




XIII Italian-German Economic Forum

Research, development and innovation: a comparison between Italy and Germany

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- The background of the slide is a green-tinted photograph of a tunnel. The perspective is from the entrance, looking down the length of the tunnel. The walls and ceiling are made of concrete and show signs of wear. At the far end of the tunnel, a car is visible, its headlights illuminating the path ahead. The overall atmosphere is futuristic and technological.
- 1 The importance of Innovation: a complex phenomenon
 - 2 Italy and Germany: a macro-economic point of view
 - 3 Italy and Germany: AI's current state and development
 - 4 Survey result analysis
 - 5 Conclusions and key messages

The importance of Innovation

Innovation is complex but opens up new perspectives



Where are we going?

*~50% executives say they **don't know** what **their industry will look like in 3 years***



...will be true?

One out of 2 Italian** says they have fallen into the trap of **fake news**, which spreads **6 times faster than real news



Is it useful?



'The safety of CRISPR-Cas9 gene editing is being debated'



'T. Cook says: personal data are weaponised against us'



An ever-smaller world

- **Hyperloop** will connect Dubai and Abu Dhabi in **12 min** (1.200 km/h)
- **I-Plane** will allow you to travel between the U.S. and China in **~2 hours** (8.600 km/h)




Increasingly smarter communities

- **Artificial moon** in Chengdu for **night lighting** by 2020
- Already in progress **home deliveries** with **autonomous vehicles** in Arizona



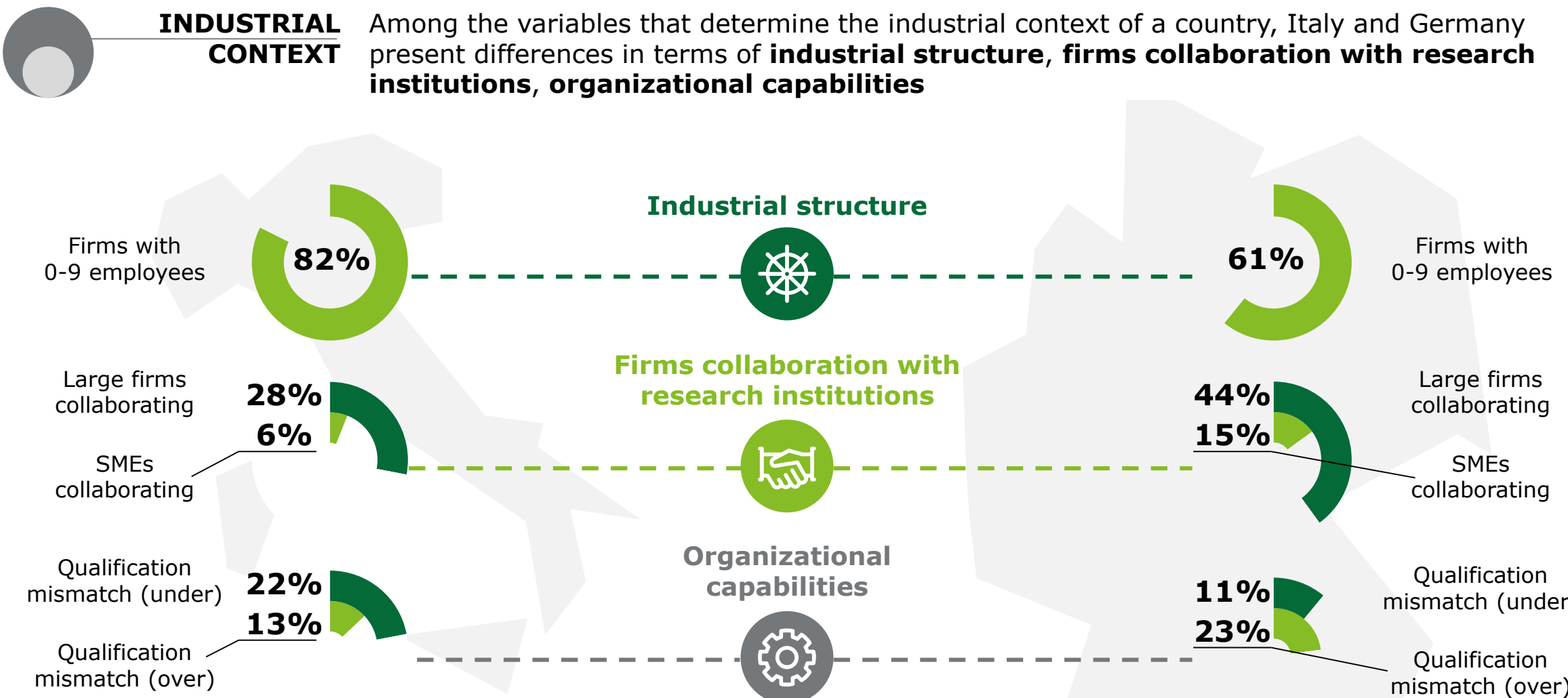
An increasingly healthy life

- Teams of **nanobots** to **operate inside** the **heart** and **brain**
- In **vitro** "**cultivated**" **burgers** instead of intensive farming

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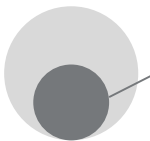
Italy and Germany: a macro-economic point of view

The innovation context of a country is directly influenced by its industrial context, and it is especially true in developed countries such as Italy and Germany



Italy and Germany: a macro-economic point of view

The innovation capabilities of a country can be measured in different ways as suggested by international report and studies



INNOVATION CONTEXT

According to a Deloitte framework focused on digital innovation capabilities, three main pillars of variables should be used, that are: **talent, start-ups, investments and patents**

In some performances and indicators, Italy and Germany **are close...** ...in other ones, they present **some differences**



Talent

Proportion of adults
over age 15
with ICT skills (2018)



26%



35%

Number of
IT faculties in the
Top50 (2018)



0



4



Start-ups

Total tax and
contribution
rate(2018)



53%



49%

Early-stage VC
investment
as % of GDP (2017)



0,4%



2,4%



Investment & Patents

Value added of ICT
sector as % of total
value added (2017)



3,6%



5%

Business Enterprises
Expenditure on ICT
R&D as % of GDP
(2017)



0,1%

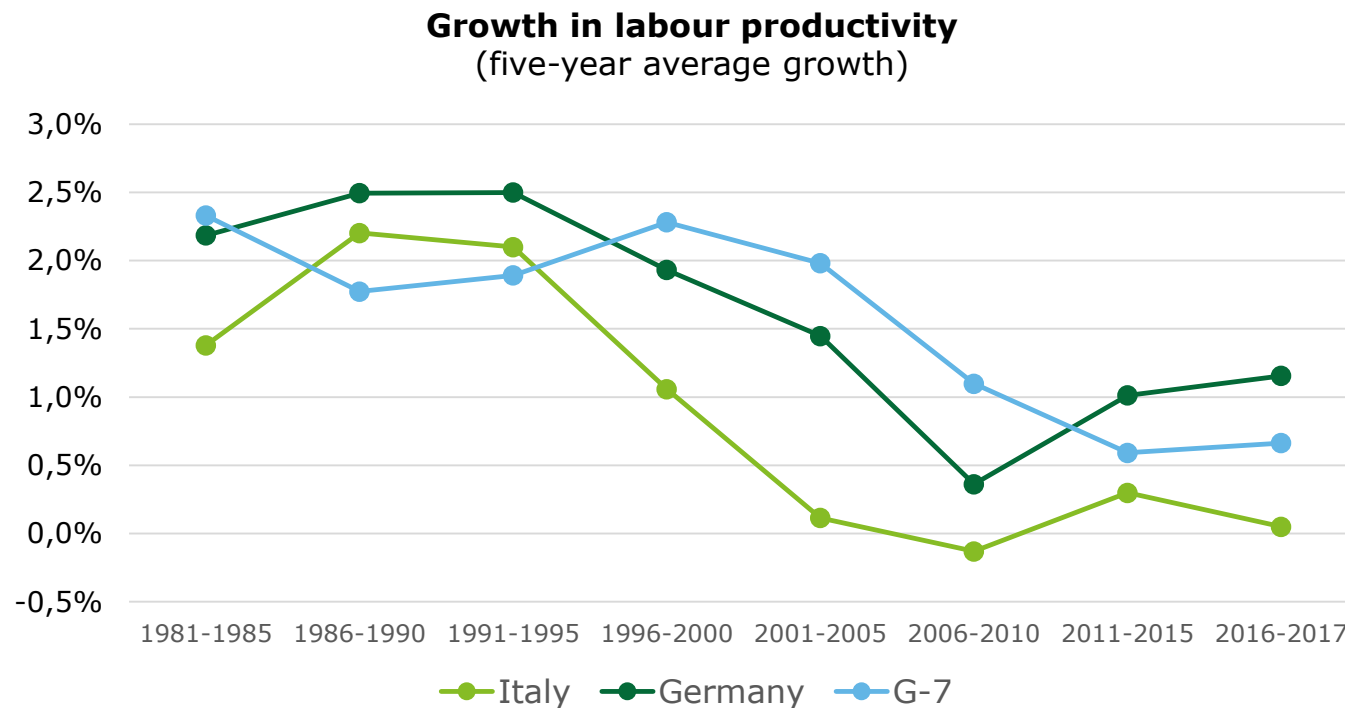


0,4%

Italy and Germany: a macro-economic point of view

In recent years, there has been a sharp slowdown in labour productivity growth

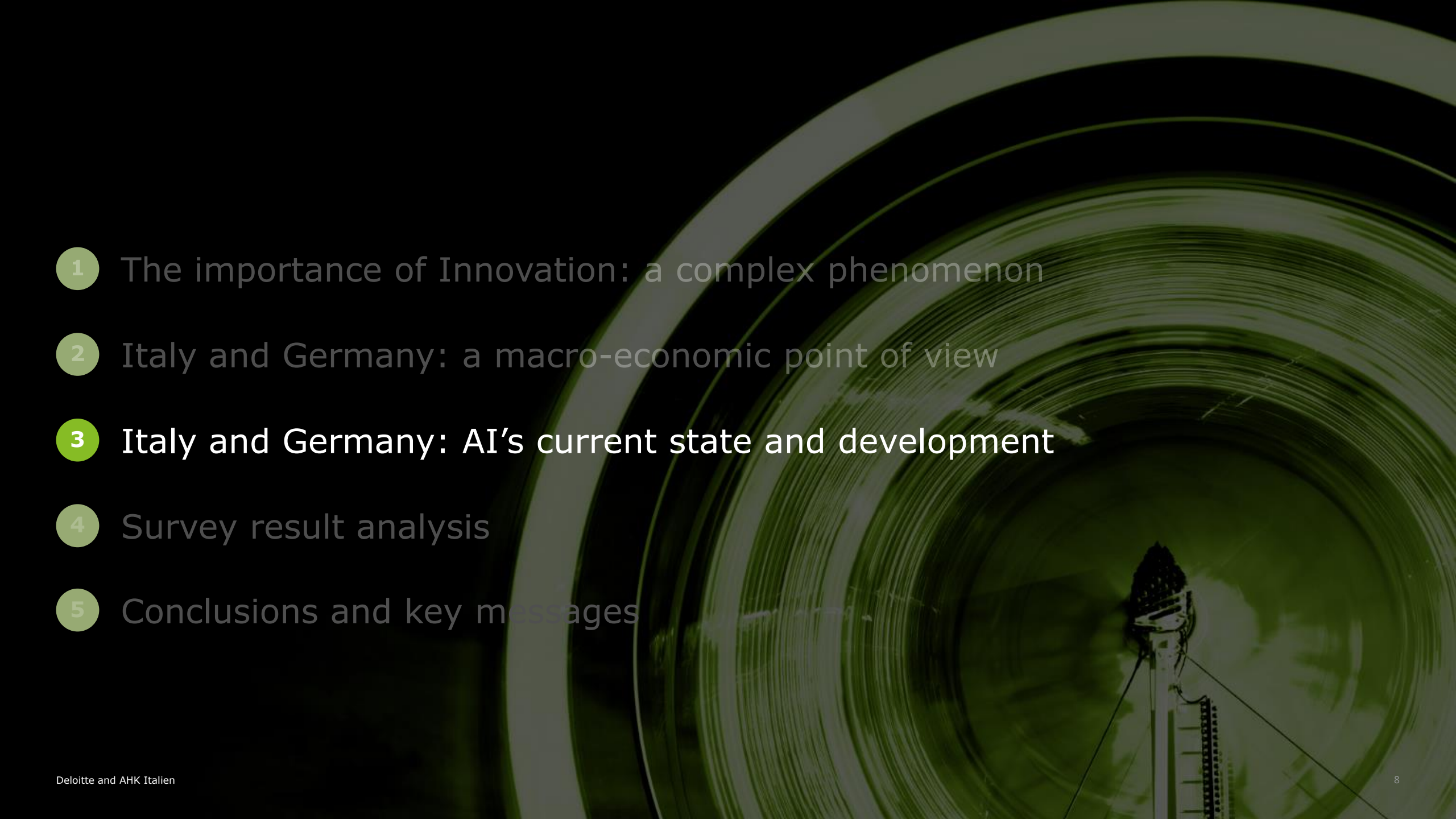
Italy and Germany have some differences in terms of industrial structure and digital innovation capacity. However, both countries and the **most developed economies** are **suffering** a **slowdown** in industrial **productivity**



In this scenario, **new technologies** have a large potential to contribute to global economic activity.

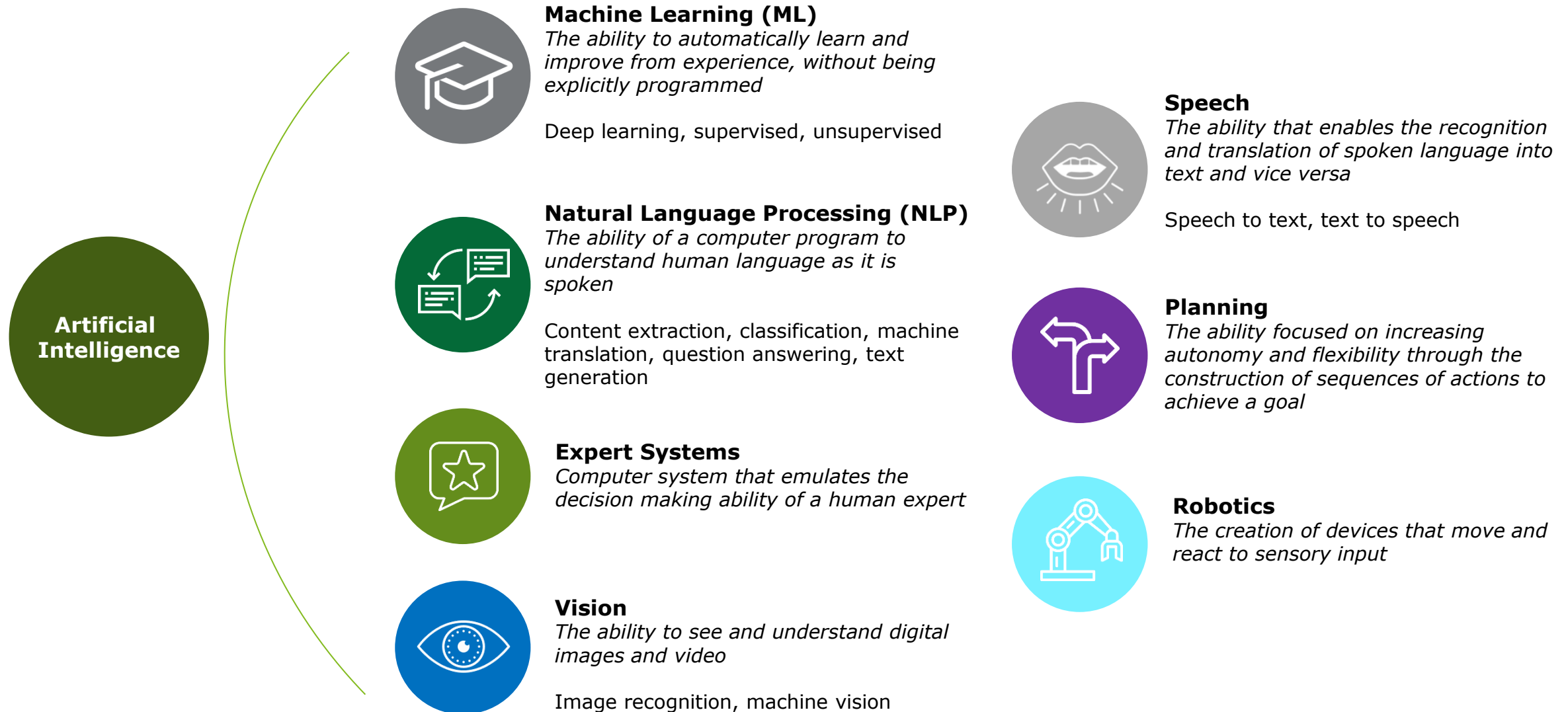
In the past, the introduction of **steam engines** during the 1800s **boosted labour productivity** by an estimated **0,3% a year**, the impact from **robots** during the 1990s around **0,4%**, the spread of **IT** during the 2000s **0,6%**.

It has been simulated that **Artificial Intelligence** could potentially deliver **1,2%** additional growth by 2030

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Italy and Germany: AI's current state and development

There are different ways to incorporate AI technologies



Italy and Germany: AI's current state and development

Countries have understood the importance of having a national agenda



Up to
€70M
by 2020
(with EU contributions)

The Italian government has created a **task force to develop and define the Italian AI strategy**.

The themes are:

- Enhancing AI research **from lab to the market**
- Permanent **education** and formation
- Promotion of **qualified investments**
- **Data as a driver** for production
- Regulations and **ethics**
- Improvement of the **public services**



€600M
by 2020

Primary goals of the strategy:

- Germany and Europe are to **become leaders** in the **development and application of AI technologies**. Germany's competitiveness is to be underpinned
- With the strategy, it is to be ensured that the development and **use of AI** is responsible and that it is pursued **for the common good**
- Within the framework of a broad dialogue within society and active political steering, **AI** is to be **firmly anchored in society in ethical, legal, cultural and institutional terms**



Over
€1B
Each year in the
period 2021-2027

Europe is **currently behind** in private investments in AI, for this reason:

- All member states have been encouraged to develop their national AI strategy
- AI investment for public and private sectors will have to scale up to reach the **target of €20 billion per year in the next decade**



Global leaders in AI **benefit** of significant **public investment, contribution** from corporate **tech giants**, and **access to large sets of data**



Over
\$4B
By 2020

While little is being done on a national level, AI industry and research is led by academia and private industry in the US



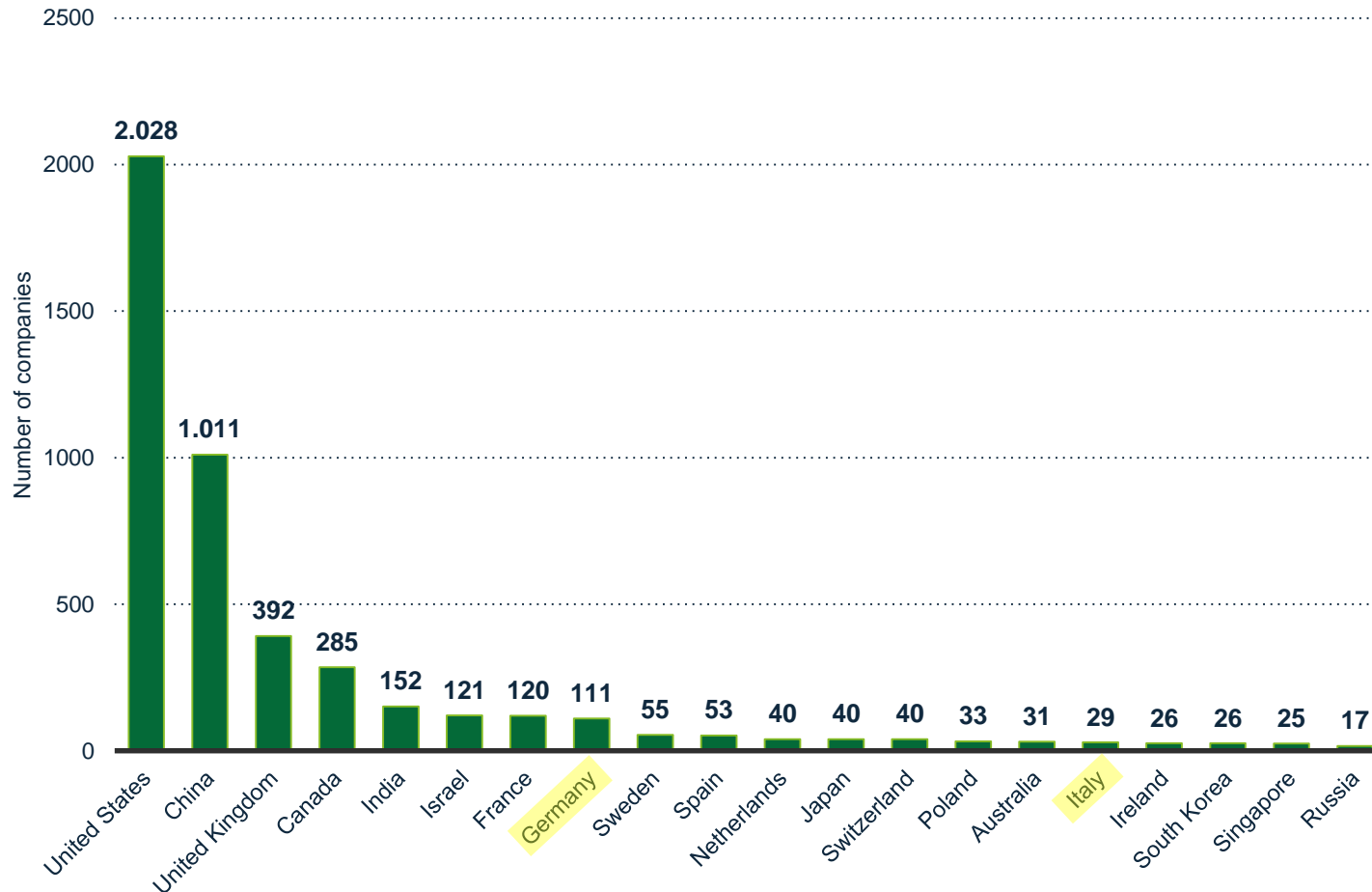
Over
\$7B
by 2020

Chinese efforts are mainly government led and have a strong research approach. China is determined to become world AI leader by 2030

Italy and Germany: AI's current state and development

Corporations all around the world started incorporating AI technologies

Number of artificial intelligence (AI) companies worldwide
as of June 2018, by country

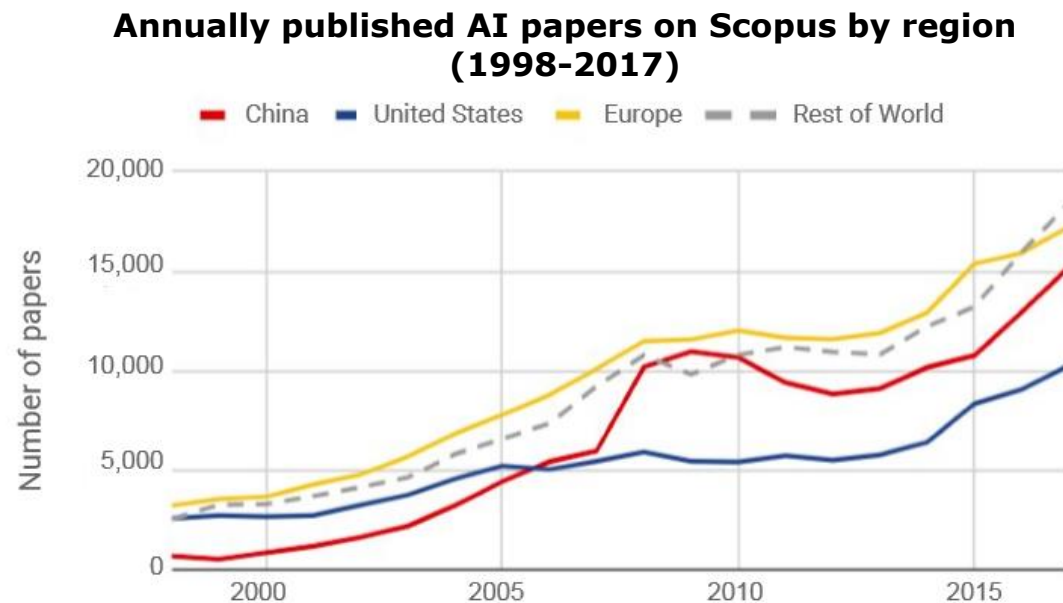


- Both **Italy** and **Germany** are in the **top 20 countries** for number of artificial intelligence companies
- **Germany** has over **3 times** the number of AI companies **Italy** has
- **China** has **7 times** the number of AI companies **Italy and Germany** have combined, the **US** almost **14 times**

Italy and Germany: AI's current state and development


Despite different level of investments, European Ecosystem is performing well in terms of reasearch: Italy and Germany are active participants in this ecosystem

Europe is the **largest publisher of AI papers**. In 2017, 28% of AI papers on Scopus were affiliated with European authors, followed by China (25%) and the U.S. (17%)

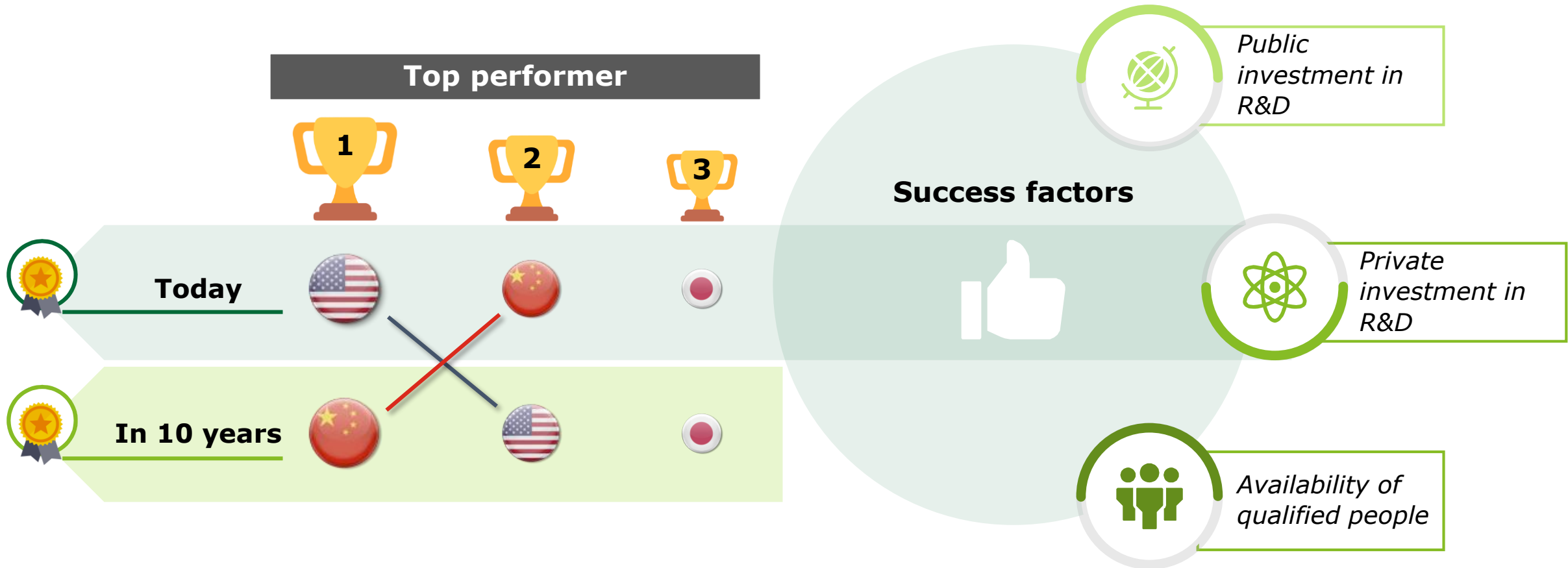


Italy and Germany perform above the average and **Italian researchers** have an **impact** on **German** research **strategy**


- **Two experts** from **Fondazione Bruno Kessler (FBK)**, one of the leading research centers for AI in Italy, are **supporting German government** in the **evaluation committee** for Artificial Intelligence research in Germany
- **During** the 2018 **AAAI** (Association for the Advancement of Artificial Intelligence) **conference** China and U.S. submitted about 70% of papers. However, **Italian and German papers** received the **highest acceptance rates, 41%**, compared to the 21% of China and the 28% of U.S
- **European Research Council (ERC)** is going to **fund 222 researchers** with 540 € million in 2019, to boost cutting edge research projects in AI. **German researchers** are the **second most represented** country with 15%, while **Italy** is the **fourth**, with more than 10% of the total


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Top performers worldwide and success factors



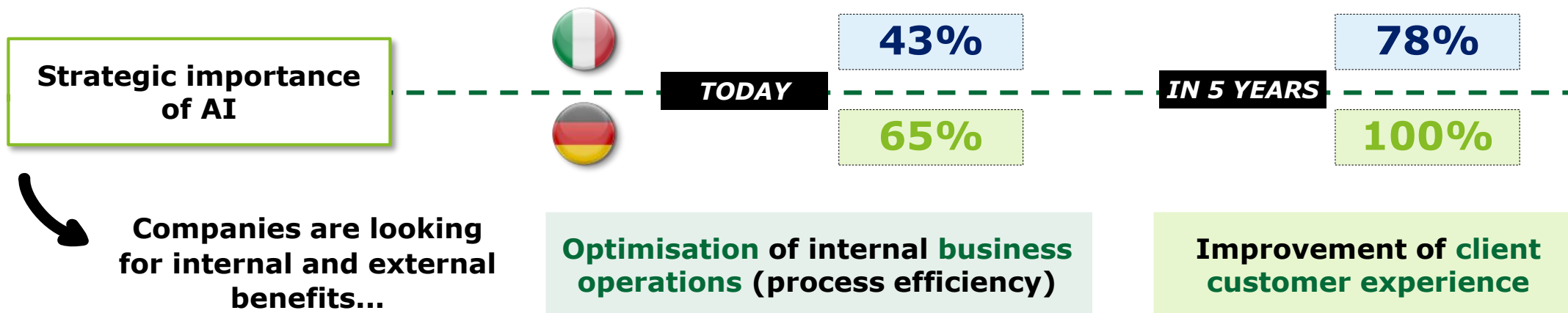
The political and regulatory context is not yet perceived as conducive to the adoption of AI technologies

 19% context ready vs **81% little prepared or not at all**

 20% context ready vs **80% little prepared or not at all**

Time horizon and dynamics of adoption of AI technology

98% of companies believe there will be a **consolidation** of AI technology



The **approach** of companies in relation to the **adoption of new technologies** is mainly **"wait-and-see" (47%)** - They do not want to be the first in the sector to invest in technologies, but they try to adopt technological solutions in a gradual manner

What are companies doing and how much are they investing

What are companies doing?



They have not yet begun to adopt AI



28%



Still in the preliminary study phase



30%



Already implemented some solutions



37%



They are an important centre of excellence



5%

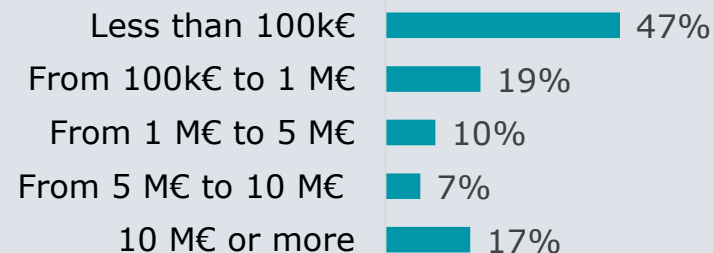
Among those who do NOT invest

Average initial investment forecasted: **about 500k €**



Among those who invest

In the last year



In future, for 87% of both countries' companies, investments will increase, especially in 3 sectors



Industrial products



Energy



Technologies, Media & Telecommunications

...And in which technologies are they investing

What are companies doing?



28%

30%

37%

5%

In which technologies they are investing (or would if not started)



Image processing (solutions to extract information from images)



Autonomous Robot (able to move themselves or some of their parts without human intervention)



Intelligent Data Processing (solutions for the analysis of structured and unstructured data)



Image processing (solutions to extract information from images)



Intelligent Data Processing (solutions for the analysis of structured and unstructured data)



Virtual Assistant/Chatbot (software able to perform actions based on natural language commands)



Intelligent Data Processing (solutions for the analysis of structured and unstructured data)



Language Processing (solutions able to understand and create contents)

Challenges, risks and readiness of companies

3 main challenges for companies



Lack of expertise in the company
(e.g. developers, data scientists)

Integration problems of AI into
roles, functions and business processes

Data issues (e.g. data privacy, access
to quality sources, integration, training)



Lack of expertise in the company
(e.g. developers, data scientists)

Integration problems of AI into
roles, functions and business processes

Difficulty in **estimating**
the **appropriate investment**

Concern about AI-related risks (cybersecurity, ethical, legal)



61% of companies are
quite or very **worried**



80% of companies are
quite or very **worried**



Companies orientation towards employees



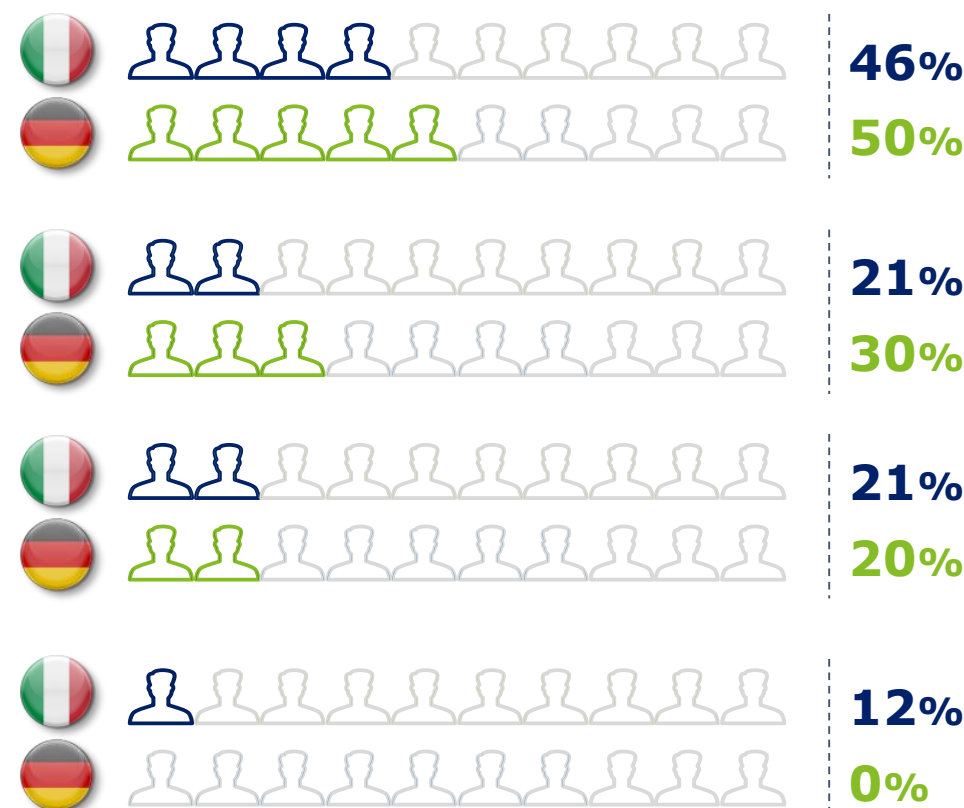
Introduce a small number of new talents, flanking/replacing them to the current ones

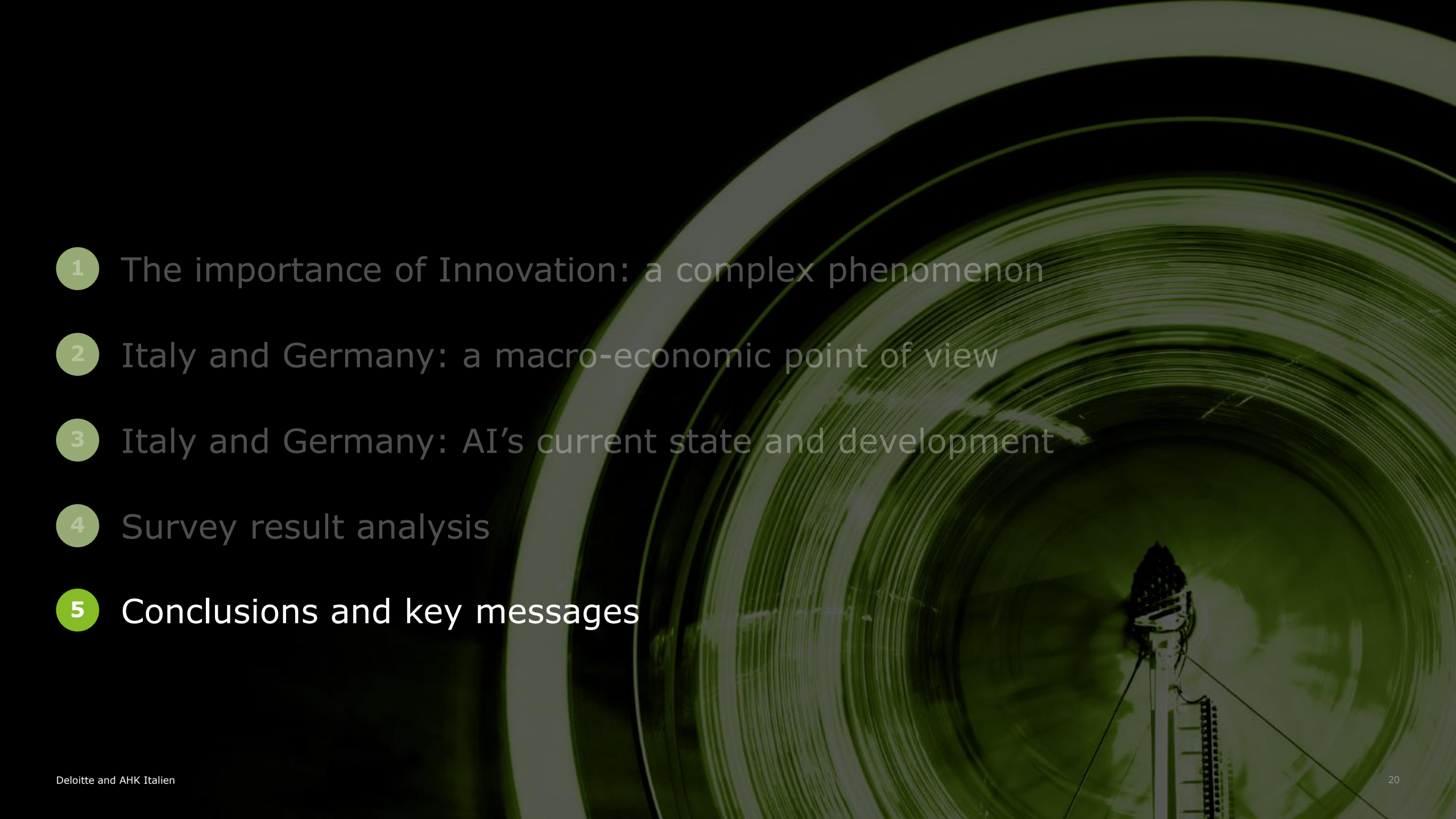
Introduce a considerable number of new talents, supporting/replacing them to the current ones

Maintain and train current employees

Reduce current employees number

Following the development of AI's initiatives, your company in the coming years is oriented to...



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Conclusions and key messages



Artificial Intelligence will have a **strategic impact on** countries' **productivity**, becoming a fundamental factor for their economic development



Artificial Intelligence is a technology that **will be** consolidated and will be **strategically important** for companies, indeed **investments in AI will grow**



Industrial context has a direct **impact** on the **innovation capabilities** of a country **and** on the ability of its **companies** in adopting new technologies



Both **lack of talents and political/regulatory context not ready** have an **impact** on the **perceptions** and **decisions of companies**



Italy and **Germany** perform **above** the **average** in the **research field**, **but** they **operate** in a **fragmented context**



Compared to major international player (China and US), there is a **lack of systemic approach** and a **shared European strategy** that increase the gap with big players

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