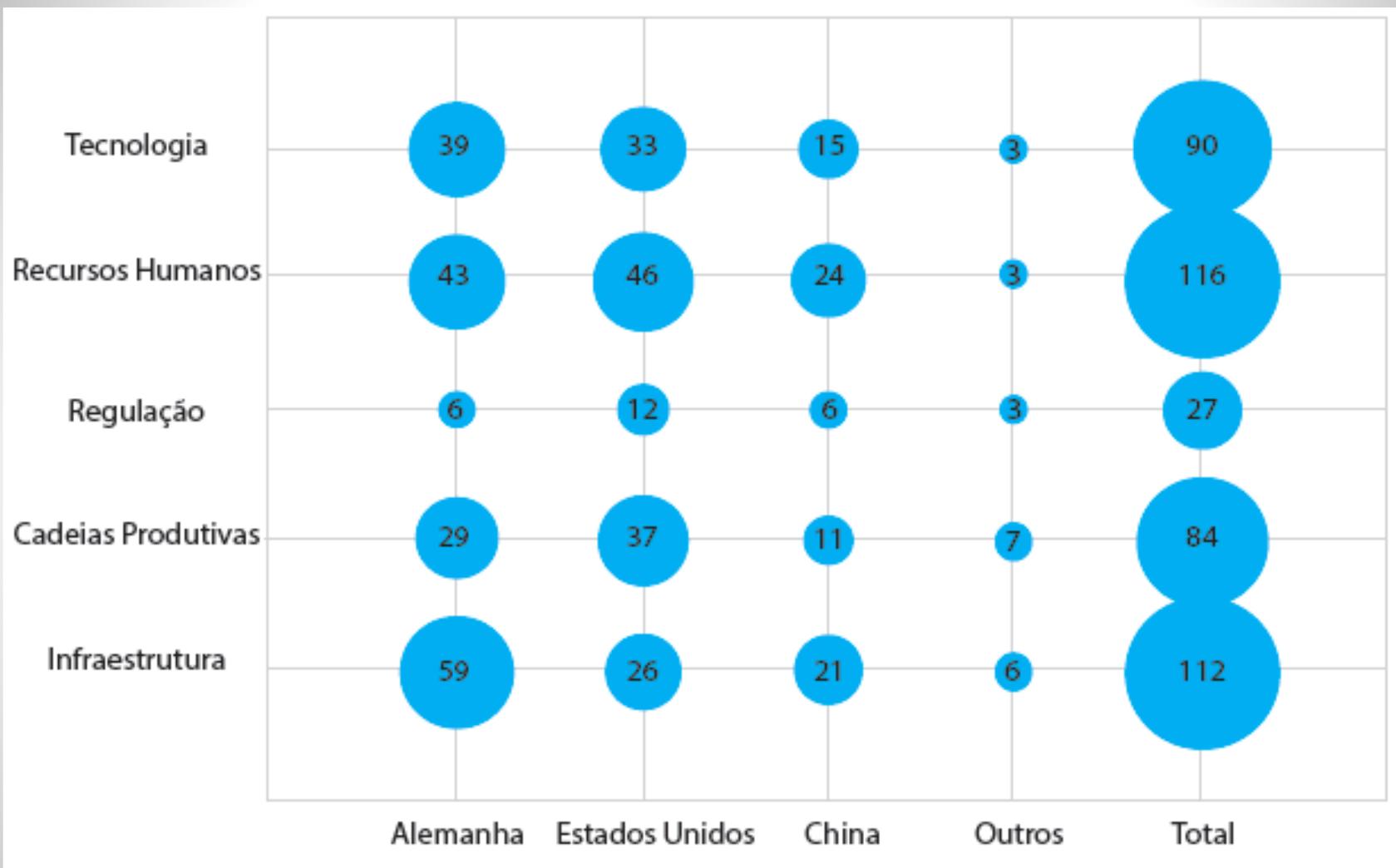
- Digitalização
- Inteligência Artificial
- Sensoriamento
- Robótica Colaborativa
- Manufatura híbrida

**4ª Revolução Industrial** | Baseada em sistemas Ciber-físicos de produção

# Estágios para o desenvolvimento rumo à I.4.0



# Justificativas e Objetivos – Volume de temas analisados



# 30%

dos empregos  
atuais não  
existiam 10  
anos atrás



# 65%

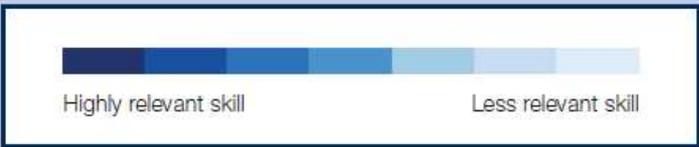
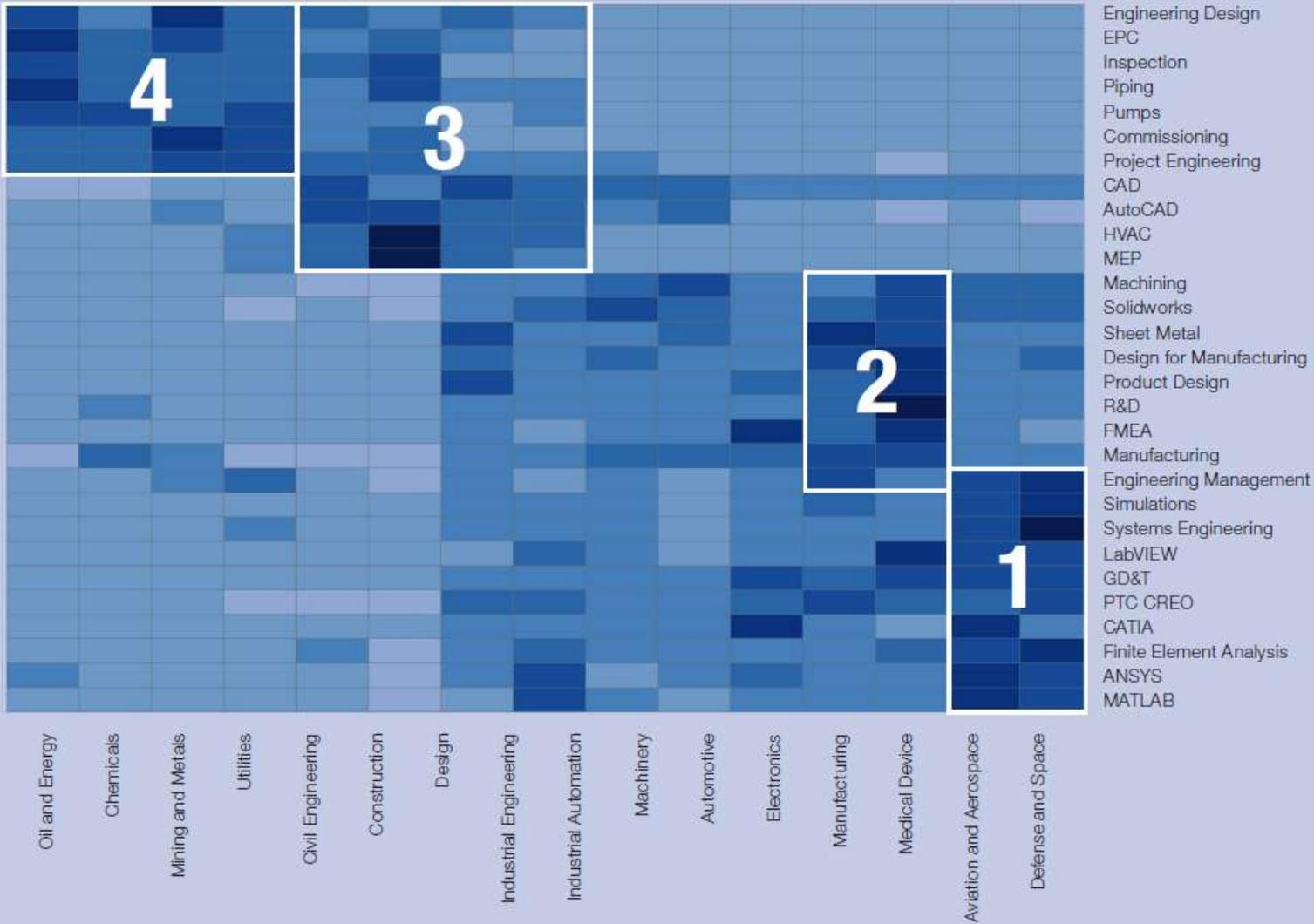
das crianças hoje  
executarão  
empregos que  
não existem hoje

Mais de 3bi habitantes estão  
em grandes e emergentes  
multinacionais

7 milhões de empregos  
em 5 anos

2 milhões criados

# Heatmap: Distribution of skills, mechanical engineers, different industries



Source: LinkedIn.



# Conclusões ....

*Que não tenho e que não sinto que as terei*

**Mas e o PIB?**

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## Immediate impact

- Increase of the geopolitical volatility
- Fast urbanization
- Mobile internet and Cloud technology
- Advancements in computing capacity and Big Data
- Crowdsourcing, shared economy and P2P platforms
- Changes in the workplace environment and restructure of work flexibility
- Climate change, natural resource scarcity and the transition to a greener economy

## 2016-2017

- New sources of energy and technologies
- Internet of things
- Advanced manufacturing and 3D printing
- Longevity and the aging of societies
- New consumer concerns over ethical issues and privacy
- Increasing women aspirations and financial power

## 2018-2020

- Advanced robotics and autonomous transportation
- Artificial intelligence and inteligente machines
- Advanced materials, biotechnology and genomics



How long will these changes take place?

Source: Future of Job Survey, World Economic Forum, 2016.