



UNIVERSITY *of* NICOSIA

Session 3

Sources of innovation Where should we begin?

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Learning objectives

- Understand factors that influence the process of innovation in organizations
- Understand where innovation ideas come from
- Explore the role of knowledge push and demand pull in innovation creation
- Highlight the importance of user-led and design-led innovation



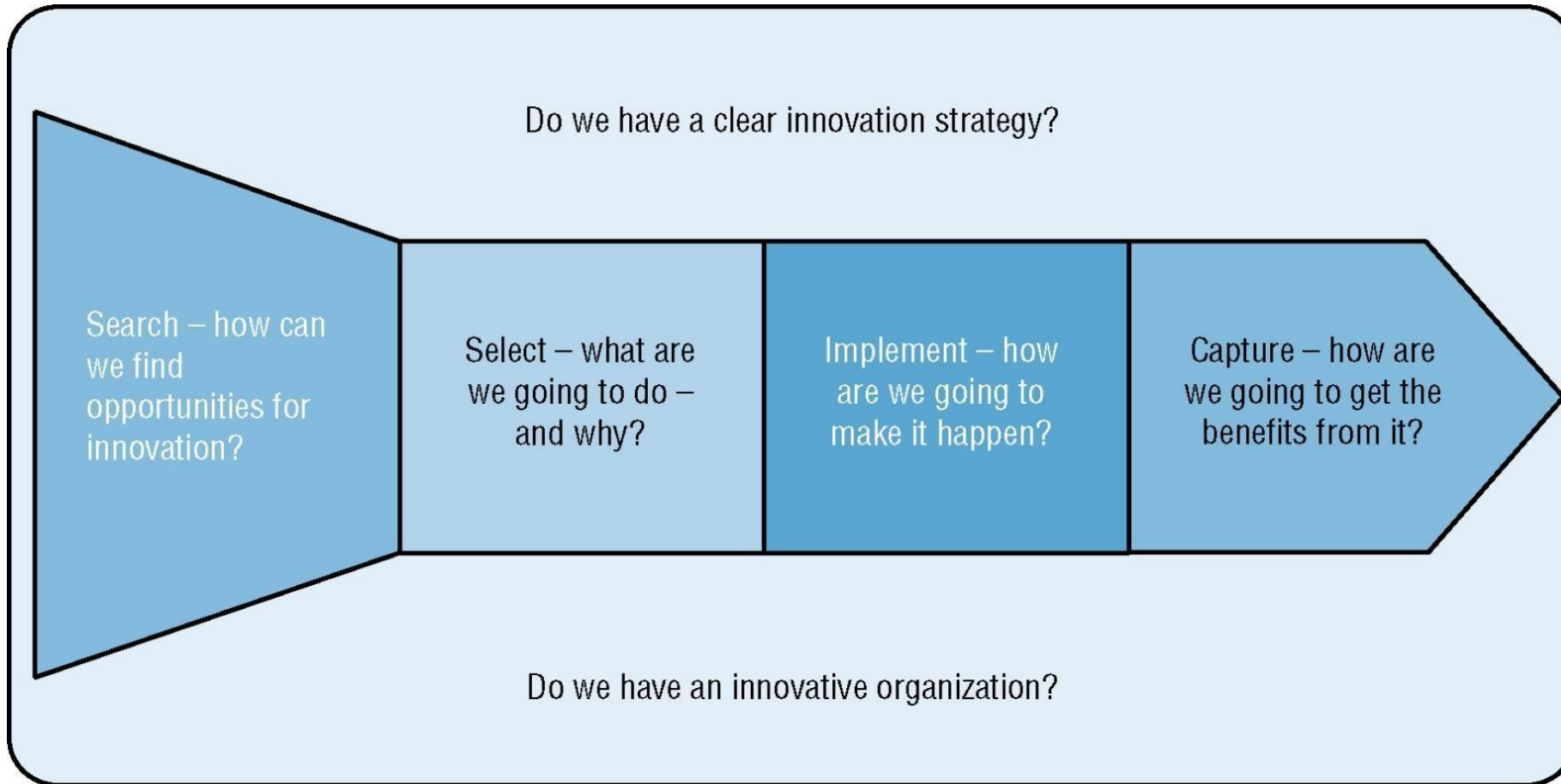
Session outline

1. Sources of innovation
2. Innovation networks
3. Forecasting innovation
4. Conclusions



1. Sources of Innovation

Innovation as a process (from session 1)



Possible innovation sources

Isaac Newton: Why apples are falling?



Possible innovation sources

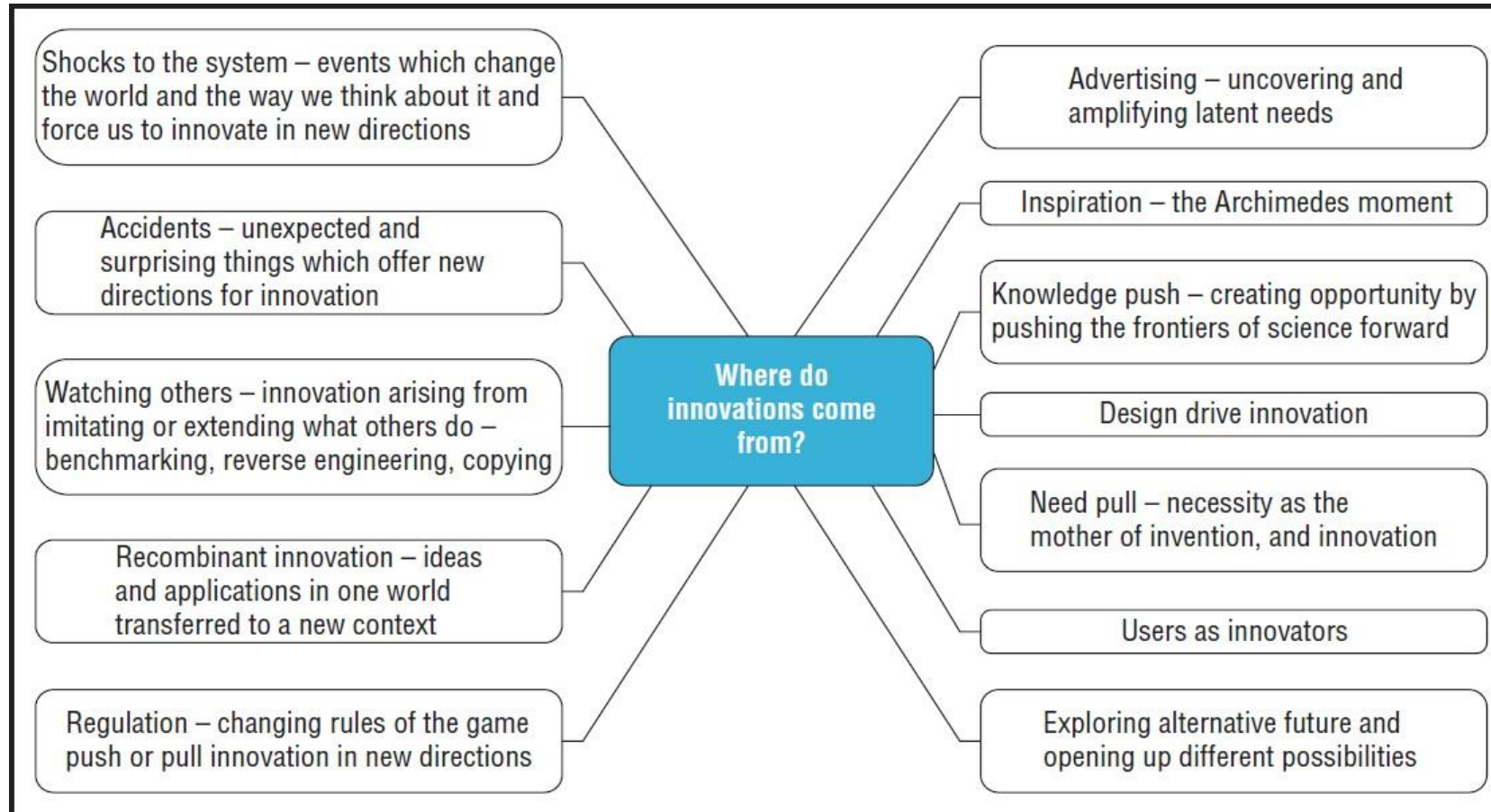
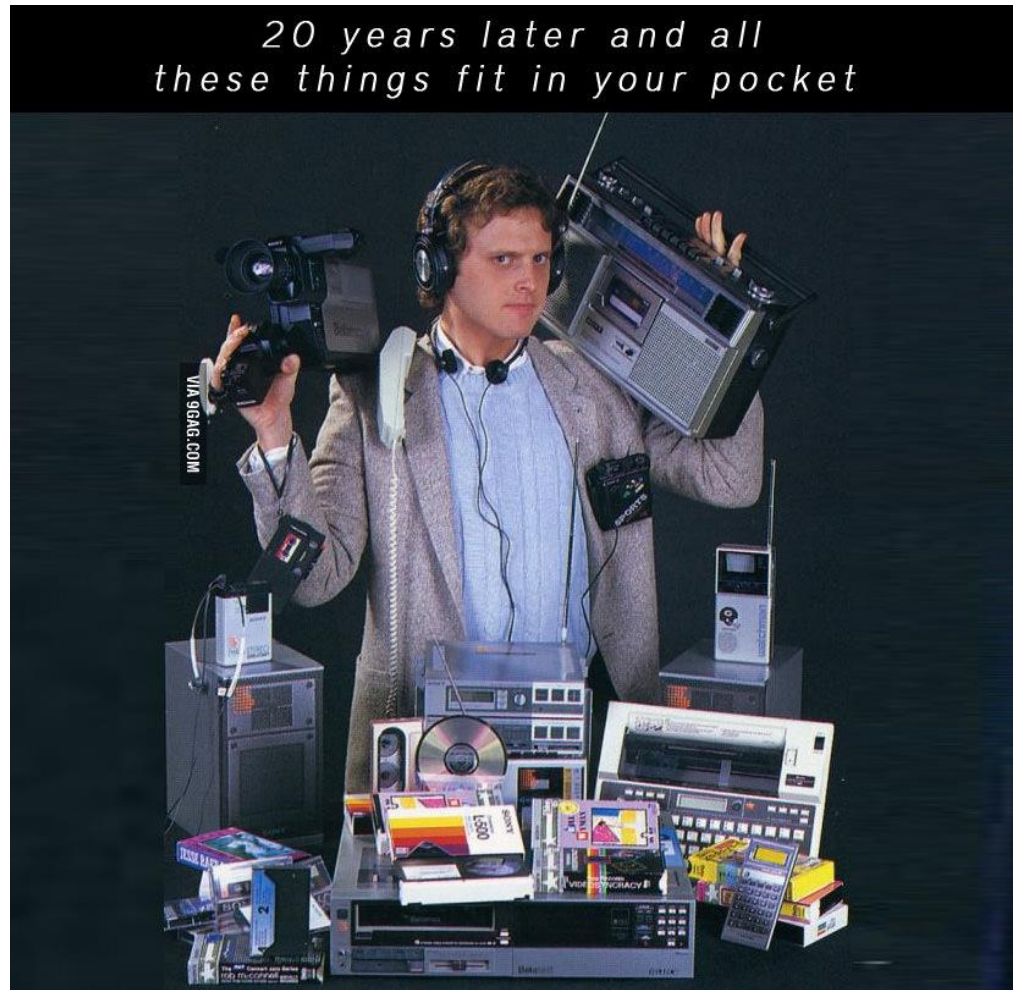


FIGURE 5.1 Where do innovations come from?

Example – General Magic (1989); an Apple spin off



General Magic: The team who invented the future



Possible innovation sources

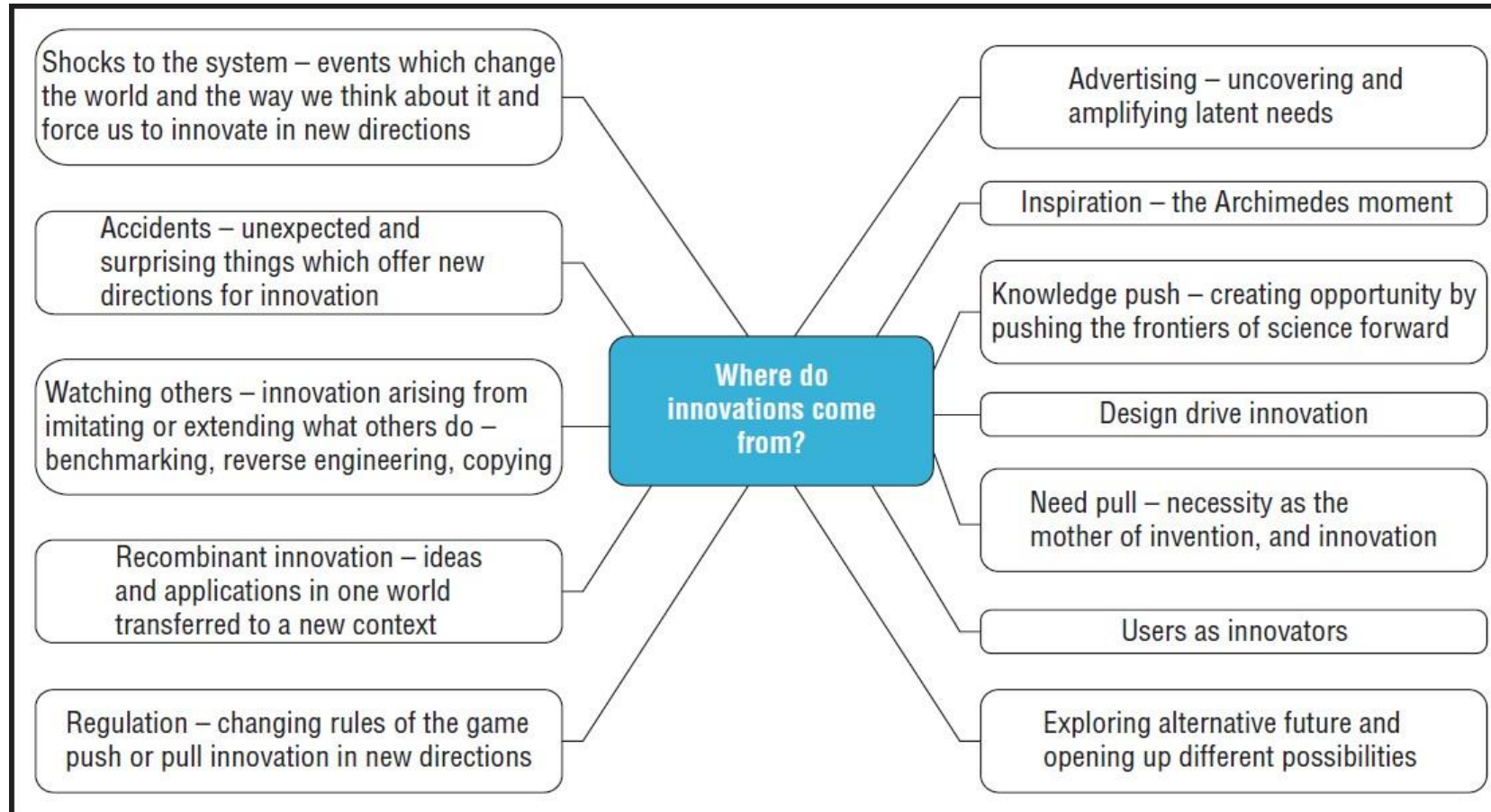


FIGURE 5.1 Where do innovations come from?

Knowledge Push

- An obvious source of innovation is results of scientific research
 - Research by **individuals** vs. the systematic exploration of knowledge frontiers by the scientific **community**
 - Bitcoin as result of Satoshi Nakamoto's design paper (solving the BZP through incentivization) vs. further innovation by other developers, researchers and entrepreneurs (e.g. Ethereum, PoS, CT, zk-SNARKs)
- Organized R&D effort has often been behind **product and process** innovations
 - Examples include: Fiber Optic Cables, Digital Imaging, Antibiotics, Cellular Telephony, etc.
- Scientific progress as the outcome of **continuous small-scale invention coupled with occasional breakthroughs** (see *T.S. Kuhn, The Structure of Scientific Revolutions*)
 - It may take years or decades to perfect a certain design – and a single invention to disrupt a whole industry.

Demand Pull

- Another obvious source of innovation is the **needs of the market** (users, customers, adopters)
 - Research may produce new products/processes – but, only those that meet a (real or perceived) market need
 - will stand a chance of market success ('necessity is the mother of invention')
 - Demand pull innovation is more important in established or mature markets
- In innovation management, the challenge is to **develop a clear understanding of customer needs**
 - Note: needs and innovations are not static (the bandwagon effect of innovation adoption, where adopters and innovations influence one another)
 - Note: needs need not even be real! (perceived needs; constructed needs)
- Demand pull is **also** the outcome of **continuous small-scale elaboration/differentiation, coupled with occasional radical new product/process offer**

Demand Pull dimensions

- **Address needs – but, whose needs?**
 - Understanding adopter behaviour is critical (marketing/psychology research)
 - Look at mass market (for scale); look at fringe markets (for new ideas); look at extreme markets (for user-led innovations)
 - Understanding needs vs. creating needs
- Address needs – but, **which** needs?
 - Market needs (for product/positioning innovations)
 - Internal company needs (for process innovation)
 - Social needs (for disruption; for platform/paradigm innovations)
- **When?**
 - Innovation production accelerates during crises – e.g. cryptography in WW II; Internet as a by-product of the Cold War; boosts to Bitcoin in financial crises or crises of confidence (e.g. Cyprus, Greece, China).

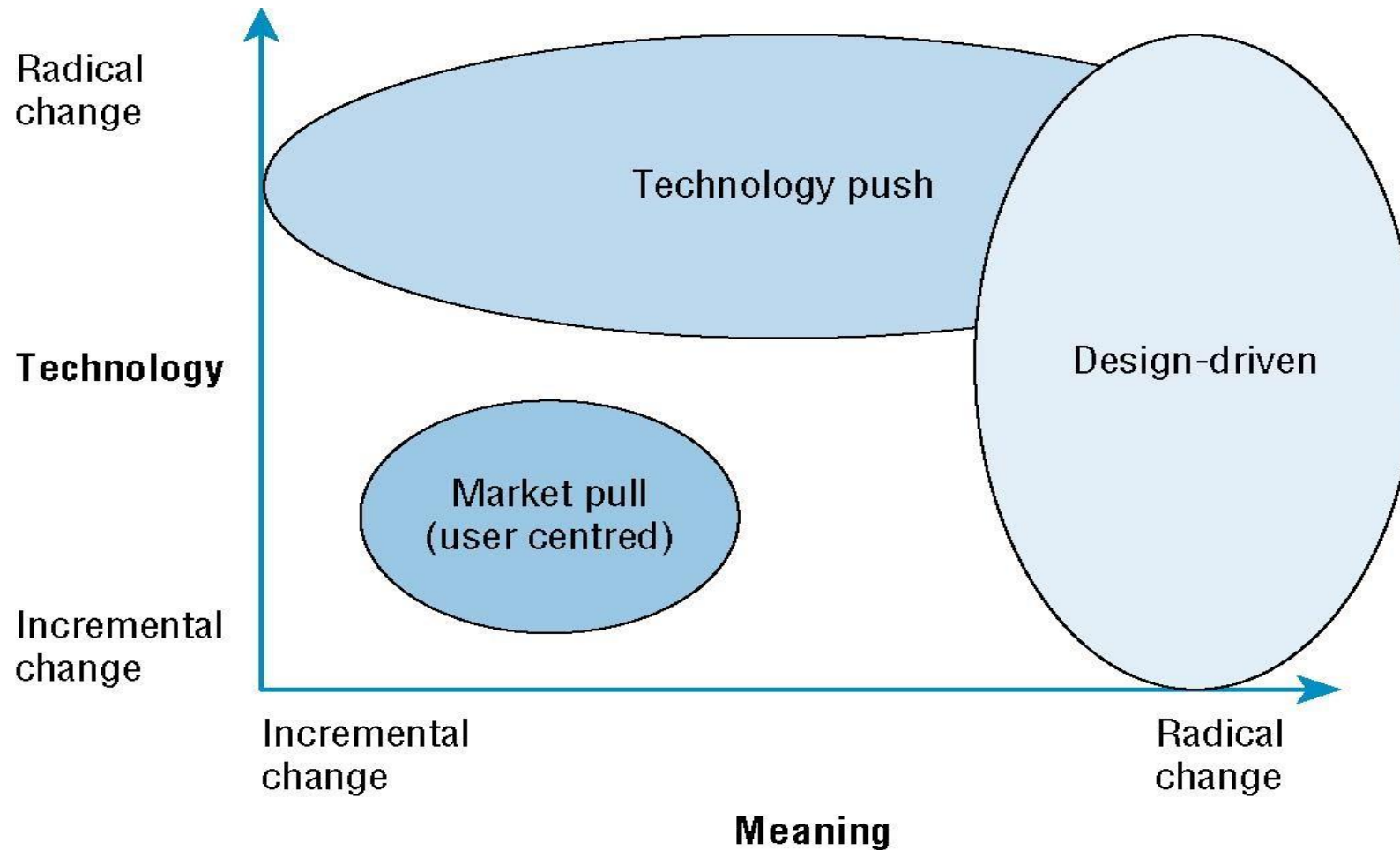
User-led innovation

- Demand pull may imply passive users; but, users sometimes innovate by experimenting and prototyping
- Innovation by user communities (e.g. Linux; FLOSS)
- Crowdsourcing approaches to co-creating innovations
 - App Store as an example of a co-created global application distribution platform (Apple created the platform; developers contributed the content)
 - Blockchain-based apps (Bitcoin provides the platform; entrepreneurs innovate through alt- coins, meta-coins, smart contract platforms, etc.)
 - The examples of OpenBazaar, DAO, ICOs: what can we learn?
- Users in extreme environments are also a potential source of innovation ideas
 - The origins of ABS (antilock break systems), the pickup truck, M-PESA, etc.

Design-led innovation

- Innovation may come as the result of a design process seeking to give meaning, shape and form to products – without drawing on (realized) user needs
 - Apple is a well-known example of a design-led pioneer that has repeatedly redefined products (iPod, iPhone) and markets (iPad & the tablet market)
- People do not buy products only to satisfy their needs
 - Important psychological/cultural factors may **shape needs** ('**experience innovation**')
 - The role of marketing
 - Examples: computer gaming; SMS (though not design-driven; innovation may also happen as a result of pure **chance!**)

Design-led innovation is radical



2. Innovation Networks

Types of innovation networks

Social network focus	Regional and business groups; communities of scientists and engineers	Diffusion and commercialization of innovations
	Portfolios of strategic alliances	Networks mobilized for a specific innovation
Actor network focus		
	Focus on general innovativeness	Focus on discrete innovations

Types of innovation networks

- Innovation has always been a multi-player game
 - The concept of **networks** has become popular as it offers the benefits of **internal development**, but with few of the drawbacks of **collaboration**
 - Networks are appropriate when **benefits of co-specialization outweigh costs of management**
- **Networks are complex**
 - Networks can be **tight or loose**, depending on the quantity, quality and type of interactions
 - Network typically have **emergent properties**: the whole may be greater than the sum of its parts
 - Flow and sharing of information may benefit all members – but, the position of an organization in the network (**network centrality**) is a matter of strategic importance and determines one's power and influence in the network
 - Sources (and benefits!) of power include: technology, expertise, trust, economic strength, legitimacy, etc.

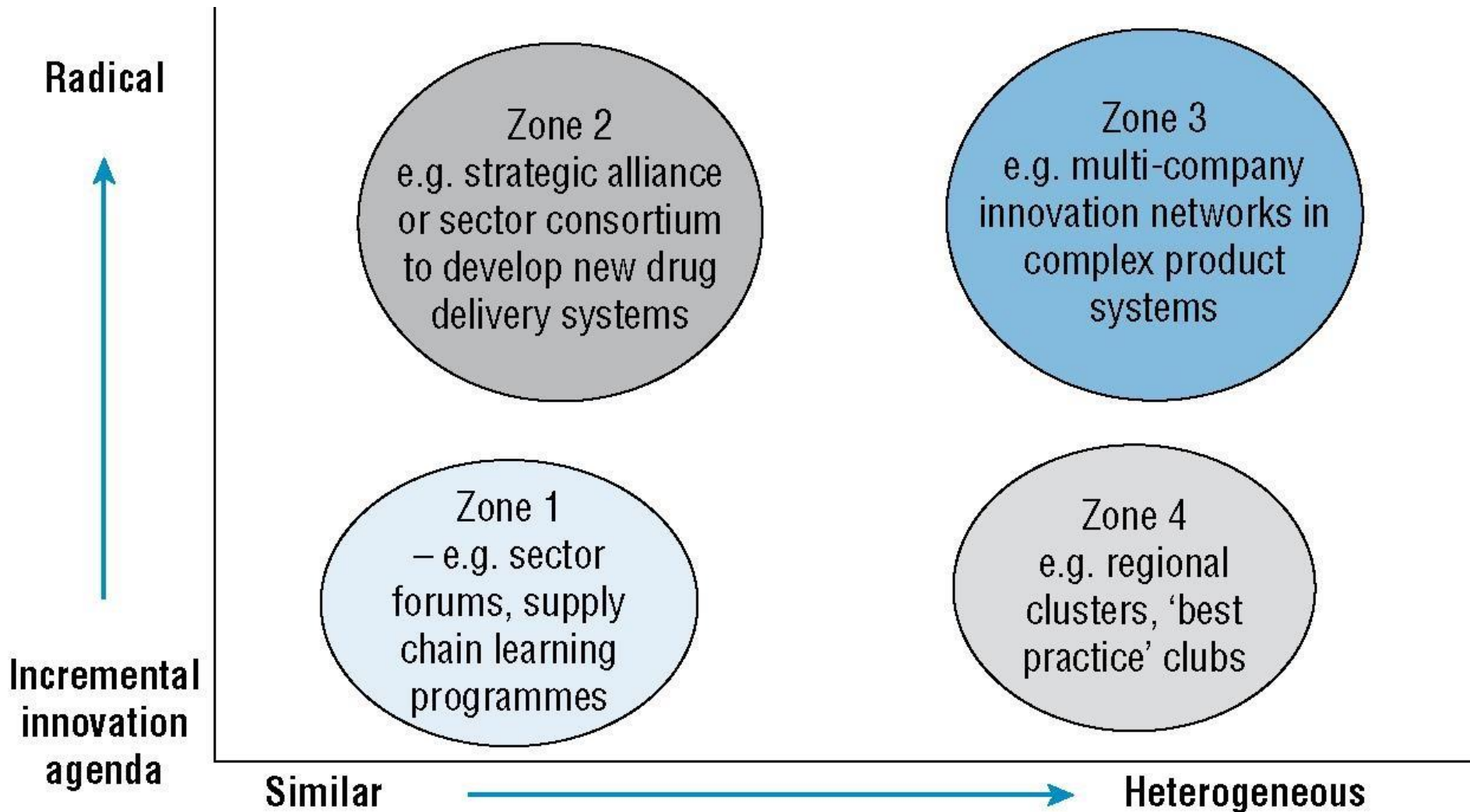
Benefits of networks

- Collective knowledge efficiency
 - Pool together **complementary knowledge sets** **Reduce risks** by sharing them
 - Gain **access to technologies and markets**
 - Benefit from **shared learning**
- **Long-lasting networks can create the capability to ride out major waves of**
- **change in the technological and economic environment.**

Network types

- **Entrepreneur-based:** bringing different complementary resources together to exploit opportunities.
- **Communities of practice:** Networks that involve players inside and across organizations (e.g. the network of bitcoin enthusiasts)
- **Regional clusters:** Networks of players being geographically close to each other, thriving on the opportunities afforded by proximity and shared culture/norms (e.g. Silicon Valley)
- **Sector networks:** Often organized by sector or business associations to bring their members together; driven by shared interests in preserving and extending shared innovations in products or processes
- **New product development consortia:** Sharing knowledge and skills in developing new products, standards or technologies (e.g. the NFC forum)

Zones of networks



Managing networks

- The challenge of learning to manage beyond the organization: collaboration and co-operation, not control
- The problem of **free-riding**: how to balance contribution with derived benefits
- The role of **catalysts and champions** in network formation and success: internally-driven vs. externally-envisioned networks
- **Network management**: formal vs. informal management structures
 - Boundary management
 - Conflict resolution
 - Risk/benefit sharing
 - Motivation
 - Decision-making
 - Co-ordination

3. Forecasting innovation

Forecasting innovation

- Forecasting has a pretty bad track record (*see next slide*)
 - The process (**forecasting**) is more valuable than the output (the **forecasts** themselves)
 - Trade-offs between the cost and the robustness of a forecast
- **Forecasting techniques** fall into two categories:
 - **Normative**: trend extrapolation; time series analysis; regression
 - **Exploratory**: market surveys; brainstorming (structured idea generation); Delphi method (expert opinions); scenario planning
- Naturally, **normative forecasting is more suited for incremental innovations and stable markets**. It can be next to useless in discontinuities and paradigm changes.

Forecasting failures

- “I think there is a world market for about five computers” (T. Watson, CEO IBM, 1948)
- “I cannot conceive of any vital disaster happening to this vessel” (Captain of the *Titanic*, 1912)
- “The war in Vietnam is going well and will succeed” (R.MacNamara, 1963)

Forecasting successes

- Not all forecasts are wrong: even in the earliest stages of disruptive innovations, when things are still totally unclear, charismatic leaders can discern the basic outlines and strategize accordingly.
- See the memo written by Bill Gates on the coming internet tidal wave in May 1995:
<http://www.lettersofnote.com/2011/07/internet-tidal-wave.html>

4. Conclusions

Conclusions

- Innovation ideas may have multiple origins: knowledge push (research) and demand pull (need) are two main innovation trigger points.
- Demand-driven innovation ideas may come from **niche markets**. **Start-ups are better positioned** to identify and exploit such markets, thereby igniting processes for market disruption.
- **User-led innovation** (incl. innovation crowdsourcing), **design-led innovation** (incl. experience innovation) and **sheer chance** are other examples of innovation triggers.
- Formal or informal **networks are great ways to accelerate innovation and share the risks** of innovation production.
- Some types of networks include: **communities of practice, regional clusters, sector networks and new product development consortia**.
- The benefits of networking need to be evaluated against the **risks and costs of network management and co-ordination**.

5. Further reading and exercises

Further reading

- Fauchard, E. and Gruber, M. (2011) Darwinians, Communitarians, and Missionaries: the role of founder identity in entrepreneurship. *Academy of Management Journal*, 54, 5, pp. 935-957. (on the different psyches of entrepreneurs)
- Cooke, P. (2007) *Regional Knowledge Economies: Markets, Clusters and Innovation*. (on innovation clusters and constructed advantage)
- Vise, D. (2008) *The Google Story* (a case-based approach to successful innovation management – a bit dated now)
- Brandt, R. (2011) *One Click: Jeff Bezos and the Rise of Amazon.com*
- Isaacson, W. (2011) *Steve Jobs: The Authorized Biography* (biographies of innovators)

Further reading

<https://www.imf.org/en/Publications/WP/Issues/2020/06/26/A-Survey-of-Research-on-Retail-Central-Bank-Digital-Currency-49517>

<https://www.imf.org/en/Publications/Policy-Papers/Issues/2020/10/17/Digital-Money-Across-Borders-Macro-Financial-Implications-49823>

<https://www.imf.org/en/News/Articles/2019/05/13/sp051419-stablecoins-central-bank-digital-currencies-and-cross-border-payments>

<https://meetings.imf.org/en/2020/Annual/Schedule/2020/10/19/imf-cross-border-payments-a-vision-for-the-future>

Further reading

36 cognitive biases that inhibit innovation

Read this article and reflect on which of the biases presented might affect your own (or your organization's) ability to innovate.

A regulatory approach to fintech

Going cashless

Monetary policy in the digital age

Read these three articles (from the International Monetary Fund) and discuss how organizations in the financial services sectors (e.g. banks) can manage innovation due to crypto-currencies and other fintech.

Also, think how regulators may approach the challenges discussed in these articles (especially the one written by Christine Lagarde) so that the ecosystem has clear guidelines and standards, without stifling innovations by new entrants in the field.

Further reading

- [Peak Valley](#)
- [Peak Valley?](#)
- Read these two articles (the first one published in The Economist and the second one Fred Wilson's view of it) and discuss the challenges of innovation networks (e.g. the case of Silicon Valley, which is discussed in the articles), not only in attracting innovation, but also in maintaining it, especially in the face of global competition.

Further reading

- Von Hippel, E. (1988) Sources of Innovation, MIT Press (dated, but still a classic on the topic of searching for innovation ideas)
- Von Hippel, E. (2005) The Democratization of Innovation, MIT Press (a complement to the previous book)
- Christensen, C.M., Anthony, S.D. and Roth, E.A. (2004) Seeing What's Next, Harvard Business Review Press (a particular look at fringe markets and unmet needs as sources of innovation)
- Hargadon, A. (2003) How Breakthroughs Happen, Harvard Business School Press (a journey through innovation networks)
- Sloane, P. (2011) A Guide to Open Innovation and Crowdsourcing, Kogan Page (a review of the emerging trend to engaging wide participation in innovation production)

Further reading

- Rogers, E. (2003) *Diffusion of Innovations* (5th ed.), Free Press (the classic text on models of innovation adoption and the S-curve)
- Cooper, R. (2001) ***Winning at New Products (3rd ed.)***, Kogan Page (innovation decision-making, project selection and stage-gate models)
- Griffin, A. (2012) ***The PDMA Handbook of New Product Development (3rd ed.)***, Wiley (a practical handbook with tools and methods for NPD)

Further reading

- **The Smart Contract Effect Network Fallacy**
- **On the Network Effects of Stores of Value**

Interesting thoughts on the existence (or not) of network effects in Bitcoin and smart contracts.

- **Drinking from the Crypto Firehose**

Read both the blog post and the comments below for a good overview of where we are (or might be) in the process of innovation diffusion in crypto.



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Questions?

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