DELEN – A PROCESS MODEL FOR THE SYSTEMATIC DEVELOPMENT OF LEGITIMATE DIGITAL NUDGES

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Abstract: Digital nudging is a promising approach from behavioral economics. In decisions where individuals tend to struggle, nudges can support users of digital systems by aligning their behavior with their preferences. Despite their wide use, most digital nudges are designed to support the intended behavior from the perspective of a company while neglecting potential legal, ethical, or individual constraints or preferences. With modern technologies such as artificial intelligence or big data, these issues multiply and with the increasing effectiveness of digital nudges and use of new technologies, this has become even more critical. Thus, in this paper we follow a Design Science Research approach to develop a process model for the systematic development of legitimate nudges (DELEN). Legitimacy requires that dealings between different entities shall be fair. Unlike other models, we set normative boundaries derived from literature, expert interviews, and target group segmentation as integral elements. Target group segmentation increases nudge effectiveness and avoids unnecessary burdens for other individuals. By doing so, the DELEN process model paves the way for legitimate and effective digital nudges.

Keywords: Nudging, Design Science Research, Process Model, Legitimacy.

1 Introduction

Government policy makers and companies have increasingly adopted insights from behavioral economics to solve a wide range of behavioral issues [11, 27]. One approach to achieve this at little costs and with the potential to promote economic and other goals is nudging. Nudging is defined as a liberty-preserving approach that intends to "alter people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives" [28 p. 6]. The concept of nudging has received great attention from academics and practitioners and has found its way into the digital environment. In the digital environment, nudging is described as the use of user-interface design elements to guide people's behavior in digital choice environments [33]. For instance, the indication of popular energy-saving options or austerity plans on

digital platforms are considered nudge elements. In this case, the majority's decision influences the perception and behavior of individuals in a way [31] that makes others try to imitate the behavior of the majority [5].

Critically, despite the wide use of digital nudges, many nudging concepts appear that harm ethical or legal standards. Thaler and Sunstein explain that nudges should be designed to make an individual's life safer, easier and of greater benefit [28]. In decisions where individuals tend to choose an alternative against their preferences, nudges should support individuals to align their behavior with their intention [28]. To this day, this standard is not being considered sufficiently in current nudging concepts. Many individuals are nudged in a direction that supports the needs of a company but not necessarily the needs of users [13]. For instance, in the online shopping environment, nudges can be advantageous from the seller's point of view but manipulate an individual to unintentionally enter into a contract or to accept an excessive price (for example, 17). Furthermore, the design of a digital nudging concept is complex, and many different aspects need to be considered. For instance, the nudge should be transparent and visible to the users, as, otherwise, critics may conclude that nudges could be of manipulative character and undermine an individual's autonomy [4]. A greater practice and accessible design knowledge of morally legitimate digital nudges is therefore urgently needed. Legitimacy is defined as a "generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed systems of norms, values, beliefs and definitions" [25 p. 574]. To be better guided in the digital nudging concept development, researchers and practitioners can work with process models that ensure legitimate designs [10]. Importantly, current digital nudge processes do not sufficiently take ethical and legal standards into account [15, 16], which are essential for the design of legitimate digital nudges [24]. These two aspects are of high relevance because nudging can alter an individual's behavior yet increase or decrease an individual's welfare. When the triggered behavior is not aligned with the individual's preferences, nudges can compromise the individual's life in the short or long term.

With the increasing effectiveness of digital nudges and use of new technologies such as big data and artificial intelligence, these issues multiply, and ethically designed systems are even more necessary. This is the case, as nudges can dynamically initiate an individual's behavior and can manipulate behavior more effectively than ever before [24]. For instance, with modern technology, once visiting a website, a user can be analyzed in real time, and the site can determine to nudge users to enroll for a specific service before leaving the site. Consequently, it is important that digital nudge development processes set these normative boundaries, as an integral element in a systematic development process model being able to create legitimate digital nudges. With this work, we aim to contribute to theory and practice by answering the following research question: *How can a nudging process model foster an effective and legitimate creation of digital nudges.* To achieve our goal, we selected an established and eminent Design Science Research (DSR) approach that suits our purpose exactly to tackle the proposed research question. We follow the DSR approach by Peffers et al. [18]. To carve out a process model for the <u>de</u>velopment of <u>le</u>gitimate digital <u>n</u>udges (named <u>DELEN</u>) being the proposed artifact, we follow a specific research approach, which is presented in Figure 1.

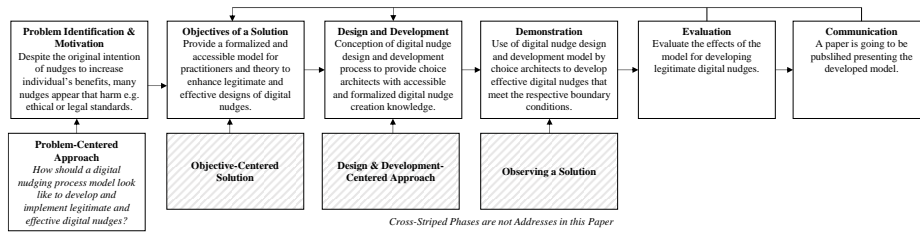https://orcid.org/0000-0002-7970-6879

Fig. 1. Research Approach Adapted from Peffers et al. [18].

With the development of the DELEN model, we contribute to theory and practice by providing a digital nudging process model that fosters a legitimate and effective design and development of digital nudges. We provide systematic guidance for the creation of digital nudges that meet ethical, legal, psychological, and societal normative boundary conditions.

2 Theoretical Background

2.1 Legitimate Digital Nudges and Normative Boundary Aspects

In digital environments, nudging typically uses design elements in the user interface to influence behavior [33]. Nudging is based on the principle of libertarian paternalism to influence decisions, letting individuals freely choose a decision option (liberalism component). The individual's freedom of choice is not restricted since none of the options are prohibited and the economic incentive of the alternatives is not significantly changed. However, the individual is nudged towards a decision option that represents the supposedly greatest benefit for them (paternalism component) [28]. To be considered as nudge, Lembcke et al. state three important considerations for digital nudges: preserving individuals' freedom of choice / autonomy, transparent disclosure of nudges and individual (pro-self) as well as (pro-social) goal-oriented justification of nudging [12]. This is important, as in offline environments, online environments offer no neutral way of presenting choices. Any user interface, from organizational websites to mobile apps, can thus be viewed as a digital choice environment and nudges can be implemented [33].

Yet, not all digital nudges embody legitimate designs. Whitworth and de Moor point out that *legitimacy* considers that dealings between different entities are fair [34]. Many nudges exploit the fact that individuals often act irrationally due to social, cognitive, or emotional factors. In these cases, nudges can unconsciously drive individuals to harmful consequences such as financial exploitation, unwanted surveillance, and unhealthy behavior. As nudges can trigger behavior that sometimes is not in line with the individual's preferences, these nudges are not fair. In online environments, especially, many nudges are designed to support the needs of a company while supplanting the preferences of the users [13]. A prominent example is the framing of decisions to accept internet cookies. Framing can be done in two ways: to support the collection of user data or to protect user data by framing the legal and ethically compliant alternative. Although data-protection-friendly defaults are set in accordance with legal

requirements, more and more internet platforms are framing the decision in such a way that it is easier for users to agree to additional cookies than to keep the actual default. If designers design and implement nudges that do not meet specific legal standards, companies may be confronted with high fines. Additionally, if nudges do not meet ethical standards such as fostering transparency and autonomy, and counteracting informational self-determination, these mechanisms could be linked to manipulating and harming the individual [21]. Digital nudges that act to the disadvantage of the individual make it clear that a multitude of different aspects play a role in the design of digital nudges [16]. Legitimacy is very context dependent and must be assessed in each design process specifically [34]. Hence, designers of digital nudges are asked to identify and set normative boundaries in each nudge's design process individually before operating a digital nudge concept.

2.2   State-of-the-Art of Processes for the Digital Nudge Development

To analyze the current digital nudge development processes and to craft design requirements for effective and legitimate digital nudges, we conducted a systematic literature review (SLR) following a methodology proposed by vom Brocke et al. as well as Webster and Watson [29, 32]. The literature was organized *conceptually* addressing *general scholars* on digital nudging and *practitioners* who are developing digital nudges. Our perspective on the literature was not completely neutral, as we selected those research papers and insights that could be used for the process model based on our prior knowledge. We chose to include a *representative* volume of research papers in our analysis, as contents, and especially nudge elements especially, were often mentioned redundantly. For the SLR we used the following search string: ("digital nudging" AND "model" OR "process") and used all variations of the keywords – singular, plural, hyphenated, or not hyphenated. We used the Basket of Eight and relevant IS journals and conferences to consider journals and conference proceedings at the intersection of Information Systems (IS) and Human Computer Interaction (HCI) that provided an overview of high-quality and relevant research in the respective research field. From our analysis, we identified 23 relevant papers from the field of IS and 18 relevant papers from the field of HCI. Our analysis showed, that various researchers have proposed models on how to craft nudges [6, 15, 16, 19, 22]. Weinmann et al. highlight, for example, how designers can create digital nudges by creating a design cycle [22]. Another approach to provide an easier access to digital nudging is proposed by Meske and Potthoff, named the Digital Nudging Process Model (DINU Model). In this model, the creation of digital nudging is divided into three generic phases: (1) analyzing, (2) designing and (3) evaluating, including a feedback loop [15]. In connection to this, in 2018, Mirsch et al. proposed the Digital Nudge Design Method (DND Method), presenting a universal four-step approach for how to systematically design digital nudges [16].

An analysis of the current design and implementation models is presented in Table 1. We analyzed whether the nudge development process models take both the design and the implementation into account. Additionally, we focused our analysis on ethical, legal, and psychological considerations as they are seen as essential requirements for a

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legitimate design [24]. Ethical considerations state that legitimate nudges should, for instance, promote transparency, voluntariness, and autonomy for reversibility. Legal standards can, for example, be based on the fact that nudges are designed in accordance with the European Union-wide General Data Protection Regulation. Psychological factors can consider that individuals who are exposed to the nudge are not left shocked, disturbed, or angry. Furthermore, we took a target group segmentation into account as our literature review results stated that nudges have to be targeted and personalized to achieve higher effectiveness [6, 19].

Table 1. Existing Models for the Design and Implementation of Digital Nudges.

Existing Digital Nudge Models	Design	Implementation	Ethical Guidelines	Legal Considerations	Psychological Considerations	Target Group Segmentation
Mirsch et al., 2018 [16]	✓	✗	✗	✗	✗	✗
Meske and Potthoff, 2017 [15]	✓	✓	✗	✗	✗	✗
Schneider et al., 2018 [22]	✓	✓	✗	✗	✗	✗
Dalecke and Karlsen, 2020 [6]	✓	✗	✗	✗	✗	✓
Purohit and Holzer, 2019 [19]	✓	✓	✗	✗	✗	✓

The models listed above build on an understanding of the general user for better nudge effectiveness. Nevertheless, segmenting the target group of the nudge recipients is not an integral element in the design process. The models mainly address the average user and do not sufficiently integrate elements of targeting and segmentation [8]. The effectiveness of digital nudges can be highly individual-dependent, and these models can only serve as a scaffold [6, 8]. On the flipside, the DND and Digital Nudge Design Cycle consider design and implementation conjointly, whereas several models do not combine these steps. However, as Durlak and DuPre argue, this is urgently needed [7]. In most models, it does not become clear for nudge designers what the key elements are that can be triggered to influence implementation effectiveness. Most importantly, the presented models do not sufficiently ensure that ethical and moral directives are thoroughly considered, making practitioners prone to design societally reprehensible nudges. For instance, ethical guidelines are proposed by Meske and Amojo, but without an integration in a process model for the design and implementation of digital nudges. Thus, we have developed a model for the **de**velopment of **le**gitimate **n**udges (DELEN) for the digital environment.

3 Development of the DELEN Process Model

We deduced requirements for the development of the DELEN process model from theory and practice. To extend and validate the results of our literature review stated above and to practically enrich our requirements, we conducted semi-structured explorative interviews with German industry experts (n=14). We interviewed digital nudging experts and researchers from various fields, such as IT developers, user interface designers and cognitive work process experts, ensuring that various perspectives and a fundamental understanding of the subject were brought together. The experts were recruited based on their specific experience and thorough knowledge in this field. Table 2 provides an overview of the interviewed experts and researchers.

Table 2. Overview of Interviewed Experts and Researchers.

ID	Expertise	Interviewee's Position	ID	Expertise	Interviewee's Position
1	Software Development	IT Developer	8	Commercial Law	Director of Research Institute
2	Software Development	IT Developer	9	Commercial Law	Associated Researcher
3	Software Development	IT Developer	10	Digital Marketing	Marketing Manager
4	Information Systems	Director of Research Institute	11	Business Consulting	IT Consultant
5	Information Systems	Research Group Leader	12	Cognitive Engineering	Business Process Manager
6	Information Systems	Research Group Leader	13	Cognitive Engineering	Business Process Manager
7	Information Systems	Digital Business Manager	14	Ethics and Information Systems	Research Group Leader

In our interviews we evaluated the decision and user context, the alignment of the nudge and nudged user, the legitimacy of the nudge, the nudge effectiveness, the systems usability, and the evaluation of the nudge. We consolidated our interview results with the results of our systematic literature review to derive requirements for our model. More than 26 design requirements (DR) were collected, tested for redundancy, and encapsulated to 15 tentative model requirements. They were condensed and simplified for easier understandability, ensuring their utility for choice architects. A summary of the key findings and our requirements can be found in Table 3.

Table 3. Design Requirements for the Design and Implementation of Digital Nudges.

Issue Category	Design Requirement (DR)	Source
Context of the decision	DR1: Creation process should consider context of the digital nudge.	Expert Interview and Literature e.g. [1]
Alignment of nudge with adjoining entities	DR2: Digital nudges should be aligned with supporting activities, business processes and overall strategy.	Expert Interviews and Literature e.g. [23]
	DR3: The enhancement of the nudge should be considered e.g. by artificial intelligence.	
	DR4: Nudge designers must understand the user's goals, values and preferences. Nudges should be aligned accordingly.	
Adaptability of the nudge	DR5: Different user characteristics should be considered.	Expert Interviews and Literature e.g. [3, 6, 8]
	DR6: Different technology characteristics should be considered.	
Legitimacy of the nudge	DR7: Digital nudges should reflect high ethical standards.	Expert Interviews and Literature e.g. [2, 12, 14, 30]
	DR8: Digital nudges should reflect on high legal standards.	
	DR9: Nudges should reflect on high psychological standards.	
	DR10: Digital nudges should reflect on high societal stand-ards.	
Effectiveness of the nudge	DR11: Process should connect design and implementation of digital nudges.	Expert Interviews and Literature e.g. [19]
	DR12: Nudge designers should consider timings as success of some digital nudges relies on their timely delivery.	
Usability of the nudge in system	DR13: Creation processes should be easy to grasp and accessible in practice.	Expert Interviews and Literature e.g. [20]
	DR14: Cost-Benefit analysis should be considered.	
Evaluation of the nudge	DR15: (User) feedback and new insights should be continuously integrated into the process.	Expert Interviews and Literature e.g. [16]

With the carved-out design requirements, we were able to derive a process model that supports ethical and legal standards and that allows for an individual adoption of digital nudge concepts. Next, the crafted requirements are presented regarding the DELEN process model and its realization.

4   The DELEN Process Model

The general process of creating digital nudges starts with a problem identification phase and an objective setting phase. In these phases, choice architects should identify and focus on the specific behavior that they want to change. In our model, we focus on the design and development processes and present these in detail, as these are the keys when creating digital nudges. After each process, the developed nudges can be assessed and revised in an artificial environment. Next, the developed nudges can be

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implemented into a system and evaluated in a real environment. The full model is presented in Figure 2:
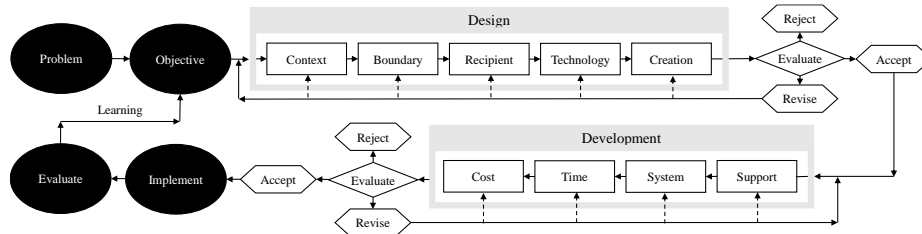

Fig. 2. Creation of Legitimate Nudges Model.

To foster practical usability, the model is condensed and simplified enough to enable easier access. The model flows in a systematic structure and avoids complex visuals, representing an easy-to-grasp approach. Furthermore, we followed the framework proposed by Renaud and van Biljon to increase communicative power [20]. The model was revised and adapted accordingly. This was crucial for usage and applicability (see *DR13*). Thus, this model paves the way for leveraging the potentials of digital nudges. Below, we will describe the model's phases in detail.

Design Process

The design process describes how digital nudges can be systematically created. It includes five steps, which should be performed consecutively and are explained below.

Assessing the Context. First, choice architects should map out the user journey of the individual (see *DR1*). This helps to determine at what point individuals make decisions and to identify optimal timings to implement interventions. At the same time, the processes in which no intervention has to be implemented should be identified in order to not interfere with other processes. In doing so, the specific choice architecture should be analyzed to identify relevant context factors that determine the individual's decision-making. For instance, the decision context differs in terms of privacy-related decisions and health-related decisions.

Setting the Normative Boundaries. To craft legitimate nudge designs, choice architects should assemble the ethical (see *DR7*), legal (see *DR8*), psychological (see *DR9*), and societal standards (see *DR10*) that frame the digital nudge. It is important to highlight that these elements might differ, according to the choice architecture and are highly context dependent. For instance, different legal boundaries apply for companies and governments. Yet, nudge designers should identify and set normative boundaries regarding the assessed context.

Targeting the Recipients. Many nudges show decreased effectiveness, as they do not sufficiently target the right individuals. Thus, it is important to get an understanding of the user's cognitive and affective processes as well as which of the user's heuristics are accessible (see *DR5*). Sundar et al. state that individuals with a stronger belief in the internal logic of a given heuristic are more likely to invoke that heuristic when presented with a cue, compared to individuals with a weaker belief. [26]. Hence, to achieve higher nudge effectiveness, the users should be segmented and targeted accordingly, as

some individuals can be addressed by digital nudges in greater detail than others. The target group should be sufficiently narrow, as ineffective nudges can slow down work processes or stimulate the individual negatively. It is important to ensure that the intended behavior resonates with the nudged person's preferences and values (see *DR4*). This is crucial, as these are important aspects of ethical justification and legitimacy of digital nudge designs.

Adapting to Technology. Choice architects should build on special characteristics of the used technology and should consider how the individual interacts with it (see *DR6*). Nudges should be designed differently when the technology can provide visual, auditory, or haptic feedback. For example, a stop signal can be transmitted to the individual by a red button (visual), an alarm sound (auditory) or a shaking impulse (haptic). Furthermore, a nudge may look different on a stationary device than a mobile device.

Creating the Digital Nudge. Based on prior analysis, choice architects can now select the suitable nudge element. Nudge elements in digital user interfaces can be, for instance, default settings that preselect a specific option. Other elements can include the framing of a decision. Options that are beneficial for an individual can be highlighted in a green color.

Development Process

The development process consists of four elements and is a pre-stage of the implementation phase, which considers the factors that need to be set for an effective implementation. The development is closely linked with the nudge design, so choice architects should consider these processes in correlation (see *DR11*).

Support: Nudges can, despite careful design, lead to unintended or conflicting behaviors. Nudges may jeopardize other significant goals, for example, when a nudge, designed to reduce pollution, ends up increasing another factor, e.g., the energy costs for the most disadvantaged members of society [27]. Thus, from the beginning, further supporting mechanisms can be implemented to counter any harmful behaviors (see *DR2*). Individuals who show unintended behavior can be recaptured and redirected. To achieve this, a variety of mechanisms may be used. This is crucial, as leading to an alternative can happen by alternative mechanisms. Nudges are described as soft-paternalistic instruments. Choice architects may even consider other soft or even harder mechanisms, such as laws or regulations. Overall, the implemented mechanism should be aligned with the overall strategy and the existing business processes to ensure that the overall goal is met.

System: Today, there is a wide range of systems available that can influence the effectiveness of the nudges. Choice architects should decide to what extent, e.g., artificial intelligence (AI) or big data can enhance digital nudges. For instance, Ferreyra et al. state that AI can enhance digital nudges to make them dynamic, e.g., referring to smart or hyper nudges [9].

Time: The success of some digital nudges relies on their timely delivery. Various researchers have presented evidence on how the different timings of nudges have an impact on their effectiveness [6]. Thus, it is essential to consider when the nudge is implemented in the system and when it is exposed to the individual (see *DR12*). This can

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be at any time of day, such as in the morning, at noon, in the evening or after special events (e.g., data protection scandals).

Cost: When implementing digital nudges, choice architects should weigh the costs and benefits. It should be decided whether other alternatives have a better cost-benefit ratio, and which behavioral change mechanism should be used (see ***DR14***).

Revision and Optimization Processes

After the design and development phase, a phase of testing and evaluation follows, and the nudge should be adjusted if necessary (see ***DR15***). After the development, the designed nudge should be tested. At this stage, choice architects should assess whether the developed nudge meets e.g., the boundary conditions and how the users are interacting with it. After the deployment process, nudge designers should test how the nudge works for instance in collaboration with supporting mechanisms or at different times in the system. After the evaluation, choice architects can adjust the different factors accordingly and can take specific learnings into account for another cycle of design and development, if necessary. This means that even when the designed and implemented nudges fail (are adjusted or rejected), choice architects now have a method to better analyze what went wrong and then gain insight into improvements in the future.

5   Model Application and Criteria Based Evaluation

The DELEN process model was applied and evaluated by a group of interdisciplinary choice architects. This group used the DELEN process to design cookie acceptance consent forms, which were positioned on the first page of a fictional online page. An exemplary privacy nudge is presented below (Figure 3).
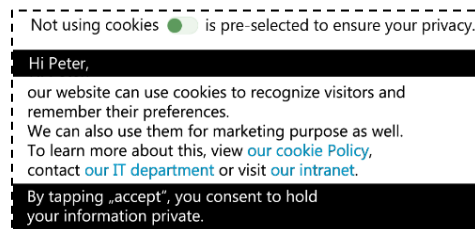

Fig. 3. Exemplary Privacy Nudge Developed by Deploying the DELEN Process Model.

Here, the nudge focuses on presenting relevant information for privacy friendly decision making. The nudge is personalized and uses, from a legal perspective, a General Data Protection Regulation (GDPR) compatible default option. Ethical directives are considered in terms of transparency, as this choice architecture encourages informational self-determination. This developed cookie consent form visually highlights further information and supporting contacts. It can be smoothly integrated in the user interface of a digital work system.

Following, it is presented how the specific features are developed phase by phase using the DELEN process model (see Table 4). The digital nudge is split up in its components, explained and assigned to the respective phase.

Table 4. Developed Digital Nudge Components Phase by Phase of DELEN Process Model.

Component	Rationale of Component	Development in Associated Section	
User behavior influence	Object Oriented Behavior Influence to disclose less personal information	Objective	
User support	Intervention is placed when user enters page for first time	Context	Design Process
Normative boundaries	meeting GDPR regulations as default is set in the right direction. Ethical directives are considered in terms of transparency, encouraging informational self determination	Boundary	Design Process
Personalization	Recipient is addressed and message adjusted for specific target audience appeal	Recipient	Design Process
Visual cues are carved out	Visual cues highlight important components for faster recognition and processing	Technology	Design Process
Nudge design	The option of cookie preferences is preselected as default, colour coding is used to symbolize the best alternative, and additional information is given to foster acceptance and trust	Creation	Design Process
Further information and contacts are provided	Supporting mechanisms are linked to message such as further information about cookie settings, link to IT-department is set for further contact	Support	Development Process
Technical enhancement	Artificial intelligence or big data can enhance digital nudges	System	Development Process
Timing	The intervention is closely presented to the time of the decision	Time	Development Process
Cost assessment	Implementation of this digital nudge is cost effective as system adjustments are rather small	Cost	Development Process

In a concluding step, we proved the suitability of our model by taking the criteria presented in sections 2 & 3 for another evaluation cycle. This is in line with Peffers et al. [18]. We presented the developed model and assessed it in semi-structured interviews with 14 experts of the legal, ethical and IS field (see Table 2). We tested and discussed how well the model serves its main purpose of supporting choice architects in designing and implementing effective and legitimate digital nudges. Furthermore, we tested if the model incorporates multi-stakeholder perspectives and is accessible to various choice architects. This ensured usability and application.

Multi-stakeholder perspective: The consideration of overarching stakeholders is implemented to prevent a one-sided focus, e.g., on only focusing on company interests while also taking ethical, legal, and societal interests into account.

Fostering nudge effectiveness: To ensure nudge effectiveness choice architects are encouraged to assess the context (e.g., mapping out the user journey), targeting the recipients specifically, adapt the nudges to individual characteristics and support their effects with supporting mechanisms. Unlike other models, a thorough process is presented that fosters not only on the design but also on the implementation of the nudge as an integral element.

Fostering nudge legitimacy: The process model specifically ensures that normative boundary conditions are considered. Choice architects are encouraged to assemble the ethical, legal, psychological, and societal standards that frame the digital nudge. Furthermore, by setting normative boundaries regarding the used technology, designs are crafted that meet standards across different technologic channels. This is important, as legal rules vary in terms of technology. Thus, ensuring that the developed nudges are crafted as legitimate designs.

Accessibility to nudge designers: To foster practical usability for various user groups, the DELEN process model is condensed and simplified. The model flows in a systematic structure and avoids complex visuals, representing an easy-to-grasp approach. Thus, even with different levels of prior knowledge the model to accessible enough for application and usability.

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6 Contributions, Limitations and Future Research

With the developed DELEN model, we contribute to theory and practice by providing a digital nudging process model that fosters a legitimate and effective design and development of digital nudges. We provide systematic guidance for the creation of digital nudges that meet ethical, legal, psychological, and societal normative boundary conditions. Our structured process model is condensed and formalized to provide choice architects with easy-to-grasp and accessible knowledge about how to design digital nudges that meet important legal and ethical standards. Unlike other models, we implement normative boundaries as integral elements for our model as well as propose target group segmentation as a key element. Target group segmentation increases nudge effectiveness and avoids unnecessary burdens for other individuals. By doing so, our model paves the way for legitimate and more effective digital nudges. By following our systematic model, choice architects can more easily compare and improve nudge designs. Even when digital nudges fail, the choice architects can systematically go through every element of the systematic model and assess their execution. Even though, our digital nudge model offers directives within a digital environment, transferring and testing these directives in an offline environment and adapting this model may be a fruitful endeavor in the future.

7 Acknowledgement

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