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Vorwort des Herausgebers

13. Journal für Facility Management: Wissenschaft trifft Praxis

13 ist eine Zahl, der einige Menschen aus dem Weg gehen. In den meisten Flugzeugen gibt es beispielsweise keine Reihe 13 oder in Wohnhäusern keine Tür 13. Wir aber freuen uns über die Tradition, die wir damit demonstrieren können. Und wir entwickeln uns weiter: Mit dieser Ausgabe gibt es das Journal nicht nur in Papierform sondern auch digital. Wir verwenden nun das reposiTUm - das TU Wien Repository als online Publikationsplattform. Dort können Sie ab sofort online alle Ausgaben kostenlos nachlesen und sich neue Anregungen für Ihre tägliche Arbeit holen. Für uns Wissenschaftler ist aber noch etwas wesentlich. Das Journal gewinnt dadurch stark an Verbreitung, weil es mehr Leser anspricht und unter anderem über die wichtigsten Suchmaschinen gefunden werden kann. Somit steigt auch die Häufigkeit, mit der Artikel zitiert werden, ein wesentlicher Umstand für uns Forscher. Wir gehen noch einen Schritt weiter: Wir etablieren neben dem Scientific Commitee, das weiter die Beträge reviewen wird, ein Editorial Board, das die Strategie und die Qualitätssicherung vorgeben wird. Es ist uns gelungen zwei führende Wissenschaftler aus dem Bereich Wirtschaft als Editorial Board zu gewinnen, Prof. Jörg Becker von der Westfälischen Wilhelmsuniversität Münster und Prof. Wolfgang Janko von der Wirtschaftsuniversität Wien. Sie sind nicht nur Experten im Bereich Wirtschaftsinformatik sondern auch im Bereich Digitalisierung, Automatisierung, Industrie 4.0 etc., also wesentlichen Themen, die die Zukunft von Immobilienerrichtung, Betrieb und Nutzung prägen werden. Sie werden mir helfen, den nächsten Qualitätsschritt für das Journal vor zu bereiten. Wir bewerben uns gerade um die Aufnahme im DOAJ Directory of Open Access Journals. Das ist dann ein weiterer Beweis für die wissenschaftliche Qualität und die herausragenden Publikationen die von Ihnen eingereicht wurden und in diesem Journal publiziert werden.

Ich möchte mich an dieser Stelle auch bei allen Wissenschaftlern bedanken, die dies durch ihren Einsatz und ihre qualitativ hochwertigen Einreichungen ermöglicht haben. Ohne SIE wäre das nicht möglich. Bitte unterstützen Sie uns weiter so. Gemeinsam können wir durch das Journal noch mehr auf die Bedeutung des Bereichs Immobilien und Facility Management und auf die ausgezeichnete Forschung, die es international gibt, hinweisen und unseren Ruf als das wissenschaftliche Journal für Forschung im Bereich Immobilien und Facility Management verbreiten.

Aber nun zu den Inhalten: Der erste Beitrag zeigt wie wichtig Prozessmanagement und IT Support im Bereich FM im Gesundheitswesen ist. Dieser Beitrag zeigt auch wie wegweisend es ist, zwei führende Wissenschaftler aus dem Bereich Wirtschaftsinformatik in das Editorial Board auf zu nehmen, die sich schon seit Jahren mit diesem Thema in unterschiedlichen Bereichen beschäftigen. Der zweite Beitrag analysiert die Bedeutung von FM bei KMUs. Seit 2006 gibt es Studien zum Bedarf bei großen Unternehmen und wie sie den Bereich FM gestalten. Dieses Paper erhebt die Anforderungen bei kleinen und mittleren Unternehmen und kommt zu interessanten neuen Aussagen, die vor allem für die Anbieter neue Perspektiven eröffnen. Im nächsten Betrag wird kritisch hinterfragt, in welchen Bereichen bei einer reinen Raumbedarfsplanung auf Basis der Anzahl der Mitarbeiter Defizite auftreten und welche „qualitativen Kriterien“ die Nutzerbedürfnisse abbilden und das Ergebnis optimieren. Der letzte Beitrag beschäftigt sich mit Lärm im Büroumfeld, wer betroffen ist, welche Einflüsse es auf Wohlbefinden und Leistung hat, sowie welche Lösungsansätze es gibt.

Diese wissenschaftlichen Beiträge in der aktuellen Ausgabe des IFM Journals zeigen wieder fundierte Ansätze zu aktuellen Themen aus dem Bereich RE und FM aus der Sicht der Wissenschaft. Die sich jedoch leicht in der Praxis umsetzen lassen und ggf. sogar neue Geschäftsfelder eröffnen.

An dieser Stelle möchte ich mich bei den Forschern aus aller Welt bedanken, die einen Beitrag eingereicht haben. Mein Dank gilt aber auch meinen Kollegen vom Scientific Committee. Sie haben in einem Double Blind Review-Verfahren zuerst die Abstracts und dann die Papers begutachtet und den Forschern mit Anregungen geholfen. Die hohe Ablehnungsquote, die namhaften Mitglieder des Komitees und der damit vertretenen Universitäten, sowie das beschriebene Verfahren machen die Beiträge zu fundierten Ansätzen für praktische Projekte in den oben genannten Bereichen.

Zudem möchte ich mich auch bei meinem Team bedanken, vor allem bei Frau Mag. Barbara Gatscher und DI Christine Hax, ohne deren großen Einsatz das Journal für Facility Management nicht in dieser Form vorliegen könnte.

Mit freundlichen Grüßen aus Wien wünsche ich Ihnen wieder viel Vergnügen bei dieser Lektüre und freue mich schon auf zahlreiche Einreichungen zum 10. IFM-Kongress 2017.

Ihr
Alexander Redlein
Head of Editorial Board

Für meine Familie vor allem Barbara
Caroline Sidonie und Alexander David

Scientific Committee

Herausgeber

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Organisation

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Vielen Dank an alle KollegInnen des IFM für die Mithilfe bei der Organisation!

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Wissenschaft trifft Praxis I:

Value Added und Betriebsoptimierung

How FM can enable the increasing need for process orientation in hospitals

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Abstract

Hospitals are facing the challenge to operate in a more process-orientated manner in order to improve efficiency and transparency as well as to reduce costs. This also includes the area of Facility Management [FM]. This situation presents a great opportunity to look at the interfaces between the medical core business and the non-medical support services, and to establish FM as a holistic process supporter instead of a sole provider of single services. In order to handle the numerous interactions between the different professions and requirements within the complex hospital context, specific process visualization and simulation tools and methods will have to be developed. To achieve a characterization of different processes, a model for FM in Healthcare [HC] processes in the entire hospital process context is presented. Following the Design Science Research [DSR] principles, an iterative approach combining explorative elements with empirical qualitative expert-interviews was applied. The findings show that FM in HC needs to intensify the characterization of processes, the systematic collection of (process) data, the openness towards IT and the interdisciplinary dialogue between the medical, non-medical and strategic processes in hospitals in order to accommodate the increasing need for process orientation in hospitals.

Keywords: FM in Healthcare, (Sub-)Processes, Process Visualizations, Process Simulations

1. Starting Position and State Of The Art / Introduction

Hospitals are currently facing several challenges. One of the most important ones is cost pressure and consequently the need for more efficiency, transparency and interdisciplinary cooperation (Kriegel, 2012; Busse, 2009; Angerer et al., 2012). Other industries that faced similar challenges earlier, overcame the situation by applying business process engineering penetrating the whole business and thus using synergies. Hospitals have recognized the issue to some extent, but so far, the process engineering approach has not or only partially been applied in healthcare, mainly because of a lack of process culture in the past, historical dominance of medical aspects refusing to include the non-medical aspects, silo thinking mentality within the many disciplines, a lack of service orientation and a fear of losing status by making processes transparent (Angerer et al., 2012; Salfeld et al., 2009; Bornewasser, 2013; Kriegel, 2012; Fischlein & Pfänder, 2008).

Nevertheless, hospital process standardization and simulation has been done in several medical areas. One approach towards standardization and process-orientation in hospitals is the implementation of clinical pathways, a definition of procedures of treatments including resources and competencies (Schlieter, 2012; Richter, 2008; Salfeld et al., 2009). However, clinical pathways have so far not been applied by all medical staff; they only comprise medical procedures and are mostly not combined amongst each other (Gadatsch, 2013). In addition, it has not been reported that non-medical aspects as suggested by Gerber (2014) have been further considered so far. With regard to FM process modeling, several approaches have been published (e. g. Fleischmann, 2007; GEFMA 230:2008; Krämer et al., 2013; SN EN 15221-5:2011) but so far the specific context of Facility Management in Healthcare (FM in HC) has not yet been factored in. In terms of simulation, numerous projects for specific areas within a hospital like simulating physical patient flows (Kumar, 2011), patient scheduling (Herrler, 2007), simulation of specific patient processes like admission and discharge (Kim, 2013) or optimizing emergency care processes (Shim & Kumar, 2010) have been reported. However, the approaches were conducted in an isolated manner and for the most part, focusing on specific medical topics. Holistic process engineering or visualization comprising the hospital in its whole complexity of medical core processes and care, the strategic management and their support processes as well as the non-medical support processes (FM) and/or FM process modelling in the specific context of FM in HC have not yet been developed.

Other reasons in addition to the lack of process orientation in hospitals mentioned above

might be a) that the complexity of the whole context necessitates different approaches taking into consideration different working cultures and unifying them on common level and b) the dynamism of the only partially plannable patient processes occurring in the hospital context. In terms of changing the process culture in hospitals, Angerer et al (2012) suggest starting by specific projects visualizing selected processes before developing them further. This is what this article does in a systematic way.

1. Theoretical Background

2. 2.1 Process visualization and process modeling

The importance of visualizing and modeling data and processes has been examined in different contexts (e.g. Eppler & Platts, 2009; Stachowiak, 1983). Sampson (2012) has shown that it is not only possible to model physical processes such as manufacturing, but also service processes. Different tools have been presented:

- *Flowcharting* tools like Event-driven Process Chains (EPCs), for interaction of entities and networks (Sampson, 2012)
- *Supply Chain diagrams*, linear process visualization for clarifying relationships between process stakeholders, but neglecting the inclusion of actions between the entities (Sampson, 2012)
- *Business Blueprints* for dynamic core and support processes, distinguishing between process steps that can be seen by the customer ("above the line of visibility") and those that are done behind the visibility of the customer (Shostack, 1984; Bitner et al, 2007; von Felten, D. et al. 2012)
- *Process Chain Network Diagram* (PCN), a further development differentiating between direct interaction, surrogate interaction and independent processing, and adding the nature of interaction, depicting all entities and allowing network representation (Sampson, 2012).

Within the hospital context, flowcharting and supply chain diagrams can, as in other industries, be used to depict and (re)engineer specific processes, but they are not made for investigating connections and synergies between different disciplines. Business Blueprinting and Process Chain Network Diagramming make it possible to show connections and to differentiate between different kinds of processes; they are, however, limited to a two-dimensional view, which do not comprehensibly illustrate the effect of simultaneous processes below the line of visibility of the patient – as it is mostly the case for Facility Management in Healthcare [FM in HC].

2.2 Process simulation

One possibility to investigate internal interactions and interdependencies of complex systems and sub-systems is computer-based simulation (Banks & Nelson, 2014; Perros, 2009). According to Banks and Nelson (2014) simulations offer the advantage that processes and procedures can be investigated without disturbing the operational processes and that the demonstration of scenarios help in visualizing and thus communicating between disciplines - both very crucial topics in the hospital context. On the other hand, it has to be taken into account, that it might be difficult to interpret simulation outputs and that simulation needs expert knowledge of different areas and can thus be time consuming and expensive (Banks & Nelson, 2014). It is therefore very important to formulate the problem well, to define the requirements of variables (exogenous, endogenous) and outputs (tables, graphics, movements) and to choose the appropriate conceptualization (static, dynamic, deterministic, stochastic) and depiction level of the model (Banks & Nelson, 2014; Perros, 2009; Herrler, 2007).

In the past, Sharma et al. (2007) presented a specific FM in HC simulation approach in the context for maintenance service management in hospitals in terms of resource allocation and impact measuring. Even though the authors had declared that the model could be applied in other areas, no continuation of the project was reported.

3. Research Objectives and Research Question(s)

In different research and development contexts of the authors, FM in HC experts had mentioned the need for different kinds of process visualizations or simulations in order to improve efficiency and reduce wastage of resources. For example:

- on an operational level, to reduce food waste and unnecessary overtime when preparing food, having real-time data about medical patient processes and scheduling
- on a tactical level, to visualize impacts and having managerial decision support upon deciding between different kinds of cost cutting measures (e.g. the trade-off between reducing staff or quality of service)
- on a strategic level, to have different scenarios of different investment and maintenance strategies with the according simulation of figures over the life cycle

The research objective of this paper is therefore to find existing or new possibilities as to how to distinguish between different categories of processes delivered in a hospital where FM takes part, to gain understanding of current interdependencies and to develop a basis for

further development improving process visualization and simulation. The explicit research question thus derived is: How can FM contribute to the increasing need for process orientation in hospitals?

4. Research Design

As the goal of this article is to set up a (reference) model as a visualization basis, the methodology of Design Science Research (DSR) according to Hevner et al. (2004), Hevner and Chatterjee (2014), Peffers et al. (2007) and Vaishnavi and Kuechler (2008) was applied. Based on the DSR principle illustrated in Figure 1, an iterative approach combining explorative elements and qualitative semi-standardized expert interviews was chosen.

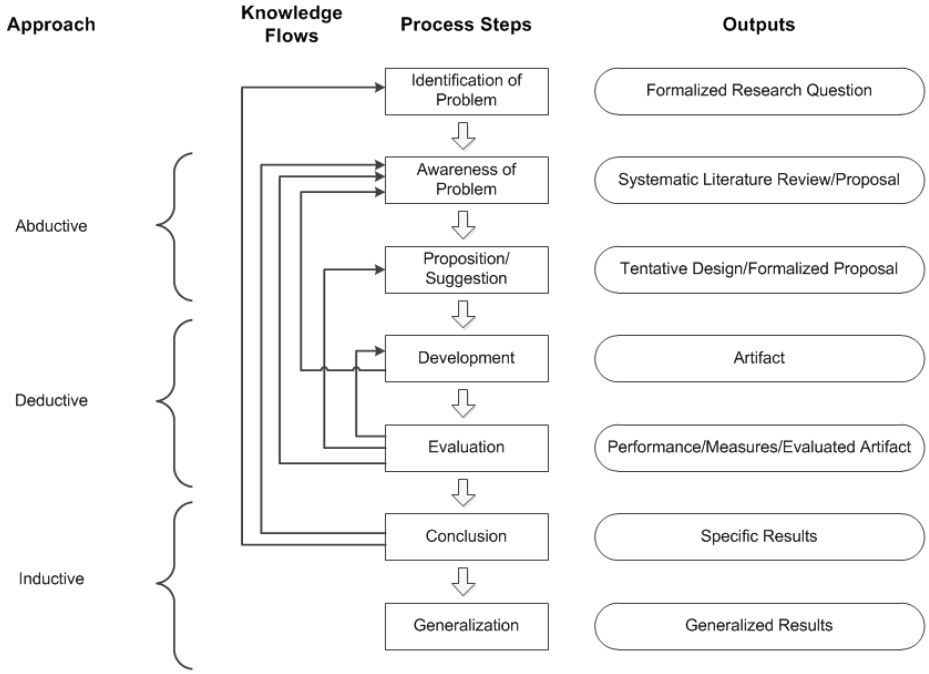

Figure 1: The general methodology of design science (based on Vaishnavi & Kuechler, 2008 and Dresch et al., 2015)

The *Identification of the Problem* and formulating the *Research Question* was derived from on-going research and development projects and previous publications. The *Awareness of the Problem* was underpinned by an extensive *Literature Review* on the subjects of process modelling and process simulation in general and in the (FM in) HC context. As a *Proposition*, modelling was suggested as a *Tentative Design.* In the *Development* phase, the model as an *Artifact* was developed in a concurrent exploratory nature combining design and empirical principles according to Huysmans & Verelst (2012) – to present the development and the model itself is the main goal of this article (compare Chapters 5 and 6). The continuation of the further development is two-fold: On the one hand, the model has to go through an

Evaluation by observations of the various FM processes, by investigating the connections amongst the different processes and their impacts with FM in HC and process specialists, and by consulting simulation experts to define the technical requirements before final *Conclusion* and *Generalization* can occur. On the other hand, the detection of different FM in HC process levels raised more specific *Awareness of more Problems* and will thus lead to more iterations (illustrated by the upward directed arrows in Figure 1).

1.1 5. Development of the Artifact

As mentioned above, in order to answer the research question, setting up a model as an artifact was chosen.

5.1 Conceptual Bases

The conceptual bases for developing the model is the Overall Layout of Service Levels in Hospitals shown in Figure 2, the Service Allocation Model for non-medical Support Services in Hospitals [LemoS] (Gerber, 2016) as depicted in Figure 3 and the Service Catalogue for non-medical Support Services in Hospitals [LekaS] (Gerber & Läuppi, 2015).

For setting up the model, the generally accepted modelling principles promoted by Schütte (1998) and Becker et al. (1998) were applied.

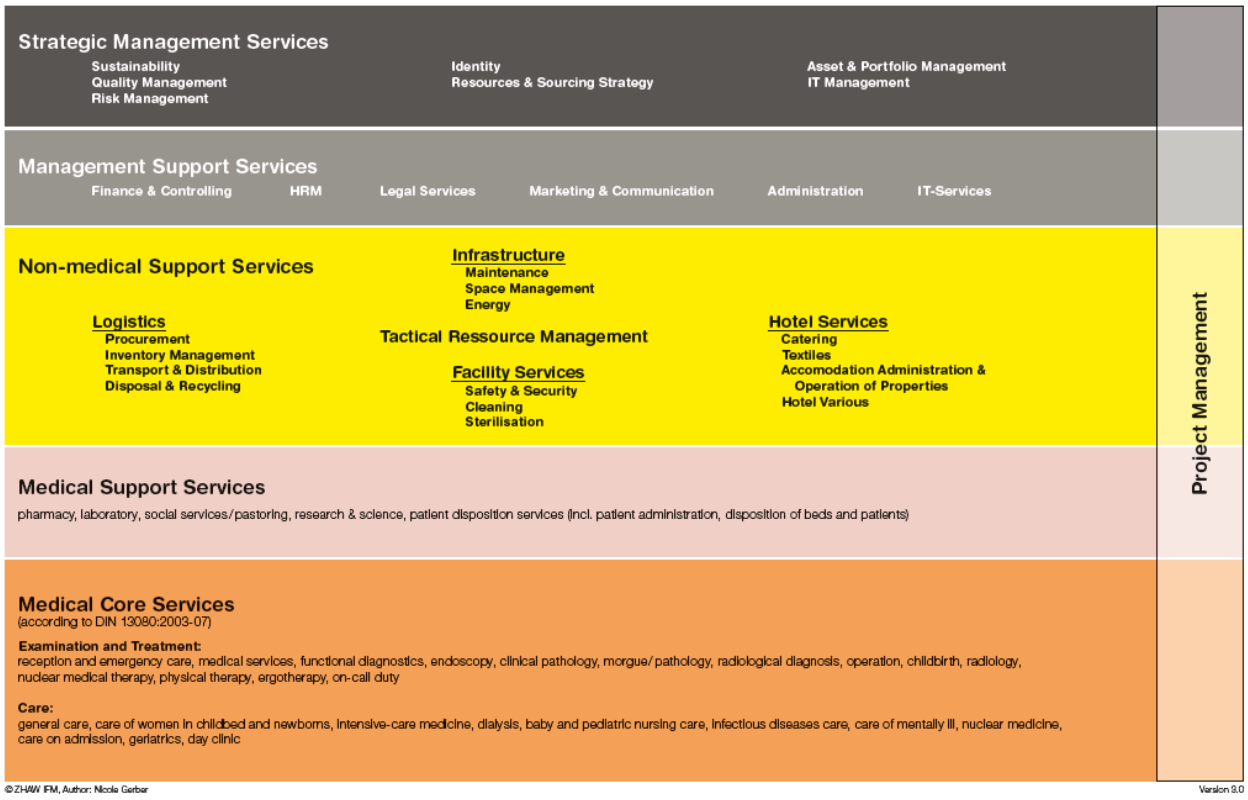

Figure 2: Overall Layout of Service Levels in Hospitals (Gerber, 2016)

Figure 3: Service Allocation Model [LemoS] (Gerber, 2016)

5.2 Categorization of processes

For the first step of process categorization, the distinction between the Medical Services (orange), the Non-medical Support Services (yellow) and the Strategic Management Services (grey) as depicted in Figure 2 were considered. Focusing on the FM processes and comparing those levels by Gerber (2016) with the level distinction of direct interaction, surrogate interaction and independent processing by Sampson (2012), the following parallels could be found:

- *Level of direct interaction* in the FM in HC context means FM *involvement in the medical process and/or FM processes with a direct contact with the patients* – here an allocation of request by a specific order placer or area is possible and thus an exact allocation of cost
- *Surrogate interaction* in the hospital context means FM *involvement in the operational and tactical hospital process overall* – here no single/specific allocation of request can be done; the processes are executed for the hospital as a whole and the cost can only be allocated by apportionment
- *Independent processing* in the FM in HC context means *strategic management processes* – here again, no single/specific allocation of request can be done therefore cost can only be allocated by apportionment

In a second step, all the services and their processes defined in LekaS (Gerber & Läuppi, 2015) could be assigned to the above mentioned levels depicted in Figure 4.

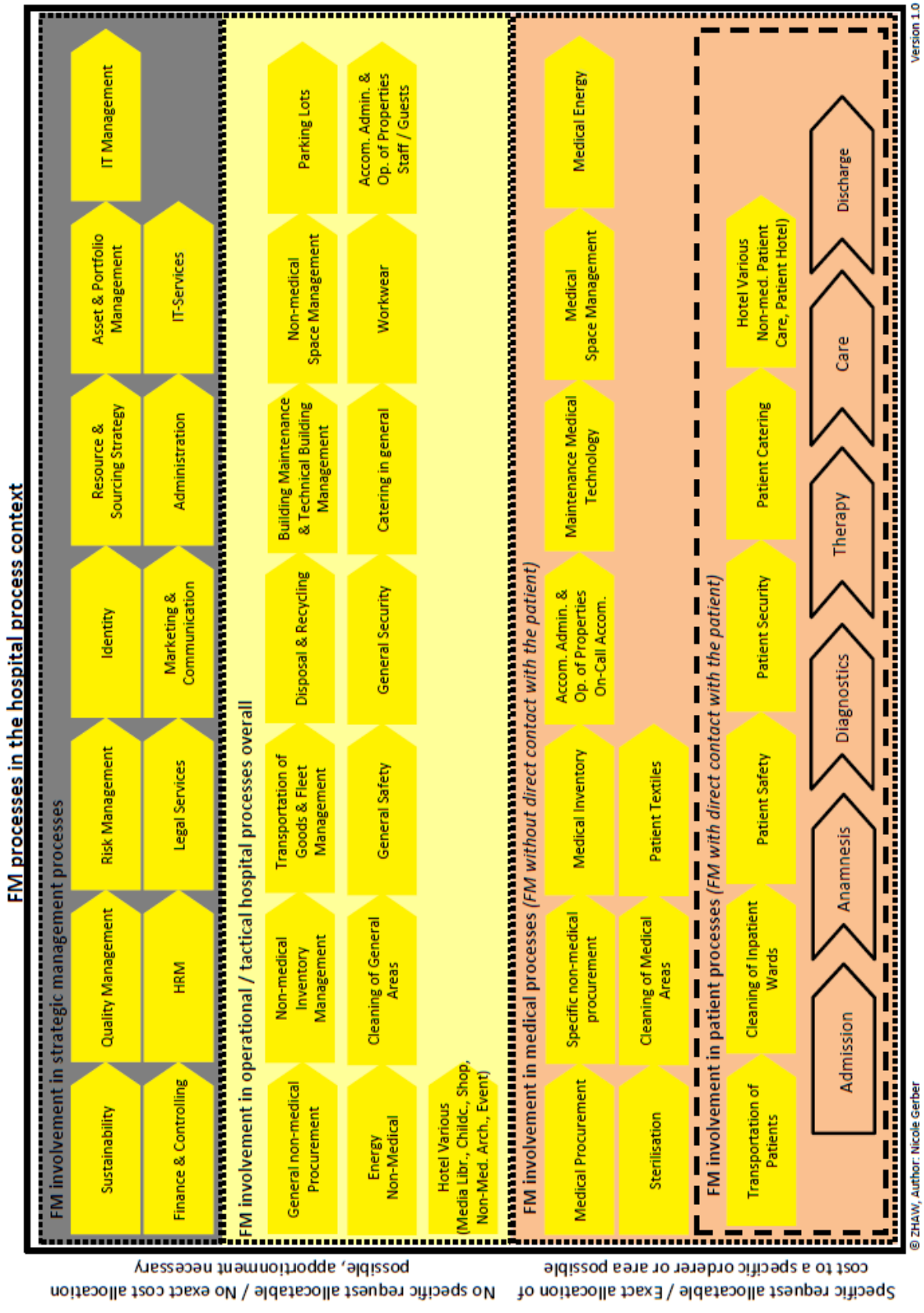

Figure 4: FM in HC processes in the entire hospital process context

What became clear in doing so was that it had not yet been investigated which stakeholder connections within the different levels influence the service execution of FM in HC, specifically which FM processes actually have direct patient contact and how they thus differentiate themselves from FM processes beyond the line of visibility and those of FM users who are not patients. This is why to gain greater understanding of this specific topic of interaction between FM and patients in hospitals and as an example for further investigations in the other areas, a first empirical study was conducted to specify the model.

5.3 Investigation of FM involvement in patient processes

5.3.1 Sampling and Data Collection

The data was collected in fives diverse hospitals with a range of 117 to 809 beds, applying the diverse-case method according to Gerring & Seawright (2007) with the goal to encompass the range values on relevant dimensions. Five FM in HC experts were interviewed in semi-structured qualitative interviews on the 15 Non-medical Support Service processes depicted in Figure 3.

5.3.2 Results

With the help of a systematically coded interview analysis, several tendencies could be derived: Out of the 15 Non-medical Support Service processes illustrated in Figure 3, Inventory Management, Sterilization and Space Management seem to not have any patient contact, whereas all the other processes have direct contact with the patient at some point. Processes which tend to involve short contact with patients (< 1 minute) are Textiles, Security and Energy, processes which tend to involve more than 5 minutes of patient contact are Procurement and Transportation Services & Provision. For the other processes, the different hospitals seem to handle the FM processes with very different emphasis in terms of patient contact intensity. When there is contact, it seems to be mostly verbally with physical presence; less common are signalization with a bell or communication by questionnaire. However, there are very different ways of interaction combinations within the execution of FM processes above the line of visibility with the patient.

6. Conclusions

The conclusions in terms of how FM can enable the increasing need for process orientation in hospitals out of the presented findings are manifold:

- With respect to the definition of FM in HC processes, it becomes clear that the processes have to be characterized on an empirical basis in order to be able to specifically proceed in the suitable process visualization. This is why FM in HC needs to intensify the systematic collection of FM (process) data in order to become ready for systematic, relevant and comprehensive process visualizations and simulations.
- In terms of visualization and simulation, the appropriate techniques within the specific contexts and the different process characters will then have to be defined and developed in the HC context. In the FM processes with medical connections, the basis of clinical pathways could be extended, for operational FM processes, real-time simulations or calculations based on production industries could be applied and for strategic processes, long-term scenario simulations could be developed. This implies that FM (in HC) first needs to become more open to IT and its technologies and procedures because it is only with IT-supported simulation tools and their principles that it will be possible to optimize the very complex processes in hospitals in a holistic approach in the future. Secondly, FM in HC should use the knowledge gained about the value of patient contact in order to strengthen its position towards the core business.
- In terms of interdisciplinary dialogue between the medical, non-medical and strategic processes in hospitals and in order to reach a more intense cooperation between FM and the core business in the future, FM in HC should take the initiative using its already interdisciplinary orientation and develop systematic approaches bringing the different disciplines together, using visualizations in order to promote common understanding including knowledge about managing internal and external Service Level Agreements.

The model “FM in HC processes in the entire hospital process context” offers an essential basis for theses further developments.

7. Limitations and Outlook

As explained in Chapter 4, the model “FM in HC processes in the entire hospital process context” is currently in the development phase and has to undergo Evaluation. The planned empirical in-depth investigation into FM in HC processes with patient contact by means of observations will contribute to the evaluation and also to the development of further investigations about process interconnections and the definition about appropriate visualization and simulation needs and tools. Now process visualization and simulation experts have to be consulted to determine the technical requirements of further developments. It is expected that several iterations illustrated by the arrows in Figure 1 will be necessary in order to specify the

different process characters in the complex and interlinked HC context.

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Facility Management bei Kleinen und Mittleren Unternehmen

Bedeutung, Bedarf, Outsourcing-Bereitschaft und Angebot

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Kurzfassung

Die gegenständliche Arbeit untersucht das Verständnis für und den Bedarf an Facility Management (FM) Leistungen innerhalb der Gruppe der kleineren und mittleren Unternehmen (KMU), sowie die Bereitschaft, Facility Services (FS) auszulagern und stellt dies in Relation zur Angebotssituation für KMU.

Als Differenzierungsmerkmale wurden im Rahmen der gegenständlichen Untersuchung anhand von qualitativen Interviews mit 11 österreichischen KMU vor allem die Unternehmensgröße, die Entwicklungsphase und die örtliche Lage der Unternehmen herangezogen.

Die Ergebnisse greifen ein an sich paradoxes Phänomen auf. Innerhalb der Gruppe der KMU haben vor allem die Kleinsten, das heißt Kleinstunternehmen (darunter auch Ein Personen Unternehmen (EPU)) nicht nur großes Interesse und Verständnis für das Thema FM, sondern sehen selbst auch entsprechenden Bedarf. Die Angebotsseite entspricht dieser Situation keinesfalls. Mit integrativen Angeboten wird seitens der Anbieter zurzeit eher an die größeren KMU herangetreten, da man hier mehr Bedarf und auch mehr Zuspruch vermutet. Dabei sind es gerade diese größeren KMU, die am ehesten zum „Selber-Machen" tendieren.

Wachsende Unternehmen haben im Allgemeinen ein größeres Bewusstsein für FM, einen höheren subjektiven Bedarf an FS sowie eine größere Bereitschaft, FS auszulagern als reife.

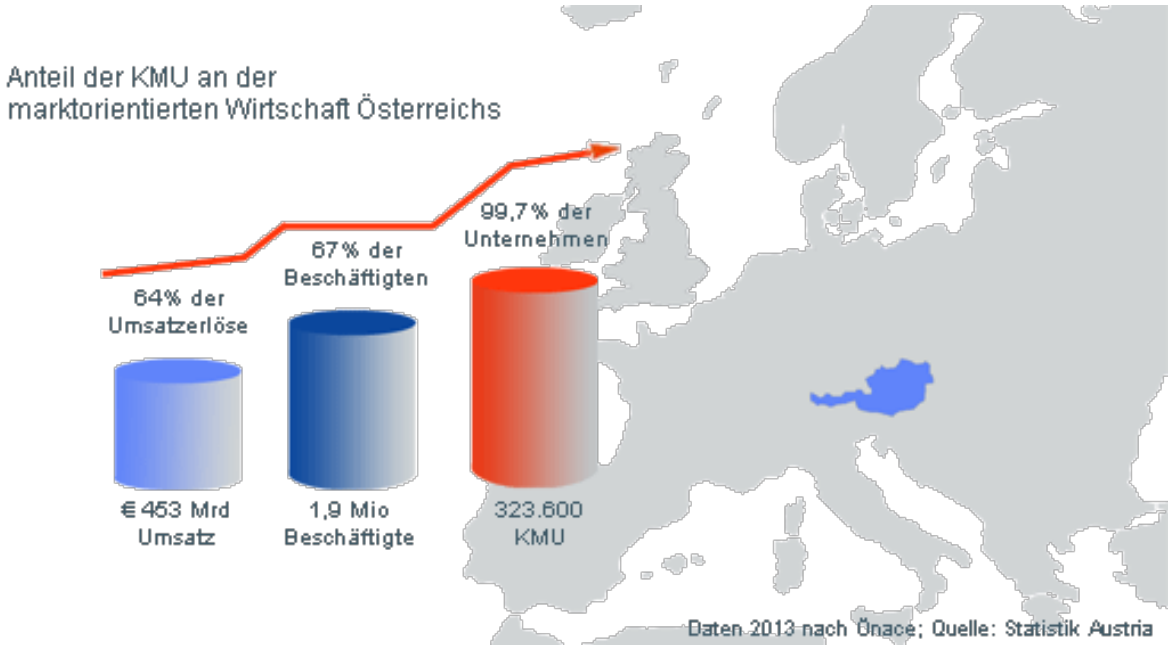
In ländlichen Regionen angesiedelte Unternehmen müssen im Kampf um qualifizierte Mitarbeiter besondere Services leisten. Das Thema Sharing von FS und Kostenoptimierung ist insbesondere dort und bei den kleinsten Unternehmen von Bedeutung.

Keywords: Facility Management, Bedarf, Outsourcing, Angebot

1. Einleitung

1. 1. Motivation

KMU sind einer der entscheidenden Treiber für Innovation, sie bilden das „Rückgrat der Wirtschaft" (Smith & Fingar 2003). Sie stellen in der EU ca. 99 % aller Unternehmen und bieten ca. 65 Millionen Menschen einen Arbeitsplatz.



Aufgrund des hohen Anteils von KMU in der Wirtschaft sollten diese Unternehmen als Zielgruppe für FS Provider sehr interessant sein. Grund genug, um diese spezifische Gruppe von Unternehmen hinsichtlich ihres FM Potenzials genauer zu durchleuchten.

1.2. Problemdefinition

In großen Unternehmen wird FM als Unterstützung des Kerngeschäftes schon seit Jahren strategisch erkannt und umgesetzt (Redlein 2015). Von KMU wird das durch den Einsatz von FM gegebene Erfolgspotential nur unzureichend genutzt. Gründe dafür sind lt. Einschätzung der Anbieter z.B. mangelnde Transparenz am Anbietermarkt und Unklarheit über Bedeutung und Nutzen von FM bei den KMU (Pfeiffenberger 2014). Roberto Cigolini, Giovanni Miragliotta und Margherita Pero vom Department of Management, Economics and Industrial Engineering des Politecnico di Milano in Italien haben eine Untersuchung über das Outsourcing-Verhalten von KMU in Italien in Bezug auf FS durchgeführt (Cigolini et al. 2011). Das Ergebnis war, dass weniger als 5 % der befragten Unternehmen sich in einer Geschäftsbeziehung mit einem Lieferanten, der mehrere FS (sog. „integrierte Services“) anbietet, befinden, was die bisherige persönliche Einschätzung des Autors bestätigt. Gegenständliche Arbeit untersucht das Verständnis für und den Bedarf an FS innerhalb der KMU, sowie die Bereitschaft diese auszulagern und stellt dies in Relation zur Angebotssituation.

1.3. Hypothesen

1. Es herrscht Unwissenheit bei KMU über die Bedeutung von FM als Managementansatz und dem daraus resultierenden Nutzen.
2. KMU haben keinen Bedarf an FS.
3. Während bei großen Unternehmen das Outsourcing von FS Standard ist, neigen KMU dazu, die Leistungen selbst zu erbringen.
4. Es fehlen maßgeschneiderte integrierte Service-Angebote und vertrauensbildende Maßnahmen seitens der Anbieter.

1.4. Methodisches Vorgehen

Es wurde vom Autor der sog. „mixed research“ gewählt.

1. *Qualitative Interviews* mit 11 österreichischen KMU (bzw. deren Geschäftsführer und gleichzeitig FM Beauftragten) in Bezug auf die getroffenen Hypothesen.
2. Validierung, Spezifizierung und inhaltliche Ergänzung der Ergebnisse der qualitativen Befragung anhand ein*er quantitativen Analyse*. Diese zweite Phase der Forschungsarbeit wird an 100 Unternehmen im deutschsprachigen Raum in einem Umkreis von ca. 400 km um Salzburg (Stuttgart, Bozen, Wien, Zürich) und unter Berücksichtigung derselben Differenzierungskriterien durchgeführt und ist nicht Gegenstand dieses Papers.
3. *Gegenüberstellung* der *Nachfrageanalyse* und der *Angebotsanalyse* aus der bisherigen Forschungstätigkeit.
4. Darstellung von *Lösungsansätzen* und eines *„Proof of Concept“ Szenarios*.

Die nachfolgende Analyse bietet einen Auszug aus dieser wissenschaftlichen Arbeit auf Nachfrageseite und zwar die Teilergebnisse aus der qualitativen Analyse (2.).

2. Qualitative Analyse

Vorausgeschickt wird, dass alle befragten Unternehmen bis auf eines sich in einem Mietobjekt befinden, in dem die Basis-Services für die Immobilie durch den Vermieter erbracht werden.

2.1. Differenzierungskriterien

Folgende Faktoren sind laut (Lu Zheng 2012) im Wesentlichen ausschlaggebend dafür, wie der Nutzen von FM wahrgenommen wird, welchen Bedarf nach FS KMU haben, ob ausgelagert wird und wie die Angebotssituation ist (vgl. auch (Feld et al. 2014)):

- *Branche*
- *Unternehmensgröße*
- *Entwicklungsphase*

Beim Faktor *Branche* ist darauf zu achten, ob FM Teil des Kerngeschäftes ist oder nicht. Das Kerngeschäft wird in der Regel nicht an Dritte ausgelagert. In Branchen, in denen FM nicht zum Kerngeschäft gehört, ist die Tendenz, FS auszulagern besonders groß. Dazu gehören vor allem Büroorganisationen und Produktionsbetriebe (Lu Zheng 2012). Gegenständliche Analyse zielt auf Büroorganisationen ab.

Hinsichtlich der *Unternehmensgröße* orientiert sich die Analyse an der Empfehlung der Europäischen Kommission vom 6. Mai 2003 betreffend die Definition der Kleinstunternehmen sowie der kleinen und mittleren Unternehmen; ABl. der EU Nr. L 124/36 vom 20.05.2003.

Als weiteres sehr wichtiges Kriterium für den Bedarf an und das Verständnis für den Nutzen von FM Leistungen gilt die *Entwicklungsphase*, in der sich ein Unternehmen gerade befindet (Lu Zheng 2012). Der gebürtige Schwede Paul Dettwiler (Dettwiler 2006) z.B. brachte erstmals die verschiedenen Theorien über *Entwicklungsphasen von Wachstumsunternehmen* (Greiner 1998, Churchill & Lewis 1983, Garnsey 1998) in Zusammenhang mit FM. Er untersuchte die Frage, wie *Wachstumsunternehmen* ihre FM Aufgaben in den verschiedenen Stadien ihrer Entwicklung handhaben und unterschied dabei – zunächst mit einem klaren Schwerpunkt auf die Thematik „space management“ - zwischen drei Phasen: (1) entrepreneurial (2) managerial und (3) consolidation. Diese Arbeit Dettwilers zeigt, dass sogar innerhalb der Wachstumsphase von Unternehmen unterschiedliche für FM relevante Entwicklungsstufen bestehen.

Gegenständliche qualitative Analyse unterscheidet allerdings nach:

- *Wachstumsphase* und
- *Reifephase*.

Als Parameter für das Wachstum eines Unternehmens gelten (vgl. z.B. (Garnsey 1998)) die (1) Entwicklung des Umsatzes, sowie der (2) Anzahl der Beschäftigten in den letzten Jahren.

Die notwendige Organisation ist in den *Reifephasen* bereits aufgebaut.

Zusätzlich wird die *örtliche Lage* der befragten Unternehmen als Differenzierungsmerkmal herangezogen. Ein wesentlicher Faktor für das Bewusstsein für und den subjektiven Bedarf an FS ist nach Einschätzung des Autors die Tatsache, ob sich das Unternehmen im städtischen Ballungsraum oder in einer ländlichen Region befindet (vgl. auch (Dettwiler 2006) sowie (Copenhagen Institute for Future Studies & ISS World Services A/S 2011)).

2.2. Analyse und Interpretation

Die unter 1. 3. genannten Hypothesen werden auf Basis der (1) *EU-Größenordnungen*, nach (2) *Entwicklungsphase* und (3) *örtlicher Lage* analysiert. Anschließend werden die Ergebnisse je Hypothese zusammengefasst und interpretiert.

2.2.1. HYPOTHESE 1

Es herrscht Unwissenheit bei KMU über die Bedeutung von FM als Managementansatz und dem daraus resultierenden Nutzen.

(1) Einflussfaktor Unternehmensgröße

Sowohl die *Kleinst-* als auch die *Kleinunternehmen* zeigen in ihren Antworten zum Begriff und Nutzen von FM ein fundiertes Verständnis für die Bandbreite von FM. Die Antworten der Befragten können unter Services betreffend Fläche und Infrastruktur, aber auch in Bezug auf Mensch und Organisation im Sinne von EN 15221-4 eingeordnet werden. Gebäudemanagement, Management von Anlagen und Objekten, alles, was für den Menschen im Zusammenhang mit Infrastruktur und Gebäuden notwendig ist, alles was man für einen Büro- und Betriebsstandort braucht aber auch die Unterstützung von Mensch und Organisation als Support für die Betriebsleistung, das heißt als Instrument, um die bestmöglichen Rahmenbedingungen für Mitarbeiter zu bieten und damit den Unternehmenserfolg zu steigern, werden angeführt.

Die Kleinst- und Kleinunternehmen untereinander unterscheiden sich lediglich durch die Fülle bzw. den Umfang ihrer Antworten. Vor allem *Kleinstunternehmen (darunter auch EPU)* scheinen sich offenbar sehr intensiv mit dem Thema FM zu beschäftigen. Dies wird auch durch aktuelle Literatur gestützt (WKO 2013, WKO 2015, Standard 2014,Rosner& Krenn 2013).

Die *mittleren Unternehmen* verstehen unter FM schwerpunktmäßig vor allem FS bezogen auf Fläche und Infrastruktur iSv EN 15221-4. Instandhaltung, Gebäudeverwaltung und

Reinigungsservice werden genannt. Nur das größte der drei befragten mittleren Unternehmen sieht darin neben den infrastrukturellen und gebäudebezogenen Services auch die FS rund um Mensch und Organisation lt. EN 15221-4. Es geht darum, sich um alles zu kümmern, was nicht zum Kerngeschäft gehört; ein Umfeld zu schaffen, in dem Mitarbeiter gerne sind.
Der Nutzen von FM wird von diesen mittleren Unternehmen darin gesehen, dass sich jemand um Bereiche im Unternehmen kümmert, für die sonst niemand zuständig ist und für welche die Erfahrung und das Wissen fehlen. Darüber hinaus geht es nach den befragten mittleren Unternehmen darum, ein flexibles Angebot für Raumbedarf und Infrastruktur zu schaffen. Die Reduktion von Umzugskosten sowie die Einbindung in ein Unternehmens-Netzwerk zur Kommunikation werden ebenfalls als konkreter Nutzen aufgezählt.

(2) Einflussfaktor Entwicklungsphase

Für alle Befragten unabhängig von der Unternehmensgröße steht die Qualität des Arbeitsplatzes in unmittelbarem Zusammenhang mit der Leistungsfähigkeit der Mitarbeiter. Dies gilt insbesondere für die in einer *Wachstumsphase* befindlichen Unternehmen. Diese haben ein starkes Bedürfnis nach Prozessoptimierung und einer Infrastruktur, die es trotz des hohen Drucks und der Ressourcenknappheit ermöglicht, sich auf das Kerngeschäft zu konzentrieren. Sie kämpfen am Arbeitsmarkt um die besten Talente und wollen mit möglichst attraktiven Rahmenbedingungen für Mitarbeiter gegenüber der Konkurrenz punkten.

(3) Einflussfaktor örtliche Lage

Um die Schaffung optimaler Strukturen für ihre Mitarbeiter und damit um das Thema „Mensch und Organisation“ im Zusammenhang mit FM machen sich Unternehmen am *Land* noch mehr Gedanken, als jene in den städtischen Ballungsräumen. Hier müssen zusätzliche Anreize geboten werden, um Mitarbeiter zu bewegen, auf dem Land zu arbeiten. Themen wie Catering oder Mobilität rücken in den Vordergrund.
Auch die Kostenoptimierung durch Sharing-Konzepte ist insbesondere bei am Land ansässigen Unternehmen von entscheidender Bedeutung.

(4) Zusammenfassung und Schlussfolgerung

Hypothese 1 kann *nicht bestätigt* werden. Der Begriff und Nutzen von FM kann als im Allgemeinen bekannt angenommen werden. Zusammengefasst verstehen KMU darunter die Grundlage für in Gebäuden lebende und arbeitende Menschen sowie Prozesse, die die Konzentration auf das Kerngeschäft ermöglichen.

Kleinstunternehmen haben das fundierteste Verständnis. Das zeigt sich in der Fülle ihrer Antworten. Bei Kleinst- und Kleinunternehmen werden vor allem Services rund um Mensch und Organisation angeführt, dies vor allem wenn sie gerade wachsen und optimale Rahmenbedingungen für zukünftige Mitarbeiter schaffen müssen.
Bei den mittleren Unternehmen konzentrieren sich die Antworten insbesondere auf das Thema Fläche und Infrastruktur. Ein Grund dafür könnte sein, dass sich zwei von drei mittleren Unternehmen in einer Reifephase befinden, in der die Neuaufnahme von Mitarbeitern, der Kampf um die besten Talente und damit die Schaffung optimaler Bedingungen für diese kein zentrales Thema sind.
Die Schaffung optimaler Rahmenbedingungen für Mitarbeiter ist vor allem für am Land ansässige KMU von zentraler Bedeutung. Hier müssen zusätzliche Anreize geboten werden, um Mitarbeiter zu bewegen auf dem Land zu arbeiten. Themen wie Mobilität, Catering und Sharing von FS rücken in den Vordergrund.

2.2.2. HYPOTHESE 2

KMU haben keinen Bedarf an FS.

Zum Thema Bedarf ist eine Unterscheidung in objektiven und subjektiven Bedarf zu treffen. Der objektive Bedarf ist in jedem Unternehmen aufgrund des genutzten Raumes und der Anzahl der Beschäftigten, also aufgrund von Größenmerkmalen gegeben. Die qualitative Analyse hat versucht, den subjektiven Bedarf der befragten Unternehmen zu ermitteln.

(1) Einflussfaktor Unternehmensgröße

Unabhängig von Unternehmensgröße haben KMU einen (subjektiven) Bedarf an FS vor allem rund um die Themen Mobilität, räumliche Flexibilität, IT und technische Infrastruktur sowie Schaffung idealer Rahmenbedingungen für die Mitarbeiter (Catering, mobiles Arbeiten, Gesundheit und Sicherheit).

Es hat sich paradoxerweise herausgestellt, dass trotz der geringen Losgrößen, also einem sehr überschaubaren objektiven Bedarf, bei den kleinsten Unternehmen innerhalb der KMU ein noch viel größerer (subjektiver) Bedarf nach FS besteht, als bei den größeren KMU. Man kann von einem *„KMU-Paradoxon“* sprechen.

Das Thema *Sharing* im Sinne von Kostenteilung und –optimierung einerseits und die gemeinsame Nutzung von technischem Equipment bzw. gemeinschaftlichen Services andererseits ist für die Gruppe der Kleinstunternehmen besonders interessant.
Für die mittleren Unternehmen ist das Thema Sicherheit signifikant.

(2) Einflussfaktor Entwicklungsphase

Eindeutig kann festgestellt werden, dass im *Wachstum* befindliche Unternehmen größeren Bedarf an FS haben als reife Unternehmen. Die Schwerpunkte liegen dabei vor allem bei den Themen qualifizierte Mitarbeiter, räumliche Entwicklung und Schaffung von idealen Rahmenbedingungen für das Wohlbefinden der Mitarbeiter. Unternehmen, die sich im Wachstum befinden, legen hohen Wert auf die Zufriedenheit ihrer Mitarbeiter und sind sich völlig bewusst, dass davon der Erfolg wesentlich abhängt.
Bei den *Reifeunternehmen* dagegen spielt das Thema Sicherheit eine wichtige Rolle.

(3) Einflussfaktor örtliche Lage

Ob ein höherer Bedarf an FS sich aus den örtlichen Gegebenheiten auf dem *Land* ableiten lässt, kann aufgrund der qualitativen Befragung nur vermutet, aber nicht eindeutig eruiert werden. Jedenfalls kann festgestellt werden, dass es am Land schwieriger ist, qualifizierte Mitarbeiter zu bekommen und diese zu halten. Naturgemäß ist das FS Angebot in abgelegenen Gegenden sehr gering bis gar nicht vorhanden.
Je abgelegener der Unternehmensstandort ist, desto bedeutender ist die Thematik des Sharings und des Zusammenschlusses mit gleichgesinnten Unternehmen.

(4) Zusammenfassung und Schlussfolgerung

Hypothese 2 gilt als *nicht bestätigt.*
Je kleiner und je abgelegener und je mehr im Wachstum befindlich ein Unternehmen ist, desto höher ist der subjektive Bedarf an FS und das Bedürfnis nach Sharing. Die Thematik eines Land-Stadt-Bedarfs-Gefälles wird in der quantitativen Analyse noch genauer zu untersuchen sein.

2.2.3. HYPOTHESE 3

Während bei großen Unternehmen das Outsourcing von FS Standard ist, neigen KMU dazu, die Leistungen selbst zu erbringen.

(1) Einflussfaktor Unternehmensgröße

Die *Kleinstunternehmen* wollen am liebsten alles auslagern, was nicht zum Kerngeschäft gehört, während die *Kleinunternehmen* schon mehr in Richtung *„Selber-Machen"* tendieren und aktuell höchstens Einzelleistungen wie Reinigung und IT Services auslagern. Auch das Bedürfnis, in Zukunft zusätzliche FS auszulagern, hält sich bei den Kleinunternehmen in Grenzen und bezieht sich am ehesten noch auf Services, die auf Mitarbeiterzufriedenheit abstellen, wie z.B. Coaching und Schulungen, aber auch Wohnungen und Essen.

Bei den *mittleren Unternehmen* wiederum gehört „Selber-Machen" wohl auf jeden Fall zur täglichen Routine. Dennoch wollen zwei von drei befragten Unternehmen am liebsten alles auslagern, was nicht zum Kerngeschäft gehört. Als Grund dafür, warum einzelne Leistungen aktuell noch nicht ausgelagert sind, wird von den mittleren Unternehmen das fehlende Management bzw. auch das fehlende Angebot genannt.

Die wichtigsten *Kriterien* für die Bereitschaft zum Auslagern von FS sind bei den *Kleinst- und Kleinunternehmen* vor allem Vertrauen und ein gutes Preis-/Leistungsverhältnis. Man ist gerne bereit, einen höheren Preis zu bezahlen, wenn die Qualität dafür stimmt. Den *mittleren Unternehmen* sind die räumliche Nähe und flache Hierarchien beim Anbieter, welche Vertrauen schaffen, am wichtigsten.

Zur Thematik, *welche Services* ausgelagert werden, ist folgendes zu sagen:
Am ehesten werden von den *Kleinstunternehmen* Steuerberatung und graphische Leistungen ausgelagert, wobei letztere nicht zu den FM Leistungen im engeren Sinne, dh nach EN-15221-4 gehören. Von den *mittleren Unternehmen* wird das ausgelagert, was vornehmlich angeboten wird, nämlich insbesondere Reinigung und Haustechnik, oftmals auch IT.
Die *Kleinunternehmen* bekommen nur wenige Einzelleistungen angeboten und lagern wenn, dann auch nur diese aus. Auch hier sind dies insbesondere Reinigung, Haustechnikdienste und IT Services.

(2) Einflussfaktor Entwicklungsphase und (3) Einflussfaktor örtliche Lage

Natürlich steht das Thema Outsourcing auch in direktem Zusammenhang mit dem *objektiven Bedarf* an Leistungen. Da die in einer *Wachstumsphase* befindlichen Unternehmen tendenziell mehr Bedarf an FS an den Tag legen, als Unternehmen in einer Reifephase (siehe Hypothese 2), ist auch die Tendenz auszulagern dementsprechend höher.

Ganz ähnlich verhält es sich in Bezug auf das Differenzierungsmerkmal der *örtlichen Lage*. Mehr subjektiver Bedarf herrscht am Land. Demnach ist dort die Bereitschaft auszulagern auch eher zu vermuten. Diesbezüglich lässt die qualitative Analyse allerdings keine konkreten Rückschlüsse zu.

(4) Zusammenfassung und Schlussfolgerung

Aus dem subjektiven Eindruck, den der Autor im persönlichen Gespräch mit den befragten Unternehmen gewinnen konnte und aus der Art und Weise der Antworten, kann darauf geschlossen werden, dass die kleineren, wachsenden Unternehmen eher eine Auslagerungsbereitschaft und damit das Vertrauen in andere an den Tag legen, als die in der Reifephase befindlichen Unternehmen. Aber vor allem die kleinsten, die größten und insbesondere die wachsenden KMU würden am liebsten alles auslagern, was nicht zum Kerngeschäft gehört.

Es kann natürlich auch sein, dass es beim Outsourcing weniger auf die hier angewendeten Differenzierungskriterien, als vielmehr auf die *Unternehmenskultur* und die *Persönlichkeit des Unternehmers* ankommt (Cigolini et al. 2011). Manche Unternehmer sehen es als ihre Aufgabe, alles selber zu machen, was andere nicht besser können. Andere wiederum sind extrem offen für das Experten-Know-How anderer. Sie schätzen diese Unternehmenspartnerschaften und sehen den Erfahrungsaustausch als wichtiges Netzwerkzeug.

Die *Hypothese 3* gilt als *nicht bestätigt*.

2.2.4. HYPOTHESE 4

Es fehlen maßgeschneiderte integrierte Service Angebote und vertrauensbildende Maßnahmen seitens der Anbieter.

Die in der Problemdefinition (Pkt. 1.2.) erwähnte Untersuchung in Norditalien (Cigolini et al. 2011) hat ergeben, dass weniger als 5 % der befragten KMU in einer Geschäftsbeziehung zu

Anbietern mit mehreren Services stehen. Die Einschätzung der Nachfrage von KMU seitens der FS Anbieter in der Masterarbeit des Autors (Pfeiffenberger 2014) hat ergeben, dass kleine Unternehmen zuerst einzelne Services ausprobieren (z.B. Reinigung) und dann, wenn sie mit der Leistung zufrieden sind, Schritt für Schritt weitere Services beauftragen. Wichtig ist dabei die Qualität der Leistung, weniger der Preis. Nur zwei der neun FS Anbieter in dieser Studie haben spezielle Angebote für KMU. Diese aber auch nur dann, wenn sich der Kunde in einem Gebiet befindet, das von den Dienstleistern bereits versorgt wird. Das sind im Wesentlichen die Ballungsräume. Es gibt also laut der Studie von Pfeiffenberger nur von wenigen Dienstleistern Angebote für KMU und diese sind nicht wirklich am Markt sichtbar. Der große Teil der Anbieter hat kein eigenes Angebot für diese Zielgruppe und schon gar nicht integriert und flächendeckend.

Die Studie hat auch gezeigt, dass große Unternehmen meist ein eigenes Konzept für integrierte FS mit einem entsprechenden Leistungsverzeichnis entwickelt haben. Die Vergabe der Leistungen erfolgt dann über Ausschreibungen und vor allem über den günstigsten Preis.

Betrachtet man die Kriterien, welche für alle untersuchten KMU, unabhängig von deren Größe, Entwicklungsgrad und Lage am wichtigsten für die Bereitschaft zum Outsourcen von FS sind, dann ist dies – wie oben unter Hypothese 3 bereits angesprochen - neben einem soliden Preis-/Leistungsverhältnis vor allem das *Vertrauen* in den Anbieter. Bestätigt wird dies auch dadurch, dass viele KMU angeben, die Aufträge auf Basis von Angeboten und Rechnungslegung nach erbrachter Leistung zu vergeben. Das heißt, Vertrauen steht im Vordergrund. Ein Vertrag ist nicht so wichtig. Das Ergebnis muss passen. Die in der Folge von den untersuchten Unternehmen am häufigsten genannte Vertragsform mit externen FS Anbietern ist ein simpler, rein an den jeweiligen Einzelaufgaben orientierter Dienstleistungsvertrag.

(1) Einflussfaktor Unternehmensgröße

Die gegenständliche qualitative Untersuchung hat ergeben, dass keines der drei befragten *Kleinstunternehmen* ein FS basierendes Angebot erhalten hat, weder zu Einzelleistungen, noch zu integrierten Services.

Bei den *Kleinunternehmen* haben immerhin drei von fünf befragten Unternehmen schon einmal Einzelleistungen angeboten bekommen. Diese bezogen sich insbesondere auf Reinigung, Haustechnikdienste, Fuhrpark und Druckermanagement.

Dagegen haben alle *mittleren Unternehmen* bereits FS Angebote, wenn auch nur zu Einzelleistungen erhalten. Diese betrafen vorwiegend die Services Reinigung und

Haustechnik. Das sind auch genau die Dienste, die von dieser KMU Größengruppe am ehesten zugekauft werden.

(2) Einflussfaktor Entwicklungsphase

Der *Entwicklungsgrad* eines Unternehmens ist für die Frage des Angebots an integrierten Serviceleistungen weniger ausschlaggebend; hier zählt naturgemäß am ehesten die Größe des Unternehmens, die von externen Anbietern auch leichter recherchiert werden kann. Je größer ein KMU ist, umso eher ist es also für die Angebotsseite interessant. Dabei sind es gerade die Kleinstunternehmen, die das beste Verständnis für den Nutzen von FS, subjektiven Bedarf (nicht objektiv aufgrund der geringen Losgröße) und auch die Bereitschaft zum Outsourcen an den Tag legen (siehe Hypothese 1-3).

(3) Einflussfaktor örtliche Lage

Das Thema Sharing und Bedarfs-Bündelung ist insbesondere auch im Hinblick auf das Differenzierungskriterium der *örtlichen Lage* interessant. Tendenziell ist – wie oben in der Untersuchung von Hypothese 2 festgestellt - der subjektive Bedarf am Land größer als in der Stadt. Für einen FS Anbieter lohnt es sich aber nicht für Einzelservices die weite Fahrt aufs Land in Kauf zu nehmen. Dazu kommen auch insbesondere die kleinen Losgrößen der subjektiv stärksten Nachfrager, der Kleinstunternehmen, die den Aufwand nicht rechtfertigen.
Würde man aber alle Kleinst- und Kleinunternehmerbedürfnisse regional zusammenfassen, könnten sich hier sehr interessante Synergien für beide Seiten, Unternehmer und Anbieter, ergeben.

(4) Zusammenfassung und Schlussfolgerung

Hypothese 4 kann als bestätigt angesehen werden. Es fehlen entsprechende vertrauensbildende Angebote für FS. Es wäre auf Anbieterseite sinnvoll, sich weg von einem rein leistungsorientierten hin zu einem ergebnisorientierten Vertragsangebot zu bewegen. Was schafft mehr Vertrauen als ein Angebot, das daraufhin hinausläuft, dass nur gezahlt wird, wenn das Ergebnis stimmt (Cigolini et al. 2011).
Und wenn dieses Angebot darüber hinaus auch noch mehrere Leistungen aus einer Hand mit nur einem Ansprechpartner abdeckt, sprich ein holistisch-integratives Leistungspaket schnürt, das noch dazu durch weniger Kosten und mehr Effizienz glänzt, steht einer langjährigen Partnerschaft mit win-win Effekten nichts mehr im Wege.

Es lohnt sich darüber hinaus für die Angebotsseite, an eine *Bündelung* des Bedarfs der Kleinst- und Kleinunternehmen zu denken, das heißt insofern eine interessante neue Zielgruppe zu schaffen, indem man das starke subjektive Bedürfnis an FS vieler einzelner Klein- und Kleinstunternehmen zusammenfasst, z.B. indem man regionale Verbände schafft.

3. Zusammenfassung und Ausblick

Innerhalb der Gruppe der KMU sehen die Kleinsten, das heißt EPU und Kleinstunternehmen, den größten (subjektiven) Bedarf an FS (KMU-Paradoxon). Die Angebotsrealität entspricht diesem Paradoxon keinesfalls. Mit integrativen Angeboten wird seitens der großen Anbieter, wenn überhaupt an die größeren KMU herangetreten. Dabei sind es gerade diese mittleren und größeren KMU, die am ehesten zum „Selber-Machen“ tendieren. Eine genauere Betrachtung der jeweiligen Entwicklungsphase (Reife oder Wachstum) eines KMU zeigt dagegen, dass sich das Verständnis für und der (subjektive) Bedarf an FS völlig gegenläufig zur Größe verhalten kann. Tendenziell haben im Wachstum befindliche Unternehmen ein größeres Bewusstsein für und (subjektiven) Bedarf an FS. Dies spiegelt sich natürlich auch in der Bereitschaft wieder, FS auszulagern. Ländliche Unternehmen müssen sich vor allem im Kampf um qualifizierte Mitarbeiter oft noch mehr Gedanken über die Themen „Mensch und Organisation“ machen als Unternehmen im städtischen Ballungsraum. Auch das Thema „Sharing von FS“ ist von zentraler Bedeutung. Diese Kriterien sollten letzten Endes auch auf Angebotsseite zum Tragen kommen, ein etwaiger „gap“ aus der Gegenüberstellung von Anbieter- und Nachfrageseite durch ein neu zu entwickelndes Angebotskonzept überwunden und durch Darlegung eines „Proof of Concept“ Szenarios belegt werden. Letzteres ist Gegenstand einer weiterführenden Dissertation des Autors mit dem Titel „Lösungsansätze für Facility Management im Bereich von kleinen und mittleren Unternehmen“, welche voraussichtlich Anfang 2017 abgeschlossen sein wird.

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Wissenschaft trifft Praxis II:

Workplace und strategisches FM

I can still hear you! Noise and noise prevention in offices.

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Abstract

The most important distraction in open plan offices is noise. Noise distraction decreases performances, causes stress and lowers job-specific wellbeing. Personality may play a role, as extraverts and introverts have been reported to react differently to noisy environments that cause higher levels of arousal. However, it is unclear whether these effects of noise affect age groups in a different way. Therefore, this study has investigated the effect of noise on affective employee wellbeing, namely anxiety-comfort, taking into account personal characteristics (age, gender, level of extraversion).

In a case study organisation a pilot was set up to measure noise levels in an open plan office; noise levels were measured for five consecutive days, and employees were asked to report on personal characteristics (gender, age, extraversion) as well as anxiety and comfort, at the start of the day, at noon, and at the end of the day. Regression analysis showed that noise levels influenced anxiety, and comfort (in the morning only); results were controlled for age group, gender and extraversion.

These results confirm the negative effect of noise on employees' wellbeing. As employees are reluctant to use headphones to reduce noise distraction, a pilot with noise reduction panels will be started to reduce noise and increase job-specific wellbeing.

Keywords: Noise level, distraction, employee wellbeing, anxiety-comfort

Introduction

Workforce demographics are currently enduring a period of change. The emergence of a highly diverse multi-generational workforce has posed a new set of questions for Corporate Real Estate professionals, HR managers, and organizations (Hughes and Simoneaux, 2008; Vicker, 2005).

The field of facility management is expanding from an operational into a tactical and strategical activity, depending on the geographical location, facility managers are confronted with a broad spectrum of responsibilities. They are responsible for occupational health and safety and are also concerned with employee wellbeing. Employee satisfaction, productivity, and wellbeing are becoming even more crucial for organisations that want to achieve a

competitive advantage in today's knowledge intense business environment and want to retain knowledge workers of all generations (Brill et. al., 2001; Chan et. al., 2007). One of the factors that facility managers are responsible for is supporting the optimal performance of knowledge workers in office environments, taking into consideration all factors that impact this performance, e.g. noise distraction.

Open plan offices

Office space is an expensive resource and is to be used effectively and efficiently (Wiggins, 2010). Since the late 20th century, open plan offices are widely used across many industries. This type of office offers numerous benefits that may be economically advantageous to companies as open plan offices often occupy less space compared with traditional offices, may save infrastructure costs, and increases human communication, hence increasing collaborations and organisational performance (Leaman, 1992; Veitch et al., 2002).

Noise in open plan offices

Open plan offices also have a number of disadvantages, including increased noise and distractions, (e.g. Hedge, 1982; DeCroon et al., 2005; Brennan et al., 2002; Veitch et al., 2002). Telephones and other peoples' conversations have been reported as being the most disturbing sources of noise (Kaarlela-Tuomaala et al., 2009; Pejtersen et al., 2011). Many authors have discussed the effect of noise on the performance of office workers (Banbury & Berry, 2005; Jahncke et al., 2011; Szalma & Hancock, 2011), especially the distracting effect of speech (Schlittmeier & Liebl, 2015). A potential loss in productivity as high as eight per cent has been reported (Roelofsen, 2008). According to Hongisto (2006) speech is a major source of distraction, whether it is relevant or irrelevant, and at different sound levels.

Noise and wellbeing

Noise, being a distractor, has been suggested to be the most widespread stressor in the work environment of office workers (Oseland & Hodsman, 2015), negatively impacting employee wellbeing. Warr's circumplex model of job-related affective wellbeing (Warr, 1990) shows three dimensions of job-specific wellbeing, namely content-discontent; anxiety-comfort; depression-enthusiasm. These dimensions are affected by individual factors, socio-demographic factors such as age and gender, and features of the environment. Borod (2000) states that stress is an important factor influencing the relationship between anxiety and brain function. Furthermore, Borod, (2000) concludes that numerous neuropsychological and

cognitive studies have manifested that stressors may result in psychological stress, such as anxious arousal. Therefore, one's level of anxiety-comfort may be an indicator of affective wellbeing as well as stress level.

Influence of personal characteristics

Stress levels due to exposure to noise are also influenced by people's personality, e.g. level of extraversion. Introverts and extraverts have different preferred levels of arousal, which in turn affects how noise affects their performance. Noise can be considered to be a kind of stimulation, so extraverts should perform better than introverts in noisy environments (Oseland, 2009; Oseland and Hodsman, 2015).

To what extent does age play a role in the effect noise on anxiety-comfort and therefore job-specific wellbeing, and should it be part of the studies on generational differences in preferences regarding workplace in general? These preferences have been studies by several authors (e.g. Bennett et al., 2012; Brand, 2008; Joy & Haynes, 2011; Phillips & Addicks, 2010; Rothe et al., 2012; Rasila and Rothe, 2012; Groen and Lub, 2015), but empirical proof is limited. Brand (2008) argues that Generation Y workers are as distracted by noise as older workers. Also, Belojevic and Jalovjevic, (2001) could not find significant relations between noise sensitivity and age. Ehrlich and Bichard (2008) researched the Welcoming Workplace and described the effects of noise on older workers in open-plan offices. Joy and Haynes (2011) on the other hand state that noise is a distractor for concentration work, but do not report on differences between generations.

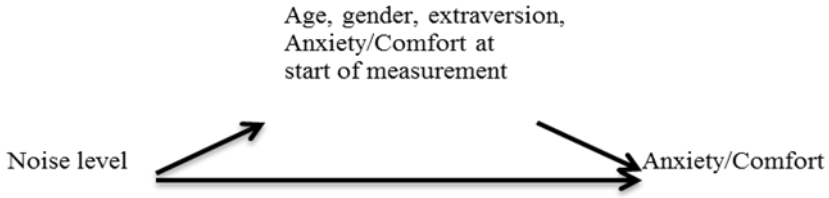

Fig. 1: Model for the effect of factors that affect Anxiety-Comfort used in this paper.

Therefore, the objective of this paper is to examine how office noise influences job-related wellbeing, and how a number of personal characteristics mediate this influence.

H_1: The influence of noise levels on of anxiety-comfort in open plan offices is mediated by gender, age group, level of extraversion, and level of anxiety at the start of the measured time interval.

H_2: The influence of noise levels on of anxiety-comfort in open plan offices is mediated by gender, age group, level of extraversion, and level of comfort at the start of the measured time interval.

Research methods

The research consisted of noise level measurements and a survey. Measurements were carried out in one of the open plan offices of the case study organisation, a multinational company in beverages. This open plan office has recently reduced its office space with 15% (due to low occupancy rates). As a result of this decrease the facility coordinator received an increasing number of complaints concerning noise interruption and loss of concentration. The total number of employees of the organisation is 240. The selected research area within the office contains 32 workplaces shared by 45 employees (see Figure 2).

During one week (Monday-Friday) noise levels in the office were measured. An iPad equipped with an external microphone (range 0-135 dB, 20-18000 Hz) was placed in the middle of the selected area; the decibel 10-th app was used to record the noise level. Noise levels were measured between 9.00 and 12.00 and 13.30 and 17.00, every 5 seconds. The iPad was calibrated with a sound level meter (SLM). A sound was played at a distance of 1, 5 and 10 m of iPad and SLM. The difference was marginal with 1 dB deviation at 1m and 5m, and 2 dB at 10m. Noise damping was not further considered, as the test area was small and has little sound damping features. Average occupancy of the open plan office was 80%, which is representative for occupancy of this open plan office.

The survey was paper-based. Respondents were asked to answer questions personal characteristics, namely gender, age category, hearing ability, use of headphones, department, and job-role. The level of extraversion was measured using the Big Five Inventory (John & Srivastava, 1999), on a 5-point scale. The level of anxiety and comfort was based on the Circumplex Model of Affect, a multi-dimensional framework that identifies two axes of psychological wellbeing, namely activation and pleasure (Russell, 1980; Warr, 1990, 2012). The axis anxiety-comfort represents high activation, unpleasant arousal (level of anxiousness) and low activation, peasant arousal (level of comfort). To stimulate respondents to fill in the questionnaire and take as little of their time as possible, both aspects of the anxiety-comfort axis were measured with one item, namely the level of anxiety, and level of comfort, on a 5-point Likert scale.

Respondents answered the questions on personal characteristics as soon as they started working in the morning; the measurement of anxiety and comfort took place at the beginning

of the day and repeated at 12.00 and 17.00. All data were collected and processed anonymously.

Fig. 2: location of workspaces and noise level measurement (spot) in open plan office.

Results

Sample characteristics

Table 1 summarizes the characteristics of the sample. It contained 95 completed responses, 40 men (42%) and 55 (58%) women. Respondents belong to three different generations, namely 41% Generation Y (born after 1980), 51% Generation X (1981 - 1965) and 8% Baby Boomers (born before 1965). The sample contains responses from interns (13), managers (25) and individual workers (57), working in mainly administration, marketing and logistics. Furthermore, as this research is about the perception of noise, people were asked about their hearing abilities; 14 responses indicated limited hearing abilities. Salient is that 25% of the responses from the age group 25-34 years indicated limited hearing abilities (Table 2). Roughly one-quarter of the responses indicated that they regularly use headphones in the office.

Extraversion

Extraversion of the responses was on average 3.23 (s.d. 0.34). This value is comparable to the Srivastava et al. (2003) but slightly lower than values reported by Denissen et al. (2008). As expected, extraversion showed no significant differences between age categories (Denissen et al., 2008) or gender (Costa, Terracciano, and McCrae, 2001; Schmitt et al., 2008).

Tab. 1: Overview of sample characteristics.

Sample characteristic		Frequency	Percent
Gender	Male	40	42
	Female	55	58
Generation	Y	39	41
	X	48	51
	Baby Boomers	8	8
Department	Administration	24	25
	Marketing	24	25
	Human Resources	10	11
	Sales	3	3
	Public relations	1	1
	Logistics	28	29
	Research and Development	5	5
Function	Intern	13	14
	Individual contributor	53	56
	Team leader	9	9
	Manager	10	11
	Senior Manager	6	6
	Other	4	4
Hearing ability	Good	81	85
	Limited	14	15
Use of headphones	Yes	27	28
	No	68	72

Tab. 2: Overview of age and hearing ability of sample.

Age and generation	Frequency	Percent	With limited hearing ability
Gen Y, 18-24	11	12	0
Gen Y, 25-34	28	30	7 (25%)
Gen X, 35-44	34	36	1 (3%)
Gen X, 45-50	14	15	3 (21%)
Baby Boomers, 51-60	8	8	3(38%)
Total	95	100	14 (15%)

Noise levels

Noise levels were measured during five consecutive days and showed similar patterns. Figure 3 shows the noise level on Wednesday. In the morning of the day, noise varied between 40 and approx. 60 dB with a mean level of approx. 55 dB outside breaks (bandwidth 50-60 dB) but rising to approx. 80 dB between 9.15 and 9.30, and between 10.00 and 10.30, and rather increases from 11.45 on, when people leave for their lunch break.

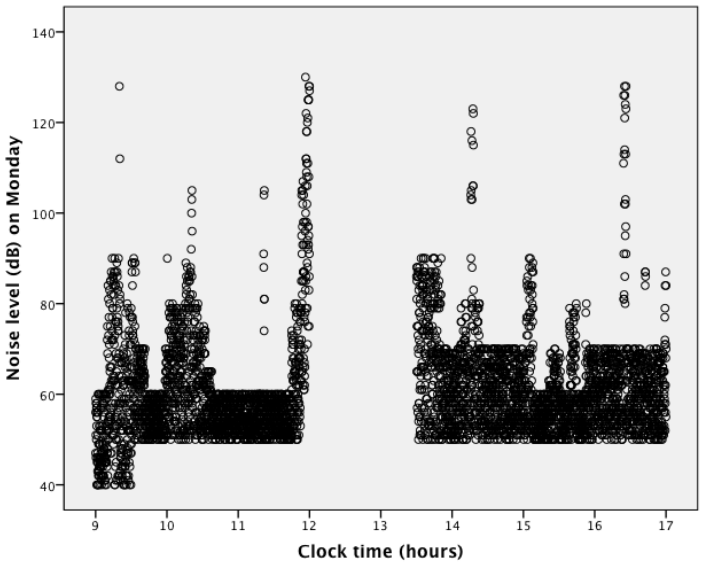

Fig. 3: Noise levels.

The afternoon likewise shows a pattern. Noteworthy is that the bandwidth of the noise is larger, namely 50-70 dB, with several peaks. From 15.00-16.00 the noise level is comparable to the morning level (50-60 dB). The recorded noise patterns show some distinctive extremes, which are a result of employee engagement (arriving at the office in the morning, assembling for presentations and meetings, moving for lunch, having conference calls, verbal communication, movement of objects, and opening and closing of doors and cabinets, going on breaks). Furthermore, morning and afternoon mail drop off as well as afternoon cleaning might impact the noise measurement.

Pattern in levels of Anxiety/Comfort during the day

At the beginning of the day (9.00), at the end of the morning (12.00) and the end of the day (17.00) respondents reported their level of Anxiety and Comfort. Anxiety levels at the beginning of the day showed no significant differences between the days of the week. Figures 4 and 5 show the levels of Anxiety and Comfort during the day, for the different age groups, averaged over five days. Anxiety levels during the day are correlated, and morning comfort levels are correlated with both the afternoon and the evening levels. Anxiety and Comfort inversely correlated with each other, as expected. For all but the oldest respondents Comfort was lowest at the end of the morning, and generally speaking Comfort correlates positively with age.

Regarding Anxiety, the youngest group showed the smallest effects on Anxiety during the day, the groups between 25 and 44 years showed a significant increase in Anxiety during the morning and a decrease in the afternoon, whereas the two oldest groups (>45 years) increased

during the day with the maximum Anxiety at the end of the day. Except for the youngest group (18-25) at any moment of the day, Anxiety was inversely correlated with age.

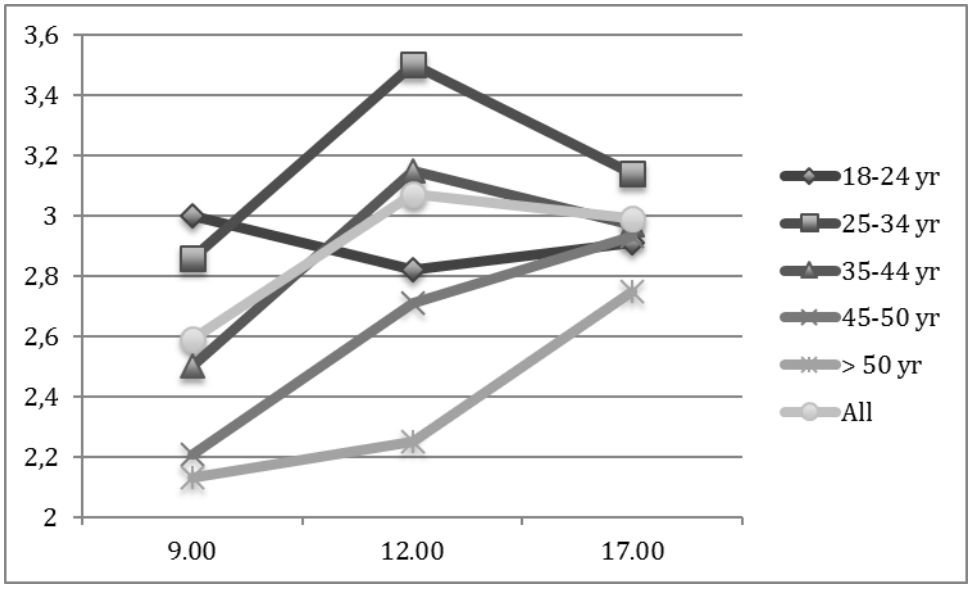

Fig. 4: Anxiety levels during the day (9.00, 12.00, 17.00) for different age groups.

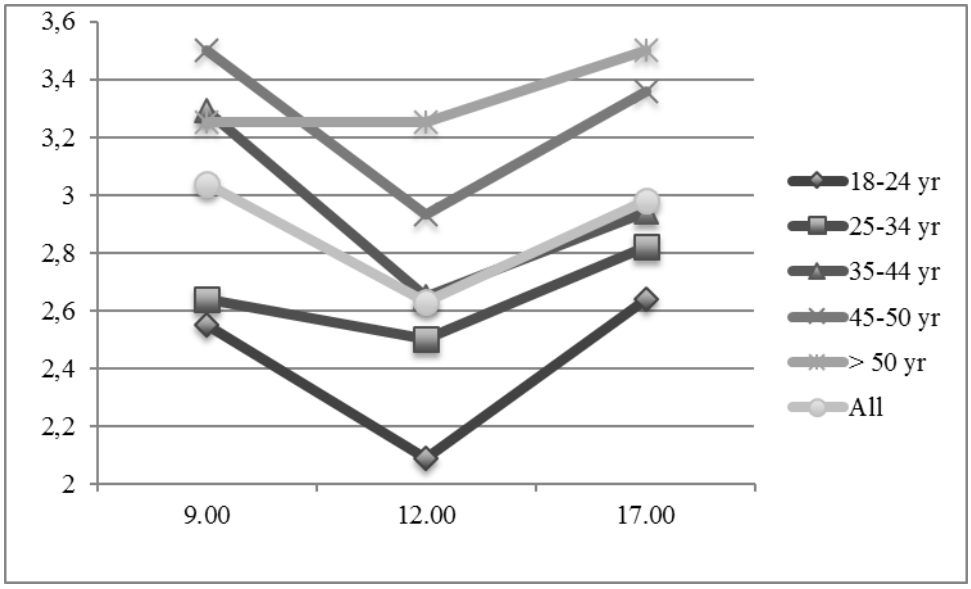

Fig. 5: Comfort levels during the day (9.00. 12.00 and 17.00) for different age groups.

Does noise level predict Anxiety/Comfort?

To determine what factors predict the levels of Anxiety/Comfort several models were tested with a hierarchical regression analysis (Tables 3 and 4). In Step 1 the effect of socio-demographic factors (gender, age group) and an individual factor (level of extraversion) was taken into account. In Step 2, the noise level was added, and in Step 3, another individual

factor was added, namely the level of anxiety-comfort measured at the start of the measured time interval.

Anxiety was predicted by noise levels, but this influence is clearly mediated by Anxiety levels at the start of the measurement, both in the morning and the afternoon. Gender, age, nor extraversion mediated this effect. Therefore, H_1 is supported.

Tab. 3. Hierarchical regression analysis predicting Anxiety

	Dependent variable: Anxiety (morning)			*Dependent variable: Anxiety (afternoon)*		
Control variables	Step1	Step 2	Step 3	Step 1	Step 2	Step 3
Gender	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Extraversion	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Age	.038	n.s.	n.s.	n.s.	n.s.	n.s.
Independent Variables						
Average noise level		.046	.049		.028	.041
Anxiety level start of measurement			.000			.000
Regression model						
F	3.15*	3.47*	7.02***	.299	1.48	8.16
ΔF	3.15*	4.09*	18.5***	.299	4.98*	32.8***
Adjusted R^2	.064	.095	.242	-.023	.02	.276
ΔR^2	.094	.039	.149	.010	.052	.253

Note. Age = mid-level of category. Standardized regression coefficients are reported *p<.05, **p<.01, ***p<.001. n.s. = not significant.

Tab. 4 Hierarchical regression analysis predicting Comfort

	Dependent variable: Comfort (morning)			*Dependent variable: Comfort (afternoon)*		
Control variables	Step1	Step 2	Step 3	Step 1	Step 2	Step 3
Gender	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Extraversion	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
Age	.006	.020	n.s.	.041	.042	n.s.
Independent Variables						
Average noise level		.001	.000		n.s.	n.s.
Comfort level at start of measurement			.004			.000
Regression model						
F	2.798*	5.55***	6.63***	2.21	1.65	6.68***
ΔF	2.79*	12.8**	8.99**	2.21	.02325.1	
Adjusted R^2	.054	.162	.231	.037	.037	.232
ΔR^2	.084	.114	.074	.068	.068	.273

Note: Age = mid-level of category. Standardized regression coefficients are reported *p<.05, **p<.01, ***p<.001. n.s. = not significant.

Results for Comfort differed between morning and afternoon. Similar to the level of Anxiety, Comfort level in the morning was predicted by noise levels, but this effect is obviously mediated by Comfort levels at the start of the measurement. Comfort in the afternoon,

however, shows no significant influence of noise. Data were controlled for gender, age and extraversion. Therefore, H_2 is partially supported, only for the morning situation.

Discussion and conclusion

Noise is an often-reported distraction factor in open office. The level of distraction may depend on personal characteristics, e.g. level of extraversion and age, and the source, character and amount of noise. In this study, the effect of noise level was determined by two aspects of wellbeing, namely the level of Anxiety and Comfort, being inversely related aspects of the circumplex model of affect (Warr, 1990).

Regarding the personal characteristics, the respondents did not significantly differ in level of extraversion. Average levels of Anxiety and Comfort were not significantly different at the beginning of the days of the week.

The noise levels during the day, caused primarily by conversations and phone calls, varied between 40-70 dB, with higher levels in the afternoon than mornings, and peak values well over 80 dB. Employees in the open plan office of the case organisation have repeatedly complained/mentioned that this office is too noisy, and the data support this.

Levels of Anxiety and Comfort may be caused by noise levels, and mediated by personal characteristics such as gender, age, extraversion, and Anxiety/Comfort levels at the start of the measurement. The results support the assumption that employee wellbeing in this office is negatively impacted by noise; that this effect is not mediated by age or extraversion, and partially mediated by Anxiety/Comfort levels at the start of the measurement. Contrary to popular belief, our results do not show that noise affects generations differently, thereby supporting Brand (2008) Belojevic and Jalovjevic, (2001).

A limitation of this study is that noise was measured as averaged levels across all frequencies, not taking into account the nature of the noise. However, it does show that even acceptable noise levels do affect wellbeing. Differentiation into noise below, in and above the frequencies for speech might show more clearly what the effect of speech noise is on wellbeing.

Three measures may reduce noise levels. First of all, changes in behaviour; however, communication is an essential part of the job of the departments using this open office, turning this into an unlikely measure.

Secondly, the use of earplugs or headphones. From an internal office health and safety as well as human resource perspective, it is up to the employee to decide on the use of headphones. However, in this organisation, it is more accepted to use visually less noticeable

headphones (in-ears). Employees are in general reluctant to use headphones, as they perceive this as unappreciated by their co-workers. Some also reported that they do not want to be perceived as rude and ignorant towards their environment or are anxious to miss out on important information e.g. colleagues talking, acoustic (emergency) notifications. The data show no significant differences between employees that wore headphones and employees that did not wear headphones regarding their anxiety-comfort level. However, it should be mentioned that the results are based on only eight participants that were found to use headphones and therefore this result is of minor value.

As a result of the noise measurement, the decision was made to invest in sound damping solutions the increase employee wellbeing. As there are several solutions on the market e.g. noise cancelling desk & room dividers, noise cancelling furniture and artwork, or acoustic ceiling and wall panels different solution need to be reviewed. The acoustic products will be placed in a test area in the office, to review solutions that can be technically implemented, are practical regarding installation as well as maintenance, and are visually appealing. Evaluation of the product performance will include noise measurements before and during the test period and interviews with employees about their perception of the test area regarding noise reduction to evaluate the appreciation in relation to the investment.

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The Space Utilization Inquiry Tool (SUIT™)

An Enhancement of Standard Building Capacity Assessments

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Abstract:

Explanation of the Problem. Standard facilities management practices include periodic building capacity assessments. In our K-12 (Kindergarten – 12th Grade) school facility management practice, capacity assessments consists largely of inflexible and purposeless calculations: the number of pupils each school facility can hold based on an arbitrary number of pupils per floor area. Buildings occupied by more pupils than the official capacity are rated as "over capacity", and those by fewer pupils as "under capacity". Such a perfunctory examination lacks crucial information: how well are the spaces suited to the present and future activities and functions for which they are used?

Approach. In response, our company's specialists have developed a straightforward and transparent tool to look more deeply into the suitability of existing school buildings for specific academic programs and future uses. SUIT™, the Space Utilization Inquiry Tool, uses a survey of building users and decision-makers to assess their responses to positively-worded issue statements. Each statement is evaluated by school district stakeholders on two five-point Likert scales: (l) actuality of the statement from the respondent's viewpoint; and (2) significance of the statement also from the respondent's perspective.

Results. We will present the structure and function of SUIT™, including sample survey results and how they can be used. SUIT™ can be adapted to a variety of building types besides schools.

Keywords: school buildings; space analysis; program suitability; Likert scale

Introduction:

A key issue in facility management is the number of people a building, or a rented portion, can hold effectively, efficiently, and economically. Typically, this is labeled "building capacity". It is calculated most often on the basis of a floor area allotment per person. Table 1 lists some sample floor areas per person for different types of workspaces. These figures are from the U.S. General Services Administration (General Services Administration, 2012, 27). This agency of the United States Government manages office space for all government departments and agencies in leased

and owned space across the United States, its territories, and in foreign nations. The following observations, findings, and remarks accompany Table 1 (General Services Administration, 2012, 26).

> *"In the 2000s, facility mangers in both the Federal government and private sector typically thought they needed 200 to 400 square feet per person to build an effective office workspace. Based on GSA research, today's prevailing standard workspace average is a little more than 190 USF (Usable Square Feet) square feet per person, and the space allocation could hit a mere 60 square feet in the next 5 years.*
>
> *As a continuous stream of GSA survey results and extensive research findings shows us, organizations have been gradually dialing back on office workspace allocation and grandness for years. As trends in today's workplace environment, such as telework and desk sharing offer organizations flexibility and optimal workspace usage. However the general slowdown in economic activity has accelerated the trend as sobered facility mangers are forced to let go of their old workspace and try new ways to use less space, increase operation efficiency, and reduce overall workspace costs.*
>
> *Our findings indicate that there are numerous other contributing factors at play in the push to make the allocation of the workspace smaller and more communal. Many responders are emphasizing teamwork, and the new mobile workforces that are accustomed to working anywhere but at a desk are turning up their noses at the hierarchical formality of the traditional workplace. In addition, familiar technologies such as laptop computers, smart phones and videoconferencing are finally beginning to affect the office workplace. Much like GSA's Central Office, the new workplace is designed to squeeze together workstations while setting aside a few rooms where associates can conduct meetings and rooms to have private telephone conversations. Ideally, GSA's design creates a workplace that is more open, collaborative, and efficient while utilizing fewer square feet per person (General Services Administration, 2012, 26)."*

Thus the numbers in Table 1 are merely a snapshot, while the narrative quoted above describes a dynamic of trends across many years and decades in technology and work ethic that will influence work behavior, operational arrangements, and office configurations. Although GSA acknowledges these trends and undercurrents, they offer no evidence of a dedicated method for inquiry into these phenomena.

Tab. 1: Floor Areas per Person in Office Space

Position	Usable Square Feet (USF)	Configuration
Executive	300	Private Office
Director	250	Private Office
Manager	200	Cubicle
Supervisor	120	Cubicle
Technical	80	Cubicle
Support Staff	80	Cubicle
Clerical	64	Cubicle

In consulting with public school clients across the United States, we saw the same situation

occurring: school capacity based on a rigid allotment of floor area per student was no longer enough to decide on the adequacy of a school building or school design. Instead, a methodology was needed to determine the suitability of an existing school or of a new school design on the basis of changes in technology and pedagogy, as evidenced by a recognition of new teaching and learning styles and newfound approaches and practices in these areas.

Ordinary, traditional school capacity analyses, while needed as a gross reference base, are insufficient to portray the true student capacity of existing building stock. Instead of the basic question,

> *How many students can your schools hold, how many do they hold now, and how many will they likely need to hold in the future?*

one needs to ask the broader question of:

> ***How will the pedagogic, programmatic, and technical changes in the school district likely influence floor area requirements in schools, and how must spaces be reconfigured, and spatial relationships changed, to implement these changes?***

For example, school districts are increasingly not only renaming their "libraries" "media centers," but are reconfiguring them to hold fewer hardcopy documents in favor of an increased cache of electronic media. This results in a completely new relationship between floor area and student enrollment, especially when there is no longer a perceived need for dedicated library shelves and the media center can be accessed remotely and virtually. Schools that have made this shift find themselves with new expanses of space in their media centers that can be repurposed in any number of ways.

The literature abounds in research concerning the influences of educational trends on school design. Prominent in this literature has been a series of papers on the influence of educational trends on the design and construction of schools by Kenneth R. Stevenson, Ed. D., (2002, 2007, 2010) of the University of South Carolina in Columbia. His monograph of 2010, titled *Educational Trends Shaping School Planning, Design, Construction, Funding and Operation*, is the most recent update of discourses he prepared under the same title in 2002 and 2007. Even he has admitted to revising his forecasts as the social, political, and economic climates have changed since he began writing his observations:

> *"Before presenting the updated trends, a note of forewarning is extended to the reader. The first two editions of this NCEF "Trends" work (2002 and 2007) tended to*

> *envision a relatively rosy, almost idealistic future for public education. The new version does not. A continuing recession, escalating political polarization, rising racial/ethnic tensions, a growing national debt, and a widening divide between the haves and the have nots portend a future fraught with unprecedented challenges to and clashes over the form and substance of public education in America… In essence, this work reflects the belief that, as an old adage suggests: "We can't control the future, but we can help shape it"* (Stevenson, 2010, 1)."

In its most current incarnation, Stevenson's monograph offers 15 key trends and observations as they are likely to influence the planning, design, construction, funding and operation of public schools in the United States. These trends forecast, among others, more flexible and changeable school facilities, increasing educational delivery by electronic means, and a restructuring of the teaching profession into expert educators similar to medical doctors, assisted by a cadre of technicians and assistants who carry out educational protocols and orders. His observations and speculations have the following message for school facilities planners and designers:

> *"How can effective learning experiences be delivered when the expectation is that the nation may well have fewer and fewer qualified teachers in the decades to come? And, how will districts address increasing enrollments when adequate funding is not available to construct or update school facilities? The emerging answer is: Through virtual learning experiences – experiences that occur at any location, at any time, and focus on the topic of choice of the learner. In this scenario, content materials are developed by the best educators in their respective fields. Highly trained distance delivery experts package the materials for effective use via multi-media devices. Student learning styles, as well as developmental stages and bio-rhythms, are considered as instructional packets are assembled… This does not necessarily foreshadow the disappearance of schools within 40 years. In fact, it is more likely in 2050 that some hybrid or blended educational delivery model, involving on-site and online learning, will be prevalent. It does, however, strongly suggest that educators and facilities professionals face a different future from what has always been. Thinking differently, particularly in terms of what school facilities will look like and the roles they will fulfill, must become a very necessary part of the long range facilities planning process.* (Stevenson, 2010, 12-13.)"

It becomes abundantly clear from the prior discussion that the mere calculation of whether or not the student population of a school building is above or below an arbitrary capacity figure no longer carries sufficient meaning, except perhaps for the most proximate moment. Of greater importance is a threefold consideration:

1. Are the school district's existing buildings suitable for the educational programs the district envisions during the coming twenty years?

2. If the existing buildings are not fully suitable, then what are the types of renovation and remodeling actions the district should initiate?

3. What types of new buildings should the school district plan, design, and construct, if any?

To help answer these questions, and to serve our school district clients in this more complete and thorough manner, we have developed a tool that permits us to assess the suitability of our clients' buildings, and the possible need for new facilities that fit future programs. The reference frame we use is our clients' view of the future, instead of a rigid, external ideological construct of what prospects are to come. We have named our tool SUIT™ – the acronym for Space Utilization Inquiry Tool.

The Structure and Function of SUIT™:

When applied in our exclusive consulting practice with public schools in the United States, SUIT™ relies on the current experiences of a school district's educators (principals and teachers), facility support staff (custodians and maintenance workers, kitchen staff, etc.), and students to define and categorize the district's existing building stock along the dimensions of pedagogical and facility suitability. This collected information is then combined with an on-the-ground assessment of every space in every school building of that school district.

- *Issue Statement Inventory*

  SUIT™ contains an inventory of factually – and positively – worded statements (issue statements) in two key categories: pedagogy and facilities. The following statements are merely examples. They will be tailored to a specific school district's conditions and situations. Examples are:

  A. Pedagogy: Educational Strategies, Programs and Initiatives

  A.1. My school provides a safe learning environment.

  A.2. All classroom doors can quickly be locked from the inside during an emergency.

  A.3. After the start of school all exterior doors are locked and the main door can be easily monitored.

  A.4. During class times, all classroom doors are locked.

  A.5. All classroom doors have unobstructed vision panels.

  A.6. Students using classroom technology can be easily monitored.

  A.7. Students using technology in common areas (such as media centers) can be easily monitored.

  A.8. Significant technology assets are deployed in each classroom. The use of computer labs is minimized.

  A.8. Classes are provided in the appropriate spaces (e.g., science in a class equipped with a fume hood, laboratory casework, secure chemicals storage, etc.)

A.9. The school is small in size or is broken into more than one school-within-a-school, or it has in place other measures to boost connectivity and familiarity among students and staff.

A.10. Room locations, size, or features do not limit educational programming options.

A.11. Classroom spaces are arranged around common space that can be used flexibly in a "learning community" format.

A.12. Some areas of the school lend themselves to quiet reflection, while other areas are most typically active and boisterous.

A.13. The school grounds provide for natural environment areas such as botanical gardens, planting beds, and other opportunities for students to be exposed to, and work with, nature.

A.14. Furnishings, fixtures, equipment, and textbooks are not obsolete in light of current teaching and learning methods, available technology, and current data and information.

A.15. All classrooms have windows to the exterior, ideally with views to natural environment.

A.16. Classrooms for younger students include restrooms and wash stations within them, to minimize class disruptions.

A.17. Elementary classrooms can be arranged to support center-based learning that is easily monitored.

B. Facilities: Space Utilization, Reconfiguration, Renovation, and New Construction

B.1. The spaces in my school can be flexibly rearranged with little cost or effort as needs and uses change.

B.2. My school has adequate seating space in the cafeteria.

B.3. The core spaces of my school (cafeteria, kitchen, gymnasium, auditorium, offices, and so forth) were expanded as classroom wings or portables were added.

B.4. Most classrooms are occupied each period.

B.5. No classes are taught in hallways or unsuitable spaces and locations.

B.6. My school has sufficient space for teacher collaboration.

B.7. There is sufficient secure storage for hazardous chemicals (both educational and cleaning).

B.8. My school has ample space in all functions and areas, with no overcrowding in any classroom.

B.9. Faculty/staff only spaces in the school (such as staff restrooms) are always locked and inaccessible to students.

B.10. There are few unused rooms.

B.11.There is sufficient refrigerator and freezer storage to store food items at the appropriate temperatures with circulation.

B.12. There are no spaces in the building designated as “off limits” due to known hazardous conditions.

B.13. Roof access is appropriately limited, secured and controlled.

B.14. Hidden areas within or adjacent to the school that might provide offenders with “cover” or provide students with a location for illicit activities have been made safer by opening them up, exposing them, sealing them off, or other measures.

B.15. Visual surveillance of exterior areas, such as parking lots, is possible through windowing or camera placement.

B.16. Bus, car, pedestrian, and bike traffic are reasonably safe from each other at entry and exit points as well as throughout the site and traffic calming strategies discourage speeding throughout the site.

B.17. The school has no “junk rooms” containing obsolete, discarded, or unused equipment, broken furniture, discarded shop tools, or hazardous materials (paint, volatile spirits, chemicals, etc.)

B.18. The school has no mobile, portable classroom or other structures that have been in place for longer than two years. Any such existing structures are expected to be removed within a one or two year horizon.

B.19. The school’s core spaces (gymnasium, auditorium, cafeteria, kitchen, media center, etc.) are sufficiently sized and equipped to serve the student population.

B.20. The school has a fence that encloses and secures its site to limit access only to students, faculty, administrators, staff, and properly credentialed visitors.

B.21. Indoor air quality is good.

B.22. Students, staff, faculty, administrators, and others do not suffer from significant amounts of respiratory ailments and allergies whose source might be the building.

B.23. Few building occupants complain about environmental discomfort due to temperature and humidity extremes.

B.24. There are no excessive noises or sound distortions causing annoyances or making communication challenging in any areas of the building.

B.25. Quiet and noisy spaces are located apart from each other and create few or no functional conflicts.

B.26. Few to no interior finishes, furnishings, fixtures, and equipment appear to be damaged or broken, or in need of other maintenance and repair.

Issue statements provided in surveys are tailored to the reference frames of each school district's stakeholder group.

- *Evaluation/Rating Scales*

  Each issue statement is evaluated by district stakeholders on two scales:

  - actuality of the statement from the viewpoint of the respondent; and
  - significance of the statement from the respondent's perspective.

Each answer lies on a five-point Likert scale. The actuality scale ranges from 1 to 5, with 1 being "not at all true" to 5 being "very true". The significance scale ranges from 1 to 5, with 1 being "not at all important" to 5 being "extremely important" ("An Overview of", 2010). (The dual Likert scale approach is adapted from prior work by co-author Martineau on his Master of Architecture thesis of an "Urban Activity Model," where urban residents were asked to rate the frequency of occurrence and the importance to them of neighborhood activities and features.)

- *SUIT™ Survey Instrument*

The issue statement inventory serves as the basis for client customization. While clients cannot remove issue statements from the list, they may create, with assistance from our staff, issue statements to be added to the inventory. The customized survey is then administered to a variety of school stakeholders:

- faculty;
- staff (kitchen, cafeteria, office, custodial, etc.);
- administrators; and
- students.

If a school district has a high rate of community usage, then community members would be an additional stakeholder group. Stakeholder responses are weighted equally and analyzed within each category, and on a cross-comparison basis for similarities and differences.

All SUIT™ surveys are administered in a secure online environment. Our survey technology allows us to require respondents to provide significance scales along a distribution, ensuring that not everything is ranked as "extremely important". A portion of a completed issue statement inventory by one stakeholder might look as shown in Table 2:

Tab. 2: Hypothetical Actuality and Significance Scores for Selected Issue Statements

Issue Statement	Actuality	Significance
A.1. Teachers, administrators and other appropriate staff are thoroughly trained before major new educational policies, procedures, programs or other strategies are implemented.	4	5
A.2. Special education programs are conducted alongside regular elementary, middle, and high school programs.	3	2
A.3. My school uses learning community teaching approaches.	1	1
A.4. My school provides a safe learning environment.	2	5

- *Issue Categorization/Prioritization*

  Once survey results have been received, we categorize them by user group as follows:

  I. Most urgent issues: issue statements with the lowest actuality ratings and the highest significance ratings are potentially the most urgent issues to be addressed.

  II. Least urgent issues: issue statements with the lowest actuality and the lowest significance ratings.

  III. Secondary issues: issue statements with mixed results, either by user group or overall. These issues may require follow-up, such as more in-depth interviews with key stakeholders and decision-makers, before they are placed in the prioritization order.

- *Issue Implementation*

  Subsequently, we prepare an implementation plan for the school district. This plan addresses typically issues of a programmatic nature. We include these issues in an educational program action plan. Simultaneously, we perform an "activity-facility translation" of all of the relevant issues and prepare educational specifications (or "EdSpecs", the term used in USA for school facilities program) to permit the physical accommodation of the initiatives contained in the educational program action plan. The latter will provide the most realistic facility utilization picture available.

Application in a US School District

The application of SUIT™ in a small school district in the US illustrates its value as a superior technique to other facilities analysis methodologies. Located in New Hampshire, the district had state-level size requirements for the physical classroom space and the number of students in a class. For example, a high school classroom should be at least 800 square feet and have no more than 30 students, requirements that had been unchanged for many years. The district projected nearly flat enrollment for the next 10 years. Faced with a mostly aged building stock and limited

funding but needing to respond to new educational concepts like competency-based education, the district undertook a facilities assessment using SUIT™ to help guide future decision-making.

SUIT™ survey instruments were customized and fielded by stakeholder group: school board members, school-based educators, high school students, community members/parents, cafeteria staff, maintenance/custodial staff, bus drivers, and secretaries. More than 300 stakeholders participated, a high level of input that later provided the results with greater weight among decision makers. Tabs 3 and 4 provide the most salient results from the input provided by high school educators and high school students, respectively. As shown, the SUIT™ methodology brought to light space adequacy concerns among the educators and students. The low actuality scores indicated that the building users did not feel these items were happening in their school but the high significance scores indicated these items were important to them.

Tab 3: Sample High School Educator SUIT™ Results for Space Usage

Issue Statement	Actuality	Significance
My school can be flexibly rearranged with little cost or effort as needs and uses change.	1.7	4.1
There are ample break-out spaces in my school for informal student gatherings to meet, study, discuss, or socialize.	1.9	4.0
My school has circulation spaces that allow for people to stop and speak with each other without disrupting others who want to walk past.	1.9	4.0
Classroom spaces are arranged around common space that can be used flexibly in a “learning community” format.	1.9	3.6
There is a variety of formal meeting spaces for small, medium, and large groups available to students in the school.	2.0	4.0

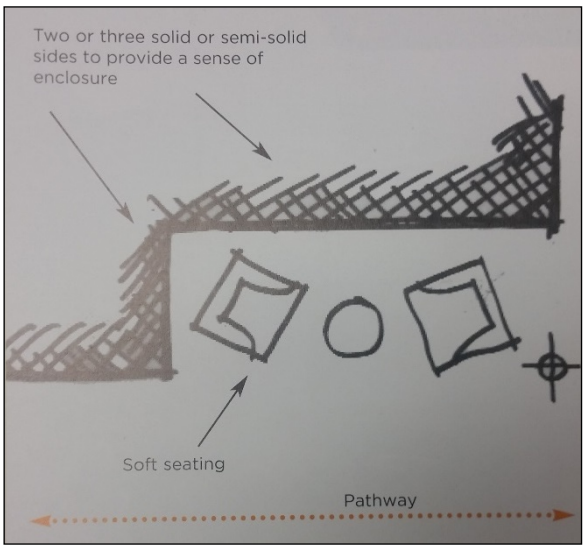
Tab 4: Sample High School Student Responses for Space Usage

Issue Statement	Actuality	Significance
There are a number of informal alcoves, nooks, or other meeting spaces available for students to study, chat, and socialize.	2.5	4.3
There are ample break-out spaces in my school for informal student gatherings to meet, study, discuss, or socialize.	2.6	4.2
There is a variety of formal meeting spaces for small, medium, and large groups available to students in the school.	2.8	4.1

The preliminary design work for the district’s high school reflected and honored these concerns. The master plan drafted included consideration for a dedicated, flexible student use space, what came to be termed “a space of their own”. This space was incorporated into an expanded foyer area that that also met the need for an improved administrative suite and professional office space for teachers (needs that were identified in other SUIT™ issue statements).

Additional break-out spaces were recommended throughout the school, by carving "cave space" from the existing footprint, comprised of portions of existing hallway and classroom square footages. Tab 5 provides a sample of what was recommended.

Tab 5: Alcove or Cave Space



Source: Nair, P., Fielding, R., and Lackney, J. (2013). The language of school design: Design patterns for 21st century schools. Designshare.com.

These recommendations were directly the result of SUIT™. It is unlikely they would have been perceived as strong needs based solely upon consultants' observations, nor would they likely have surfaced among stakeholders without the structure and space usage language SUIT™ provided.

The SUIT™ results from an elementary school in the same district pointed out different concerns among that building's users. Tab 6 provides some of the salient SUIT™ results. As shown, there were a number of space adequacy and space usage issues. Given the tools to speak the language of facilities designers, the educators were able to clearly identify the ways in which their building was not supporting the type of educational programming they desired to provide. There was overcrowding in many areas, some teacher-student small group work was being conducted on the floor, in breezeways, and core spaces such as the "gymnacafetorium" were so undersized and overscheduled that they were no longer effectively serving their purpose (in this case many classes had taken to eating in their classrooms), and the needs of special student populations for space had been neglected. While this school was well within the state guidelines as to the square footage of the classrooms provided and the number of students per classroom, it fell short of meeting the needs of teachers and students engaged in modern concepts of learning.

Tab 6: Sample SUIT™ Results for an Elementary School

Issue Statement	Actuality	Significance
Space Adequacy		
My school has ample space in all functions and areas, with no overcrowding in any classroom.	1.8	4.6
There is sufficient space in the teacher workroom.	1.0	4.6
The core spaces of my school (cafeteria, kitchen, gymnasium, etc.) were expanded as classroom wings were added.	1.9	4.6
Specialists have sufficient space to work with special education students.	1.5	4.9
Elementary classrooms provide nooks or otherwise recessed spaces to house center activities in semi-private settings and without encroaching in the main classroom area.	1.4	4.1
Space Usage		
There is a variety of formal meeting spaces for small, medium, and large groups available to faculty and administrators in the school.	1.5	4.8
No classes are taught in hallways or unsuitable spaces.	1.6	4.9
The spaces devoted to special education are appropriate.	1.7	4.8
There is a variety of formal meeting spaces for small, medium, and large groups available to students in the school.	1.5	4.1
There are ample break-out spaces in my school for informal student gatherings to meet, study, discuss, or socialize.	1.4	4.4
The school has designated and sufficient space for teacher collaboration.	1.4	4.6
There is designated and suitable space within the school for teachers to meet with parents or conference with students.	1.7	4.4
There is designated space within the school for students to engage in small group work.	1.5	4.6

The preliminary design work for this elementary school reflected and honored the concerns of its educators. The master plan drafted included consideration for:

- A new space to be used as a cafeteria and occasional auditorium, allowing the "gymnacafetorium" to be used solely as a gym;
- Increased storage options for teachers and students outside their classrooms in order to free space within them; and
- Adding a "specialist suite" to better accommodate work with special student populations.

As with the high school master plan elements, it is unlikely these elements would have been perceived as strong needs based solely upon consultants' observations, nor would they likely have surfaced among stakeholders without the structure and space usage language SUIT™ provided.

Conclusion:

The methodology presented in this paper was developed for use and application in the K-12 school consulting practice of our firm. However, the approach described in the structure and function of SUIT™ is equally useful and applicable with many other building types. This

includes offices, hotels, stores, government buildings, transportation facilities, and many others. Prototype buildings developed by chain establishments are especially applicable to our approach.

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Wir danken unserem Partner des 9. IFM-Kongresses 2016:

ÜBER SODEXO

Von Pierre Bellon 1966 gegründet, ist Sodexo weltweit führend bei Services für mehr Lebensqualität, die eine wichtige Rolle für den Erfolg des Einzelnen und von Organisationen spielt. Dank einer einzigartigen Kombination aus On-site Services, Benefits & Rewards Services und Personal & Home Services stellt Sodexo täglich für 75 Mio. Menschen in 80 Ländern seine Dienste bereit. Der Erfolg und die Leistungsfähigkeit von Sodexo beruhen auf der Unabhängigkeit, dem nachhaltigen Geschäftsmodell und der Fähigkeit des Unternehmens, seine weltweit 428.000 Mitarbeiter an sich zu binden und kontinuierlich weiterzuentwickeln.

Sodexo verfügt über langjährige Erfahrung im Bereich integrierte Servicelösungen - vom technischen Gebäude- und Energiemanagement über Catering, Reinigungs-, Empfangs- und Sicherheitsdienste bis hin zu Concierge-Services, mit denen Sodexo auch die individuellsten Wünsche eines jeden Kunden erfüllt. Als weltweit tätiges Unternehmen verfügt Sodexo über namhafte Referenzen in der Betreuung nationaler und internationaler Facility-Management-Projekte. In enger Abstimmung mit dem Kunden erarbeiten die Experten von Sodexo Optimierungspotentiale und erstellen maßgeschneiderte und nachhaltige Facility-Management-Konzepte.

On-site Services in Österreich

Sodexo Service Solutions Austria ist seit mehr als 20 Jahren in Österreich vertreten und beschäftigt heute bundesweit rund 4.000 Mitarbeiter. Diese begeistern mit ihrer Servicementalität täglich 70.000 Endkunden in 1.125 Betrieben, darunter Wirtschaftsunternehmen, Behörden, Schulen, Kindergärten, Kliniken und Senioren-einrichtungen.

Benefits & Rewards Services in Österreich

ist mit über 20 Jahren Erfahrung Marktführer in der Abwicklung von Sozialleistungen und Incentives für Mitarbeiter mittels Gutschein- und Chipkartenlösungen und bietet vielfältige Möglichkeiten, um zusätzliche Leistungsanreize zu setzen und Wachstum zu steigern.

www.sodexo.at