Apple, Amazon, Google, Facebook, Microsoft

Market Concentration – Competition – Innovation Strategies

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Abstract

Based on a systematic review and evaluation of business reports, documents, statistics, literature and press releases, this paper analyzes the market concentration and the expansion and innovation strategies of the leading internet companies Google, Facebook, Apple, Amazon and Microsoft. The findings invalidate any claims that a decentralization of the market and a democratization of the internet is taking place, or that research, development and innovation processes are becoming more open and collaborative. The five examined companies, as the operators of the core infrastructures of the worldwide web, shape the overall products and services offer of the internet, determine access to the web, structure the communication possibilities for users, and are the main drivers of innovation in this field. Not decentralization, democratization and open innovation, but market concentration, control and power struggles are categories to adequately describe the fundamental dynamics of the commercial internet.

Zusammenfassung

In diesem Aufsatz, der auf einer systematischen Auswertung von Geschäftsberichten, Dokumenten, verfügbarem empirischem Material, Literatur und Presseberichten basiert, werden die Konzentrationsprozesse, Expansions- und Innovationsstrategien der führenden Internetkonzerne Google, Facebook, Apple, Amazon und Microsoft analysiert. Die Befunde, die der Text vorstellt, sind von einer Dezentralisierung der Markt- und Demokratisierung der Innovationsprozesse im Web ebenso weit entfernt wie von Vorstellungen einer vornehmlich offenen und kollaborativ betriebenen Technik- und Produktentwicklung. Die fünf untersuchten Konzerne prägen nicht nur wesentliche Angebote und Märkte des Internets. Sie regeln als Betreiber der zentralen Infrastrukturen auch die Zugänge zum Netz, strukturieren die Kommunikationsmöglichkeiten der Nutzer und sind wesentliche Treiber des Innovationsprozesses. Nicht Dezentralisierung, Demokratisierung und Kooperation, sondern Konzentration, Kontrolle und Macht sind, so die These, die Schlüsselprozesse und -kategorien, mit denen sich die wesentlichen Entwicklungstendenzen des (kommerziellen) Internets angemessen erfassen lassen.

Contents

1 Introduction: Expectations and empirical developments

Over the past two decades, the internet has evolved into a ubiquitous information, communication and media network that is indispensable to the social reality of our societies. Its visible interface includes search engines, e-commerce platforms and social media services as distinct commercial offers. It is on these platforms that the bulk of information provision, consumption, user-generated content and private or public exchange on the internet takes place. In addition there are multi-function and mobile devices such as smartphones, tablets or laptops which serve as means of access or communication. The vastly invisible but nonetheless structuring footing of this extensive infrastructure is formed by a diverse range of software applications with which operators not only manage, aggregate and evaluate large amounts of data but also direct the actions, and modes of action, of the individual platforms.

Although the internet still provides room for decentralized and collaborative production and innovation processes, or the emergence of start-ups such as Snap Inc., Airbnb or Uber, large parts of the web are now dominated by the offerings of a few internet companies, all of which are based in the United States. These are, by and large, Google (restructured into "Alphabet" in 2015), Facebook, Amazon, Apple and Microsoft. They not only dominate the basic offerings and markets of the internet, but, as operators of the central infrastructures, also regulate access to the web, structure the communication possibilities of users, are key drivers of the innovation process and, as employers of some 10,000 staff, shape the working conditions of the commercial internet sector. With the exception of Facebook, these companies are among the 50 companies with the highest sales in the United States. Indeed, in 2015, Apple ranked 3rd, Amazon 18th, Microsoft 25th and Google 36th (Table 1, Fortune 500, 2016).

The focus of this article, which is based on the analysis of business reports, documents, empirical material, literature and press reports, is on the economic, infrastructural and rule-setting power that these companies have acquired by now. The findings presented repudiate the existence of the supposed decentralization of the market and the democratization of innovation processes just as much as the notions of a largely open and collaborative technology and product development (Chesbrough 2003, 2003a; Hippel 2005; Benkler 2006; Tapscott and Williams 2006). Not decentralization, democratization and cooperation but rather concentration, control and power are—which comprises the thesis of this article—the key processes and categories with which to adequately describe the essential development trends of the (commercial) internet.

This article is structured as follows. First, we examine the concentration processes in important segments and markets of the internet (*Section 2*), followed by an analysis of the main modes of expansion and competition between the big internet companies (*Section 3*). An overall strong concentration of the supply and the market is accompa-

nied by fierce oligopolistic competition between the leading companies. This competition is fought out primarily by way of innovative leads. Given the important role of innovation, *Section 4* analyzes and systematizes these groups' innovation strategies. The latter are still characterized by a strong in-house orientation, for two main reasons. For one, strategically relevant projects are carried out at the companies' own research and development (R&D) centers under tightly controlled conditions of strict secrecy and, secondly, external know-how is obtained primarily through acquisitions and then integrated into the companies' own research. *Section 5* summarizes the expansion and innovation strategies of the big internet companies and discusses the question of how their dominance is reflected not only in economic clout but also in data-related, infra-structural and rule-setting power.

2   Concentration: Market power and the fight to secure business sectors

Economically speaking, the internet is not a clearly defined sector with a well-developed data basis (such as the automotive or pharmaceutical industry). Instead it offers the space for relatively few yet commercially diverse activities, especially in advertising, commerce, mediation services and the sale of multi-function devices. The market structures on the internet likewise differ from those of many classic markets. Often the companies here act as intermediaries in so-called two-sided markets in which the commercial attractiveness of offerings, for example to advertisers or retailers on one side of the market depends directly on the number of regularly active users of their free services on the other side of the market. This effect is particularly noticeable in search engines or social networking platforms. Indeed, the economic success of Google and Facebook as advertising and marketing companies results from the large number of users, which make these platforms particularly interesting for advertisers. Commercial or mediation platforms such as Amazon, booking.com or Airbnb likewise work according to this principle (Rochet and Tirole 2003).

A look at the most important segments and markets of the commercial internet shows that each of the companies examined in this study has carved out its own domain.[1]

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[1]   The use of the term *commercial internet* refers to consumer-oriented economic offerings and markets, which is referred to as business-to-consumer (B2C) e-commerce in the economic literature. The internet companies examined here are predominantly active in this sector, which is in fact relatively small compared to e-commerce as a whole, which includes the economic activities that take place between companies (business-to-business e-commerce, B2B). "While the internet economy is generally thought of as enterprises selling to consumers, the vast majority of e-commerce is actually comprised of businesses selling to other businesses. In 2007, roughly 90 percent of global e-commerce was B2B" (Atkinson et al. 2010: 22).

The *search engine* segment is globally dominated by Google as a quasi-monopolist. In all leading Western countries (but not Japan), Google is the unchallenged monopolist in this field—usually accounting for well more than 90% of all search queries (Netmarketshare 2016). Even the once promising search engines Yahoo or Bing, of Microsoft, are today insignificant. Moreover, numerous smaller and specialized search engine providers are now generating their results via Google.

In the *social networks* sector, Facebook had evolved from a newcomer to a worldwide dominant company in only a few years, ousting former platforms such as MySpace or, in Germany, StudiVZ along the way. In mid-2016, some 1.7 billion people were registered as monthly active users on Facebook, about one billion on WhatsApp and 500 million on Instagram (Facebook 2016). Facebook, and its two subsidiaries, presently dominate the social networks sector just as much as Google does the search engine market.

Table 1: Internet companies – economic data 2015/16

Companies fiscal year end	Sales in billion US$	Core business in billion US$	R&D in Mrd. US$	Share R&D in sales in %	Employees in thousands	*Of that:* *In R&D* in thousands
Apple (9/2016)	215.6	180.1 Hardware[a] (84%)	10.0	4.6	116.000	n/a
Amazon (12/2015)	107.0	99.1 Retail (93%)	12.5[b]	11.7	23.800	n/a
Microsoft (6/2016)	85.3	71.3[c] Software / Services (84%)	12.0	14.1	114.000	37.000 (32%)
Google[d] (12/2015)	75.0	67.4 Advertising (90%)	12.3	16.4	61.814	23.336 (38%)
Facebook (12/2015)	18.0	17.1 Advertising (95%)	4.8	26.7	12.691	n/a
Twitter (12/2015)	2.2	2.0 Advertising (91%)	0.8	36.4	3.898	n/a

a   iPhone, iPad, iPod and Mac.
b   Amazon conducts its R&D under the "Technology and Content" label, which is much more than just research and development: "Technology costs consist principally of research and development activities, including payroll and related expenses for employees involved in application, production, maintenance, operation and platform development for new and existing products and services, as well as AWS and other technology infrastructure expenses. Content costs consist principally of payroll and related expenses for employees involved in category expansion, editorial content, buying and merchandising selection." (Amazon Annual Report 2013: 42, 27)
c   Rough estimation: Total sales less sales with devices (computing, gaming and phone hardware).
d   Alphabet Inc. since 2015 (including Google).

Source: 2015/16 Annual Reports (Form 10-K) of the companies

Search engines and social networks are not markets; however, they form the basis of the core business of Google and Facebook. In fact, the two companies generate more than 90% of their sales through *internet advertising,* which is a fast-growing and highly concentrated market (Evans 2008). In the United States, this market accounted for one third (33%) of all advertising revenues, or $59.6 billion, in 2015. Only television advertising (Broadcast and Cable Television) generated more revenues, namely $66.3 billion. In 2015 in the United States, 75% of the total revenue generated by advertising on the internet was realized by the top ten advertising companies in this sector. And Google, which makes 45% of its sales in the United States, captured approximately 50% of that total revenue. Worldwide, too, this segment is clearly dominated by Google, followed by Facebook, Yahoo, Microsoft and Twitter (Price Waterhouse Coopers 2016, Table 1). Nonetheless, Google would not qualify as a monopolist in this market, being challenged in particular by Facebook. It should be stated, moreover, that internet advertising is still competing with other advertising media such as television, radio and magazines.

E-commerce is the domain of Amazon, by far the largest retailer on the internet (Stone 2013). In 2013, the group generated a higher turnover in global retail than the nine largest (after Amazon) internet retailers taken together (National Retail Federation 2013). In Germany, Amazon's second-largest market, the group in 2015 generated €7.8 billion, comprising nearly one third of the total sales of the hundred biggest online retailers, followed by Otto (€2.3 billion) and Zalando (€1.0 billion) (EHI Retail Institute 2016). Here too, the effects of two-sided markets are evident: the more consumers use Amazon, the more interesting the platform becomes for retailers—and the more Amazon can dictate the conditions under which these can make their offerings there. It should be noted, however, that e-commerce, with a turnover of around 10% of all retail trade, is still a small segment of retail at large, which is still dominated by the classic retail companies. Nonetheless, in 2015 Amazon ranked 9th among the world's largest retailers (Handelsverband Deutschland 2016; National Retail Federation 2015).

Apple, for its part, has burgeoned since the early 2000s from a niche provider for PCs to the leading and trend-defining manufacturer in the *multimedia devices market*: iPod and iTunes were constitutive of the internet-based music market; the iPhone and the proprietary operating system iOS then led to the triumph of the smartphones; and with the iPad Apple pioneered the market for tablet PCs. This was accompanied with a sky-rocketing increase in sales from $5.4 billion (2001) to $233 billion (2015). Nevertheless, Apple too is not a monopolist in its rather classically-oriented consumer markets and is under immense pressure from its competitors. The extremely dynamic and fiercely competitive mobile devices market, previously in the hands of Nokia, has been dominated since the advent of smartphones by Apple and the South Korean company Samsung Electronics. That said, looking at the number of smartphones sold

worldwide in 2015, Apple and Samsung together accounted for just under 40% of all sales, followed by a number of smaller competitors such as Huawei (Statista 2016). By contrast, in the field of *mobile device operating systems*, Google and Apple have been the central players, and competitors, for several years. In 2016, 64% of all devices were equipped with Google's open Android system, and 29% with Apple's proprietary iOS system (Netmarketshare 2016a).

Although the commercial internet is a relatively new phenomenon, its cornerstones (consumer-oriented commerce, advertising, services, equipment and software) are now dominated by a few companies—not just nationally but internationally. This is due to various factors which, in their interaction, explain the high degree of concentration in the different business sectors of the internet.

For many internet offerings, direct or indirect *network effects* are typical. The allegedly egalitarian and decentralized web produces, even under normal circumstances, only few centralized sites for doing searches and engaging in communication, networking and consumption, attributed to the similar behavior of the numerous users (Barabasi and Bonabeau 2003). These sites essentially comprise social media platforms such as Facebook, YouTube and Twitter. The more such web services are used and the more members they have, the more interesting they become for additional users who then flock there—and the more difficult it becomes for alternative providers to compete. E-commerce platforms or search engines can likewise benefit from such network effects. For example, an e-commerce platform like Amazon can easily attract additional users due to its high acceptance and broad product range. For those same reasons, a leading search engine such as Google can generate added trust in the superior quality of its search results and thereby attract new users. In addition, given the mass of data which Google generates over the long term, the company can continually improve the quality of the search algorithm, thereby distinguishing itself from the competition. Such network effects result in quasi-monopolies, which are engendered by the mass behavior on the web in addition to being, often, desired by the users (Shelanski 2013, Monopolkommission 2014).

However, not only massively streamlined behavior of users can produce such Matthew effects. The reach and reputation of an offer also entails indirect network effects, which are triggered by actors on the other side of the market (Haucap and Wenzel 2011; Haucap and Heimeshoff 2014). A dominant social network or a frequently used search engine, for example, is of particular interest to advertisers, as it allows them to bundle their advertising activities, which in turn contributes to the concentration of the advertising market on the internet. A leading retailer such as Amazon also becomes a coveted intermediary and e-commerce platform for other retailers who wish to benefit from the high visibility of this established online retailer. Finally, the heavily frequented app stores such as those of Google and Apple are instrumental in shaping the ways in which end users select and purchase their devices,

while also becoming the preferred venue for numerous software developers wishing to present and market their applications there.

Network effects of this kind can be augmented if the switch from one offer to another is associated with comparatively high *switching costs* (Pollock 2010). All companies work hard to keep users, customers, providers and advertisers tied as extensively and permanently as possible to their services. As a result, proprietary system environments, such as those provided by Apple and Amazon with their customized and integrated hardware offerings, programs and services, are designed to prevent any subsequent systems change and to aim for exclusive use. Even open systems such as Google's operating system Android for mobile devices can produce such lock-in effects. The purchase of a smartphone or tablet is linked to the choice between two operating systems (and app stores), which are not only mutually incompatible but which also differ greatly with regard to their interface concepts and usage routines.

However, what contributes the most to the increase of switching costs for users and providers is the development of the various offerings and business activities into integrated socio-technical ecosystems that encompass coordinated and networked services, programs and devices. Such ecosystems are not simply cross-application technological infrastructures but rather, with their wide range of offerings and services, also social spaces in which users build member profiles, establish specific search, communication and consumption patterns, and develop reproducible behavioral and usage routines—all of which invariably ties them to the offerings of a given company. Overall, users do have the possibility to switch systems, yet only at the price of a comprehensive reorganization or reconstitution of their individual patterns and movements on the net.

In the context of their ecosystems, the internet companies also act as *active market creators and regulators*. Amazon's e-commerce platform, for example, has long since integrated a number of independent retailers. Similarly, Google's video platform YouTube is now much more than the playground for amateurs it started out as. Rather, it is an advertising market place used by big-name companies as well as by numerous professional YouTubers, many with their own firms. Finally, the app stores operated by the big companies have become the focus of activity for many more or less successful developers. As a result, the scope and reach of the internet companies has grown beyond their activities in existing markets. As platform operators, they also create, organize, regulate and control markets and market competition within their ecosystems (Kirchner and Beyer 2016).

In addition, another factor plays a central role in the concentration dynamics and the consolidation of market power on the internet: these are the *superior economic resources* which internet companies can now put into play to stabilize and expand their market power. These consist of high stock market values and considerable liquid as-

sets that enable these companies to make major investments and costly acquisitions on a continual basis (Table 2).

Table 2: Stock market value of selected internet companies (February 1, 2017)

	Stock market value *in billion US$*
Google	551.4
Facebook	392.8
Amazon	392.2
Apple	675.4
Microsoft	487.7

Source: NASDAQ: Market Cap on February 1, 2017.

Due to their extraordinary financial strength, the internet companies are in a position to invest heavily in the continuous development of their own *technological and logistical infrastructures*. The latter may include: server architectures; data collection and evaluation technologies; the quality of search algorithms; the technical integration of extensive ecosystems; or, as in the case of Amazon, the group's ordering, logistics and warehouse systems. This alone makes it very hard for newcomers to become serious competitors of the established leaders in any of the already occupied core business fields.

In addition, all internet groups have the necessary financial resources to continually and consistently invest in their own *research and development (R&D)*. This applies not only to the continuous and frequent improvement of their already established product and service portfolio but also to technology and innovation fields that are new to those companies and with which they hope to gradually expand their radius of action. In highly dynamic and fast-moving technology markets such as those discussed here, where competitive positions are often defined less by price than by innovation strategies and innovation leadership, this ability to make massive investments in R&D becomes a key competitive advantage against newcomers.

Last but not least, any of these companies are easily able to protect their business fields and to penetrate into new sectors not only through internal restructuring but also through at times very costly *partnerships and acquisitions* (Hong, Bhattacharyya and Geis 2013; Table 3). The vast majority of the numerous smaller "business-as-usual" acquisitions made by all of these companies on a regular basis serve to acquire know-how and interesting applications that support the respective core business. In addition, the acquisition strategies are designed to allow these companies to expand and venture into new business areas. This is typical for the newer company acquisitions of Google (e.g., Nestlabs, Skybox Imaging, Deep Mind), Amazon (e.g., Lovefilm, Double Helix

Games, Twitch) and Microsoft (e.g., aQuantive, Skype Technologies, Nokia Devices, LinkedIn). After all, the acquisition of particularly successful newcomers is a tried and tested means to take potential competitors out of the race at an early stage and to integrate their services into one's own group. This is perhaps best illustrated with the purchase of WhatsApp by Facebook in early 2014 (Dolata and Schrape 2014).

Table 3: Internet companies – selected mergers and acquisitions

	Year	Company	Purchase price in billion US$
Google	2004	Picasa (photo service)	0.01
	2004	Where 2 Technology (mapping service)	n/a
	2005	Android (mobile software)	0.05
	2006	YouTube (videos, media)	1.65
	2008	Doubleclick (internet advertising)	3.10
	2009	Admob (mobile advertising)	0.75
	2011	Motorola Mobility (mobile devices; 2014 sale to Lenovo for US$ 2.9 billion)	12.50
	2013	Waze (GPS navigation software)	0.97
	2013	Boston Dynamics (military robots)	n/a
	2014	Nest Labs (thermostats; fire alarms)	3.20
	2014	Skybox Imaging (satellite technology)	0.50
	2014	Deep Mind Techn. (artificial intelligence)	0.80
	2016	Apigee (predictive analytics)	0.63
Facebook	2009	FriendFeed (social networking aggregator)	0.05
	2010	Hot Potato (social media platform)	0.01
	2011	Beluga (messaging)	0.01
	2011	Gowalla (social network)	n/a
	2011	Snaptu (app developer)	0.07
	2012	Instagram (photo and video portal)	1.00
	2013	Parse (app platform)	0.09
	2014	WhatsApp (messaging service)	19.00
	2014	Oculus VR (virtual reality)	2.00
	2015	Surreal Vision (augmented reality)	n/a
	2015	Pebbles (augmented reality)	0.06
Amazon	1999	Junglee (online shop; electronics, clothing, books)	0.19
	1999	Alexa Internet (server; website rankings)	0.25
	2008	Audible (audio book download provider)	0.22
	2009	Zappos.com (online shop; shoes, clothing)	0.82
	2010	Quisidi (online shop; drug store, pet food)	0.55
	2011	Living Social (special offers; gift cards)	0.40
	2011	Lovefilm (video rental)	0.30
	2012	Kiva Systems (automatic ordering systems)	0.78
	2013	Goodreads (book community)	0.20
	2014	Double Helix Games (video games)	n/a
	2014	Twitch (video game platform)	0.97
	2016	Curse (game portal)	n/a
Apple	1996	Next Computer (software; operating systems)	0.40
	1997	Power Computing (computer manufacturer)	0.11
	2010	Siri (voice assistant software)	0.20
	2012	AuthenTec (biometrics hardware)	0.36
	2013	Topsy Labs (media research)	0.20
	2013	PrimeSense (3D sensor manufacturer)	0.35
	2014	Beats Electronics (headsets; music streaming)	3.00
	2016	Turi (machine learning)	0.20
Microsoft	1997	Hotmail (internet software)	0.50
	2000	Visio Corp. (software)	1.38
	2002	Navision (software)	1.33
	2007	aQuantive (advertising)	6.33
	2008	Fast Search & Transfer (search software for companies)	1.19
	2011	Skype Technologies (voice over IP)	8.50
	2013	Nokia Devices (mobile devices)	7.20
	2014	Mojang (video games)	2.50
	2016	LinkedIn (social network)	26.20

Source: Annual reports of the companies; media content analysis; own compilation.

3 Expansion: Competition and new areas of rivalry

However, the brief history of the commercial internet is characterized not only by a strong trend of mergers and the formation of a few dominant companies. What strikes just as much is the persistently fierce competition over innovation and, in some cases, the swift replacement of market leaders who once seemed indomitable by new players.

As a matter of example, in the early 2000s, the search engine pioneers Altavista, Lycos and Yahoo were quickly crowded out by Google, followed by, a decade later, the ousting of the initial social network pioneers MySpace and StudiVZ (a German student-based social networking platform) by the then-newcomer Facebook—despite the fact that MySpace was owned by News Corporation and StudiVZ by the Holtzbrinck Publishing Group, both powerful media groups. Since the beginning of the 2010s, Facebook has emerged, practically starting from nowhere, as a serious new competitor for Google in the internet advertising market. And in the market for accommodation and car transportation services, Airbnb and Uber have recently positioned themselves as new providers and competitors.

In these cases, newcomers who had until then been unknown became challengers, if not leaders, in those markets. By contrast, the struggle for dominance in the mobile internet market took place between already established groups. For example, the leading providers Nokia and BlackBerry were put in their place, in the late 2000s, by Samsung and Apple; and the competition over mobile operating systems and apps was limited to Apple and Google (Arthur 2012; Angwin 2009; Kirkpatrick 2010).

This means that the strong, sometimes monopolistic position enjoyed by a small number of internet companies is no guarantee for sustained periods of market dominance. This is partly due to the often volatile and unpredictable *behavior of large user groups*. The consumer-oriented product markets and service offerings that characterize the commercial internet are, to a large extent, dependent on the respective preferences of end consumers and users, similar to comparable markets in the old economy.

This applies to the purchase of technological devices (such as smartphones or tablets) as well as to the use of specific internet services such as search engines, social networks, messaging services and apps. The success of Google's search engine; the dominance of Facebook as a social media network; the rapid increase in the significance of the messaging service WhatsApp, acquired by Facebook; the increased practice of streaming digital music; and the success of vendor-specific smartphones, e-book readers or tablets—what these have in common is that they are all based on user- and consumption choices that, by and large, condense in a non-organized and spontaneous manner into mass behavior, which the companies are then tasked to anticipate and channel (Dolata and Schrape 2016). Indeed, the fact that the swarm can move on is the downside of the described network effects.

Table 4: Internet companies – areas of expansion and main competitors

	Domain	Expansion	Main competitors
Google	Search engine / Advertising	*Media* YouTube (video/film), Google Play (media-/app store), All Access (music), Google Books *Mobile soft- and hardware* Android, Chrome Browser, Chromecast, Nexus (smartphone and tablet), set-top box running Google TV) *Social networks* Google+ *Internet of Things* Smart home, connected car: Open Automotive Alliance, alliance between Google and car manufacturers, special drones	*Advertising* Facebook, Yahoo, advertising firms *Media* Apple, Amazon, Netflix, Hulu, media companies *Social Networks* Facebook, Twitter, Flickr *Mobile soft- and hardware* Apple, Amazon, Microsoft *Connected car* Apple; car manufacturers *Smart home* Microsoft, Cisco, appliance manufacturers
Facebook	Social network / Advertising	*Media* Instagram (photos), WhatsApp (messaging) *Software* Oculus (virtual reality headsets)	*Advertising* Google, Yahoo, advertising firms *Social networks* Google+; YouTube; Twitter, Flickr *Apps* Google, Apple
Amazon	Retail	*Media* Amazon Game Studios, Lovefilm, Prime Instant Video, Fire TV, Amazon MP3, Amazon Publishing, Amazon App Store *Mobile soft- and hardware* Kindle e-book reader; Kindle Fire tablet, Fire Phone, Amazon Fire set-top box (TV) *Cloud / IT Leasing* Amazon Web Services	*Trade* Retail companies, specialized online dealers *Media* Google, Apple, Microsoft, Netflix, Spotify, game manufacturers, media companies *Mobile hardware* Apple, mobile device manufacturers *IT Services* Microsoft, Apple, Google
Apple	Consumer / communications-electronics	*Media* iTunes Store, App Store, iBooks Store, Apple TV set-top box, music-streaming *Mobile hard- and software* iPhone, iPad, iPod, iWatch, iOS operating system, Safari browser *Mobile soft- and hardware for corporate clients* Strategic alliance Apple-IBM *Cloud* iCloud *Internet of Things* Wearables; health and fitness; connected car: iOS in the car - alliance between Apple and car manufacturers	*Mobile hard- and software* Smartphone/tablet manufacturers; Amazon, Google (Android), Microsoft *Media* Google, Amazon, Netflix, Hulu, Spotify, media companies *Connected car* Google; car manufacturers
Microsoft	Computer soft-ware / IT services	*Media* Games – Microsoft Studios, Xbox game console, MSN TV *Mobile soft- and hardware* Skype, Bing, MSN, Surface (tablet), Windows Phone, *Social Networks* LinkedIn	*Mobile software* Google (Android); Apple (macOS, iOS); Apple-IBM *Media* Amazon, Google, Apple, game developers *IT services* Google, Apple, Amazon, IBM *Social networks* Facebook; Google+

Source: Annual Reports of the companies; media content analysis; own compilation.

To compound matters, given the extraordinary innovation dynamics and rapid trend changes on the commercial internet, the leading companies are constantly challenged to defend and renew their position of dominance. They do so mainly through the development of new offerings and features as well as rapid advances into new growth markets. This means that the companies must demonstrate a high and sustained level of *adaptability*, considered to be comprised of the early and continuous anticipation, reception and integration of new technological and socio-economic developments as well as their implementation into attractive commercial offers (Dolata 2013). The literature on organizational inertia and path dependency has demonstrated that established and saturated companies often underestimate the potential reach or shattering effect of radically new developments, that they are reluctant to veer from the strategic behavior that led to their initial success, and that they are not inclined to adopt new and ambiguous developments unless these are clearly being backed at a broader scale (Mellahi and Wilkinson 2004).

These characteristics by no means apply to all the already established companies. While Apple, Google or Amazon proved to be very adaptable in the last decade, other companies did not. Yahoo's decline from search engine pioneer to takeover target, Nokia's rapid loss of clout in the mobile device market, and Microsoft's ongoing problems with the internet as a whole are examples of how well-established companies do not necessarily succeed in anticipating new trends and in responding promptly with appropriate strategic repositionings (Arthur 2012; Shapiro and Varian 1999).

In addition, the *ambition of internet companies to expand* beyond their regular area of business often leads to new and fierce competition both among themselves and with established media, consumer electronics, technology and industrial enterprises. All the companies considered in this study have been, to a greater or lesser degree, expanding their radius of action for several years. Overall, four key expansion trends and new fields of competition can be identified which are being pushed forward by the companies by means of internal development strategies as well as acquisitions and strategic alliances (Table 4).

The first of these expansion trends concerns the extremely complex field of *internet-based media content and services*, targeted and vied for especially by Google, Apple and Amazon (Dolata and Schrape 2013). Over the last decade, the three companies have gradually turned into internet-based media groups and are steadily building their profile as turnkey providers of a broad range of commercial services and media content, some of which they are now producing themselves. Apple had already entered this segment in 2003 by introducing its iTunes Music Store, and Google in 2006 with the acquisition of the video platform YouTube. Amazon, for its part, has been pursuing the trend since the late 2000s with a very aggressive expansion strategy. In the meantime, all three companies have a broad portfolio of media offerings consisting of their own digital music and video services (purchase, rental and stream-

ing), e-book and games, app stores as well as over-the-internet access to television. Through these offers they are encroaching on the territory of the classic media companies (film, music and book publishers), established game publishers (Microsoft, Sony and Nintendo) as well as net-based movie rental and streaming companies (Netflix, Hulu and Spotify). Apple (with iPod, iPad, iPhone and iWatch) and Amazon (with the Kindle e-book reader, Kindle Fire tablet and Fire Phone) also offer, as a means to provide access to their content and services, complete and proprietary device families. Google, for its part, focuses on driving the spread of its open source mobile Android operating system, with which it establishes priority access to its users via the devices of other manufacturers (2015/16 Annual Reports [Form 10-K] of the companies; media content analysis).

The second key trend, which is closely linked to the first trend, concerns the *dominance over the mobile internet*. This competition is fought out primarily between Google and Apple, whose operating systems are installed on over 90% of all mobile devices and which have by far the largest app stores. In addition, Amazon, which is already marketing a complete range of mobile devices and services, is likewise trying to join the ranks of the major players in this field—so much that it even engages in predatory pricing. Microsoft, for its part, even despite the acquisition of Nokia Devices, has not yet succeeded to make inroads into this field. In the meantime, the dominance of Google and Apple in the mobile devices market means that, unlike at the end of the 2000s, they can impose their rules on other device manufacturers and large telecommunication companies wishing to use their software or sell their devices. While Apple, with its advancement in the mobile internet market, aims primarily at marketing its hardware, Google's primary goal is to provide users, through the spread of its operating system and mobile browser, with priority access to its services (2015/16 Annual Reports [Form 10-K] of the companies; media content analysis; Dolata and Schrape 2014).

In addition to these two major trends, two new markets have emerged over the last few years and are being pursued by the main internet groups (Amazon, Apple, Google and Microsoft) not only through acquisitions but also through strategic alliances. The first of these—comprising the third key trend—is the provision of *data storage, computing capacity and cloud services*. These offers and services can be used not only by individual internet users to store and retrieve their music, images, documents, contacts and programs from external computers, but also by business customers who outsource entire internal data processing infrastructures onto the new platforms. Here, Apple and IBM have entered, in mid-2014, a strategic alliance designed to combine the offerings of mobile devices and services from Apple with the experience of IBM in the construction and management of company-internal data processing and communication structures. The aim of the alliance is to, by way of devices, software and services, make the internal IT and communication structures of

business customers more compatible with the mobile web. At the same time, this alliance serves to challenge Microsoft as a leader in the field of IT equipment and consulting for companies (media content analysis).

As a fourth key trend, especially Google, Apple and Amazon are increasingly pioneering fields that until recently have not been affected or determined by the internet. For example, Amazon and Google are each working on developing *package delivery drones*, which challenges the established structures of the logistics industry as well as the conventional parcel delivery companies. In addition, with the acquisition of the thermostat and smoke detector manufacturer Nest, Google has also entered the *smart home sector*, effectively moving into territory that has been in the hands of, for instance, Microsoft, Bosch kitchen and home appliances, and network equipment provider Cisco. Apple, for its part, with the introduction of its iWatch in 2014, has also been venturing into the field of *wearables*, that is, body-wearable information technology, and health and fitness-related monitoring and tracking devices. Finally, Google and Apple compete with each other as well as with the established automobile companies for dominance in the *connected car* sector (media content analysis).

The commercial internet is thus characterized not only by strong merger trends but also by intense competition in all its essential segments—a situation that, for better or for worse, challenges the power of individual companies on a continuous basis. As we have demonstrated, this pressure is generated more so by the big companies as direct competitors than by commercially-oriented newcomers, open source projects or forms of commons-based peer production. Thus, the essential feature of today's competition in the commercial internet is fierce *oligopolistic competition between the leading companies*, which is carried out primarily through aggressive innovation and expansion strategies. In all the mentioned areas of business, Google, Apple and Amazon are currently the key players, with Facebook still in a consolidation phase and Microsoft largely consumed in a defensive battle. Under these conditions of oligopolistic competition, individual start-ups only have a chance of becoming significant (co-)players if they can occupy a completely new, not yet consolidated commercial field that is not on the radar of the established companies. Examples of the latter are the search engine market, in the early 2000s, social networking, one decade later and the recent reconfiguration of the markets for online accommodation and car transportation services. However, start-ups that are innovative in fields that have already been appropriated, such as WhatsApp in the messaging service sector, are essentially easy prey to becoming bought out by the main players.

The expansion strategies of the internet companies are typically twofold. While the leading companies in other economic sectors often have drastically reduced the number of their business areas over the last two decades, instead focusing on a few core areas (such as the pharmaceutical industry, Dolata 2003: 185-192), the internet companies are successively diversifying and expanding their reach. However, despite their

diversification activities, none of them has managed to complement their core business with commercially viable new business areas to date. Although all five companies, and especially Google, Amazon and Apple, have through their expansion and acquisition strategies de facto become media groups with a broad offer of media content and services, all of them continue to generate the vast majority of their revenues and profits from their traditional core business (Table 1). Economically, Google and Facebook are still web-based advertising and marketing companies, Apple is still a leading provider of communications and consumer electronics, Microsoft is still a software company, and Amazon an internet retailer. Until now, the in part strong expansion and diversification into new business segments serves above all to enhance these companies' socio-technical ecosystems, which are designed for the extensive and exclusive use by individual users as well as business customers. Nonetheless, this has in no way eclipsed the still enormous economic importance of their core business areas.

The second characteristic of these companies' innovation and expansion strategies can be summed up as "acquisition instead of cooperation." In other words, the examined companies do not, generally, obtain external know-how and penetrate into new business areas through cooperation with start-ups, as is the case in other high-tech sectors (Rothaermel 2001; Roijakkers and Hagedoorn 2006; Hagedoorn, Link and Vonortas 2000) but rather through the acquisition of companies whose resources and competences are integrated into the respective group.

4   Innovation: Closed cores, controlled opening of peripheries

The latter characteristic is also indicative of the companies' strong in-house orientation, in particular with regard to R&D, for which strategic alliances and cooperations are entered into only on rare occasions.

In general, in economic sectors characterized by oligopolistic structures and strong innovation dynamics, the struggle for dominance focuses primarily on achieving a competitive edge in research and the rapid marketing of innovations (Ahuja et al. 2008). This is particularly true of the commercial internet:

> "R&D is the central input of production, not merely an episodic activity that affects the production process. Put differently, the R&D process and the production process are essentially the same thing for many products and services related to the internet and digital platforms." (Shelanski 2013, p. 1685)

Therefore, it is not surprising that all of the five internet companies are highly research-intensive, have large-scale R&D centers, and allocate a substantial portion of

their staff to R&D (Table 1)[2]. The central feature of the way in which they organize their R&D activities is not only a strong in-house orientation but also what has been termed *closed innovation* for some time now (Chesbrough 2003, 2003a; West et al. 2014). A significant portion of the products and services that characterize the internet today and which users are confronted with in rapid succession derives from internal research and is developed and produced under conditions of strict secrecy. Among these are Google's search algorithm; Facebook's social graph; Microsoft's software packages; Google and Facebook's data evaluation and advertising systems; Apple and Microsoft's operating systems; Apple and Amazon's device families; Apple, Amazon and Google's cloud services; and Amazon's ordering and logistics systems. If and when know-how for proprietary developments is lacking, the companies rely on acquisitions of technology companies that offer the sought for resources (Table 3).

Microsoft explains, which could be representative of any of the other groups, the strong internal focus of its R&D activities as follows:

> "We develop most of our products and services internally. Internal development allows us to maintain competitive advantages that come from product differentiation and closer technical control over our products and services. It also gives us the freedom to decide which modifications and enhancements are most important and when they should be implemented. [...] Generally, we also create product documentation internally." (2013, p. 8)

In a statement that could likewise have been issued by any of the other companies, Google points to the great importance of confidentiality and secrecy in its R&D activities and to which it commits both its staff and third parties:

> "We rely on a combination of patent, trademark, copyright, and trade secret laws in the U.S. and other jurisdictions as well as confidentiality procedures and contractual provisions to protect our proprietary technology and our brand. We also enter into confidentiality and invention assignment agreements with our employees and consultants and confidentiality agreements with other third parties, and we rigorously control access to proprietary technology." (2010, p. 16)

The *core of the innovation model* of the five internet companies is therefore a strong internal orientation of their R&D and the practice of those activities under quarantine-like conditions of extreme secrecy. The main reason for this is that the successful development and marketing of proprietary innovations on the internet markets comprises the basis for achieving competitive advantages over competitors. To this end, all companies seek to maintain utmost secrecy and control over their research activities and innovation projects, especially those crucial to their corporate strategy, and to secure the intellectual property rights of their products and services (Trott and Hartmann 2009; Braun and Herstatt 2008; Freedman 2012).

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[2]   The, at first sight, very low percentage of R&D in Apple's total turnover (Table 1) should not be interpreted as a weakness. The group's product portfolio, to which its R&D is dedicated, is fairly small. Moreover, its exorbitant growth rate over the last 15 years—from $5.4 billion in 2001 to just under $234 billion in 2015— invariably dwarfs the R&D intensity (as a percentage of R&D expenditure in relation to total turnover) (Apple 2001, 2016).

At the same time, however, there are also *controlled openings* at the edges of this closed system—especially in the form of relationships between the internet companies and open source communities as well as within the framework of the companies' own app stores.

All internet companies have long been benefiting from the adaptation of software developments that have been driven in the context of open source communities such as Linux, Mozilla or Apache (Lerner and Tirole 2002). Open source software is a constituent part of operating systems (such as macOS and iOS from Apple or Android from Google) and servers, of devices (such as the Apple iPhone or Kindle from Amazon), of tools for external developers, of preinstalled mobile app devices and of the cloud services offered by internet companies.[3] It is therefore important for them to stay abreast of, and gain access to, the widely dispersed knowledge generated in the various open source communities. To this end, the companies employ a non-negligible number of people who are involved in open source development and who work in open source communities. They also participate, through their employees, in the big developer conferences of those communities and even contribute to the financing of open source projects and their foundations (West and O'Mahoney 2008). The Mozilla Foundation is funded by Google, the main sponsors of the Apache Software Foundation include Google, Yahoo, Microsoft and Facebook as platinum members with donations of more than $100,000 per year, and the Linux Foundation is financed by numerous large companies including Google, Amazon, Yahoo, Twitter, Samsung and Nokia (Schrape 2015).

Dahlander and Gann (2010) refer to this aptly as *inbound innovation sourcing*. According to them, the companies' activities in the open software sector allow them to gain access to a wide range of external ideas and knowledge—unobstructed by formalized and contractually regulated cooperations and with comparatively little asked in return. The companies then exploit and utilize said ideas and knowledge for their internal R&D, a practice described as "parasitic actions by firms" by West and Lakhani (2008). Amazon, in particular, is described as a company "that harvests code from vast fields of open source software while obscuring its code donations and distancing itself from the wider world of computing" (Clark 2014).

Controlled openings also exist in the fast-growing field of software applications, or apps, that are tailored to mobile devices. Indeed, in today's market a mobile device would not be viable unless it comes with a broad range of apps. The central hubs for

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[3]   For example, Google itself points to "the vital role of open source software plays at Google" (https://developers.google.com/open-source/) and Apple emphasizes that "Open Source development [is] a key part of its ongoing software strategy" (https://www.apple.com/opensource/). Amazon too uses "tons of Linux, not only to power all the servers that it uses for retail but also for Amazon Web Services—and in its own Kindle Device, which is by all accounts selling like hotcakes" (Brockmeier 2011).

spreading mobile applications are Google and Apple, which, with well over one million apps each, have by far the largest app stores. Amazon is likewise active in this field, with its own app store that offers no less than one quarter of a million apps. It is obvious that only a fraction of this huge number of apps could possibly come from in-house development and that the companies rely on the work of countless external developers and companies. In no other area of business is the collaboration of the major internet companies with third-party providers as extensive as in the mobile apps field. Therefore, they have to maintain a new balance between control on the one hand and decentralized creative freedom on the other (Eaton et al. 2011; Schreyögg and Sydow 2010).

Nonetheless, these openings which the companies concede to are subjected to rigid control strategies. The app sector, as such, is not a bottom-up market that was initiated by countless developers but rather a top-down market established and developed mainly by Apple and Google. These companies control the app market as follows: they coordinate and monitor their app stores; define the licensing conditions and price structures; specify the criteria that an application must meet in order to be sold there; remove offers that do not appear opportune to them or that are classified as politically incorrect; co-determine, with their supporting software development kits, the appearance of the apps and the terms and conditions for using them; and contribute significantly to the success or failure of offers through the search algorithms in their stores. In addition, the companies resort to their app stores as a pool of ideas from which they can draw on if need be. In recent years, Apple and Google have consistently integrated new application ideas into their own products or acquired promising emerging market players. For example, Google has purchased the apps Flutter (movement control), Sparrow (e-mail client) and Waze (social GPS); and Apple has purchased Siri (voice control), Cue (personal assistant) and Spotsetter (social maps) (Dolata and Schrape 2014, Table 3).

The internet companies are thus perceptive to their environments and systematically exploit external innovation impulses. They observe very closely what is happening in the open source communities; collaborate in open source projects; revert to a not insignificant degree to software and know-how developed there; outsource development activities when their own R&D capacities have reached their limits to external developers and companies; and regularly and systematically survey the wide field of start-up companies for interesting takeover targets.

However, a sustained opening-up of the essentially closed innovation model can hardly be observed. The companies thus continue to be characterized by a strong focus on proprietary developments, which mainly take place in their in-house R&D centers that are extremely sealed off from the outside world. In this way, the innovation model of the internet companies differs significantly from the patterns of collaborative technology and product development that are typical of other high-tech sectors. What became known in the 1990s as the *Networks of Innovators*—"The locus of

innovation will be found in networks of learning, rather than in individual firms"
(Powell et al. 1996, p. 116; Powell and Grodal 2005; Freeman 1991; Pittaway et al.
2004), and which has since been relabeled as *Open Innovation*—"a distributed inno-
vation process based on purposively managed knowledge flows across organizational
boundaries" (Chesbrough and Bogers 2014; Chesbrough 2003, 2003a; West et al.
2014)—does not apply to the internet companies.

5   Power: Centralization, control and volatility

The above discussions provide us with an *overall picture* that has three main features.

First, the commercial internet is today dominated by a small number of international-
ly active companies and is characterized by a strong trend toward market concentra-
tion in all major segments. These processes are driven mainly by network effects, the
establishment of company-specific socio-technical ecosystems, and the extraordinary
financial strength that the leading internet groups by now possess. Of course, the
commercial internet is more than the sum of its leading companies. Similar to the
classic economic sectors, it continues to be impacted by the dispersed activities of
countless developers, start-ups and smaller companies who operate outside of its core
structures.[4] This, of course, does not invalidate our *first finding* of a significant *hier-
archization, market concentration and economic power structure* in the commercial
internet. Indeed, the prevailing notion in the early 2000s of the "internet economy"—
i.e., a new form of business characterized by a multitude of new digital business op-
portunities, perfect markets, free competition and decentralized structures (Litan and
Rivlin 2001; Anderson 2008)—has little to do with the reality of the commercial in-
ternet today.

Second, today's commercial internet is characterized by fierce rivalry at all levels.
This applies not only to newly emerging segments, such as the search engine market
in the early 2000s or, a decade later, the social networks sector, where an initial pool
of competing start-ups would merge into one or two dominant groups. It also applies
to segments that are already established and that have been subject to considerable
market concentration, and which are the domains of individual companies. The inter-
net companies act not only as established players who are primarily concerned with
securing their respective domains but also as challengers who, with aggressive expan-
sion strategies, endeavor to penetrate the domains of their fellow competitors and to
continuously challenge positions of power. Thus, the intense oligopolistic competition
which the established internet companies are subject to, both against one another and

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[4]   The automotive industry, for example, has numerous suppliers; and in the pharmaceutical industry
there are the many R&D-intensive start-up companies that exist alongside and in cooperation with
the large pharmaceutical companies.

against communications, consumer electronics and media groups, does not change the high degree of concentration that is typical of the commercial internet. However, which constitutes the *second finding*, it leads to a remarkable *volatility of acquired market and power positions*, which must be repeatedly defended and renewed in the face of the extremely rapid succession of innovation dynamics—and which cannot always be sustained permanently.

Thirdly, the rivalries between the internet companies primarily concern innovative leads. The latter, even if only temporary, are acknowledged as a means to drive the ongoing development of software, devices, services, technical infrastructures and integrated ecosystems. The strategic importance of a group's own R&D is, accordingly, very high. The companies make intensive use of the dispersed knowledge and know-how that is emerging in open source communities, and also draw on the contributions of a large number of software developers and companies, for instance in the framework of their app stores. In the core area of competitively relevant innovation projects, however—this being the *third finding*—they are still in-house oriented; insist on utmost secrecy and sealed-off conditions for conducting their R&D and managing their knowledge base; and prefer a *closed innovation model* with which they seek to secure as much control as possible over their proprietary projects, products and services. Thus, overall their activities have little to do with open innovation or with the decentralization and democratization of innovation processes.

What constitutes the power of the internet companies?

Their power first manifests as an *economic power*, which is based on the superior economic resources of the companies—their financial strength, strong research capacity, market dominance—which they use against the competition and with which they can keep new competitors at bay.

In addition, internet companies are gradually broadening their *power over data*, namely by interlinking their range of cross-divisional offerings and by systematically matching and evaluating the resulting user traces. For example, the companies use their large volumes of data to create ever-more differentiated user profiles, which are applied to anticipate what users want—ideally even before the users themselves might acknowledge or express their own wants. These profiles also serve as an important input for their research and production and help to refine their products and services and to tailor these as closely as possible to user preferences (Shelanski 2013). Google's former CEO, Eric Schmidt, aptly expressed this in an interview during the Washington Ideas Forum in 2010 as follows:

> "With your permission, you give us more information, if you give us information about who some of your friends are, we can probably use some of this information—again: with your permission—to improve the quality of our searches. […] We don't need you to type at all. 'Cause we know where you are—with your permission. We know where you've been—with your permission. We can more or less guess what you're thinking about. Now is that right

over the line? [...] So we'll try to find that line to try to help you understand more about the world around you." (Eric Schmidt at Washington Ideas Forum, October 1, 2010, https://www.youtube.com/watch?v=CeQsPSaitL0)

However, the power of internet companies is above all based on their ability to, by means of numerous and coordinated offers, design and shape the framework conditions of essential *social* contexts, be they consumer worlds, information and communication patterns or social relationship networks. No device, no software, no app store and no search, media, consumer or social platform is simply a neutral technical offering that allows users to design and redefine their content. At all times, the underlying technology incorporates rules, standards and instructions that impact the activities of users similarly to how social institutions influence people's behavior (Winner 1980; Lessig 1999).

This starts with, for example, the predefined user interfaces and default settings of the platforms, which are not usually changed by the users and which have a strong structuring effect on their actions insofar as they allow for certain activities while excluding others. The embedding of features such as the trending button on Twitter, the emoticon buttons or the trending news function at Facebook are not just technical gadgets but rule-setting, action-orienting and opinion-forming structural elements. Socially constructed algorithms are used to determine what might be relevant for whom and what not and to structure all information and interaction processes, to anticipate user preferences and to make recommendations. Together with intra-company content moderation teams, algorithms function to decide on what is obscene, offensive, politically incorrect, erotic or pornographic—and to relegate or delete content accordingly. In this way, algorithms, forming the basis for any search, information, communication and interaction on these platforms, are highly political programs that construct distinct, selective and increasingly personalized social realities on the basis of social criteria that ultimately remain obscure to both the individual and the public (Just and Latzer 2016; Gillespie 2014; van Dijck 2013; Pariser 2011).

This can be described as *infrastructural and rule-setting power*. In that the internet companies develop and provide the essential infrastructural foundations of the web and act as gatekeepers to access to the web, they become the main rule-setting and -controlling actors. As part of that function, they structure the online experience of individual users and collectives and prescribe framework conditions for their activities, whereby they ultimately influence users' behavior and actions. As companies that seek to have a socio-political vision and voice, they structure and shape large segments of private and public life on the web through the technically mediated social specifications of their offers—all below the radar of public perception and control. This means that they are not merely intermediaries, such as telephone companies, but are action-orienting and opinion-forming "curators of public discourse" (Gillespie 2010, p. 347).

In sum, the purview of the internet companies' power today includes, beyond the economic dominance of the commercial internet markets, a major influence on the constitution of the public in our societies—albeit without being limitless or absolute. After all, power is never simply a "thing" that one either has or does not have but rather the outcome of social relationships, and is therefore continuously subject to negotiation and contestation. This relational and dynamic view on power applies not only to the fierce rivalries in which the internet companies everywhere are entangled. Indeed, AOL, Yahoo, MySpace or Nokia are examples of how quickly market-dominant positions in this dynamic business can dissipate. Governmental and European regulatory activities, too, can pose problems for internet companies, as the political debates over the power of Google show.

In addition, this view applies to asymmetrically developed relationships, in which the subordinates likewise always have specific resources and room for action with which they can irritate, influence or even challenge those in power (Giddens 1984). Although the internet companies know far more about their users than vice versa, collective preferences and behaviors can nevertheless, when condensed into a mass phenomenon, impel said companies to make corrections or revisions of their strategic orientation, or can even induce existential crises.

In such turbulent environments as are typical for the (commercial) internet, the companies must continually work on optimizing and aligning their resources, competencies and scope of influence and on adapting themselves to rapidly changing conditions. If they fail to do so, on time, they may see their power erode very quickly.

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