

# **Technology, Innovation and Entrepreneurship – Instruments for Growth and Wealth**

**Bujor Pavaloiu**

# Outline

- **Introduction**
- Technology
- Innovation
- Entrepreneurship
- Technology, Innovation, Entrepreneurship
- Romanian Landscape

# Introduction

- What is **technology**?
  - What is **innovation**?
  - What is **entrepreneurship**?
  - Do you have a preferred term?
  - Are they related?
  - Give example of **pairs** formed by the terms.
  - Do you have a **preferred pair**?
  - If you already know lots of things about these subjects, is it worthy to study them further?
- 
- *"The best way to predict the future is to create it",* **Peter Drucker**

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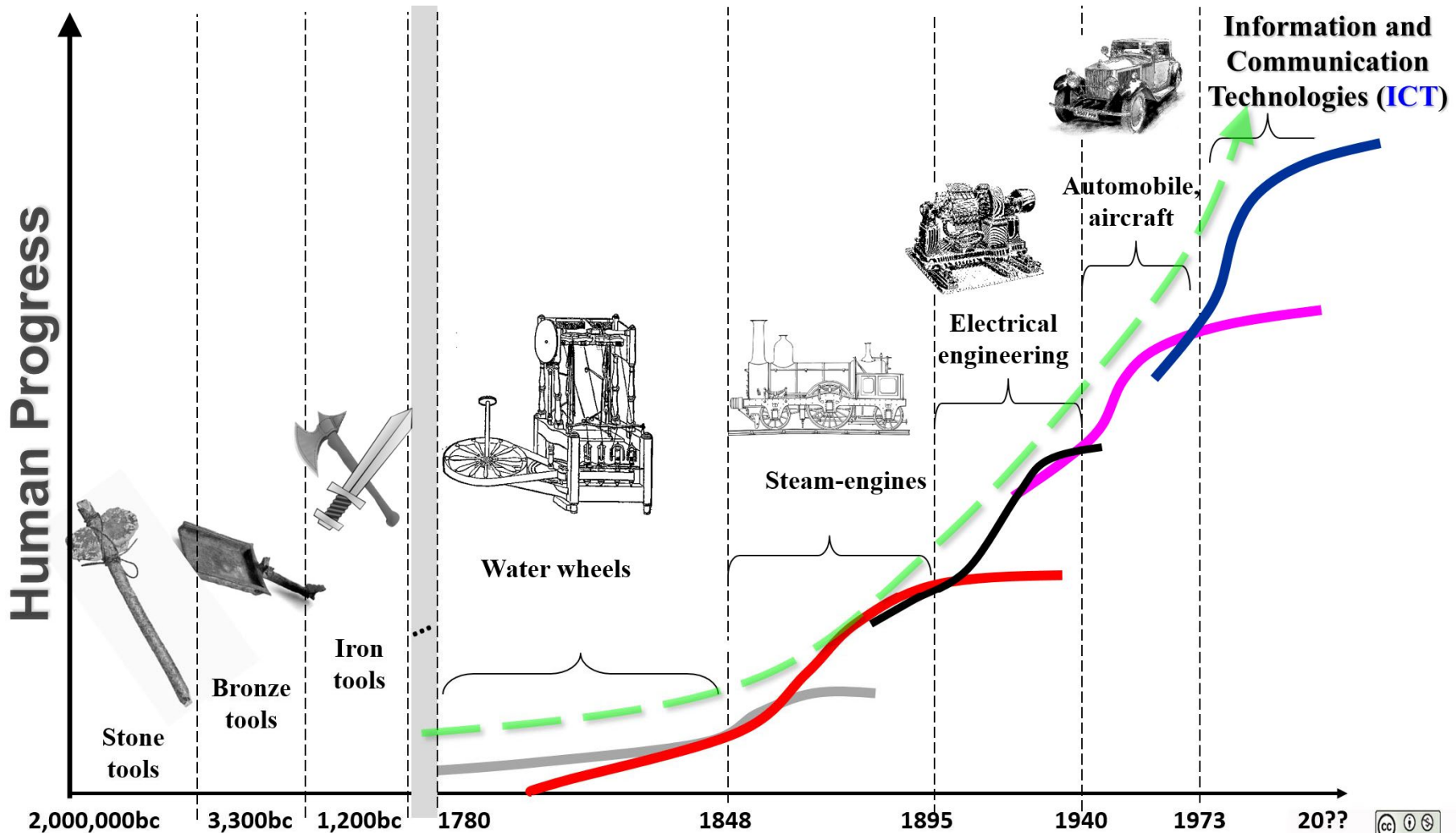
# Technology

- **Science of Craft**

From the greek

- τέχνη/ *techne* = **craft, art, skill, trade**
- λογία/ *logia* = **science**
- The use of **theoretical science and research** to solve **practical problems.**
- The **application of scientific knowledge** for **practical purposes**, especially in **industry.**
- Many times, it is identified with its tools created and used to apply it - **technology systems** or **technological systems.**

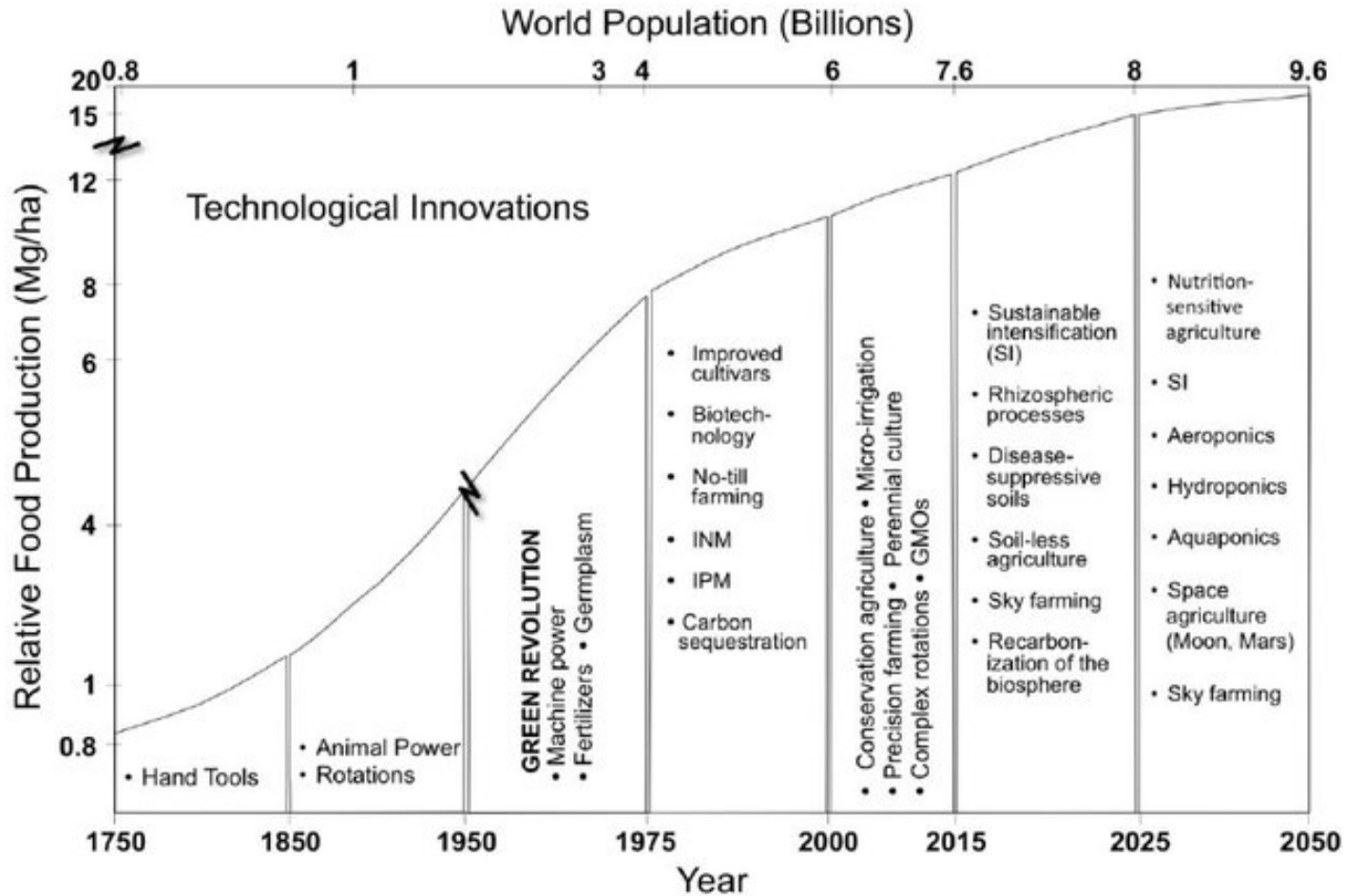
# Technology evolution



M. Hilbert, Online Course *Digital Technology & Social Change*, University of California: <https://canvas.instructure.com/courses/949415>

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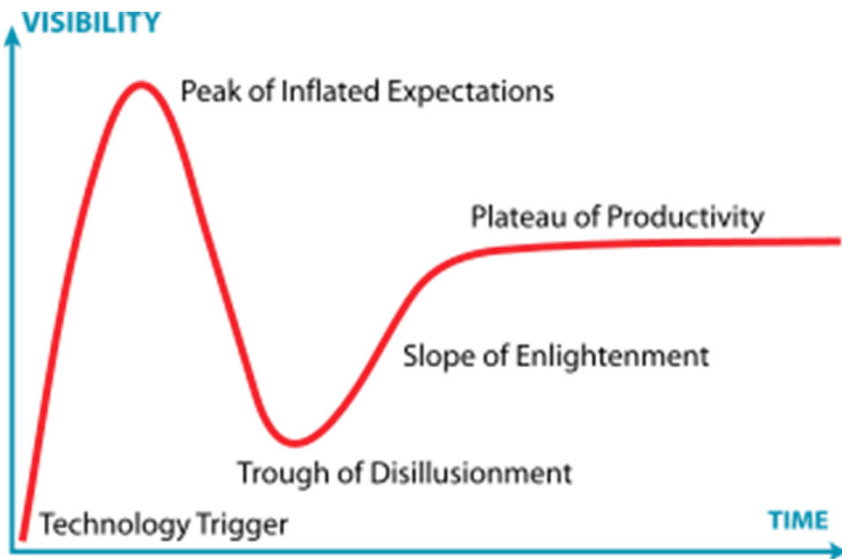
# Technology evolution in agriculture



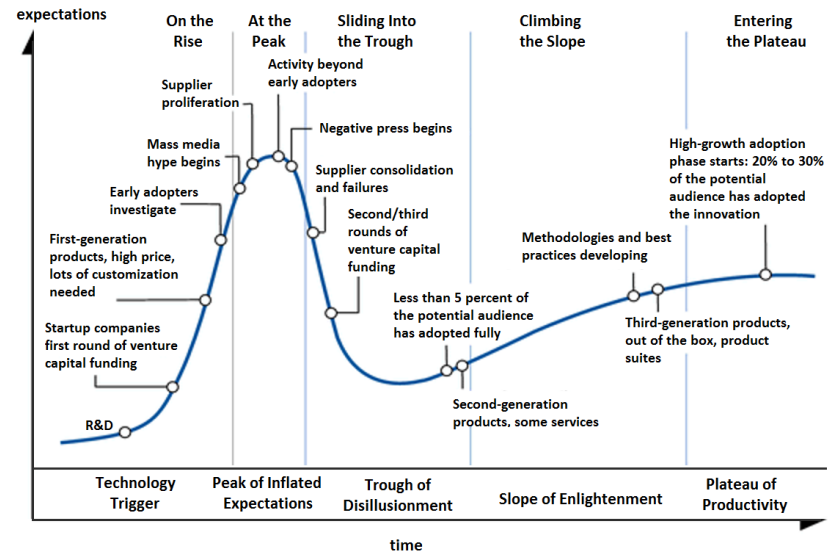
Rattan Lal, 2014, Climate Strategic Soil Management

# Technology Hype Cycle

The **Gartner hype cycle** is a graphical presentation developed, used and branded by the American research, advisory and information technology firm **Gartner** to represent the maturity, adoption, and social application of specific technologies [1]



Technology hype cycle (Wikipedia)

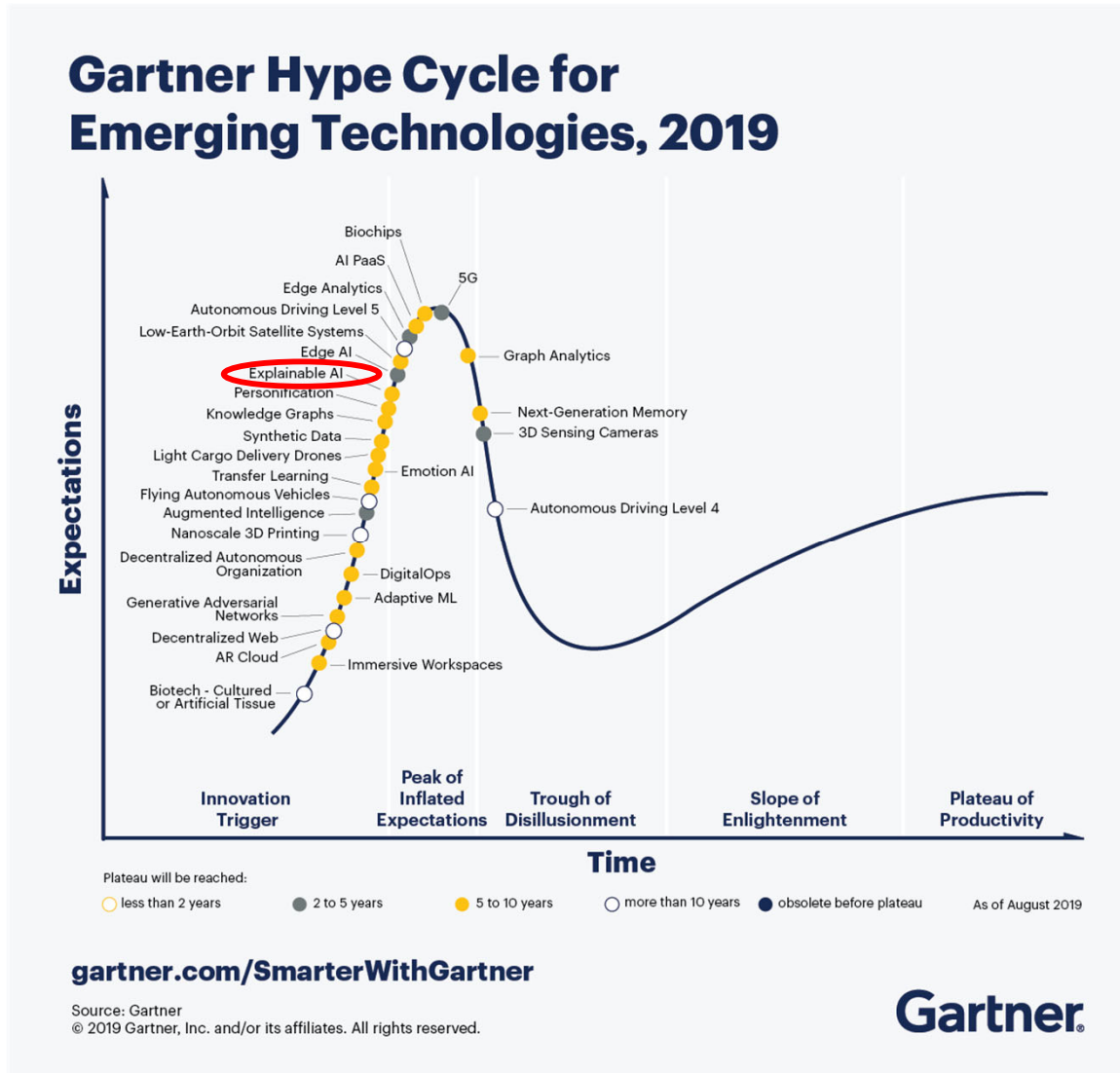


General hype cycle for technology (Wikipedia)

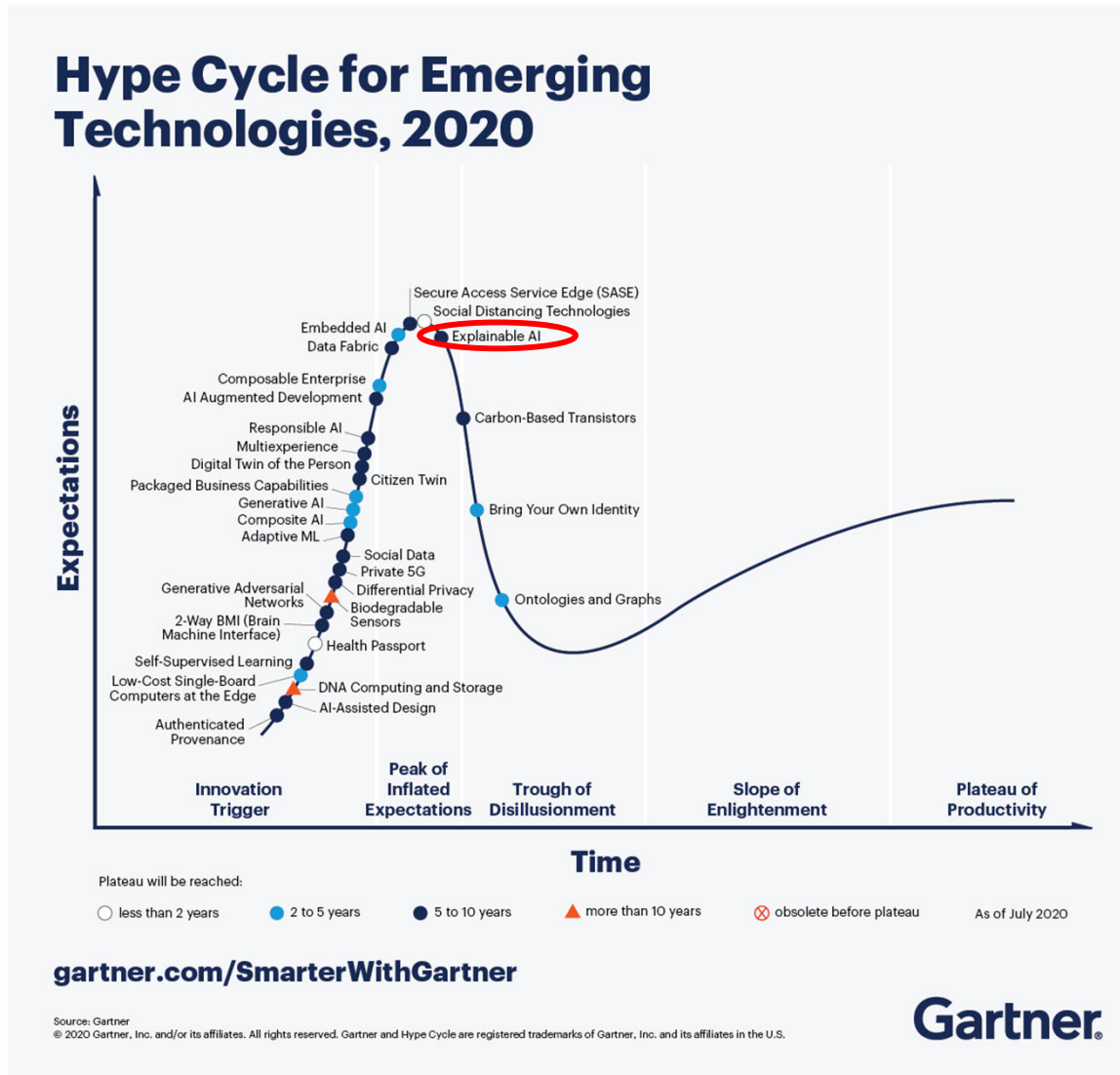
<https://www.gartner.com/en/research/methodologies/gartner-hype-cycle>



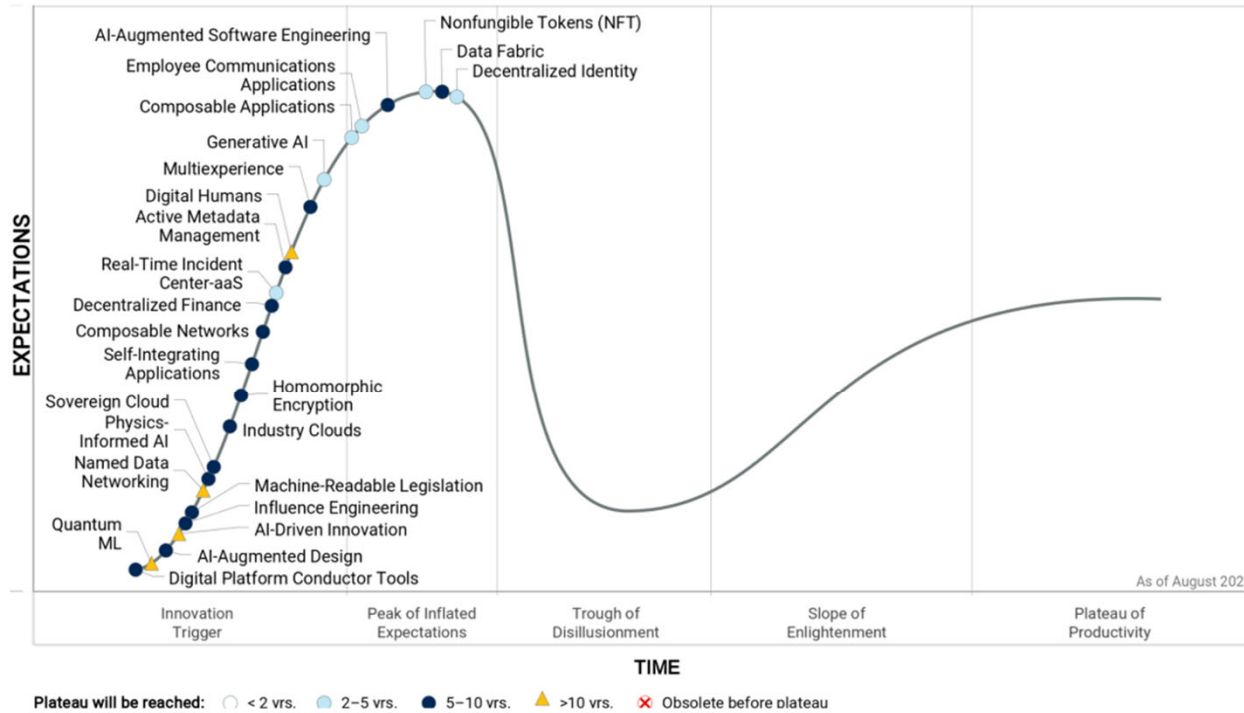
# Gartner 2019 Hype Cycle for Emerging Technologies



# Gartner 2020 Hype Cycle for Emerging Technologies



# Gartner 2021 Hype Cycle for Emerging Technologies



Source: Gartner (August 2021)

747576

# Gartner Top 10 Strategic Technology Trends for 2020

- **1. Hyperautomation**
- **2. Multiexperience**
- **3. Democratization**
- **4. Human augmentation**
- **5. Transparency and traceability**
- **6. The empowered edge**
- **7. The distributed cloud**
- **8. The distributed cloud**
- **9. Practical blockchain**
- **10. AI security**

# Question

- What have we talked about in this chapter?
- Technology...
- Are you sure?
- Top New Technology is in fact...
- Innovation

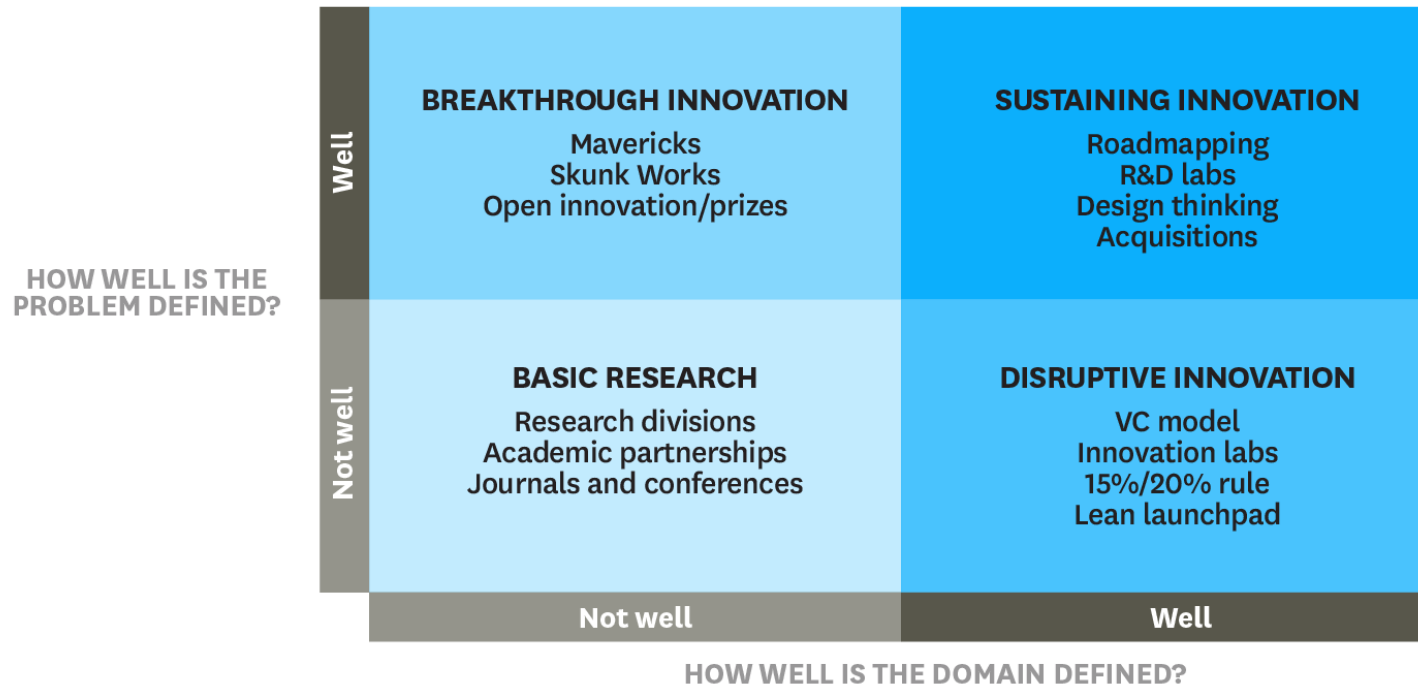
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# Innovation

- Innovation is regarded as the process of introducing something new (idea, method, process, device) or the subject/result of this action.
- **It is not the process of finding/discovering!**
- An important component of **innovation** is the one related to **science and technology**, with direct application in the production of goods.
- Most of the time, innovation comes with **incremental** improvements of the existing products on a given market, but sometime it represents **radical** changes in what was known up to that time. When new technology or processes are applied to an existing market, we are talking about **disruptive** or stealth innovation, while when existing technology is applied to a new market, we have an **architectural** innovation.

## 4 Types of Innovation

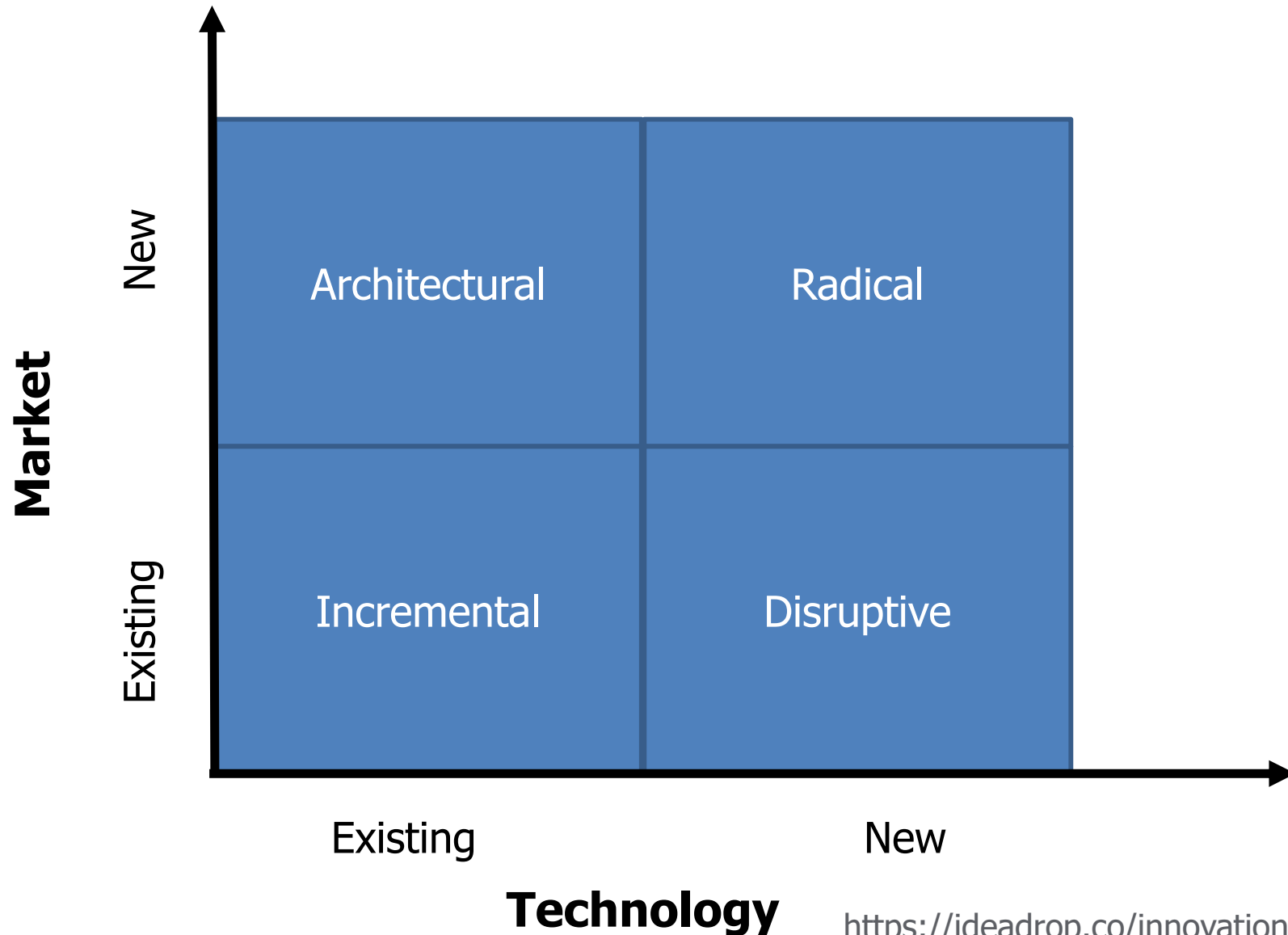


SOURCE GREG SATELL

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# Types of Innovation



<https://ideadrop.co/innovation-management/different-types-of-innovation/>

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# What is Entrepreneurship?

- Jean-Baptiste Say (1767-1832), French economist, is credited with the initiation of the 'entrepreneurship' term at the beginning of the 19<sup>th</sup> century. He conceptualized entrepreneurs as organizers and leaders of the economy, while many other economists of that time considered as primal factors the population growth and variation in savings ratios.
- Joseph Schumpeter (1883-1950), Austrian economist, described in "The theory of economic development" (1934) concepts and tools to connect the economy to the real world. The major role is assigned to entrepreneurship, due to its creative and innovative nature [2].

# Roles

- Richard Cantillon (1680-1734) identified the entrepreneurs as those who are ready to take risks in order to receive future profit - **Risk-taker**
- Jean-Baptiste Say (1767-1832) described entrepreneurs as those who transfer economic resources from unimportant places to areas with higher productivity and organize production process by combining diverse factors of production with information and experience.  
Entrepreneur: **Key Factor for Economic Development.**
- Joseph Shumpeter - **Innovator and Change-maker**

- Schumpeter tied entrepreneurship to the creation of five basic "new combinations."
  - Introduction of a new good
  - Introduction of a new method of production
  - The opening of a new market
  - The conquest of a new source of supply
  - The carrying out of a new organization of industry
- "Entrepreneurship is the identification, evaluation, and exploitation of opportunities" (Shane, 2011, p. 143)
- Entrepreneurial process
  - Opportunity recognition
  - Opportunity exploitation

# Entrepreneurship

- Entrepreneurs are agents of change, they create innovations of all kinds.
- Entrepreneurship unleashes the creativity of individuals.
- Entrepreneurship contributes to job creation and growth economic.
- Entrepreneurship is essential for competitiveness.
- Entrepreneurship increases alternatives for consumers.
- Entrepreneurship can contribute to the promotion of social solidarity and economic growth in a region

# Advantages of Entrepreneurship

- Freedom
  - You can work less.
  - Nobody will tell you what to do.
  - You can do your program - sleep up to lunch.
- Money
  - Important financial rewards.
  - The rewards are proportional to the efforts and skills.
  - You can get really rich.
- Satisfaction
  - You can do what you like to do.
  - Personal satisfaction if you are successful.
- Recognition
  - The community/ world will recognize your value.

# Disadvantages of Entrepreneurship

- Lack of freedom
  - You will have to work much more, at irregular hours.
  - You will have to do tedious jobs you don't like (cleaning, answering phone calls, do paperwork, etc.)
  - You will have to organize the others
- Money
  - You may loose money, sometimes get in debt.
  - You will have to look for financial resources
  - You can get really poor.
- Satisfaction
  - You can do what you like to do and you can see that you are not so good as you thought to be.
  - Personal dissatisfaction if you fail. Maybe many times.



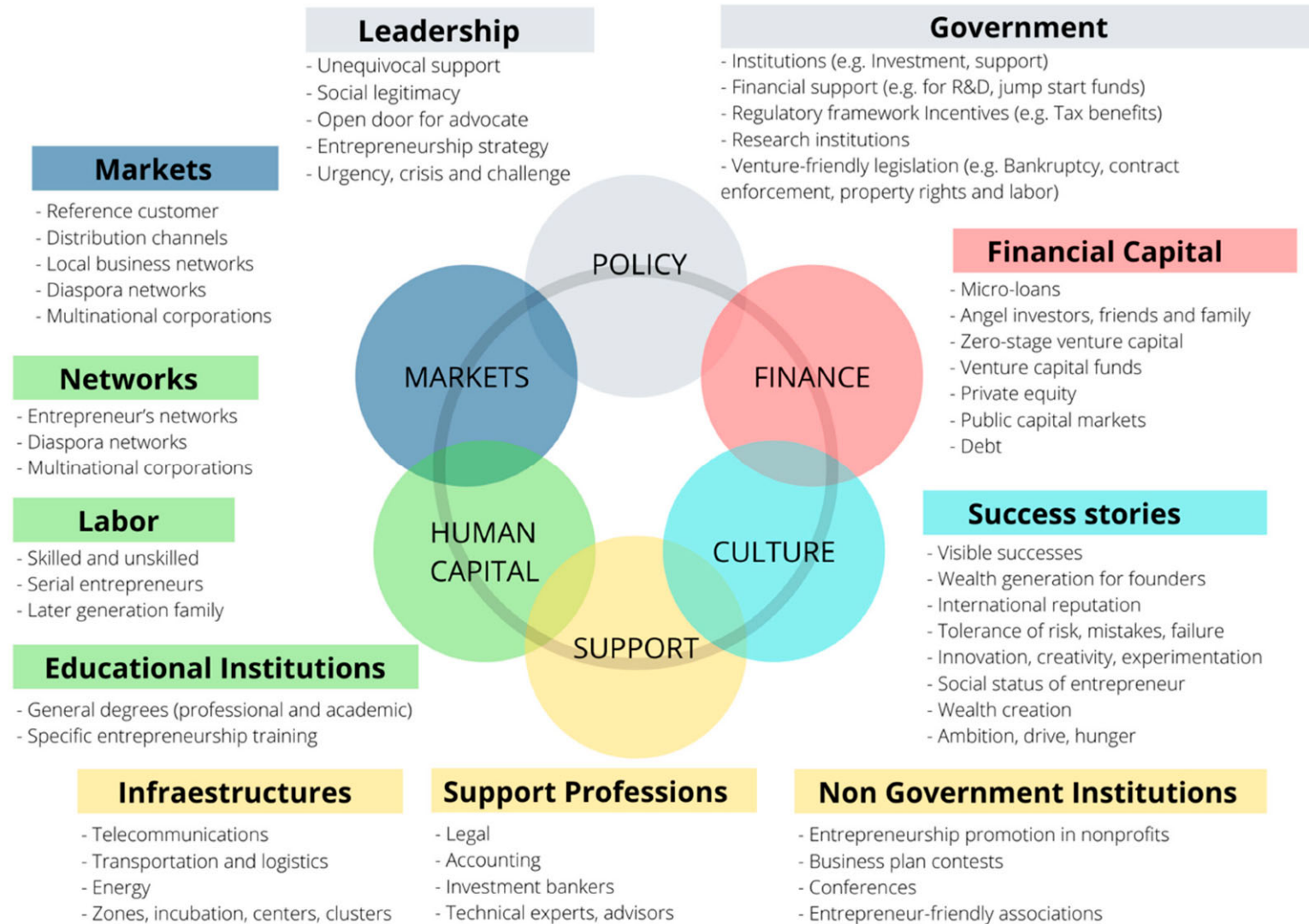
# Business Ideas

- Products: Create New Products
- Services: Create New Services
- Solutions: Solve “End-to-end” Problems for Customers
- Customers: Find New Customer Segments or
- Needs: Find New unsatisfied Needs
- Customer Experience: Change How Customers Interact With You
- Revenue Model: Change How You Get Paid

## Business Ideas (2)

- Processes: Innovate on Operating Processes
- Value Chain: Change Position or Scope of Participation
- Logistics/Supply Chain: Change the Way You Source & Ship
- Channels: Change How you Go To Market with your Products
- R&D: Create New Technologies, Materials, Products or Processes

# Domains of the entrepreneurship ecosystem



Isenberg, D.J. *The Entrepreneurship Ecosystem Strategy as a New Paradigm for Economic Policy: Principles for Cultivating Entrepreneurship*, the Babson Entrepreneurship Ecosystem Project

# Entrepreneurial initiatives

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# Entrepreneurial assistance

- Funding [3]
  - Crowdfund
  - Angel Financing
  - Venture Capital
  - Small Business Credit Cards
  - Small Business Loans
  
- Startups opportunities
  - Incubators –help entrepreneurs to refine business ideas and start from the ground.
  - Accelerators – help entrepreneurs and startups which already have a minimum viable product (MVP) with education, resources and mentorship, in order to succeed on the market.

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# Entrepreneurship – Technology, Innovation,

- The topic of entrepreneurship has also become increasingly popular as a higher education subject, especially for master programs.
- Many of these programs are dedicated exclusively on the creation and management of small firms.
- This is good, but some of the world's most successful companies are using entrepreneurship as the cornerstone of their activities for acquiring and sustaining competitive advantage in increasingly volatile and unstable world markets [4].
- Entrepreneurship is important enough to be studied from a certain dedicated perspective – the technological, digital and innovative one.

# New Entrepreneurship and Innovation Perspective

- Entrepreneurs stimulate savings and generate economic growth through introduction and implementation of innovative ideas at the level of products, production processes, and market organizations.
- **They do not invent but innovate**, materializing knowledge in products on market. Entrepreneurial activity is very important for innovation, growth of productivity, competitiveness, growth and job creation.
- The reason why entrepreneurs and their innovative activity have gained importance major in the new **knowledge-based economy** is the personalization of consumption, respectively the intensification of the demand for specific products.
- **Information and Communication Technology (ICT)** has become thus both an **instrument** and a **target** for **Innovation and Entrepreneurship**.



# ICT for Innovation and Entrepreneurship, drivers for Digitalization

- ICT based innovations and applications are nowadays major factors for:
  - economic growth
  - organizational performance
  - social change
- They are the drivers of the **Digitalization**, which is not just the use of digital technologies to change businesses, but to move towards the digital businesses and to adopt socially and culturally this framework.
- Study of ICT for innovation and for entrepreneurship is a routine for master studies and this subject is a step on the route to the future.

# CITE Project

- Entrepreneurship is recognized nowadays as the driving force of a market economy and technology-driven entrepreneurship tends to become a standard for early-stage businesses in Europe and worldwide.
- Information and Communications Technology (ICT) holds a major part of any business nowadays and it is either the major factor or a major one in any technology driven business enterprise.
- The project addresses the development in Romania of education for Information and Communications Technology Entrepreneurship (ICTE), aiming to increase the development of new businesses, based on innovation and new technologies.



## Working together for a **green**, **competitive** and **inclusive** Europe

CITE - Computing Innovation for Technology Entrepreneurship

The objectives of this project will enhance the human capital and the entrepreneurship initiatives. The primary targets are the master programs (curricula, students and academic staff) which train students in the domain Management and Engineering and in the domain of Computer Science. Increasing the quality and quantity of Romanian information-technology driven business initiatives focusses directly the first two priority sectors of the EEA grants: Innovation, Research, Education and Competitiveness, as well as Social Inclusion, Youth Employment and Poverty Reduction. The Romanian students will benefit from mobilities in the partner University and the development of teachers is aimed by direct involvement between the professors from both parties and the direct implication of students. Former students which created successful start-ups will participate from the world of work in the creation of case-studies and of the lecture materials as evaluators. There is a clear recognition of the need for the uplifting the role universities in the Romanian entrepreneurial ecosystem and the project aims directly this target.

[Latest News](#)

**Mobility**  
Mobilities for the CITE project

**Scholarships**  
Short-term student mobility

Universitatea Politehnica din București



Østfold University College



Iceland  
Liechtenstein  
Norway grants

Universitatea Politehnica din București  
Splaiul Independenței nr 313  
Sector 6, București, România  
RO-060042

Østfold University College  
Høgskolen i Østfold  
P.O.Box 700  
NO-1757 Halden, Norway

CITE 2019 – 2022  
Computing Innovation for Technology Entrepreneurship 18-COP-0012

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# CITE Project Disciplines

- The objectives of this project will enhance the human capital and the entrepreneurship initiatives. The primary targets are the master programs (curricula, students and academic staff) which train students in the domain Management and Engineering and in the domain of Computer Science:
  - Develop the curriculum, including teaching materials for the Information and Communications Technology Entrepreneurship discipline to be included in the curricula of FILS, to be included in the Engineering and management master programs BAE, GIVE and NGELI
  - Develop the curriculum, including teaching materials for the Information and Communications Technology based Innovation, to be included in the Computer science master programs SE and MITSC.

# Curricula

	Common lectures
1	Technology, Innovation and Entrepreneurship – Instruments for Growth and Wealth
2	Technology-driven vs. Market-driven Innovation
3	Innovation and Knowledge Driven Entrepreneurship
4	Innovation and Technology Transfer for Business Development

	ICT Innovation lectures
1	Types of Innovation
2	Methods for Innovation
3	Innovative Trends: Internet of Things - Fog Computing
4	Innovative Trends: Blockchain
5	Innovative Trends: Cloud Computing (Serverless, Microservices)
6	Innovative Trends: AI for Software Engineering
7	Innovative Trends: Autonomous Vehicles
8	Innovative Trends: Chatbots
9	Innovative Trends: VR/AR
10	Innovative Trends: Robotic Process Automation/ Communications

	ICT Entrepreneurship lectures
1	Entrepreneurial Initiatives (Star-ups, Spin-offs, MSMEs)
2	Entrepreneurial Discovery Process
3	Target Market Selection/ Business Plans / Strategy in Technology Entrepreneurship
4	Financing for Entrepreneurial Projects
5	Product management
6	Risk Management
7	Intellectual Property and Legal Framework
8	Industry 4.0 Integration
9	Digital Entrepreneurship
10	Case studies – Guidance from Digital Entrepreneurs

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# Romanian Startup Ecosystem




StartupBlink – Global Startup Ecosystem Index 2021

# Romanian Startup Ecosystem

## Startup Ecosystem Overview

Boasting a strong startup ecosystem in Eastern Europe, Romania offers entrepreneurs affordable and highly talented professionals as well as access to the European market. Romania also offers several effective accelerator programs that allow startups to engage mentors and improve growth.

	National Rank	City	Global Rank	Rank Change (from 2020)	Total Score	Overperforming Industry	
	<b>1</b>	Bucharest	111	-8	<b>5.014</b>	Software & Data	
	<b>2</b>	Cluj-Napoca	250	-36	<b>1.367</b>		
	<b>3</b>	Timisoara	391	-23	<b>0.563</b>		
	<b>4</b>	Iasi	484	-64	<b>0.388</b>		
	<b>5</b>	Brasov	706	+186	<b>0.210</b>		

# Romanian notable StartUps

More than 100,000 Romanians are already taking part in the IT scene, mainly as employees, freelancers, and remote workers for foreign companies capitalizing on the local talent pool. Romanian entrepreneurs already enjoy improved infrastructure with fast Internet connections, but this alone will not be enough to build a regional hub.

That said, much more can be done in terms of public sector involvement. The Romanian startup ecosystem would benefit from government policies that support startups, as well as an increase in entrepreneurial education via secondary schools and entrepreneurship programs.

Outside the capital of Bucharest, the city of Cluj Napoca has managed to build a name for itself, with ecosystem developers who understand that the path to growth includes attracting more foreigners. After the creation of the first Romanian unicorn in 2018, UiPath (reaching an amazing \$7 billion valuation in 2021 and becoming a local inspiration), we are optimistic that the Romanian startup ecosystem will soon be surpassing additional milestones.

## Notable Startups and Ecosystem Champions

### ➔ **UiPath** Unicorn 🦄

Bucharest, Romania

UiPath is a robotic process automation software development company.

### ➔ **Archbee**

Bucharest, Romania

Ultra-fast Wiki that powers your team's knowledge, documentation, playbooks, onboarding, meeting minutes and product docs.

### ➔ **Logicode**

Cluj-Napoca, Romania

Logicode provides labeling, industrial coding, traceability and software solutions using barcode technology.



# Entrepreneurial programs

The screenshot shows the website start-upnation.ro. At the top, there is a navigation bar with the following items: FINANȚARE, BENEFICIARI, CHELTUIELI ELIGIBILE, CONTACT, and SOLICITĂ CONSULTANȚĂ (highlighted in red). Below the navigation bar is a large banner image of two women in business attire reviewing documents at a table. Overlaid on the right side of the banner is a contact form titled "Solicită consultanță GRATUITĂ". The form includes input fields for Name, Email, and Phone, a larger text area for Message, and a Captcha field with the text "1 + 4 =". A red "SUBMIT" button is located at the bottom of the form. In the top right corner of the website, there are contact details: Telefon (+40 748 768 191, +40 770 395 348) and Email (office@start-upnation.ro). The logo for START-UP NATION and the 100 ROMÂNIA logo are also visible.

# Entrepreneurial programs

buchareststartupcity.ro



Despre program Metodologie Comunicate Inițiatori: CNIPMMR PMB



## Programul Bucharest Startup City, pe scurt



### Ce este?

Program de finanțare dedicat start-up-urilor din Municipiul București



### Ce își propune?

Suținerea a minimum 200 de beneficiari (start-up-uri), cu o valoare maximă a ajutorului de minimis de 50.000 Euro per start-up



### Care sunt partenerii?

Programul este implementat pe baza unui parteneriat încheiat între Primăria Municipiului București și Consiliul Național al Întreprinderilor Private Mici și Mijlocii din România



### Cum se realizează procesul de selecție?

Departajarea aplicațiilor se va realiza printr-un proces amplu de selecție, structurat în trei etape distincte, principalul element de diferențiere a aplicațiilor primite fiind calitatea lor și implicarea asociațiilor în dezvoltarea respectivei afaceri.



### Unde se depun planurile de afaceri?

Aplicațiile (planurile de afaceri) vor fi depuse și evaluate prin intermediul unei platforme online



### Care sunt cele mai importante condiții de eligibilitate?

Condițiile de eligibilitate specifice programului vizează înființarea întreprinderii pentru care este solicitată asistența financiară pe raza Municipiului București, după data de 1 ianuarie 2019

# Romania - Startup Accelerators and Incubators

- <https://www.vestbee.com/blog/articles/best-startup-accelerators-and-incubators-in-romania>
- <https://www.romanianstartups.com/accelerators-incubators/>
- <https://incubatorlist.com/top-startup-accelerators-incubators-and-vcs-in-romania/>
- <https://fi.co/insight/bucharest-startup-resource-list-250-accelerators-incubators-investors-and-more>
- <https://rotsa.ro/en/homepage-en/>
- <https://www.innovationlabs.ro/>

# References

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- [2] Schumpeter, J.A., The Theory of Economic Development: An Inquiry Into Profits, Capital, Credit, Interest, and the Business Cycle, 1934 , Transactions publishers (from german).
- [3] Forbes, <https://www.forbes.com/sites/allbusiness/2019/12/22/startup-financing-key-options/>
- [4] Alain Fayolle, Entrepreneurship Education at a Crossroads:  
Towards a More Mature Teaching Field, Journal of Enterprising Culture, Vol. 16, No. 4 (December 2008), pp. 325–337

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