UNIVERSITY of NICOSIA

Session 1

The Importance of Innovation

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BLOC 515: Blockchain and Entrepreneurship Management

Session 1 Objectives

- Explain what innovation is and why it matters
- Discuss how digital currencies and blockchains relate to innovation
- Explore aspects and types of innovation
- Introduce the four Ps of innovation, as well as Platform Innovation
- Discuss how digital currencies and blockchains relate to innovation

Blockchain and entrepreneurship management

What is entrepreneurship? Select the correct answer(s)

A. “The activity of setting up a business or businesses, taking on financial risks in the hope of profit”

B. “Entrepreneurship is the creation or extraction of value.”

C. “The most prominent example of entrepreneurship is the starting of new businesses.”

D. “Entrepreneurship is an act of being **an entrepreneur”**

Innovation is a frequently used, but not always properly understood, concept

Before delving into the details of how innovation can be managed, especially in the context of new technologies that disrupt the status quo (such as digital currencies and blockchains), we need to set the scene by developing a common understanding of the basic principles and types of innovation, as well as discussing why it matters.

Session Outline

1. Innovation: what is it?
2. Innovation: why it matters
3. A Process View of Innovation
4. Types of Innovation
5. Conclusions
6. Further Reading & Exercises

1. Innovation: What is it and why it matters?

The nature of innovation

- Innovation is driven by an ability to see connections, spot opportunities and take advantage of them.
- It can involve opening up new markets or offering new ways of serving established and mature ones.
- Technology often plays a key role in enabling such radical new options:
  - Typically, through technology invention or extension.
  - But also, through using old technologies in new ways.
- Innovation started in manufacturing, but is now typically seen and studied in service industries as well (even including the public sector).

The nature of innovation in DCs & Blockchain

Innovation is driven by an ability to see connections, spot opportunities and take advantage of them.

- *Think of a digital currency or blockchain firm you consider innovative: what has it done differently?*

It can involve opening up new markets:

- *Think of mining equipment*
- *Wallets and currency exchanges*
- *Neo Banks*
- *CBDCs etc.*
- *Smart contracts and Dapps;*
- *DeFi*
- *NFTs*
- *DAOs*
- *Metaverse?*

The nature of innovation in DCs & Blockchain

or offering new ways of serving established and mature ones:

- *Think of payment processors;*
- *Fintech;*
- *Insurtech;*
- *Distributed marketplaces; etc.*

Innovation started in manufacturing, but is now typically seen and studied in service industries as well (even including the public sector).

- *Dubai's Blockchain2021 strategy;*
- *Other crypto-friendly jurisdictions.*
- *CBDCs*
- *NFTs*
- *NFTs marketplaces*
- *Blockchain, N FTs and Metaverse*

Why innovation matters

Innovation matters not only **at the level of the enterprise**, but increasingly as the **wellspring for national and global economic growth**.

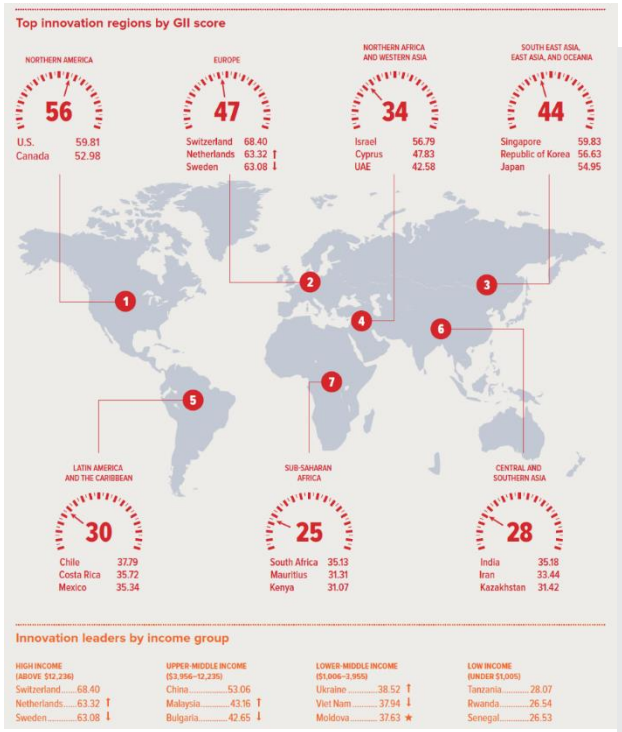
- Studies have shown that '**innovation leaders**' in most industry sectors consistently outperform their rivals in revenue growth, profits, and share price performance.
- The economist William Baumol claims that '*virtually all of the economic growth that has occurred since the eighteenth century is ultimately attributable to innovation*'.

Why innovation matters

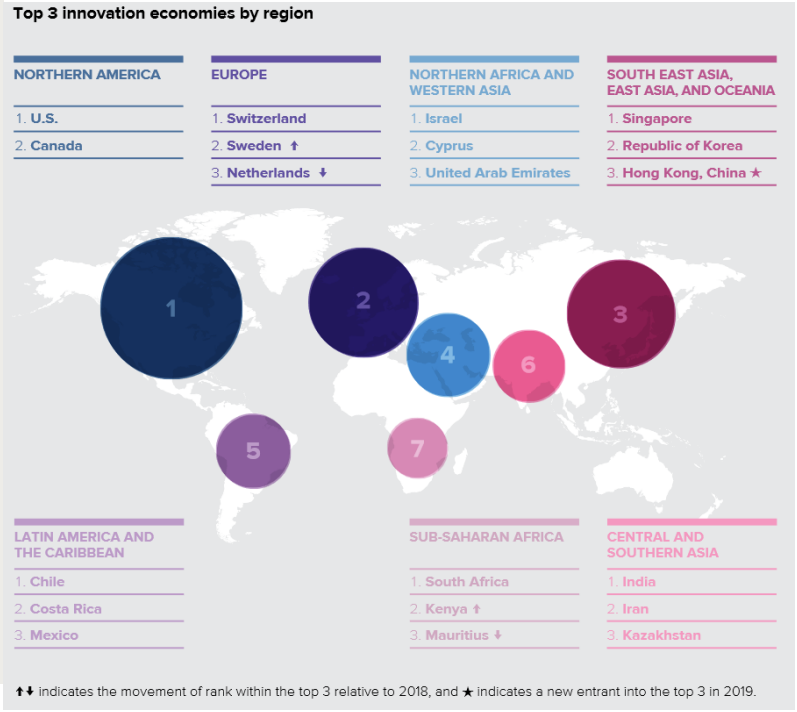
As a result, innovation has entered the public debate and is quickly becoming a central plank in **national economic policy formulation**.

- According to the **Global Innovation Index (GII)**, which features, among others, a composite indicator that ranks countries/economies in terms of their enabling environment to innovation, the top-ten innovative countries in 2018 are: Switzerland, Netherlands, Sweden, UK, Singapore, USA, Finland, Denmark, Germany, Ireland
- See **globalinnovationindex.org** for detailed country profiles.

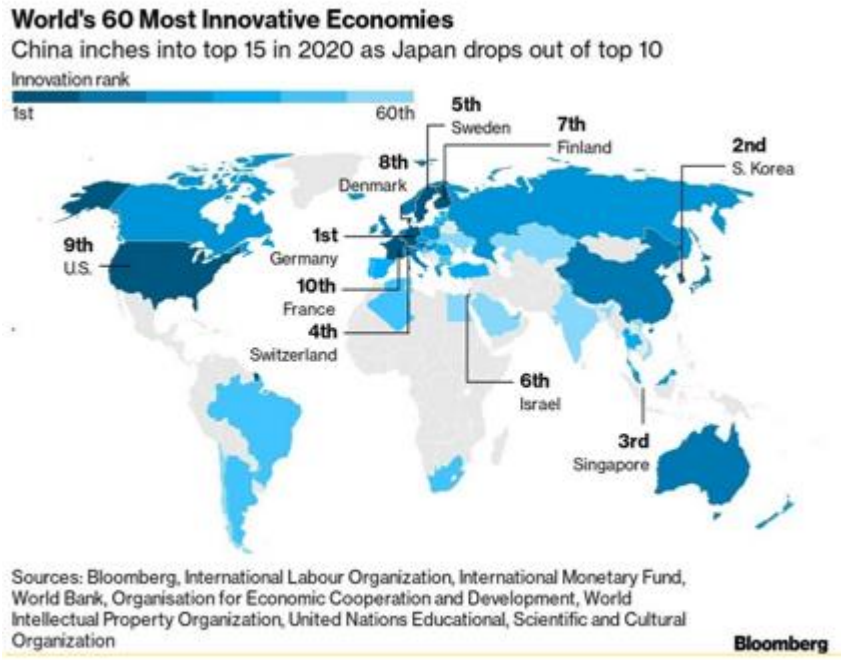
Global leaders in innovation 2018-2020



2018



2019



2020

Global leaders in innovation 2021-2022

Top ten innovative economies

#GlobalInnovationIndex

2021

Source: WIPO, 2021

1. Switzerland
2. Sweden
3. United States of America
4. United Kingdom
5. Republic of Korea
6. Netherlands
7. Finland
8. Singapore
9. Denmark
10. Germany

How innovation matters

Innovation contributes in several ways:

- Research shows **strong correlation between new product development and market performance** (capturing and retaining market shares, increasing profitability, etc.).
- **Process innovation** can also become a strong strategic advantage, helping companies reduce costs, achieve economies of scale and lock-out competitors and new entrants.

How innovation matters

But, it is important to bear in mind that **innovation-driven competitive advantage is usually short-lived**

- **Gains tend to be competed away**, as others imitate (and may even leap-frog) the innovator – ask Citibank, the inventor of the ATM.
- **Gains may also be lost due to disruptive technologies** that change the basis of competition in an industry – ask ***Kodak***, once the leader in the photography market; or any company in the pre-internet music industry.
- Hence, the **need for continuous innovation** - ideally, coupled with innovations that are not easy to copy (such as patented technologies, process innovations, and hidden innovations).

Strategic advantages through innovation

Mechanism	Advantage	Example (older, existing or potential)
Novelty in product offering	Offering something no one else can (at least for a while) to secure first-mover or fast-follower advantage	• Tablets • First digital currency (Bitcoin) • First ASIC miner • First smart contract platform • First ICO
Novelty in process	Offering that can't be matched – in time, cost, scale, customization, etc.	• Amazon, Ebay • Ripple, R3 • ICOs
Complexity	Offering something that others find difficult to master	• Anonymous/fungible currencies • Smart contracts • DAOs
IP protection	Offering something that others need to pay a license / fee	• Patented apps • Hashgraph
Disrupt competition	Move the basis of competition, e.g. from price to differentiation	• Digital currencies vs. fiat • Smart contracts vs. written • ICOs vs. IPOs/VC

What is (and isn't) innovation?

'Companies achieve competitive advantage through acts of innovation. They approach innovation in its broadest sense, including both new technologies and new ways of doings things'

Michael Porter, 1990, The Competitive Advantage of Nations

'Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced'

Peter Drucker, 1985, Innovation and Entrepreneurship

One of the problems in managing innovation is variation to what people understand by the term, often confusing it with invention.

What is (and isn't) innovation?

- **One of the problems in managing innovation is variation to what people understand by the term, often confusing it with invention.**
- In fact, some of the most famous inventions have come from inventors whose names are forgotten; the names we associate with them are those of innovators who brought them into commercial use.

- **Vacuum cleaner:** invented by J. Murray Spengler; commercialized by W.H. Hoover
- **Sewing machine:** invented by Elias Howe; (stolen and) commercialized by Isaac Singer
- **Thomas Edison**, as a counter-example of a famous inventor (over 1,000 patents) AND innovator

Innovation: the process of turning opportunity into ideas and of turning these into commercial practice

2. A Process View of Innovation & Types of Innovation

Summary

*Innovation comes in many flavors: it may involve creating new **Products**, implementing new **Processes**, changing a company's **Positioning** and/or altering the prevailing business **Paradigm**.*

*Further to these four Ps of innovation, exploiting network effects through **Platform** innovation is lately emerging as a powerful mechanism for value creation.*

In this section, we will study these 4+1 Ps of innovation and we will also discuss how they might present themselves in the case of Digital Currencies (DCs) and blockchains/DLT.

Innovation as a *process*

If we think about innovation as the *process* of turning ideas into commercial practice and capturing value from them, we can identify **four distinct phases**, each with its own set of challenges, to be managed if innovation is to be successful.

Innovation as a *process*

Phase 1: Search

- We need to bring new ideas into the system – systematically! Ideas may come from R&D, ‘eureka’ moments, copying, market signals, regulation, etc.
- **Challenge**: how do we organize an effective search process?

Phase 2: Selection

- **Strategic choice:** which of the ideas are worth pursuing further?
- **Challenge**: match (external) opportunity with (internal) capabilities to maximize return on investment

Innovation as a *process*

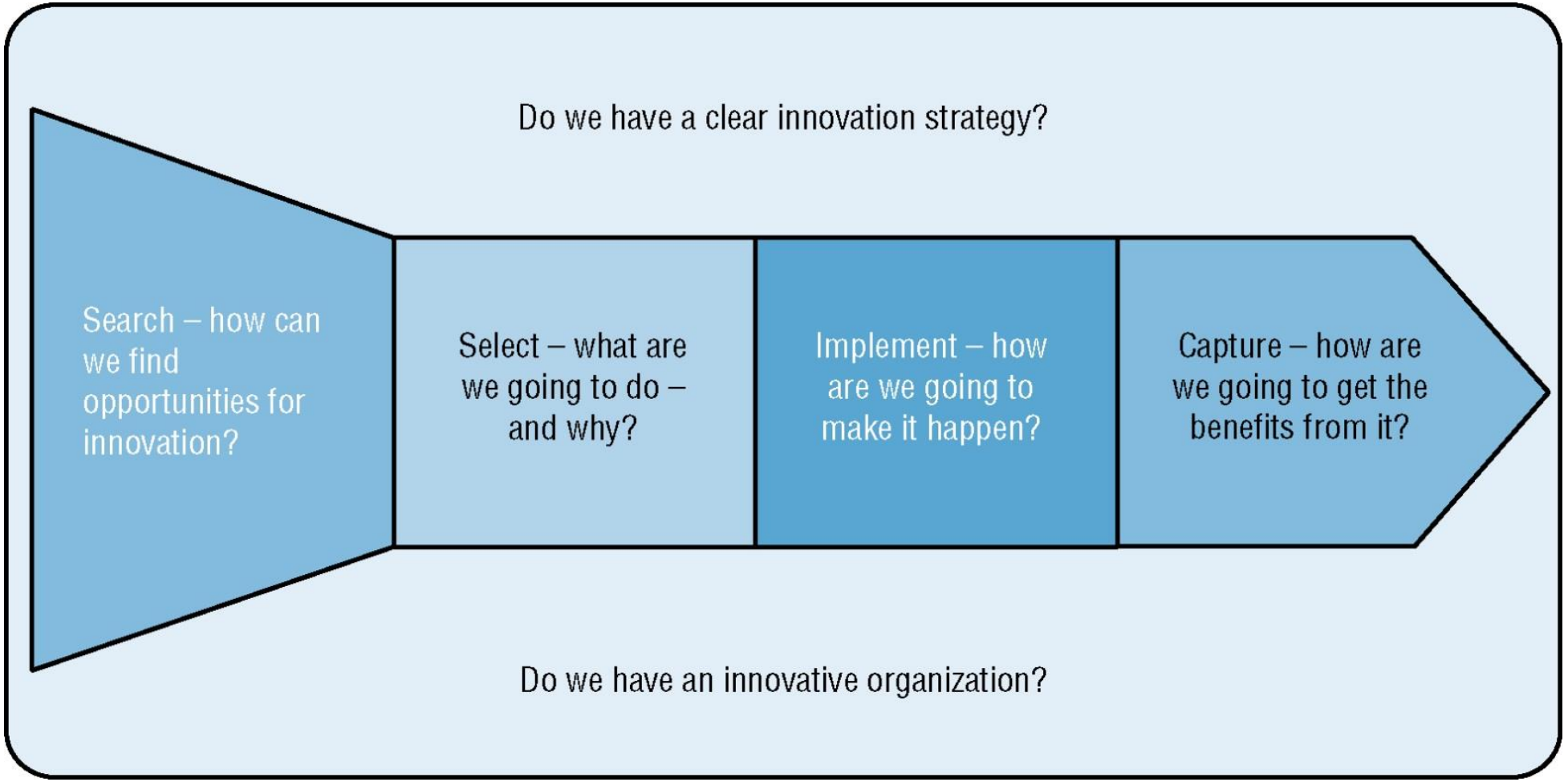
Phase 3: Implementation

- Converting ideas into reality
- **Challenge**: manage a large array of resources (time, energy, capital, knowledge) against a background of uncertainty.

Phase 4: Value capture

- Generate returns;
- Protect gains from competition;
- Achieve learning for future endeavors.

Innovation as a *process*



The four Ps of innovation

If innovation is a process, we need to consider its output.

- We can focus on **four broad innovation categories** (the 4Ps of innovation):
- **Product Innovation**: changes in the things (products/services) which an organization offers; e.g. a new car design, a new insurance package.
- **Process Innovation**: changes in the ways in which they are created and delivered; e.g. Amazon's logistics and vertical/horizontal integration.
- **Position Innovation**: changes in the context in which the products/services are introduced; e.g. Coca Cola's journey from a patent medicine to a world-leader in soft drinks.
- **Paradigm Innovation**: changes in the underlying mental and business models; e.g. digital currencies, blockchain, ICOs, DAOs.

Sometimes, dividing lines are blurred;

Think of the four Ps as a guiding tool, not an absolute dichotomy

Product innovation and DC/DLT

- **DIGITAL CURRENCIES**
  - Digital currencies are based on new inventions in computer science: e.g. solving, under assumptions, the Byzantine Generals Problem; creating new cryptographic techniques, such as zero-knowledge proofs, to address anonymity/fungibility.
  - Digital currency features leap-frog and extend many functions of existing financial products (such as near-real time borderless payments, irreversible transactions, etc.)
- **BLOCKCHAIN / DLT**
  - Blockchain-based innovations may support the creation of new applications, such as smart contracts, decentralized trust services, etc.
  - Private keys that store transferable ownership rights can be used to control physical objects (keys, operation control, etc.), thereby connecting blockchains to IoT and the physical world.
  - Application tokens are the fuel of decentralized value networks and crowd-sourced distributed ventures.

Process innovation and DC/DLT

- **DIGITAL CURRENCIES**
  - Digital currencies rely on novel forms of labor and consensus (computational power, proof-of-stake or other issuance/verification mechanism).
  - Digital currencies bring together many individual innovations into a unique combination with far greater value than the sum of its parts (digital signatures, asymmetric cryptography, proof-of-work, etc.).
  - Governance is based on consensus, instead of a single point of control – both at the network level (majority consensus) and at the transaction level (e.g. multi-sig).
- **BLOCKCHAIN / DLT**
- While elements of the transaction verification and currency issuance mechanism are innovative in themselves (such as PoW/PoS/etc.), when used in the context of the blockchain, they implement a novel process of establishing the veracity of any transaction/record in a shared ledger.

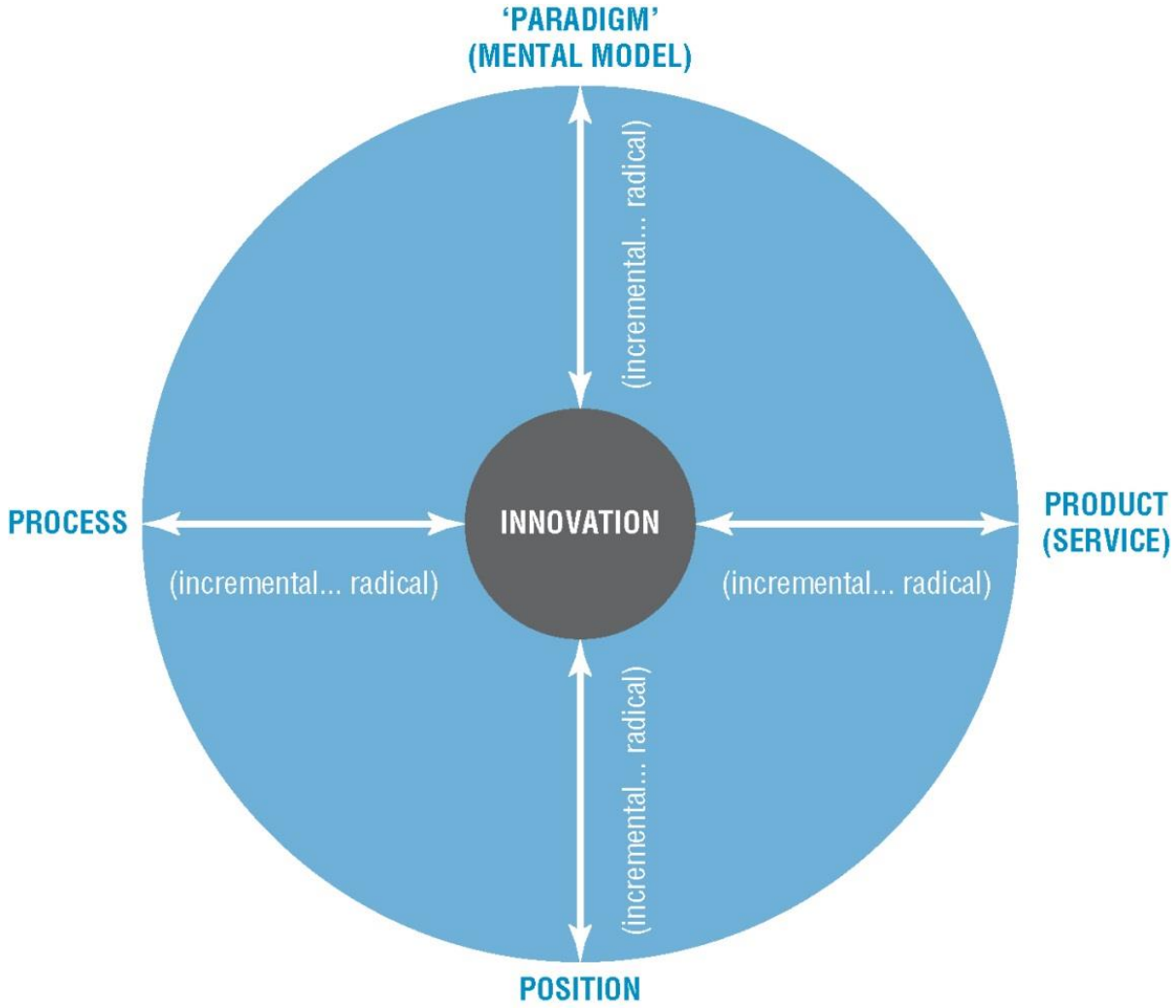
Position innovation and DC/DLT

- **DIGITAL CURRENCIES**
  - Digital currencies are fixed in supply (at least in some implementations) and have built-in monetary policy features (although these might also be disadvantages).
  - Digital currencies are open source – operational details of the protocol and participation in its development is accessible to everyone.
  - Digital currencies enable borderless and trustless peer-to-peer exchange of financial value.
- **BLOCKCHAIN / DLT**
  - Decentralized governance, Initial Coin Offerings (ICOs) and autonomous economic agents (even distributed autonomous organizations) redefine what is possible in terms of internet applications, new venture funding and even commerce.

Paradigm innovation and DC/DLT

- **DIGITAL CURRENCIES**
  - Digital currencies include programmable means of exchange (multisig, timelock, etc.), thus supporting the creation of the world's first programmable money (money-over-IP).
  - Digital currencies enable machine-to-machine financial communication.
- **BLOCKCHAIN / DLT**
  - Blockchain-based applications enable distributed consensus over a shared ledger for the first time in history, thereby embedding trust in internet communication.
  - Digital currencies may provide the basis for autonomous economic agents and human-less corporations (DAOs). This can unleash a whole new era of machine-to-machine (M2M) commerce.

Four types of innovation: incremental or radical?



Incremental vs. radical innovation

Innovation type	Incremental – do what we do, but better	Radical – do something different
Product	New versions of Windows. New car models. CDs replacing vinyl.	iOS, Android. Tesla. Spotify.
Process	Improved fixed line telephony. Improved branch banking.	Skype. Online banking, m-banking.
Position	Airline market segmentation. Online support to university courses.	Low cost airlines. Coursera, MSc in Digital Currency
Paradigm	IBM (from machine maker to services)	Microlending and microfinance. App Store and iTunes. Google (search and ad matching). Blockchain.

The 5th P: Platform innovation

Platform innovation is about **being able to establish a strong basic platform or family, which can then be extended**.

- For example, car makers produce models, which, although apparently very different, make use of common components, such as floor plans or chassis.

Platforms are very strong ways in which innovations can be diffused, by creating an infrastructure upon which other innovations can be built, even outside company boundaries (**innovation crowdsourcing**).

- Ethereum as platform innovation? (Smart contracts, Dapps, ERC20 tokens, ERC721, ERC1155, EVM, DeFi, DAOs, NFTs, etc.)
- Mastercard as platform innovation? (Launch platform to test CBDCs)

Platforms are also a great vehicle for position innovation at the brand level

- Think of Richard Branson's Virgin brand or Stelios Haji-Ioannou's Easy brand as ways of allowing entry to different markets.

The 5th P of innovation: Platforms

- While digital currencies are perhaps the basis for many instances of Product/Process/Position/Paradigm innovation, the blockchain may be best conceptualized as a Platform Innovation.
  - **Ethereum** as an example of platform-based innovation.
  - **Smart contracts** as examples of product innovations on top of this platform.
  - **DeFi** as an example of process innovation on top of this platform.

Discontinuous innovation

Most of the time, innovation takes place within a set of rules. But, occasionally, something happens, which dislocates the framework and changes the rules of the game. We call this **discontinuous or disruptive innovation**.

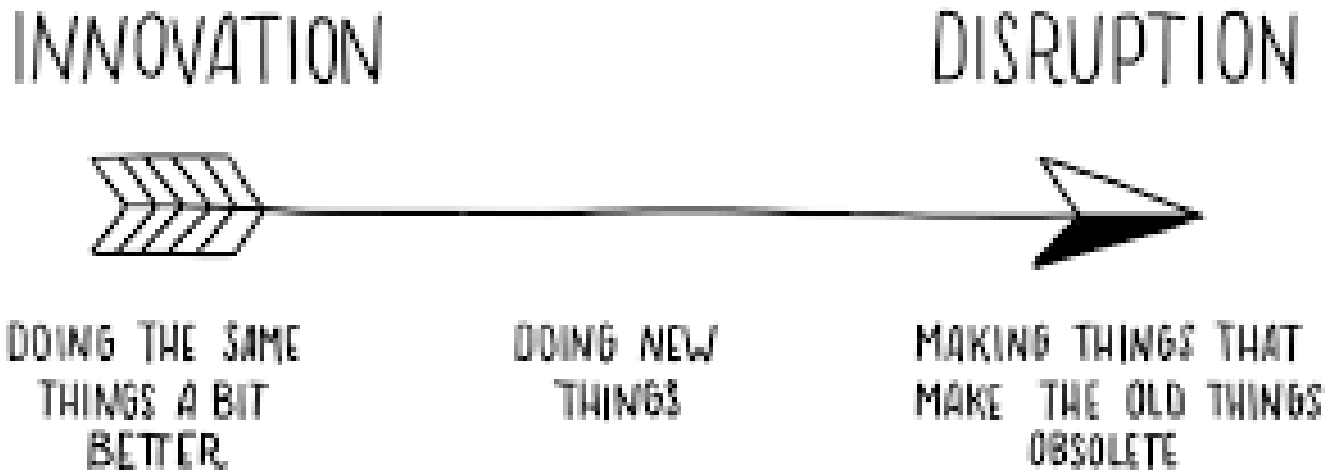
- By definition, disruptive innovations are not everyday events.
- But, they can redefine the space, open up new opportunities, challenge existing players and create new markets.
- This is a central theme in Schumpeter's original theory of innovation as a process **of creative destruction.**

Discontinuous innovation

Disruptive innovation usually comes through the **emergence of a new technology**.

- The invention of the steam engine triggered the industrial revolution.
- Tim Berner-Lee's pioneering work on the WWW helped shape the internet as most people perceive it today.
- Satoshi Nakamoto's design paper may trigger a similar disruptive innovation in the worlds of finance and decentralized networking – hence, we will study disruptive innovation in detail in this course.

Discontinuous or disruptive innovation



Innovation disruption

Flying car - 2018

You can now buy a flying car for $92,000

And you don't even need a pilot's license to fly it.

By **Kristin Houser**
October 28, 2021

Challenges

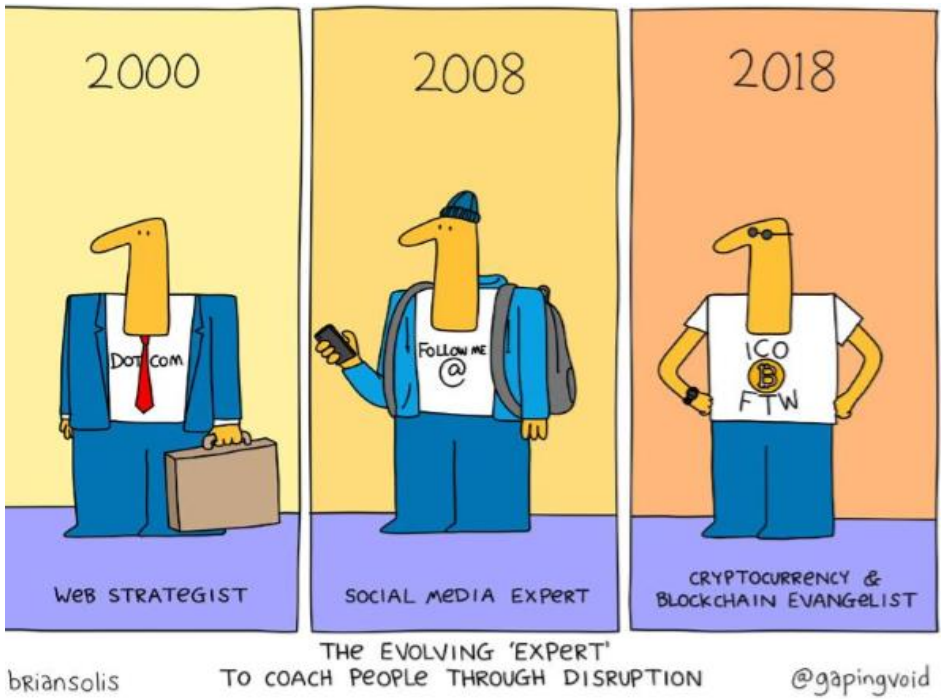
BUILDING A SOLARPUNK FUTURE

Fields

CLEAN ENERGY
TRANSPORTATION

Share

Technology disruption



3 Conclusions

Conclusions

- Four phases in innovation management: **Search, Select, Implement, Capture**.
- Four types of innovation (4Ps): **Product; Process; Position; Paradigm**.
- **Platforms** are very strong ways in which innovations can be diffused.
- **Disruptive innovations** may result from new technologies. They can redefine the space, open up new opportunities, challenge existing players and create new markets, through a process of **creative destruction.**

Conclusions

Constant revolutionizing of production, uninterrupted disturbance of all social conditions, everlasting uncertainty… all old-established national industries have been destroyed or are daily being destroyed. They are dislodged by new industries.

Karl Marx & Friedrich Engels, Communist Manifesto, 1848

- Innovation is the process of turning opportunity into ideas and of turning these into commercial practice.
- Innovation matters, both at the enterprise and at the economy level.
- Innovation-driven competitive advantage can be short-lived. Hence, the need for continuous innovation.

4. Further Reading & Exercises

Book (main textbook for this course)

- **Managing Innovation: Integrating Technological, Market and Organizational Change, 5th edition, Joe Tidd, John Bessant (Wiley, 2013, ISBN: 978-1-118-53859-3)**

  The classic MBA-level book for innovation management. It will not be required to purchase a copy of the book to complete this course, as all relevant material are included in the slides and accompanying material. However, the book is a good source for those interested in learning more about innovation.

Books (optional reading list)

- **Innovation and Entrepreneurship, Peter Drucker**

  Perhaps the most inclusive book on innovation, after this course's main reading book.

- **The Innovator's Dilemma, C. Christensen**

  Another classic, albeit a bit dated now.

- **Innovating at the Edge, Tim Jones**

  Focus on practice rather than theory.

- **Capitalism, Socialism and Democracy, J. Schumpeter**

  Published in 1950, still a classic to get a philosophical idea of where all this came from.

Articles (accompanying material) & exercises

- **58 Big Industries Blockchain Could Transform**

  Read this article and identify which of the applications listed you consider innovative and why.

- **Media Coverage of Bitcoin is Still a Total Disaster**

  Although the article was written in 2018 it is still interesting. Read this article (and the Washington Post piece it refers to) and argue whether Bitcoin is an innovation in terms of the claims made in the article.

Articles (accompanying material)

- https://www.financemagnates.com/cryptocurrency/news/defi-in-2020-is-decentralized-finance-really-ready-for-the-mainstream/
- https://www.globenewswire.com/news-release/2020/09/15/2094156/0/en/Mastercard-Launches-Central-Bank-Digital-Currencies-CBDCs-Testing-Platform-Enabling-Central-Banks-to-Assess-and-Explore-National-Digital-Currencies.html
- https://wirexapp.com/blog/post/first-phase-of-revolutionary-product-overhaul-and-mastercard-launched-0215
- https://wirexapp.com/blog/post/wirexs-mastercard-card-a-competition-killer-0238
- https://www.finextra.com/newsarticle/36532/mastercard-launches-cbdc-testing-platform-for-central-banks
- https://cointelegraph.com/news/the-bahamas-launches-world-s-first-cbdc-the-sand-dollar
- https://cointelegraph.com/news/the-cryptoruble-is-the-future-says-russian-policymaker
- https://www.digitaldollarproject.org/publications

Articles (accompanying material)

- https://www.forbes.com/sites/vipinbharathan/2020/10/24/peoples-bank-of-china-draft-law-provides-a-legal-basis-for-digital-currency-electronic-payments-dcep-and-bans-all-stablecoins-backed-by-renminbi-reserves/?sh=4db079c44c0d
- https://www.financemagnates.com/cryptocurrency/news/china-brings-law-to-categorize-crypto-passwords-ahead-of-cbdc-launch/
- https://www.coindesk.com/five-years-in-defi-now-defines-ethereum
- https://www.coindesk.com/defi-deflates-ethereum-reprieve-soaring-fees-congestion
- https://decrypt.co/46796/ethereum-price-1-5-billion-defi-markets
- https://decrypt.co/46585/siam-commercial-bank-in-thailand-delves-into-defi
- https://decrypt.co/46679/harvest-finance-offers-1-million-get-stolen-34-million-back
- https://news.bitcoin.com/iran-crypto-law-miners-bitcoin-central-bank/
- https://www.coindesk.com/iran-amends-law-to-allow-imports-to-be-funded-with-cryptocurrency
- https://cointelegraph.com/news/mongolia-s-largest-bank-to-offer-crypto-related-services

Articles (accompanying material) & exercises

- **Use Ethereum Applications**
- **90+ Ethereum apps you can use right now**

  Read this article and identify where you would place the applications listed in the 4 (or 5) Ps of innovation: product, process, position, paradigm, platform.

5. Self assessment exercises

Self-Assessment Exercises

1. Choose a crypto/blockchain company that you consider innovative. Answer the following questions:
   a. Why is this an innovation?
   b. What strategic/competitive advantage does this company have (or will gain) against existing and future competition?

Self-Assessment Exercises

2. Choose a country/region that you consider innovative in its approach to distributed ledger technologies and applications (either in general or in some vertical). Answer the following questions:

a. What is innovative about the approach/vision adopted?
b. What does the country/region have to gain by realizing its vision?
c. What are the critical success factors in realizing this vision? In other words, what are the main steps/initiatives it should adopt, according to your opinion?
d. What are the main challenges/risks it faces?

Self-Assessment Exercises

1. (follow-up from session 1) Choose a blockchain company that you consider innovative. Answer the following questions:
   a. What types of innovation is it based on, in terms of the 4Ps model?
   b. What are the main challenges/risks it may face in the future?

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Questions?

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