

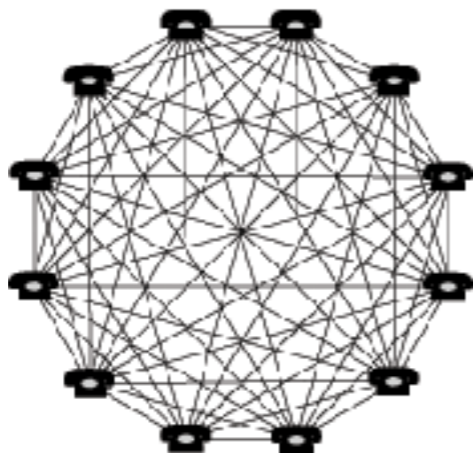
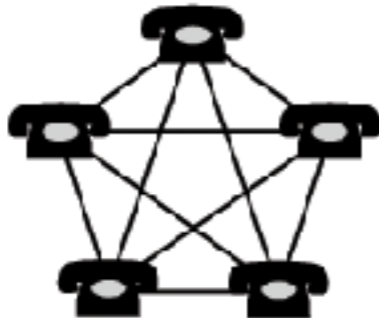
Innovation and Entrepreneurship

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Network Effect

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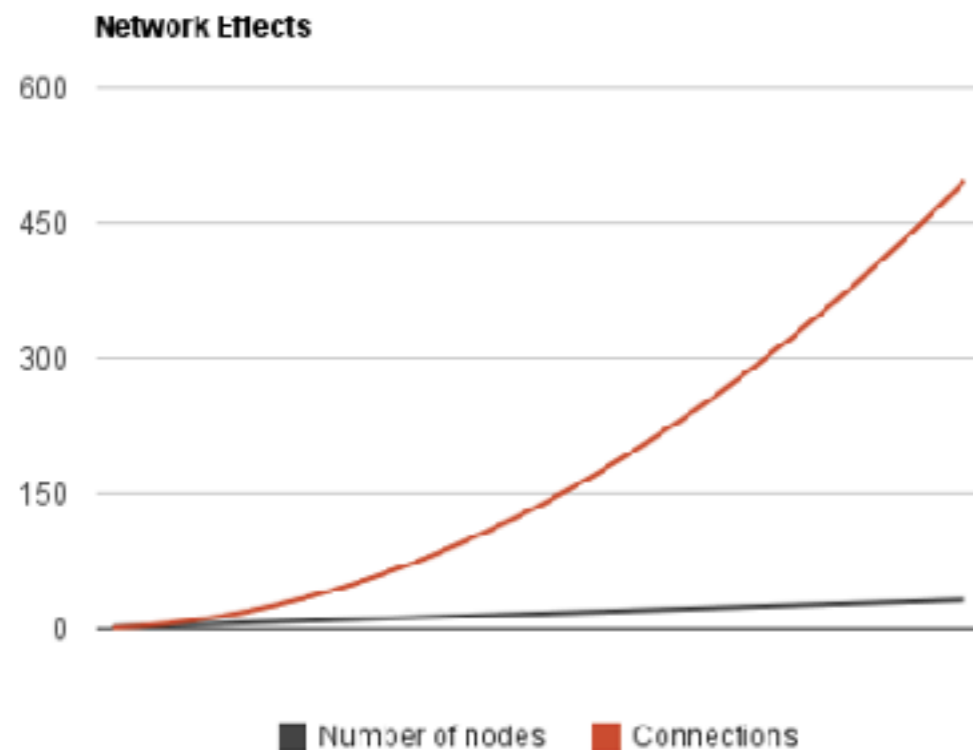
**“Come here Mr.
Watson, I want to
see you!”**



- In 1876 Bell made the first telephone call. There were only 2 telephones.
- In 1878 the Bell Company had 10000 telephones in service.
- **What happened to the value of the telephonic network between 1876 and 1878?**
- **How much was the utility for a user to join the network in 1876? And in 1878?**

Metcalfe's Law

- The value of a telecommunication network is proportional to the square of the number of connected users.
- Given n users of a network, the number of possible connections that can be made is:
$$n(n-1) = O(n^2)$$
- Explain the **growth** of many technologies ranging from phones, cell phones, and faxes to web applications and social networks.



Network Effect

- The value that a consumer extracts from a product or service depends on the number of people using that product or service as well
- Network effect give rise to **positive feedback**: when I buy a fax machine, the value of your fax machine is enhanced since you can now send faxes to me and receive faxes from me. Even if you don't have a fax machine yet, you are more tempted to get one yourself since you can now use it to communicate with me.



Network Effect Types

- Two types of Network Effects:
- **Direct**: An increase in usage leads to a direct increase in value for other users (e.g. telephone: the more people have telephones, the more valuable the telephone is to each user)
- **Indirect**: increasing in usage of the product spawns the production of increasingly valuable complementary goods, and this results in an increase in the value of the original product (e.g. softwares for OS: more people use an OS, more software is developed, more softwares = more reasons to use the OS)



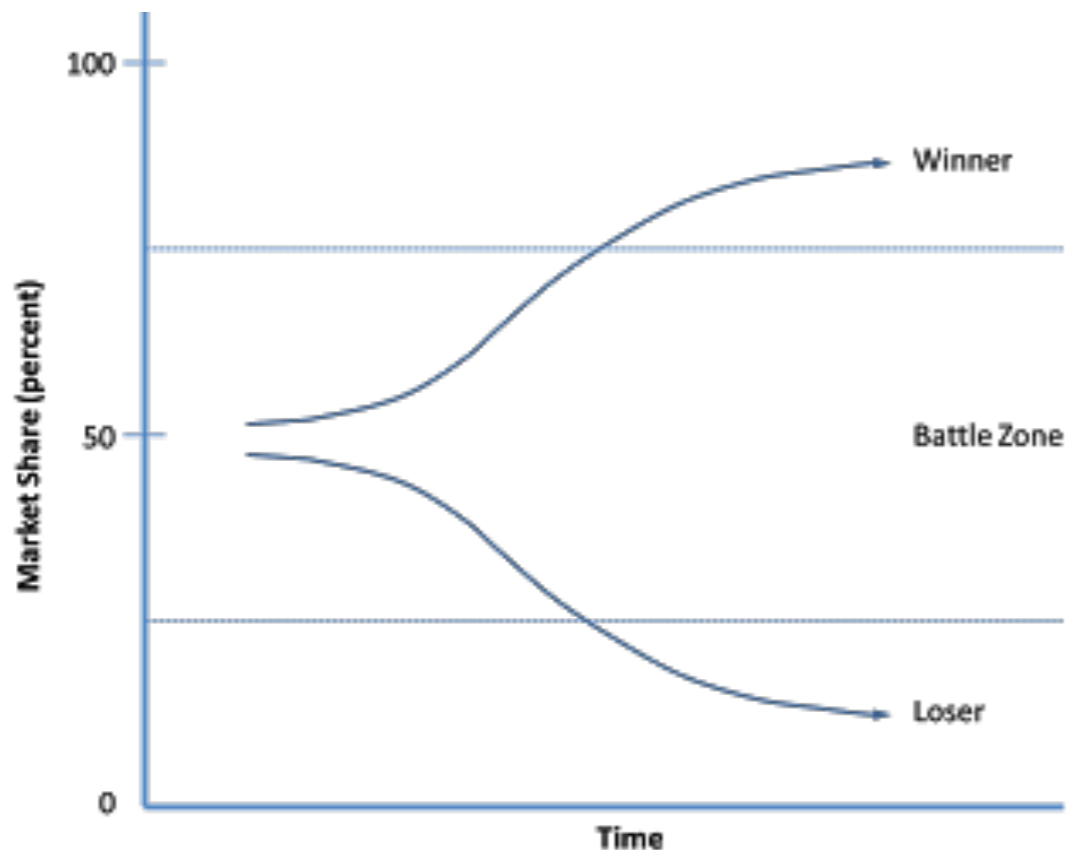
Bandwagon Effect

- People base their choices **not** in a “**rational**” way.
- As more people come to believe in something, others also “**hop on the bandwagon**” regardless of the underlying evidence.
- **Counterintuitive** for classic economy which assumes that consumers make buying decisions solely based on price and their own personal preference



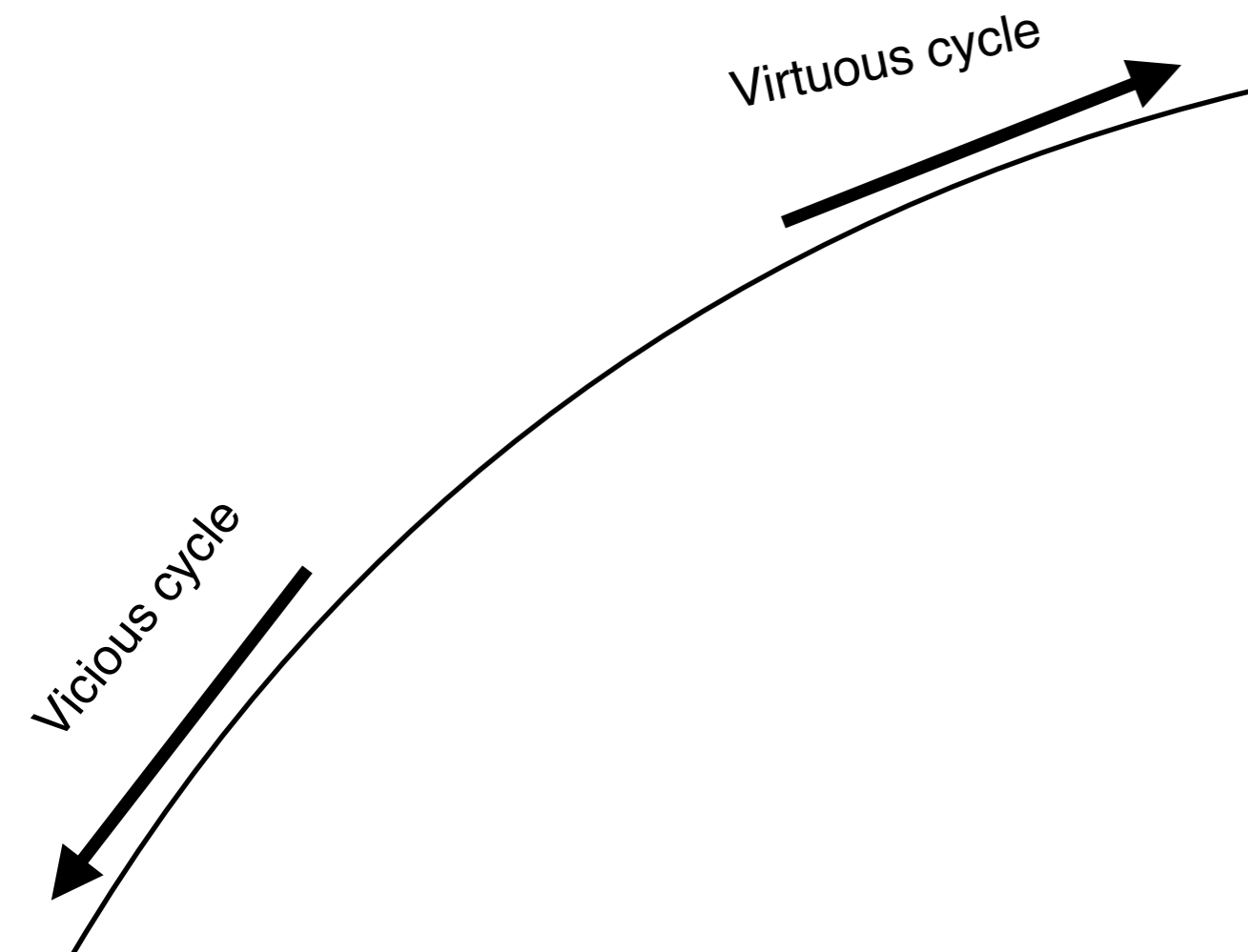
Positive Feedback

- Network effects can create bandwagon effect in a positive feedback loop.
- **Positive feedback makes the strong get stronger and weak get weaker.**
- In the extreme case, positive feedback can lead to a winner-take-all situation, through a virtuous cycle.
- When the battle is ongoing the market is “tippy”, it can tip in favor of one player or another (e.g VHS vs Betamax battle).



Virtuous / Vicious Cycle

- The popular product with many compatible users becomes more and more valuable to each user as it attracts ever more users (**virtuous cycle**)
- The product loses value as it is abandoned by users, so more and more abandoned the product (**vicious cycle**)
- If consumers expect your product to become popular, a bandwagon will form, the virtuous cycle will begin. But if consumers expect your product to flop, the vicious cycle will take over.
- **Success and failure are driven as much by consumer expectations and luck as by the underlying value of the product.**



Critical Mass

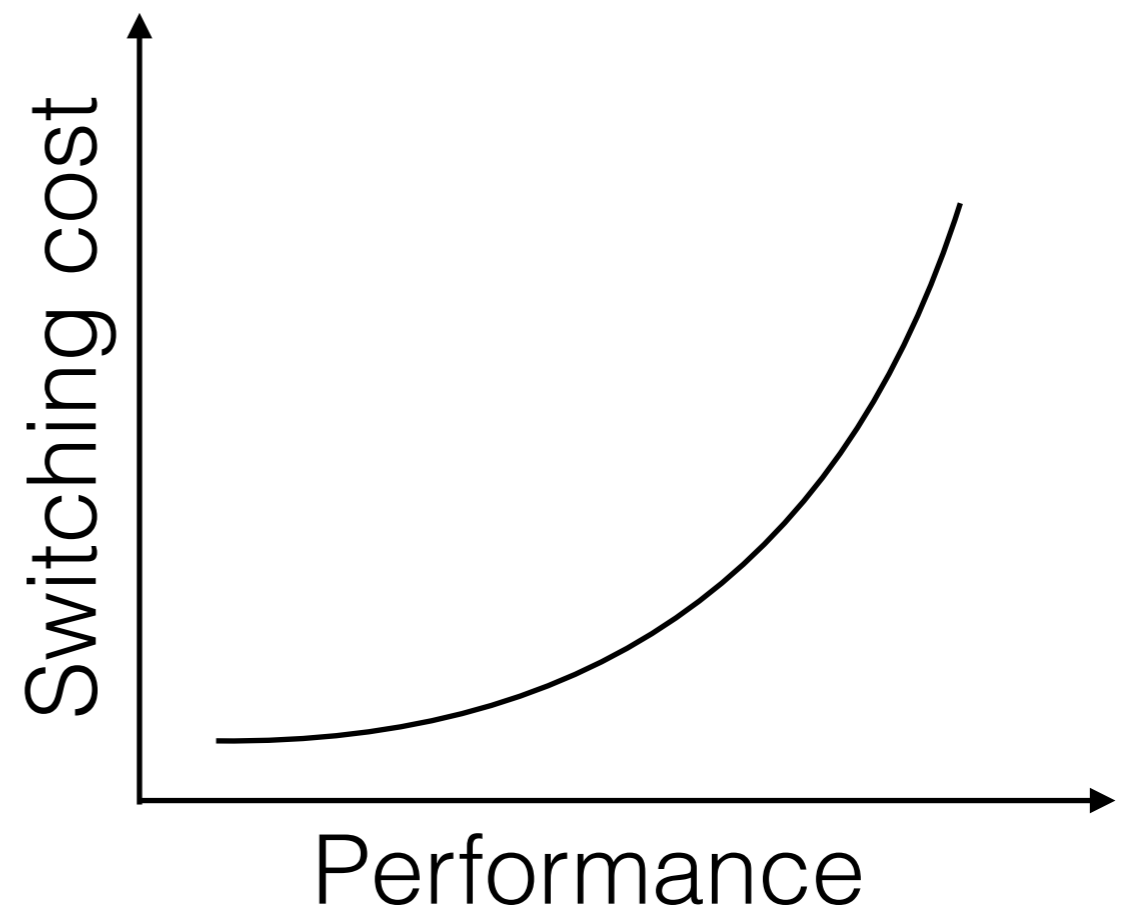
How to attract users prior to reaching critical mass?

- Network effects become significant after a certain **critical mass** of users. At the critical mass point, the value obtained is greater than or equal to the price paid for the good or service.
- After the critical mass point additional users will subscribe to the service or purchase the good due to **the value exceeding the price.**

Evolution vs. Revolution

Is it better to wipe the slate clean and come up with the best product possible or to give up some performance to ensure compatibility and ease consumer adoption?

- You can improve performance at the cost of increasing customer switching costs, or vice-versa.



Evolution Strategy

Offer to consumers an **easy migration path**, centered on reducing switching costs so that consumers can gradually try the new technology

Risks to manage:

- **Technical**: need to develop a technology that is at the same time compatible with, and yet superior to, existing products.
- **Legal**: need to have or obtain the legal right to sell products that are compatible with the established installed base of products covered by patent.

Revolution Strategy

Offer a product **so much better** than what people are using that enough users will bear the pain of switching to it.

- This strategy works by first attracting customers who care the most about performance and working down from there to the mass market, searching for a bandwagon effect in a positive loop feedback.
- The revolution strategy is inherently **risky**.

Open vs. Control

Do you choose an "open" approach by offering to make the necessary interfaces and specifications available to others, or do you attempt to maintain control by keeping your system proprietary?

- **Openness**: the underlying idea is to **forsake control** over the technology to get the bandwagon rolling. If the new technology draws on contributions from different companies, each agrees to cede control over its piece in order to create an attractive package: the whole is greater than the sum of the parts.
- **Control**: companies strong enough to unilaterally control product standards and interfaces have lot of **power**. Only those in the strongest position can hope to exert strong control over newly introduced information technologies without fail (e.g Betamax)

Standards

Standards enhance **compatibility**, or interoperability, generating greater value for users by making the network larger and enhance network effect.

- **Open Standards:** developed by **multiple actors** and companies, provide mutual benefit.
- **Closed Standards:** network effect can give company controlling those standards **monopoly** power, often they are a “de facto” standards.
- Where standards exists, instead of competing **for** the market, companies compete **within** the market, using the common standards.

Switching Cost and Lock-In

When the costs of switching from one technology to another are substantial, users face *lock-in*.

Type of Lock-In	Switching Costs
Contractual commitments	Compensatory or liquidated damages
Durable purchases	Replacement of equipment; tends to decline as the durable ages
Brand-specific training	Learning a new system, both direct costs and lost productivity; tends to rise over time
Information and databases	Converting data to new format; tends to rise over time as collection grows
Specialized suppliers	Funding of new supplier; may rise over time if capabilities are hard to find/maintain
Search costs	Combined buyer and seller search costs; includes learning about quality of alternatives
Loyalty programs	Any lost benefits from incumbent supplier