Key Features of the Digital Economy

Business Models for the Digital Economy

Master in Informatics and Computing Engineering

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João Claro

Agenda

- Information goods and technology
- Information goods
  - Differential pricing
  - Experience good
  - Rights management
  - Attention economics
- Information technology
  - Switching costs and lock-in
  - Network effects
- Change

Information goods and technology

Information goods: anything that *can* be digitised

Examples	Characteristics	Implications
• News • Music • Software • Databases • Games	• High fixed, near zero marginal costs • Unlimited capacity	Pricing on value
	• Cheaply copied and distributed • Enforcement of rights is challenging	Manage rights for value, not protection
	• Experience good	Experience to value
	• Fast, ubiquitous and inexpensive to access	Attention: find what is of value, avoid the rest

Information technology: infrastructure that deals with information goods (store, search, retrieve, copy, filter, manipulate, view, transmit, receive)

Examples	Characteristics	Implications
• Smartphones • Browsers • Game consoles • Music players • DBMS	High switching costs and lock-in	Tension between buyers and sellers on value capture
	Importance of complementors	Achieving critical mass for value
	Strong network effects	

Information goods

Information goods (1/6)

Differential pricing

Examples	Pricing scheme	Categories
• Amazon early 2000s	• Clean browsing cookies, different price	Personalized – perfect discrimination; theoretical ideal
• Software, news	• Student status	Grouping – pricing as a function of observables; student, zip code, assets
• Software	• Basic, advanced, ultimate	Versioning – people self-select

Category	Example	Why (can they) do it?
Personalize	Elsevier and universities	• Know the demand • Large B2B contracts – easier to charge different prices to different customers
Grouping	Spotify – countries, families, students	• Customer characteristics are observable and correlated with demand behaviour • Characteristics are unchangeable • No resale
Versioning	Adobe Creative Cloud – different tools, different bundles; also grouping business, academic, individual	• Customers with different willingness-to-pay value features differently

Information goods (2/6)

Experience good

Examples of information goods	Examples of strategies	Categories of strategies
Musicians' new albums	Free song	Preview and browse – access to parts, for a limited time, for free or at a promotional price
Amazon books	Look inside, sample chapter	
News media	Promotional pricing	
Software	Free trial, version	
Streaming platforms	Temporary access	
TripAdvisor	Analogous reviews	Reviews – testimonials, influential reviews
Film critics	Influential reviews	
News media	Brand reputation	Branding and reputation – What are we known for? What is that associated with (image, logos)? Leverage that association.

Information goods (3/6)

Rights management

Examples of information goods	Examples of strategies to maximize value	Categories of strategies to maximize value
News media	Freely share a certain number of articles	Give away part, sell the rest
Magazines	Limited free views per month	Limit views with demand for repeated views
Anti-virus	Free version with limited functionality	Give away similar, but not identical
Books, magazines	Easy to browse, hard to print online versions	
McAfee 1989	Free with full functionality	Pay whatever the user thinks it is worth
Elsevier (outside subscriptions)	Free indexing and search, charge for content	Sell complementary products

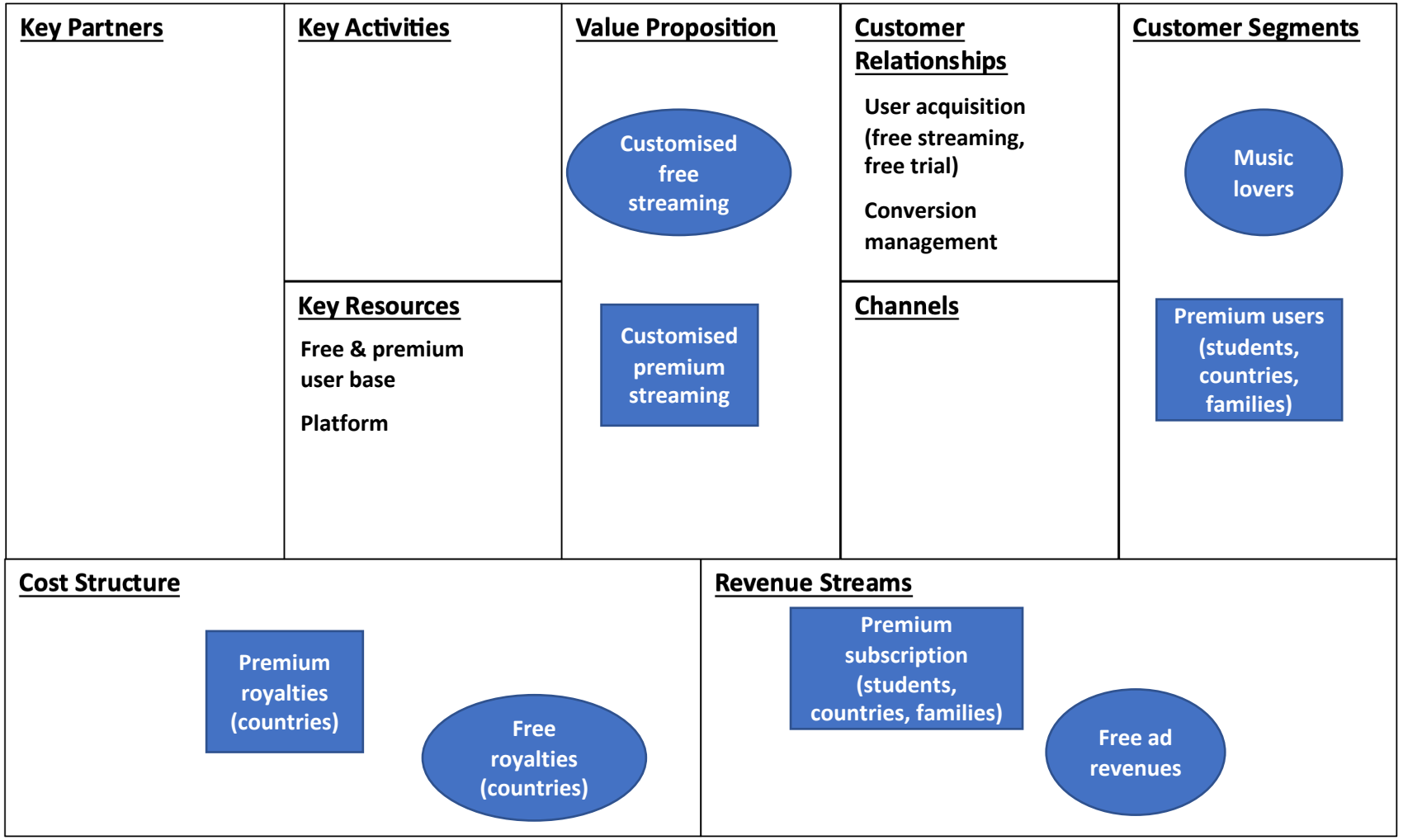
Attention economics

Examples of information goods	Examples of strategies	Categories of strategies
Digital media purchasing	Recommender systems – may not be customized, e.g., top-sellers	Recommenders and personalization – based on profile, historic and similar profiles, configure good to generate the most value.
	Personalized contents	

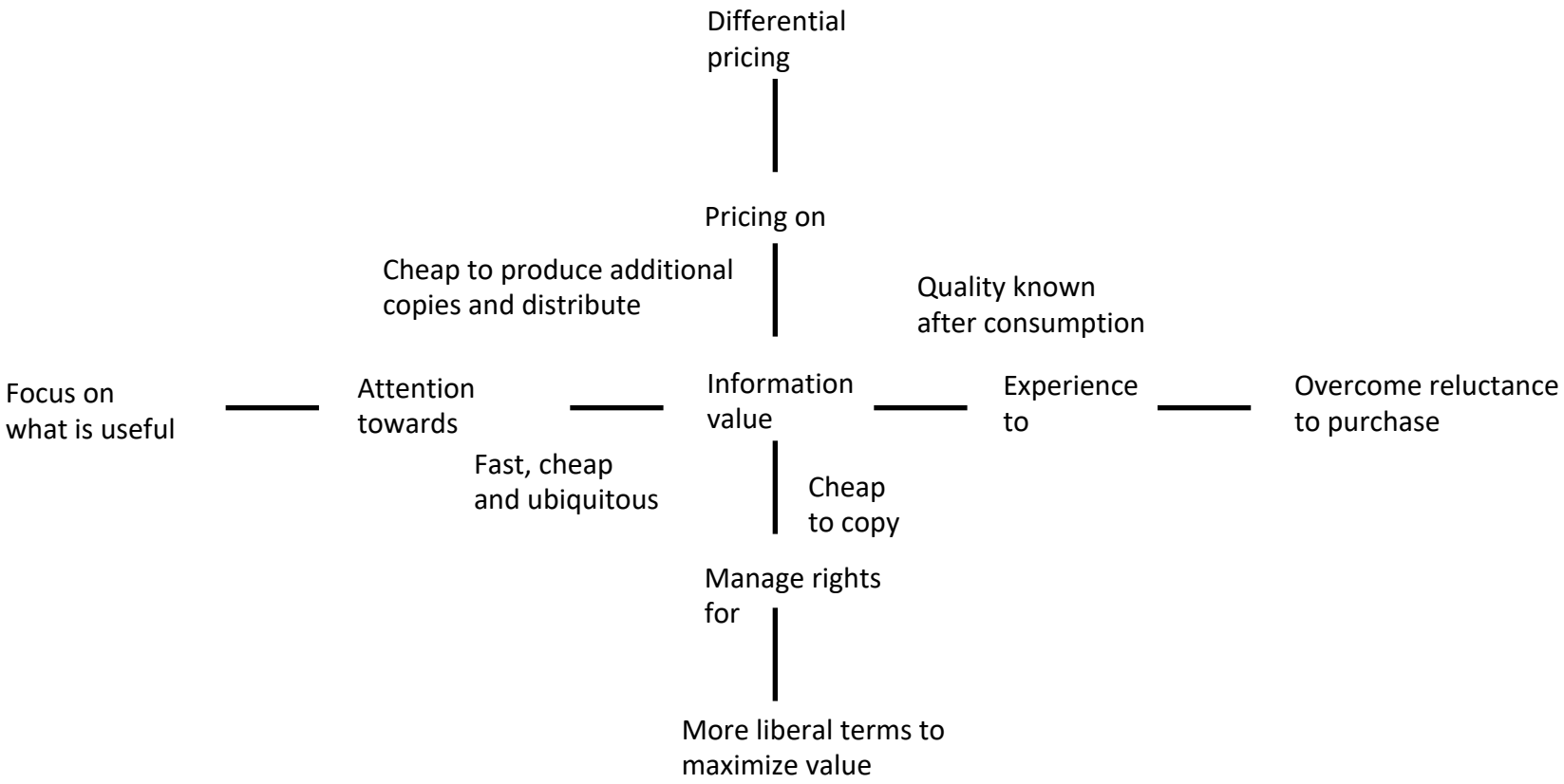
Spotify – Information goods (4/6)

- Differential pricing – versioning with freemium, grouping with countries, students, families
- Experience good – free streeeming, free trial
- Rights management – free streaming with limited functionality and adds
- Attention economics – customised content for free (related to adverstising) and premium users

Spotify – Information goods (5/6)



Information goods (6/6)



Information technology

Information technology (1/8)

Switching costs and lock-in

Examples	Difficulties	Categories
Mobile phones	2-year contracts	Contractual commitments
Game consoles	Learning interface, incompatible gaming hardware, incompatible games	Complementary investments – durable purchases followed by complementary purchases*, specific training, asset creation
Web browser	Effort to set up same functionality	Transaction costs – time and effort to change
Search engine	Find and evaluate other engines	Search costs – time and effort to find and evaluate, risk of new
Mobile phones	Loyalty benefits	Loyalty programs – benefits increase with longevity

Example	Categories of switching costs
Google Chrome	• Change computer settings – complementary investment, asset creation • Unknown quality of alternatives – search costs • How to use effectively – complementary investment, training
Facebook	• List of friends – complementary investment, asset creation • Learning the interface – complementary investment, training
iPhone	• Software – complementary investment, complementary purchases* • Learning the interface - complementary investment, training

Information technology (2/8)

Switching costs and lock-in (continued)

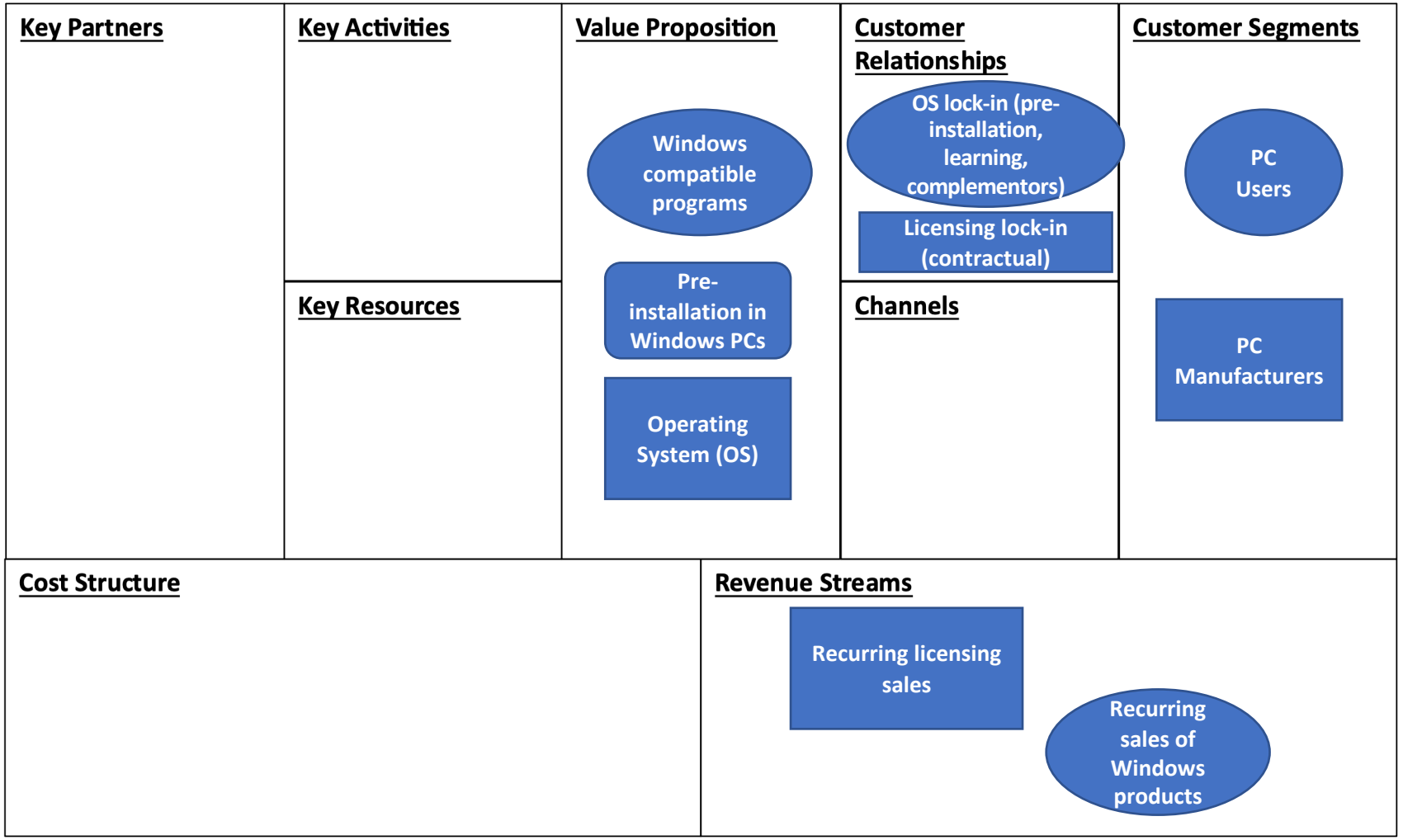
Phase	Buyers	Phase	Suppliers
Before	• Introductory offers • Increase ex-ante bargaining power • Ensure full specification and long-term protection	Get	(Dealing with others' switching costs) • Discounts, lower prices, better conditions • Sell to influential customers
After	• Dual sourcing • Avoid full commitment in complementary purchases* • Acquire information for ex-post bargaining • Leverage bond for ex-post bargaining	Keep	• Offer more value-added information services • Proprietary improvements to extend cycle and reaffirm choice at selection • Loyalty programs and cumulative discounts
		Grow	• Offer full range of products and services • Complementary products • Sell access to installed base

*Complementors – if specialized, contribute to lock-in

MS Windows – Switching costs and lock-in (3/8)

- Licensing lock-in – long term licensing contracts
- User lock-in – pre-installation, learning and complementors
- Lock-ins link benefits with switching costs, with a reflex on the extension of recurring revenues

MS Windows – Switching costs and lock-in (4/8)



Information technology (5/8)

Network effects

Examples	Benefit	Network effects
• Communications technologies • Internet • Email • Videoconferencing	Users inherently care about other users	Direct
• Electric vehicles and charging stations • Gaming consoles and games	Users care about complements*	Indirect

When value of format or system depends on number of users, **achieving critical mass** is the key challenge

Nature of the challenge	Methods to address the challenge
• Low early value • Certain homing costs (product, training) • Uncertain current and future benefits	• Introductory discounts • Direct management through announcements of products, services or features • Internalisation of externalities by users – invite relationships • Leverage small networks – institutions, geographies, segments
	Assemble group of partners* (with different degrees of openness) • Go-it-alone – compete to become standard • Formal standards – compete within standard • Open parts of the "standard" – intermediate position

*Complementors – strengthen network effects adding directly to initial base and managing expectations.

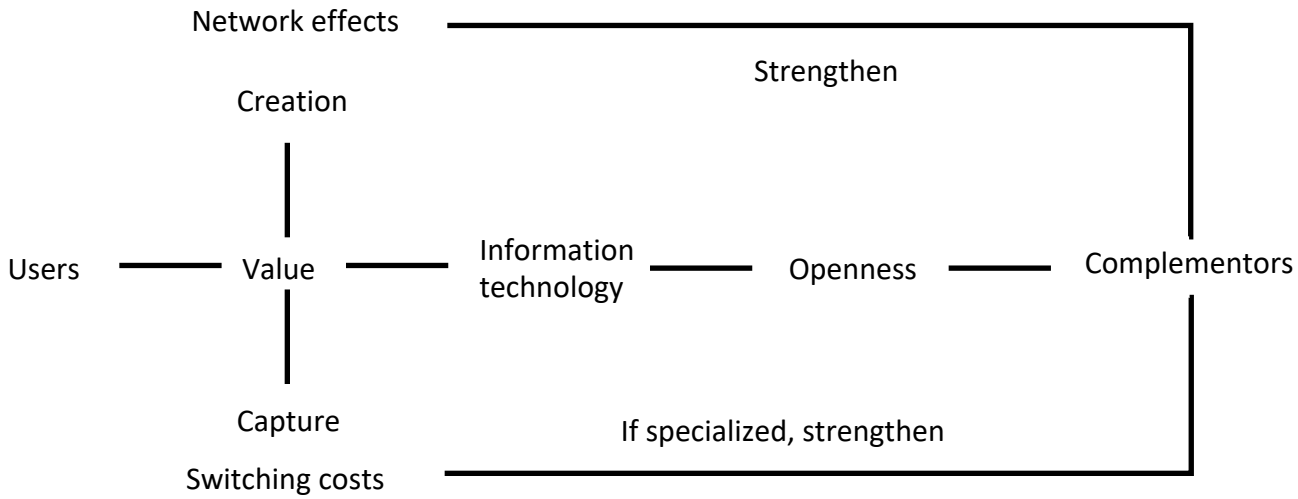
Waze – Network externalities (6/8)

- Same-side network effects - the users contribute to the value proposition directly
- Data network effects – the users contribute to the value proposition indirectly through smarter algortithms
- Critical mass – free app drives faster user acquisition

Waze – Network externalities (7/8)

Key Partners	Key Activities App development Key Resources Driver community Traffic data & algorithms	Value Proposition Real-time traffic navigation	Customer Relationships User acquisition Channels	Customer Segments Users / editors
Cost Structure Cost of app development Cost of acquisition			**Revenue Streams** Free	

Information technology (8/8)



Change

Change is a constant

- Information Rules – Shapiro & Varian (1998) – machines skilled at following rules, not pattern recognition
- The New Division of Labour – Levy & Murmane (2004) – producing the first unit of an information good has high costs

Change	Implications

In Information Goods
• Everything is being digitised
• Change in degree – change in kind
	• Cheaper or free to produce information, through:
	  ○ User-generated content
	  ○ Machine-generated content
	  ○ Support to understanding and prediction

In Information Technologies
• Exponential improvements
  ○ Computation
  ○ Communication
  ○ Sensing
	• New areas of the economy and society where the economics of information will apply

In Innovation
• Information goods and technologies foster recombinant innovation
• Each development is a building block for future innovation
	• Combing through the possibilities
	  ○ More eyeballs
	  ○ Leverage increased computation, communication, and data

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