Co powinniśmy zrobić, aby skutecznie transferować technologię do gospodarki?

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Agencja Rozwoju Przemysłu SA

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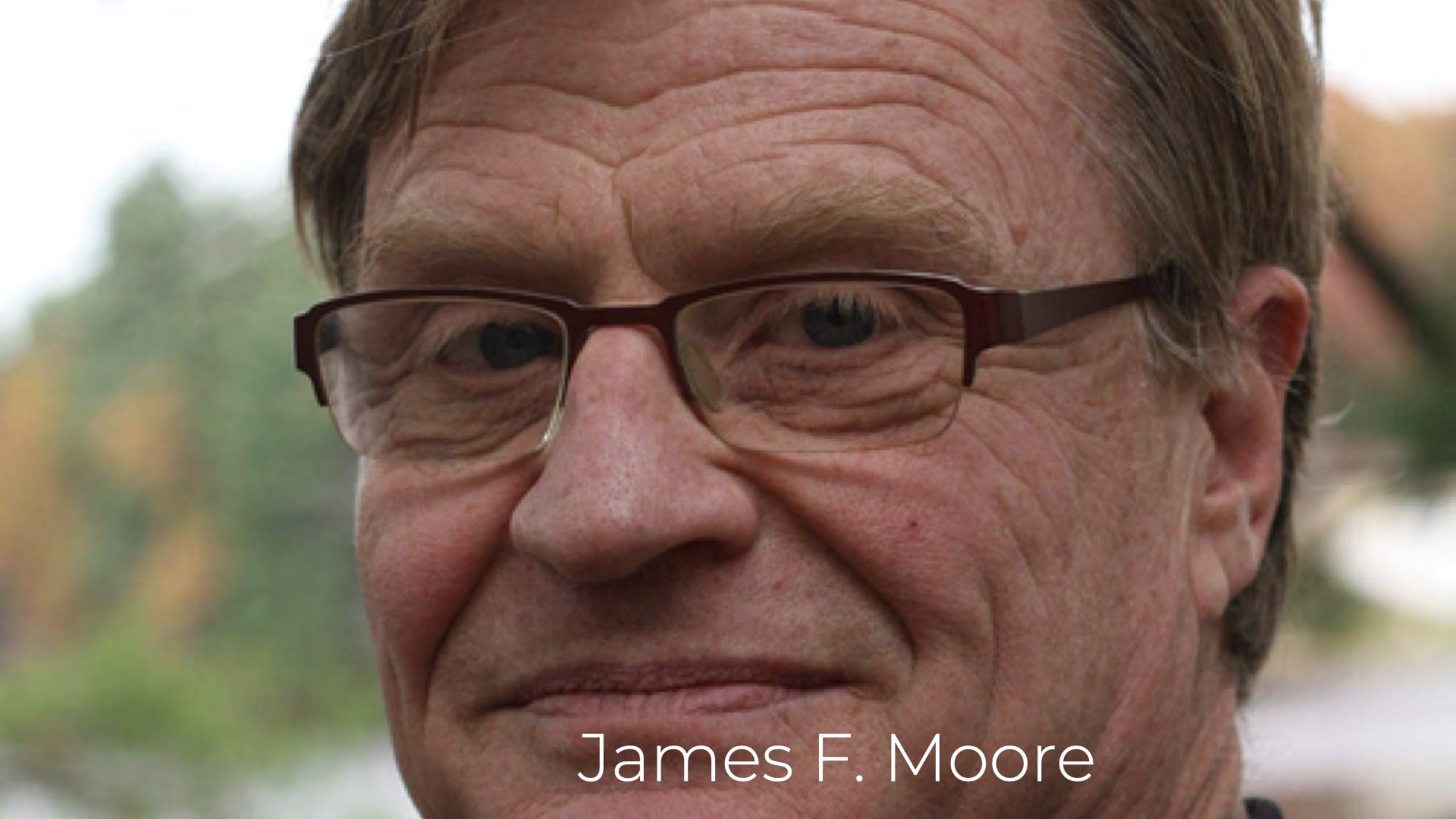
James F. Moore

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Predators and Prey:

A New Ecology of Competition

by James F. Moore

ECOLOGY OF COMPETITION

Another insight comes from biologist Stephen Jay Gould, who has observed that natural ecosystems sometimes collapse when environmental conditions change too radically. Dominant combinations of species may lose their leadership. New ecosystems then establish themselves, often with previously marginal plants and animals at the center. For current businesses dealing with the challenges of innovation, there are clear parallels and profound implications.

To extend a systematic approach to strategy, I suggest that a company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies co-evolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations.

For example, Apple Computer is the leader of an ecosystem that crosses at least four major industries: personal computers, consumer electronics, information, and communications. The Apple ecosystem encompasses an extended web of suppliers that includes Motorola and Sony and a large number of customers in various market segments.

Apple, IBM, Ford, Wal-Mart, and Merck have all been or still are the leaders of business ecosystems. While the center may shift over time, the role of the leader is valued by the rest of the community. Such leadership enables all ecosystem members to invest which they anticipate to maintain leadership, or incorporating new innovations to fend off obsolescence, executives must understand the stages that all business ecosystems pass through– and, more important, how to direct the changes.

A business ecosystem, like its biological counterpart, gradually moves from a random collection of elements to a more structured community. Think of a prairie grassland that is succeeded by stands of conifers, which in turn evolve into a more complex forest dominated by hardwoods. Business ecosystems condense out of the origin[illegible] of capital, cus[illegible]

observed the four sta[illegible] time, across busine[illegible] entertainment, and [illegible] mains the same fro[illegible] process of co-evol[illegible] between competiti[illegible] strategies (see the [illegible] of a Business Ecosy[illegible]

During Stage 1 [illegible] trepreneurs focu[illegible] wan), that is, the [illegible]

companies go head-to-head for market share. But events [illegible] icularly in high-technology [illegible] trate the limits of that un[illegible]

[illegible] ly sustainable [illegible] e competition.

[illegible] s must develop new ideas [illegible] g, tools for making tough [illegible] o innovations, business al[illegible] of customers and suppliers. [illegible] Bateson's definition of co[illegible] al and social systems pro[illegible]

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Automobiles: An Old-Fashioned Timelin[illegible]

An ecological approach can be used to analyze the evolution of any major business. However, a look at how the old-line automobile companies evolved reveals a different time scale than that of almost any new business today. Historically, the evolutionary stages of an established ecosystem like Ford's or GM's often took decades to play out; but now businesses can be born and die in a matter of years. Managers used to focus on directing the action within a particular stage rather than on how to move from one stage to another. Yet transition between stages has currently become a managerial fact of life.

The major U.S. automobile ecosystems took about three-quarters of a century to evolve, a phenomenal length of time compared with the rise and fall of high-tech businesses like personal computers. However, early automobile executives were well aware of the need to forge a community of suppliers and customers.

Birth of the Horseless Carriage. The late 1800s were a time of experimentation, as the first automobile pioneers struggled to grasp the potential of individual-ized, motorized transportation. Ransom E. Olds and a handful of others established viable automobile businesses by the turn of the century. Their machines worked reasonably well, were accepted by a small but dedicated number of customers, and could profitably produce.

Expansion Battles. The next 20 years carried the automobile business deep into the second stage of ecological competition. In 1904, William C. Durant began building what would become General Motors. Henry Ford founded the Ford Motor Company; and, in 1908, produced his mass-produced, mass-marketed Model T. Near-legendary battles between Ford and Durant–struggles as much for soul and future direction of the businesses for simple market share.

Durant's approach was based on vertical integration, engineered production, and product simplicity; by 1914, his company produced over [illegible] cars and held 48% of the market.

Ford's strategy for GM, however, was based on acquiring early companies, marketing might, sales and product variety. Durant's ecosystem had what we now would call "[illegible]ty": by 1914, his company produced over [illegible] of the production facilities of a variety of companies. However, by 1920, General Motors had nearly collapsed because of the inability of its management systems to control such a complex ecosystem of business entities.

From 1910 to 1930, industry leaders directed the evolution of the automobile market, reconfiguring the ecosystems in the process. Alfred P. Sloan's design for General Motors, [illegible] most notable and involved the simul[illegible] Durant. Sloan's design specifically [illegible] management of a complex business [illegible] breaking up the diverse company into [illegible] which, in turn, could be focused like f[illegible] duced lines. Sloan also centralized financ[illegible] prototype of the modern multidivisional or[illegible] of decentralized product lines, and GM [illegible]

Community Leadership. By the 1930s, [illegible] community leadership and bargaining power [illegible] around the principal supplier to the auto ind[illegible] bor. In the late 1930s, around 500,000 people [illegible] in the Detroit area car factories. Working con[illegible] were dangerous; one auto body plant was know[illegible] "the slaughterhouse." But by the mid–1930s, the [illegible] ed Auto Workers Union had formed. In 1937, the U[illegible] achieved a landmark victory when GM recognized [illegible] union as an official representative of its employees.

Over time, organized labor brought workers crucial [illegible] bargaining power, which the union used to force the [illegible] companies to share the spoils of victory. The tug-of-war between workers and companies continued for [illegible] decades, mediated with varying effectiveness by the U.S. government. While it protected workers, this [illegible] form of ecosystem struggle also carried with it high [illegible] costs: work-rule rigidity and the polarization of work[illegible] ers and management. These costs would come back to haunt the U.S. automobile business in the next stage [illegible] of ecosystem development.

The Threat of Obsolescence. Labor–management [illegible] struggles continued into the 1970s, until both sides were driven together by a much deeper crisis: the obsolescence of the management approaches, business practices, and systems of production that had been co[illegible] ly incrementally improved since the 1920s. The near [illegible] collapse of the U.S. automobile business came, of course, at the hands of the Japanese. The Toyota ecosystem, for one, was capable of unheard-of levels of product variety, quality, and efficiency at the time. This powerful new business ecosystem was based on a combination of customer–focused design, concurrent engineering, flexible manufacturing, dedicated workers, and networks of suppliers, all tied together through statistically refined management practices. Therefore, the automobile industry, as traditionally defined, found itself in a full–fledged ecological war, defending against a new wave of business ecosystems. Self–renewal proved difficult, and companies like Ford and Chrysler had nearly collapsed by the late 1970s. The superiority of Japanese approaches ultimately forced the transformation of the [illegible] business into what we [illegible]

ECOLOGY OF COMPETITION

based on supplying machines to meet demand in the IBM ecosystem.

IBM did its best to keep up with demand. In the early 1980s, it invested directly in several key suppliers to help it grow fast enough to meet the market. Intel, for example, received $250 million from IBM in 1983. Concerned about its image as an insensitive behemoth, as well as possible antitrust objections, IBM managers carefully assured these suppliers that the help came without any strings attached.

IBM's relationships with suppliers were basically nonexclusive. Obviously, suppliers like Intel, Microsoft, and Lotus were happy to help the successo[illegible] Compaq and others because it allowed them to di[illegible] versify the risk of overdependence on IBM. For h[illegible] part, IBM was flush with more demand and succes[illegible] than it knew what to do with. Top managers didn[illegible] focus on slowing the development of clone make[illegible] and nonexclusive suppliers–or keeping crucial el[illegible] ments of value like the microprocessor in–hous[illegible] At first, IBM didn't attack new competitors with[illegible] its ecosystem through the courts, through spec[illegible] promotions, or by lowering its own prices.

However, clear the threat from the rest of the pack appears to us now, at the time, IBM and its business partners were pleased. By 1986, the combined revenues of companies in the IBM ecosystem were approximately $12 billion, dwarfing the Apple ecosystem's revenues of approximately $2 billion. IBM's leadership also forced Tandy and essentially every other non–Apple maker of personal computers to dump their proprietary designs and offer IBM PC compatibles.

In contrast with IBM, the story of Wal–Mart's falling ecosystem shows how top managemen[illegible] take the right precautions when a business [illegible] panding (see the insert "The Evolution of Wal–Mart: Savvy Expansion and Leadership"). In [illegible] al, Stage 2 rewards fast expansion that squ[illegible] competing ecosystems to the margin. But mar[illegible] must also prepare for future leadership and les[illegible] in the next stage. To do so, companies m[illegible] maintain careful control of customer relatio[illegible] and core centers of value and innovation. Mo[illegible] they must develop relationships with their [illegible]

ers that constrain these followers from becoming leaders in Stage 3.

While the lion and antelope are both part of a healthy savanna ecosystem, they also struggle with each other to determine to what extent each species expands within it. Simi[illegible] in business ecosystems, two conditions con[illegible]

ECOLOGY OF COMPETITION

writers and editors–by storm. Demand for CP/M machines soared, fueling the growth if not the fortunes of small companies like Morrow and Kayproto.

But during the first stage of any business ecosystem, co–evolving companies must do more than satisfy customers; a leader must also emerge to initiate a process of rapid, ongoing improvement that draws the entire community toward a grander future. In the Apple and Tandy ecosystems, the hardware companies provided such leadership by studying the market, defining new generations of functionality, and orchestrating suppliers and partners to bring improvements to market. In the CP/M ecosystem, however, the hardware companies were bedeviled by rivalry among themselves. Infighting kept down prices and profit margins, and none of the CP/M companies could afford heavy advertising programs.

In Stage 1, established companies like IBM are often better off waiting and watching carefully as a new market sorts itself out. The iterative process of trying out innovative ideas and discovering which solutions are attractive to customers is hard to accomplish in a traditional corporate culture. And the diverse experimentation that thrives in an entrepreneurial scene provides more "genetic diversity" from which the market can ultimately select the fittest offering.

Established companies can subsequently replicate successful ideas and broadcast them across a wider market. In other words, they can enter the market at Stage 2 by appropriating the developmental work of others. Meanwhile, original ecosystems that succeed, like Apple's, do so by consciously nurturing a full community of partners and suppliers right from the start.

In Stage 2, business ecosystems expand to conquer broad new territories. Just as grasses and weeds rapidly cover the bare, scorched ground [illegible] forest fire, some business expansions [illegible]

In the end, one business ecosystem may triumph, or rival ecosystems may reach semistable accommodations. Think of a hardwood forest that borders a grassland. The zone of conflict at the boundary may shift from year to year, but it never completely wipes out either ecosystem.

In general, two conditions are necessary for Stage 2 expansion: (1) a business concept that a large number of customers will value; and (2) the potential to scale up the concept to reach this broad market. During the expansion stage, established companies can exercise enormous power in marketing and sales, as well as in the management of large–scale production and distribution, literally crushing smaller ecosystems in the process.

IBM, for example, entered the personal computer business in 1981. In contrast to its own history and culture of vertical integration, IBM followed and extended the Apple model of building a community of supporters. IBM took on partners and opened its computer architecture to outside suppliers. Moreover, it adopted a microprocessor from Intel that incorporated all of the instructions available in the Zilog microprocessor in Tandy and CP/M machines. And IBM licensed MS–DOS, a software operating system from then tiny Microsoft, which was almost a near clone of CP/M. As a result, Wordstar and other popular application programs could easily be ported over to the IBM PC.

One of the most important managerial challenges in Stage 2 is to stimulate market demand without greatly exceeding your ability to meet it. IBM certainly stimulated demand for its new machine through a combination of heavy brand advertising, distribution through Sears and other channels, and building its own network of specialty stores. By anyone's measure, IBM's approach to expanding its PC ecosystem was a major success. Its personal computing business grew from $500 million in 1982 to $5.65 billion by 1986, and IBM's ecosystem rapidly dominated the market.

However, IBM also generated much more de[illegible] [illegible] could meet. The company maintained [illegible] to enter the

sorts was achieved in 1989 [illegible] and product shipments from [illegible] es bypassed those of major [illegible] ufacturers. Thus IBM was [illegible] lead–on with myriad "box [illegible] ned a large share of the [illegible] offering extensive dis[illegible] thwers.

in addition, central companies reinforce their roles by making important innovative contributions to the performance of the ecosystem as a whole. Intel, for instance, has enormous scale advantages in the fabrication of microprocessors. Its chip volumes allow it to work out fabrication–process advances sooner than other chip vendors. Ironically, IBM held a license to manufacture Intel–designed microprocessors. With its large volumes during the expansion stage, IBM could have been the one taking the fabrication and price/performance lead in chips–and it could have denied Intel the scale to keep up.

Finally, followers value a central contributor because of its grip on customers. End users are drawn to Microsoft operating systems and Intel chips because so many software applications are available for them. In turn, developers keep turning out such applications because they know Microsoft and Intel are customer gateways.

To some extent, these two companies achieved their current central position by being in the right place at the right time– that is, by serving IBM. Intel and Microsoft clearly appreciate what they have now and are working effectively to maintain their central contributions. Still, some companies like Wal–Mart have systematically gone about building a strong ecosystem, one that guarantees a leading role for themselves.

In any case, for dominant companies, the expansion and leadership stages of an ecosystem can make or break them. In Stage 3, lead producers must extend control by continuing to shape future directions and the investments of key customers and suppliers. And for healthy profits, any company in the ecosystem–leader or follower– must maintain bargaining power over other members.

Stage 4 of a business ecosystem occurs when mature business communities are threatened by rising new ecosystems and [illegible]

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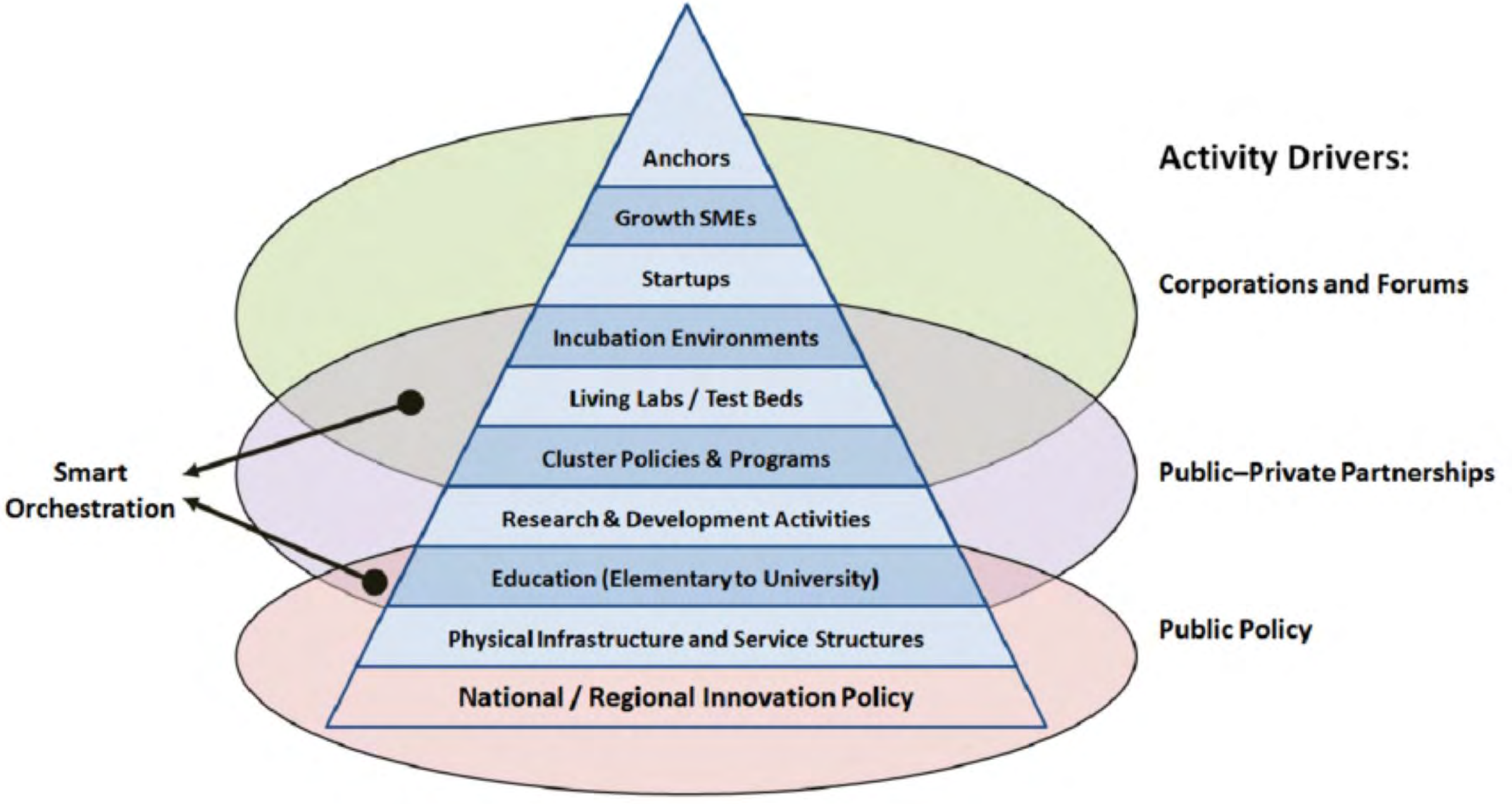
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Startups
Incubation Environments
Living Labs / Test Beds
Cluster Policies & Programs
Research & Development Activities
Education (Elementary to University)
Physical Infrastructure and Service Structures
National / Regional Innovation Policy
Smart Orchestration
Activity Drivers:
Corporations and Forums
Public–Private Partnerships
Public Policy

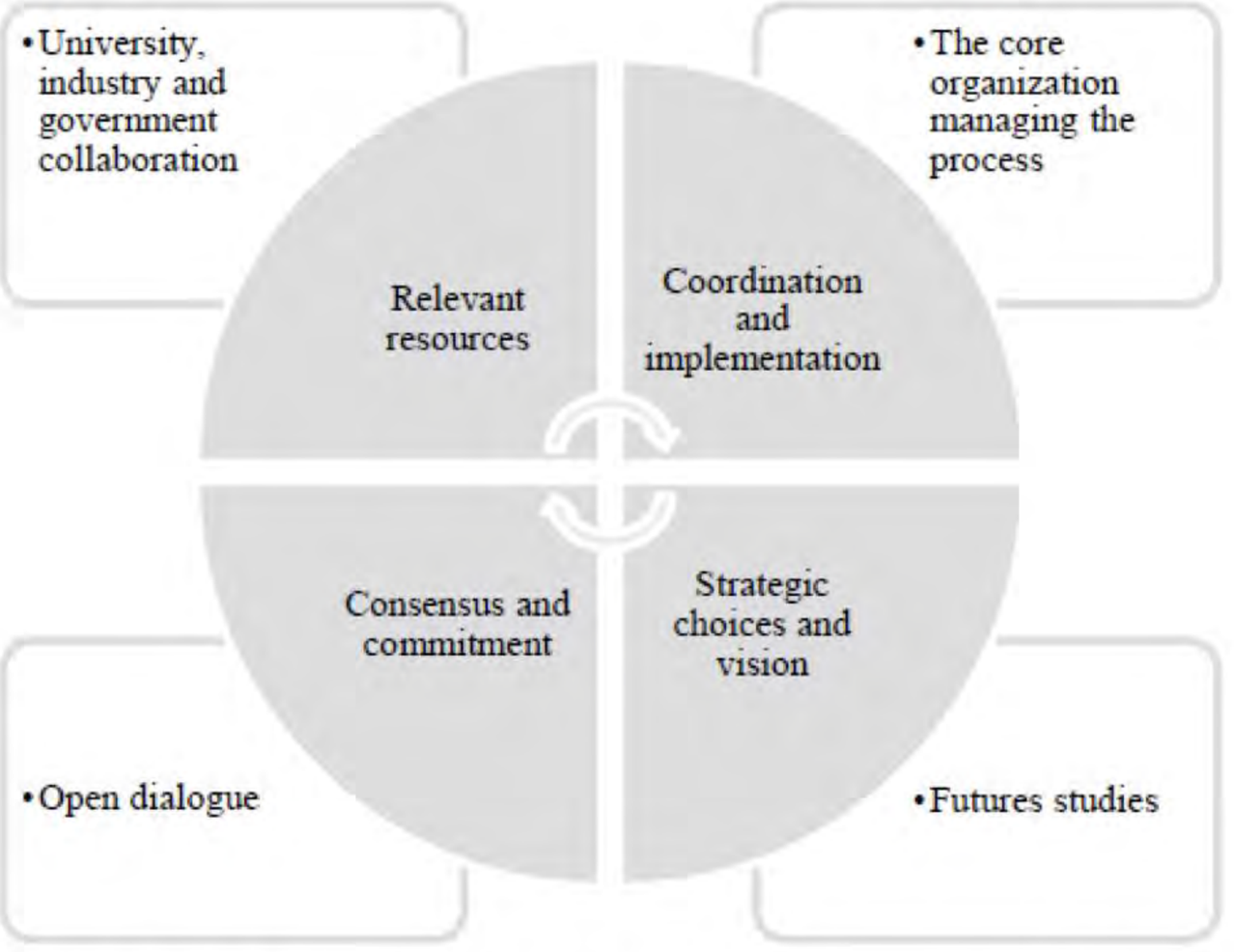

Fig. 1 – *Model for building innovation ecosystems.* (Credits: Oksanen and Hautamäki, 2014)

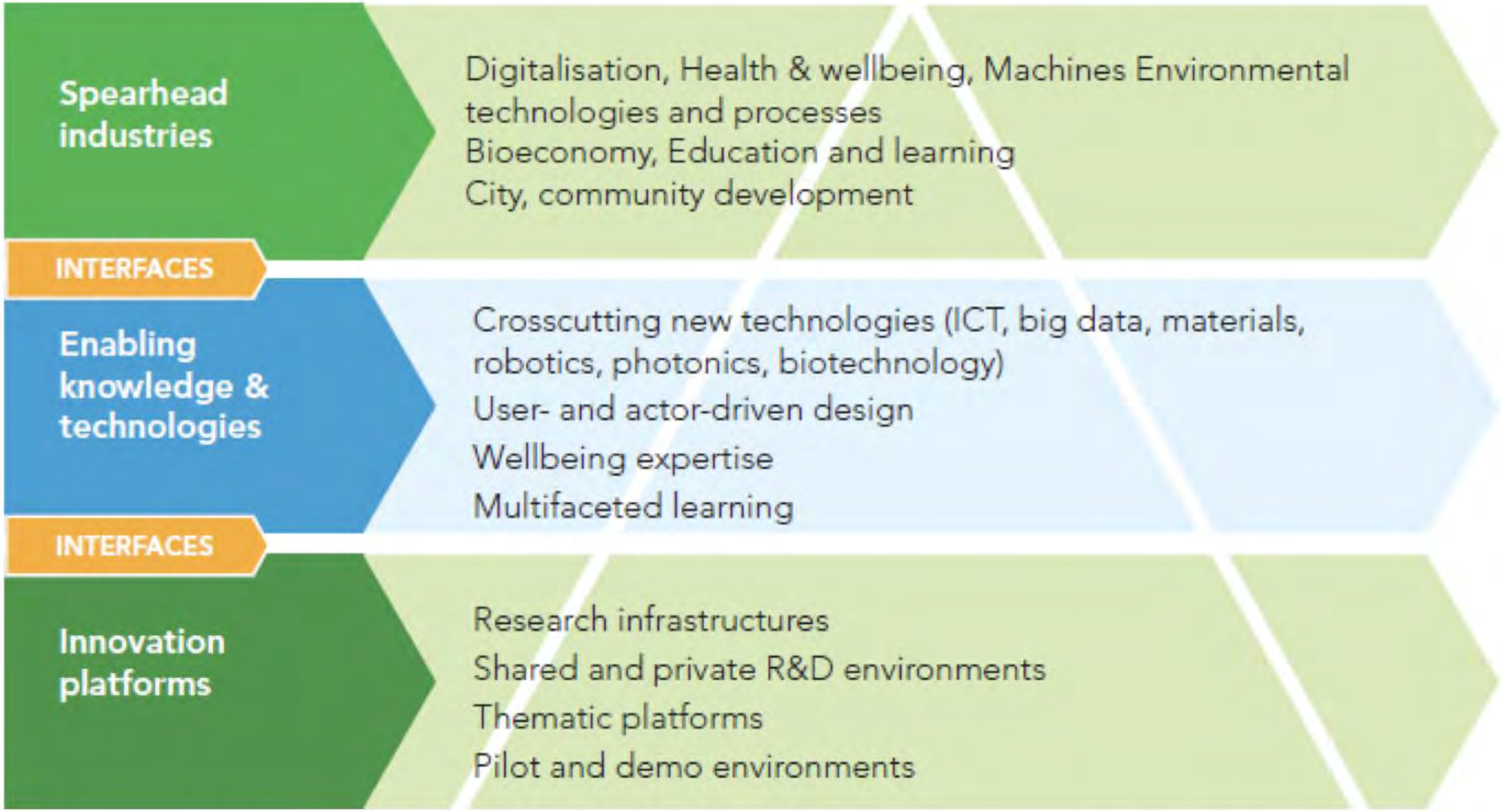

Fig. 4 – Helsinki-Uusimaa RIS3 concept based on systemic orchestration of all key innovation actors (Credits: Heiniemi-Pukkinen, 2015)

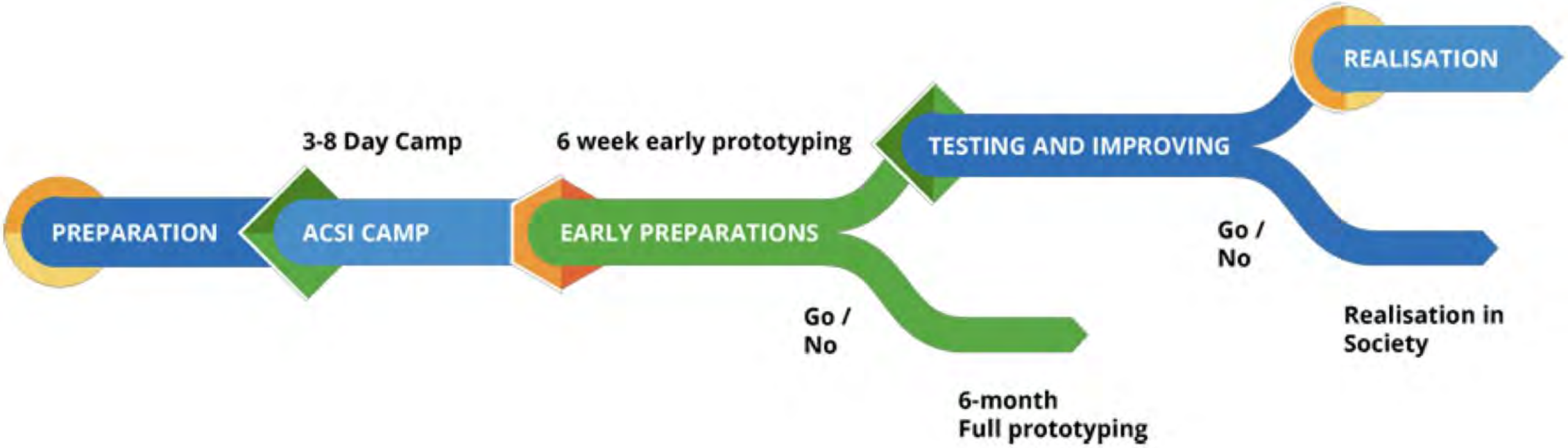

Fig. 5 – *ACSI challenge-to-rapid-prototyping methodology* (Credits: ACSI ESPOO 2015)[52]

Incubators and accelerators
Commission for Technology and Innovation
Grant givers and investors
Swiss start-up support system
Co-Working spaces
Universities and Tech Transfer Offices
Tech parks

MICROCITY NEUCHÂTEL

Microtechnology
Advanced manufacturing
Future of photovoltaics

CSEM UNINE Hes·so

BLUE FACTORY FRIBOURG

Smart building
Sustainable architecture
Smart living

UNIFR Hes·so

EPFL INNOVATION PARK LAUSANNE

Health and Life Science
Computer and computational science
Energy, natural resources and environment
Mobility and transportation
Manufacturing and materials

Unil CHUV Hes·so

EPFL

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Affective Sciences

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ENERGYPOLIS SION

Energy management
Green chemistry
Renewable Energy

Hes·so

COMPUTER AND COMPUTATIONAL SCIENCE

Data security (for example blockchain), data analytics, artificial intelligence, storage technologies, the Internet of Things (IoT), smart sensors, cloud computing, bioinformatics

ENERGY, NATURAL RESOURCES AND ENVIRONMENT

Energy storage, smart grids, power generation, smart building/living, energy/resource efficiency, green chemistry, alternative energy sources

HEALTH AND LIFE SCIENCES

Drug discovery and design, precision/personalized medicine, medtech, biotech, diagnostics, biomedical engineering, nutrition, human physiology

MATERIALS AND MANUFACTURING

Robotics, automation, industry 4.0, advanced manufacturing, accelerator technology, nondestructive testing, new materials, nanotechnology, microelectronics

MOBILITY AND TRANSPORTATION

Aviation and space, autonomous driving, avionics and drones, electric mobility and batteries, traffic planning and transport systems, mobility infrastructure.

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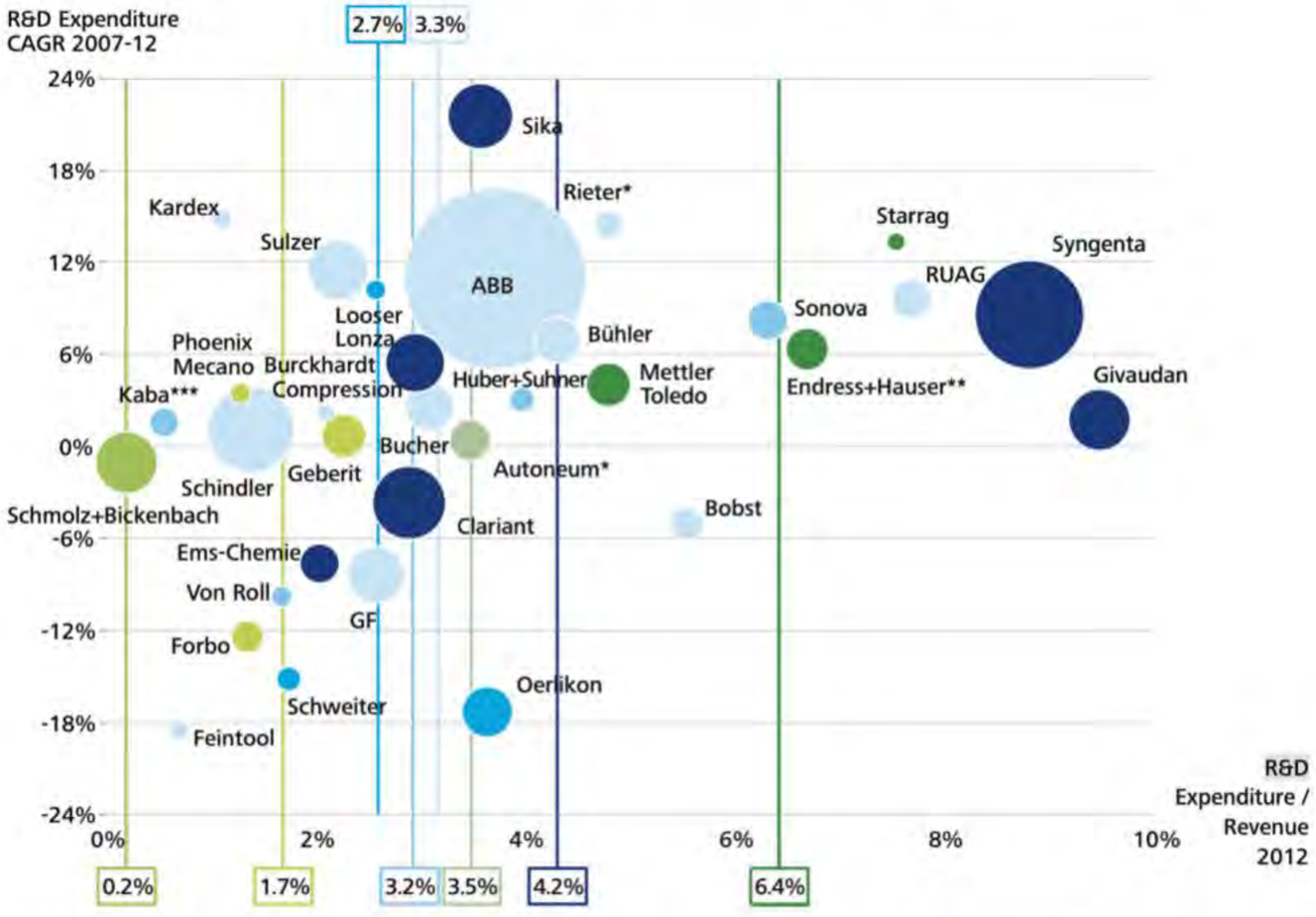
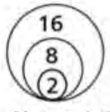
Overview of Innovation Areas

INNOVATION AREAS

INNOVATION AREA	LIFE SCIENCES									ENERGY							INDUSTRY 4.0							MATERIALS					INFORMATION AND COMMUNICATION TECHNOLOGY							TRANSPORTS AND MOBILITY					ENABLING TECHNOLOGIES				
INNOVATION FOCUS	Medtech	Biotech	Health	Sport	Medicine	Radiology	Pharmaceuticals	Diagnostics	Biomedical Engineering	Power Generation	Storage	Transportation	Smart Building	Green Energy	Energy Efficiency	Decommissioning of NPP	3D Technologies	Robotics	Additive Manufacturing	Sensors	Microtechnology	Automation	Lasers	Analytics	Advanced Materials	Extreme Environments	Radiography	Surface Technology	Computer Science	Security	Smart Data	Networks	Social Media	Artificial Intelligence	Cloud Computing	Automotive	Space	Avionics	Drive Technology	Public Transportation	Smart Living	Essential Technologies	Nanotechnology	Accelerator Technology	Optics
PARK BASEL AREA	●	●	●		●	●	●	●	●								●	●	●	●			●		●		●	●	●		●			●									●		●
PARK INNOVAARE	●	●			●	●	●	●		●	●			●	●	●	●			●	●		●	●	●	●	●	●						●		●	●						●	●	●
PARK ZURICH	●		●	●	●	●		●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
PARK BIEL/BIENNE	●		●	●	●			●	●	●	●				●		●	●	●	●	●	●	●		●			●	●	●	●	●				●	●		●	●					●
PARK NETWORK WEST EPFL	●	●	●	●	●		●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●		●		●	●	●	●	●		●

Chart 4. Growth rates and R&D expenditure as a percentage of revenue in leading Swiss industrial companies[4]
[2012, CAGR 2007-12]





Bubble size: **Revenue, 2012 (in billions of CHF)**

= Mechanical engineering (Ø = 3.3%)
= Electrical eng./Electronics (Ø = 3.2%)
= Conglomerate (Ø = 2.7%)
= Chemicals (Ø = 4.2%; without Syngenta)
= Precision instruments (Ø = 6.4%)
= Metals (Ø = 0.2%)
= Industrial applications (Ø = 1.7%)
= Automotive suppliers (Ø = 3.5%)

Notes: * CAGR 2010-2012;
** CAGR 2008-2012;
*** 2011 and CAGR 2006-2011 figures.

Chart 7. Unused potential for innovation[7]

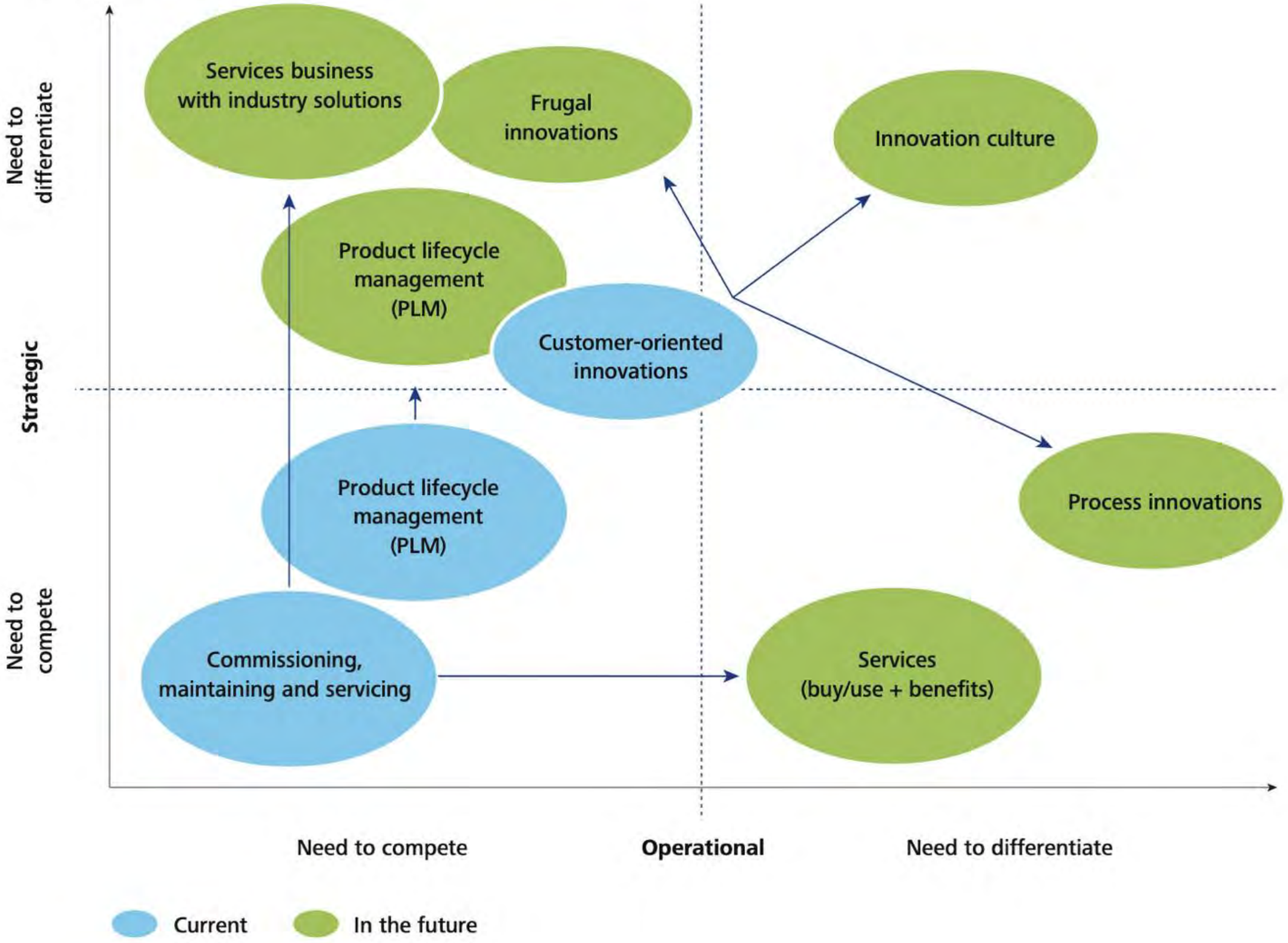


Chart 9. Global operating models for R&D and the challenges they involve[8]

Decision-Making Structure (DMS)	Independent WF Performed by standalone locations	Sequenced WF Hands off from one location to another	Integrated WF Locations collaborate within single phase
Centralised DMS Managed by centralised group	Creates challenges in aligning authority with responsibility	Limits the independence of regions to perform their work	Allows organisation to manage coordination problems that arise between regions and head office
Shared DMS Managed by head office and regions	Supports effective decision-making and provides independence to the regions	Establishes balance in decision-making between the regions and head office	Provides disruption in workflow if different regions have alternate solutions
Decentralised DMS Managed by regional centers	Creates challenge in the regions to comply with the overall organisational strategy	Causes barriers in the regions to follow the overall business strategy	Causes coordination challenges among the various regions

Workflow (WF)

Process optimisation within the agency
Improved quality of service
Data protection
Data security
Improved efficiency of administrative procedures
Cost savings

KEY MILESTONES FOR STRATEGIC NATIONAL PROJECTS

Smart Nation SINGAPORE

	2019	2020	2021 and Beyond
National Digital Identity (NDI)	More features for SingPass Mobile (SPM) MyInfo for 145 Govt and 155 private sector services Pilots to simplify corporate submissions to Govt with Authorise In-person identity verification with Verify	1 million SPM users (1H 2020) Digital signing trials (2H 2020) Biometrics-enabled login (1H 2020) Launch of MyInfo Business (2H 2020) SingPass Login extended to private sector, available at 20 entities (1H 2020) Launch of API Marketplace (2H 2020)	Widespread adoption of NDI (2022) Digital identity for cross-border transactions 3 million SPM users
E-Payments	Bank cards for public transport 54,000 unified point-of-sale terminals deployed 75,000 SGQR labels distributed	Payment Services Act commences (1H 2020) Non-bank FAST access (2H 2020)	E-payment option for all payments to and from Govt (2023) No more cheques (2025 and beyond)
Moments of Life (MOL)	Services for families with young children expanded Launch of Parents Gateway Active Ageing features for seniors introduced Electronic birth registrations for private hospitals	Brand refresh with new look and additional services (2H 2020) Services for Singaporeans travelling and living overseas (2H 2020) More support for working adults e.g. seeking employment (2H 2020)	More personalised services to benefit more Singaporeans
GoBusiness	Streamline processes to help F&B businesses apply for the licences they need	GoBusiness to expand to other industry sectors e.g. retail sector More services for businesses on GoBusiness platform e.g. Advice on suitable Govt grants, info and tools on starting a business	Further streamlining and improving Govt services for businesses
Core Operations, Development Environment, and eXchange (CODEX)	Migration of Govt systems to cloud Trial of developer-friendly tools and APIs Central repositories to facilitate inter-agency data sharing to improve services	Cross-agency sharing of core data sets within 7 working days (2H 2020)	Majority of eligible Govt systems on commercial cloud (2023)
Smart Nation Sensor Platform (SNSP)	Lamppost-as-a-Platform trial (LaaP) Central tools to facilitate sensor deployment	Progressive deployment of Personal Alert Buttons benefitting 10,100 elderly households in 53 HDB rental blocks Deployment of LaaP in Punggol	City-level sensor data available for industry and public (2022) Computer Vision Drowning Detection System (CVDDS) at 27 swimming complexes Smart Utility Meters roll-out (2024)
Smart and Sustainable Punggol	Singapore Institute of Technology (SIT) and Punggol Digital District (PDD) groundbreaking	Completion of smart HDB homes for better monitoring of energy consumption Progressive deployment of smart estate services in Punggol Northshore	Punggol Regional Sport Centre: Virtual coaching, augmented reality gamification, seamless facilities booking (2023) Open Digital Platform to integrate smart technologies and promote data-sharing (2023) Smart grid solutions to reduce carbon emissions (2023) Smart Facilities Management for predictive maintenance (2023)
Smart Urban Mobility	Trial of hands-free ticketing technology Trials of autonomous buses and shuttles	Expansion of hands-free ticketing technology trial	Pilot deployment of Autonomous buses and shuttles Progressive deployment of next-generation smart traffic light control system

SMART, TANGIBLE BENEFITS FOR CITIZENS AND BUSINESSES

Smart Nation SINGAPORE

Networked Trade Platform
- 3,500+ businesses benefit from a **one-stop ecosystem** to access Customs and TradeNet e-services

GoBusiness
- 460+ F&B companies enjoy **ease of applying for business licences**
- **Simpler, faster and better processes** that result in **$500 cost savings** for businesses

MyInfo Business
- 260,000+ businesses enjoy **convenience of pre-filled forms**
- 20,000+ B2B transactions in 2019

MyInfo
- 110,000+ daily transactions with **verified info pre-filled** for users at each transaction
- 460 government and commercial digital services on-boarded to date, **cutting application time by 80%** for users
- **Savings of up to $50** per transaction, and **80% reduction in transaction time** for businesses

PayNow
- 3.2 million* registered mobile and NRIC registrations for **instant funds transfers**
- 137,000* UEN registrations by companies for **instant funds transfers**
- 71 million PayNow transactions in 2019

**As of Dec 2019*

SingPass Mobile
- Almost 1 million users seamlessly logging in **without the need for passwords**

National Digital Identity (NDI) APIs
- More businesses leveraging on NDI APIs to **build better services** for their customers and **streamline business processes**

MyCareersFuture.sg portal
- **Personalised job recommendations** aided by machine learning for 540,000+ unique users

Moments of Life (MOL)
120,000+ app downloads with **personalised services for citizens** (as of Jan 2020)

DigiMC
- 400,000+ digital MCs issued (as of Feb 2020), for **convenient MC retrieval and routing to employers**
- Progressive roll out to private healthcare sector from 1H 2020

MOL Families:
- **Time** needed for birth registration, application for Baby Bonus, and NLB membership **cut by 3x**
- 18,000+ births e-registered **without physical queues and manual form-filling** since 2018

Wireless Alert Alarm System (Wireless AAS)
- Progressive deployment of Personal Alert Buttons **benefitting 10,100 elderly households** in 53 HDB rental blocks

Healthy 365
- 2.25 million+ downloads (as of Dec 2019)
- 830,000+ new sign-ups coinciding with season 5 of National Steps Challenge™ (as of Dec 2019)

MOL Active Ageing:
- MOL enhanced to include **services and info for seniors to encourage active ageing**. Includes access to Merdeka Generation Package e-cards and info on government benefits tailored for seniors
- Content generates hits averaging 37,000 times per month

myResponder
- **Quick medical intervention has saved 20 lives** to date
- About 70,000 sign-ups to be first responders
- 3,500 active community first responders who **arrive on scene before SCDF**

Benefits for citizens and community

Benefits for businesses

Exhibit 2: Global Innovation Network, 2007-2016

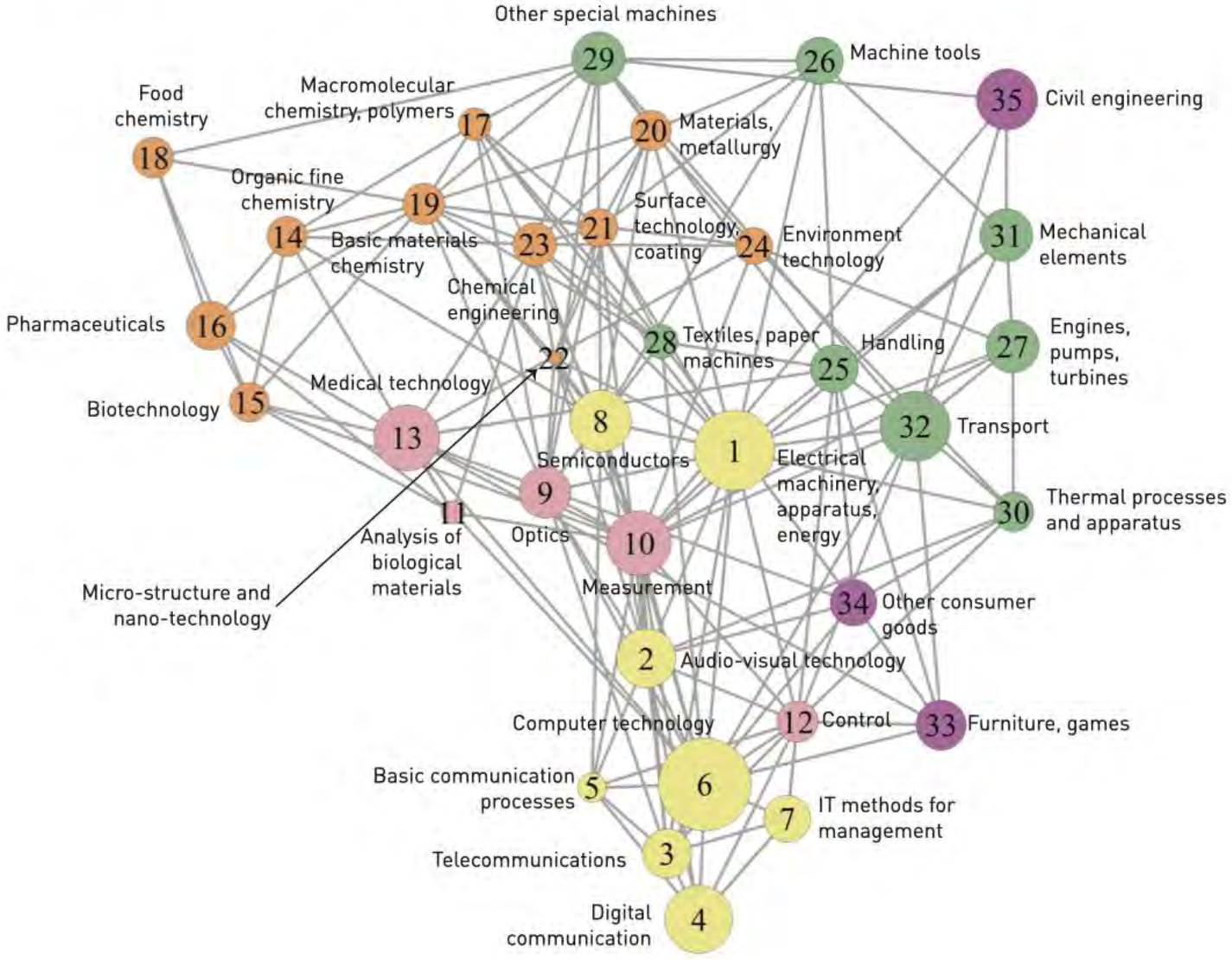
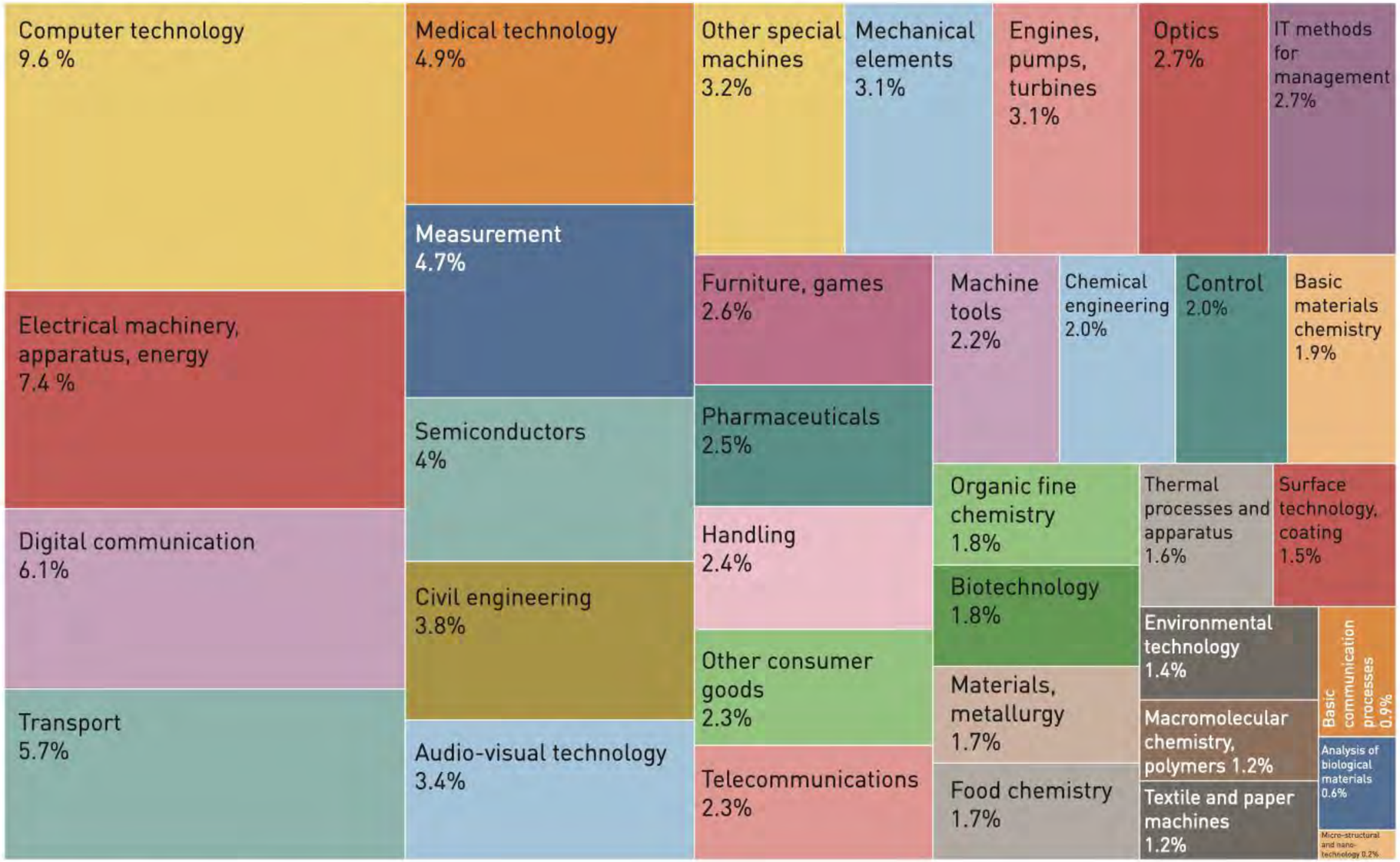


Exhibit 5: Share of Patenting Activity in the World, 2012-2016



Source: PATSTAT, Authors' estimates

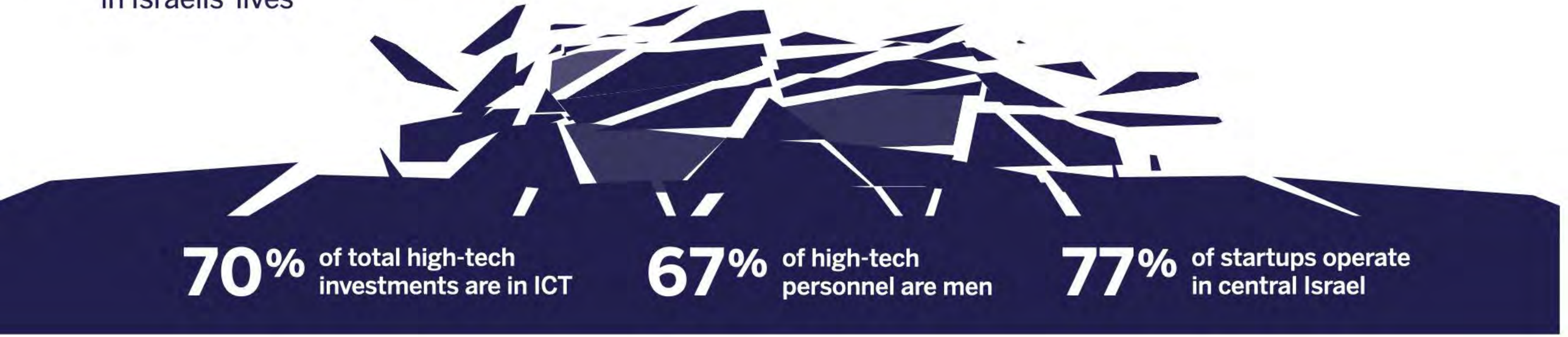
Israeli Innovation Must Break New Ground

Technological aspect
Leading with future technologies, primarily AI

Geographical aspect
Developing an innovation-based economy in the periphery

Sectorial aspect
Developing a personalized medicine ecosystem

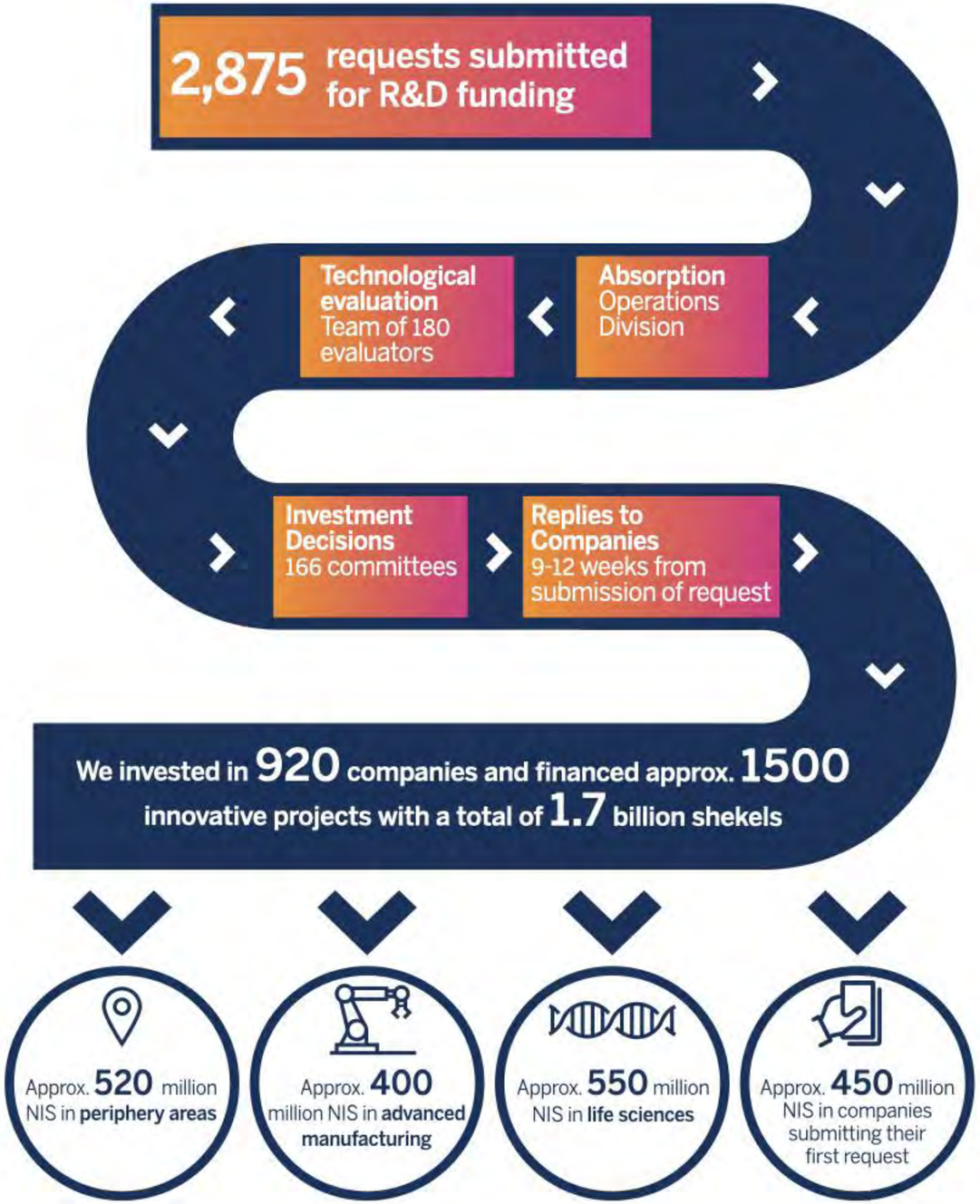
Depth aspect
Assimilating technology in Israelis' lives



70% of total high-tech investments are in ICT

67% of high-tech personnel are men

77% of startups operate in central Israel


2,875 requests submitted for R&D funding
Absorption Operations Division
Technological evaluation Team of 180 evaluators
Replies to Companies 9-12 weeks from submission of request
Investment Decisions 166 committees
We invested in 920 companies and financed approx. 1500 innovative projects with a total of 1.7 billion shekels
Approx. 520 million NIS in periphery areas
Approx. 400 million NIS in advanced manufacturing
Approx. 550 million NIS in life sciences
Approx. 450 million NIS in companies submitting their first request

To ensure sustainable **technological leadership** in the high-tech industry

- Advancement of Israeli leadership in **future technologies**
- Assistance to ground-breaking startup companies to reach a **fundable milestone**
- Accelerating development of **new ecosystems and communities**
- Integration of efforts to increase the **supply of skilled human capital** to high-tech

To increase the **economic impact** of high-tech companies

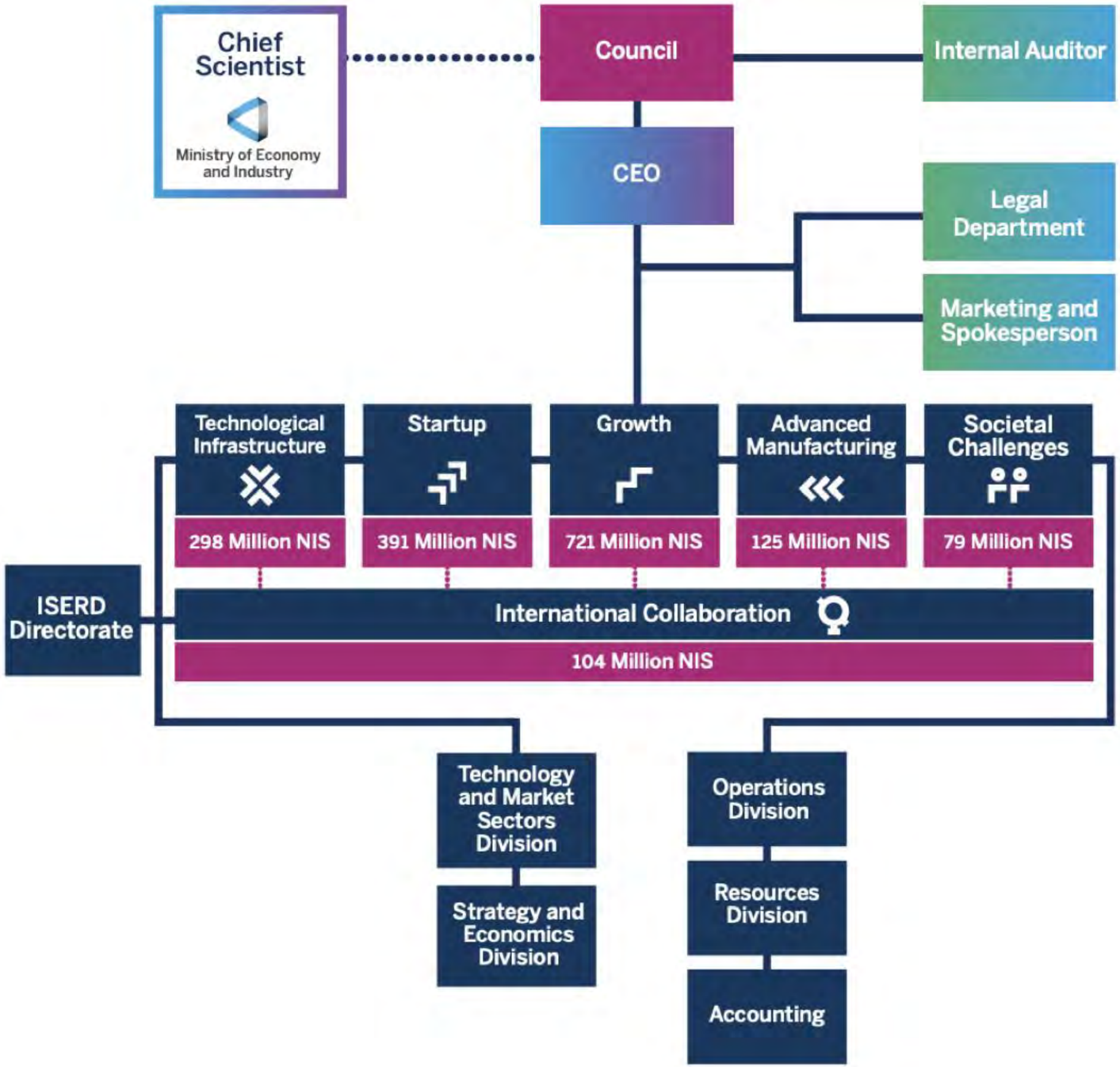
- Supporting the **growth of complete technology companies** in Israel
- Increasing the economic impact of **multi-national corporations'** R&D centers

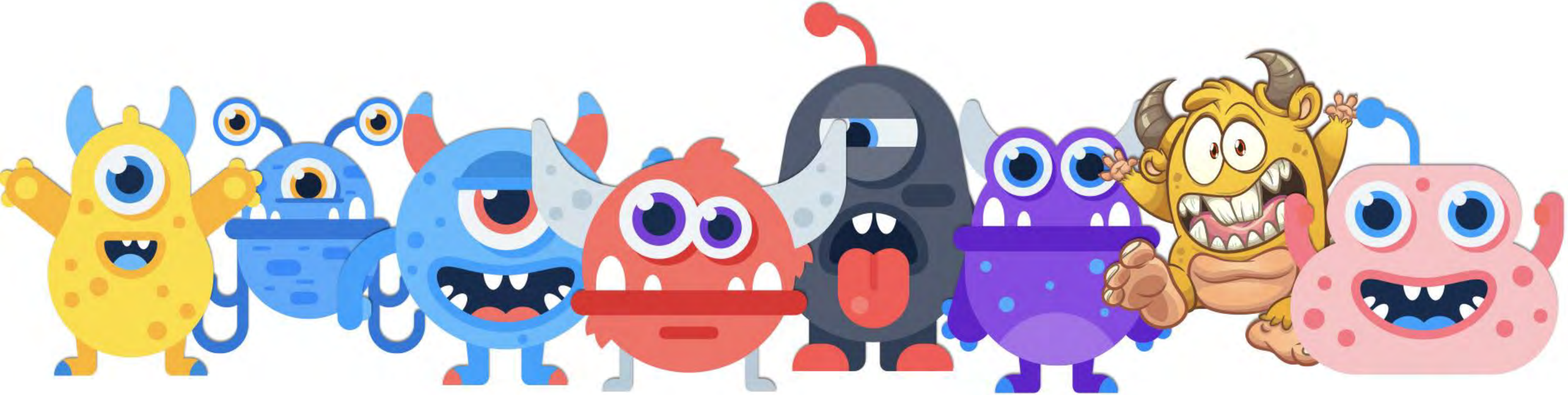
To support technological innovation aimed at strengthening **competitiveness and productivity** in the business sector

- Supporting competitiveness via R&D in the **manufacturing industry**
- Increasing productivity via technological innovation in the **entire business sector**

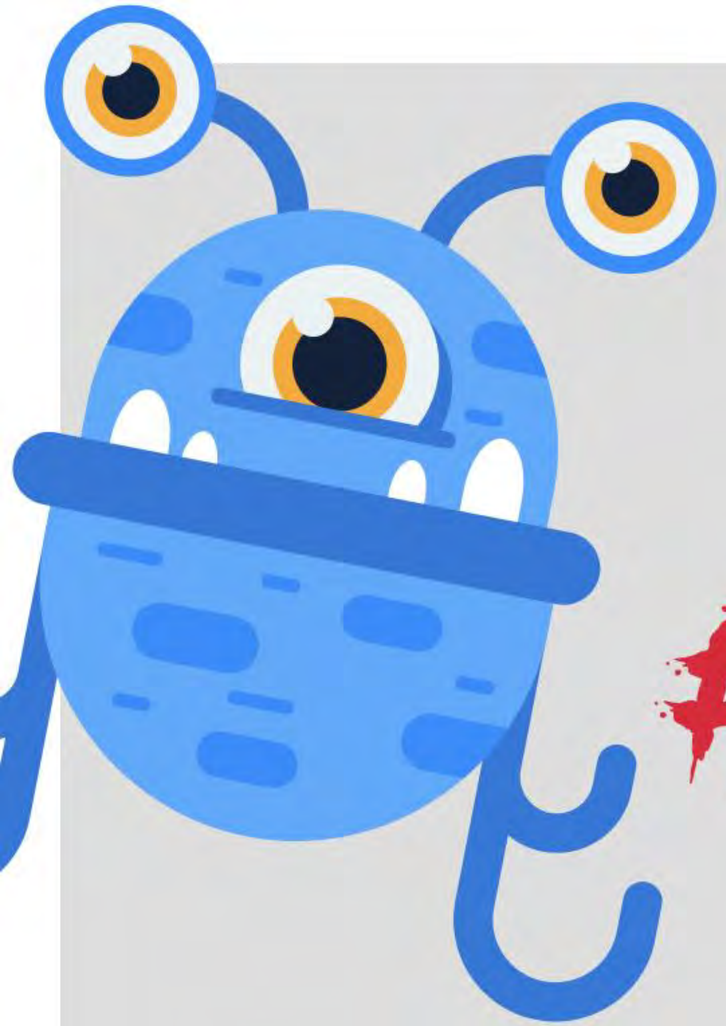
To promote technological innovation with **social and economic** return

- Promoting and positioning Israel as an Impact Innovation Nation that produces innovative technological solutions for **societal challenges.**
- Promoting **technological innovation in the periphery** in order to fully utilize innovation potential throughout Israel and to increase regional productivity

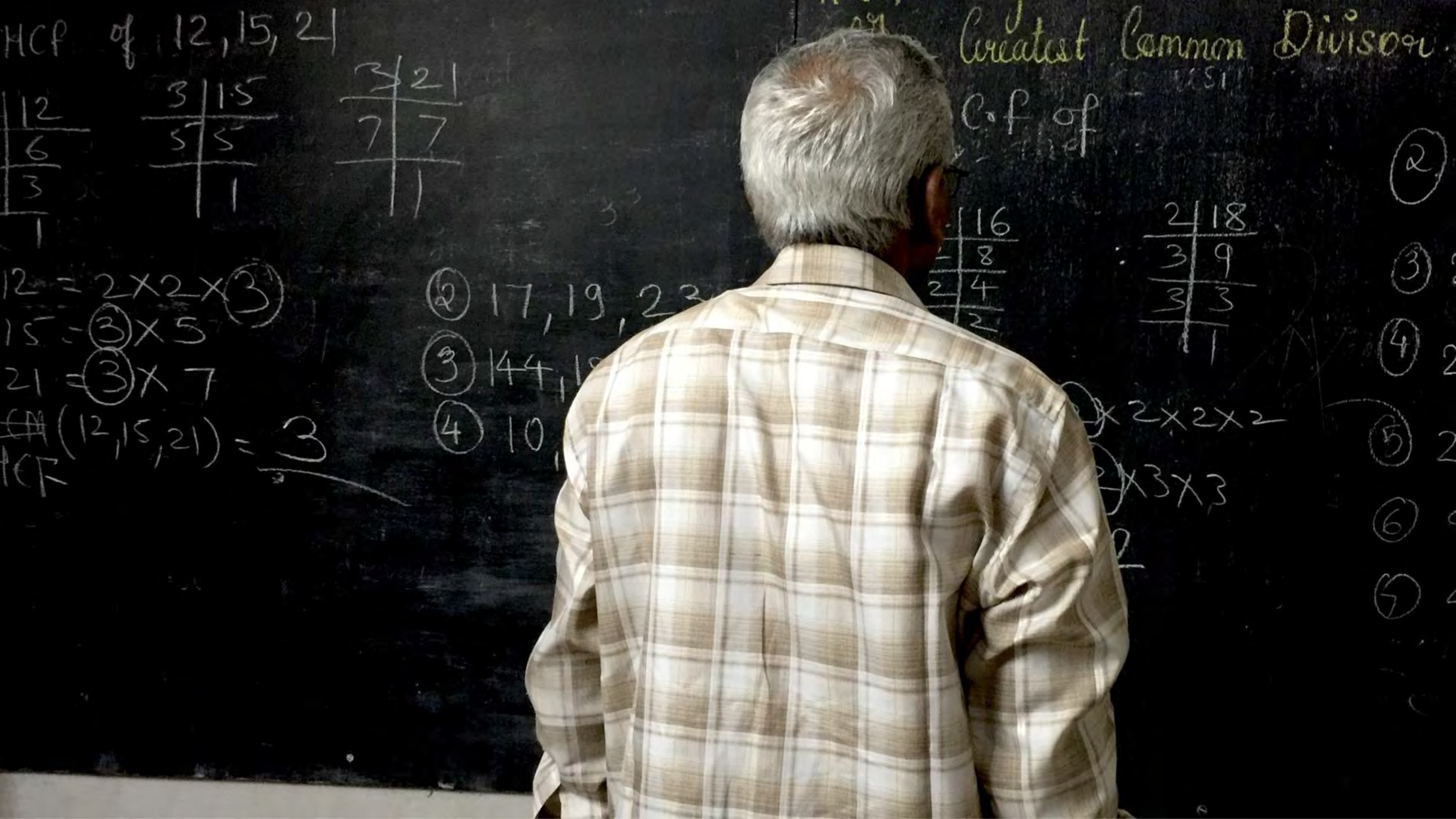

Chief Scientist
Ministry of Economy and Industry
Council
Internal Auditor
CEO
Legal Department
Marketing and Spokesperson
Technological Infrastructure
298 Million NIS
Startup
391 Million NIS
Growth
721 Million NIS
Advanced Manufacturing
125 Million NIS
Societal Challenges
79 Million NIS
ISERD Directorate
International Collaboration
104 Million NIS
Technology and Market Sectors Division
Strategy and Economics Division
Operations Division
Resources Division
Accounting



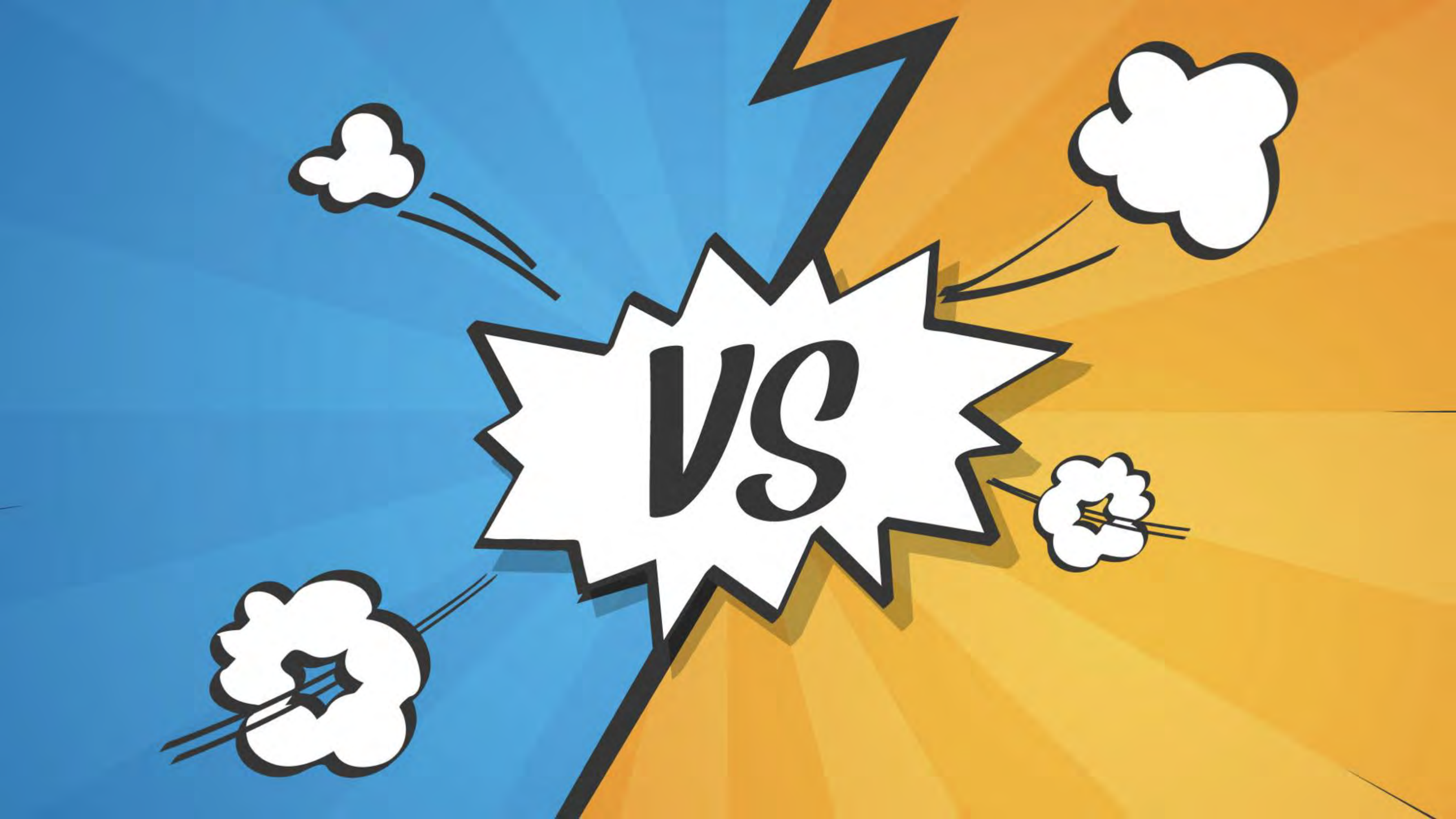
OSIEM GRZECHÓW GŁÓWNYCH



#1 ŚCIEŻKA KARIERY


HCF of 12, 15, 21
Greatest Common Divisor
C.F of
12 = 2×2×3
15 = 3×5
21 = 3×7
(12, 15, 21) = 3
HCF
17, 19, 23
144
10
16
8
4
2
18
9
3
1
2×2×2
3×3
2

MLM


VS

#2 NIEUFNOŚĆ

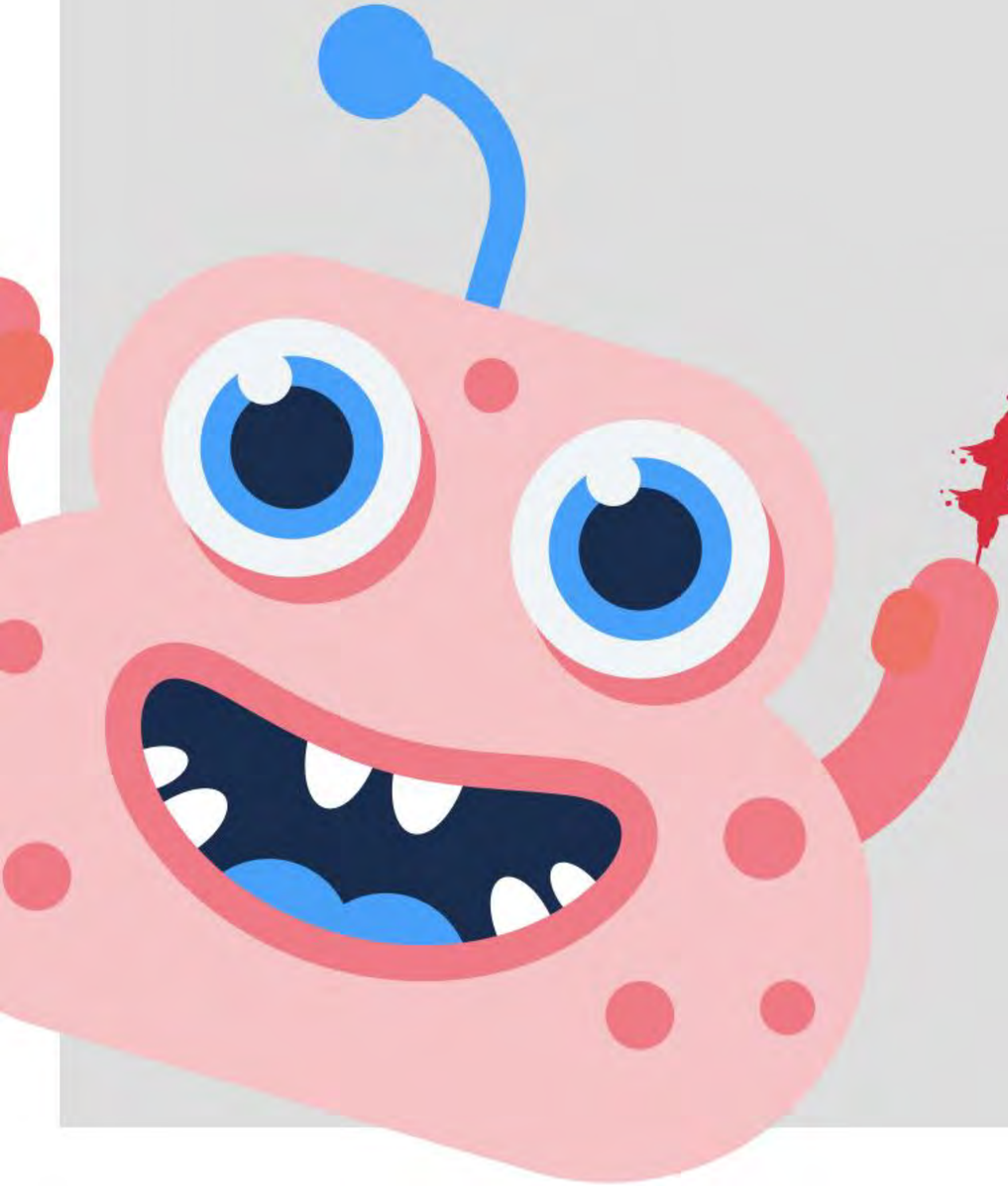
#3 FRUSTRACJA

#4 DOŚWIADCZENIE

#5 GRANTOZA

#6 PYCHA

#7 NIEPOHAMOWANIE



#8 NIEŚMIAŁOŚĆ

INNOWACJE TO NIE TYLKO PIENIĄDZE...

Cornell
SC Johnson College of Business

INSEAD
The Business School
for the World®

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION

Cornell
SC Johnson College of Business

INSEAD

WIPO
WORLD INTELLECTUAL PROPERTY ORGANIZATION

GLOBAL INNOVATION INDEX 2020

Who Will Finance Innovation?

CII
Confederation of Indian Industry

DASSAULT SYSTEMES

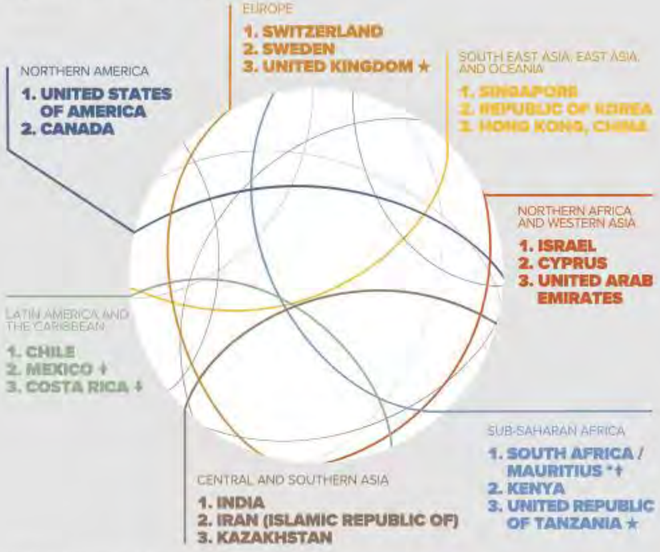
CNI

FIGURE D

Global leaders in innovation in 2020

Every year, the Global Innovation Index ranks the innovation performance of more than 130 economies around the world.

Top 3 innovation economies by region



* Mauritius is ranked above South Africa this year but with wide significant data variability as compared to last year.
↓↓ indicates the movement of rank within the top 3 relative to 2019, and ★ indicates a new entrant into the top 3 in 2020.

Top 3 innovation economies by income group

HIGH-INCOME GROUP	UPPER MIDDLE-INCOME GROUP	LOWER MIDDLE-INCOME GROUP	LOW-INCOME GROUP
1. SWITZERLAND	1. CHINA	1. VIET NAM	1. UNITED REPUBLIC OF TANZANIA ↓
2. SWEDEN	2. MALAYSIA	2. UKRAINE	2. RWANDA ↓
3. UNITED STATES OF AMERICA	3. BULGARIA	3. INDIA ↑	3. NEPAL ★

Source: Figure 1.4 in Chapter 1.

Global Innovation Index 2020 rankings

Country/Economy	Score (0–100)	Rank	Income	Rank	Region	Rank	Median 30.94
Switzerland	66.08	1	HI	1	EUR	1	
Sweden	62.47	2	HI	2	EUR	2	
United States of America	60.56	3	HI	3	NAC	1	
United Kingdom	59.78	4	HI	4	EUR	3	
Netherlands	58.76	5	HI	5	EUR	4	
Denmark	57.53	6	HI	6	EUR	5	
Finland	57.02	7	HI	7	EUR	6	
Singapore	56.61	8	HI	8	SEAO	1	
Germany	56.55	9	HI	9	EUR	7	
Republic of Korea	56.11	10	HI	10	SEAO	2	
Hong Kong, China	54.24	11	HI	11	SEAO	3	
France	53.86	12	HI	12	EUR	8	
Israel	53.55	13	HI	13	NAWA	1	
China	53.28	14	UM	1	SEAO	4	
Ireland	53.05	15	HI	14	EUR	9	
Japan	52.70	16	HI	15	SEAO	5	
Canada	52.26	17	HI	16	NAC	2	
Luxembourg	50.84	18	HI	17	EUR	10	
Austria	50.13	19	HI	18	EUR	11	
Norway	49.29	20	HI	19	EUR	12	
Iceland	49.23	21	HI	20	EUR	13	
Belgium	49.13	22	HI	21	EUR	14	
Australia	48.35	23	HI	22	SEAO	6	
Czech Republic	48.34	24	HI	23	EUR	15	
Estonia	48.28	25	HI	24	EUR	16	
New Zealand	47.01	26	HI	25	SEAO	7	
Malta	46.39	27	HI	26	EUR	17	
Italy	45.74	28	HI	27	EUR	18	
Cyprus	45.67	29	HI	28	NAWA	2	
Spain	45.60	30	HI	29	EUR	19	
Portugal	43.51	31	HI	30	EUR	20	
Slovenia	42.91	32	HI	31	EUR	21	
Malaysia	42.42	33	UM	2	SEAO	8	
United Arab Emirates	41.79	34	HI	32	NAWA	3	
Hungary	41.53	35	HI	33	EUR	22	
Latvia	41.11	36	HI	34	EUR	23	
Bulgaria	39.98	37	UM	3	EUR	24	
Poland	39.95	38	HI	35	EUR	25	
Slovakia	39.70	39	HI	36	EUR	26	
Lithuania	39.18	40	HI	37	EUR	27	
Croatia	37.27	41	HI	38	EUR	28	
Viet Nam	37.12	42	LM	1	SEAO	9	
Greece	36.79	43	HI	39	EUR	29	
Thailand	36.68	44	UM	4	SEAO	10	
Ukraine	36.32	45	LM	2	EUR	30	
Romania	35.95	46	UM	5	EUR	31	
Russian Federation	35.63	47	UM	6	EUR	32	
India	35.59	48	LM	3	CSA	1	
Montenegro	35.39	49	UM	7	EUR	33	
Philippines	35.19	50	LM	4	SEAO	11	
Turkey	34.90	51	UM	8	NAWA	4	
Mauritius	34.35	52	UM	9	SSF	1	
Serbia	34.33	53	UM	10	EUR	34	
Chile	33.86	54	HI	40	LCN	1	
Mexico	33.60	55	UM	11	LCN	2	
Costa Rica	33.51	56	UM	12	LCN	3	
North Macedonia	33.43	57	UM	13	EUR	35	
Mongolia	33.41	58	LM	5	SEAO	12	
Republic of Moldova	32.98	59	LM	6	EUR	36	
South Africa	32.67	60	UM	14	SSF	2	
Armenia	32.64	61	UM	15	NAWA	5	
Brazil	31.94	62	UM	16	LCN	4	
Georgia	31.78	63	UM	17	NAWA	6	
Belarus	31.27	64	UM	18	EUR	37	
Tunisia	31.21	65	LM	7	NAWA	7	
Saudi Arabia	30.94	66	HI	41	NAWA	8	

CONTINUED

Estonia	48.28	25	HI	24	EUR	16
New Zealand	47.01	26	HI	25	SEAO	7
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Montenegro	35.39	49	UM	7	EUR	33
Philippines	35.19	50	LM	4	SEAO	11
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Belgium	49.13	22	HI	21	EUR	14	
Australia	48.35	23	HI	22	SEAO	6	
Czech Republic	48.34	24	HI	23	EUR	15	

List of per capita nominal GDP for countries and dependencies [edit]

International Monetary Fund (2019 estimates)[3]

Rank	Country/Territory	US$
1	Luxembourg *(EU)*	113,196
2	Switzerland	83,716
—	*Macau*	81,151
3	Norway	77,975
4	Ireland *(EU)*	77,771
5	Qatar	69,687
6	Iceland	67,037
7	United States	65,111
8	Singapore	63,987
9	Denmark *(EU)*	59,795
10	Australia	53,825
11	Netherlands *(EU)*	52,367
12	Sweden *(EU)*	51,241
13	Austria *(EU)*	50,022
—	*Hong Kong*	49,334
14	Finland *(EU)*	48,868
15	San Marino	47,279

World Bank (2019)[4]

Rank	Country/Territory	US$
1	Monaco (2018)	185,741
2	Liechtenstein (2017)	173,356
3	Luxembourg *(EU)*	114,705
—	*Macau*	84,096
4	Switzerland	81,994
5	Ireland *(EU)*	78,661
6	Norway	75,420
7	Iceland	66,945
8	United States	65,281
9	Singapore	65,233
10	Qatar	64,782
11	Denmark *(EU)*	59,822
12	Australia	54,907
13	Netherlands *(EU)*	52,448
14	Sweden *(EU)*	51,610
15	Austria *(EU)*	50,277
—	*Hong Kong*	48,756

United Nations (2018)[5]

Rank	Country/Territory	US$
1	Monaco	185,835
2	Liechtenstein	179,258
3	Luxembourg *(EU)*	117,370
—	*Bermuda*	101,208
—	*Macau*	86,355
—	*Cayman Islands*	85,474
4	Switzerland	82,709
5	Norway	81,336
6	Ireland *(EU)*	79,415
7	Iceland	76,867
8	Qatar	68,794
9	United States	62,918
10	Singapore	62,721
11	Denmark *(EU)*	61,834
12	Australia	58,393
13	Sweden *(EU)*	55,767
—	*Greenland*	53,950

DZIĘKUJĘ.