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Introduction to Digital Platforms

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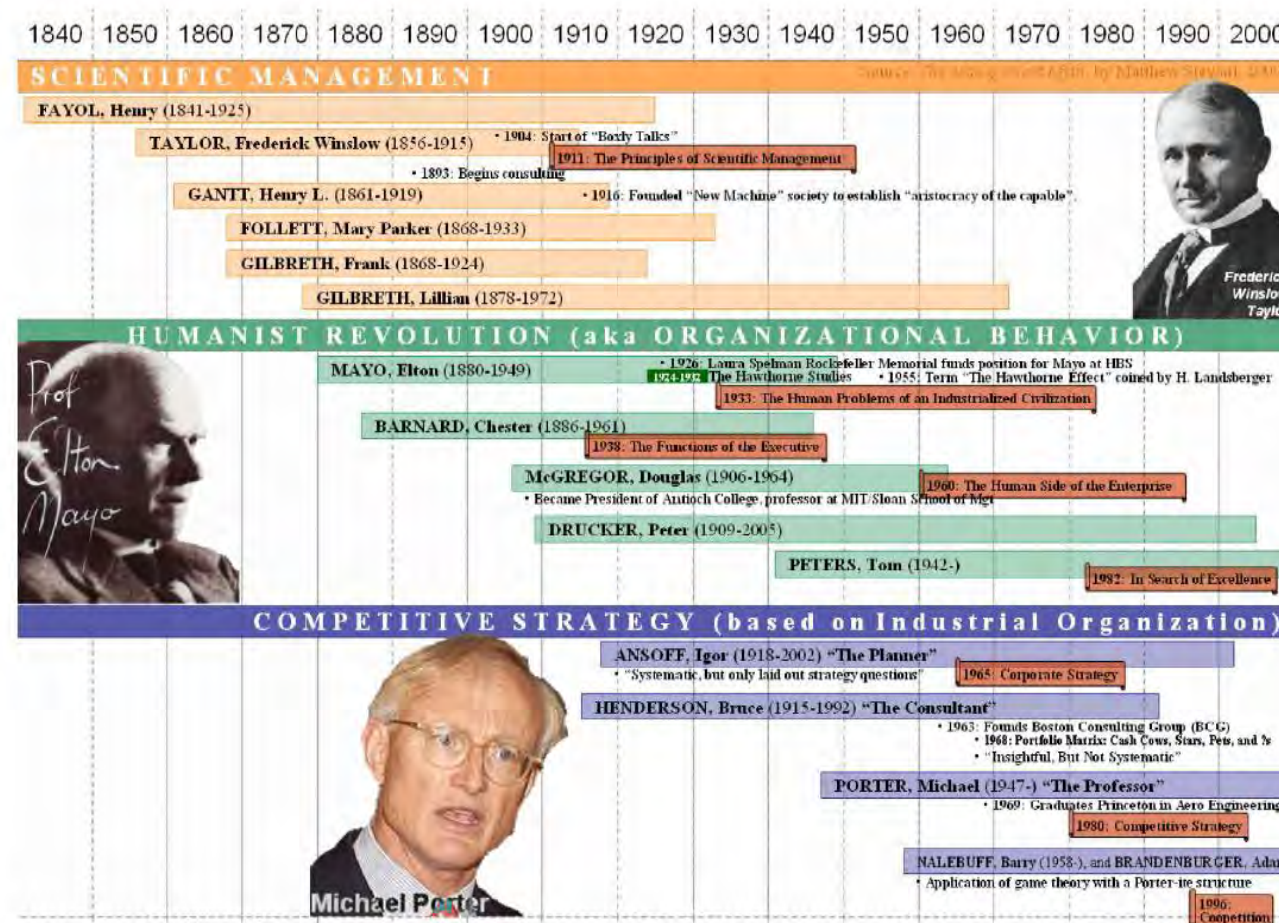
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Agenda

- I. Pipeline vs. platform business organization**
- II. Seeing through the thicket: platforms, ecosystems and networks**
- III. Types of platforms**
- IV. Constituents in Digital Platform Ecosystems and their role**
- V. Platform conceptualization in engineering and economics**
 - I. Key concepts of digital platforms in economics**
 - II. Key concepts of digital platforms in engineering**

Digital Platform Enterprise

Why this topic?



For the last 150 years pipeline enterprises have been dominant

Major changes in organisational functioning triggered by technological breakthroughs

Focus:

- control and optimization of resources and process flow in one enterprise
- hierarchical organisation
- focus on customer value optimization

Source: http://academic.cankaya.edu.tr/~bozsacmaci/course_materials/MAN102/History%20of%20Management%20Thought.pdf

Digital Platform Enterprise

Why this topic?

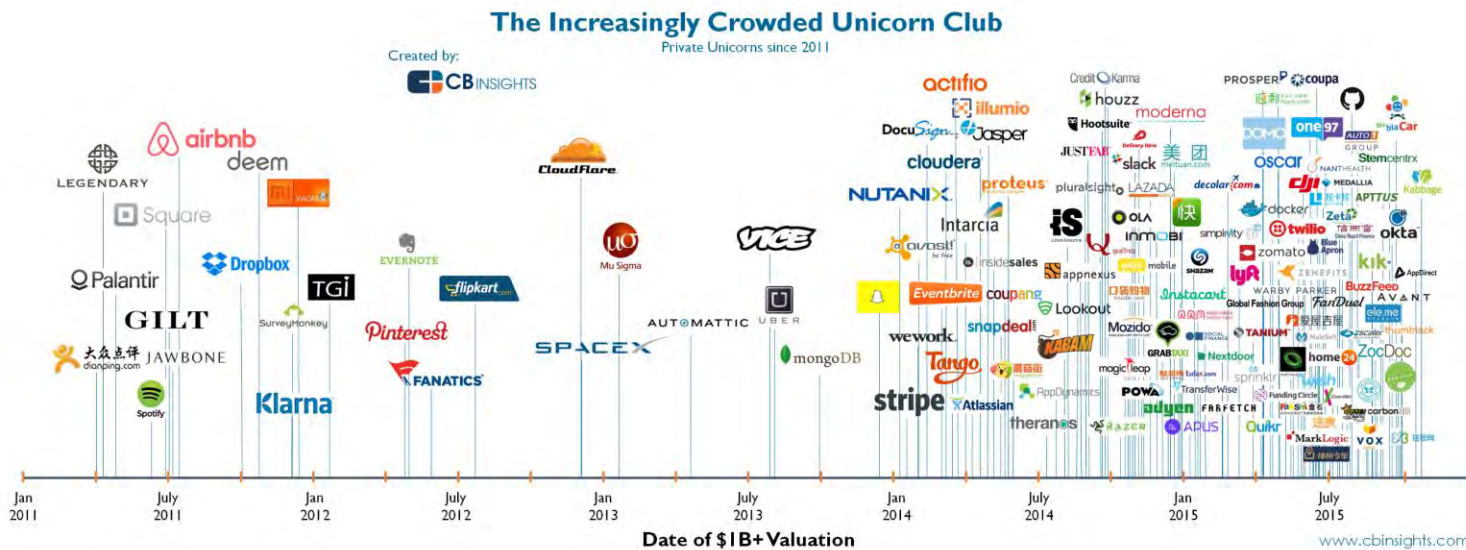


Platform Enterprises emerge as a new contender in work and economical organisation

Triggered through digitalisation

Focus:

- capability to harness economies of scale and scope both on the demand-side and supply side
- coordination of resource allocation within a network
- incentivizing cooperation of independent actors within a network
- multi-focus on optimizing value of network



Baseline question...

When does a regular enterprise (i.e. a pipeline business) transform into a platform business and develops an ecosystem?

When the critical decision factor or the critical supply source gets digitized.

Examples

Amazon, Netflix – digitization of buyer behaviour

AirBnB - digitization of identity and trust

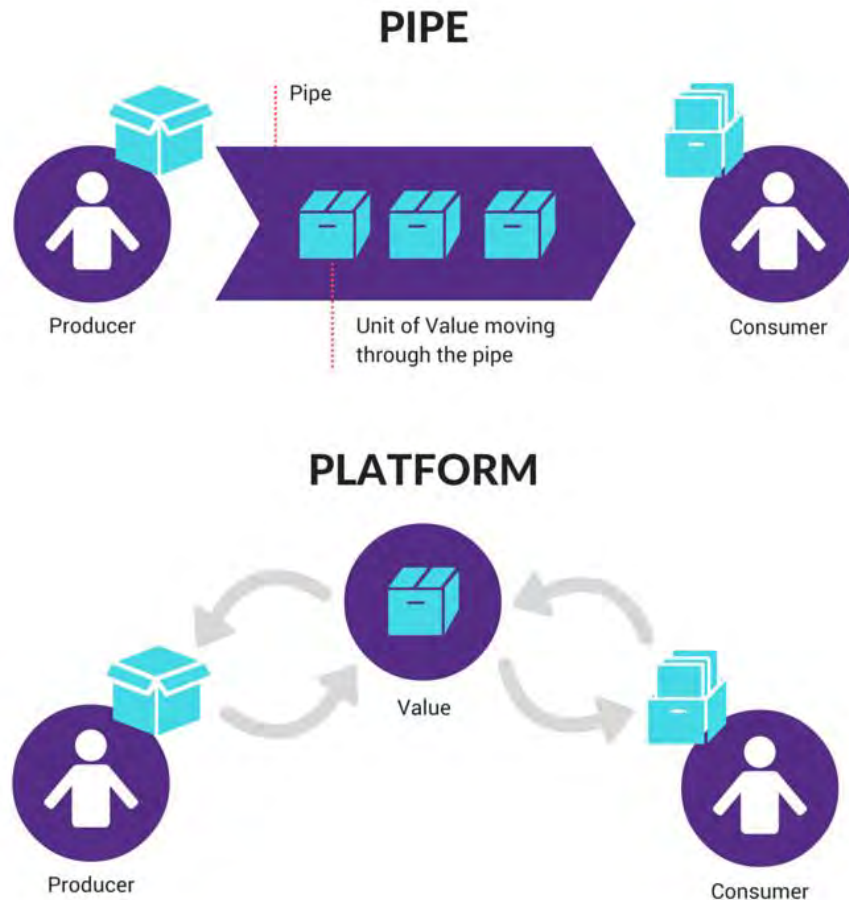
Uber, Lyft – digitization of location

Rolls-Royce (airplane engines)- digitization of machine performance

Source: Digital Platforms, Sanget Choudray



What transforms when going from pipeline to platform?

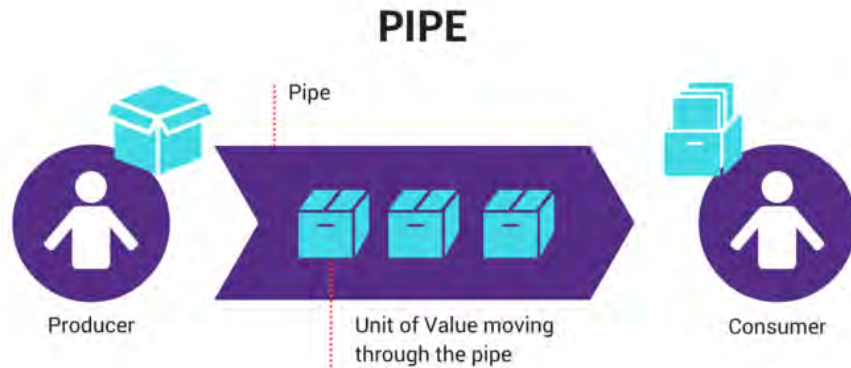


- Main differences in:**
- Resource flow
 - Organizational model
 - Value delivery

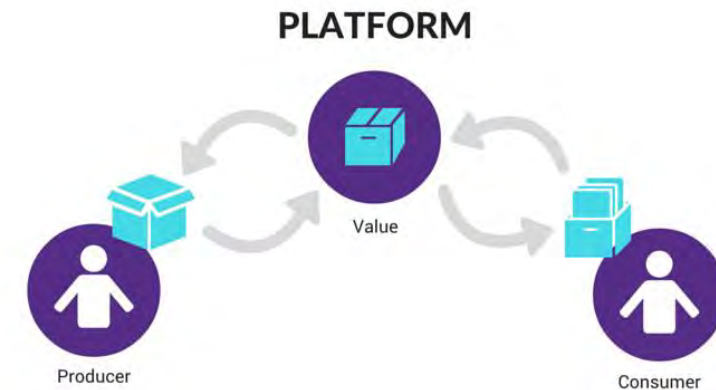
Source: <https://codersera.com/blog/platform-business-vs-pipeline-business/>

Pipelines vs. platforms [1]

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- **Resource flow** - control and optimization of resource flow in one enterprise and vertical integration (mostly supply chain)
- **Organizational model** - hierarchical organization and control within the organization
- **Value delivery** - customer value optimization



- **Resource flow** - coordination of resource allocation within a network
- **Organizational model** - incentivizing cooperation of independent actors within a network
- **Value delivery** - multi-focus on optimizing the value of the network employing different control and incentive mechanisms

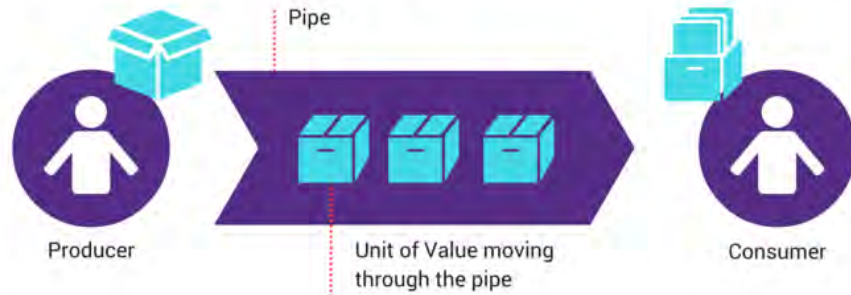
Source: <https://codersera.com/blog/platform-business-vs-pipeline-business/>



Pipelines vs. platforms: Examples



PIPE



PLATFORM



Transaction Platforms		Innovation Platforms	
Social Networks 	Crowdsourced Content 	Operating Systems 	Processors
Marketplaces 	Communication 	Enterprise Software 	Cloud Computing
Financial Exchanges 	Payment Networks 	Gaming 	Browser

Source: <https://codersera.com/blog/platform-business-vs-pipeline-business/>

Source: <https://www.andremuscat.com/4-types-of-platform-business-models/>



Funded by the European Union

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II. Seeing through the thicket: platforms, ecosystems and networks



Some definitions.....

Platform

... a group of technologies that are used as a base upon which other applications, processes or technologies are developed [2]

...a **network** designed and implemented in such a way as to support “value creation processes” [3]

...multi-sided technology enabled, markets which bring together different sides in order to facilitate exchange [7]

...shared market for software and services, together with the relationships among them. These relationships are frequently underpinned by a common technological platform or market and operate through the exchange of information, resources and artifacts [8]

Some definitions.....

Ecosystem....

- is the sum of all constituents who are active in it and all patterns of interaction employed in order to create and consume value.
- ecosystems as gatherings or different actors who come together in a common process in order to create value, which they exploit for business purposes.
- platform-based ecosystem can be viewed as a meta-organization which (a) has a governing role among the member organizations, (b) has the capability to harness economies of scale and of scope both on the supply-side and on the demand-side, and (c) is driven by a platform-core with technological attributes like modularity and defined architecture [4].
- sum of a software-based platform and the modules which are specific to it [5]

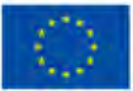
Digital Platform Ecosystem (or Enterprise)

Is defined as a software-based core (platform) which provides the conceptual and technological functionalities for third-parties to innovate. Additionally, the platform facilitates the exchange of goods and services between two or more parties, under the consideration of network effects.

Main pillars:

- (a) the actors and their interaction with the ecosystem,**
- (b) technology which enables value creation,**
- (c) a business purpose, and**
- (d) an interdependency of roles, technology and business model in order to be able to realize the intended purpose.**

III. Types of platforms



Types of platforms

Differentiation of platform types is done in scientific research along two dimensions:

- Type of activities central to the platform ecosystem
- Asset endowment

Types of platforms

Transaction platforms – are concerned with matching, i.e. acting as intermediaries, between buyers/suppliers and sellers/users, for the transaction of products and/or services.

They follow the business model of a ‘market place (or bazar)’ and transfer this concept into the digital world through technological facilitation (internet and technology-supported matching mechanisms) [4].

Examples: eBay, Visa, Mastercard, eHarmony, Tinder, Uber etc.

Types of platforms

Innovation platforms – are a technological foundation upon which others, either firms or individuals, can develop complementary products or services. This type of platforms aims to harness the potential of open innovation (Chesbrough, 2003) through extending the boundary of the platform organization [4].

Examples: Linux, Microsoft, Intel etc.

Types of platforms

Integrated platforms – merge aspects of the two previous types, i.e. by facilitating transactions but also by providing an ecosystem for content and application development by developers of complementary products/services [4].

Examples: Apple, Google, Facebook, and SAP etc.

Investment platforms – organizations who follow a portfolio and investment strategy in other platform organizations [4].

Examples: Rocket Internet and Priceline Group etc.

Types of platforms

Asset heavy – mainly incumbents, endowed with a significant number of physical assets as well as large numbers of employees, which aim to diversify their offerings or change their business model into a platform-based one [4].

Examples: Daimler Moovel, GE Predix, Samsung Tizen etc.

Mixed – have both physical asset base and significant no. of employees in addition to platform ecosystem [4].

Examples: Apple and Amazon App stores etc.

Asset light – manage few physical resources and employees. Focus business on the platform ecosystem [4].

Examples: Booking.com, Uber, AirBnB

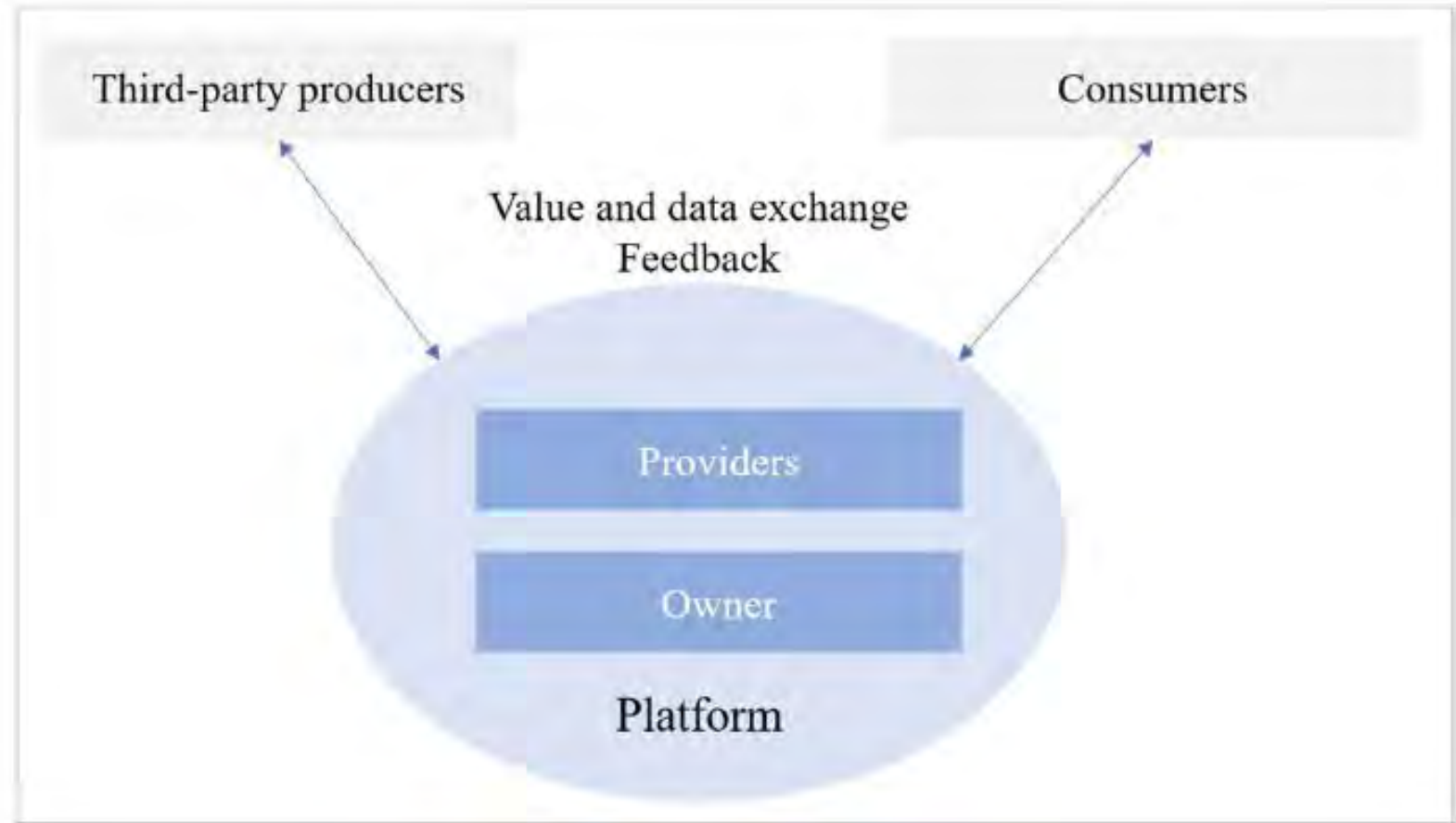
III. Constitutents of Digital Platform Ecosystems and their role



Constitutents of an ecosystem

Actor types:

- (a) the platform owner,
- (b) the platform provider,
- (c) the producer and
- (d) the consumer [1]



Constitutents of an ecosystem



- **The platform owner** is in control of the intellectual property rights as well as the governance of the ecosystem.
- **The platform provider** makes the platform available on the technological level by providing the implementation of the core.
Additionally, he mediates interactions between the parties involved in the ecosystem.



Constitutents of an ecosystem



- **Third-party producers (or complementors)** independent third-party firms or individuals who extend the platform core by innovating add-on functionality and use platform functionality to build complementary products atop the platform, which they then offer through a marketplace to the consumers.
- **Consumer(s)** are individuals and organizations that interact with the digital ecosystem in order to consume the value created. The transactions between the consumers and the digital ecosystem might be monetary or non-monetary.

Note: What is the difference between a consumer and a customer?



IV. Platform conceptualization in engineering and economics



Perspectives of different disciplines



Literature	Economics	Engineering design
Platform conceptualization	Markets	Technological architectures
Perspective	Demand	Supply
Focus	Competition	Innovation
Role	Coordinating device among buyers and sellers	Coordinating device among innovators
Empirical settings	ICT	Manufacturing and ICT

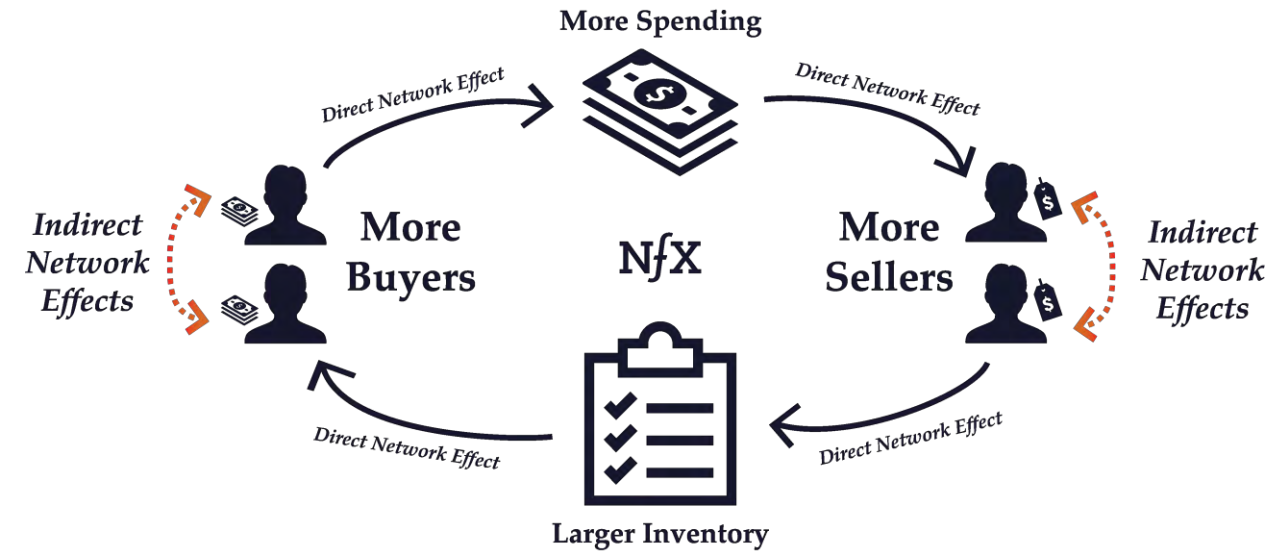
Source: [4]



Key concepts in economics

Direct and indirect network effects

- **Direct network effects:** occur when the value of the network increases as a result of one type of node benefiting from the other type of node.
- **Indirect network effects:** occur when the value of a network increases as a result of one type of node benefiting another type of node directly, but not directly benefiting the other nodes of its same type.



For detailed information see
lecture on Revenue Models

Source: [Indirect Network Effects](#) | [The Network Effects Bible](#) | [Guides](#)

Key concepts in economics



Chicken and egg paradoxon

- Relates to the question: what was first, the chicken or the egg?
- Direct relation to direct network effects
- In platforms refers to the need of the platform provider to lure both sides into joining the platform, even if it is worthless as the other side has not yet joined
- Solution to the problem is in the platforms' market seeding strategy, or "Stand-Alone Mode" (Choundray), i.e. subsidising one side of the audience to bring them to the platform first

Types of subsidies:

- Free access for one side
- Free content for one side
- Freemium model
- Paying one side for access
- Reputational subsidies (i.e. tournaments)



For detailed information see
lecture on Revenue Models



Key concepts in economics



Lock-In Effect (Switching Costs)

- the choices we make today restrict the choices we can make in the future => lock-in
- software-based platforms increase the lock-in effect as information is stored, managed and processed in integrated systems, which are hard to replicate or re-learn => digitalization increases lock-in
- Lock-in must be looked at from the role perspective (platform owner, complementor, customer) => decision if lock-in is desired and which level of lock-in is acceptable will depend on the role (risk/reward principle)

Examples of lock-in (switching costs):

- Contractual commitments
- Infrastructure and other material investments
- Training which provides proprietary knowledge
- Information and databases
- Specialized suppliers
- Search costs



For detailed information see
lecture on Revenue Models

Key concepts in economics



Multi-homing (closely related to lock-in)

- if more than one platform exists that serves the same purpose the two sides (third-party producers and consumers) of the platform might be interested in joining more than one ecosystem
- inflicts high costs on one side of the platform
- which side to 'lock-in' through high switching costs is a decision the platform owner will need to make depending on his core business and the price sensitivity of the two sides



For detailed information see
lecture on Revenue Models

Key concepts in engineering



Architecture

- is the conceptual design, which shows **what** the components of the platform are, **how** they **depend** on each other and **how** they can **interact** in order to perform the intended functionality.
- defines **what part of system belongs to the platform core and which to the modules.**
- embeds the principles guiding the design and evolution of the platform [9]
- **restricts the level of freedom** (in terms so adaptability, flexibility, modularity etc.) available in the system through normative decisions
- is a coordinating function over time

To be suitable as a core of an ecosystem they must exhibit, at least the following properties:

- Decomposition
- Extensibility
- Modularity
- Reusability
- Design rules



For detailed information see
lecture on Platform Architectures

Key concepts in engineering



Interfaces (APIs)

- describe how the components of the platform and the complementary modules exchange information. (Tiwana et. al, 2010)
- are a collection of commands, protocols and functions which are made available through interfaces by the platform provider to the complementors
- standardized = stable and well-documented
- standardization reduces asset specificity, increases reusability
- Popular technologies used for exposure are REST and SOAP



For detailed information see
lecture on Digital Platform Technologies
and lecture on Interoperability



Key concepts in engineering



Components/Modules/Services

- assets produced by third-parties which “connect to the platform to add functionality” (Tiwana et. al, 2010)
- must comply to the specifications of the core or at least with that of APIs.
- depending on the degree of modularization and encapsulation components/modules must also consider the platform’s architecture in the micro-architecture design of their applications.



For detailed information see
lecture on Digital Technologies
and lecture on Interoperability



Self-check



- What is critical to transforming pipelines into platforms?
- Name at least three media platforms you know. Argument based on their characteristics why you consider them to be platforms.
- What are integrated platforms?
- What are direct and indirect network effects?
- Volkswagen builds several of its car models (Skoda, Volkswagen, Porsche) on the same platform. Is Volkswagen a platform enterprise?
- Identify which of the following are platform enterprises and argument why or why not:
 - Tesla
 - Coursera
 - Crowdfund
 - Netflix
 - Zoom
 - WhatsApp



References

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