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# What's in an SME? Considerations for Scoping Research on Small and Medium Enterprises and Other Organisations in the IS Discipline

Andreas Drechsler

*Victoria University of Wellington, andreas.drechsler@vuw.ac.nz*

Sarah Hönigsberg

*TU Chemnitz, sarah.hoenigsberg@wirtschaft.tu-chemnitz.de*

Laura Watkowski

*FIM Research Center, University of Bayreuth, laura.watkowski@fim-rc.de*

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# WHAT'S IN AN SME? CONSIDERATIONS FOR SCOPING RESEARCH ON SMALL AND MEDIUM ENTERPRISES AND OTHER ORGANISATIONS IN THE IS DISCIPLINE

*Research Paper*

Andreas Drechsler, Victoria University of Wellington, Wellington, New Zealand,  
andreas.drechsler@vuw.ac.nz

Sarah Hönigsberg, Chemnitz University of Technology, Chemnitz, Germany,  
sarah.hoenigsberg@wiwi.tu-chemnitz.de

Laura Watkowski, Project Group Business & Information Systems Engineering of the  
Fraunhofer FIT, University of Bayreuth, Bayreuth, Germany,  
laura.watkowski@fit.fraunhofer.de

## Abstract

*We propose an approach to better scope an IS research project for the context of small and medium organisations (SMOs), depending on the project's topic and goals. SMOs are of a fundamentally different nature compared to large organisations, yet IS research often implicitly assumes the context of large organisations. This may lead to IS research outcomes not being applicable to the SMO context due to incompatible boundary conditions. Simultaneously, common criteria to distinguish SMOs (employee count, turnover) are often not particularly useful to include or exclude distinct classes of SMOs from the scope of a specific research project. Our proposed scoping approach thus considers research topic-dependent criteria to classify SMOs to be included. We illustrate our approach with examples from our own research. Other researchers can draw on our approach to include/exclude suitable SMOs of interest more clearly and thus produce research that is applicable to clearly delineated SMO classes.*

*Keywords: SME, small and medium enterprises, SMO, small and medium organisations, research scope, research configuration, boundary conditions*

## 1 Introduction

Small and medium organisations (SMOs, comprising businesses as well as non-profit organisations) are among the most numerous organisations in almost every country. Before we continue it is important to note that we carefully distinguish between small and medium enterprises (SMEs) on the one hand and small and medium organizations (SMOs) on the other hand in this paper. SME is the more well-known acronym and we follow its common use to describe for-profit enterprises. We use SMO as a wider term that shall include non-profit organisations such as charities or sports clubs in addition to for-profit SMEs. SMEs usually contribute substantially to a country's GDP and its growth. Welsh and White (1982) note that "a small business is not a little big business", i.e. that SMEs – and by extension all but the largest non-profit organisations as well – are of a fundamentally different nature compared to larger enterprises. While there is a growing body of IS research specifically targeting specific types of SMEs (e.g., startups), there is often an implicit focus on larger enterprises in many other IS research areas. For instance, IT strategy or digital innovation research often assumes that a role similar to a Chief Information Officer (CIO) or Chief Digital Officer (CDO) exists. Neither is true for many SMOs. Such

an implicit research emphasis on larger enterprises means that many of our IS theories may have SMOs actually outside their boundary conditions and thus the corresponding findings and implications may not necessarily be applicable to SMOs.

It is also not easy to assess to which extent current IS research is actually affected by insufficiently specified boundary conditions with respect to SMOs since IS papers rarely discuss their boundary conditions in this regard. We are also not aware of a systematic analysis that scrutinises recently published IS research in this matter. Since, as highlighted above, “a small business is not a little big business” (Welsh & White, 1982) in a very general sense, the issue may well be prevalent in many IS research domains where organisational size or related characteristics influence or limit the applicability of theories or the findings. Addressing this issue in future research projects first requires a general awareness among the involved researchers to consider boundary conditions regarding SMOs. For the authors at least, the need for such an awareness was not obvious at the start of their respective research programmes on SMOs and we assume the same is true for many other IS researchers.

Once having reached an awareness, however, we also found that there is a challenge to define suitable boundary conditions to include or exclude SMOs. For SMEs, there are often country-specific definitions around their number of employees or yearly turnover (see section 2). These definitions, however, are not targeted towards non-profit organisations, and it is unclear whether they can be meaningfully applied to those. And even when criteria exist, these are somewhat arbitrary (Osteryoung & Newman, 1993) and are usually defined for the main purpose of providing useful statistical information about SMEs in a particular country. More importantly in the context of this paper, these criteria often are only proxies at best for those characteristics of SMOs that would allow researchers to distinguish organisations of interest for a specific IS-related research question from those being out of scope. Whether these proxies happen to be useful for a particular IS research question would be something for each research team to answer after they have become aware of the general issue.

To illustrate the general challenge outlined above, in one author's research on enhancing information security in SMOs, small IT service providers would fall well into the common criteria for SMEs mentioned above (so would technically be in-scope). However, small IT service providers could be expected to have ample IT resources and capabilities as part of their core business, and thus an at least reasonable level of information security maturity. Thus, these types of SMOs would be less interesting for the research goal to begin with and thus it would make sense to exclude them from the research scope. Simultaneously, there were enterprises outside the common upper employee boundary for SMEs with over 300 or even over 500 employees (so technically out-of-scope for the research), but these enterprises had hardly anyone with an in-house IT responsibility or competence to speak of. The latter would make these enterprises very much in-scope for the research project, but it is not obvious how common SME characteristics could satisfy an argument for an inclusion into the research scope. This issue is further exacerbated when research spans different countries (see Table 1). The same applied when considering the inclusion of non-profit organisations such as sports clubs or charities.

We are also not aware of extant and sufficiently generic frameworks or other extant guidance on good research practices in this area. For instance, if papers in the field of small business research distinguish different SME types – and many of them do not – they tend to develop domain-specific SME characteristics (e.g., Gélinas & Bigras, 2004; Tetteh & Burn, 2001) without relying on a unified approach to derive these characteristics. Recent IS literature on SMEs simply relies on the EU size classes (Canhoto et al., 2021), chooses a narrow scope (incumbent microbusinesses) suitable for the research topic but without further rationale (Mandviwalla & Flanagan, 2021), or focuses on family-owned enterprises in specific countries, irrespective of enterprise size (Soluk & Kammerlander, 2021). Since SMOs often have scarce IT and digital resources and capabilities there is the danger that such organisations may be left behind on the wrong side of the digital divide (i.e., failing to adapt their business for the digital age). Recent research shows that SMEs are still struggling with their digital transformation (Barann et al., 2019), which is an indicator of a lack of appropriate support for them in this area. However, as outlined above, finding a clear and useful scope for SME- or SMO-specific IS research projects and questions may not be that easy, if the number of employees or revenue does not

have an immediate bearing on the research topic of interest. Moreover, the shortcomings of the traditional SME perspective discussed above also mean that it is at least unclear to which extent IS research findings apply to SMOs or can be useful for them. For instance, SMOs might not have to face the question who shall lead a digital transformation: the CEO, CDO or CIO (Singh & Hess, 2017) since the latter two might not even exist as a formalized role. Moreover, a CEO of an SMO outside the IT industry might have little knowledge about IT and its potential to digitally transform their organisation.

Against this backdrop, we set out to answer the following research question: *How can a useful distinction of organisations of interest for SMO-specific IS research look like?* Having such a clear distinction early in the research process would benefit SMO-specific IS research in two ways: First, the boundary conditions and extent of applicability of the resulting findings could be specified more clearly and right from the outset. Consequently, such research could be of even higher benefit to organisations that often do not have the resources to question or change their ‘digital status quo’ on their own. Second, a clearer delineation of research specific to SMOs (e.g., only to be applicable for particular subtypes) would also allow to question our disciplinary knowledge bases with respect to extant knowledge’s applicability to SMOs (or particular subtypes).

We structure this paper as follows. The second section gives an overview of traditional definitions of SMEs and SMOs and highlights these definitions’ shortcomings for IS research. In the third section, we propose an approach to better scope and tailor IS research in the context of SMOs. The fourth section gives three examples from the authors’ own research: on IS/IT and information security management in SMOs, on digital innovation in SMEs, and on digitalisation in networks of SMEs. The fifth and final section draws a conclusion.

## 2 Traditional SME definitions and their shortcomings

Table 1 shows SME size classifications for the European Union and its member countries and a few selected other countries, based on the relevance for the authors’ research (Australian Bureau of Statistics, 2002; European Commission, 2003; MBIE, 2021).

Note that the United States does not even have a single unified size classification of SMEs (US Census Bureau, 2021). There, SME classifications are determined by employee count and annual receipts, may differ between government agencies (e.g., the U.S. Census Bureau and the U.S. Small Business Administration), and may also vary substantially by industry. As one can see, there is hardly any consensus on SME size classes across different countries and regions.

Size class	Country	Employees	Yearly Turnover	Balance sheet total
<b>Sole proprietor / sole trader</b>	Australia / New Zealand	0		
<b>Micro</b>	European Union	0-9	≤ €2m	≤ €2m
	Australia	1-5		
	New Zealand	1-5		
<b>Small</b>	European Union	10-49	≤ €10m	≤ €10m
	Australia	6-19		
	New Zealand	6-19		
<b>Small-medium</b>	New Zealand	20-49		
<b>Medium</b>	European Union	50-249	≤ €50m	≤ €43m
	Australia	20-149		
	New Zealand	50-99		
<b>Large</b>	European Union	250+	> €50m	> €43m
	Australia	200+		
	New Zealand	100+		

Table 1. Common enterprise size classes in different countries and regions

To complicate matters further, some countries have additional (and peculiar) distinctions in the SMO context. For instance, there is the German ‘Mittelstand’, defined by a dedicated institute – the IfM Bonn

– as a for-profit enterprise where “up to two natural persons or their family members hold (directly or indirectly) at least 50% of the shares of the company [and] these natural persons belong to the management” (IfM, 2021). While there may well be a substantial overlap between SMEs and this Mittelstand definition, the latter has no upper employee count limit and a fair number of large for-profit enterprises in Germany actually belong to the Mittelstand (see also Soluk and Kammerlander (2021), for instance). Simultaneously, owners of small for-profit enterprises can leave the company operation to external managers entirely. Beyond for-profit enterprises, an SMOs context can also include small public sector organisations, non-governmental organisations (NGOs) such as human rights or environmental organisations, and non-profit organisations (NPOs) such as charities and sports clubs. All these types of organisations are usually not included in common SME definition and size classes.

SMEs as well as NGOs / NPOs usually share the same characteristics regarding the lack of resources (e.g., financial and IT expertise), however, and thus face similar challenges in terms of, for instance, digitalisation or information security maturity (Carey-Smith et al., 2007). Simultaneously, SMEs play an important role in most economies worldwide (Ballantine et al., 1998; Falkner & Hiebl, 2015; Parkin et al., 2016). The same applies to NGOs and NPOs (Teegen et al., 2004; Umaphy & Huang, 2015) – which also make additional contributions to society. Hence, dedicating IS research to SMOs (or specific subtypes) is a worthwhile endeavour, especially since these organisations usually lack the resources to ‘help themselves’ to lift their game in the digital space.

However, while there are numerous implications for a given IS research topic that one can infer from the different size classes and types of SMOs outlined above, such implications are often tenuous at best. These size classes are therefore often ill-suited for clearly defining organisations that shall be in-scope or out-of-scope for a given IS research topic and goal in the SMO context. We therefore develop a more fine-grained general approach for scoping SMO research in the next section.

### **3 An approach for scoping research on SMOs in the IS field**

In this section, we propose a general approach to scope SMO-specific research in the IS field, based on criteria that are more useful for a chosen research topic than common criteria such as employee count or yearly turnover. Our approach draws on Busse et al.’s (2017) Type C approach for handling boundary conditions (i.e., exploration under uncertainty whether and which boundary conditions actually apply for a specific context) and makes their general suggestions for handling boundary conditions more actionable in a 6-step approach that is specifically tailored for scoping research on SMOs in the IS field.

We understand scoping as a deliberate positioning of the research in terms of the phenomenon or *topic* of interest, the *context* in which the research takes place and thus the *boundary conditions* that will limit the applicability of the intended and actual research results (Bacharach, 1989; Busse et al., 2017; Whetten, 1989). These research results can comprise one or more of the following: a descriptive conceptualization of a novel phenomenon, an explanatory and/or predictive theory, or a design artefact or theory (Gregor, 2006).

In a nutshell, boundary conditions determine the explanatory, predictive, or prescriptive accuracy or fitness of a theory or artefact for a certain context (Busse et al., 2017). Research results that are applicable to more specific contexts with narrow and well-articulated boundary conditions tend to be more accurate or impactful for the specific context than more generalized but less context-specific research results (Weick, 1979). In addition, especially design-oriented research results are highly context dependent and it is no trivial task to *project* designs that were effective in one particular well-defined context into different particular and equally well-defined contexts (Vom Brocke et al., 2020).

Note that we also distinguish intended and actual research results since scoping may also take place during a research project, i.e., when the participating researchers adjust their focus, scope and direction based on intermediate findings. This could be the case, for instance, when particularly interesting or surprising first results take the research in unexpected, yet fruitful directions. Here we agree with Busse et al.’s (2017) idea behind their dynamic perspective on boundary conditions in that we regard the

exploration of boundary conditions not only as being intertwined with theory (and artefact) development but also as a means for further – in our case, more SMO-specific – theory (and artefact) development.

Applied to the context of SMOs we posit that a carefully delineated SMO context leads to research outcomes with SMO-specific boundary conditions which have a higher accuracy and/or fitness for the SMO context than research that draws on common SMO characteristics or size classes in an unreflected way, or does not even problematise boundary conditions at all during the research. The SMO context can be as wide or narrow as feasible for the chosen research project, based on the topic, goals and the resources available to the researchers.

Note that SMO-specific research does not necessarily mean that the unit of analysis needs to be an organisation. If we interpret Welsh and White's (1982) "a small business is not a little big business" with sufficient latitude, then also group or individual behaviour can differ in SMOs compared to large organisations. The same applies to the design of social and/or technical systems (e.g., management approaches or information systems) for certain SMO contexts.

Against this backdrop, we propose the following approach to properly scope an IS research project for an SMO context:

1. *Formulate general research goals and questions:* As with any scoping of research, the first step is to decide on a high-level IS-related research phenomenon of interest (e.g., IS/IT security management or digital innovation) and subsequent research goals and questions to investigate. At the start of a research project, these goals and questions can be quite vague and will be subject to ongoing refinement throughout the project.
2. *Explicate the relevance and specificity of the research topic, goals and questions for the SMO context in general:* To prepare for a more precise scoping in the subsequent steps, the second step is to highlight why the topic is worth studying specifically in an SMO context and how an SMO-specific focus could conceivably lead to differing research results than for large organisations (or for any, unspecified type of organisation).
3. *Identify characteristics of SMO contexts that are to be in-scope and out-of-scope for the research project:* In the third step, researchers derive characteristics and criteria that are to be as specific as possible about the intended scope for the research. There are several aspects that can be considered for influences on these characteristics, as outlined below in the substeps 3a to 3e. For each substep, possible sources for specific characteristics and criteria can be the research or the practitioner literature as well as the researchers' own field experience.
  - a. *Phenomenon / problem / topic:* The first and most general source for scoping criteria are the phenomenon / problem and the corresponding main research topic(s) themselves. In other words: What are aspects related to an SMO context – in the widest sense – that matter for the phenomenon / problem to occur, or where it can have (or has had) a particular severe impact? What are aspects along the same lines that can be derived from the research topic of interest itself with regards to theoretical and / or practical impacts?
  - b. *Researcher interest / access / feasibility:* A second source is more related to the practicalities of the research project. Are there specific characteristics related to an SMO context based on the researchers' interests to pursue a topic? Do they happen to have convenient access to a specific group of SMOs? Does the population of potentially researchable SMOs have a certain subset that makes it particularly feasible to research instead of a more general sampling strategy?
  - c. *SMO and general organisational characteristics:* A third source for scoping criteria can be general SMO characteristics as discussed in the previous section, as well as other organisational characteristics. Given the very diverse nature of SMOs, it can also make sense to consider the extent or maturity level of specific competences, capabilities, or roles related to the research problem or topic. And perhaps employee count or a for-profit orientation do indeed matter for the research topic and goal in question. But even if they do, maybe different size classes than those outlined in section 2 would be a better fit for the research project?

- d. *Core theories / artefacts*: Another source for the delineation of specific boundary conditions for SMO-specific research are the constructs used by those theories or artefacts that the research will build upon, e.g., for the main research framework. The same also applies to boundary conditions of those theories or artefacts. Which of those constructs or boundary conditions would have specific implications when applied to an SMO context? Are there explicit or implicit assumptions in those core theories or artefacts that either make them specifically applicable or potentially less applicable to the SMO context? The proper execution of this substep requires a deeper exploration of the phenomenon and the topic to be researched than the first three substeps.
- e. *Scenarios for inclusion and exclusion of certain SMO types*: As a final substep, the researchers can use scenarios to verify the comprehensiveness and applicability of their list of scoping criteria. To assess whether the criteria for inclusion or exclusion from the research scope make sense, researchers could write up short organisational 'personas', apply the criteria, and assess whether they lead to inclusion or exclusion in-line with the research goals and their own interests in the project. Similarly, researchers can consider scenarios of edge cases or outlier organisations and assess whether these would be appropriately included or excluded, based on the compiled list of scoping criteria.

After this step, there should be a clear and unambiguous delineation of the research context(s) of interest that would allow e.g., the formulation of a reasonably straightforward sampling strategy. This delineation should also still be in-line with the more general formulation of relevance and specificity in step 2. If not, a second iteration through steps 2 and 3 may be necessary before the actual research commences.

4. *Integrate the chosen scoping criteria into the research design*: After clearly scoping the research, the chosen inclusion criteria should of course also be reflected in the chosen research design. Depending on the nature of the project and the chosen research approach this would mean that the relevant criteria form a key part of the research framework, research model or the design principles and features. Simultaneously, criteria for exclusion should define what remains out of scope for the configuration of the research design. In particular, the chosen inclusion/exclusion criteria may affect the suitability of existing theories, concepts, constructs, or measurements to be (re)used in the research design or research model. Since many theories as well as related research studies (from where existing constructs or measurements may be borrowed for re-use) might not distinguish between different organizational size classes, an un-reflected incorporation into a new SMO-focused research design may lead to validity concerns, especially if the constructs or their underlying theories have – perhaps only implicit – assumptions related to organizational size or similar characteristics. Busse et al. (2017) give two – albeit non-SMO-related – examples in their paper.
5. *Reflect on and possibly adjust the scoping criteria throughout the research project*: If steps 1 to 4 are executed at the very start of a research project, there will be many unknowns about the suitability of the chosen scoping criteria and their implications for the resulting findings. Hence, we recommend to continuously reflect about the chosen scoping criteria and their implications over the course of a research project. In other words, what does the chosen scope make us see or overlook? Similar to theories which can, in the worst case, serve as blinders (Holmström & Truex, 2011), poorly chosen scoping criteria may, for instance, exclude the truly interesting organisations from the sample, or inadvertently lead to a focus on special cases. That the initially chosen scoping criteria may not have been the best ones may only become apparent during the research, however. Therefore, researchers should not be averse to refining these scoping criteria during their research and, in the most extreme case, iterate through steps 1 to 4 all over again and refocus their scope.
6. *Document and reflect on the scoping criteria at the end of the research project*: Along the same lines, the resulting publications should document the chosen scoping criteria and perhaps also the process of choosing and refining them. Also, the implications of the chosen scoping criteria and their incorporation into the research design can (and perhaps should) form an integral part of the discussion and limitations. Choosing a certain focus for the research leads to findings that emphasize

particular SMO types or characteristics. Simultaneously, such a focus also prevents us from taking a different perspective and thus considering other aspects. Such reflections at the end of a research project can thus even lead to a follow-up project which takes a deliberately different stance in order to compensate for potential shortcomings of a chosen perspective.

As a final note, it may well be the case that certain research outcomes are *not* going to be SMO-specific after all. However, this would be part of the *findings* of a research project. These findings would then essentially refute the initial assumptions made in steps 2 and onwards in the proposed approach about an SMO-specific relevance. Such a finding would then be part of the surprising results of the research project, and thus may even be part of the 'storyline' for an eventual research paper.

## 4 Examples for scoping research on SMOs

In this section, we illustrate our six-step approach in three examples for three different areas of IS research, based on the authors' research projects. As a detailed consideration of especially step 3d would require a 'deep dive' into the theoretical foundations of each of the three research fields, we keep our illustrations on a rather high level.

### 4.1 IS/IT management and security management in SMOs

Despite often processing sensitive data (e.g. employee or customer information), most SMOs also do not appreciate the impact of information security risks on their business operations (Dojkovski et al., 2010; Goucher, 2011; Tawileh et al., 2007). Information security maturity in SMOs is generally low (Almeida et al., 2018; Henschel & Heinze, 2016). SMOs have a limited IT budget (Goucher, 2011), which also results in limited access to best practice standards or specialized tools (Falkner & Hiebl, 2015; Hernández et al., 2015; Islam et al., 2006; O'Connor & Coleman, 2009; Sánchez et al., 2010). Moreover, cyberattackers often specifically target SMOs since they are 'softer targets' than larger organisations (Renaud, 2016). Against this backdrop, there are clear indications that SMO-specific research in the area of IS/IT security management (as one subdiscipline of IS/IT management) is indeed a worthy undertaking (step 1).

In an IS/IT management perspective, SMOs usually have scarce IT management resources and capabilities, may rely on 'virtual CIOs' or internal 'involuntary IT managers', and may not even have a single employee with a profound understanding of IT's strategic business potential and the related risks for their organisation (Arendt, 2008; Gupta & Hammond, 2005; Parkin et al., 2016). Often, there is even no dedicated IT department (Cragg et al., 2011). Hence, common IS/IT management research findings may not be applicable to SMOs, thus warranting a more tailored research approach (step 2).

Common SMO criteria such as overall employee count or revenue are not particularly helpful to scope research in these areas, however, as already illustrated in the example in the Introduction. In contrast, a criterion that most probably would matter here is whether an SMO is part of the IT industry and has IS/IT management and security as their core competencies, as one would at least expect a higher level of competency for those SMOs (step 3a). A finding contrary to those expectations would be at least surprising. In contrast, for SMOs in other industries a low competency level in these areas would be less surprising. Since these organisational competencies are ultimately tied to employee competencies (i.e., even external vendor involvement has to be arranged and directed), one key criterion to distinguish different classes of SMOs for IS/IT management and security research can be the number of internal dedicated IT personnel. Closely tied to this criterion would be the extent to which the IS/IT management is formally institutionalised in these organisations (step 3c).

There is also evidence that (IT) risk and security management concepts and frameworks developed for large enterprises cannot be directly applied to SMOs (Arnsfeld et al., 2007) (step 3d), partially due to different corporate and risk structures. For instance, Beranek (2011) reports anecdotal evidence that he failed to implement the same risk analysis framework in SMOs which he implemented successfully three years earlier in large enterprises. Moreover, De Haes et al. (2013) claim that an implementation of COBIT 5 may take several years for SMOs, whereas ISO/IEC 27005 is criticized for its limited SMO-



specific guidance (Klipper, 2015). For an illustration of step 3e (sample scenarios for inclusion or exclusion), please refer to the examples given in the Introduction.

Against this backdrop, Table 2 contains a proposal for a differentiated perspective on different SMO size classes for all contexts where IS/IT management capabilities matter, including IS/IT security management research. The names of the size classes are based on Table 1, and each size class is to represent a 'shift' in the extent to which there are internal employees with IS/IT management competencies. Based on the first author's field experience, these 'shifts' in the extent of available competencies might have implications for the validity or applicability of research results (e.g., does a CIO exist or not?).

Size-class	Characteristics
<b>Micro</b>	Noone in-house really takes care of IT matters
<b>Small</b>	One operational and perhaps one strategic in-house 'involuntary IT manager'
<b>Small-to-medium</b>	IT function with 1-2 employees in a part-time IT role, perhaps shared with other roles
<b>Medium</b>	Dedicated IT function with a part-time or full-time CIO and 2-5 employees (FTE)
<b>Large</b>	Dedicated IT function with a full-time CIO and more than 5 employees (FTE)

Table 2. A proposal for SMO size-classes from an IS/IT management perspective

Due to the varied ways how SMOs may organise their internal IS/IT management, Table 2 does not show straightforward employee numbers, however. Instead, it makes more sense to distinguish strategic and operational IT personnel – who may be working part-time or full-time in their IT roles, or may not even have formal roles and partial full-time equivalents (FTEs) allocated to their IT duties at all. On the micro level, IT matters may be taken care of by external IT consultants (who may, in the extreme case, be a relative or acquaintance with some sort of IT skill instead of an actual professional IT consultant). More institutionalised IS/IT management functions would only come into play in the larger size classes. And as noted in the example in the Introduction already, one author had instances of organisations in their information security research which went beyond common employee size classes, but which simultaneously would also fit quite well into the small or small-to-medium category of Table 2.

A research design to investigate the state of IS/IT (security) management in SMOs could thus, for instance, focus on those SMO-specific (or size class-specific) barriers that prevent the adoption of established IS/IT (security) management best practices (step 4). By focusing on the different size-classes one could then derive specific insights for either each size class or gain insights that turn out to be common for one or more size classes below 'large' (step 5) and would discuss these differences in-depth in the resulting publications (step 6). Another outcome may be to find criteria that are even more well suited to conceptualize relevant SMO size-classes for IS/IT security management research.

## 4.2 Digital Innovation in small and medium enterprises

Innovation can take place in enterprises of all sizes and types, including SMEs, but under potentially different circumstances and constraints than in larger enterprises. Nevertheless, SMEs are still argued to be more innovative than large enterprises (Gibson & Van der Vaart, 2008). Hence, investigating how digital innovations – as one special case of innovation in organisations – take place in the SME context is a worthwhile topic to investigate (step 1).

As with the previous example, however, a delimitation based on quantitative criteria would be far too short-sighted. Thus, meaningful demarcation criteria in the area of innovation cannot be defined using traditional approaches that only look at the number of employees, sales and total assets. Besides, no clear and distinctive quantitative definition of SMEs exists in the field of digital innovation, e.g., due to geographical or institutional differences, or because no formal criteria are applied at all. The same

applies for innovation-specific quantitative criteria such as the number of employees (primarily) involved in innovation, amount of cooperation for innovation and number of innovations per year.

Beyond quantitative criteria, SMEs can also be defined by qualitative criteria such as a limited availability of resources or having financial constraints (Bouncken et al., 2015; Diez, 2002; Lee et al., 2010). Certainly, the field of digital innovation requires a non-negligible investment and enterprises are also exposed to high risks due to failure ratios (step 2). Further, as Medina et al. (2005) identified, enterprises can be characterized regarding innovative capacity by qualitative means such as strategic flexibility, communication and use of IT, strategic alliances, and collaboration agreements. Nevertheless, and as recent research on digital innovation in SMEs points out, there is no consensus on the characteristics classifying digital innovativeness (Ramdani et al., 2021).

Although qualitative criteria for SMEs might still provide a better approximation than solely looking at quantitative criteria in the digital innovation context, their suitability to provide a well-founded SME classification is – besides lacking agreement on the characteristics – also limited due to their vagueness. Moreover, large enterprises can also face financial or other resource constraints for digital innovation, making a clear distinction based on these criteria difficult. Instead, a more nuanced, yet comprehensive consideration and classification scheme combining qualitative and quantitative criteria is required.

First – and in contrast to the previous example – it makes sense for digital innovation research to focus on for-profit SMEs as one key criterion (step 3a). While it is not inconceivable that NPOs would also engage in digital innovation activities, their wholly different nature and risk attitudes would make them hardly comparable to digitally innovating regular for-profit enterprises (step 3b). The largest differentiator between private and public innovation is the extent to which NPOs are influenced by politics (Bozeman & Bretschneider, 1994) and the special requirements for public institutions such as trust and security which also result from the special perception by the public.

As research from other contexts shows (e.g., Mangiapane & Bender, 2020; Stelzl et al., 2020), maturity levels can help to provide a context-related classification of SMEs and enterprises in general (step 3c). In a nutshell, maturity levels draw on quantitative and qualitative criteria in order to define different maturity stages of enterprise capabilities in each field of interest which build upon one another (step 3d). As research demonstrates, maturity models can be unidimensional and thus generalizing (e.g., HIMSS, 2017) or multidimensional (e.g., Stelzl et al., 2020) and thus, more specific.

Hence, it makes sense to classify SMEs based on maturity levels with respect to the different facets of their innovative capacity and innovation-specific areas, while the approach includes large enterprises as well (see Table 3).

<b>Maturity-level</b>	<b>Description</b>
<b>Novice</b>	Enterprises without prior or particular experience in the field of digital innovation and no deliberate action taken.
<b>Advanced</b>	Enterprises with a minor understanding of digital innovation as well as action taken on a rudimentary scale.
<b>Competent</b>	Enterprises that have built competencies and competences in some areas of digital innovation regarding methods and practical experience.
<b>Proficient</b>	Enterprises that have a comprehensive understanding of digital innovation and significant practical experience.
<b>Expert</b>	Enterprises that have extensive practical experience, well-established structures, and an enterprise environment conducive to digital innovation.

Table 3. An approach for maturity levels from a digital innovation perspective

We propose five maturity levels, ranging from *Novice* at the lower end to *Expert* at the upper end, that allow enterprises to be classified based on digital innovation criteria. Due to many qualitative criteria in the literature that can be used to classify digital innovativeness in SMEs and the missing consensus on determinants, the definition of the maturity levels is based on the idea of presenting an assessment of the overall state regarding innovative strength focusing on methodological competences and practical

experience of enterprises (step 4). Here, of course, the challenge arises to find good measurement constructs to clearly ‘sort’ SMEs into a particular size class.

Now, adding a traditional size-related classification as mentioned in Section 2 as a second, orthogonal criterion in addition to the maturity level enables well-founded informative assessments of an enterprise’s innovative capability within a size class and, in comparison, among the size classes (Figure 1). This is particularly of value as the short descriptions of typical enterprises at each of the four corners of the resulting matrix in Figure 1 indicate how diverse categorizations across size classes and maturity levels can be.

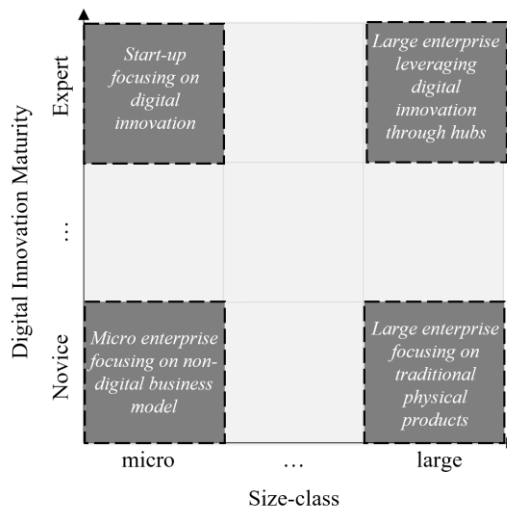


Figure 1. A multidimensional classification scheme for enterprises in the digital innovation context

Micro enterprises focusing on non-digital business models likely have few touchpoints either regarding methodological competencies or practical experience within digital innovation (novice & micro). At the other end of the micro spectrum, digital start-ups can have a high level of innovative strength and expertise even though they may start with limited personnel and finances (expert & micro). In contrast, enterprises from traditional industries may well show that they are still innovation naives rather than innovation natives if their focus is primarily on familiar physical products (novice & large). Nevertheless, large enterprises can be also digital innovation-driven by, for instance, providing innovation hubs to accelerate their innovation competencies and practical experience (expert & large) (step 3e).

Drawing on the proposed scheme, a distinction that research could focus on are differences among the size classes within the same maturity level. Assuming that micro-sized enterprises can be as digitally innovative as large enterprises, their digital innovation output might still differ greatly due to varying resource allocations (step 4). Further, defining suitable success factors from research or practice to determine the innovative strength of enterprises underlying the proposed categorization based on methodological competencies and practical experience could support a more accurate classification (step 5). Thereby the proposed scheme encourages to add further examples derived from literature and practice that can be classified within the scheme or are exceptions to the scheme and encourages further refinement (step 6).

### 4.3 Digitalisation in networks of small and medium enterprises

Digitalisation in SMEs is another area that is still heavily under-researched. Interestingly, the few studies in this context do not come to a homogeneous conclusion. On the one hand, SMEs are described as being particularly dynamic digital transformers without internal inertia due to their size, and on the other hand, they are described as being so limited in digital and relational resources and capabilities due to their size that independent transformation is not possible without help (Li et al., 2018; Mandviwalla &

Flanagan, 2021). Thus, studying the digitalisation of SMEs to understand how this phenomenon unfolds in this specific context is an important research objective (step 1).

The digital transformation phenomenon differs between SMEs and small NGOs/NPOs, however. While for-profit organisations primarily focus on improving their business and market position (Westerman et al., 2014), NGOs/NPOs often focus on citizen satisfaction or primarily internal objectives in their digitalisation endeavours instead (Mergel et al., 2019). Therefore, in this case, it makes sense to narrow down the investigation to either SMEs or small NGOs/NPOs right from the start. The following example focuses on SMEs.

One factor that can explain such heterogeneous observations of the digitalisation phenomenon in the SME context is the varying position of the enterprises in a business network. Business networks are defined as loosely coupled, flexible, and evolving systems that span more than two actors that engage in relationships to exchange services to achieve a (business) objective (Halinen & Törnroos, 2005). Due to the resource limitations of SMEs, they are often reliant on the formation of networks from which they can acquire lacking capabilities, knowledge, and other resources (Montoro-Sanchez et al., 2018).

Digitalisation processes cross the boundaries between enterprises (Vial, 2019). Thus, it makes sense to consider the digitalisation of SMEs at the network level due to their close interconnectedness. Consequently, it can be assumed that digitalisation in networked SMEs actually has different characteristics than in large enterprises and should be studied separately (steps 2 and 3a). In such a network setting, the researcher must consider the enterprise's positioning in the network, meaning the relationship structure, role, and strength of the enterprise (Halinen & Törnroos, 2005). Therefore, a reasonable classification according to network positions would be little networked enterprises (weak) or focal enterprises (dominant) and further highly networked business-to-business (B2B) (upstream) or business-to-customer (B2C) (downstream) enterprises. This exemplary scoping approach for investigating the digitalisation of SMEs is shown in Table 4.

Network position	Description	Size Assumption
<b>Little networked (B2B or B2C)</b>	The enterprise has limited suppliers and customers and is a member of a small number of networks.	Micro to small
<b>Highly networked B2B</b>	The enterprise is strongly networked with suppliers and business customers and is a member of numerous networks.	Small to medium
<b>Highly networked B2C</b>	The enterprise is strongly networked with suppliers and customers and is a member of numerous networks.	Medium to large
<b>Focal position (B2B or B2C)</b>	The enterprise is the focal actor in the network. The surrounding networks of suppliers and customers are dominated.	Large

Table 4. SME scoping from a business network digitalisation perspective

In general, smaller enterprises tend to be highly connected in B2B networks, while larger enterprises are often further down the supply chain and maintain large networks with B2C relationships (Hauser, 2021). As SMEs are inclined to operate in B2B networks, such networks might be easier to access than less common constellations (step 3b). Depending on the degree of connectedness to be considered in the digitalisation research, very small or medium SMEs are preferable to be sampled (step 3c). Furthermore, very large enterprises appear as dominant and very small ones as weak actors in networks (Ngugi et al., 2010). This circumstance is particularly relevant when examining digitalisation and transformation processes in the SME context. While technology diffusion in the network can be assumed for focal actors (Skog et al., 2018), tightly networked enterprises of equal strength must negotiate technical changes, and very small enterprises might be even overwhelmed by requirements imposed on them by larger enterprises (Ngugi et al., 2010). As a result, the transaction cost theory, for example, could be an important theoretical basis for the digitalisation of networked SMEs rather than technology diffusion. By contrast, enterprises that benefit from technology diffusion due to their technological advantage despite their small size could be excluded from the theoretical sampling (step 3d).

So, in a way, enterprise size is associated with this grouping of SMEs, but only to the extent that enterprises of certain sizes are more likely to be in certain network positions. However, this assumption

is not strong enough to solely base the sampling strategy of one's research on enterprise size, hence the choice of network position as the primary scoping criterion. To illustrate this, a machine builder with 143 employees who collaborates closely with many other machine builders to supply components to large industrial enterprises would be a likely candidate for inclusion. In contrast, a small 16 employee technology startup that revolutionizes the market with a new invention would be a candidate for exclusion if a collective digitalisation process of SMEs is to be considered (step 3e).

Based on the illustrated scoping approach, different research avenues emerge. For instance, a researcher who intends to study the dynamic transformational abilities of SMEs should consider looking at weakly networked enterprises of relatively small size. Whereas a researcher who intends to study the critical network and relational capabilities in SME digitalisation should sample highly networked, B2B enterprises of small to medium size. The scoping criteria thus directly influence the research design and might, for example, lead to a theoretical sampling in which a set of 4-6 B2B network SMEs are studied as a single case study in order to investigate the transformation process in depth (Halinen & Törnroos, 2005; Yin, 2018) (step 4). A prerequisite for this sampling process would be to define clear criteria for measuring the network position as little or highly networked or as occupying a focal position.

Moreover, these scoping criteria might change in the course of the research project if, for example, certain B2C partner SMEs in the case under investigation play such a vital role in the transformation process that they have to be included (step 5). The resulting research design and theoretical scoping considerations for the case under investigation should be transparent when communicating the research findings (step 6) in order to highlight the relevance of the theoretical contribution for the SME context.

## **5 Discussion and conclusion**

In this paper, we proposed an approach to scope IS research in the SMO context, based on a nuanced consideration of important aspects for the chosen research topic and goals. We further illustrated how applying the steps of the proposed approach together with different ways of scoping can lead to inclusion or exclusion criteria that are considerably more useful to scope SMOs for certain research topics than common general criteria such as overall employee count or turnover. The examples also illustrate the range of possible scoping approaches: from size classes depending on a single key enterprise characteristic over a two-dimensional matrix with maturity as a second criterion in addition to enterprise size, to the nature of an SMO's position in a business network as key criterion, with size considerations being a secondary concern. Especially the latter two examples also highlight how specific research avenues can emerge from a nuanced scoping of the relevant landscape of organisations.

Our approach thus is a contribution to the IS research method base that supports configuring IS research designs for the most common type of organisation in many countries. Our approach can help raise the initial awareness for the issue of scoping SMOs among the research team and then provide specific guidance for an explicit scoping exercise at the beginning (and potentially throughout) the research endeavour. Moreover, beyond the traditional focus on for-profit enterprises, our approach is also open to include non-profit organisations (as illustrated in the first example), and makes such an inclusion (or exclusion) an explicit part of the scoping criteria. Our approach is also independent of IS research topics or goals, and is applicable everywhere where organisational size or related characteristics may affect the research topic. Moreover, the issue may well be not exclusive to IS research and thus be 'imported' from other disciplines whenever IS research borrows concepts and theories from other disciplines.

Despite being the most common type of organisation in many countries, SMOs are understudied in IS research. Since "a small business is not a little big business" (Welsh & White, 1982), at least a fair number of SMOs may also lie outside the boundary conditions of many IS research outcomes, which often assume large enterprises and common features (e.g. resources or governance structures) of such large enterprises. Moreover, this common focus on larger enterprises is usually not explicitly acknowledged in IS research and thus taken for granted. Our experience in various SMO contexts shows that SMOs are much less unified in nature compared to many types of large enterprises (e.g., banks) which – on a high abstraction level at least – are often quite alike in comparison. Hence, we believe that explicit attention to careful scoping early on (and during) research in the SMO context is well warranted

in order to advance knowledge in the IS field further. Here, our proposed approach can give some guidance especially to researchers who enter the SMO context for the first time.

Applying our approach to scope IS research (steps 1 to 3), tailor research designs to SMOs (step 4) and conduct reflections where appropriate (steps 5 and 6) can lead to research outcomes that are less generalised but more accurate or of a higher fitness and thus more useful for researchers and practitioners in the SMO context alike. In other words, the approach makes a deliberate trade-off between generalisability, simplicity and accuracy in favour of the latter two. But since achieving all three is hardly possible in research in general (Busse et al., 2017; Weick, 1979), we posit that such a deliberate choice leads to more accurate and/or useful research outcomes for the SMO context.

Furthermore, our approach has implications for comparing research studies and conducting meta-analyses if the research topics in question may depend on organisational size or similar characteristics. If relevant to the goal of the respective analyses, comparisons or meta-analyses should therefore consider if and to which extent the analysed papers take size-related characteristics into account when scoping and discussing their findings. Because even if they did, the understandings of ‘small’ and ‘medium’ may actually differ across different studies, for instance. As an example, Soluk and Kammerlander (2021) relied mainly on papers covering SMEs for building their theoretical base, but have simultaneously included large family-owned Mittelstand firms (up to 20,000 employees) in their empirical sample.

In a practical perspective, producing research outcomes that are specifically tailored to organisations that may not have ample resources at their disposal to ‘help themselves’ can also have a positive impact on society. This is especially the case since the vast majority of organisations in many countries are SMOs. And since it is reasonable to assume that SMOs outside the ‘digital sphere’ and the IT industry have a rather low digital maturity, these organisations are yet to harness substantial digitalisation potentials. Research tailored specifically to SMOs who otherwise might be in danger of ending up on the wrong side of the ‘digital divide’ can therefore help these organisations keeping pace in the digital age. Here, we see the potential to conduct research in the traditional sense, but also research explicitly aimed at exploring the effective boundary conditions of extant knowledge for specific SMO contexts, and potentially adapting that extant knowledge for use in these SMO contexts.

Of course our research is not without limitations. First, the proposed approach has not yet seen widespread use, so we cannot claim a high level of confidence in its viability and fitness for purpose. Second, space restrictions in this paper prevented us from illustrating the steps of the approach in greater detail, since especially a careful consideration of the implications of the boundary conditions of the theories used for the respective research frameworks would require quite a bit of space in each of the three subsections 4.1 to 4.3. Moreover, boundary conditions are almost always necessarily fuzzy (Busse et al., 2017), and when applying the approach we would actively discourage trying to be ‘overly precise’ in terms of the formulation of inclusion and exclusion criteria, since especially the initial set of criteria may prove not to be the most suitable. Here, the reflection activities in steps 5 and 6 can act as a counterbalance to the necessary imprecision and possible unsuitability of a given set of scoping criteria. In the worst case, researchers may need to iterate once more through steps 1 to 3 if they find that their initial scoping criteria were indeed unsuitable for the current state of the SMOs in their sample. Furthermore, due to space restrictions, we could only outline the high level implications for the definition of core concepts and the development (or re-use) of related constructs and measurements. Lastly, our examples currently scope SMOs based on one or two criteria. It may be the case, however, that different topics would benefit from developing a multidimensional space based on several criteria to include or exclude certain SMO classes. Future research can explore how such multidimensional scoping spaces can look like and what implications would be for the research design and outcomes.

We would like to end this paper with a request to you as a reader: Even if your own research happens to focus on large enterprises, and does so with good reason: we hope that we managed to convey the benefits to consider whether and to which extent your own research would be applicable in the SMO contexts as well – and if yes, to which subtypes. And maybe there are even one or more useful research questions in this space waiting to be discovered by you?

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