

# The Social Accumulator (SOAC)

An explanation model for digital interaction among human actors

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**Abstract**—This contribution is addressing current issues in the increasing intensity of digital supported interaction and the perception and experiences made by human actors. Special attention is being put on the more than two years of due to the precautions in relation to the pandemic caused by the COVID19-virus. As a result, the concept of the Social Accumulator (SOAC) is introduced in this paper for the first time. It builds on the experiences from the intensified digital interactions both in academia and business life and should serve as an explanation model for the effects of digital interaction, that is easy to understand and to apply. The SOAC should help to understand the processes of Knowledge Creation and Knowledge Sharing when being driven by digital tools, which becomes increasingly important in a world that transforms education and businesses towards a highly digitized world.

**Keywords:** *Digital Transformation; Social Interaction; Higher Education; Digital Interaction; Communication; Collaboration; CSCW.*

## I. INTRODUCTION

Digitization and the digital transformation of our economy and our society has been an important topic in the recent years. The last two years under the influence of the global COVID19 pandemic acted like a catalyst for an almost instant digital transformation in many economies. In countries like Austria and Germany that period could be seen as the first large scale and real-life application of fully digital work experience, whereas other countries in Europe like Sweden, Denmark or Estonia already had substantial experience with the digital transformation at scale.

From a knowledge management perspective this situation was unique and interesting, as the use of information technology was always considered an important part of developing knowledge intensive businesses and activities. Thus, it is interesting to reflect back on the experience from a Knowledge Management perspective considering the interaction among human users (mostly) using digital channels.

In the beginning of the pandemic technical challenges and the improvement of the infrastructure, the availability of software systems and the building of the necessary skills were dominating the agendas in many organizations, in business and academia alike. However, much to everybody's surprise those challenges that were considered major showstoppers for

technology adoption in the Knowledge Management community were resolved rather quickly. The collaboration in the digital world became the new norm and soon felt like the "new normal".

As the duration of the pandemic extended in the second year, it became much more obvious that the mode of digital interaction had its own properties, which lead to advantages and disadvantages at the same time. Connections between colleagues and peers could be established quickly and communication and collaboration between individuals and groups of all sizes was facilitated by a number of useful tools that developed quickly to fit to the demand. Geographic distance was no impediment anymore, travel times virtually did not exist anymore. The transition from paper to digital in office became a reality at last and implemented easier ways of knowledge sharing among the users. On the other side the differentiation between working time and free time became much more blurred, the amount and the duration of digital meetings increased for most users very significantly and the time slots for concentrated work shrunk. Despite the massive use of digital communication tools, the individual feeling of loneliness or being isolated increased and informal conversation or communication did not happen that easily. This hampered informal knowledge exchange and affected the human well-being in the long run.

The long-term effects led to a kind of tiredness and exhaustion and became the label "Zoom fatigue" [1] and recent research validated the effect in a study carried out in Germany [2].

The channel reduction theory (from German: „Kanalreduktionstheorie") [3] assumes that remote communication generally has deficits. Newer studies identify a shift of the relation between the communication partners. At the same time, new phenomenon seems to take place: 1) Intimacy between communication partners can be even higher in an online setting, because the situation leads to a higher readiness of self-revelation (phenomenon: "Talking to a Stranger") and 2) digital setting often focus on the factual level. This is being perceived in a positive way as communication is more efficient and less status oriented and refers to the Disinhibition Hyperpersonal Model of computer mediated communication [4].

The situation described above, “This rapid and large-scale switch from in-person to remote interactions”, had been described earlier as Remote Living or “Telelife” [5], which puts emphasis on the fact that we will collaborate more remotely. It seems to be the case, that the massive application of technology mediated communication and collaboration does not only have benefits and positive effects, but also drawback – which is a common observation in massive use of any technology. Therefore, the right balance between digital interaction and direct interaction of human actors seem to be important in the author's opinion.

Since the perception that direct interaction between human and digital interaction in which technical means are used for the communication (e.g., a phone call, a chat or a video conference call) are perceived differently in terms of richness and cognitive load, as well as towards trust building and perceived interactivity. This might be due to the fact that the channels are less rich [6], [7], we will use both channels. In essence direct interactions are perceived as more attractive and easier than digital interactions by most users. This became especially obvious during COVID19-pandemic when everything switched to solely digital interaction for a rather long period of time.

Here the question on when to use which channel and how to interleave those to channels arises.

Within this contribution we will introduce the concept of the Social Accumulator (SOAC) as an explanation model for the digital interaction of human actors, that focuses on the beneficial and the negative effects of computer supported collaboration (CSCW). By emphasizing on the different factors in a simple conceptual model, the SOAC should support the interleaving of digital and personal channels during communication and collaboration activities.

The paper is structured as follows: in section 2 the concept of SOAC is introduced which is followed by an illustration of positive and negative characteristics that effect the SOAC of human actors in section 3. After that in section 4 some application areas of the model and challenges in the application are described. the paper concludes in section 5 with a summary and the outlook for future research.

## II. THE CONCEPT OF THE SOCIAL ACCUMULATOR

The main contribution of this paper is the concept of the SOAC, which should serve as an explanation model for the characteristics of (intensified) digital interaction. The author perceives a need for grasping the positive and negative effects of digital interaction in a simplified form in order to plan, to facilitate and to execute digital communication and other forms of direct communication in the most effective way without the need to be an expert in that research field. This might be also important in the discussion about the future workplace [8] and post pandemic education models [9].

SOAC builds on the analogy of an electric accumulator that stores electric energy, transformed to the aspect of interaction between human actors. Refueling activities are providing an energizing element and feel good for the humans interacting with each other. But there are also draining activities which are perceived by the human actors as taking

energy from them. Figure 1 illustrates our concept of an SOAC.

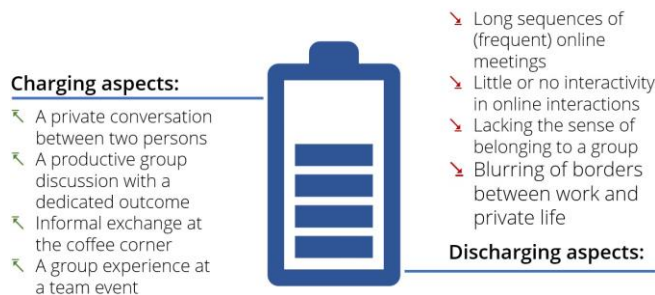


Figure 1. The concept of the Social Accumulator (SOAC) with some charging and discharging aspects as examples.

The term Social Accumulator is currently not used, although it is briefly mentioned in [10], but in the different context of social status of the youth generation. Therefore, in the opinion of the author, the metaphor of an accumulator that charges or discharges the perception of a communication or collaboration activities might be intuitive. With the focus of digital interaction in mind, we can consider the general observation that a direct conversation between human actors (“face-to-face”) is generally being perceived as richer and more satisfying than a digital interaction. Thus, we consider those types of interactions as *positive* or *charging activities* with respect to the SOAC, while we consider extensive digital interactions generally as *negative* or *discharging activities*, following the concept of the zoom fatigue.

Based on the observations the (mental) concept of a SOAC is being ‘charged’ in direct interactions of human users and ‘discharged’ in digital interactions. When balanced correctly viable amount of ‘social energy’ is available for the human user and the interaction is perceived as sufficient. If the level drops below a certain level, this becomes a (perceived) problem and affects the well-being of the user, if the situation continues to last longer – that’s the observation from the longer COVID19 periods. If the level exceeds the average energy level substantially the interaction is perceived as an especially valuable interaction – users call this a good chat, that was inspirational, for example. If this situation occurs more often, the context of the interaction is perceived in a positive way, e.g. as an inspirational workplace or motivating group. Figure 2 illustrates the process on a schematic level.

It should be noted, however, that the digital and direct interaction do not have a negative effect (discharging) or positive effect per se, but that the right balance or orchestration of charging and discharging effects are important for a working communication relation between the participants.

The level of *Social Energy* (SE) available to the human actors is having a strong influence on his or her ability to create and share knowledge and might also influence his or her level of creativeness and innovation [11]. The term social energy is often used in the connection of energy supply and use within a nation or society.

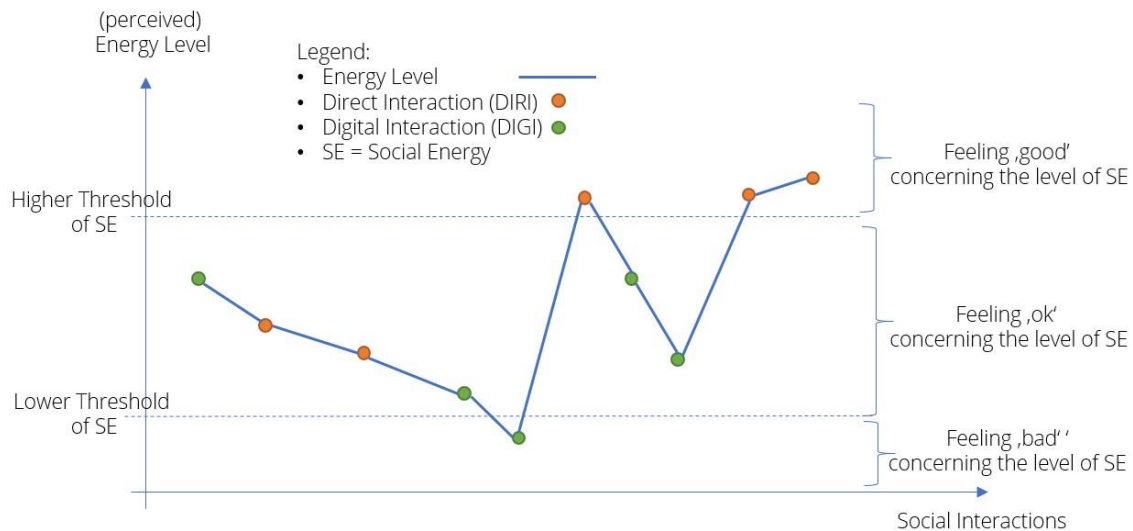


Figure 2. Illustration of the changing SOAC charging stage influenced by direct interactions and digital interactions over time.

Another definition can be found in the context of a societal force that aims at the wellbeing of its members by “doing good”.

The relation between SE and the context of communication is less well defined in research literature and more informally described, see [12]. In the context of this contribution the term social energy is being defined as an individual and subjectively perceived energy level of a human actor with respect to his or her capability or willingness to enter into or contribute to a physical or digital conversation. As an immediate result, SE has a strong impact on knowledge related activities like knowledge creation, knowledge sharing, knowledge use and knowledge transfer. SE is changing over time and even during a conversation.

The *awareness* created by the SOAC model first of all serves as a way to reflect on one’s own communication and collaboration situation, which puts the actor in a position to act on it.

Simply assessing the current situation might be a start and a result of the reflection could be a change of the communication mode (e.g. from digital interaction to direct interaction). As a next step a human actor could also track the SE over time to learn more about positive and negative aspects on digital interaction from his or her individual perspective.

It should be noted, that the authors would like to focus with this model at the dichotomy of direct vs. digital communication. With this respect the focus is being put on the channel and its methods and properties. It is clear that the human interaction is also largely influenced by the topic of the communication and the opinions and general feelings of the human actors. Those aspects can also have positive and negative aspects and require actions like a conflict resolution. These aspects are, however, not topic of this contribution.

### III. CHARGING AND DISCHARGING THE SOAC

The aspects and characteristics of the digital and the direct communication channel can be considered towards their charging effects (adding social energy to the SOAC) and the discharging effects (taking social energy from the SOAC) and will be a subject for detailed future research. In order to illustrate the effect, examples of both categories will be described in the following subsections.

#### A. Positive aspects charging the SOAC

To illustrate the aspects that are draining social energy some of those discharging aspects are being described in more detail below:

1. *A fruitful conversation*: between two human actors that evolves interesting and sometimes unexpected results is a good example of a fueling activity. Very often it is not only the exchange of information but the overall situation, gestures and mutual empathy that makes a difference here. As an important side effect psychological safety is created in such situations.
2. *An informal talk*: at a coffee corner or similar place is a form of latent communication that happens as a by-product of another activity (e.g. taking a coffee). This often leads to the exchange of interesting information, knowledge sharing and even the creation of new knowledge stimulated by the situation. The main characteristic is that it is unplanned, but not unlikely. Those events happen much less likely in digital interactions. One of the reasons might be the less frequent and less natively incurred interactions in digital settings.
3. *A team experience*: almost always requires a presence setting to allow for the emergence of a team spirit while working on a common goal or being submerged in a joint activity, very often these

activities serve as trust building entities for new groups or are reassessing mutual trust level for existing team that fuels the SOACs of the participants. Such settings can create transparency within the group as an important side-effect that fuels the positive perception of the group-members.

#### B. Negative aspects discharging the SOAC

To illustrate the aspects that are draining social energy some of those discharging aspects are being described in more detail below:

1. *A high frequency and/or long duration of digital interactions:* might be considered as tiring to the human actors. This fact had been reported in a number of studies and it is important to clarify that this could also occur in situations in which only one of the human actors is under such a high load of digital interactions leading to a communication setting which is perceived very different by the participants (e.g. a team lead that is connecting to its peers in 1:1 session).
2. *Few interactions during a digital interaction:* are another impact factor that is adding cognitive load to the human user, especially if the video setting is static and thus requires additional effort for the human brain to remain focused. When presentation settings are transferred 1:1 from a presence setting, they are often perceived more demanding in the digital communication and take less time or include more interactions to retain the attention of the audience.
3. *The perception of constant availability:* for human actors might add to the perceived stress level as well. The lowered barrier of getting in contact with the other participant in a synchronous interaction might inflict his or her current working process and a cultural assumption within the organization that everyone is expected to be available almost always and instantly can lead to less efficiency in the working tasks and a high level of engagement at the same time.

#### IV. POTENTIAL APPLICATION AREAS OF SOAC

In this section some application areas for the SOAC will be explained in detail and it's interesting to note that the SOAC can serve for different purposes in different application areas. From a Knowledge Management perspective, the charging and discharging aspects of the SOAC could be helpful to identify barriers in the fields of those Knowledge (Co)-creation, Knowledge Sharing and Knowledge Use among the different actors in the application settings that are described below.

##### A. The context of Higher Education (HEI)

The effects of the COVID19 pandemic and the intensified use of distant teaching just changed the way how Higher Education of the future is seen by students and lecturers alike. Due to those experiences Higher Education Institutions (HEI)

will have to reflect on how to modernize the education in post-pandemic age with a mixture of presence and distant teaching activities. It is very likely, that even education programs that relied on presence teaching only will include some form of e-learning elements into their curricula. Even hybrid settings in which presence teaching and distant teaching occur simultaneously might be a valid scenario for the future. It is obvious, that some topics are more suitable for distant teaching than others (e.g. labs and exercises) but on the other hand also some students will favor digital interactions while others prefer a more direct interaction. Balancing those two forms of interaction between lecturer and students in the right way (in terms of didactic requirements and individual preferences), will retain a competitive advantage for a HEI in a market that constantly becomes more competitive and globalized due to the extension into the digital domain by market participants (e.g. Coursera, Udacity). The SOAC will help lecturers and to derive a measurement system during planning and execution of their lectures to find the right mix between direct and digital interaction while planning and during execution of their lectures. For students SOAC could work as a tool to reflect on the own learning preferences with respect to their preferred form of communication and they could adapt accordingly by becoming aware of the advantages and drawbacks of digital interaction.

##### B. The context of professional trainings

For the professional training in the workplace setting and as part of the lifelong learning the results of the COVID19 pandemic showed to companies and trainers that digital training can be effective and efficient. The requirement of traveling to a training became less of a demand and the integration in the everyday work schedule was much easier for digital training, leading to a higher acceptance rate for training in general and budget saving aspects (no travel and accommodation costs). On the other side, the focus on the training itself in a presence training and the direct and valuable exchange between participants and towards the trainer had been assigned a new value due to the drawbacks of digital trainings. Overall, it can be expected, that the market for professional training's will be changed due to the results of the pandemic, yet it is still to be shown what the long-term effects will be.

The SOAC can help trainers design the interaction with the participants in an effective way by mixing direct and digital interactions in such a way that participants benefit in an optimal way from the training. Being aware of the characteristics of the charging and discharging effects will help to establish a level of social interaction that is common in a presence training also in a digital setting. SOAC helps to incorporate education in the professional job setting to fit to the individual requirements and thus provide a framework for the trainer to derive and monitor the charging state of the participants in his or her training. The concepts of SOAC might be combined with more agile approaches in delivering the teaching practices, too.

### C. The context of virtual companies

The third application area that the author would like to shed light on in terms of SOAC is the digitization process within companies, that had been accelerated by the pandemic, too. Here, the concept of “New Work” [13], [14] became a reality in the perception and evolving work models of many organizations that resisted such changes before. This significant and ongoing change on the organization of companies often leads to more distributed or virtualized companies, especially in the IT-domain. While being common pattern in northern European countries, this is relatively new in the DACH area. From a managerial point of view this change creates new challenges for managing teams and project due to the fact of (perceived) fewer social interactions. The SOAC will help managers and team leaders as a managerial concept to understand the needs of their colleagues and team mates better and to act according to their (individual) needs, since they are able to sense and classify the charging and discharging activities during the digital and direct interactions. For the employees the SOAC can act like a model that helps them to become aware and to voice their needs in terms of communication and interaction over the various channels.

Monitoring the social energy of the members of a group always had been an important task for leaders. However, in a hybrid working environment with a large amount of digital interaction it will be more important to monitor the SE of the team members and to recharge their SOACs early enough to prevent “outages” that might affect team motivation and performance. The concept of SOAC could help to manage team-SE more actively.

### D. Challenges for the application of SOAC

Applying the mental model of a SOAC will have its challenges, which are a subject to future research. Some of the foreseen challenges are briefly mentioned in this section in order to provide some hints for the application in the settings described above.

It will be important to keep the simplicity of the concept and to stick as close to the accumulator metaphor as possible in order to make application simple and intuitive for the human actors in the communication process.

Likewise, it will be important and challenging to make the current SE visible for the individual and for the group in order to create awareness and the opportunity to act on critical states of the SOAC appropriately. A promising approach for teams could be the use of retrospectives as a method from the agile software development for groups [15]. An adapted and simplified version might even work for the individual as a form of self-retrospective that can be mapped to the communication events in the recent period to plot the SE-levels over time.

Finally, charging and discharging factors will overlay each other and communication setting (presence or digital) might not be directly related to the SE level or being conscious for the human users in every situation. Therefore, the identification of relevant communication events and their contribution to the SE-level in a precise way is going to be another challenge.

## V. CONCLUSION & FUTURE RESEARCH

The main contribution of the paper is the introduction of the SOAC as a mental concept that might serve as a simple explanation model for the social energy level of an individual or a group and the perceived differences of direct and digital interactions. This might help to understand the interplay between the different forms of interaction and thus support the improvement of the overall interaction between human users as both forms are and will be present in our daily professional life. Further, the paper contributes in terms of working out different individual aspects that have to be considered when planning and orchestrating the different forms of interaction. This is being exemplified using application examples from three different fields.

Being currently on the conceptual level, this contribution is missing the empirical data, whose gathering is subject to further research in the different usage scenarios mentioned above. This next step will also be used to collect responses from the human stakeholders in the interaction process concerning the understanding and usefulness of the mental model of a SOAC.

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### REFERENCES

- [1] G. Fauville, M. Luo, A. C. Muller Queiroz, J. N. Bailenson, and J. Hancock, ‘Zoom Exhaustion & Fatigue Scale’, Social Science Research Network, Rochester, NY, SSRN Scholarly Paper ID 3786329, Feb. 2021. doi: 10.2139/ssrn.3786329.
- [2] ‘Zoom-Fatigue – Institut für Employment and Employability’. [https://www.ibe-ludwigshafen.de/zoom\\_fatigue/](https://www.ibe-ludwigshafen.de/zoom_fatigue/) (accessed Mar. 27, 2022).
- [3] N. Döring, *Social Psychology of the Internet. The importance of the Internet for communication processes, identities, social relations and groups.*, 2nd ed. Göttingen: Bern: Hogrefe Verlag, 2003.
- [4] J. Walther, ‘The Effect of Feedback on Identity Shift’, *Comput.-Mediat. Commun. Media Psychol.*, vol. 14, no. Issue 1, pp. 1–26, 2011.
- [5] J. Orlosky *et al.*, ‘Telelife: The Future of Remote Living’, *ArXiv210702965 Cs*, Jul. 2021, Accessed: Jul. 10, 2021. [Online]. Available: <http://arxiv.org/abs/2107.02965>
- [6] A. M. Johnson and A. L. Lederer, ‘The Effect of Communication Frequency and Channel Richness on the Convergence Between Chief Executive and Chief Information Officers’, *J. Manag. Inf. Syst.*, vol. 22, no. 2, pp. 227–252, Nov. 2005, doi: 10.1080/07421222.2005.11045842.
- [7] K. Ishii, M. M. Lyons, and S. A. Carr, ‘Revisiting media richness theory for today and future’, *Hum. Behav. Emerg. Technol.*, vol. 1, no. 2, pp. 124–131, 2019, doi: 10.1002/hbe2.138.
- [8] D. Smite, N. B. Moe, J. Hildrum, J. G. Huerta, and D. Mendez, ‘Work-From-Home is Here to Stay: Call for Flexibility in Post-Pandemic Work Policies’,

- ArXiv220311136 Cs*, Mar. 2022, Accessed: Apr. 29, 2022. [Online]. Available: <http://arxiv.org/abs/2203.11136>
- [9] L. Bayerlein, M. T. Hora, B. A. Dean, and S. Perkiss, 'Developing skills in higher education for post-pandemic work', *Labour Ind.*, vol. 31, no. 4, pp. 418–429, Oct. 2021, doi: 10.1080/10301763.2021.1966292.
- [10] D. V. Lepeshev and A. N. Teslenko, 'Social status of scientific activity in the minds of the youth of Kazakhstan', *Eur. Sci. J. ESJ*, vol. 10, no. 17, Art. no. 17, Jun. 2014, doi: 10.19044/esj.2014.v10n17p%p.
- [11] '7 Ways to Recharge When You're Feeling Drained of Social Energy', *Andy Mort*, Feb. 16, 2015. <https://www.andymort.com/social-energy/> (accessed Apr. 29, 2022).
- [12] 'Understanding Social Energy & Communication Styles – Evergreen Planner'. <https://www.evergreenplanner.com/2021/03/17/understandin>  
[g-social-energy-communication-styles/](https://www.evergreenplanner.com/2021/03/17/understandin) (accessed Apr. 29, 2022).
- [13] R. C. Barnett, 'A New Work-Life Model for the Twenty-First Century', *Ann. Am. Acad. Pol. Soc. Sci.*, vol. 562, no. 1, pp. 143–158, Mar. 1999, doi: 10.1177/000271629956200110.
- [14] M. Helmold, 'Culture Change Towards New Work Concepts', in *New Work, Transformational and Virtual Leadership: Lessons from COVID-19 and Other Crises*, M. Helmold, Ed. Cham: Springer International Publishing, 2021, pp. 45–54. doi: 10.1007/978-3-030-63315-8\_4.
- [15] Y. Andriyani, R. Hoda, and R. Amor, 'Reflection in Agile Retrospectives', in *Agile Processes in Software Engineering and Extreme Programming*, Cham, 2017, pp. 3–19. doi: 10.1007/978-3-319-57633-6\_1.