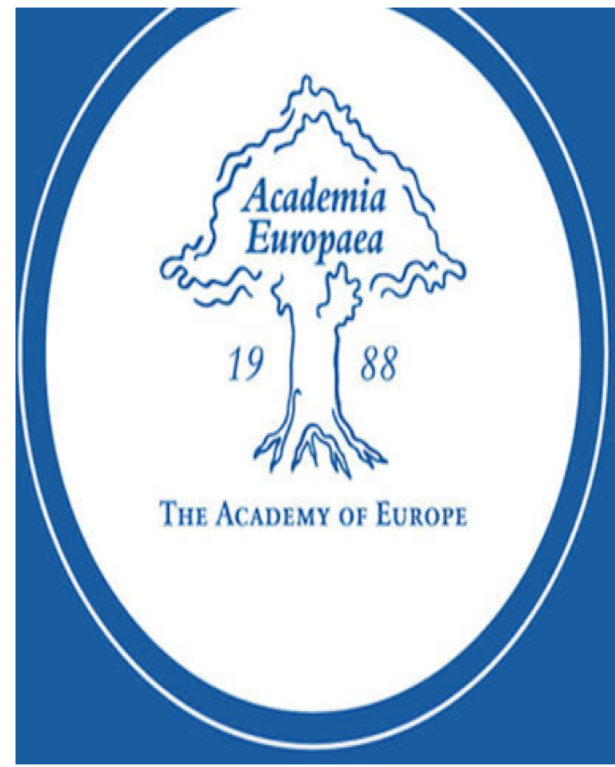




ACADÉMIE
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DES
TECHNOLOGIES



From Research to Innovation in Europe

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Let us Enhance Innovation in Europe

2019

- GDP EU (28): \$18,377 Bn, USA: \$21,430Bn, China: \$14,340Bn
- China < EU < USA
- 20 Largest Tech Brands by Capitalization: 1 EU (SAP), 4 China, 1 Korean (Samsung), 14 USA
- 18 Top Technology Companies by Revenue: 0 EU
- 50 Top Companies by Revenue: 8 EU

2020 Venture Capital: \$250Bn Total, \$43Bn EU (17%)

- EU Research: CNRS, Max Planck, CNR, INFN, CERN, INRIA, Fraunhofer, VTT, IMEC etc.
- Publications 2016: EU 28.1%, USA 19.3%, China 17.7%
- 70% EU High Potential Innovations Co-Developed by Universities
- EU Level Defence Research is Small: 2021 EDF Euro 1.2Bn

1980s

- USA: 250 Top R1 + R2 Ranked Universities reduce teaching loads to 60-90 contact hours/academic staff/academic year
- Removes mandatory retirement age for academic staff
- USA: Typical class size 25 to 50 students
- France: Increases teaching load to 120-180 hours with 200 students/class

2019-21

- France: Universities 18-20 students/academic staff; academic staff recruitment reduced by 50% in 20 years. Higher education budget + research budget 2021 is - 4.1% compared to 2011 (Le Monde 21/9/21 p. 15)
- Belgium: Universities 21 students/academic staff
- UK: Cambridge 2.93 students/academic staff, UCL 5.68, Imperial 4 (including doctoral students), Edinburgh 7.68
- USA: Duke 3.92, Wash. Univ. St Louis 4.26
- USA: R1 Universities: on average 2 PhD graduations/academic staff/year, i.e. on average 8 PhD students per academic staff
- France: Limit of total of 4 PhD students/academic staff
- US announces massive investment in universities and research

USA 2020

- University Overall Endowment \$500B (Public and Private)
- Univ of Texas System Endowment \$31B
- University of Michigan Ann Arbor \$11B, Princeton \$26B, MIT \$16.5B, Harvard \$38B, Yale \$29B, Washington St Louis \$8.52B, Western Michigan Kalamazoo +\$500M ..
- Spending rate 5% or 25B per year for all universities
- Endowment spending ~ annual salaries of 100,000 full professors or « endowed chairs »
- For top 300 universities ~ 333 endowed chairs per university per year ..
- Industry University Research State (Local) Based Matching Funds
- SBIR/STTR Programs
- State (Local) Encouragement of Academic Staff to develop small companies
- Biden Multiannual Plan \$21B + \$35B for Universities, \$250B for research

UK

- Oxford ~ 11Bn Euro Endowment, ~550 Million/year spending
- Cambridge UK similar numbers
- Edinburgh UK ~ £500M Endowment
- UK University with 20,000 Students also has roughly £ 340M tuition income (50% domestic and 50% overseas students)
- Top 5-6 Universities in the UK have each roughly £ 200-300Mn research contracts
- 2014/15: All UK Universities had total of £ 5.9B research contracts, £ 826M from EU
- SBIR Programs
- University/Industry/Business Initiatives
- 2020: Government announces £800M ARPA Program

France

- 2019/20: CNRS received 435M Euros in Research Grants and Contracts on a total budget of ~3B Euros
- Recent Successes « thanks » to the 2011-2012 Funding Plan based on the 2008 Financial Crisis:

5 Universities enter Shanghai Top 100, Including 3 In Paris Area,
Paris-Saclay is 15th Worldwide

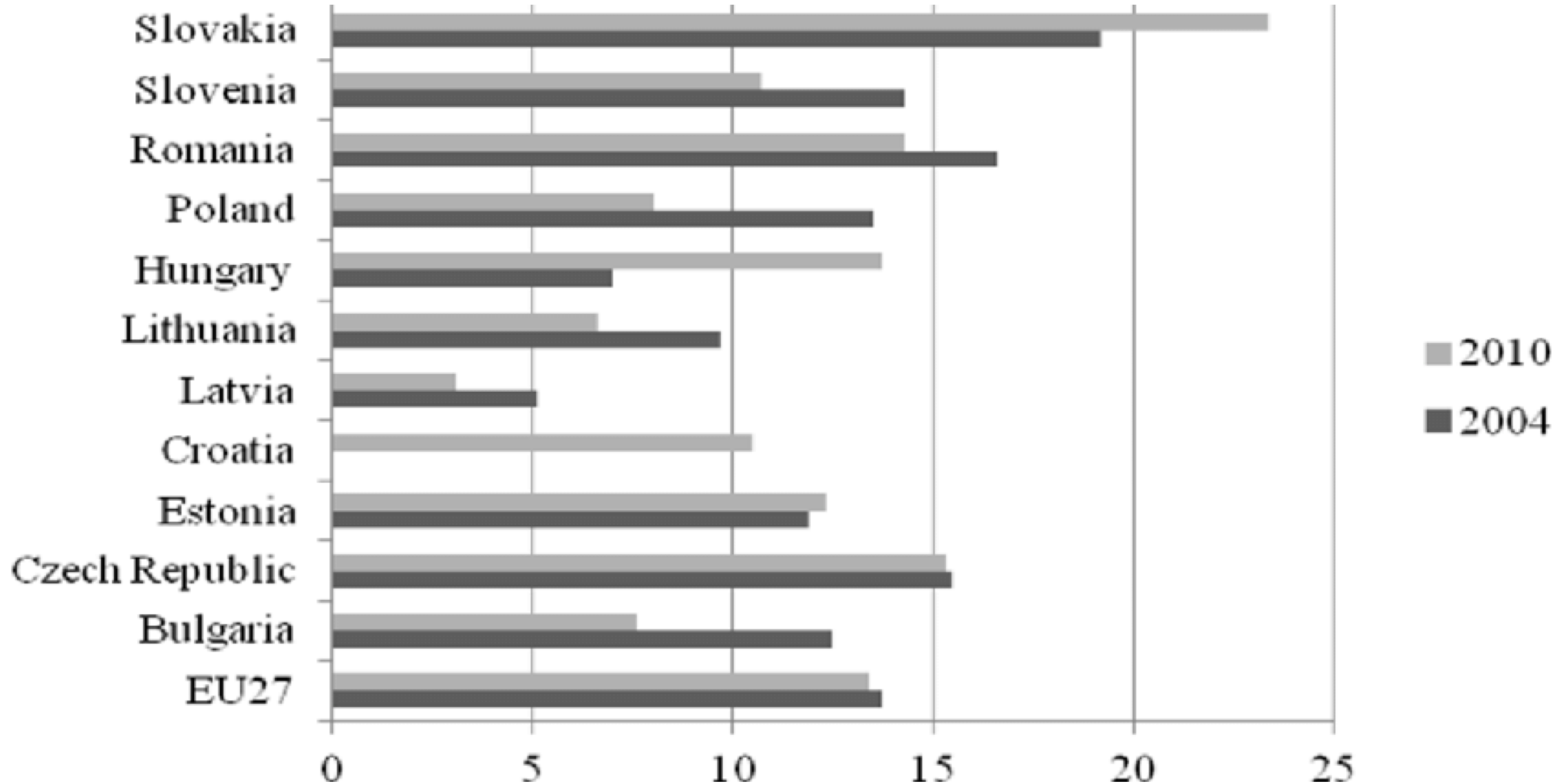
CERN

- 10 Business Incubator Centers
- Knowledge Transfer Office with 40 Patents but only 0.1% of its income is from royalties (2M Swiss Francs/Year)

ERC

- 7 Nobel Prizes
- 4 Fields Medals
- 9 Wolf Medals
- 200,000 articles in journals
- 6,100 (3.05%) among 1% most cited
- Not enough coupling with Innovation (150K max funding per project)

Interesting Changes in Innovation Turnover in Europe



Some Guidelines to Innovation

**Large Companies can Better Absorb Fundamental Research,
But they may take Longer to Decide what they Use .. But are More Innovative After All**

One Steering System. Leaders increase their odds of success by establishing good-governance practices and regularly adjusting them as needs change. For example, most large companies now have a varied set of ecosystem partners and vehicles—including [internal incubators](#), [venture funds](#), and [accelerators](#)—to accelerate innovation by complementing their in-house development efforts. These vehicles may overlap in scope, undermining their effectiveness.

Talent First. Leaders work toward finding internal and external talent. They devote resources to attracting, training, and retaining the best people they can find—often prioritizing those with entrepreneurial experience. Yet what really drives performance is their ability to allocate their best internal talent to innovation teams.

Portfolio Mindset. Leaders pay close attention to the shape and quality of their innovation funnel—and the processes to manage it. Not surprisingly, leaders tend to have broader funnels: they have the capacity to generate more potentially valuable ideas and convert their best ideas into scalable products or services.

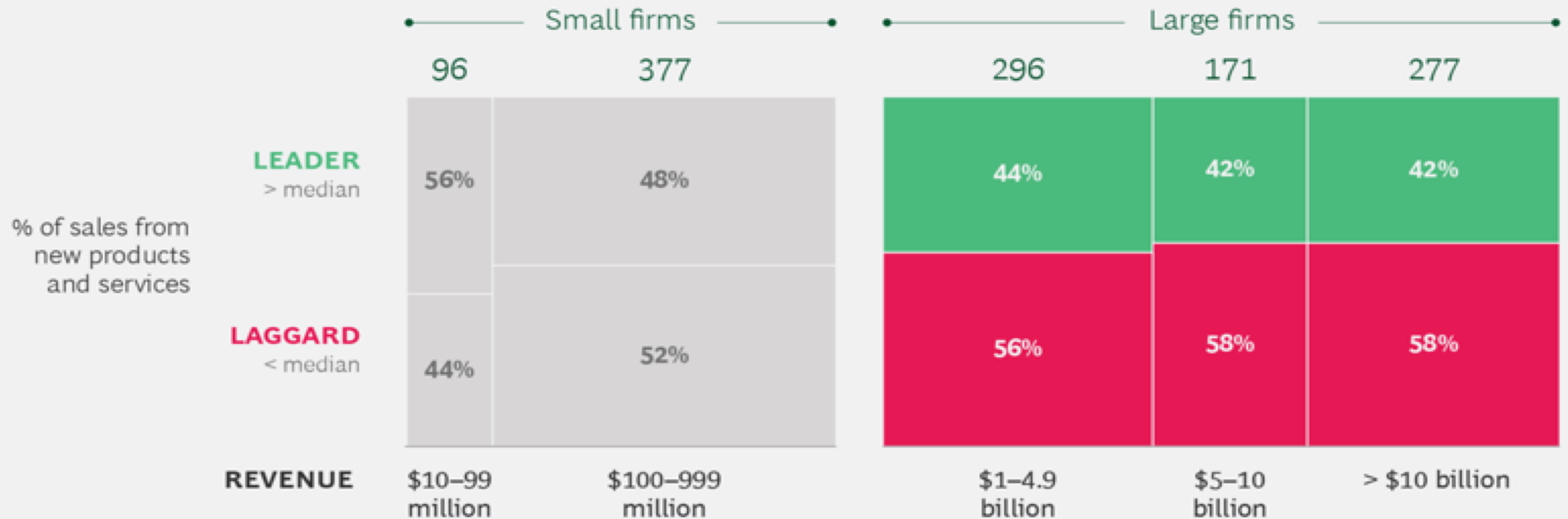
Empowered Teams. Ultimately, the innovation success of a company lives and dies with the quality of its innovation teams. Good teams are small (they adhere to Jeff Bezos’s two-pizza rule) yet functionally diverse, that is, they are staffed with a mix of product managers, engineers, and designers. They combine data-driven (patent scanning, for example) and human-centric (such as ethnographic) methods to find solutions to problems that add value for customers.

Teams need a healthy degree of autonomy led by a strong product owner who maximizes the desirability and viability of the innovation, keeping it technically feasible to deliver in an acceptable time and cost. Incentives matter.

Being a great innovator is about spotting changes in the technology or regulatory environment, in markets, and in social norms, and understanding which doors these changes open and which they shut. Innovation is a learning journey in which the destination shifts in response to changing travel conditions.

SMEs are 56% of EU Economy But Innovators are often Large Firms

EXHIBIT 1 | More Than 40% of Large Companies Are Innovation Leaders



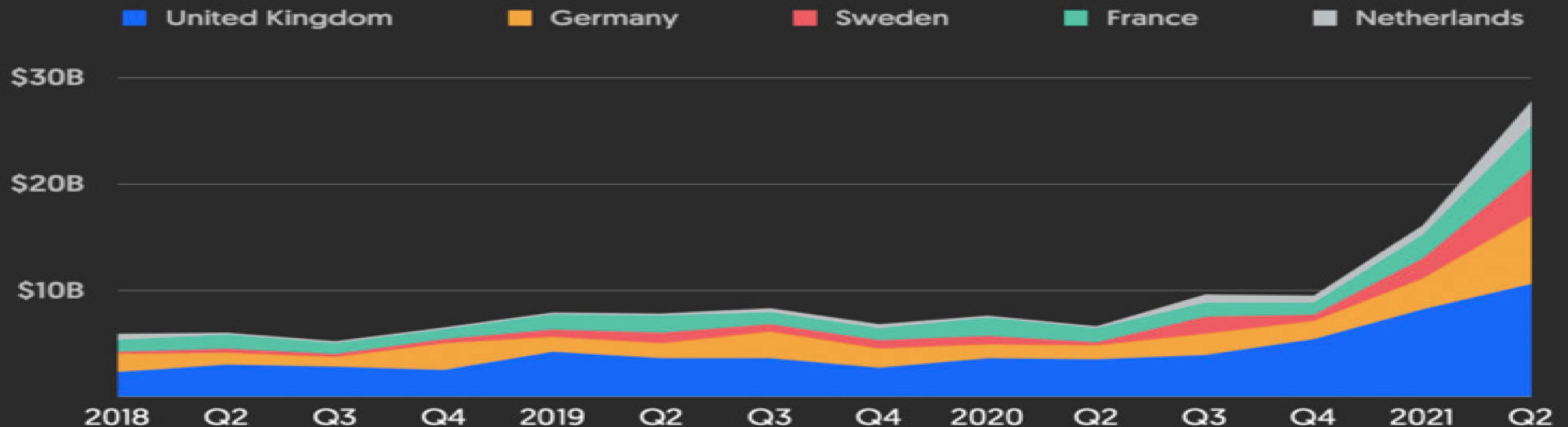
Sources: BCG Global Innovation Survey; BCG i2i team.

Note: n = 1,217 (most innovative companies and i2i samples); innovation leaders are defined as generating more output in terms of percentage of sales from products launched within the past three years than the industry peer median.

It's Not Great but Getting Better

Leading European Countries, By Venture Dollar Volume, Through Q2 2021

Includes seed, venture and private equity to venture-backed companies



crunchbase news

Aim to Double in 10 Years the Share of Innovation Turnover in Europe

1/09/21

- Innovate with the Climate Transition
 - Innovation should be Central to the Grand Green Transition
- Strengthen the Business - Research – Industry - Innovation Linkage
 - Anchor European Key Industries into Regional Development and Business
 - Support the Creation of Industry-University-Business RTOs as For Profit or Not for Profit Corporations via Horizon-type Calls - perhaps using EU Regional Development Funds
 - Encourage Regional Smart Specialization through Key Industries
 - Develop European Level SBIR/STTR (Small Business & Industry Research & Small Business Technology Transfer & Research) - the USA has SBIR/STTR programs funded by most Government Departments (Health, Commerce, DoD, ...) (perhaps via the EIF?)
 - Encourage Member States to Develop SBIR/STTR Programs (perhaps via the EIF?)
 - Encourage the needed Creation and Extension of European Venture Funds esp. at the second or third stage (via the EIB ?)

Double in 10 Years the Fraction of Innovation Turnover in Europe

1/09/21

- Strengthen the Innovation Potential of EU Universities
 - Fund 5000 Endowed Chairs for 5 Years at Universities and Research Institutes across the EU, each E250,000/Year chair being renewable once on the basis of achieved impact and innovation. This recommendation responds to the lack of Endowment in EU Universities.
 - Renew 50% of these chairholders one time, based on Innovation achievement and potential. This should be a long-term EU R&I Program, separate from ERC, Horizon , EIC, EIT, etc.
 - Fund a volume of 30,000 PhD Engineering/Applied Science Scholarships across Europe along the French CIFRE Model of University-Industry-Research. The program could be managed by the same agency as the Endowed Chairs. Note that CIFRE currently supports a volume of 3,500 PhDs
 - Support the Routine Creation of fully or Partially Owned For Profit Subsidiaries by Universities - via the EU Regional Funds?
 - Support « Dennis Gabor » Mobility fellowships to Individuals in Academic Organizations & RTOs who transition to SMEs and Large Enterprises, and Vice-Versa

Double in 10 Years the Fraction of Innovation Turnover in Europe

1/09/21

- Enhance the Innovation Outcome of Horizon and ERC Programs
 - Reduce the « paperwork » of Horizon and ERC Applications – 20 pages is better than 100 – Encourage Innovation and Reduce Bureaucracy. Reduce the Number of Distinct Deliverables in Horizon Programs – Encourage Greater Impact
 - Award Additional Grants for Development to TRL 8 and 9 to Selected High Impact Innovations emanating from the Horizon and ERC Programs - as an extension of Horizon, without the constraints of the X-Country, Y-Partner Model: these Innovations are can be identified by the Existing Innovation Radar and by specific expert analysis
 - Create a specific EU ARPA Type Program
 - Reward Innovative Horizon Projects with a One Year Demonstration & Market Focused Extension additionally funded for one year for the most successful partners
 - Encourage Horizon and ERC Projects to Sell or Licence Innovations and generate SMEs
 - Award « Dennis Gabor » Mobility Fellowships (to individuals) for moving from Horizon & ERC to other SMEs or Large Enterprises & Reciprocally from Industry and Business to Academia and RTOs