

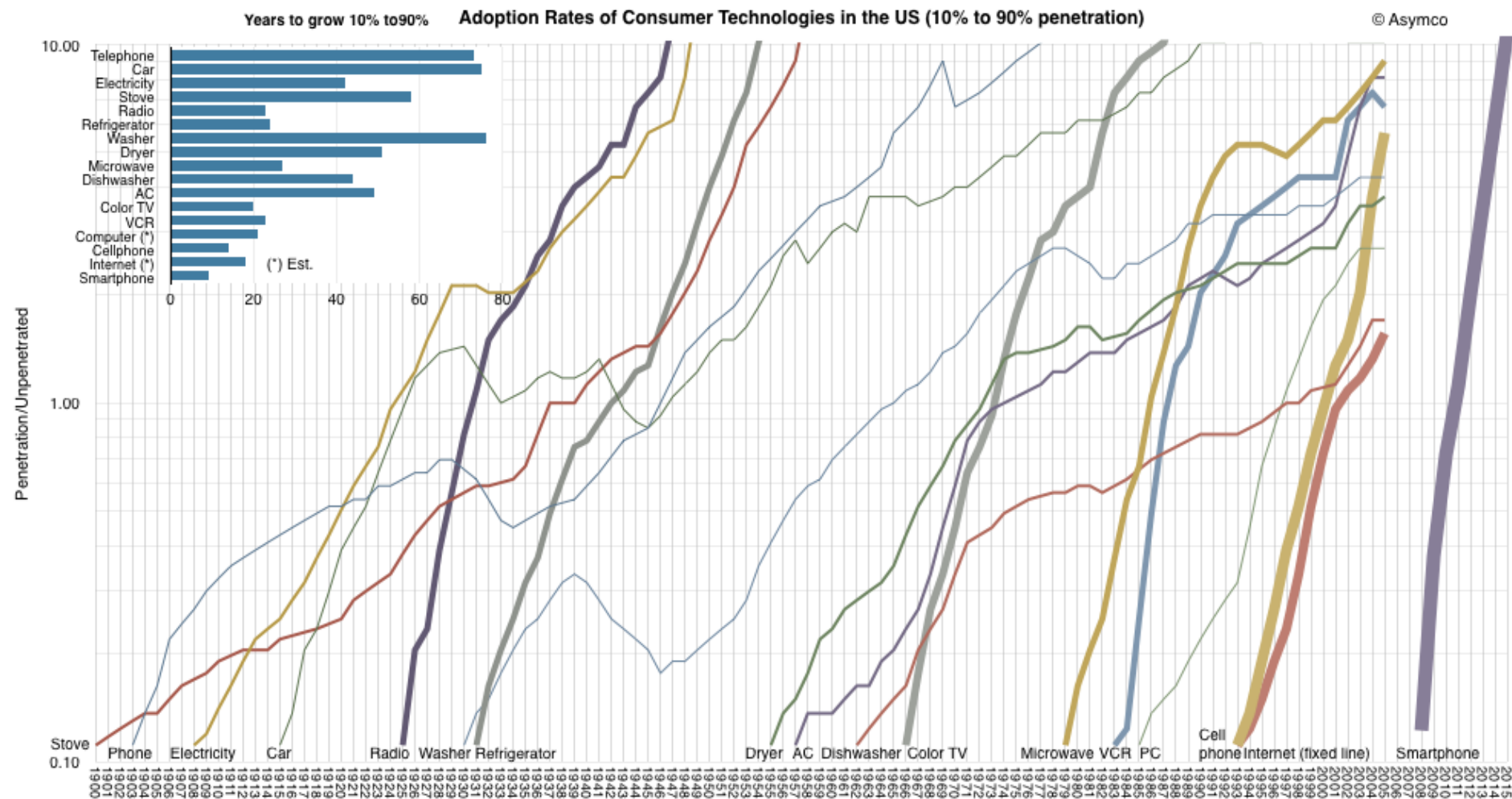
SEBA Master: Web Application Engineering

1. Web Site Genres

Prof. Dr. Florian Matthes, SS21

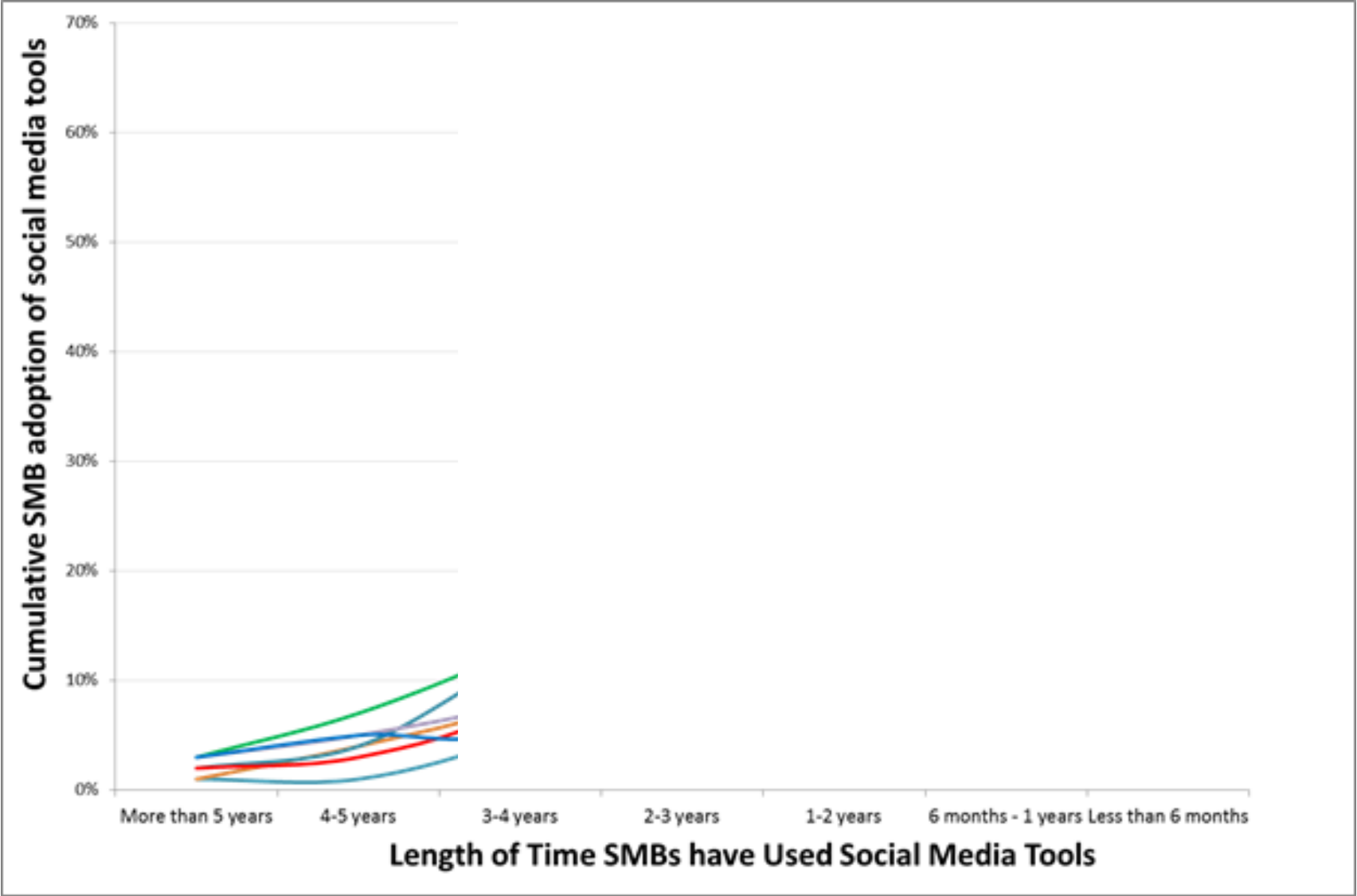
Chair of Software Engineering for Business Information Systems (sebis)
Faculty of Informatics
Technische Universität München
www.matthes.in.tum.de

Accelerating adoption rates for new technologies



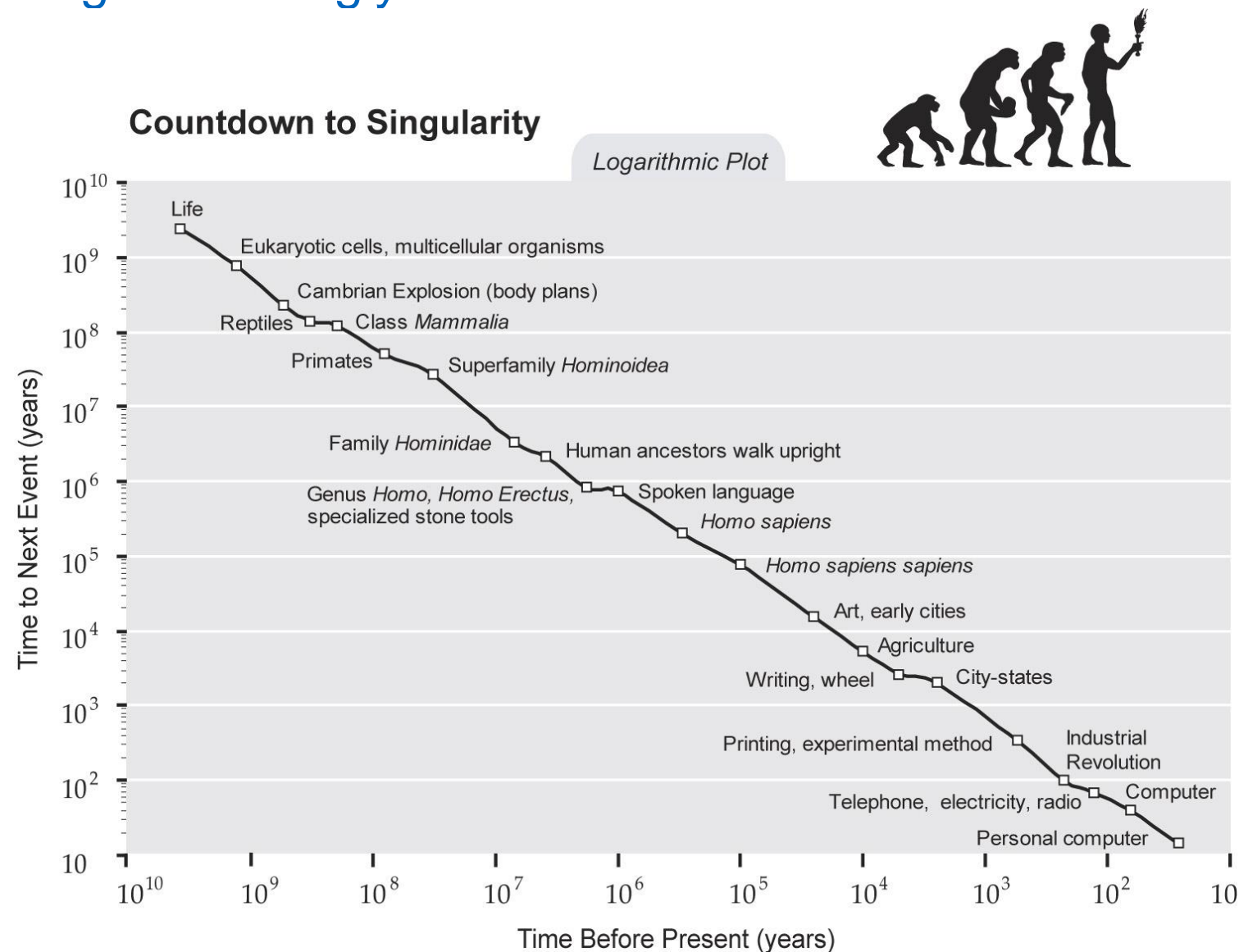
Tablet, Sensors, ...

Exponential growth starts inconspicuously, and humans are not used to reasoning about non-linear processes



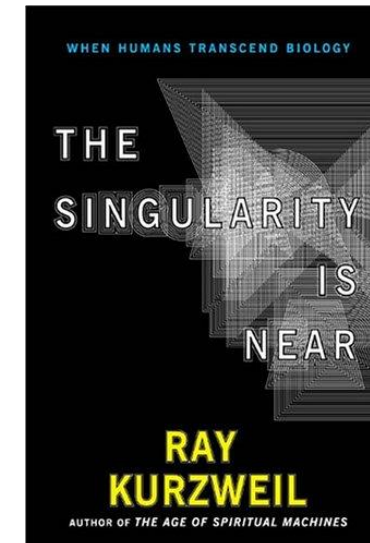
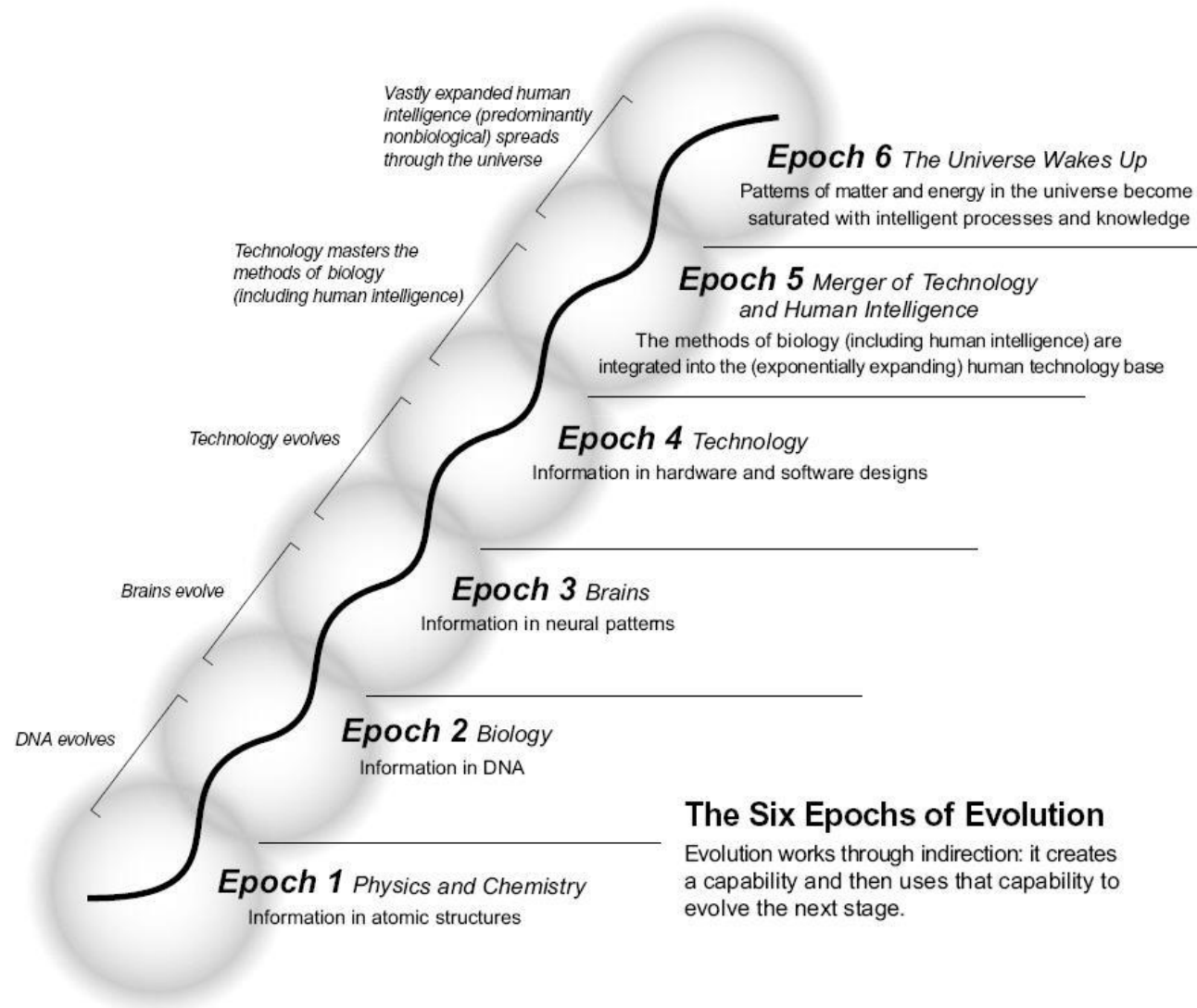
Source: 2012 Small and Medium Social Business Study, SMB Group

The world is getting increasingly turbulent



source: www.singularity.com

Speculation: Where does the evolution of information technology lead?



source: www.singularity.com

1. Web Site Genres

- Business Models on the Web
- Web 2.0 and Social Software
- Anything as a Service (XaaS)

2. Web Site Design Process

- Key Issues of Customer-Centered Web Design
- An Overview of Web Design Patterns
- Knowing Your Customers
- Involving Customers with Iterative Design
- Processes for Developing Customer-Centered Sites
- Additional Viewpoints and Aspects

Material and References



The material for this unit has been taken from the course "Managing the Digital Enterprise" of Prof. Michael Rappa from North Carolina State University.

There is a podcast available for free: <http://digitalenterprise.org/podcasts.html>

[Ra11] Rappa, Michael, "Business Models on the Web", <http://digitalenterprise.org/models/models.html>, [Last Accessed: April 9th 2021]

- A business model is the method of doing business by which a company can sustain itself
 - that is, **generate revenue**.
- The business model spells out how a company makes money by specifying where it is positioned in the **value chain**.

Simple example:

- A company produces a good and sells it to customers.

More complicated:

- Radio and Television Broadcasting
 - The broadcaster is part of a complex network of distributors, content creators, advertisers (and their agencies), and listeners or viewers.
 - Who makes money and how much is not always clear at the outset.

source: [Ra11]

Why are business models on the web important / different?

- In general, there is a limited, well understood set of models businesses can make money with.
- The web didn't invent entirely new ways to make money but tried-and-true models have been reinvented, e.g. auctions
- The web has popularized the auction model and broadened its applicability to a wide array of goods and services.

Especially on the web, business models must be considered carefully:

- During the dot-com bubble most web companies did not have a sustainable business model.

source: [Ra11]

Basic Categories of Business Models on the Web

- **Brokerage**
 - **Advertising**
 - **Merchant**
 - **Subscription**
 - **Manufacturer (Direct)**
 - **Utility**
 - **Community**
 - **Affiliate**
 - **Infomediary**
-
- The models are implemented in a variety of ways, as described later with examples.
 - A firm may combine several different models as part of its overall Internet business strategy.

source: [Ra11]

- Brokers are **market-makers**: they bring buyers and sellers together and facilitate transactions.
- Brokers play a frequent role in:
 - business-to-business (B2B),
 - business-to-consumer (B2C),
 - consumer-to-consumer (C2C) markets.
- Usually, a broker charges a **fee or commission for each transaction** it enables.
- **The formula for fees can vary:**
 - Who pays the fee (the buyer, or the seller, or both?)
 - How much is the fee (a percentage of the transaction volume, a flat fee?)
- The broker is **acting as a third party in the process of the transaction**.

source: [Ra11]

Variations of the Brokerage Model

Auction Broker (e.g. eBay.com)

- Conducts auctions for sellers (individuals or merchants).
- Broker charges the seller a listing fee and commission scaled with the value of the transaction.
- Auctions vary widely in terms of the offering and bidding rules.

Transaction Broker (e.g. PayPal)

- Provides a third-party payment mechanism for buyers and sellers to settle a transaction.

Demand Collection System (e.g. priceline.com)

- The patented "name-your-price" model pioneered by Priceline.com.
- Prospective buyer makes a final (binding) bid for a specified good or service, and the broker arranges fulfillment.

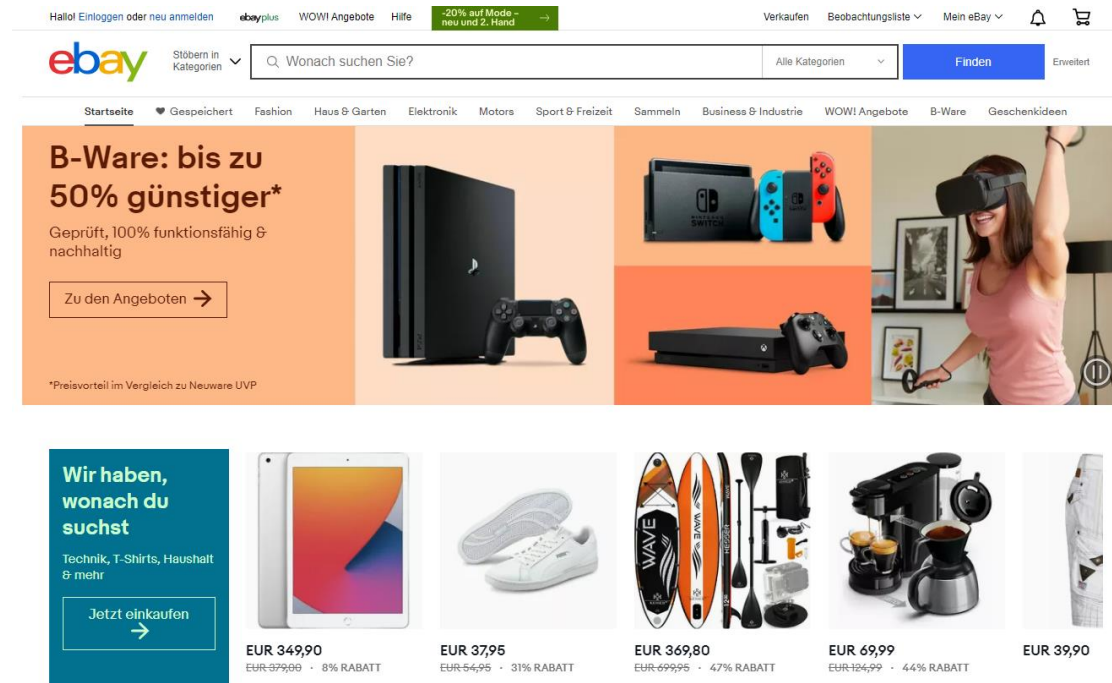
Mobility Broker (e.g. Moovel)

- Assembles all mobility offers of a certain region
- Provides mobility services like car-sharing, bike-sharing or intermodal traveling, etc.

source: [Ra11]

Case Study: eBay

- Started in 1995, highly profitable from the start.
- In 2004: 1,4 billion listings of products, 168 million registered users, 68 million active users.
- *Challenge*: limited ability to guarantee satisfaction, since eBay only acts as a broker.
- Actions to reduce fraud:
 - Focus on the "eBay community" with certain standards and values.
 - Feedback mechanism which results in a rating for each transaction from both the seller's and the buyer's perspective.



source: [Ra11]

Merchant Model

- Wholesalers and retailers of goods and services.
- Sales may be made based on list prices or through auction.
- A merchant usually creates an **inventory**.
- A merchant is involved in **distribution**.

source: [Ra11]

Variations of the Merchant Model

- **Virtual Merchant** (e.g. Amazon)
 - or e-tailer, is a retail merchant that operates solely over the web
- **Bit Vendor** (e.g. Apple iTunes Music Store, Musicload, Apple App Store)
 - A merchant that deals strictly in digital products and services and, in its purest form, conducts both sales and distribution over the web.
- **Catalog Merchant** (e.g. Otto, Lands' End, Manufaktum)
 - Mail-order business with a web-based catalog. Combines mail, telephone and online ordering.
- **Click and Mortar** (Barnes & Noble)
 - traditional brick-and-mortar retail establishment with web storefront

amazon.de

Mein Amazon

Angebote

Gutscheine

Verkaufen

Hilfe

Alle Kategorien

Suche

Alle

Los

Hallo! Anmelden

Mein Konto

Prime testen

Einkaufswagen

Wunschzettel

Amazon Instant Video

Musik-Downloads

App-Shop für Android

Amazon Cloud Drive

Kindle eReader & Bücher

Fire-Tablets

Amazon Fire TV

Fire Phone

Bücher

Filme, Serien, Musik & Games

Elektronik & Computer

Haushalt, Garten, Baumarkt

Beauty, Drogerie & Lebensmittel

Spielzeug & Baby

Kleidung, Schuhe & Uhren

Sport & Freizeit

Auto & Motorrad

Alle Kategorien

Prime Instant Video

Musik-Downloads

Kindle

App-Shop für Android

Downloads

Testen Sie den Testsieger ohne Risiko

30 Tage Geld-zurück-Garantie

kindle paperwhite

Mehr dazu

Frühling

Fashion-Gutscheine

Sport

Ostern

Shopping Club

Student

Liebe & American Football

Geschenkideen

und alles fürs Osterfest

Hier klicken

Amazon nutzt Cookies. Was sind Cookies?

So, 22.03.: FC Barcelona - Real Madrid

Kostenloser LIVE-Stream

amazon fireTV

Mehr dazu

Amazon Fashion

NEUE KOLLEKTION

Frühjahr/Sommer 2015

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Fürs Osterfest: Süßigkeiten, Schokolade & mehr

Oster-Schokolade

Mehr

Oster-Süßigkeiten

Oster-Geschenksets

Backdekoration

Ostertee

Elektronik & Foto: Restposten radikal reduziert

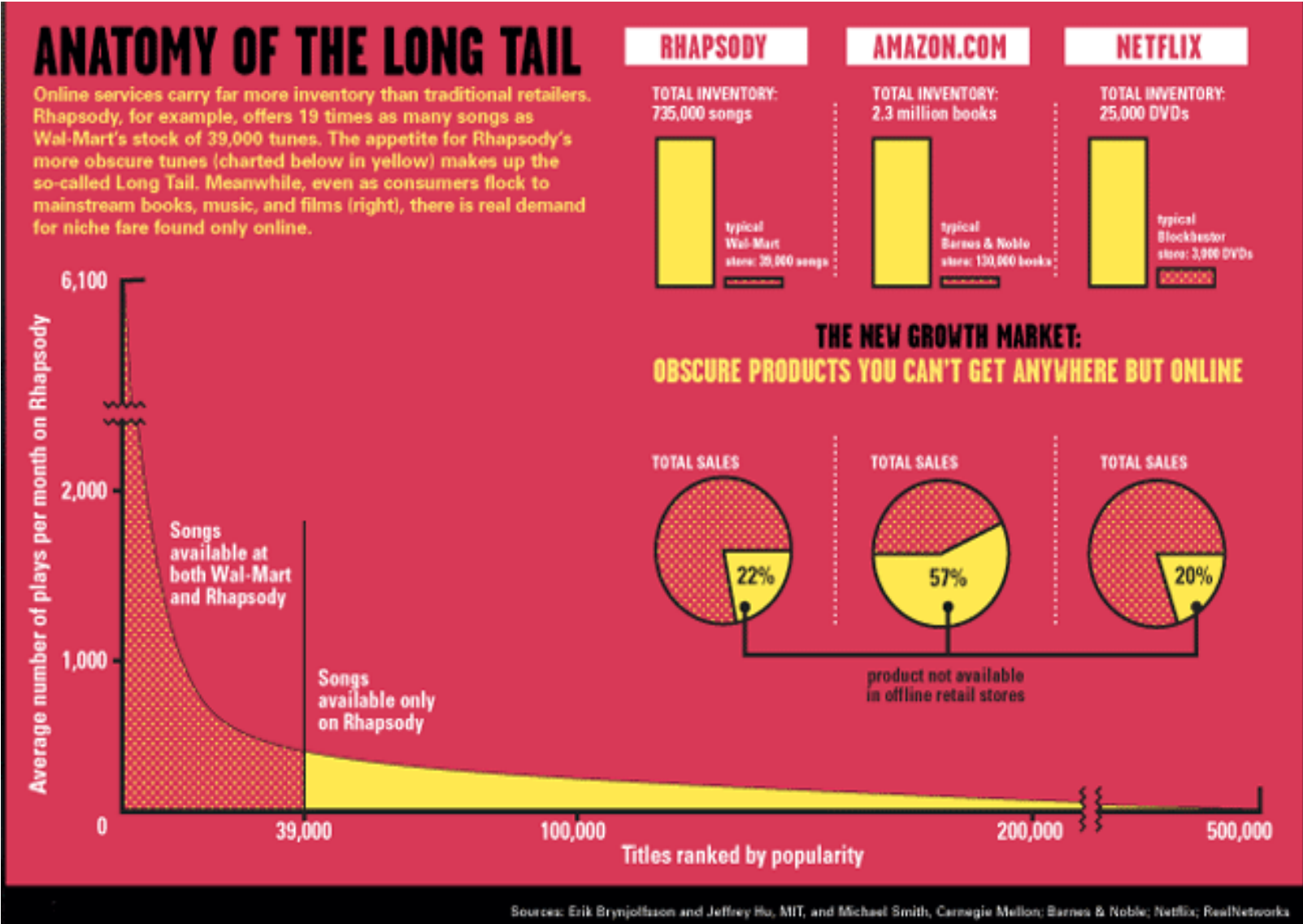
Alle Restposten

Handys & Zubehör

Kamera & Zubehör

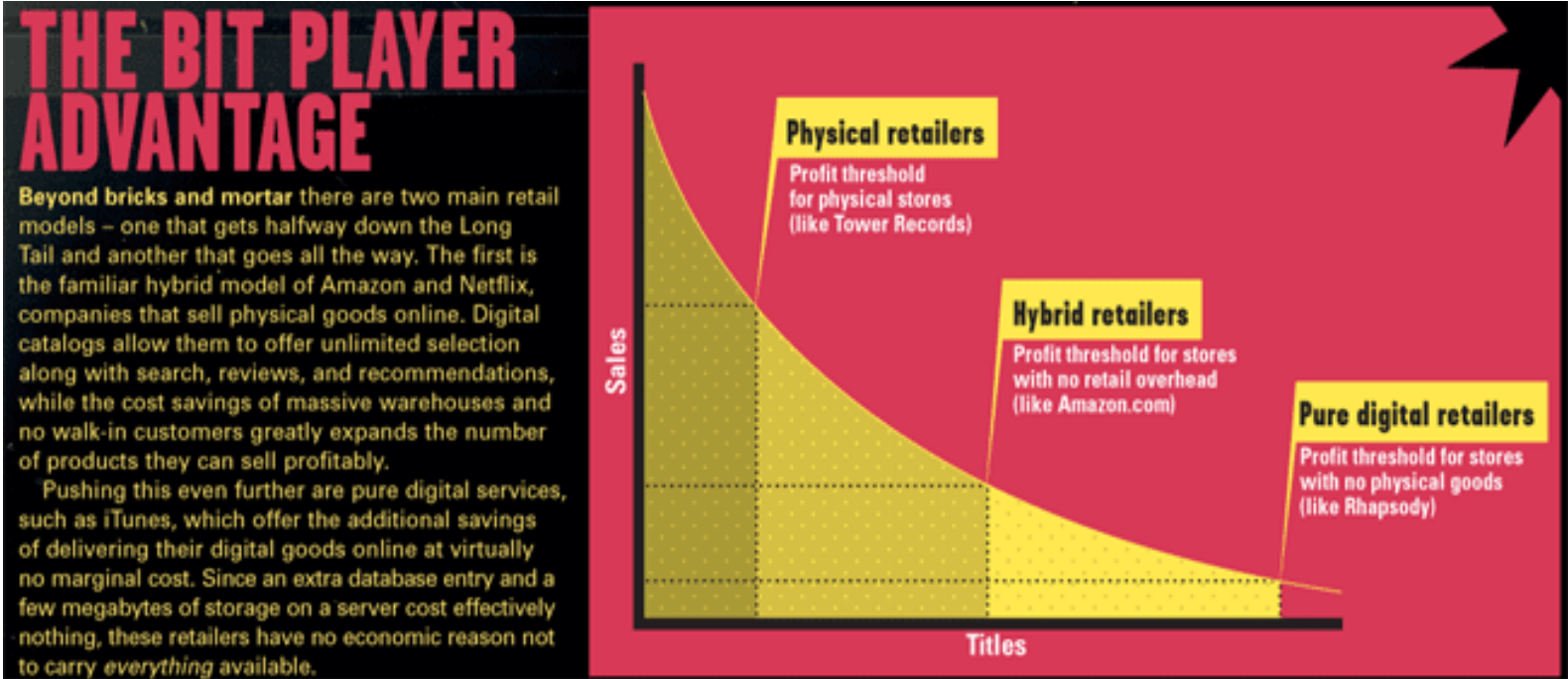
Heimkino

The Long Tail (1)



[“The Long Tail: Why the Future of Business Is Selling Less of More”, Chris Anderson, Hacette Books, 2008]

The Long Tail (2)



[“The Long Tail: Why the Future of Business Is Selling Less of More”, Chris Anderson, Hacette Books, 2008]



[“The Long Tail: Why the Future of Business Is Selling Less of More”, Chris Anderson, Hacette Books, 2008]

Advertising Model (1)

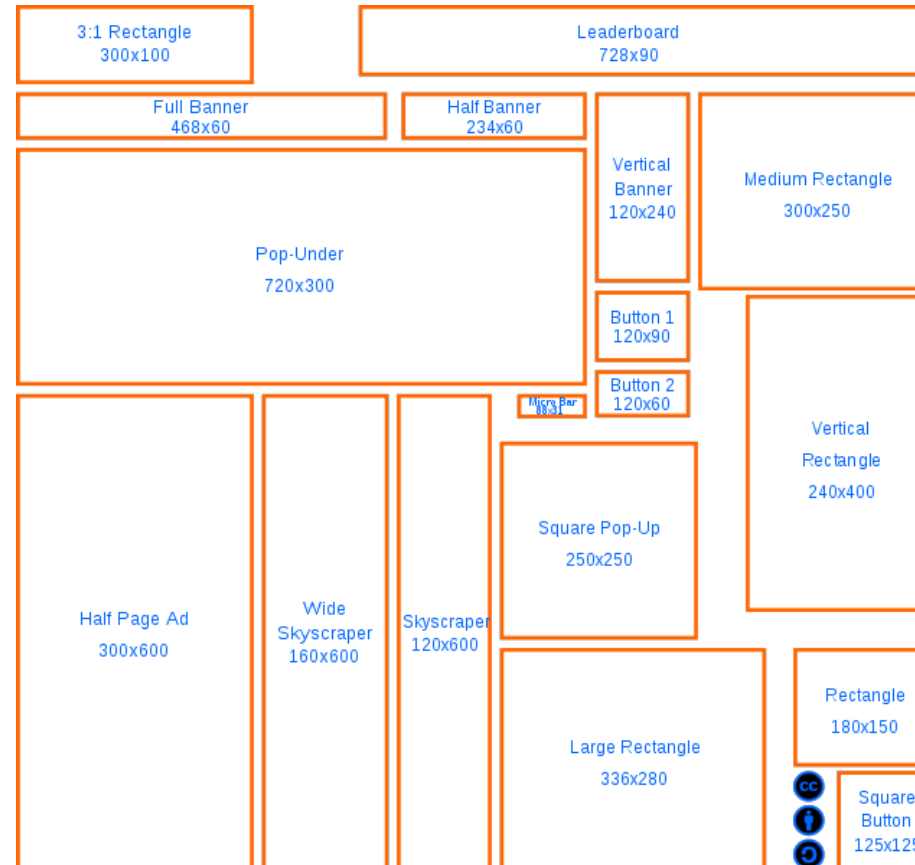
- Is an extension of the traditional media broadcast model.
- The broadcaster, in this case, a web site, provides content (usually, but not necessarily, for free) and services (like email, IM, blogs) mixed with advertising messages in the form of banner ads.
- In the web **the effect of advertisement can be analyzed immediately**.
- The banner ads may be the major or sole source of revenue for the broadcaster.
- The broadcaster may be a content creator or a distributor of content created elsewhere.
- The advertising model **works best when the volume of viewer traffic is large or highly specialized**.

source: [Ra11]

Advertising Model (2)

- Evolution of the advertising model:
 - Simple image-based advertising has declined.
 - More target-oriented placements.
 - Google's "Sponsored Links" are short, consisting of one headline and two additional text lines.

Standardized Sizes of Banner Ads



Variations of the Advertising Model (1)

Portal (e.g. Yahoo!)

- Usually a search engine that may include varied content or services.
- A high volume of user traffic makes advertising profitable and permits further diversification of site services.
- A personalized portal allows customization of the interface and content to the user.
- A niche portal cultivates a well-defined user demographic.

Query-based Paid Placement (e.g. Google, Overture)

- Sells favorable link positioning (i.e., sponsored links) or advertising keyed to particular search terms in a user query, such as Overture's trademark "pay-for-performance" model or Google's "Google Ads".

Location Based Placement (e.g. TripAdvisor)

- Provide location-specific advertisements mainly on mobile devices
- Push location-based service: User receives promotional materials from advertisers nearby
- Pull location-based service: User searches for places of interests nearby, like restaurants, sightseeing, etc.

source: [Ra11]

Google Ads (formerly Google AdWords)

coffee machine

Anmelden

Alle Shopping Bilder Videos News Mehr Einstellungen Suchfilter

Ungefähr 771.000.000 Ergebnisse (0,45 Sekunden)

Tipp: Begrenze die Suche auf **deutschsprachige** Ergebnisse. Du kannst deine Suchsprache in den Einstellungen ändern.

https://www.amazon.de › Coffee-Machine › k=Coffee+...

Suchergebnis auf Amazon.de für: Coffee Machine

Ergebnissen 1 - 16 von 601 — Suchergebnis auf Amazon.de für: **Coffee Machine**. ... Krups Essential EA8108 Kaffeevollautomat | Espresso und Kaffee | mit ...

Bilder zu coffee machine

commercial professional espresso cafe automatic

Unangemessene Bilder melden

Alle anzeigen

Ergebnisse finden auf

Ebay-Kleinanzeigen

Coffee Machines eBay...

Facebook

Emmi CAFFÉ LATTE - Real...

Bewertung

Öffnungszeiten

Espresso Factory

5,0 ★★★★★ (1) · Kaffeemaschinen-Anbieter

Pullach im Isartal · 0911 57033100

Geschlossen · Öffnet um 09:00

Website

Route

Anzeigen · Einkaufen

Produkte Vergleichswebsites

Gastroback
42619 Design...
499,00 €
Proidee
+5,95 € Versand
Energie: A+++
Von Super S...

Makita
DCM501Z, Ak...
77,74 €
Böttcher-AG
+3,56 € Versand
★★★★★ (184)
Von Google

PHILIPS
EP5447/90...
599,99 €
MediaMarkt
Kostenloser Ve...
Energie: A
★★★★★ (185)
Von Blue Sho...

Variations of the Advertising Model (2)

Classifieds (e.g. Craigslist)

- List items for sale or wanted for purchase.
- Listing fees are common, but there also may be a membership fee.

Content-Targeted Advertising (e.g. Google AdSense)

- Pioneered by Google, it extends the precision of search advertising to the rest of the web.
- Google identifies the meaning of a web page and then automatically delivers relevant ads when a user visits that page.

source: [Ra11]

[Home](#) [Services](#) [Advertise](#) [About Us](#) [Contact us](#) [Join Us](#) [Login](#)

Dw DEVILS' WORKSHOP
The tech community blog

**Blogger to WordPress Migration Service**
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20 Bookmarklets as Alternative to Popular Extensions on Chrome!

Posted in [Chrome](#) by [vibin](#) (8) on 5 May, 2011 [Be The First To Comment!](#)

2

2

Share

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[Google als Startseite](#)
Immer finden, wonach Sie suchen mit der Google Suche!
[Google.de/Startseite](#)

[Singles Online treffen](#)
Attraktive Partnervorschläge auf eDarling: Jetzt kostenlos testen!
[www.eDarling.de](#)

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Automate your Web & Windows Applications Testing. Download Now!
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[What is Quantum Jumping?](#)
Discover Why Thousands of People are "Jumping" to Change Their Life
[www.QuantumJumping.com](#)

Ads by Google



Stay Connected

Read latest headlines in your favorite news reader

10263 readers
BY FEEDBURNER

 Sign up for our email news letter

Write for us and Make Money

Our New Revenue Sharing Program

What makes our revenue sharing program unique is that **ONLY your AdSense content** unit will be shown **on your posts**. The idea to provide exposure to both, irregular bloggers and niche bloggers. [Read more](#)

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- [\[Tablet\] Acer ICONIA Tab A500 to be priced Rs 27,990 in India](#)
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- [Download All Free Web Apps You Need From One Place! \[All My Apps\]](#)
- [9/11 to Osama Bin Laden's Death – How Internet Changed Our World](#)

Subscription Model

- Users are charged a **periodic** (daily, monthly, annual, etc.) fee to subscribe to a service.
- Subscription fees are incurred **irrespective of actual usage rates**.
- Subscription and advertising models are frequently combined.

source: [Ra11]

Variations of the Subscription Model

Content Services (e.g. Netflix, Spotify)

- Provide text, audio, or video content to users who subscribe for a fee to gain access to the service.
- On the web it is possible to create a prolific relationship with the customers.

Person-to-Person Networking Services (e.g. Classmates, Xing/OpenBC, Neu.de)

- Are conduits for the distribution of user-submitted information, such as individuals searching for former schoolmates.

Internet Services Providers (e.g. America Online)

- Offer network connectivity and related services on a monthly subscription.

Trust Services (e.g. TRUSTe)

- Come in the form of membership associations that abide by an explicit code of conduct, and in which members pay a subscription fee.

source: [Ra11]

Case Study: Netflix.com

- Founded in 1997: Reed Hastings, the founder of Netflix had to pay a late fee for a rented movie.
- Idea behind founding Netflix: **Late fees annoy customers** but are necessary to make the classical movie rental system work.
- Club of movie viewers who would pay a membership fee to be allowed to borrow a certain number of DVDs (3) for **as long as they wished**; when returned they would receive the **next movie on the queue** created at the Netflix website.



- Netflix is able to create a large catalog of movies, "The Long Tail".
- Subscription for unlimited online streaming access.

source: [Ra11]

NETFLIX THE WITCHER

English Sign In

Unlimited movies, TV shows, and more.

Watch anywhere. Cancel anytime.

Ready to watch? Enter your email to create or restart your membership.

Email address **Get Started >**

Enjoy on your TV.

Watch on Smart TVs, Playstation, Xbox, Chromecast, Apple TV, Blu-ray players, and more.

It is not uncommon for sites to combine free content with "premium" (i.e., subscriber- or member-only) content, this is called ***freemium***.

"Give your service away for free, possibly ad supported but maybe not, acquire a lot of customers very efficiently through word of mouth, referral networks, organic search marketing, etc., then offer premium priced value added services or an enhanced version of your service to your customer base."

http://avc.com/2006/03/my_favorite_bus/

Manufacturer (Direct) Model

- The manufacturer or "direct model", it is predicated on the power of the web to allow a manufacturer (i.e., a company that creates a product or service) to **reach buyers directly and thereby compress the distribution channel**.
- The manufacturer model can be **based on efficiency, improved customer service, and a better understanding of customer preferences**.
- Prominent Examples: Dell, www.spreadshirt.net
- Other Examples: Apple Online Shop (personalized iPod)
- Difficulty: Co-existence with indirect distribution channels (Media-Markt, Saturn, ...)

source: [Ra11]

Variations of the Manufacturer (Direct) Model

Purchase (Dell)

- The sale of a product in which the right of ownership is transferred to the buyer.

Lease (E-Sixt Car Rental)

- In exchange for a rental fee, the buyer receives the right to use the product under a “terms of use” agreement.
- The product is returned to the seller upon expiration or default of the lease agreement. One type of agreement may include a right of purchase upon expiration of the lease.

License (Download.com, 2ndSoft.de)

- The sale of a product that involves only the transfer of usage rights to the buyer, in accordance with a “terms of use” agreement.
- Ownership rights remain with the manufacturer (e.g., with software licensing).

source: [Ra11]

Save \$40 off desktops \$499+ with code 30RBDP79JXN993 or Save \$60 off PCs \$699+ with code 27PLW7D7VFL7L3. See Coupons

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Meet the new 5th Gen Intel®Core™ processors. [Learn More](#)

New XPS 13 Touch

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Erase borders, starting with the display.

The XPS 13 isn't just the smallest 13-inch laptop on the planet, it also has the world's first virtually borderless infinity display with optional touch.

Starting at \$1599⁹⁹


★ [Get up to \\$80 back](#) in rewards

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360°

[Video](#)

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- The utility or "on-demand" model is based on **metering usage**, or a "**pay as you go**" approach.
- Unlike subscriber services, metered services are **based on actual usage rates**.
- Traditionally, metering has been used for essential services (e.g., electricity water, long-distance telephone services).
- Internet service providers (ISPs) in some parts of the world operate as utilities, charging customers for connection minutes, as opposed to the subscriber model common in the U.S.

Metered Usage

- Measures and bills users based on actual usage of a service.
- Car2Go, DriveNow, Audible, etc.

Metered Subscriptions

- Allows subscribers to purchase access to content in metered portions (e.g., numbers of pages viewed without ads) (e.g. Slashdot).

source: [Ra11]

Amazon Web Services – S3 (File storage) - Pricing

Amazon S3 Pricing

Pay only for what you use. There is no minimum fee. Estimate your monthly bill using the [AWS Simple Monthly Calculator](#). We charge less where our costs are less, and prices are based on the location of your Amazon S3 bucket.

Manage Your AWS Resources

[Sign in to the Console](#)

AWS Free Usage Tier*

As part of the [AWS Free Usage Tier](#), you can get started with Amazon S3 for free. Upon sign-up, new AWS customers receive 5 GB of Amazon S3 standard storage, 20,000 Get Requests, 2,000 Put Requests, and 15GB of data transfer out each month for one year.

Storage Pricing (varies by region)

Region: US East (N. Virginia) ▾

	Standard Storage	Standard - Infrequent Access Storage †	Glacier Storage
First 50 TB / month	\$0.023 per GB	\$0.0125 per GB	\$0.004 per GB
Next 450 TB / month	\$0.022 per GB	\$0.0125 per GB	\$0.004 per GB
Over 500 TB / month	\$0.021 per GB	\$0.0125 per GB	\$0.004 per GB

Community Model

- The viability of the community model is based on **user loyalty**.
- Users have a **high investment in both time and emotion**.
- Revenue can be based on the sale of ancillary products and services or voluntary contributions.

source: [Ra11]

Open Source (e.g. Red Hat, SUSE)

- Software developed voluntarily by a global community of programmers who share code openly.
- Instead of licensing code for a fee, open source relies on **revenue generated from related services like systems integration, product support, tutorials and user documentation.**

Social Networking Services (e.g. Facebook, Flickr)

- Sites that provide individuals with the ability to connect to other individuals along a defined common interest (professional, hobby, romance).
- Social networking services can provide opportunities for contextual advertising and subscriptions for premium services.

Knowledge Networks (e.g. Stackoverflow, Stack Exchange)

- Discussion sites that provide a source of information based on the sharing of expertise among professionals.

Open Content (e.g. Wikipedia)

- openly accessible content developed collaboratively by a global community of contributors who work voluntarily.

source: [Ra11]

Affiliate Model (1)

- In contrast to the generalized portal, which seeks to drive a high volume of traffic to one site, the affiliate model, provides **purchase opportunities wherever people may be surfing**.
- It does this by offering **financial incentives** (in the form of a percentage of revenue) to affiliated partner sites.
- The affiliates provide **purchase-point click-through** to the merchant.
- It is a **pay-for-performance** model
- If an affiliate does not generate sales, it represents no cost to the merchant.
- The affiliate model is inherently well-suited to the web, which explains its popularity.
- **Variations:**
 - Pay-per-click: Site that pays affiliates for a user click-through.
 - Revenue Sharing: offers a percent-of-sale commission based on a user click-through in which the user subsequently purchases a product.
- E.g. Barnes & Noble, Amazon.com

source: [Ra11]

Amazon Affiliate Program

Login

Profit from our experience

Earn up to 10% advertising fees with a trusted e-commerce leader

Join Now for Free

[Learn More »](#)

Join

It's easy and free to join

Get up and running today. Just one approval to join — no third-party advertiser approvals.

[Learn More »](#)

[Join Now »](#)

Advertise

Choose from over a million products to advertise to your customers

Whether you are a large network, content site or blogger, we have simple linking tools to meet your advertising needs and help you monetize your web site.

Earn

Get up to 10% in advertising fees

Earn advertising fees from Qualifying Purchases, not just the products you advertised.

Plus, our competitive conversion rates help you maximize your earnings.

What's New

Boost your earnings with **Native Shopping Ads**

Display highly relevant and dynamic product recommendations in a stylishly designed, responsive and mobile-optimized ad unit.

[Get Started](#)

Data about consumers and their buying habits are extremely valuable.

Especially when that information is carefully analyzed and used to **target marketing campaigns**. Some firms are able to function as infomediaries by collecting and selling information to other businesses.

Audience Measuring Services (e.g. Nielsen Online)

- Online audience market research agencies

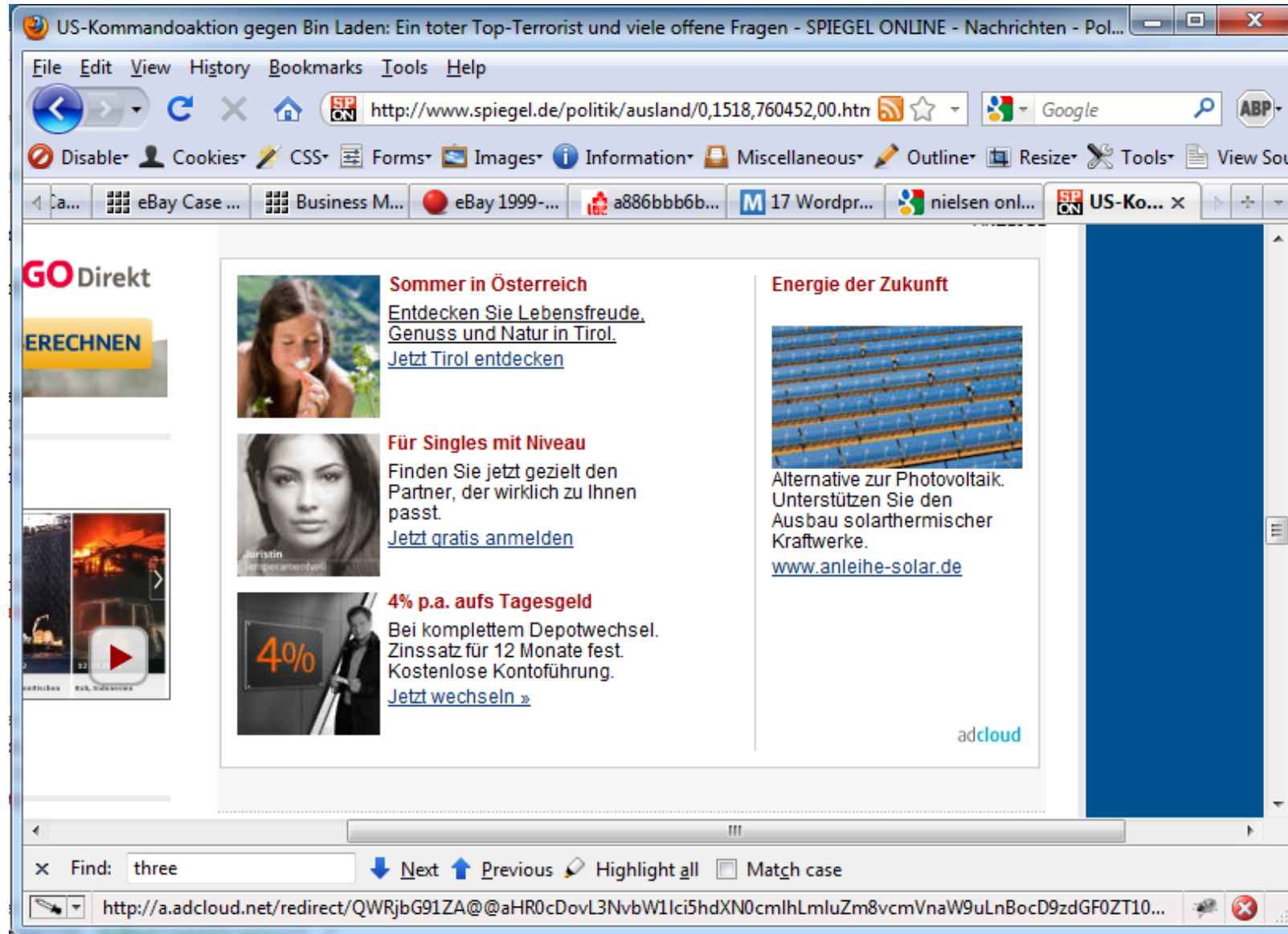
Incentive Marketing (e.g. Coolsavings)

- Customer loyalty program that provides incentives to customers such as redeemable points or coupons for making purchases from associated retailers.
- Data collected about users is sold for targeted advertising.

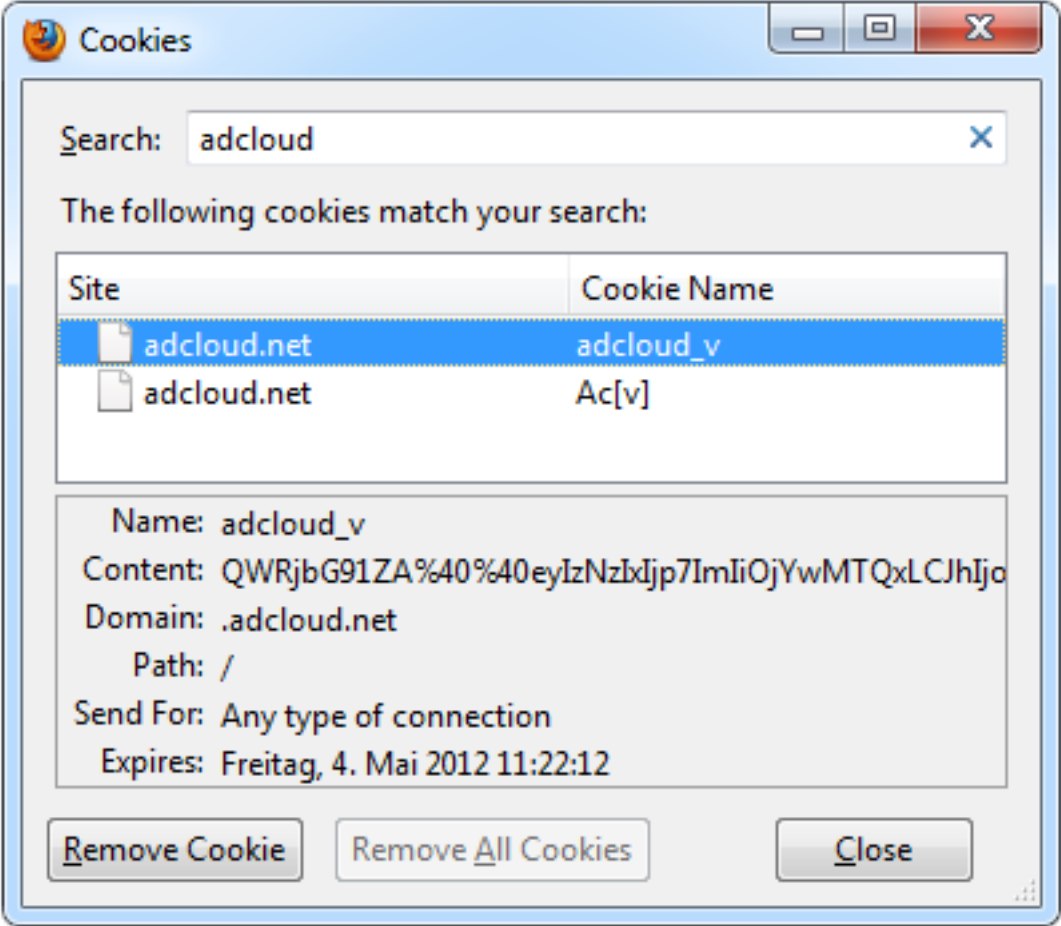
Advertising Networks (e.g. DoubleClick, adcloud)

- Feed banner ads to a network of member sites, thereby enabling advertisers to deploy large marketing campaigns
- Ad networks collect data about web users that can be used to analyze marketing effectiveness

Example of an Advertising Network



Cookies from an Advertising Network



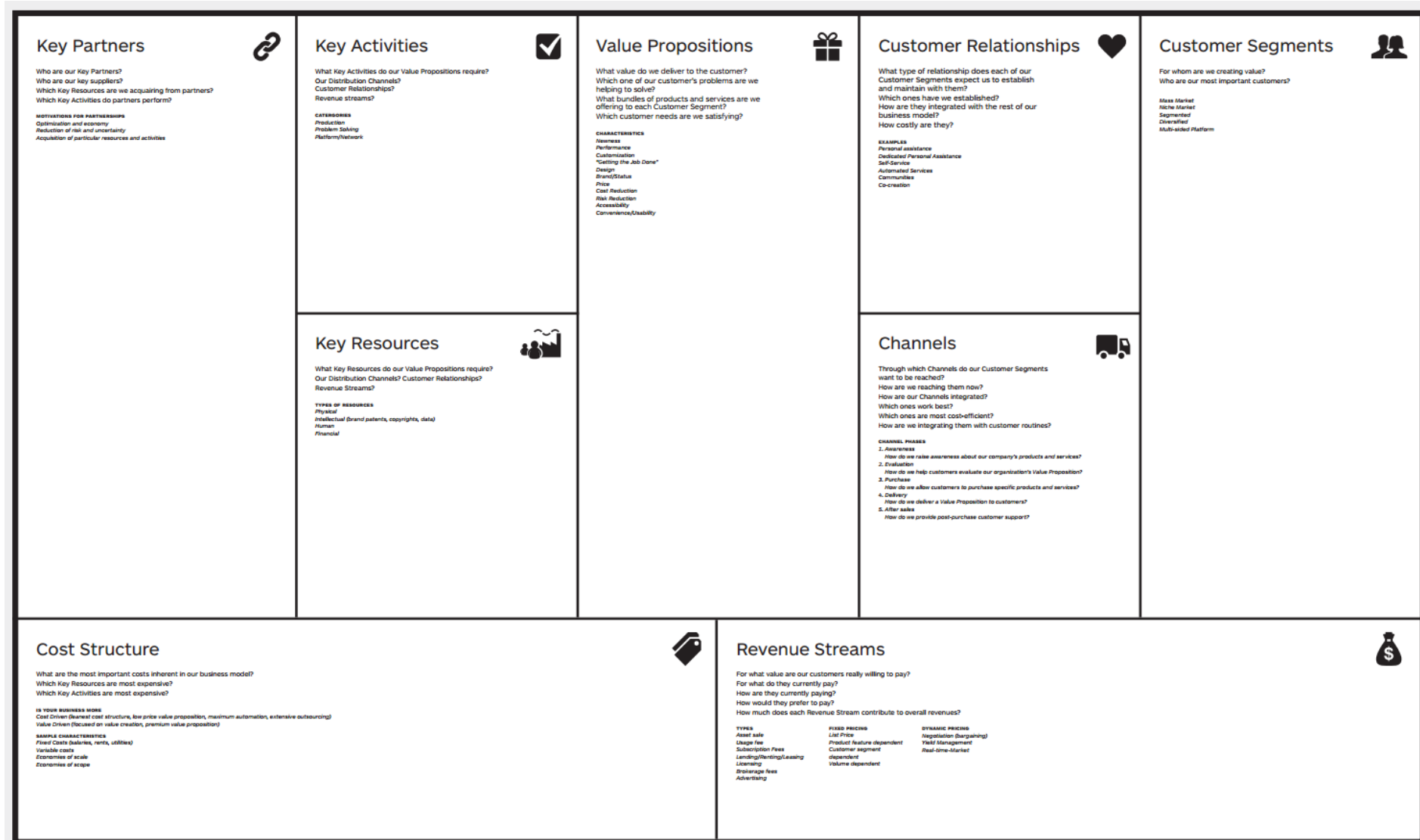
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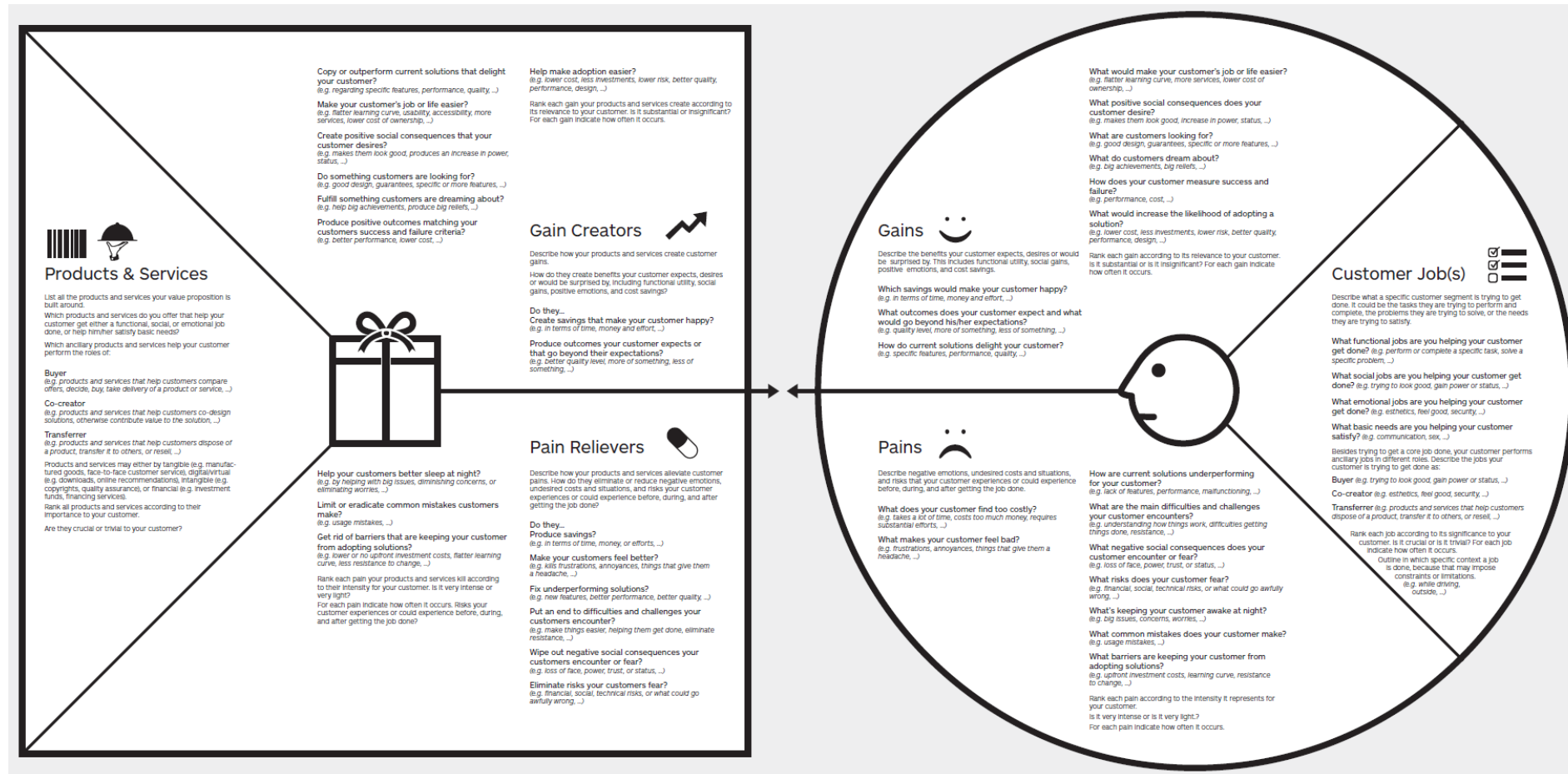
Business Model Canvas



Watch the video for more information [<http://www.businessmodelgeneration.com/canvas/bmc/>]

Value Proposition Canvas:

Focus on value proposition and customer segment



[<http://www.businessmodelgeneration.com/canvas/vpc>]

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What does "Web 2.0" mean?

- Web 2.0 is mainly about **business models** and **social structures**, less about technological infrastructure
- But: exponential increases in processing power are a driving factor of Web 2.0, which enables:
 - Users to create content
 - Interaction between users
 - Rich multilingual experiences
- Suggesting a new version of the “old” Web 1.0 emphasizes new, disruptive rules
- Established players of Web 1.0 respond to this development by enhancing their Web sites with elements of Web 2.0 or by taking over new players
- The term Web 2.0 has been established by Tim O'Reilly in [Ore05].
- 2.0 is pronounced "**two point oh**", because 2.0 is a version number with a decimal point in it.

- In Web 2.0, it is important to control unique, precious data, which gets more valuable the more customers use it.
- Examples: encyclopedia, maps, reviews, bibliographical information, user profiles at eBay, ...
- Technological challenges:
 - Scalability

- Traditionally, content is produced by few professionals
- Utilization of traditional media is based on:
 1. Ownership or control of Intellectual Property (i.e. content) by the corporation.
 2. Ownership or control of expensive distribution networks (so that the content can reach the audience).
 3. Established business models based on highly evolved approaches to advertising and subscription models - models which themselves are built upon the presumptions of #1 and #2.
- New technologies made the production of new media accessible and affordable to the general public
- Examples: social networks, blogging, podcasting, vlogging, wikis, photo sharing, ...
- Additionally, user-generated content may also employ flexible licensing or related agreements to further diminish the barriers to collaboration

From Object-Centered towards User-Centered Social Software

Social Networks (Social Networking Services) – popular examples:

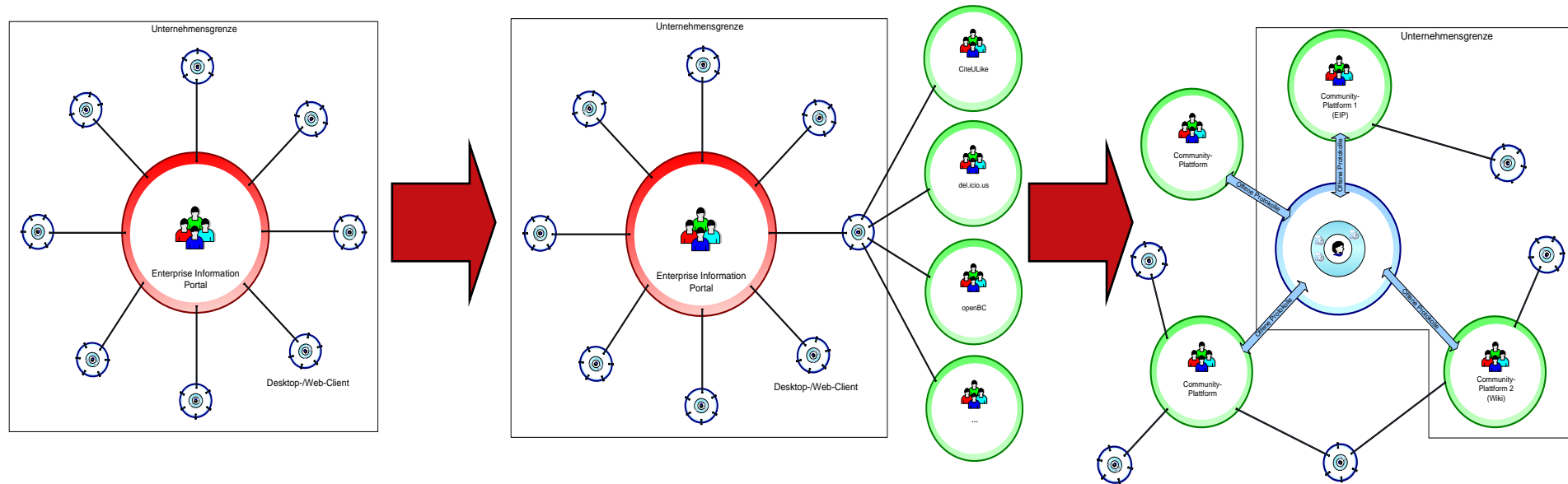
- Facebook (www.facebook.com), LinkedIn (www.linkedin.com), Xing (www.xing.com), ...

Object-Centered Social Software - popular examples:

- Del.icio.us (<http://del.icio.us>) bookmark sharing
- Flickr (www.flickr.com) photo sharing
- CiteULike (www.citeulike.org) bibliographic reference sharing
- 43things (www.43things.com) task sharing

Current trend: APIs provided by Social Networks are used to tightly integrate object-centered services with social networks (e.g., facebook's Open Graph API)

Towards User-Centered Social Software



Enterprise-Centered Portals

2000+

Tidal wave of digital micro-content
Knowledge resides in relationships

Object-Centered Social Software

2005+

Multiple roles and contexts at once
Open content formats and web protocols

User-Centered Social Software

20??

Changing roles over time
Contexts travel with content
Multiple personal devices

1. Web Site Genres

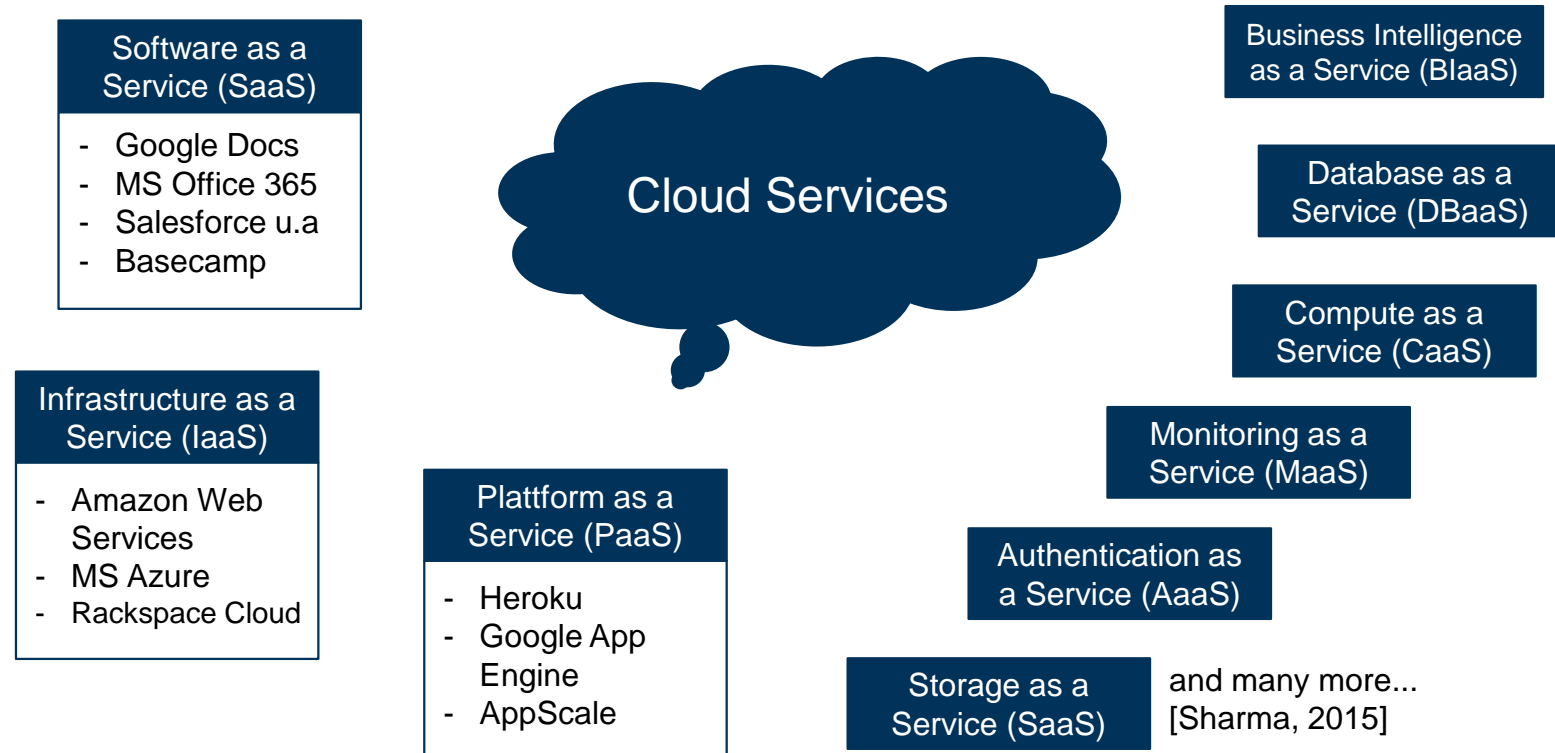
- Business Models on the Web
- Web 2.0 and Social Software
- Anything as a Service (XaaS)

2. Web Site Design Process

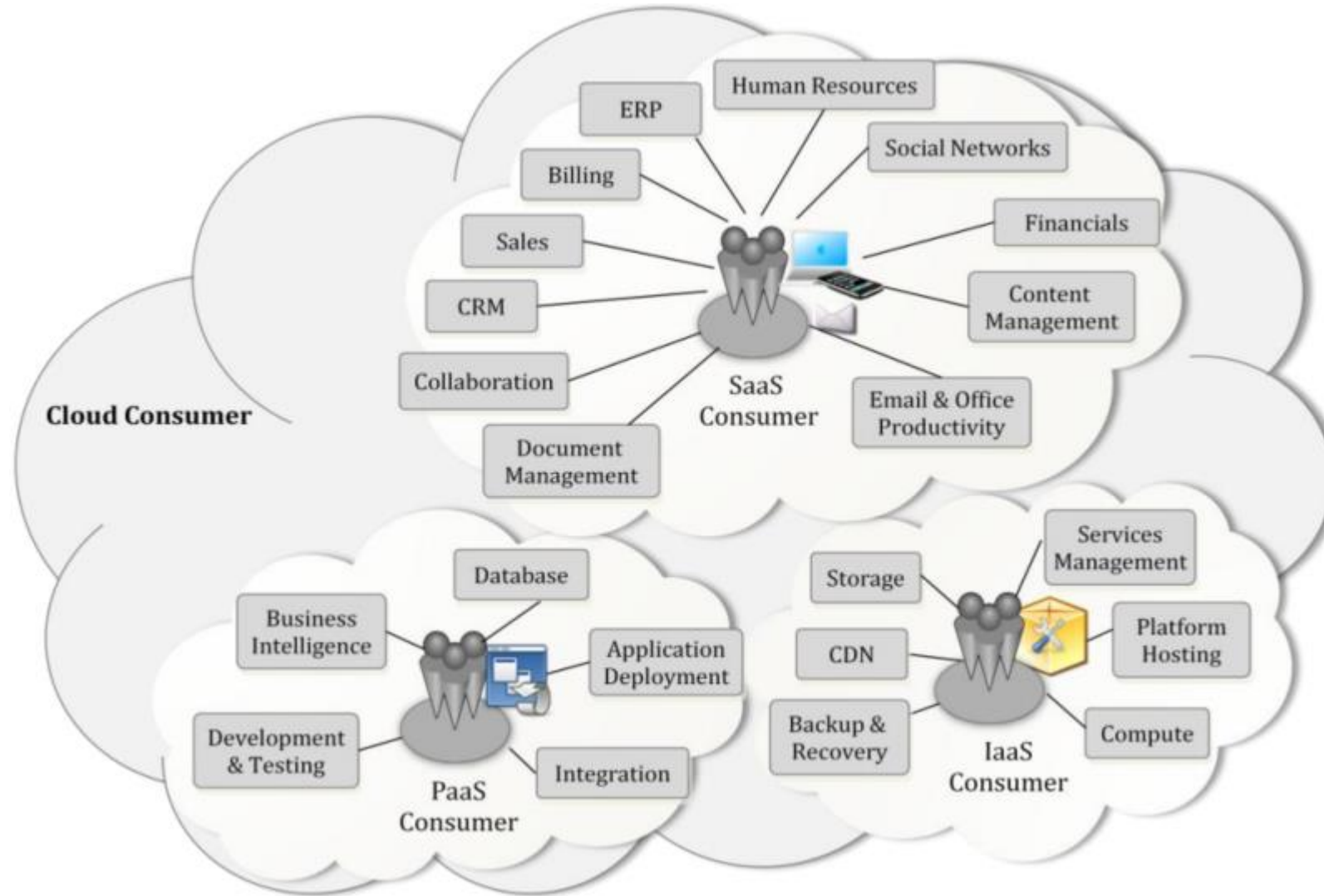
- Key Issues of Customer-Centered Web Design
- An Overview of Web Design Patterns
- Knowing Your Customers
- Involving Customers with Iterative Design
- Processes for Developing Customer-Centered Sites
- Additional Viewpoints and Aspects

Anything as a Service (XaaS)

- Concept of being able to call re-usable fine-grained software components across a network
- Old rules: my applications and data “live” on my hard drive
- New rules: I use **services hosted somewhere, my data lives in the data centers of the service provider**



Anything as a Service (XaaS)



["NIST cloud computing reference architecture." Liu, Fang, et al. (2011)]

The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure

The applications are accessible from various client devices through either

- a thin client interface, such as a web browser (e.g., web-based email)
- a program interface

The consumer does not manage or control the underlying cloud infrastructure including

- network
- servers
- operating systems,
- Storage

Examples: Google Docs, Microsoft office online ...

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider.

The consumer does not manage the underlying cloud infrastructure including

- network
- servers
- operating systems
- storage
- but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

Example: Google AppEngine - provides a programmable platform that can scale easily

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications

The consumer does not manage or control the underlying cloud infrastructure but has control over

- operating systems
- Storage
- deployed applications
- possibly limited control of select networking components (e.g., host firewalls)

Example: Amazon EC2 – consumers can rent virtualized hardware, can control the software stack on the rented machines

Implications for the Service Providers (1)

Operations must become a core competency

- Expertise in daily operations is as important as expertise in product development.
- The software will cease to perform unless it is maintained on a daily basis.
- Google must continuously:
 - crawl the web and update its indices
 - filter out link spam and other attempts to influence its results
 - respond to hundreds of millions of asynchronous user queries, simultaneously matching them with context-appropriate advertisements.
- Google's system administration, networking, and load balancing techniques are perhaps even more closely guarded secrets than their search algorithms.

Users must be treated as co-developers

- The open-source dictum, "release early and release often" has morphed into an even more radical position, "the perpetual beta".
- Products are developed in the open, with new features slipstreamed in on a monthly, weekly, or even daily basis.
- Real time monitoring of user behavior to see just which new features are used, and how they are used, thus becomes another required core competency:
 - "We put up two or three new features on some part of the site every day, and if users don't adopt them, we take them down. If they like them, we roll them out to the entire site." [A web developer at a major online service]

Anything as a Service (XaaS)

- **Advantages** of XaaS:
 - Increased availability and reliability
 - Organizations can focus on their core business
 - Zero installation overhead, the latest version is always accessible
 - Backup is done in a centralized way
 - Easily scale up and down adjusted on the business needs, reducing TCO
 - Collaborative work is possible
 - Many services are monetized via advertising → using the service is “for free”
- **Challenges:**
 - Who do I trust?
 - How to change the service provider?
 - What if there is no internet connection?
 - Is the availability of the service guaranteed?