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# Social Media – A Systemic Change Perspective

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**Abstract.** Social media would not have been possible without the advances in the field of human-computer interaction (HCI). It was laying the basis for interactive systems early on when computers became personal, focused on how humans would not only work collaboratively, but how people could connect and socialize beyond borders, be it organizational or geographical. Social media has changed society dramatically. From a systemic change perspective, the interplay between people and technology was moving from a single user interacting with a system, to groups of users interacting with a variety of connected systems – impacting companies, organizations, communities and societies. This chapter gives a brief and simplified overview on the history of social media, followed by a systemic change oriented analysis how social media is changing the way people live, how they socialize and make friends. It then focusses on how societies change on national and international level using as an example the recent twitter activities of Kpop fans during the US presidential election campaign showing how new organizations and groups of people start to interact in ways that were unimaginable 15 years ago.

**Keywords:** Social Media, Kpop, Systemic Change

## 1 Introduction

Meet the Dutch couple, Sara Park and Jesse Jansen, and their 12 year old daughter Emma. Sara is communicating with her Korean parents via Kakao [12], she started a trello board [25] to organize the neighborhood activities and spends quite some time on Instagram following her favorite fashion brands.

Jesse is working at an international company for hardware technologies and social media is a central part of his daily work as well as family life. Jesse uses WhatsApp not only to reach out to his co-workers but organizes his cooking club activities and all the sharing of recipes, invites and of course all the joking, in a WhatsApp group for more than three years now.

Emma is not allowed to use Facebook, and her parents are strict on the set age limit of 13 to have a Facebook account. Emma does not mind, her main interest is to watch funny TikTok [24] videos and everything is anyway shared via WhatsApp messages with her friends, typically distributing Twitter and YouTube content and related discussions. When it comes to Emma rambling about Kpop, her parents are just rolling

their eyes. For Emma the type of BLINK or ARMY<sup>1</sup> subgroup she ships<sup>2</sup> (and why the pink hair of her favorite idol was so much better than now the blue hair of the leader of the kpop group) are central for her daily communication. But Emma was surprised last week, when she was able to follow the political discussion her parents had with friends over dinner, when she knew more than her parents about the twitter groups that were spamming racist twitter channels and how ARMY had helped to book seats for an event with the US president to influence attendance [20].

As the Park-Jansen family demonstrates, social media has become not only an integral part of business and family life, it is interwoven in local groups and neighborhoods, and now reaches beyond to impacting society on a broader level. There is a plethora of new services, platforms and possibilities to enable users to connect, share, discuss and communicate, allowing everyone to find and use their own personal mix. In this sense we have become even closer to McLuhans “the medium is the message” [15].

In the following a brief overview on the history of social media is presented. Then the POISE-framework is presented, describing how social media can be analyzed and understood based on three relations between people, system and society. The chapter concludes with some recent examples on how social media has been influencing society and gives an outlook on future challenges when it comes to the design, implementation, evaluation, deployment and usage of social media.

## 2 History of Social Media

### 2.1 The 1980ies and 1990ies

The foundations for social media come from many fields, with, from a technological viewpoint, human-computer interaction its most central one. In the 1980s HCI focused a lot on how to allow people to interact efficiently and easily with computers, most often for individual users with one machine and followed by the support of users to communicate and interact in groups. Main forms of interaction styles at that time were of course textual, as in command line interfaces, and the first versions of graphical user interfaces like Apple’s Lisa [27]. While history typically associates these early years of social communication as business-driven mainly operating on text and direct e-mail communication, there were already large communities using even basic text-based command-line interfaces to play games and develop games as groups. Games like [2].

When it comes to how people communicated and shared information in terms of business as well as entertainment, most available channels were limited in reach (e.g. within an institution or group) and limited access was rather the norm. With the introduction of the world wide web (WWW) and its basic protocols HTML, URL and HTTP it became possible to provide information for a global audience. In 1993 there were

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<sup>1</sup> BLINK fans following and supporting the Korean Pop group Blackpink [5], ARMY fans following and supporting the Korean Pop Group BTS [7]

<sup>2</sup> Shipping: initially derived from the word relationship, is the desire by fans for two or more people, either real-life people or fictional characters (in film, literature, television, etc.) to be in a romantic relationship [21].

about 50 https webservers worldwide, with about 700 websites available, ranging from the music television channel MTV to local news from the university at MIT. Most websites at that time could be found within universities.<sup>3</sup>

The commercialization of the WWW started in 1996, with an exponential growth in available websites and from 1998 to 2001 the dot.com boost. The main turning point for social media was the introduction of the Web 2.0, with its aim to allow new forms of sharing and exchanging content [10].

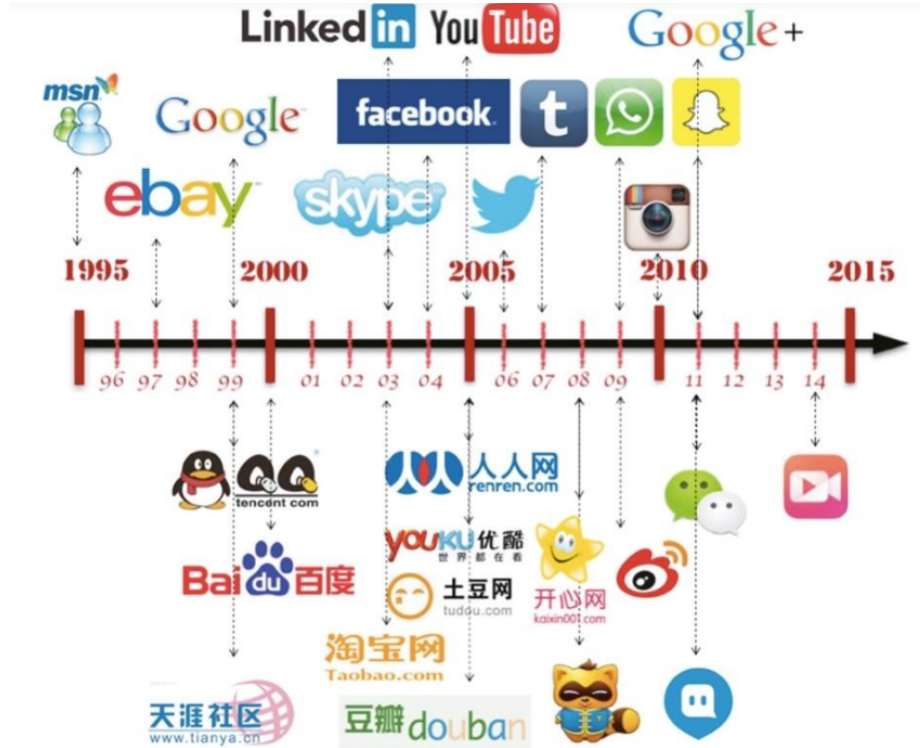
## 2.2 Web 2.0 as the foundation of Social Media and its uptake

As Wikipedia summarizes, [23] most commonly, social media is understood to be interactive computer-mediated technologies that facilitate the creation or sharing of information, ideas, career interests and other forms of expression via virtual communities and networks. The common point for most of them in terms of technology is that they are based on the web 2.0, and use related protocols to distribute, share and display information on a broad variety of devices, including mobile phones.

As Figure 1 shows, the rise of social media started with the introduction of services like MSN, ebay and google. Similar services started in Asia like Baido or Tencent. With the introduction of Facebook, LinkedIn, YouTube, Twitter and Skype, five key social media channels were established that today are still amongst the top 10 used services. Figure 1 shows the introduction of similar services for Asia. With the addition of Whatsapp, Snapchat and Instagram around 2010, the major social media channels for worldwide usage had been established.

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<sup>3</sup> Personal note: I would like to take this opportunity to apologize to the course instructor of networks and distributed systems in my computer science education in 1995, asking us to set-up our own personal website. I commented, it was useless time spent having a personal website. He was right, I was wrong.



**Fig. 1.** Overview of social media applications, platforms and services from 1995 onwards [28]

### 2.3 Social Media becoming an integral part of people's daily lives (2010 – 2020)

In 2010 social media had around 1 billion active users, and within the past 10 years, this tripled to about 3 billion active social media users in 2020 [22]. The major social media companies Facebook, Twitter, LinkedIn and Youtube were accompanied by Snapchat with about 1 million daily active users in 2012. A broad range of other services have since then reached these milestones of more than 1 million active daily users, including Pinterest, Reddit, Tumblr, Medium, Flickr or Twitch. One of the latest social media platforms that was added to the mix is TikTok, founded in 2016, and since then the app was downloaded worldwide more than 2 billion times.

Not all social media applications introduced in the last 10 years have been successful. One of the most prominent ones is Google + which disappeared most likely due to the privacy issues the platform had experienced.

From a non-US and European perspective there is a range of services that reach millions and billions of people in other parts of the world. For example, in China WeChat reaches about 1.2 billion and Tencent QQ has a user base of more than 650 million. In

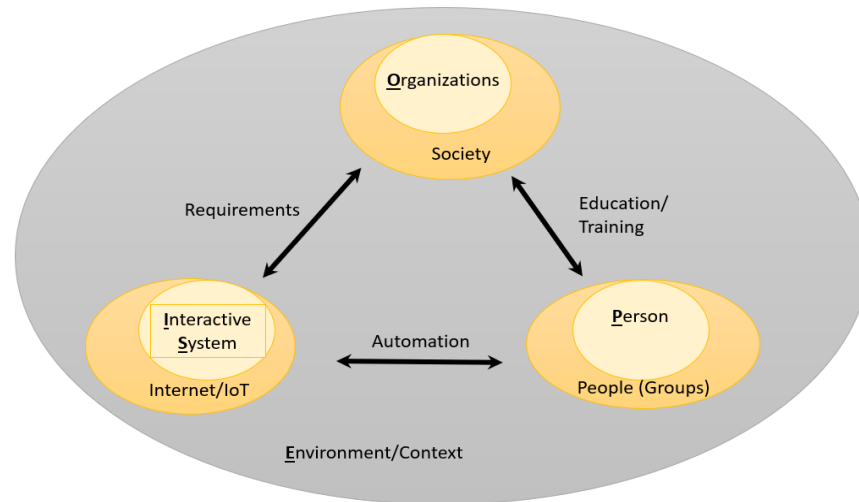
Korea, platforms like Kakaotalk is currently having more users than Facebook has in Korea.

The prediction for social media usage is that the growth trend will continue at least at the same pace. It has thus become unlikely that social media will disappear. On the contrary, social media will become an integral component when it comes to how society develops in the next 10 years.

### 3 Social Media in 2020: A Systemic Change Perspective

#### 3.1 The Systemic Change Approach POISE

The POISE systemic change framework describes the relationship of People, Organization, Interactive System and Environment (Figure 2). The development of social media can be described using three relations (Figure 2, [13]) analyzing and describing how social media has developed from supporting activities from personal and group related perspective to all activities within organizations, companies and society in general.



**Fig. 2.** The POISE Research Framework for People, Organization, Interactive System and Environment extends a standard socio-technical system model from the 1960ies [6]

In the original model persons (and people) were typically considered to be trained operators with validated qualifications, but today can be seen as individual users or a group of users, performing activities and tasks while interacting with a multitude of interactive systems or the Internet of Things (IoT).

Interactive systems are usually computer-based ones which present a certain level of automation and are supposed to fulfill requirements that enable users to perform activities and tasks. The computer will “disappear” in the future in the sense that it will be

invisibly integrated in the physical system with which the human interacts, going even beyond the current IoT related interaction concepts.

The organization is usually a large entity composed of several organizational layers and can be extended to depict society in general. Furthermore, the organization deals with the context and the environment into which it is embedded.

The people node in Figure 2 includes aspects like the study of the human using and interacting with the system and what activities they perform when interacting with social media. The edge between people and organization/society typically is about learning and training about social media usage, its advantages and limitations. The node on organization/society includes the description of (business) processes and regulations, while the edge interactive system/organization is central for any engineering requirements of the system. The interactive system node includes all technological aspects ranging from network, to system design, and finally the edge of interactive system and people is central for how users can interact with the system and to what degree such systems enable and support users by introducing automation.

### 3.2 User vs System → Automation

Social media in the first place is an interaction of a user with an (interactive) system. The goal of the social media user is to perform an activity or to accomplish a task, be it to communicate, to inform, to educate or to be entertained. Tasks and activities range from a simple and specific activity like sending a text message to trying to change their mood by being entertained in general during a Sunday afternoon.

The overall experience a user has when interacting with social media is influenced by a range of software qualities including usability [11], user experience with subdimensions like aesthetics, emotion, meaning/value, social connectedness, identification or stimulation [3], or privacy, security and service quality.

A key aspect when it comes to the social media experience is the relation between system and user, and what tasks and activities are automated: what activities and functions can be performed by the user? What type of information is visible and transparent to the user and what things are done automatically by the system, like personalization or recommendations the system proposes? What data is automatically collected and what can be influenced by the user? When it comes to the design of a social media app, the degree of automation influences how the service will be perceived by the user in terms of usability and user experience, but more critically also in terms of privacy or service quality.

*Usability & User Experience:* Examples of such automation common in real applications are recommendation engines for targeted advertisement used by google or amazon. Once you have been buying a Christmas present for your parents, the system is still recommending similar articles, related to that present, even if you personally would not be interested in them. Another example is the repetition of a product advertisement that you have been buying recently, with the possible downside that the advertisement might indicate the product you have bought at a discounted price. Being offered the product you were buying with a 40% lower price can heavily influence the brand perception you have of a store or company.

*Privacy:* The perception of the user to what extent their personal data is handled with the specific service (and connected to other services) with regards to automation. As example, Apple's iPhone does not allow a user to deactivate the transfer of location information of the device [1]. This shows how central the automation aspects are for the overall perception of privacy.

*Service Quality:* The 'filter bubble' originally coined by Pariser [18], describes the phenomenon that algorithms used for personalization of content can lead to an effect that a person only receives content that is similar to previous visited or selected content, thus creating a bubble around a user. This has recently become a central discussion for Facebook and the claim that Facebook is spreading fake news. The role of automation in filter bubbles is based on the algorithm implementation. The way users are interacting with the system can also play a central role [19].

### 3.3 System vs Organization → Requirements

For social media to be successful a key component is the functionality different services and applications offer. When it comes to the interactive system, it is not only about the user's perspective on what is automated, but how what type of data is presented and used when it comes to different perspectives, like the organizational view. The need of an organization or company for example will be to use social media and the data generated with it, to track with as much detail as possible what and how users are interacting with their system, while on a personal basis the individual users might prefer that less personal relevant information is made available.

Requirements for social media applications are thus key when it comes to the implementation aspects of the different software qualities, and how to balance between them. Will it be more beneficial to enhance the overall user experience by personalizing the service for the user by using location information of the smart phone, or is it more important to ensure the users privacy? Is it more important to have a better word completion prediction using the users movement and holding patterns of a remote control to identify the user, or do we respect the security and privacy concerns of the user, and expect that such data might be mis-used by an insurance company, say, as it allows it to predict early detection of specific diseases [4].

Key aspects when it comes to requirements for social media are transparency and how to enable and ensure transparency [14], and privacy (from a technical perspective), the use, for example, of differential privacy algorithms and aspects like security, reliability or dependability. What will be central in the coming years is not how to solve each of these challenges, but how to address multi-properties and balance them [17]. Is it more important to have a good user experience, or is a focus on privacy more important? Is it necessary or worth it to focus on dependability to ensure social media will not influence ongoing elections?

Or do we allow the users (and society) to handle the balancing? And simply teach and train the users, instead of solving it from a technical perspective?



### 3.4 People vs Organization → Learning/Training

Computer Supported Collaborative Work (CSCW) is focusing on how to design and develop technologies to support groups of users, and how interactive digital systems affect work. On a more general level, there are entire research fields focusing on how digital media and social media are influencing communication, education, entertainment and business in general.

The third angle of the system change framework is focusing on what aspects we should be focusing on when it comes to learning and training people and how to interact with social media. This can range from simple education on how to use e-banking systems for the elderly to ensure that there will be no digital gap in society, to higher level goals, on how to develop regulations to ensure social media providers are reactive enough when it comes to hate speech, fake news or country-depending un-appropriate content (for example the German NetzDG).

For the next 10 years, recent developments including some country-wide lockdowns will shift the focus even more on the necessity to understand the role of social media when it comes to society in general and how for example to enhance resilience of citizens. Recent events including the Covid 19 pandemic, for example, have already been bringing a considerable shift in the perception of how entertainment like social media entertainment and games can be highly beneficial when it comes to coping strategies, and a deeper understanding will be of profound interest when it comes to societal strategies ranging from architecture (work and life at home vs. office work) to transport (cars currently are considered safer than trains, contrary to goals we might have when it comes to sustainability).

### 3.5 Using the POISE Framework as Analysis Guideline for Systemic Change

The POISE framework and its three defining edges can be a guiding framework when it comes to the analysis of social media and its societal impact on a systemic change level. The POISE model should be a guide, where the components like learning, requirements, processes or automation aspects are not individual, but they are interwoven and dependent on each other. The balance between these aspects allows to balance between the different software qualities that should be achieved for the social media systems and services. The POISE model has the advantage that it encompasses the micro-mesa-macro approaches of systemic change approaches.

## 4 Social Media Changing Society: A Twitter Case Study

Twitter, the micro blogging and social media service, started in 2007. Users typically send short text messages called tweets to each other. These tweets initially were maximum 140 letters, and today have up to 280 letters. Twitter is commonly used for information sharing, it is a key medium for companies, businesses and people in politics and entertainment to accompany their social media strategies. There is a number of statistics that can help understand this type of social media. Among the top 50 persons with most followers are former President Obama, Ellen DeGeneres and a number of other people

in entertainment like Justin Bieber or Katy Perry. From a content perspective the 20 tweets that were most shared belong to President Obama, with the Korean pop boyband BTS having 10 most shared tweets among these 20. The majority of the 20 most shared tweets is from 2020. The tweet with the most received likes in 24 hours is again from BTS (June 2020).

Twitter and twitter activities today are not only related to marketing, information sharing or public complaints. There are groupings within followers structures that are influencing societal events. In June 2020, the followers of the BTS called ARMY have been actively spamming a number of accounts to support the activities of the Black-Lives-Matters Campaign [8] by spamming accounts with BTS memes.

This is a central example how political activism and influences have changed from traditional media and geographical influence to social media with international activism in a US election campaign. A possible explanation of the strength of these kpop twitter followers is that their interaction ration compared to number of followers is extremely high [9].

A second example for such activity from June 2020 is the reservation of tickets for Trumps election campaign which was disturbed by Twitter activists and TikTok users [16]. The goal of the campaign was to have (in most cases teenagers) reserve tickets for a campaign event in Tulsa, and then not using them. The strategy was very successful and even acknowledged by the Trump election campaign team.

These examples lead us back to our Dutch couple and Emma, who was surprised that her understanding of politics was better than her parents. Today social media enables very different user groups to access information worldwide, shifting traditional media approaches and campaigns to new ways of outreach and influence for society on a more general basis.

## 5 Conclusion and Future Challenges

The goal of this chapter was to give a brief overview of social media history, and to show how the impact of social media can be analyzed using the POISE framework. The POISE framework connects traditional computer science-oriented approaches and theories based on socio-technical systems with the potential to address social media influence on the larger societal level. This chapter was written in times of change and, given the current drastic changes in society, it becomes clear that, in the foreseeable future, social media will become an integral part of our daily lives, given the necessity to connect and socialize more digitally and virtually than through personal contact.



**Fig. 3.** Demonstration of changes in the last 15 years following the Pope with audiences in 2005, 2013 and without audience in 2020

Since the introduction of social media and its rise since 1995 digitalization has changed the world. Figure 3 shows a comparison of the impact of such trends using the Pope as an example. While in 2005 usage of smart phones was very limited, the pictures for 2013 speak a different language, showing the uptake of social media. Today the pope is having the most influential twitter account in the religious world (@Pontifex, @Pontifex\_es and @Pontifex\_it), and as the picture in Figure 3 right-side shows, this has become key to reach followers, given the limitations in personal interaction in 2020.

Future challenges will be the design and development of interactive systems and more general social-technical systems and services that allow the integration of different social media channels with existing systems to lay a basis for next generation services based on cross-usages of IoT based infrastructures. ICT professionals, both researchers and practitioners, and professional societies must contribute to a responsible development and implementation of such technologies and services.

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