INFO5992 Understanding IT Innovations

Week 5: Distributed Innovation

A/Prof Jinman Kim

Semester 1, 2018

THE UNIVERSITY OF SYDNEY

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UoS Outline

Week	Lecture Topics	Activity	Assessments
1. 5 Mar	UoS Introduction; Definition of IT Innovation; IT Innovation System; IT Innovation in Australia	Tute 1 – Welcome to your tutorial; Importance of innovation to a Country	Form Groups
2. 12 Mar	Introduction to Technological / IT innovation; Examples of IT innovation in industry sectors; Type and Source of Innovation	Tute 2 – Massive Open Online Courses – Enabling technologies and Peer-review	
3. 19 Mar	Dynamics of Technological / IT Innovation; Adoption of Technology; Dominant Design	Tute 3 – Dominant design in the Smartphone market	Individual Report Introduction
4. 26 Mar	Disruptive Innovation; Industry Value Chain; Value Network analysis	Tute 4 – Cognitive IT services and its value chain	Quiz intro
	Easter Break		
5. 9 Apr	Distributed innovation I: Open / Closed innovation; Platform innovation; Web APIs;	Tute 5 – Web API considerations	MCQ
6. 16 Apr	Distributed innovation II: Crowd innovations; Free and Open source software;	Tute 6 – Open source Geolocation and Maps	Group presentation Introduction
7. 23 Apr	Distributed innovation III: User innovation; Open Data	Tute 7 – Sharing Economy from a Distributed Innovation Context	
8. 30 Apr	Innovation by Start-up companies and Opportunities	Tute 8 – Business Model Canvas	
9. 7 May	Organisational Culture; Structure supporting innovation	Tute 9 – Group Presentation preparations and feedback	MCQ Report Submission
10. 14 May	IT Innovation Management	Group Presentation	Group Presentation submissions
11. 21 May	Innovation ecosystem; Sydney's innovation ecosystem	Peer-Review Marking	
12. 28 May	Judging IT Innovations	Tute 10 – Developing a Judging criteria for IT Innovation project	
4. 30 Jun	UoS Review; UoS comments / questions	Tute 11 – Technology innovations in IT Management	Peer-review

Agenda

- Value Network
- Open Innovation
- Distributed Innovation Concepts
- MCQ
- Tutorial 5

Value Network

Recap wk4: “Disruptive Innovation”

- “Disruptive innovations” disrupt markets
- They create new markets or change the **value network** in an existing market.
- To understand “**value network**”, we must study “**value chain**”

Recap wk4 : Industry value chains

- An industry value chain is how value is created and passed on between participants in an industry
- Diagrams can show how value flows through the industry
- Value may be from licensing a technology, selling a product, providing a service, etc

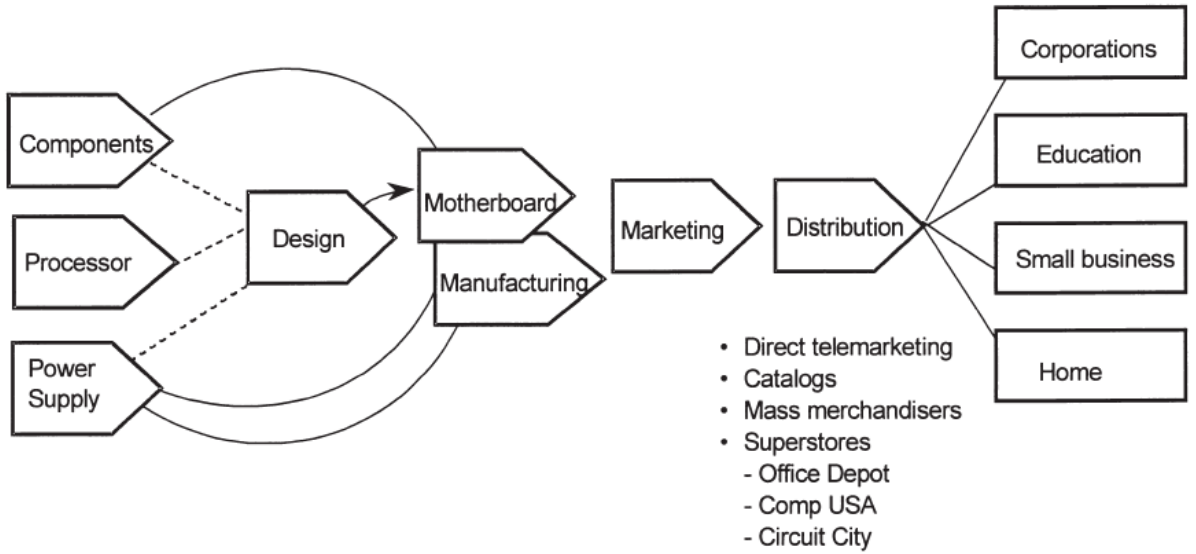


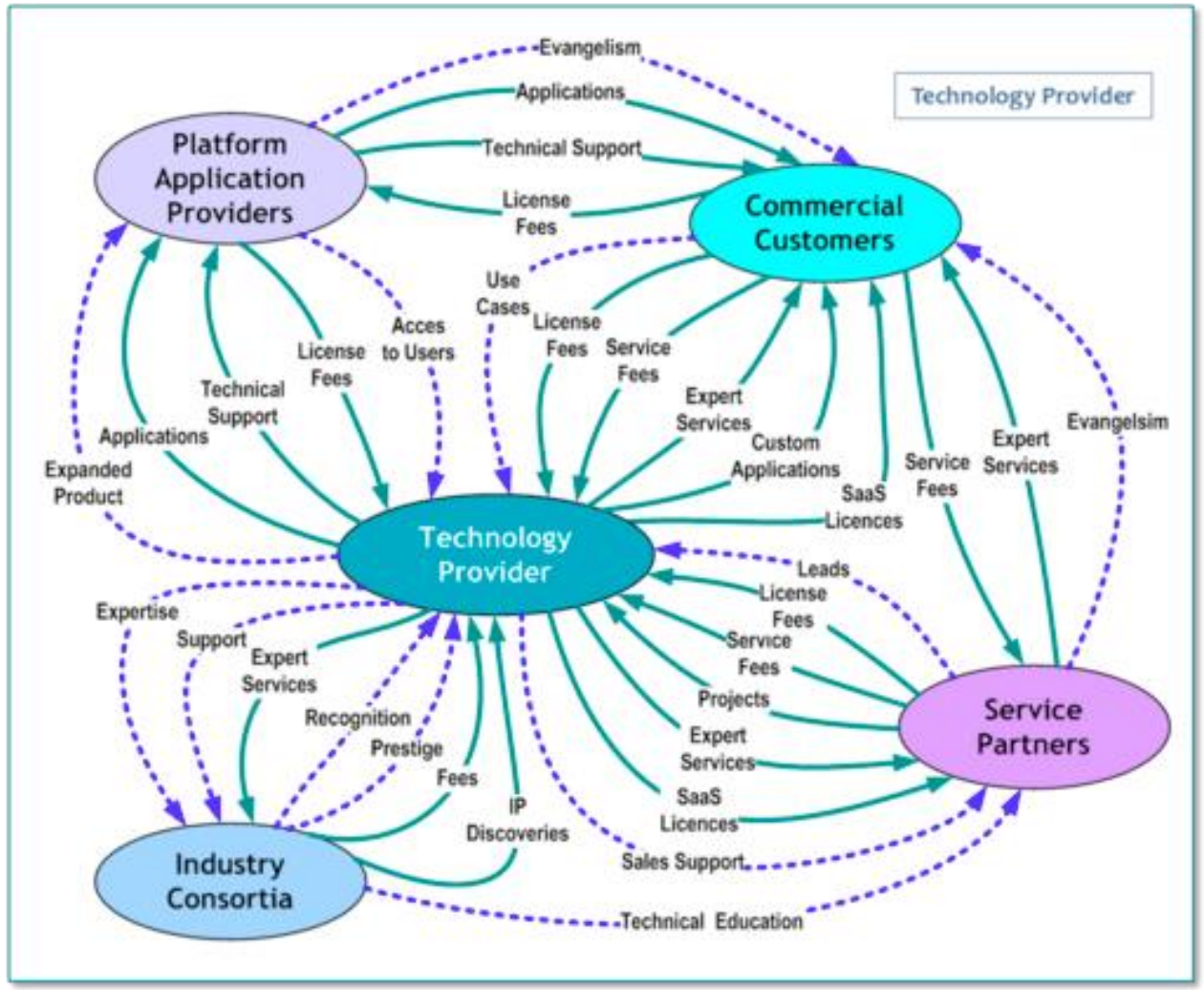
FIGURE 5. Building toward enacted value chain; a typical computer firm.

Source of figure: Kothandaraman and Wilson, "The Future of Competition: Value-Creating Networks" (2001)

Value Network

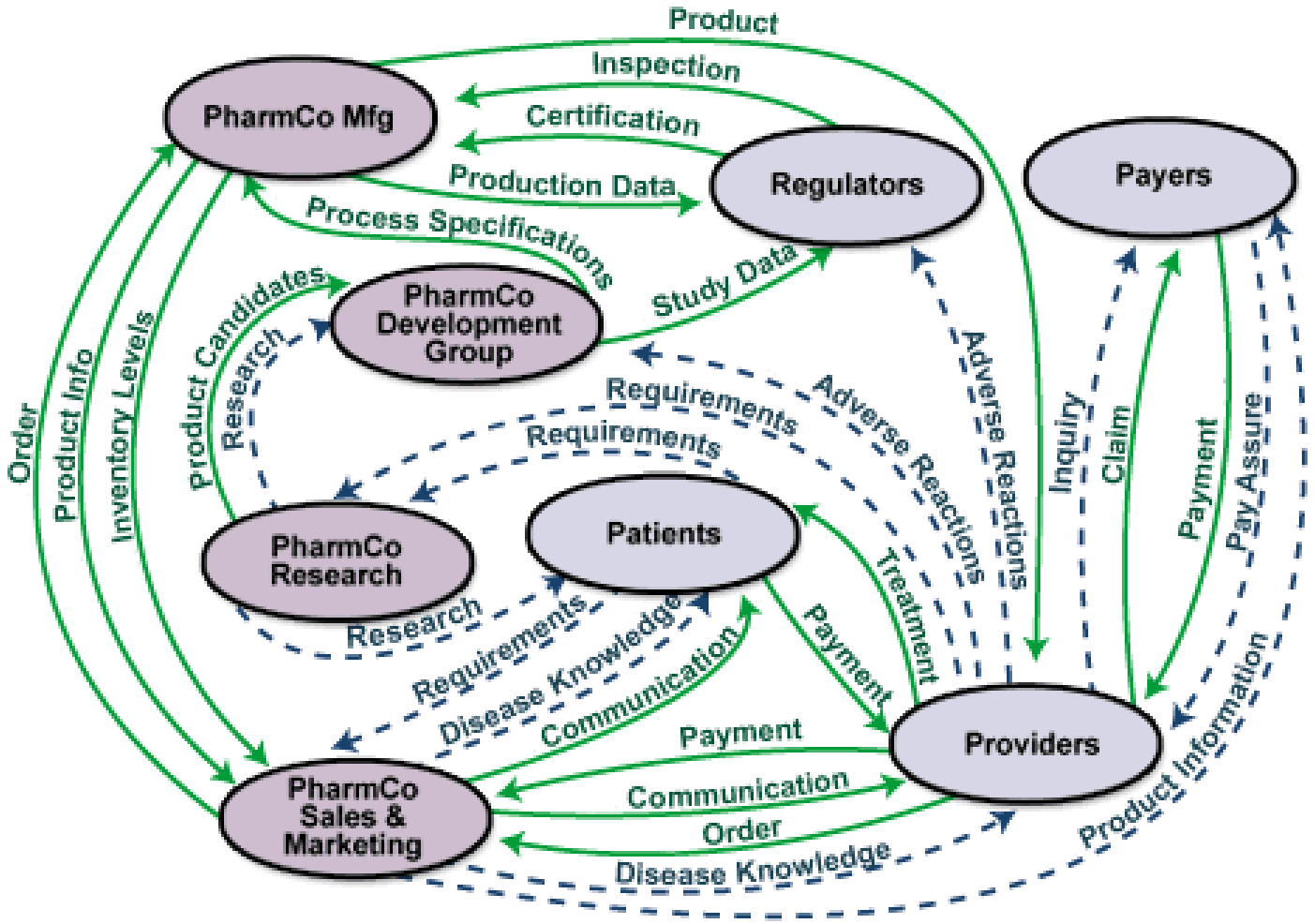
- Term “value network” first used by Clayton Christensen
- Similar concept to “industry value chain” but usually **more focus on the whole system** rather than for a specific product/service type

Value Network Analysis – Example on Technology Provider



Source of figure: Verna Allee http://www.vernaallee.com/valuenetworks.html

Value Network Analysis – Example on Health care Network



Source of figure: Verna Allee http://www.vernaallee.com/value_networks/Understanding_Value_Networks.html

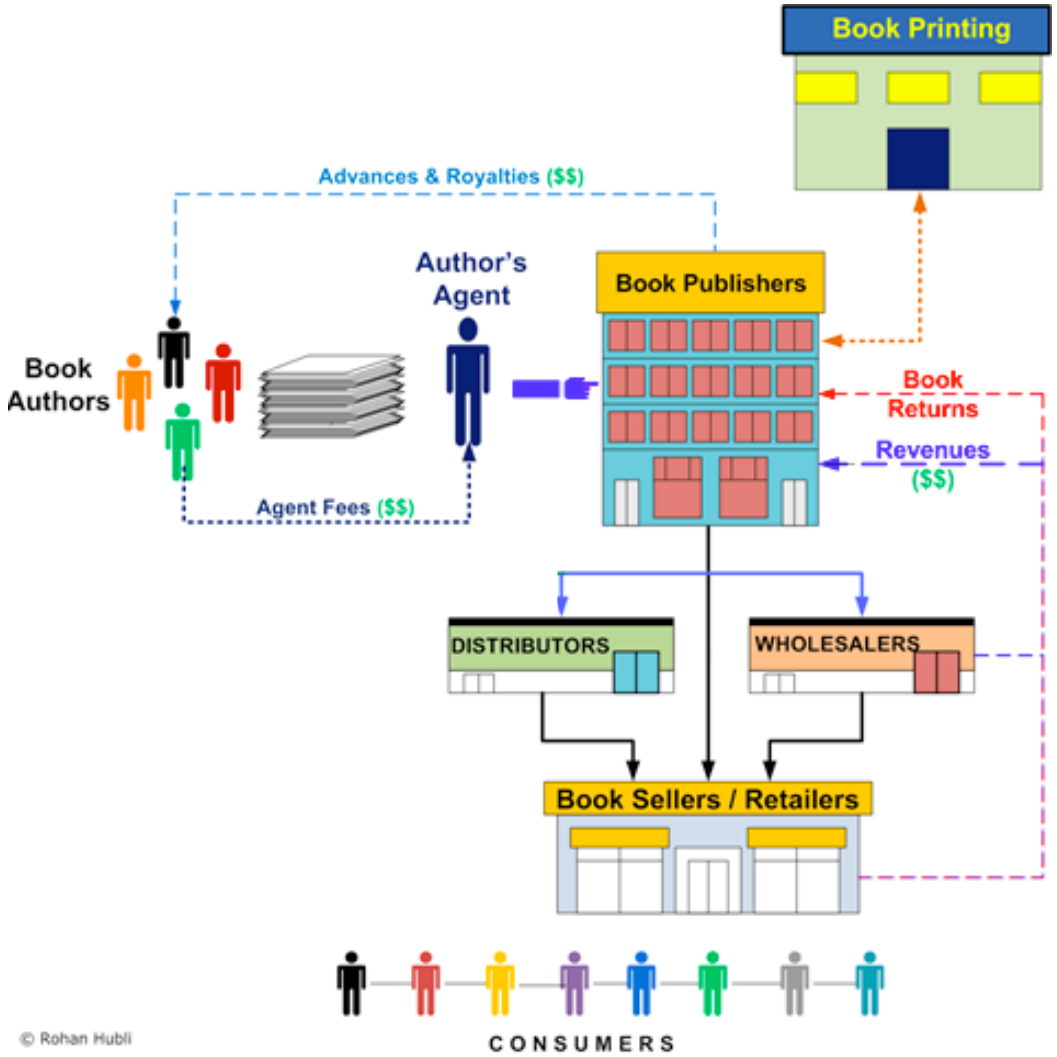
Use of Value Chains/Networks

- Analysing value chains/systems/networks is useful for:
  - Understanding an industry (including relationships between companies)
  - Understanding your company's position within the market
  - Deciding where your company wants to be within that market
  - Looking for opportunities for disruptive innovations

Disruptive Innovators and Value Networks

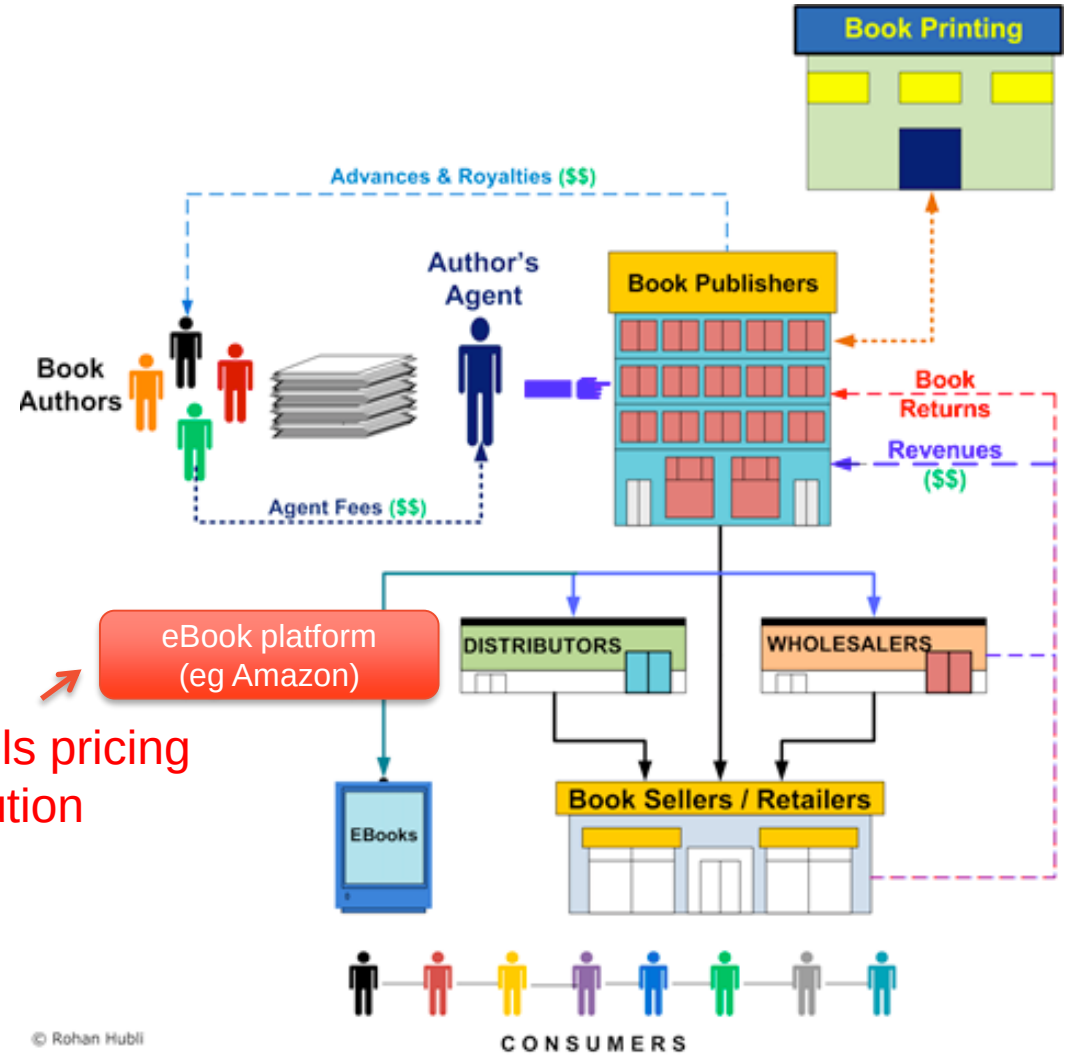
- "When would-be disruptors enter into existing value networks, they must adapt their business models to conform to the value network and therefore fail that disruption because they become **co-opted**."
- *(Clayton Christensen, "The Innovator's Dilemma", 1997)*

Book publishing value network: Traditional



http://marketingstrategicmanagement.blogspot.com.au/2009/10/ebooks-and-future-of-us-book-publishing.html

Book publishing value network: Traditional + e-books



Now controls pricing and distribution

Modified from : http://marketingstrategicmanagement.blogspot.com.au/2009/10/ebooks-and-future-of-us-book-publishing.html

Disrupting the value networks

- Disrupting value networks can be done by:
- Analysing the value network and attempting to change it:
  - "Disintermediation" = "cutting out the middleman"
  - Common using the Internet, e.g. book flights from the airline directly
  - "Reintermediation" = adding in a new intermediary
  - Also common using the Internet, e.g. new types of travel agent – WebJet, Flightfox, etc)
- Ignoring the current value network and having it change around you
  - Also common using the Internet
  - Facebook: "Move fast and break things"

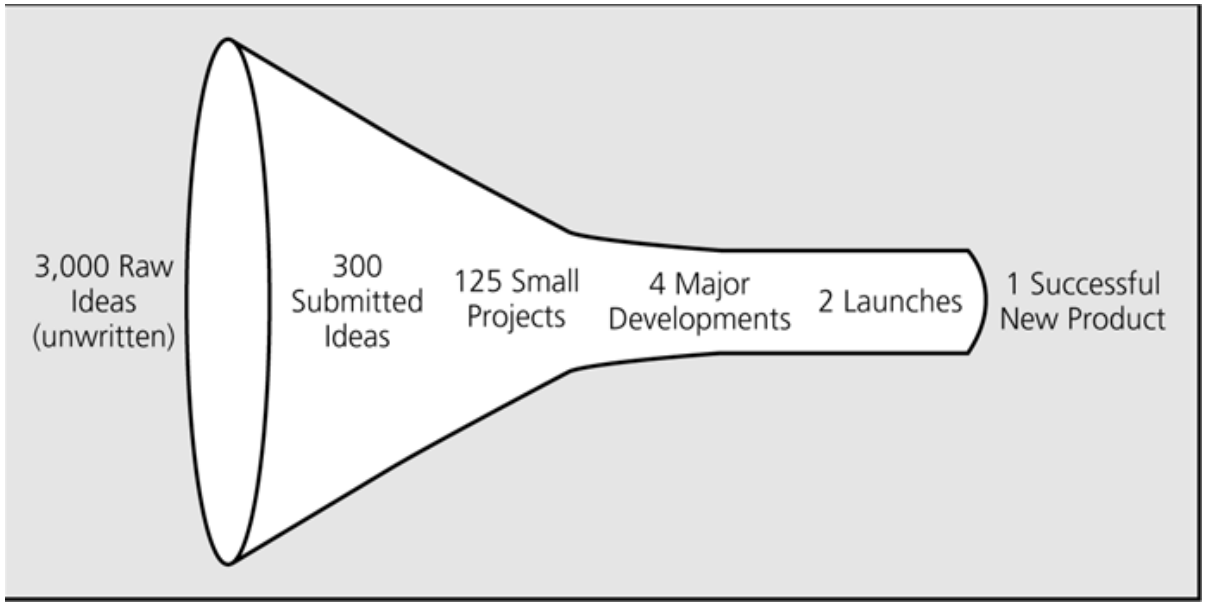
Distributed Innovation

Evolution of innovation by companies: Traditional model

- Most R&D and other innovation done in-house
- Successful innovation required control
- Was used for most of the 20th century
- Some spreading of innovation through “spillovers”

Evolution of innovation by companies: Traditional model

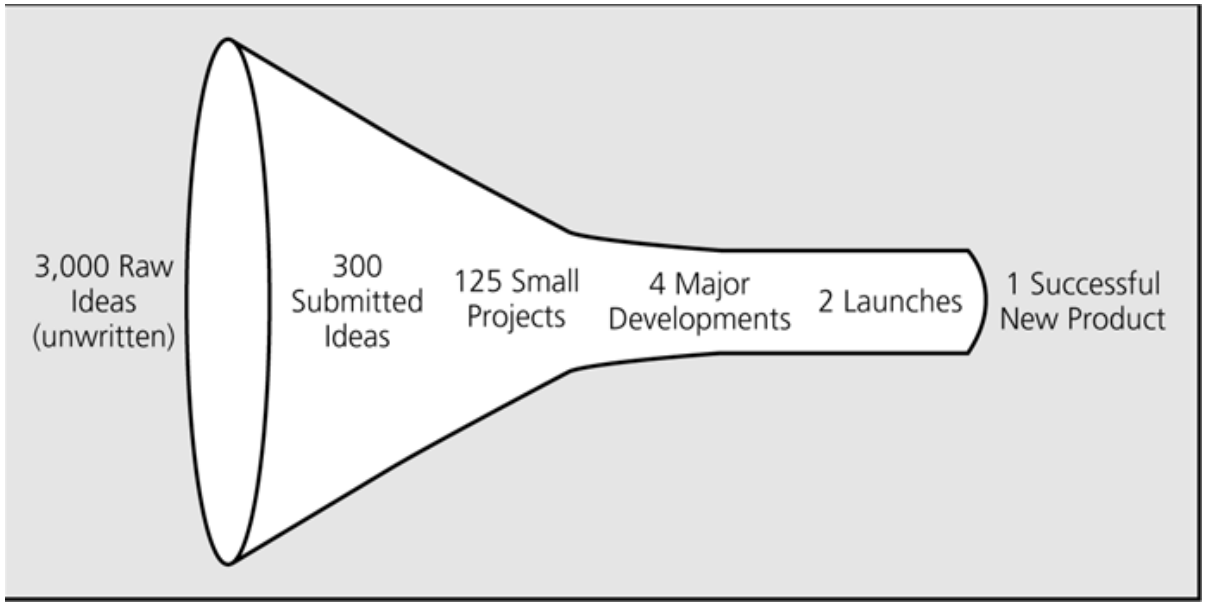
- Example of a traditional innovation funnel



Source – Schilling, 2013

Evolution of innovation by companies: Traditional model

- This is a simplistic model assuming:
  - Simple one-way flow – left to right (it's not usually this simple)
  - All activities inside a single company (no in-flows, no out-flows)



Source – Schilling, 2013

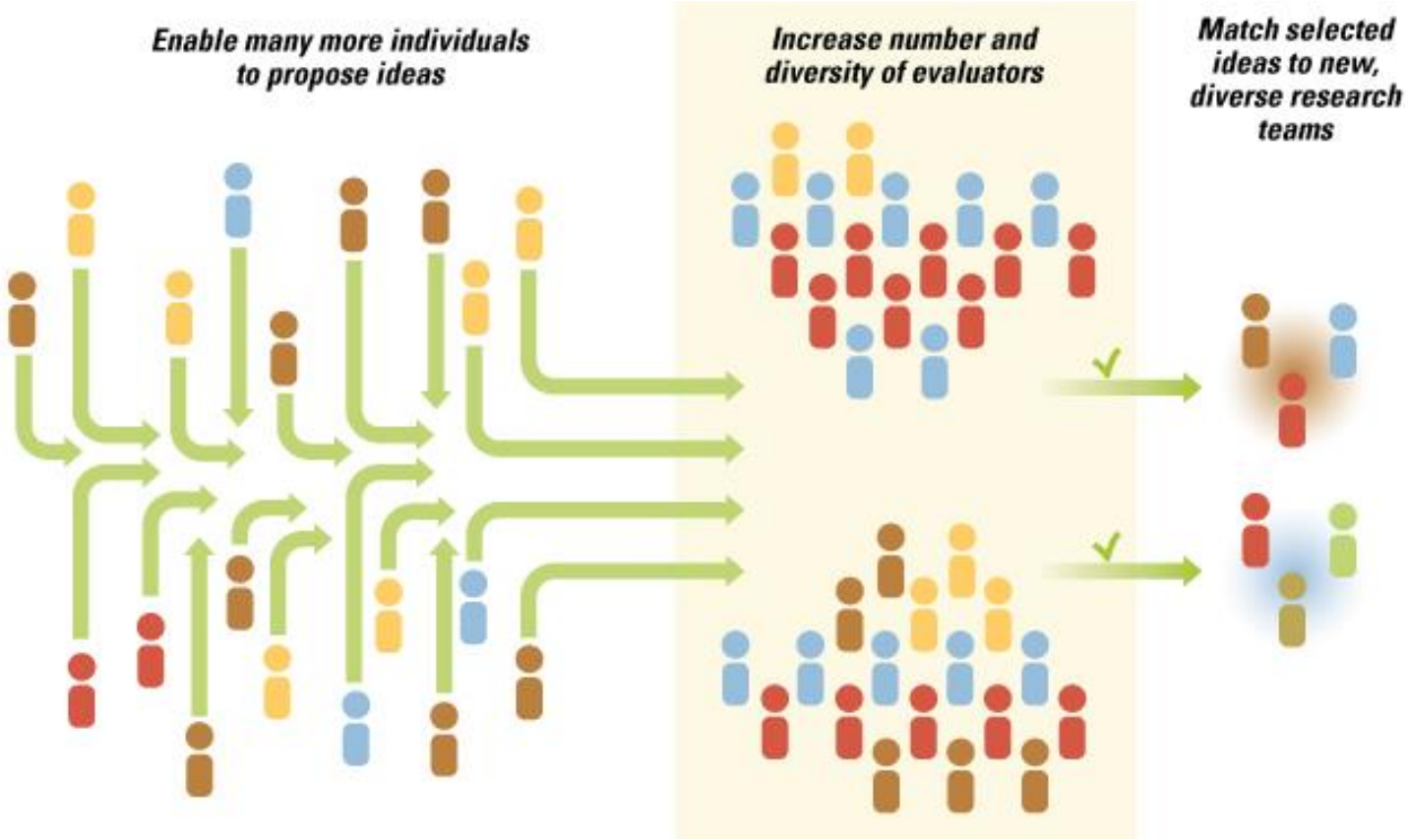
Evolution of innovation by companies: Some trends in the late 20th century

- More mobility of workers between companies
- More outsourcing of work
- Globalisation (more working across countries)
- Better information and communication technologies (eg email, web)
- Availability of **venture capital funding** allowing small companies to grow quickly (even without revenue)
- Easier to create and build new technology companies

- So more opportunities for collaborative innovation

Distributed innovation

- "a system in which innovation emanates not only from the manufacturer of a product but from many sources including users and rivals"
- Eric von Hippel (1988) paraphrased by Carliss Baldwin (2012)



http://sloanreview.mit.edu/article/experiments-in-open-innovation-at-harvard-medical-school/

"Joy's Law"

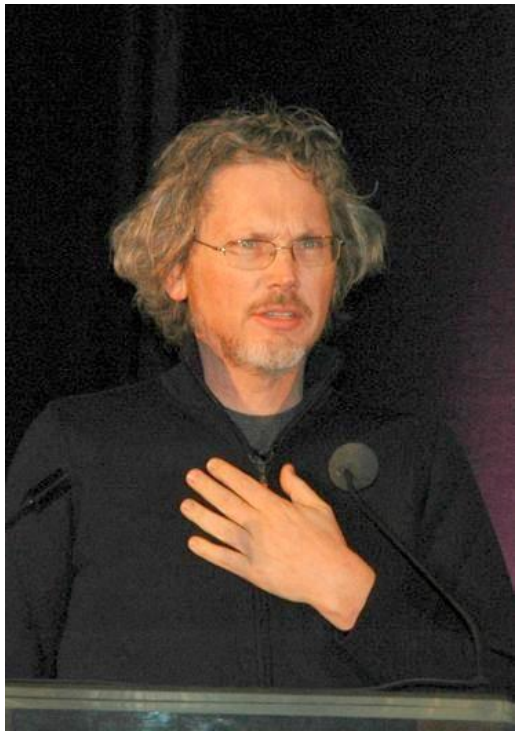


Photo: Martin LaMonica/CNET Networks

Bill Joy
Co-founder of Sun Microsystems
Computer Scientist

- "Most of the bright people don't work for you -- no matter who you are. [So] you need a strategy that allows for innovation occurring elsewhere."

- In 1990 speech - quoted by Surowiecki (1997)

“Open Innovation”

- Many companies have changed from purely internal R&D activities to being open to outside ideas and innovations.
- Cooperation and collaboration with external parties to increase innovation and reduce time to market.

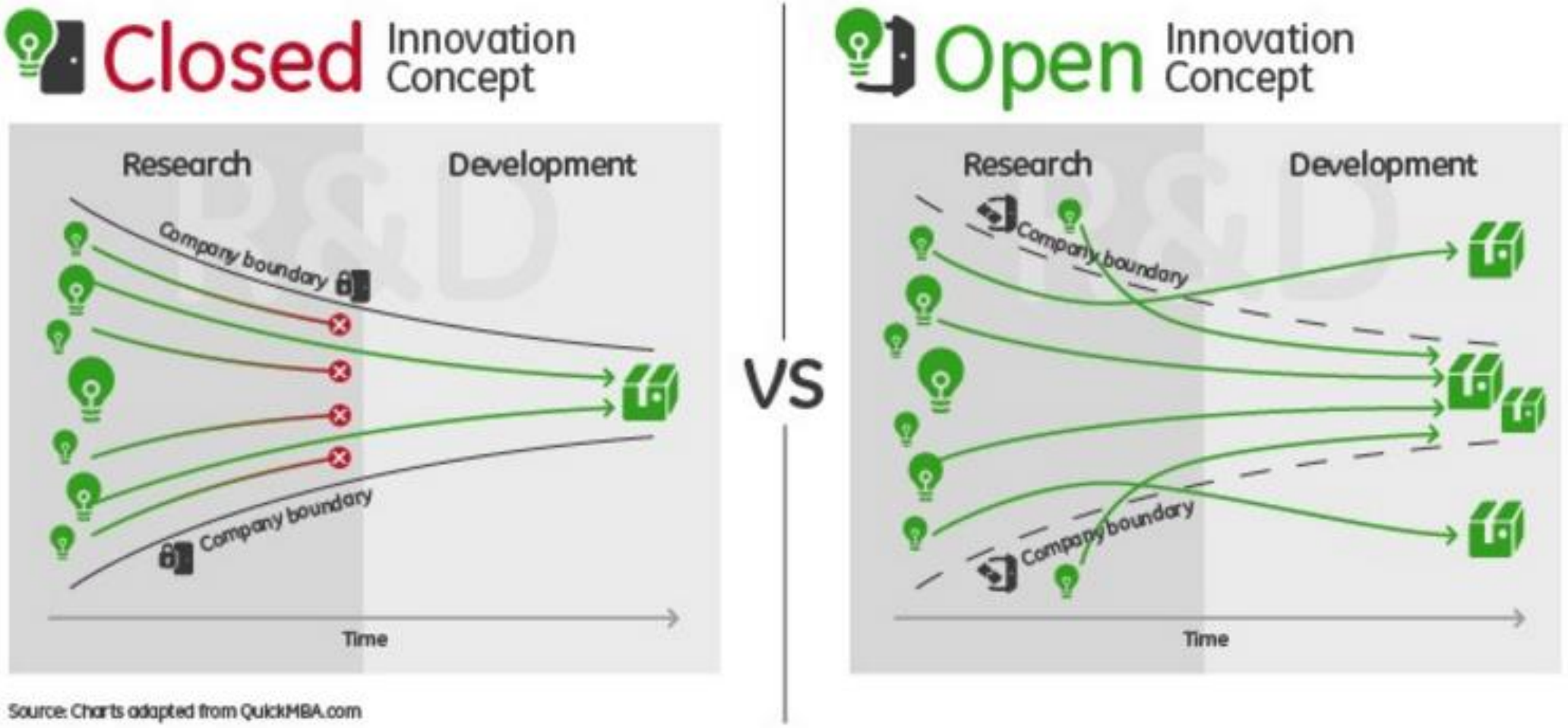
Henry Chesbrough, Economist, Business Administration
University of California, Berkeley.
Started and promotes term “open innovation”

Definition of "Open Innovation"

- "the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation" (Chesbrough, 2006)

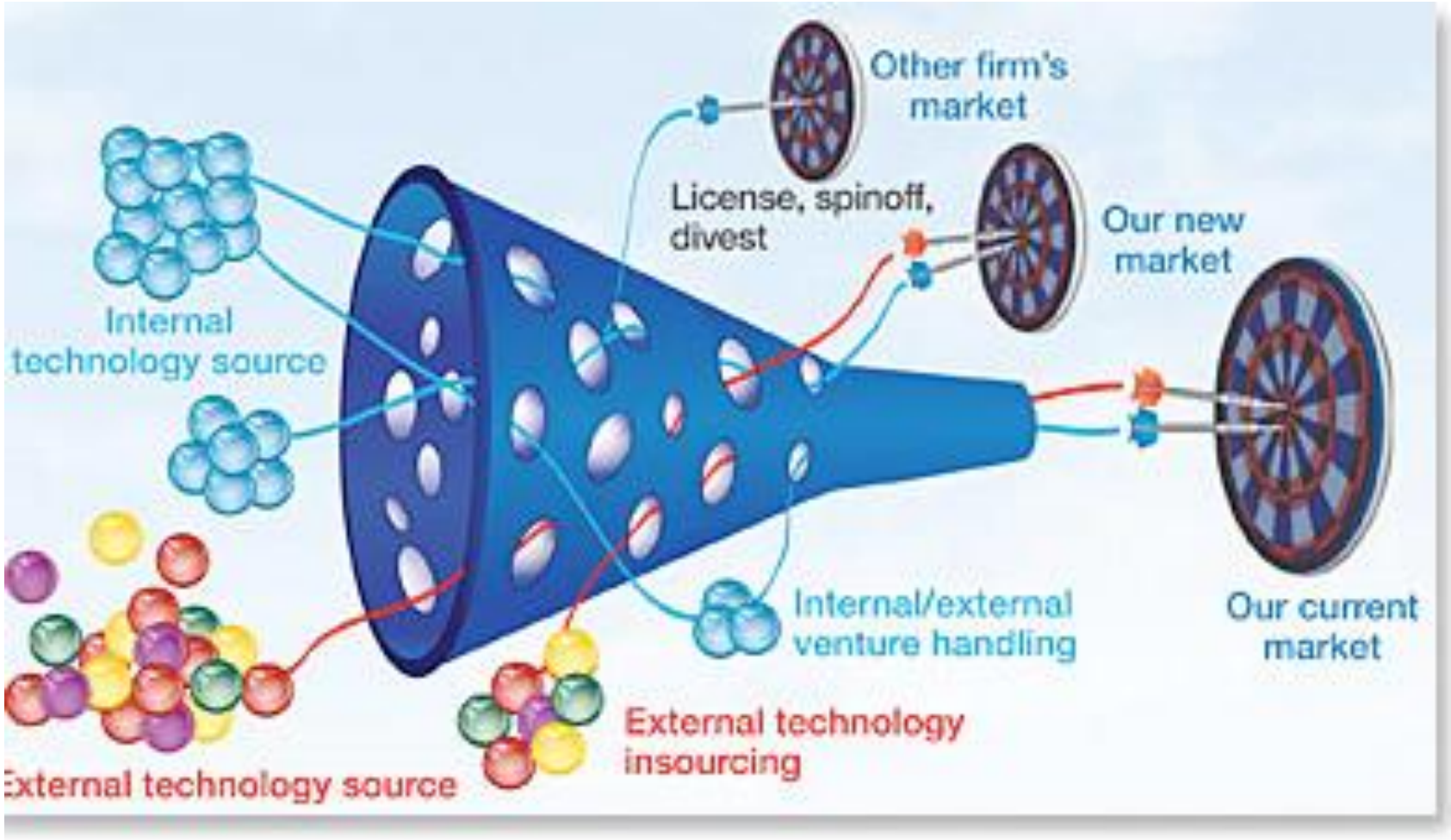
- Revised definition: "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough and Bogers, 2014)

The classic innovation funnel: "Closed innovation"



http://www.geglobalresearch.com/blog/growing-middle

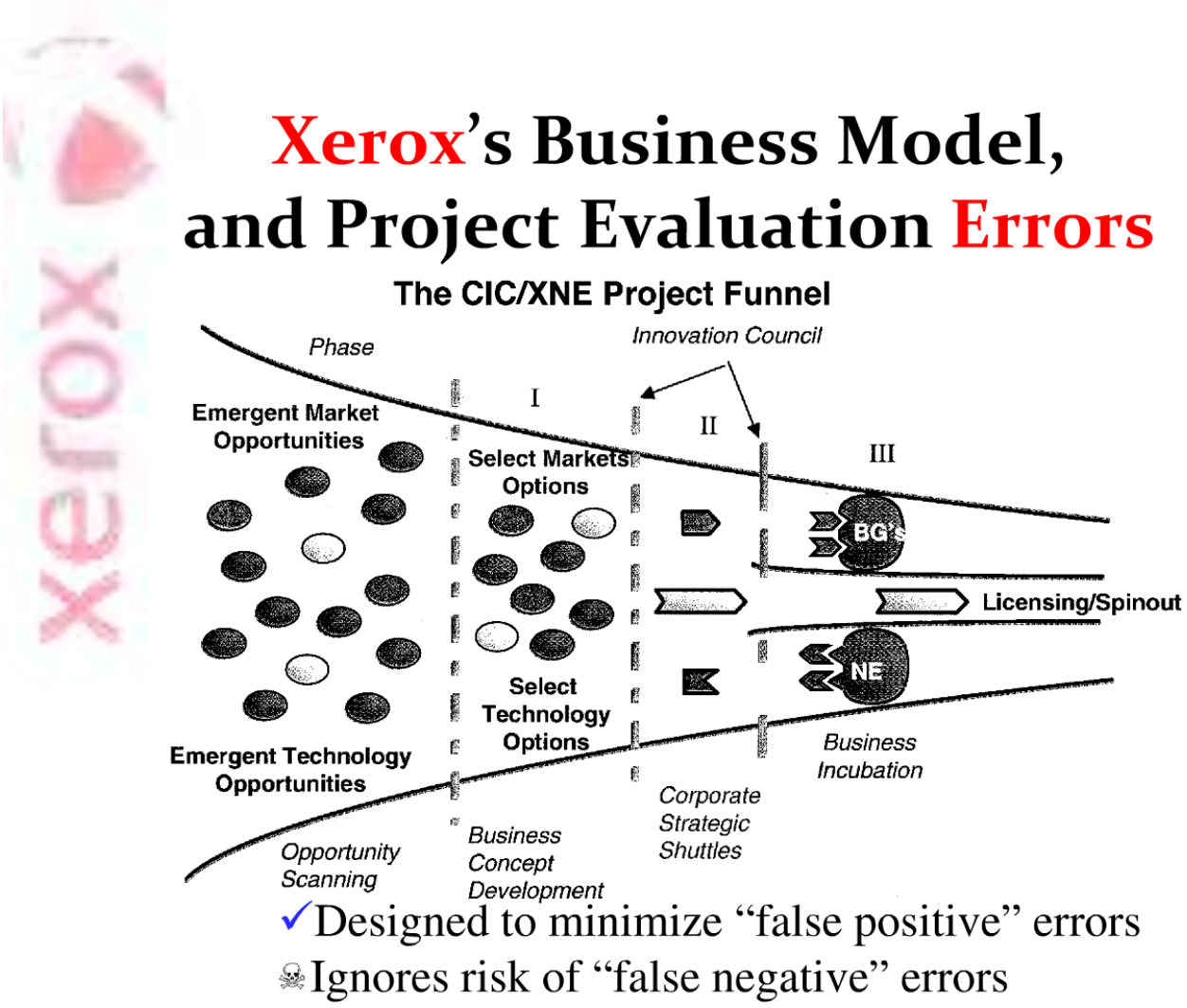
Open innovation



Source: Chesbrough (2013) - http://spie.org/x91420.xml

Example of open innovation: Innovation at Xerox PARC

- Chesbrough studied Xerox PARC's innovations, spin-outs etc



Source: Chesbrough (2009) - http://www.slideshare.net/Allagi/open-innovation-seminar-2009-brazil-henry-chesbrough

The change from closed innovation to open innovation

- According to Chesbrough…
- In 1981:
  - Approx. 70% of total R&D spending was by companies with >25,000 staff
  - Approx. 5% of total R&D spending was by companies with <1,000 staff
- In 2012:
  - Approx. 35% of total R&D spending is by companies with >25,000 staff
  - Approx. 24% of total R&D spending is by companies with <1,000 staff

Source: http://www.businessinsider.com.au/professor-henry-chesbrough-says-that-the-fortress-corporate-office-is-dead-2012-6

Types of open innovation

1. Outside-in process:
   - "Enriching the company's own knowledge base through the integration of suppliers, customers, and external knowledge sourcing"
2. Inside-out process:
   - "Earning profits by bringing ideas to market, selling IP, and multiplying technology by transferring ideas to the outside environment."
3. Coupled process:
   - "co-creation with (mainly) complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success."

Source: Enkel, Gassmann and Chesbrough (2009)

Some benefits of open innovation

- ☺ Larger base of ideas to draw from for innovation
  - "Not all of the smart people work for us" (Bill Joy from Sun Microsystems)
- ☺ Existing third-party technology can be used, reducing risk and cost of development
- ☺ Identification of new business opportunities with collaborators
- ☺ Share risks and pool resources with other companies
- ☺ Can be lower cost than large R&D departments

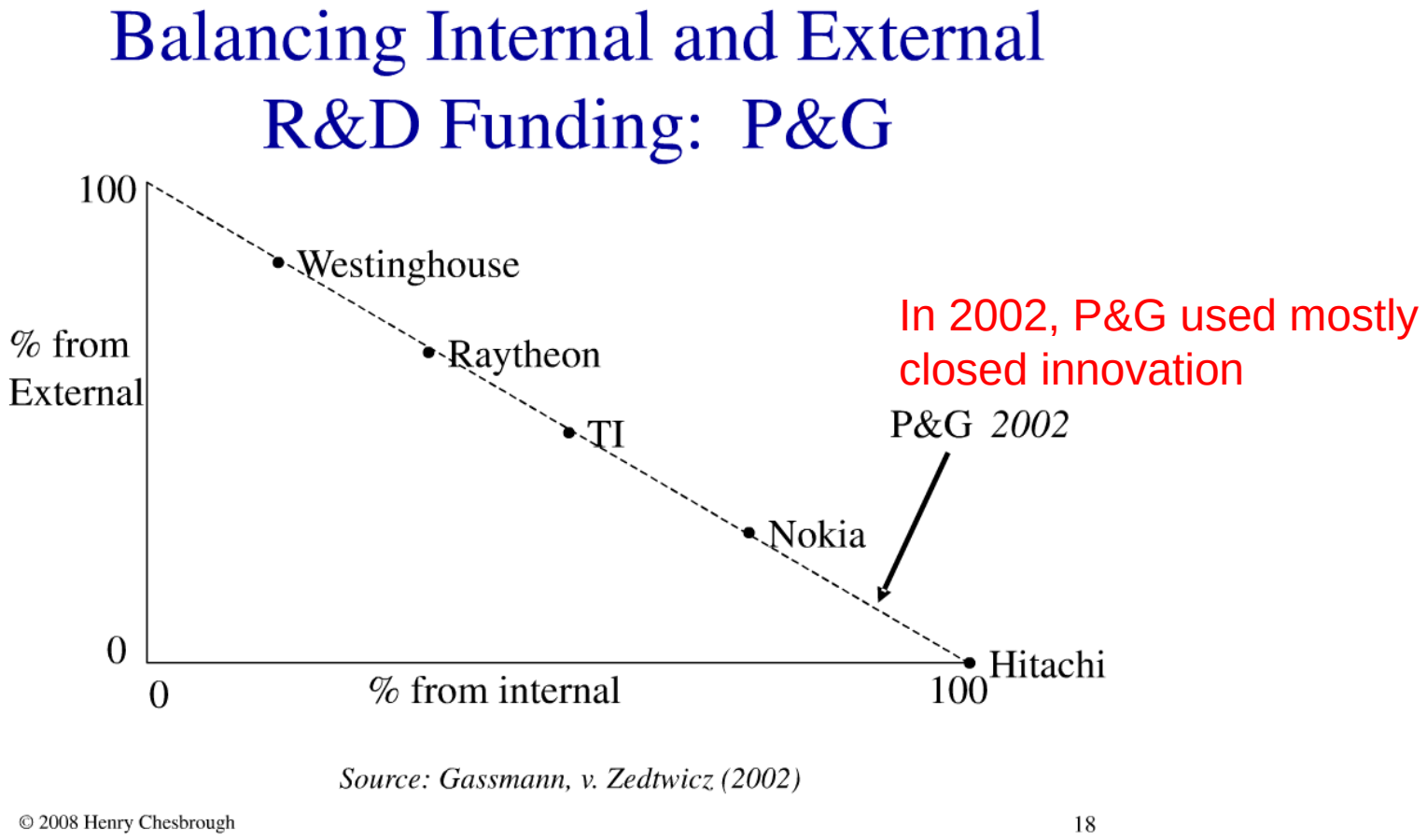
Risks of open innovation (compared to closed innovation)

- ☹ Lack of control
  - Will usually not have as tight control of external resources as internal ones
- ☹ Higher complexity of managing innovation
  - Need to manage external relationship, intellectual property, confidentiality etc
- ☹ Higher coordination costs
  - May cost to coordinate external resources
- ☹ Possible loss of own capability over time
  - If are not using and building a capability but relying on others
- ☹ Possible loss of competitive advantage compared to others
  - If allow others to build skills in area important to your business, they can sell their expertise to your competitors (contracts can help address the risk)

Balancing Open and Closed Innovation?

- Both traditional ("closed") innovation and open innovation have benefits
- Many companies do both and balance them

Balancing internal and external spending on innovation



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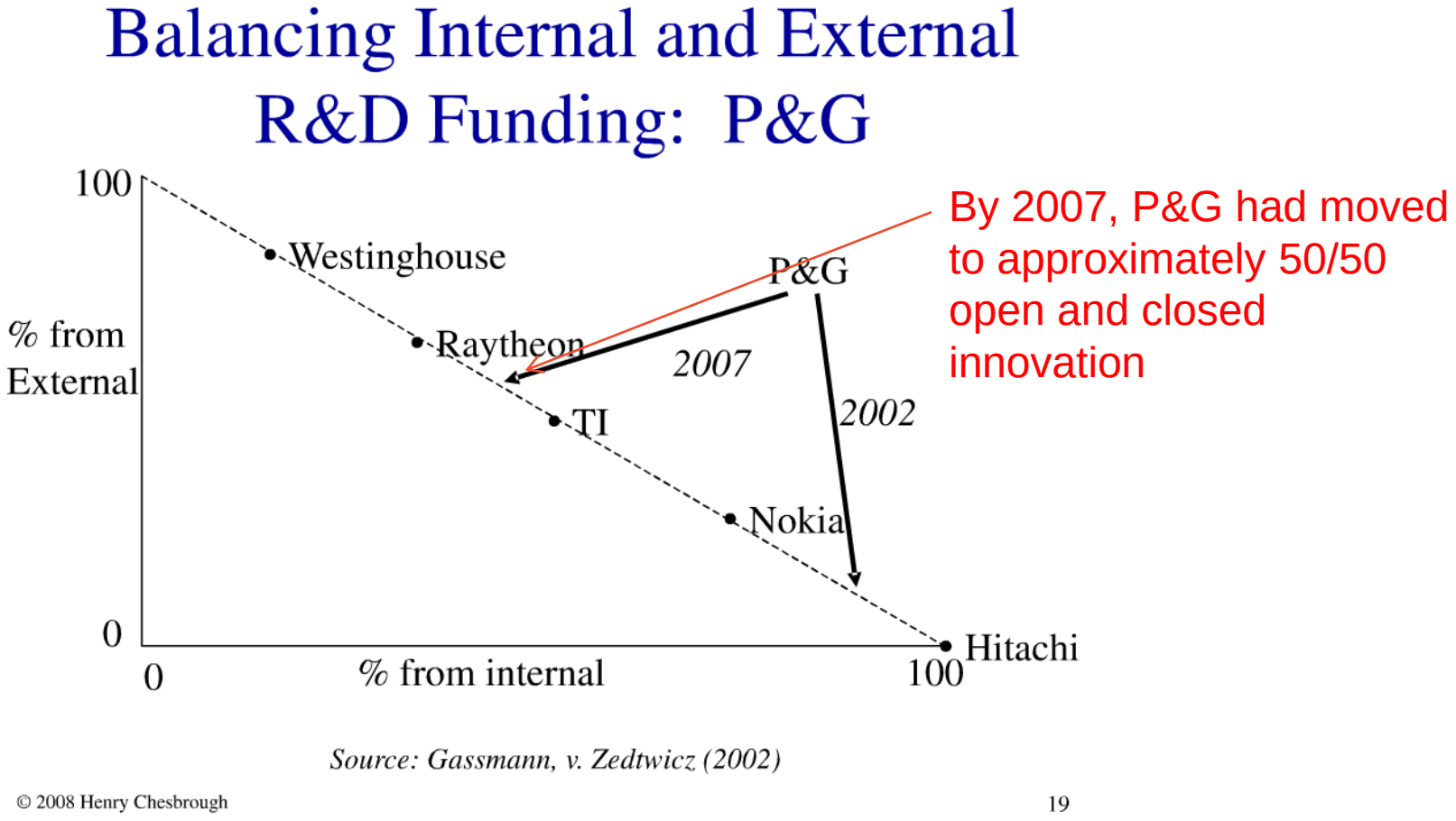
Balancing internal and external spending on innovation



Source: Chesbrough (2009) - http://www.slideshare.net/Allagi/open-innovation-seminar-2009-brazil-henry-chesbrough

Distributed Innovation:
Getting others involved in innovation

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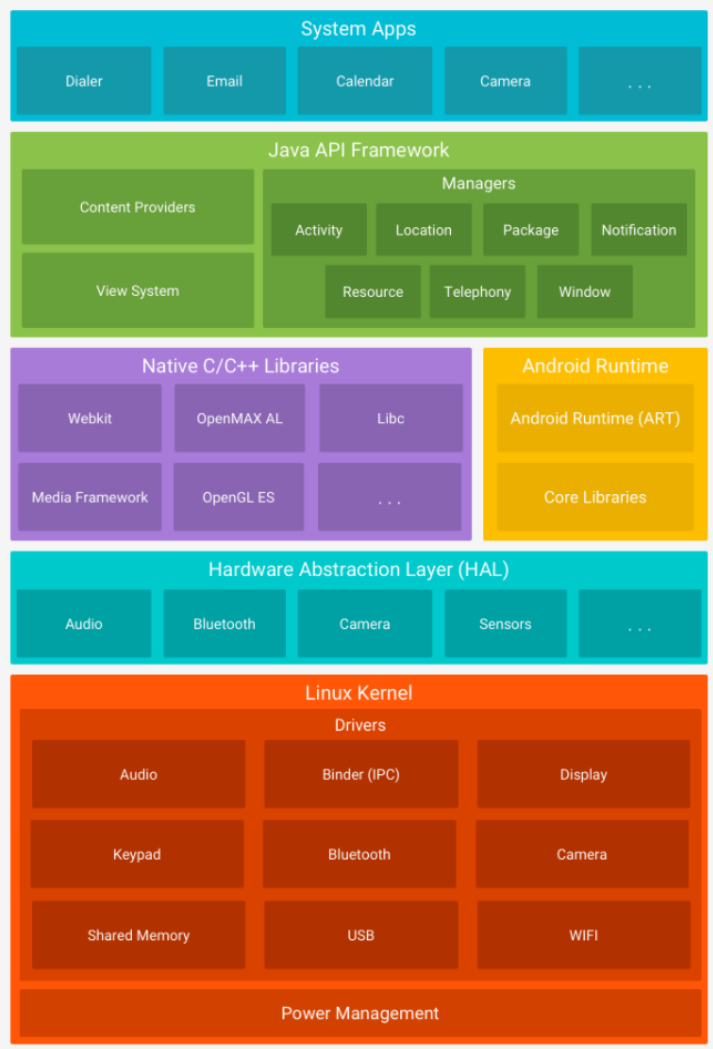
Enabling distributed innovation: Modularity

- *the use of individually distinct functional units, as in assembling an electronic or mechanical system.*
  - www.dictionary.com

- In software engineering, modularity refers to the extent to which a software/Web application may be divided into smaller modules. Software modularity indicates that the number of application modules are capable of serving a specified business domain.
- https://www.techopedia.com/definition/24772/modularity

Enabling distributed innovation: Modularity

- A standard interface enables components to be combined easily (e.g. by user, within company, between companies)
- Modularity can enable many different configurations to be achieved from a given set of components.



https://developer.android.com/guide/platform/index.html

Enabling distributed innovation: Modularity

- Products may be modular at:
  - **User level** e.g. Firefox add-ons, Microsoft Office plug-ins, Smartphone Apps
  - **Producer (company) level** e.g. Software products based on a company's platforms
  - **Industry level** e.g. Each component of a PC made by different company

Some approaches to distributed innovation

– These are some approaches companies use to get external companies/individuals involved in their innovation:

A. Product platforms
B. Web APIs
C. Crowdsourcing innovation / Crowdfunding Innovation
D. Releasing data sets “Open data”
E. Free and Open Source Software
F. User innovation
G. Platform ecosystems
H. Accelerators, investment and others

A. Product Platforms

Product Platforms

- Concept became popular in the 90s – used for reusable components/design frameworks
- Foundation of components around which a company builds related products
- Also known as "product family engineering"
- Platforms make it possible for companies to:
  - Have a rich line-up of different products with the same core functions
    - At different price-points
    - For different customer types
  - To do so efficiently through re-use of a common platform

Canon DiG!C chip

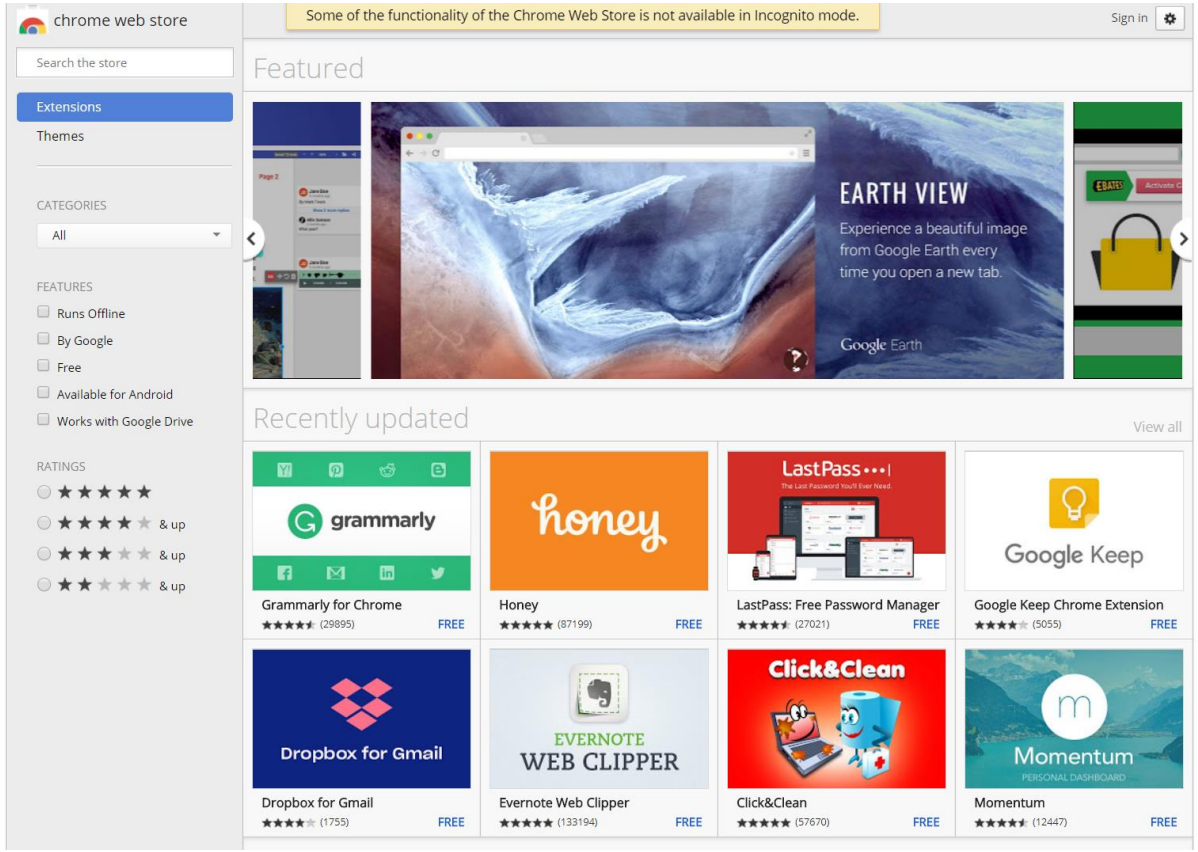
http://www.reghardware.com/

Some ways in which companies provide IT product platforms

- Make source code available:
  - Allows external innovators to modify the software for their own needs
  - Eg: Core Java platform
- Provide toolkit (software and documentation):
  - Allows external innovators to write software based on the toolkit
  - Eg: SAP XML Toolkit for Java
- Provide plug-in/add-on support in software:
  - Allows external innovators to customise software without access to source code
  - Eg: Google Extensions
- Provide full product platform for external innovation
  - Allows external innovators to write rich and varied applications on the platform
  - Eg: Android and iPhone app architectures
- Provide live data/functionality via application programming interface (API)
  - Allows external innovators to build new services using the data
  - Eg: Facebook API

Example of a Product Platforms – Google Extensions

- Extensions are small software programs that customize the browsing experience. They enable users to tailor Chrome functionality and behavior to individual needs or preferences.
- They are built on web technologies such as HTML, JavaScript, and CSS.



Product Platforms: Benefits

- For external product platform:
  - Can be made available externally, leading to new businesses, and new business models
- For internal product platform:
  - Reuse technology component in multiple products leading to:
  - ☺ Faster development time so gets to market sooner
  - ☺ Lower effective cost (as spread over multiple products)
  - ☺ Higher adaptability and 'evolveability'
  - ☺ Innovative aspects of the platform can benefit a range of products
  - ☺ Application development on platform can focus on innovative value-add

B. Web APIs

Web APIs

- Interfaces for web-based services to interact (usually RESTful APIs)
- Enable modularity on the web
- Used for e.g:
  - Maps
  - Payment
  - Messaging
- Becoming the underlying infrastructure for a lot of automation

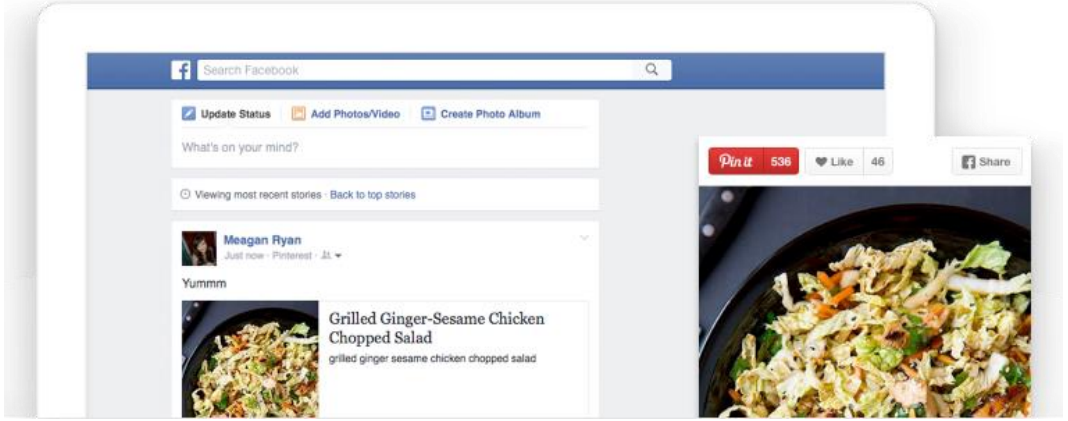
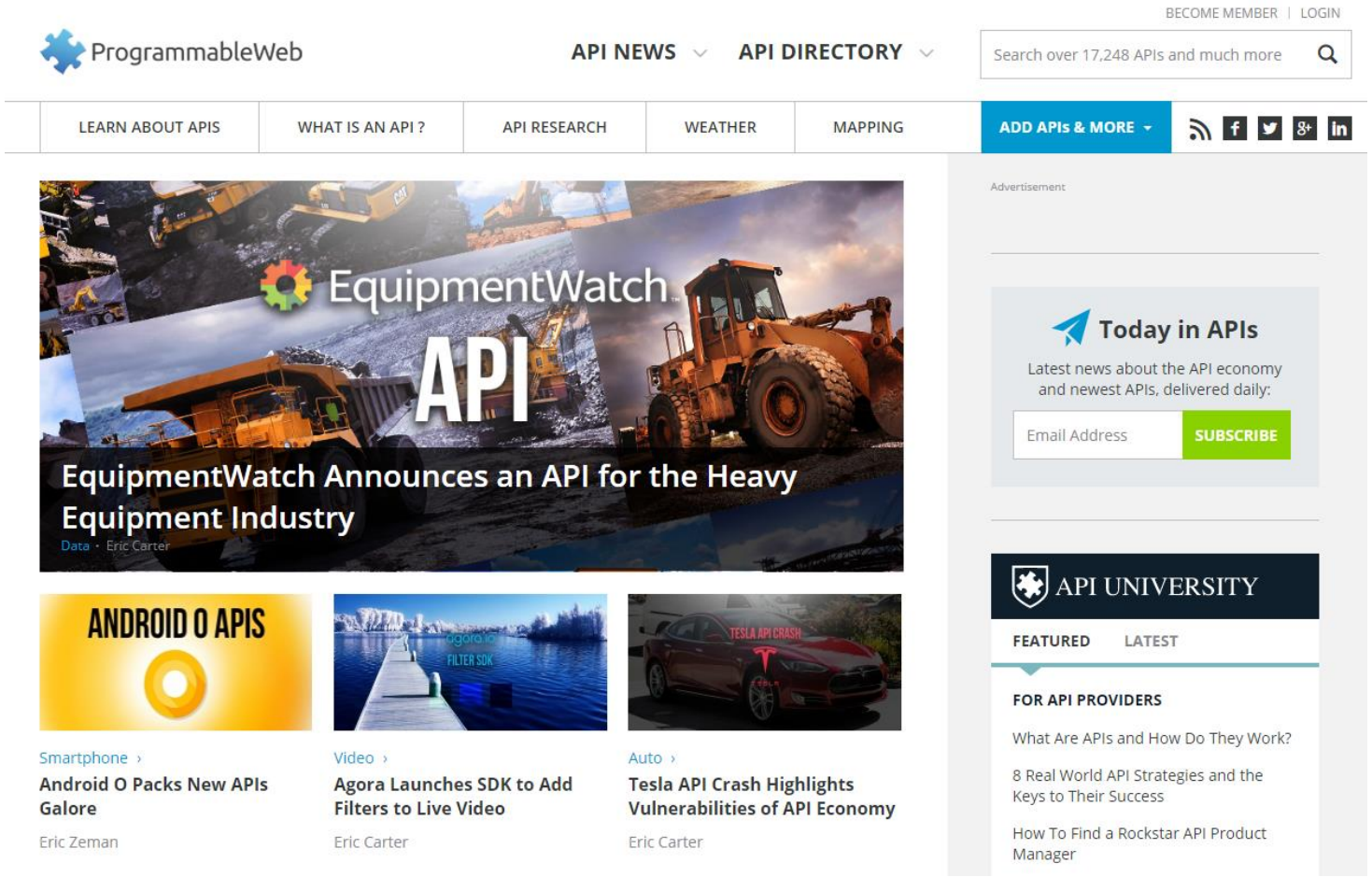


Image: facebook.com/developer

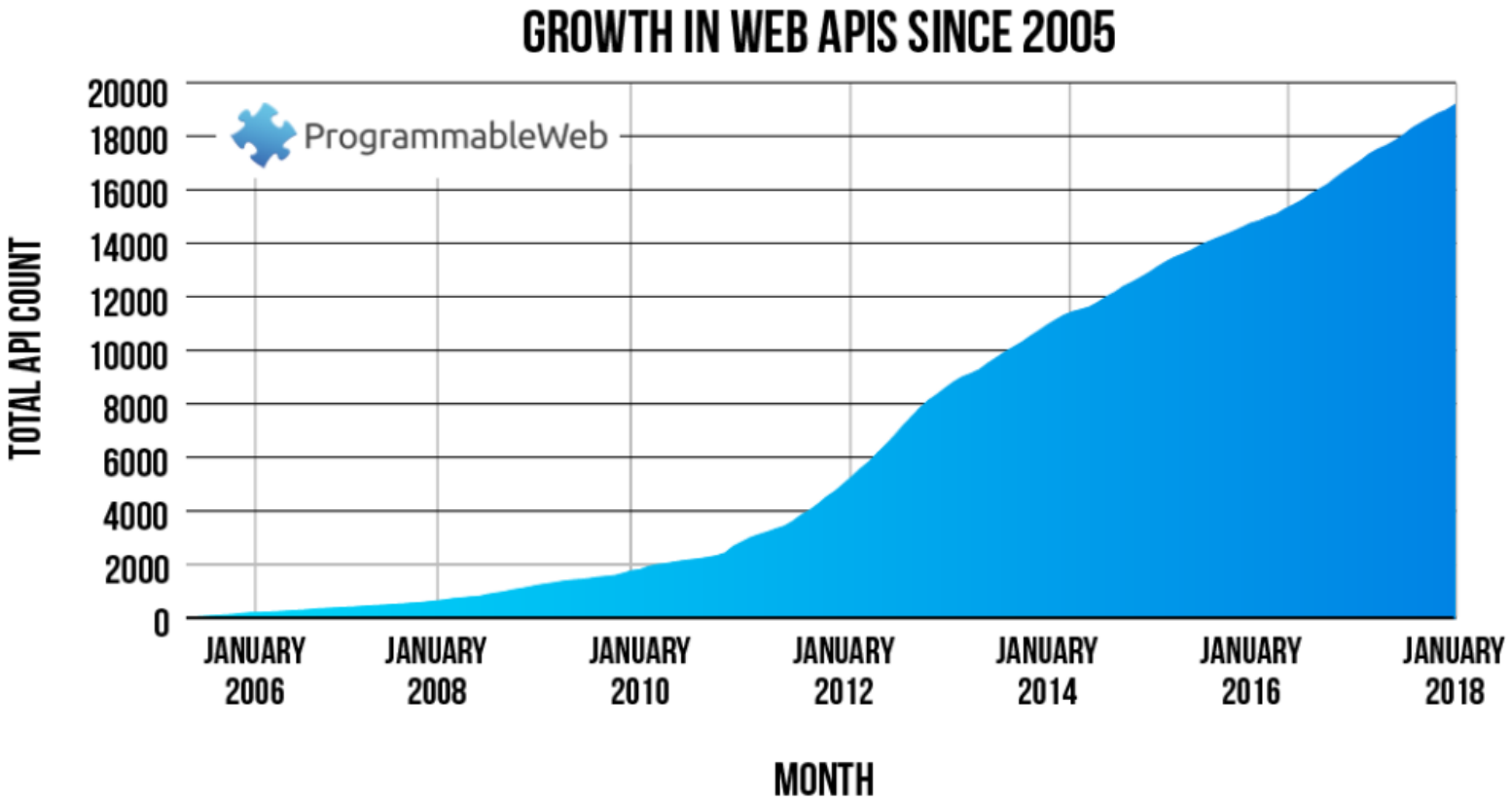
Image: developer.google.com

Web APIs: The state of them today

- Over 19,000 web APIs available now http://programmableweb.com



Web APIs



The growth over time of the ProgrammableWeb API directory to more than 19,000 entries

https://www.programmableweb.com/news/research-shows-interest-providing-apis-still-high/research/2018/02/23

Web APIs

- The interest in the Netflix API is unexpected given that the public program has been shut down since 2014.
- Despite the closure, Netflix still open sources much of their technology such as Chaos Monkey (est the resilience of its IT infrastructure) and Falcor, and this no doubt helps spur engagement with developers.

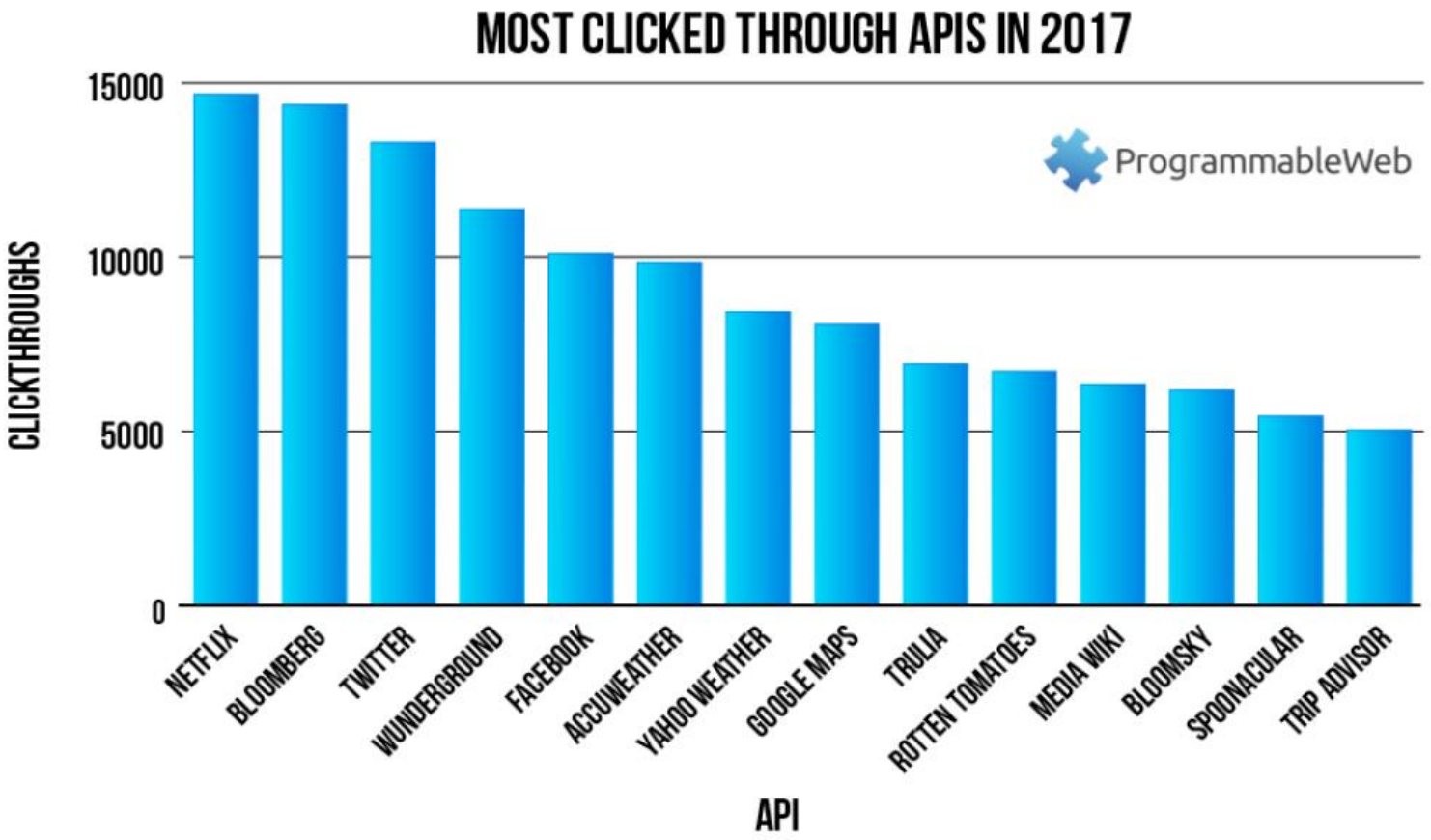


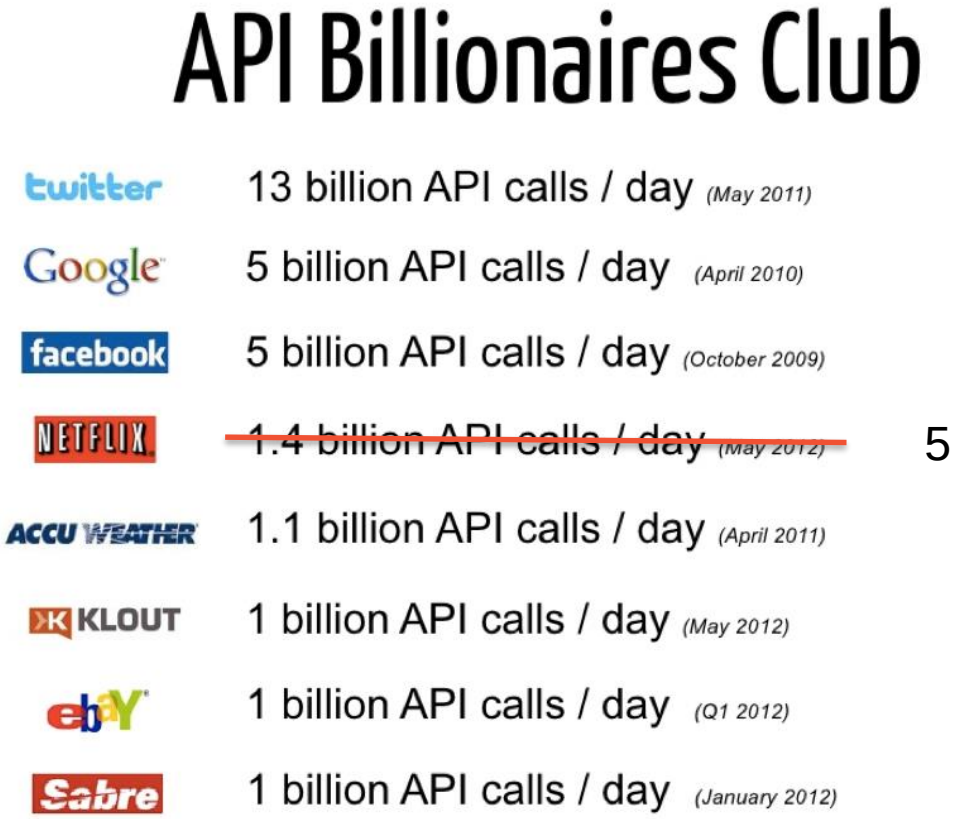
Figure 1: APIs that drove the most click throughs from ProgrammableWeb API profiles in 2017

https://www.programmableweb.com/news/programmablewebs-most-popular-apis-2017/research/2018/02/21

Web APIs

Number of API count in 6 month
Source: ProgrammableWeb http://www.programmableweb.com/api-research

Web APIs

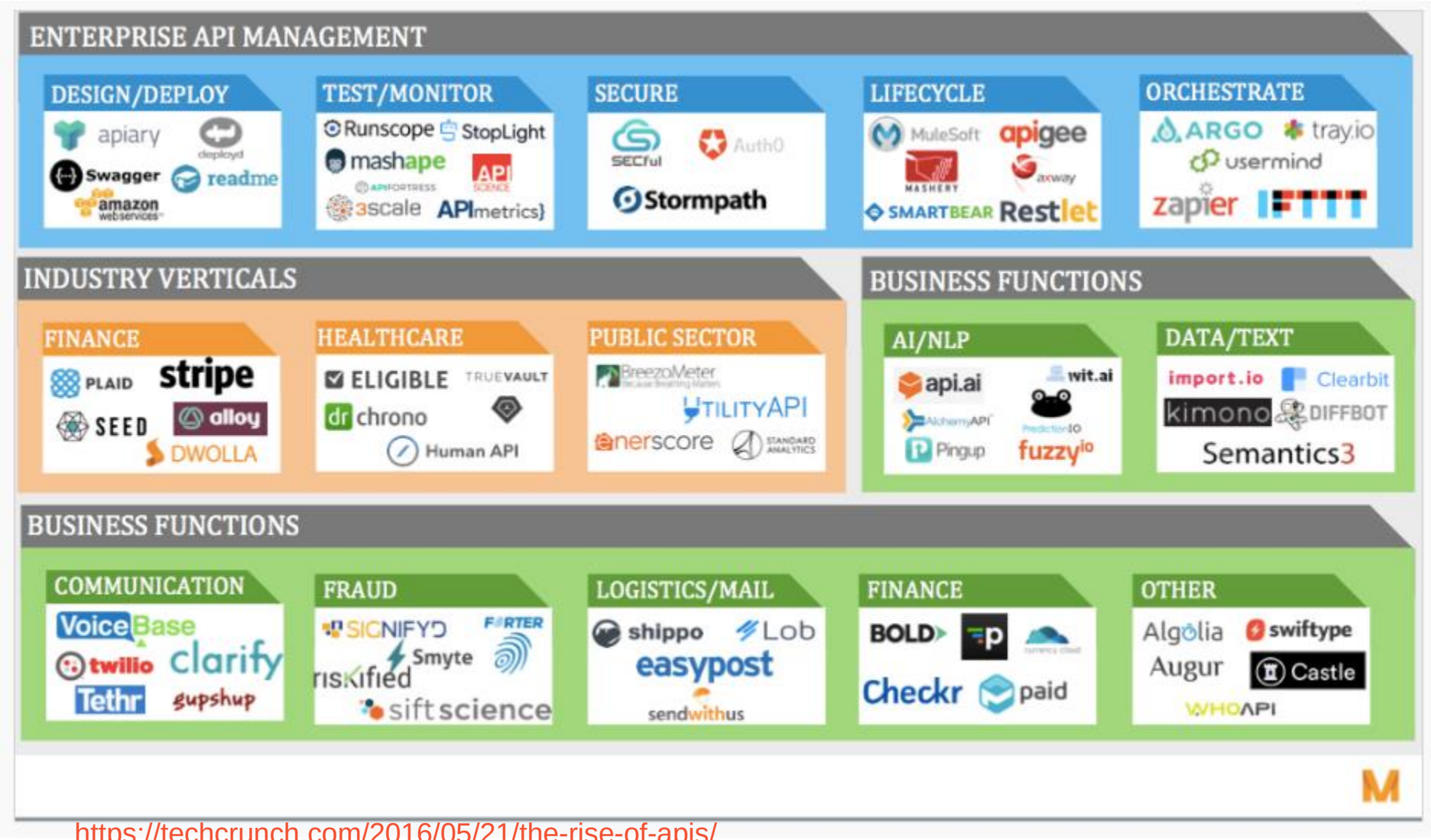


5 billion/day in 2014

Source: John Musser, ProgrammableWeb (May 2012) http://www.slideshare.net/jmusser/what-makes-a-great-open-api

The rise of APIs – Techcrunch

- Faster, cheaper, smarter
- A new breed of software companies
- Rethinking the value chain



https://techcrunch.com/2016/05/21/the-rise-of-apis/

"In the past, the biggest companies were those closest to the data (e.g. a system of record), able to impose a tax, or lock-in to their platform. In the API economy, the biggest companies may be the ones that aggregate the most data smartly and open it up to others."

https://techcrunch.com/2016/05/21/the-rise-of-apis/

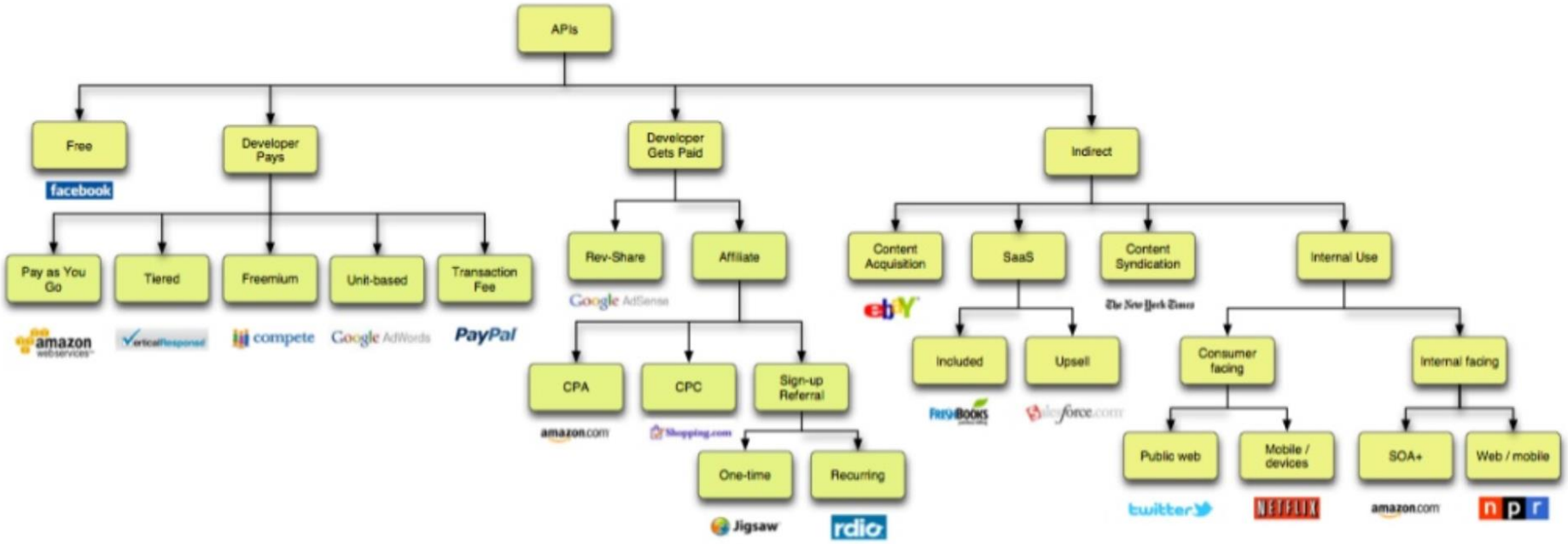
API Business models

- Models can be: Free /Developer Pay / Developer Gets Payed / Indirect

- ***API as a product***: This category implies that the API has a specific money-making goal or serves as a significant or single source of income for the company. By definition, APIs in this category must provide value that is easy to monetize, and is highly competitive or unique
- ***API enhancing existing product***: A majority of monetized APIs fall into this category. With the main money-making responsibility assigned to another part of the business, API providers have a greater set of business model options, ranging from direct pay-to-play to indirect, commission-based compensation
- ***API promoting existing product***: Designed to solidify the market position, APIs in this category are often offered for free, and work to attract interest and traffic to the API provider.

https://www.epam.com/insights/blogs/a-guide-to-picking-the-right-business-model-for-your-api-strategy

API Business Models, 2013

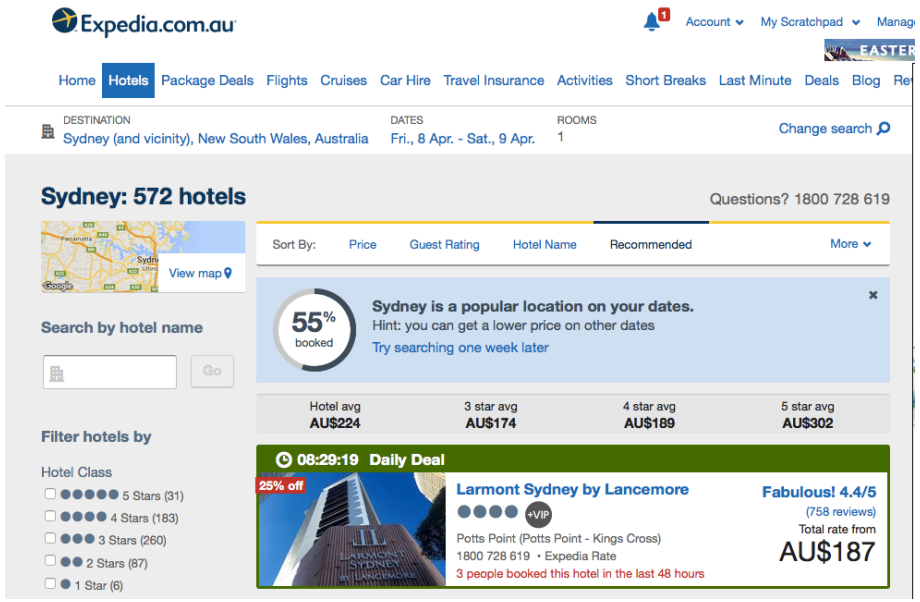


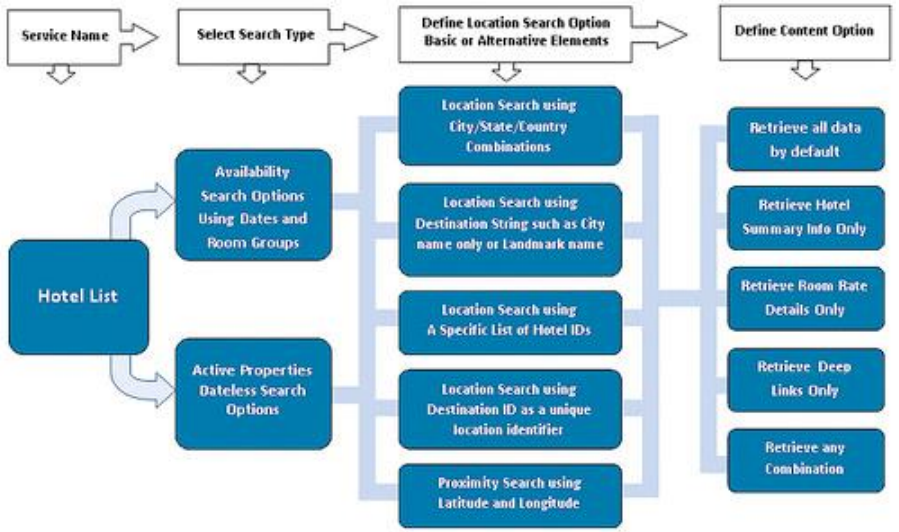
https://www.slideshare.net/jmusser/j-musser-apibizmodels2013/8-API_Business_Models_2013

Examples: Using APIs for business

- Salesforce.com generates 50% of its revenue through APIs
- Expedia generates 90%
- eBay generates 60%

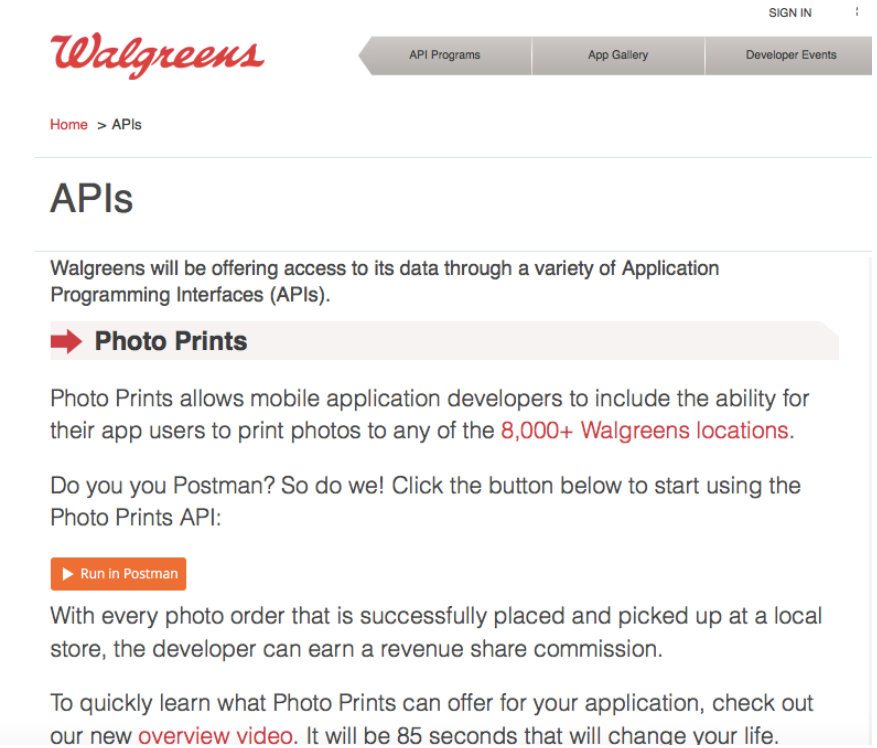
Source: https://hbr.org/2015/01/the-strategic-value-of-apis



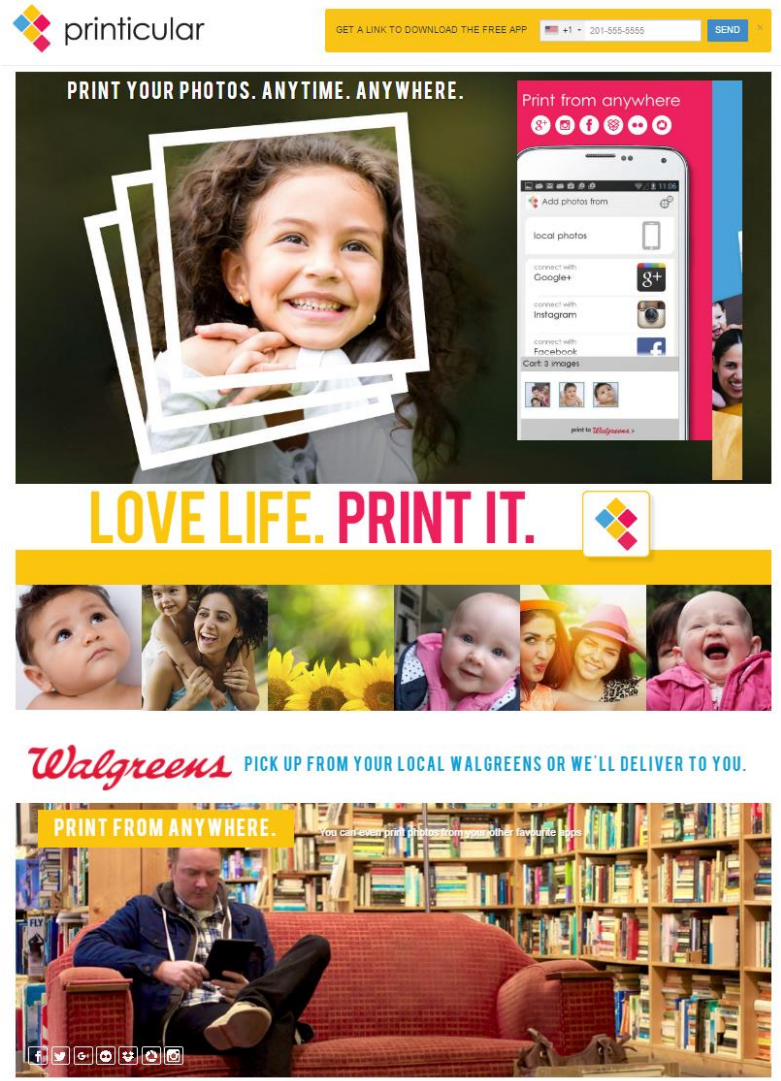


Expedia Affiliation Network – typical pathways http://developer.ean.com/docs/getting-started

Examples: Not just the usual web companies…



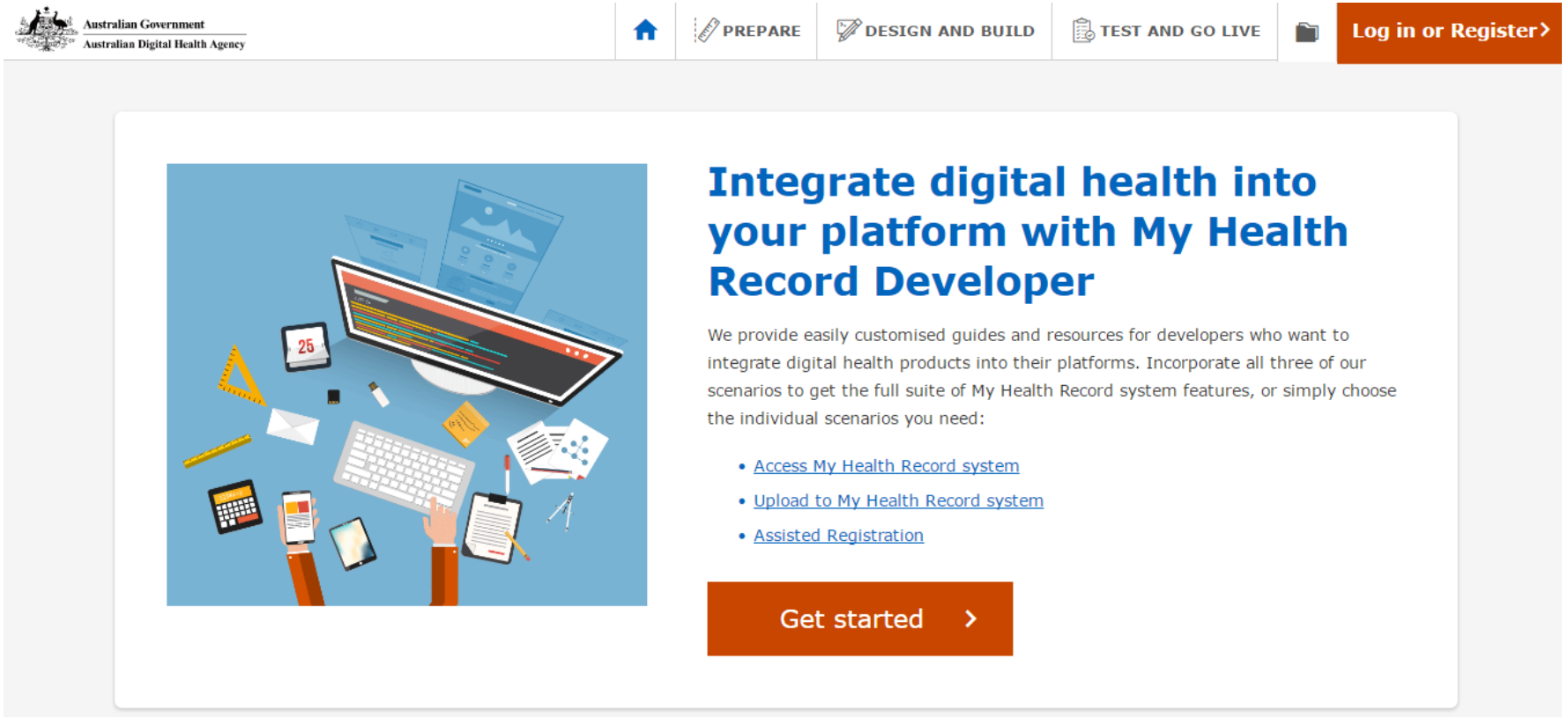
https://developer.walgreens.com/apis



https://www.printicular.com/

Example: Personal health record in Australia

- Government wants to increase the acceptance of personal health records
- API for developers



https://myhealthrecorddeveloper.digitalhealth.gov.au/

C. Crowdsourcing (and Crowdfunding)

Crowdsourcing: What is it?

- Original definition (from 2006)
- = Crowd + Outsourcing
- "Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call.

  This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals. The crucial prerequisite is the use of the **open call format and the wide network** of potential laborers."
- (Jeff Howe, Wired Magazine, 2006)

Crowdsourcing: The typical crowdsourcing process

Crowdsourcing: Newer definition

- "Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task.

- The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money, knowledge and/or experience, always entails mutual benefit.

- The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the crowd- sourcer will obtain and utilize to their advantage what the user has brought to the venture, whose form will depend on the type of activity undertaken."

Estellés-Arolas, E., & González-Ladrón-de-Guevara, F. (2012). Towards an integrated crowdsourcing definition. *Journal of Information science*, *38*(2), 189-200.

Crowdsourcing: What is it?

- (a) there is a clearly defined crowd;
- (b) there exists a task with a clear goal;
- (c) the recompense received by the crowd is clear;
- (d) the crowdsourcer is clearly identified;
- (e) the compensation to be received by the crowdsourcer is clearly defined;
- (f) it is an online assigned process of participative type;
- (g) it uses an open call of variable extent;
- (h) it uses the internet.

- Estellés-Arolas, E., & González-Ladrón-de-Guevara, F. (2012). Towards an integrated crowdsourcing definition. *Journal of Information science*, *38*(2), 189-200

Why do people engage with crowdsourcing?

Many reasons including:

- "the desire to earn money;
- to develop one's creative skills;
- to network with other creative professionals;
- to build a portfolio for future employment;
- to challenge oneself to solve a tough problem;
- to socialize and make friends;
- to pass the time when bored;
- to contribute to a large project of common interest;
- to share with others; and
- to have fun." Brabham (2011)

Types of Crowdsourcing (Brabham, 2011)

Type	How it Works	Kinds of Problems	Examples
Knowledge Discovery and Management	Organization tasks crowd with finding and collecting information into a common location and format	Ideal for information gathering, organization, and reporting problems, such as the creation of collective resources	Peer-to-Patent *peertopatent.org* SeeClickFix *seeclickfix.com* http://seeclickfix.com
Broadcast Search	Organization tasks crowd with solving empirical problems	Ideal for ideation problems with empirically provable solutions, such as scientific problems	InnoCentive *innocentive.com* http://innocentive.com Goldcorp Challenge *Defunct*
Peer-Vetted Creative Production	Organization tasks crowd with creating and selecting creative ideas	Ideal for ideation problems where solutions are matters of taste or market support, such as design or aesthetic problems	Threadless *threadless.com* http://threadless.com Doritos Crash the Super Bowl Contest *crashthesuperbowl.com* Next Stop Design *nextstopdesign.com*
Distributed Human Intelligence Tasking	Organization tasks crowd with analyzing large amounts of information	Ideal for large-scale data analysis where human intelligence is more efficient or effective than computer analysis	Amazon Mechanical Turk *mturk.com* http://mturk.com Subvert and Profit *subvertandprofit.com*

Brabham (2011)

Crowdsourcing for innovation: Another typology

- Intermediary platforms
  - Research & Development platforms (eg Innocentive, NineSigma)
  - Marketing, Design & Idea platforms (eg 99designs, Spigit)
  - Collective intelligence & Prediction platforms (eg Kaggle, We Are Hunted)
  - HR and Freelancers platforms (eg TopCoder, Amazon Mechanical Turk)
  - Open innovation software (eg Imaginatik)
  - Intermediary open innovation services
- Creative co-creation
  - Eg Threadless, CreateMyTattoo, Quirky
- Corporate initiatives
  - Product ideas crowdsourcing (eg IBM InnovationJam, Dell IdeaStorm)
  - Branding and Design crowdsourcing (eg Fluevog)
- Peer production
  - Eg Linux, Wikipedia
- Public crowdsourcing
  - Eg Creativecommons.org, Fold it

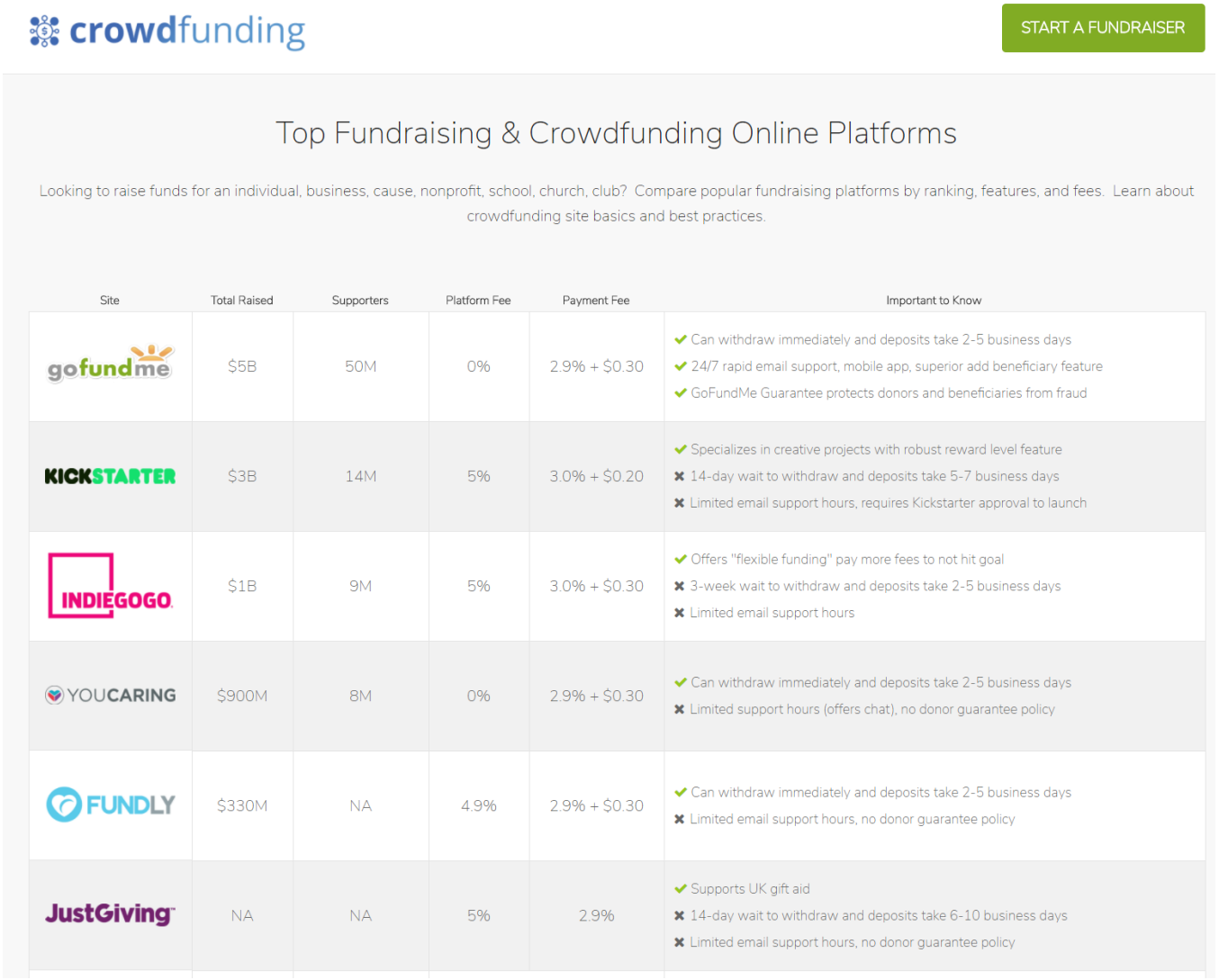
http://www.boardofinnovation.com/list-open-innovation-crowdsourcing-examples/

Crowdsourcing: What is it?

https://www.youtube.com/watch?v=WCPfxPSpEsI

Cwordfunding

- Crowdsourcing is the sourcing of anything from a crowd
- Crowdfunding is the sourcing of funds from a crowd - a specific type of crowdsourcing.



crowdfunding

START A FUNDRAISER

Top Fundraising & Crowdfunding Online Platforms

Looking to raise funds for an individual, business, cause, nonprofit, school, church, club? Compare popular fundraising platforms by ranking, features, and fees. Learn about crowdfunding site basics and best practices.

Site	Total Raised	Supporters	Platform Fee	Payment Fee	Important to Know
gofundme	$5B	50M	0%	2.9% + $0.30	✔ Can withdraw immediately and deposits take 2-5 business days ✔ 24/7 rapid email support, mobile app, superior add beneficiary feature ✔ GoFundMe Guarantee protects donors and beneficiaries from fraud
KICKSTARTER	$3B	14M	5%	3.0% + $0.20	✔ Specializes in creative projects with robust reward level feature ✖ 14-day wait to withdraw and deposits take 5-7 business days ✖ Limited email support hours, requires Kickstarter approval to launch
INDIEGOGO	$1B	9M	5%	3.0% + $0.30	✔ Offers "flexible funding" pay more fees to not hit goal ✖ 3-week wait to withdraw and deposits take 2-5 business days ✖ Limited email support hours
YOUCARING	$900M	8M	0%	2.9% + $0.30	✔ Can withdraw immediately and deposits take 2-5 business days ✖ Limited support hours (offers chat), no donor guarantee policy
FUNDLY	$330M	NA	4.9%	2.9% + $0.30	✔ Can withdraw immediately and deposits take 2-5 business days ✖ Limited email support hours, no donor guarantee policy
JustGiving	NA	NA	5%	2.9%	✔ Supports UK gift aid ✖ 14-day wait to withdraw and deposits take 6-10 business days ✖ Limited email support hours, no donor guarantee policy

http://www.crowdfunding.com/

Summary

- The patterns we've talked about in previous weeks happen in an "Innovation System"
- Governments try to influence this system to provide a good environment for innovation
- There is a trend from internal "closed" innovation models towards distributed innovation models where innovation is done through members of an innovation ecosystem working together
- In IT innovation, some approaches to involving others in innovation include:
  - Product platforms
  - Web APIs
  - Crowdsourcing innovation
  - Releasing data sets
  - Platform ecosystems
  - User innovation
  - Free and open source software
  - Accelerators, investment, etc

More in later lectures

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- Trott, P., & Hartmann, D. (2009). Why 'open innovation' is old wine in new bottles. *International Journal of Innovation Management*, *13*(04), 715-736.
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Tutorial

Open Innovation adoption among companies

THE UNIVERSITY OF SYDNEY

Examples

GENIUSLINK

https://ge-geniuslink.com/

Google for Entrepreneurs

https://www.googleforentrepreneurs.com/

Microsoft Imagine

https://imagine.microsoft.com/en-us

Cisco Entrepreneurs in Residence

https://eir.cisco.com/

SAMSUNG NEXT

http://nationswell.com/samsung-next-challenge/

Walmart Labs
Open Source Technology

https://www.walmartlabs.com/

Companies can use….

- Top coder by Nasa, ebay
- https://www.topcoder.com/
- http://www.designorate.com/successful-open-innovation-examples/

- Kaggle
- https://www.kaggle.com/
- https://www.kaggle.com/c/intel-mobileodt-cervical-cancer-screening

Tutorial Questions

- Which of the three distribution concepts are being used? Identify and briefly describe how it is used.
- What is the strategy for the company with its open innovation? What is its mission / vision / purpose?
- What are the benefits for the company? Similarly, what are the benefits for the user?
- [Optional / Homework] There are companies such as eBay, and Facebook, which has the capacity to have their own open innovation platform (e.g., within their own company) but chose to use other platforms e.g., Topcoder https://www.topcoder.com/ and Kaggle https://www.kaggle.com/ What are the advantages and disadvantages when compared to companies with their own open innovation platform?

MCQ

Contents from Week 1 to 4

MCQ

- After the Lecture at your Tutorial
- Your attendance will be noted

- 30 minutes
- 15 Questions
- No penalty – so attempt all Qs

- After the MCQ, your Tutorial will start

- Good luck!