

Near-practice Teaching in the Field of Mobility Management Requirements and Methodologies for Study Courses

Institut für Verkehrsmanagement der Ostfalia Hochschule für angewandte Wissenschaften Braunschweig/ Wolfenbüttel

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Near-practice Teaching in the Field of Mobility Management

Requirements and Methodologies for Study Courses

Prof. Dr.-Ing. Christoph J. Menzel

Near-practice Teaching in the Field of Mobility Management

Abstract

Transport and mobility are continuously changing. Environmental impacts, particularly climate change processes, on the one hand, and development in society and technology, particularly digitalisation processes, on the other hand, are major challenges for sustainable and integrated planning and operation of transport and mobility.

Since sustainable improvements in technical operations and – even more importantly – in infrastructure take many years of analysis, planning, preparation and construction, these are often not the most effective options when it comes to short-term requirements concerning behavioural change.

The gap between the existing unsustainable transport system and future sustainable system exists because of many behavioural aspects, which are derived from misinformation, attitudes and lack of awareness. This is where mobility management comes into play. Mobility management uses 'soft measures' such as individual consultation, strategic communication and campaigns to achieve behavioural changes. This has been clearly proven by the evidence. The above-mentioned gap can therefore be filled, especially since mobility management seems to have started to become a stand-alone field of work.

However, significant differences concerning mobility management exist worldwide. Although the implementation of mobility management started in the USA in the 1980s, today, Europe appears to be the driver of developments in this area. The so-called SUNflower states in particular, Sweden, United Kingdom and The Netherlands (but also other countries), are pioneers in this field. Other parts of the world, especially South America and Southeast Asia, still suffer from inadequate transport systems and/or non-integrated planning processes. Without these elements, which are the necessary framework and basic requirement for any approach towards mobility management, mobility management simply does not exist in these places.

The positive experiences with mobility management, especially the fact that mobility management for companies (CMM) has become widely established, have however led to an increasing number of projects, initiatives and programmes, and – consequently – jobs in this field. It is an obvious fact that a field of work which aims to achieve behavioural changes within a technically driven world requires adequately specialised professionals for doing these jobs.

The project thesis 'Near-practice Teaching in the Field of Mobility Management' reflects on the existing educational opportunities for learning mobility management, their upcoming development and new didactic standards. During five years of research, the author found out that mobility management has become very dynamic, so that new study courses (and additional vocational opportunities) in mobility management, which do not yet exist, are highly important to implement. This also requires a change of didactic methods concerning examination, evaluation and practical interaction. Moreover, the strategic focus of mobility management must change from transport engineering, including merely a small element of communication, to a 50/50-share of each. This share means that there is a very high need for educational quality. The proposed study courses shall therefore be at the Master's degree level.

Although a large volume of knowledge concerning education and jobs within mobility management was gained during the project, more research, especially evaluative and qualitative monitoring must follow for both the field of mobility management and the related educational opportunities.

Praxisnahe Lehre im Bereich des Mobilitätsmanagements

Kurzfassung

Verkehr und Mobilität sind ständigen Veränderungen ausgesetzt. Die großen Herausforderungen nachhaltiger und integrierter Verkehrsentwicklungsplanung sind negative, verkehrliche Umweltwirkungen, allen voran der Klimawandel auf der einen Seite, gesellschaftliche und technologische Veränderungen, allen voran die Digitalisierung auf der anderen Seite. Da Veränderungen in Infrastruktur, Organisation und Betrieb in der Regel einige Jahre benötigen von der ersten Idee über die Analyse, Prognose, Planung und Kalibration bis zur Umsetzung, sind kurzfristigere Ansätze vonnöten, um notwendige verkehrliche Verhaltensänderungen zu evozieren.

Der systemische Unterschied zwischen nachhaltigem und nicht nachhaltigem Verkehr hängt in hohem Maße vom realen Verkehrsverhalten ab. Fehlende oder falsche Informationen, fehlendes Bewusstsein oder Kenntnisse sowie bestimmte persönliche Einstellungen beeinflussen das Verkehrsverhalten in erheblichem Maße. Hier setzt das Mobilitätsmanagement an. Individuelle, auf Wertschätzung beruhende Beratung, strategische Kommunikation bis hin zu eindeutigen Kampagnen sind effiziente Werkzeuge des Mobilitätsmanagements, die nachgewiesenermaßen Verhaltensänderungen erzeugen. Das Mobilitätsmanagement hilft also, die langfristigeren Ansätze zu untermauern, sogar zu beschleunigen. Es scheint sogar möglich, dass sich das Mobilitätsmanagement, welches sich klassischerweise als Teilaspekt integrierter Verkehrsplanung definiert, hin zu einer eigenständigen Fachdisziplin entwickelt.

Weltweit zeigen sich in Bezug auf Mobilitätsmanagement jedoch deutliche Unterschiede. Trotz der Tatsache, dass das Mobilitätsmanagement in den 1980er Jahren in den USA seinen Ursprung nahm, sin des derzeit vor allem europäische Staaten wie Schweden, die Niederlande oder Großbritannien, die das Feld des Mobilitätsmanagements weiter entwickeln. In Südamerika und Südostasien hingegen scheint das Thema Mobilitätsmanagement noch nicht oder höchstens rudimentär zu existieren. Gründe hierfür können die noch laufenden Entwicklungsprozesse im Verkehrssystem, aber auch strikte administrative Trennungen der Disziplinen Verkehr und Stadtplanung sein.

Die guten Erfahrungen mit Mobilitätsmanagement, allem voran die breite Etablierung des betrieblichen Mobilitätsmanagements (BMM) führt dazu, dass mehr und mehr Projekte, Förderprogramme, Privatinitiativen und – folglich – Jobs im Mobilitätsmanagement entstehen. Es ist daher offensichtlich, dass Jobs, die sich mit Verhaltensänderungen in einer sich technisch und gesellschaftlich schnell wandelnden Welt befassen, entsprechend gut und spezifisch ausgebildetes Personal benötigen.

Das Projekt "Praxisnahe Lehre im Bereich des Mobilitätsmanagements" beleuchtet bereits bestehende, das Mobilitätsmanagement betreffende, Ausbildungsprogramme. Dabei berücksichtigt der Autor nicht nur die wahrscheinlichen inhaltlichen Veränderungen einer sich emanzipierenden Fachlichkeit, sondern auch notwendige didaktische Anpassungen einer sich nicht weniger dynamisch entwickelnden Hochschullandschaft. Die fünfjährige Forschungsarbeit ergab, dass neue Studienangebote sowohl im grundständigen Bereich als auch im Weiterbildungsbereich notwendig sind. Ebenso ist eine grundlegende Reform der Lehr- und Prüfungsformen notwendig, um den Ansprüchen gerade im Mobilitätsmanagement zu begegnen. Schlussendlich muss das Mobilitätsmanagement sich selbst reformieren. War es bisher noch eine Subdisziplin der Verkehrsingenieurwissenschaften, gewürzt mit ein bisschen kommunikationswissenschaftlicher Kompetenz, so werden sich diese Inhalte zukünftig paritätisch entwickeln müssen, um den künftigen Ansprüchen an ein adäquates Mobilitätsmanagement gerecht zu werden. Das bedeutet automatisch ein höheres Level an Lernkompetenzen, welches nur von Masterstudiengängen erfüllt wird.

Nichtsdestotrotz wird noch viel weitere Begleitforschung notwendig sein, um die Entwicklung des Mobilitätsmanagements selbst und der damit einhergehenden Lehre und Ausbildung gestalten zu können.

Near-practice Teaching in the Field of Mobility Management

Requirements and Methodologies for Study Courses

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0. Acknowledgements

In the year 2004 I had a 'flow'. My boss, Professor Hartmut Topp, gave me two weeks on my own to finish my PhD thesis. Of course, the whole project took approximately three years and yes, of course, I was writing much longer than for these two weeks. However, it was mainly due to these two weeks of not having anything else in focus than just writing on my PhD that put me into a 'flow' (a very important factor for this research report - see chapter 5.2.2). By then, my working day started at 2pm (!) and it ended at 4am.

Now, many years later (and older), I have three nice children, two more or less nice cats and a lovely wife. Did I mention my full-time job? Consequently, there is neither chance at all to just focus on this report, nor to work from 2pm to 4am. The corona-crisis beginning in March 2020 aggravated these rather invidious circumstances even further.

The fact that you, dearest reader, are able to read this report, therefore, is merely possible, because my wife gave me the chance to finish it by offering me rotating working slots that would match with her own work. Adoring thanks for that, Daniela!

I would also like to thank a few persons, without whom this report would not have occurred. Many thanks to my dear friend Christian Raupach who provided ideas, gave good hints concerning literature and supported me during phases of doubt.

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So, finally, even if I did not have my two weeks of focused work, I got enough fuel from you all to finish this thesis in a 'flow'.

1. Introduction

Transport causes problems worldwide. Especially car traffic impacts on matters of sustainability. Pollution, noise, land consumption and several other circumstances cause damage on the ecological edge of the sustainability triangle, which has direct consequences on the economic edge such as losses in value and massive investment in safety measures. Accidents, exclusions and inhomogeneity between urban and rural spaces have an impact on the social edge of sustainability.

Hence, on one hand, managing erroneous trends in the transportation sector seems to become one of the biggest challenges for 21st century society. On the other hand, mankind faces a largescale and accelerated amount of innovations and inventions in digitalisation, biogenetics, astronomy and many other fields which can make the world better. Matters of mobility and transportation are settled in the core of this development.

Mobility and transportation sciences, therefore, have so many interdependencies with other sciences, that it might be one of the most interdisciplinary sciences of all. Hence, the author's major motivation working as a transportation engineer, is - more or less – making the world a better place.

Now, this aim is likely to be a bit too highly challenging for a habilitation thesis. So let us lower the sights a bit. Transportation and mobility sciences have developed mainly as a sub science from civil engineering, as well as from mechanical engineering. Nearest to that are urban and rural design, human geography and architecture. A mixture of all the above mentioned sciences led to the implementation of transportation sciences study courses beginning in the 1970s, accelerated in the 1990s and again in the following years after the Bologna Declaration in 1999.¹

During the last two decades, mobility management arose from the large toolbox of ideas that transport sciences supplied. The fascination behind this: the question "how can one change people's unsustainable behaviour without the garrulousness of planning processes"? Amongst the simplicity of this question lie loads of open academic questions: "how are the interdependencies between communicative and infrastructural approaches?", "how does durable participation work?", "what are the necessary requirements for those actually conducting mobility management" and so on and so on... This all leads to a more complex question: "Has mobility management developed itself to a stand-alone science?"

This thesis, to be honest, will deliver no answer to this complex and rather philosophic question. Nevertheless, it is meant as a start of something new. It takes into account that mobility management might be on the road to stand-alone. Even if not, there is evidence that mobility management needs more attention than it gets today. There is evidence that mobility management should become a topic of an independent study course. There is evidence for the necessity of this thesis.

¹ Source: European Ministers of education: "The Bologna Decleration of 19 June 1999" [AD03a]

1.1 Personal motivation

The author had the personal experience that, in real life, certain employees very have responsibility for tasks and topics they were not prepared for in their study courses and further education. In concerns of mobility management, this fact used to be the norm. This results either in the fact that projects in the context of mobility management do not get enough emphasis compared to 'classical' traffic planning methods. Or it results in the fact that the methods of mobility management are applied in the wrong way, wrong shape or wrong scope. In this case, 'wrong' means: Leading to inadvertent results.



Figure 1: First brainstorming draft towards this thesis in 2016 [own picture by the author]

Hence, the author decided to make mobility management a major topic of his teaching, so that further generations of graduates at least have basic knowledge of how to conduct mobility management. Back in 2011, Ostfalia UAS started a Masters degree study course called 'Transport and Logistics', in which students must choose five out of six similarly shaped modules per semester, beginning with the summer semester (March-July). Herein, the author provides one module per semester – one of which: 'Mobility Management'. So, consequently, the author had the chance to create the model from scratch, merely relating to the existing module description, which – by 2011 – had no more than the nature of a placeholder.

1.2 Structure of this thesis

This thesis consists of thirteen chapters with regards to content and an appendix catalogue chapter. The content chapters meet three major parts of the scientific work. The first part embraces all basics and the framework of the thesis. This part begins with the introduction and ends with a selected review of literature. Hence, chapters 1-5 compose part one.

The second part embraces practical content and results of the research done, whereas chapters 6-8 already focus on specific content extracted from the basic part one. Chapters 9-11 deliver results and conclusions for part three: the final outcome.

Part three, therefore, consists of a study course design approach and the prospects towards its implementation, quality management structures and improvement.

This thesis also has a hybrid structure. It builds up a framework for near-practice teaching in the field of mobility management. Hence, it brings together two structural elements. One of which is 'teaching and education' (i.e. didactics, university contexts, formats and derived job profiles). The second structural element is the scientific and practical portfolio of 'transport and mobility'. The link between both structural elements is the near-practice approach. The structural elements merges in the last part of the thesis. Both elements occur in each of the three parts of the thesis.

The following figure gives an overview of how the structural elements correspond to the content of the three parts and which chapters belong to which part.



Figure 2: Erection and structure of the thesis

The third part named 'outcome and ring structure' shows the necessity of monitoring the further development of mobility management and related study courses as well as the verification or falsification of the hypotheses (chapter 1.6). This is due to the abductional nature of the research done for this thesis. All results are merely approaches to proof in the aftermath.

1.3 Cause of research about near-practice teaching in the field of mobility management

Although this thesis arose from a very subjective suggestion (see chapter 1.4), it became clear very early during the preparative work that near-practice teaching in the field of mobility management is nothing trivial. This has at least three reasons. Firstly, the Bologna process at universities started a new era of teaching. Now, quality aspects, learner's perspectives, aspects of multidisciplinarity, transparency, student mobility and – last not least – employability change study courses and teaching setups continuously. This thesis tries to cope with the challenges that arise from such changes.

Secondly, job profiles in mobility and transport contexts changed rapidly during the last two decades, both driven by what we call 'the third industrial revolution' (i.e. digitalisation, decarbonisation, decentralisation).² Mobility and transport have become more diverse. Coming from engineering (i.e. mechanical and civil engineering), the job profiles now spread into economics, geography, sociology and several other disciplines (see chapter 4).

Thirdly, during the research done in relation to this thesis, mainly with the expert interviews and the focus group discussions, one specific thought became clearer and clearer and its likeliness of being true increased. This thought is: mobility management is developing to become a field of its own. Even more than that: If education in mobility management includes the right mixture of content, it can evolve to a strong weapon against nearly all negative effects of transport (see chapters 6.1 and 6.5).

1.3.1 Development in didactics at university teaching since the Bologna declaration

The Bologna declaration and its derivatives (see chapter 1.6.1) led to higher requirements concerning quality management of study courses. Accreditation processes include the following checklist:

- evaluation of lectures
- workload for students
- so-called 'mobility windows'³
- facilities, workings spaces, laboratory
- consulting options for students
- variety of examinations
- multidisciplinarity
- options for (didactic) courses for lecturers
- competence-oriented learning outcome

Although every study course must use the above-mentioned checklist this has several impacts on lecturing in transport and mobility. Transport and mobility is – just like healthcare – complementary. Everyone is mobile, every day. Transport policy articles are in every newspaper, every day. The amount of realtime practice with transport and mobility issues (i.e. planning, scoping, measuring) is extremely high. Therefore, it is important to identify such lectures and didactics that match best with the requirements of quality as mentioned in the list above.

This thesis aims to give an overview of how far the existing study courses and lectures already comply with the mentioned requirements, especially concerning multidisciplinarity and learning outcome.

² Source: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit: "Die Dritte industrielle Revolution - Aufbruch in ein ökologisches Jahrhundert", Berlin, 2008

³ Comment: All curriculum schemas of study courses must identify one certain period of time (semester) in which students can easily make use of a student exchange programme.

1.3.2 Recent changes in jobs profiles in the field of mobility and transport

The empirical and literature research (especially chapters 4, 5.3.1, 7, 8 and 9.3) results show a high relevance of mobility management in the national and international job markets.

The vocational fields reach from public administrations, NGOs to companies in the field of transport economy, consultants and large employers. Especially the demand for Masters degree graduates increases constantly. Since 2010, online job exchange portals (e.g. Stepstone, XING, LinkedIn) post job descriptions including the term 'mobility management' to an increasing degree. Since 2017, the portals started posting job offers entitled 'mobility manager' or 'mobility consultant'. A random sample in December 2020 showed three to six new 'mobility manager' job offers per week on each of the mentioned portals – only in Germany – and in spite of the second wave of the ongoing corona pandemic by that time⁴.

Some of the expert interviews with persons from the pioneering countries United Kingdom, Sweden and The Netherlands (the so-called SUNflower states) showed a paradigm shift away from a classical segmentation between conceptual planning (e.g. transport plans) and municipal communication management (e.g. participation processes) towards explicitly hybrid mobility management approaches. This mashup-approach led to a decided demand for mobility managers, mostly consultants, in these three countries. This change of job market started at least ten years earlier than in Germany.^{5,6,7}

An astonishing aspect of this matter is that the need for mobility managers is relatively high, while corresponding study course offers are not yet, or not sufficiently, available in the SUNflower states. This leads to the fact that newly developed Masters courses in mobility management can lead to international demand, or might even be a unique selling point for a German university.^{8,9}

1.3.3 Emancipation process of mobility management

Today as well as in the recent years, mobility management processes supplemented transport plans, mobility Masterplans, long-term shifting strategies and climate change programmes. The research results also show a tendency to classify mobility management as a (important but) subordinated part of sustainable transport planning. However, also here, a recognisable paradigm shift concerning development strategies of municipalities and companies is going on.

⁴ Comment: This is more a random sample by the author than a statistical review. Several institutions (e.g. DEPOMM, however, monitor such job market development.

⁵ Source: Expert interview with Representative from DTV Consultants [Pr8]

⁶ Source: Expert interview with Caroline Ljungberg [Pr11]

⁷ Source: Expert interview with Anders Söderberg [Pr12]

⁸ Source: Expert interview with Tom Rye [Te5] ⁹ Source: Expert interview with Till Koglin [Te8]

This thesis aims to show how the field of mobility management might diverge from the transport planning processes, even though it has the same goals. The unique aspects of mobility management are:

- Mobility management can support planning processes at a very early stage even BEFORE project processes actually start
- Mobility management can ease negative aspects of failed projects (e.g. after public decisions against large public transport projects)
- Mobility management can achieve durable awareness
- Mobility management can persuade stakeholders to support sustainability and is therefore a political method
- Mobility management can even AVOID planning projects
- Mobility management can achieve public acceptance because of the appreciating nature of communication

Hence, mobility management may, at least possibly, develop into its own intrinsic field of work gaining achievements in sustainability which classical transport planning cannot. This thesis will not give an adequate answer to the question, whether or in how far this will really occur, but the question alone brings the idea of sustainable transport forward.

1.4 Teaching experience in mobility management by the author

Hence, in a first attempt for the module 'Mobility Management', the author tried out a weekly session consisting of four hours contact time, in which the students' task was to manage shifting policies for electric mobility. The author aborted the lecture after the second week, due to a lack of attendance.

1.4.1 Near-practice teaching in mobility management

So, in the second attempt - one year later - the author changed the setting. From now on, the teaching (and therefore contact time) – sessions consisted of six full-time day workshops throughout the semester. In 2012 and 2013, the task was to create a concept for mobility management concerning the campus and the scientific events of Ostfalia UAS in Salzgitter. From 2013 on the setting changed again. The topic changes year by year. Since then, each topic was (and is) supported by external project partners. The basic case studies switched to real problems to be solved.¹⁰ Table 1 gives an overview of the topics and partners in the module 'Mobility Management'.

¹⁰ Source: Menzel, C./Künnecke, K.: "Kooperation meets Interaktion - Veranstaltungen mit Praxispartnern im Fach Mobilitätsmanagement" [AD13]

Year	Торіс	Content	Project partner(s)	Eval. 11	Feedback and aftermath
2011	Promotion for electric mobility	Coord./manag ement	none	none	Aborted after one lesson due to a lack of attendance
2012	Mobility managemant campus Salzgitter	Location- dependent MM	none	1,89 (n=19)	internal presentation for the faculty's dean
2013	Mobility management Ostfalia UAS Events	Event- dependent MM	none	1,60 (n=15)	internal presentation for the faculty's dean
2014	Mobility management for the industrial park "Berliner Bogen" in Nienburg	СММ	Ecolibro Itd, City council of Nienburg	3,05 (n=20)	Public debate in concerns of redesigning the local public transport system, newspaper article, students criticize the poor results of the project
2015	Mobility management for kindergartens in Braunschweig	MM for kindergartens	Ecolibro Itd, Kindergarten Sterntaler, Kindergarten Kreuzkirchengem.	1,62 (n=13)	Parts of the concept are used to take part on an international competetion towards sutainable transport solutions in Salzburg, redesign of parking lots near kindergarten Sterntaler, kindergarten Sterntaler buys new vehicles appropriate for children
2016	Mobility centrals in the region of Braunschweig	Mobility centrals	Administration union region of Braunschweig, Ecolibro ltd, Wolfsburg AG, City council of Wolfsburg, Municipality of Oderwald, Hofgut Heiningen	1,75 (n=9)	Adaptation of the concept for political purposes, Redesign of the building 'EMCube' in Wolfsburg, Concept for redesigning the farm shop in Heiningen
2017	Mobility management for the industrial park "Southend" in Wunstorf	СММ	Ecolibro ltd, City council of Wunstorf, ATS Elektronik ltd	2,67 (n=9)	Harsh political discussion in Wunstorf, abort of final presentation
2018/ 19	"Curriculum Mobility" teaching concepts at vocational schools in Braunschweig	MM for schools	Ecolibro Itd, Vocational School "Otto-Bennemann"	1,56 (n=10)	Continuing co-operation between Ostfalia UAS and vocational school 'Otto- Bennemann', requests from various schools in the region of Braunschweig
2019/ 20	Mobility management for the city council of Uelzen	MM for municipalities	City council of Uelzen, Ecolibro ltd, B.A.U.M. ass.	1,80 (n=7)	Ecolibro makes a new concept for Uelzen based on the students' concept.
2020/ 21	Cycling campaign for socially deprived people an Brunswick- Bebelhof – Bebelbike	Campaigns	City council of Brunswick, Aduld education centre of Brunswick, VCD, ADFC	1,45 (n=11)	A local Facebook group adapts the idea of Bebelbike as well as the slogan.
2021/ 22	Mobility management in rural areas	CMM, campaigns, MM for municipalities	Reinau GmbH, ELMO e.V., Municipality of Sickte	1,00 (n=19)	The company Reinau starts an internal project approach of sustainable mobility.

Table 1: Topics and results of the module 'Mobility Management' at Ostfalia UAS 2011-2021 (own design by the author)

¹¹ Comment: Evaluation marks refer to common German marks: 1 = excellent, 2 =good, 3 = satisfactory, 4 = sufficient 5 = insufficient

1.4.2 What is special about the module 'Mobility Management'?

There are a few basic elements of the lecturing that make this particular one special. Beginning with the setting of the lecture, which always takes places in a room where everyone can see each other. The lecturer sits in between the students. The room is equipped with flip charts, moderation equipment and a flatscreen. Coffee and cakes are available throughout the whole workshop. In order to increase both students' attendance and their willingness to take an active part in the workshop, there are a few 'NO's included:

- 1. No frontal lecture
- 2. No distance between the students and the lecturer
- 3. No assignment of tasks
- 4. No limits to ideas
- 5. No unrealistic or notional topics

Table 2: NOs in near-practice teachings (design by the author)

After discussing a few basic facts about the idea of mobility management and the major methods of this, the group usually divides – depending on the number of attendees – into three or four sub-groups. One of which – the most important one – is called the project management group consisting of two or three students. They now become the leading persons of the project. The project managers get marks for their performance of coordination, whereas all others get their marks for the actual concept. These conceptual groups give themselves a title. Examples of group titles are 'Hard facts group', 'Research group', 'Family questionnaire group', 'Multiplicator teaching group', 'Bicycle campaign group' etc. Apart from group participation, one participant is in charge of coffee and cake supply.



Figure 3: Workshop session during the module 'Mobility management' in 2018 - students work together with scholars from the vocational school 'Otto-Bennemann' [own picture by the author]

The project managers coordinate all follow-up workshops, the complete communication with the external partners and the communication between the teaching professor and the whole group. They also generate the whole framework for all project reports and presentations (layout, wording list, index etc.). They also become supervisors of the concept groups, so that the various conceptual fit to one major concept.

The concept groups decide the assignment of tasks within their group (always in co-operation with the project management group) and create work packages which they fulfil part by part. The project ends with a completed project report and a presentation at the facilities of (one of the) project partners.



Figure 4: Final presentation of the module 'Mobility management' in 2018 at the gym hall of the vocational school 'Otto-Bennemann' - the project management group sits at the right hand side [own picture by the author]

During the Corona-Lockdown-Phases in 2020, the presentations were held online, using the standard online tool of Ostfalia UAS named BigBlueButton. The external partners connected from their homeoffice, as did the students and the author. Previously, the author went to the Christmas market with the group of students after the presentation. In 2020 this also went online.



Figure 5: Students celebrate after the final presentation of the results 2019 (left) [picture by F. Wagner] and 2020 (right) [picture by K. Bogatek]

The results of nearly all projects within the module show a high level performance and very good feedback from the project partners. Apart from the project report, the projects resulted in various web site approaches, social media approaches, posters, flyers and other output.



Figure 6: Information flyers from the 2020 project 'BebelBike' in six different languages; all translations were conducted by participating students of the module Mobility Management

This module is merely one of twelve in a study course which is not directly related to mobility management as a profession. Therefore, this thesis focuses on what else (more than sample topics of mobility management) is needed to prepare students for their working life.

Mobility management

Transport Physical change of place	Mobility Possibility and ability for a change of place		
 Transport management ⇒ Control, Increase of efficiancy, Optimised use of existing infrastructure ⇒ Methodology: Engineering 	Mobility management ⇒ Providing access to alternative transport modes ⇒ Providing adequate information ⇒ Change of behaviour ⇒ Public awareness		
Approach at infrastructure and operations	Approach at user		
Transport plan Coord Infrasi Ope	nning and policy lination tructure ration		
Approach at basic str	uctures and framework		

Figure 7: Classification of mobility management [own design by the author]

In order to give an overview of what the core, and extend, of mobility management is this thesis both defines methods of mobility management in chapter 7 and presents in chapter 1.7.3 the experts' opinions about what mobility management means in comparison to planning and transport management context.

1.5 Research questions

The research questions are divided up into one basic question concerning the content and boundaries of mobility management and three questions concerning educational requirements for teaching and learning mobility management.

Q0.1. Is mobility management more an administrative routine with objective aims or an intrinsic routine with a subjective aim?

Q0.II. Which is therefore the most precise definition for mobility management?

Q1. Which are the key qualifications and skills for working contexts in mobility management – depending on the working area?

Q2. Which didactic methods are best for teaching such key skills and qualifications?

Q3. Which types of course and exams are best for proving key skills and qualifications

- ... for students?
- ... for trainees?
- ... for professionals?
- ... for career changers?

This thesis merely focuses on new arrivals, hence, students willing to start a career as a mobility management professional. However, there will be one further research question left open:

In how far can further education settings level professionals up to the same skillset as study courses do?

However, in order to find an answer to this latter question, empirical data must be collected from mobility management graduates working in the field, which – by 2021 - do not exist in a sufficient quantity. Therefore, the author suggests implementing a working group to monitor the field. This can be done by EPOMM [BP17] (and DEPOMM [BP18] for Germany). The circumstance of non-liable empirical data concerning size and scope of the divergences between graduates and attendants of further education courses in mobility management leads to hypothesis 1 (see chapter 1.6.3).

1.6 Hypotheses

The used hypotheses were created after the expert interviews in early 2018 (see chapter 1.7.3), before the next empirical steps. Therefore, some of the hypotheses already reflect on what experts think and recommend about near-practice teaching in mobility management.

However, a few explanations must be put before even presenting the thesis' methodology. The one and only core of this thesis is derived by the Bologna and London processes [AD03a and AD03b], accelerated by the author's motivation and experience (view chapters 0 and 1.4) and driven by the tremendous feedback from professionals to create a new idea for study courses in the field of mobility management. This core idea is that study courses must prepare students for their professional working life. Or, even more than that, study courses must preferably aim towards professional working life more than just giving the students an idea of scientific methods. This includes any academic job. Even becoming a scientist is no other than entering professional working life. The London communiqué uses the term 'employability' for what is meant.

However, this term is not sufficiently defined in the London communiqué.¹² Therefore, the author uses an own definition, taking into account that 'diversity' exists, which means, that graduates have different states of exercise, skills and awareness when entering the professional working life.

1.6.1 Core Definition "Employability"

The core definition of the term "employability" is as follows:

In this thesis, the terms 'employability' and the attribute 'Being qualified and competent for jobs in mobility management' - according to the pareto-principle - are defined as follows: 80% of graduating students are able to fulfill 80% of mobility management job tasks WITHOUT any training on the job. The missing 20% of mobility management and other job tasks can be trained during the first 6 months on the job. 'Employability' is one of the core goals of the so-called 'Bologna'-reforms, according to the London communique published in 2007¹².

Definition 1: Employability

The pareto-principle¹³ is a very often used management rule based on the research done by Vilfredo Pareto and Joseph M. Juran during the early 20th century. This is no more than a thumb rule. Nevertheless, it helps to measure how successful graduates are in doing their job and gives hints towards necessary adjustments to the specific study course.

1.6.2 Complexity of mobility management

Mobility management embraces very complex circumstances, which can only be coped with by a professional with a broad skillset. The intended process behind this thesis provides an overview of how complex professional mobility management is and how an educational build-up process can be.



Figure 8: Educational build-up process for mobility management [own design by the author]

 ¹² Source: European Ministers of education: "London Communiqué - Towards the European Higher Education Area: responding to challenges in a globalised world" [AD03b]
 ¹³ Source: https://www.pareto-prinzip.net [AD18]

Mobility management is defined as follows:

"Mobility management is a concept for promoting sustainable transport and dealing with the question of car use by modifying the habits and behaviour of travellers. The core of this mobility management is formed by 'soft' policy measures such as information and communication, organisation of services and the coordination of activities of the various partners".

Definition 2: Mobility Management¹⁴

These circumstances and the necessity of employability according to chapter 1.6.1 lead to the following hypotheses.

1.6.3 Used Hypotheses

H1. Mobility management is a field to be taught in study courses only, vocational and further training in mobility management are not sufficient educative formats.

H1.I. Study courses can be properly shaped and scoped in order to enable students to become qualified and competent (Definition 1) for the job of mobility management.

H1.II. The combination of skills for mobility management is necessarily multidisciplinary.

H2. According to the expert point of view, study courses teaching mobility management skills must be at the Masters's level. A specified Masters degree course for mobility management can be either shaped as a consecutive course for multiple bachelor courses or as further education.

H2.I. Mobility management students must have an intrinsic motivation (according to the theory by Ryan/Deci) for becoming qualified and competent (Definition 1). The likeliness of students' intrinsic motivation on Masters degree courses is essentially higher than for bachelor courses.

H2.II. According to the expert point of view, practical skills are more important than theoretical skills in concerns of mobility management.

H2.III. According to the expert point of view, at least 60% of mobility management courses must consist of case studies in real contexts, supervised by practical professionals. Notional tasks must be avoided as far as possible.

H2.IV. According to the expert point of view, case studies within mobility management courses must essentially include project management tasks, analytic tasks, conceptual tasks, communicative tasks, scientific working methods and presentation tasks.

¹⁴ Source: https://epomm.eu [BP18]

H2.V. The related type of assessment and grading for case studies within mobility management course must evaluate all tasks as in III. The weighting between the tasks can be individual.

H2.VI. Case studies described as in III are also useful, but less important for transport planning topics. The latter can also use notional tasks.

H2.VII. Shaping a specified curriculum for mobility management courses at the Masters's level causes less effort than a curriculum for a bachelor's level. This includes both admission to the course (students must have a bachelor degree, only a few bachelor courses do not have the right specification for a consecutive mobility management course) and shape and scope of assessment (the minor part of modules within the course need written or oral examination).

1.7 Methodology

This chapter reflects on the empirical parts that were done in three major steps. Nevertheless, the start of the scientific work for this thesis is fluently connected to the teaching experience of the author. The author's comprehension of mobility management and how to teach it was growing for more than five years beforehand. Thus, the three steps of empirical research already took some experience into account that would not have existed if the research had started at a certain point (e.g. a project call). Perhaps, this fact is the most important distinction between this thesis and a typical scientific thesis.

1.7.1 Internet Research

As a part of preparation, the author hosted two student assistants in order to find out, how frequently the term 'mobility management' appears in study courses at universities and universities of applied sciences (UAS) in Germany, Austria and Switzerland. The student assistants had two tasks to do. First of all they had to find out, which universities and UAS provide study courses in the direct field of 'mobility management'. After the search was extended to study courses in transportation sciences. The students used specific web search assistants (e.g. studycheck) and the web service from eurailpress (i.e. the largest publishing company for journals in the field of transportation in Germany).

Unfortunately, in Germany, there is no website available, which collects all relevant information in one place. Apart from a lack of centralised information about what and where to study transportation, there are several fields such as geography, social sciences and other with close relations to transportation matters. This means that there may be more study courses in Germany, which are not mentioned in the list (see chapter 5.4.1).

Hence, to provide a closer view of the specific study course offer in transportation, the author supervised a student thesis focusing (see chapter 5.4.1) contents of mobility management within the existing study courses.

The second part of the internet research focused on potential (international) teaching professionals to contact. The intention of this research was not to create a list of mobility management teachers, but to find a very small group of teachers in Germany, Switzerland and the SUNflower states with long-term experience in teaching mobility management.

1.7.2 Teaching comparison through teaching observation

The author originally planned to conduct teaching observation during courses on the spot in addition to the expert interviews (see chapter 1.7.3). However, the fact that some specific courses (dealing with mobility management) did not take place during the time of the empirical research (September 2017 – March 2018), the fact that some specific courses usually are held in mother tongue (i.e. Swedish and Dutch) and the fact that some specific courses did not have any contact time (i.e. written theses only) led to the decision not to conduct any teaching observation during the empirical phase of this thesis (see chapter 11.1).

However, it is sensible to conduct teaching observation (and evaluations) in order to find out, which didactic methods lead to the best results (i.e. highest degree of employability). This must run continuously and using methods that make the results comparable. Therefore, the author suggests a very detailed monitoring and quality management supervision of study courses (especially the designed one) in terms of mobility management (see chapter 12.5).

1.7.3 Expert Interviews

The selection of the institutions and persons within the empirical parts is purposely not comprehensive. The selected group of people rather represents a sample pattern of people in charge of mobility management and teaching its aspects.

The first choices were made because the author knew or read about the persons actually working with mobility management (e.g. representatives from partner institutions with the Masters's module – see chapter 1.4). These persons already recommended further representatives, institutions or projects during the preparation phase, even before the expert interviews started. The basic aim was to get a broad overview of how mobility management works in practice and teaching in Germany, Switzerland and Austria (called the DACH states).

The second aim was to find out best practices for teaching and operations in the SUNflower states, which was not meant to be representative. The author was involved to a European research project from 2002-2006 named PROSPER¹⁵, where institutions from all three countries were partners. The contacts to these former partners are still active, so that they gave good advice for institutions dealing with mobility management as well as teaching it. This selection was flanked by analysis of EPOMM best practice and international partners, so that during the second step (i.e. the online questionnaire) the focus changed from just the SUNflower states towards Europe as a whole.

The third aim was to find out activities for teaching and practicing mobility management worldwide. Therefore, the author used overseas contacts nominated by interviewees (in the USA, South America and Australia). The author also used existing contacts to Chinese, Japanese and South Korean universities (teaching transport engineering courses), whom he knew from an international symposium and derived activities in 2016.

This selection may seem arbitrary. However, the surplus of the information gained by all three empirical parts and the reconciliation with the publications from DEPOMM and EPOMM give the legitimation for this methodology.

¹⁵ Source: https://ec.europa.eu/transport/road_safety/sites/roadsafety/files/pdf/projects/prosper.pdf

The expert interviews were conducted between September and November 2017, during a sabbatical term of the author. Most of the interviews in Germany and surrounding countries were done personally. The overseas interviews and a few more were done with different visual telephony online tools. All interviews were recorded audio only and the author made a shortcut memorandum of each interview. The audio files of the interviews are stored on a separate data carrier.

All audio files were originally recorded in the m4a-Format (usable only for Apple[™]-devices) and then afterwards converted to the more common mp3-Format. During that converting process, five files (Auge, IVM GmbH, Saary, Petersen and Van Wee/Mingardo) were damaged so that between three and twenty minutes of the audio files (each at the end of the recording) are missing. However, the shortcut memorandum and the existing content of the audio files were adequate for the purposes of this thesis. However, the fact of missing parts of the audio files must be mentioned as mistakes made within this thesis (see the critical reflection in chapter 11.1 and 11.2).

The duration of the interviews in the group of practicing professionals were between 42mins and 4h15mins, in the group of teachers between 31mins and 2h02mins. In both groups, the median value was an identical at 1h20mins, so that the different interview guidelines had no influence on the length and intensity of the interviews. Each of the 26 interviews focused differently on the specific aspects of mobility management and transportation planning which were mentioned – due to individual preferences of the interviewees. However, all interviews were conducted similarly, with all interviewees keeping to the guidelines. Detailed statistics are displayed in chapter 9.1.1.

The first interview Mingardo/van Wee was conducted as a single interview with both professionals. Both answered open questions individually by email on the day immediately after the interview took place. Robert Cervero also answered open questions by email after the interview. All three separate emails are filed by the author.

Most interviewees gave permission to use their clear names for this thesis. One interviewee declined permission, four did not answer the request for permission. All five interviewees are classified as 'representative from' and the institution then is mentioned.

#	Date	Interviewpartner	Organisation	Country	Media
		Bert van Wee	TU Delft		
Te1and2	13.09.2017	Giuliano Mingardo	Erasmus University Rotterdam	Netherlands	Personal Interview
Te3	05.10.2017	Kay Axhausen	ETH Zürich	Switzerland	Personal Interview
Te4	05.10.2017	Klaus Zweibrücken	HS Rapperswil	Switzerland	Personal Interview
Te5	10.10.2017	Tom Rye	Napier University Edinburgh	United Kingdom	Personal Interview
Te6	25.10.2017	Christian Holz-Rau	University Dortmund	Germany	Personal Interview
Te7	03.11.2017	André Bruns	HS Rhein-Main Wiesbaden	Germany	FaceTime Interview
Te8	13.11.2017	Till Koglin	TU Lund	Sweden	Personal Interview
Te9	17.11.2017	Carsten Sommer	University Kassel	Germany	Personal Interview
Te10	20.11.2017	Chris De Gruyter	Monash University Melbourne	Australia	Skype Interview
Te11	20.11.2017	Oliver Schwedes	TU Berlin	Germany	Personal Interview
Te12	21.11.2017	Alvaro Rodriguez-Valencia	Universidad de los Andes Bogotá	Colombia	Skype Interview
Te13	22.11.2017	Robert Cervero	Berkeley University	USA	Skype Interview
Pr1	18.09.2017	Knut Petersen	Ecolibro GmbH	Germany	Personal Interview
Pr2	28.09.2017	Eva Hannak	Region Hannover	Germany	Personal Interview
Pr3	29.09.2017	Katalin Saary	Mobilitätslösungen GmbH	Germany	Personal Interview
Pr4	09.10.2017	Matthew Clark	Steer Davis Gleave	United Kingdom	Personal Interview
Pr5	09.10.2017	Representative from	Transport for London	United Kingdom	Personal Interview
Pr6	25.10.2017	Representative from	IVM GmbH	Germany	Personal Interview
Pr7	26.10.2017	Johannes Auge	B.A.U.M. GmbH	Germany	Skype Interview
Pr8	06.11.2017	Representative from	DTV Consultants	Netherlands	GoToMeeting Interview
Pr9	06.11.2017	Representative from	Advier	Netherlands	Skype Interview
Pr10	13.11.2017	Representative from	City of Malmö	Sweden	Personal Interview
Pr11	14.11.2017	Caroline Ljungberg	Trivector	Sweden	Personal Interview
Pr12	14.11.2017	Anders Söderberg	City of Lund	Sweden	Personal Interview
Pr13	23.11.2017	Stefan Schneider	Impuls Mobilität	Switzerland	FaceTime Interview
Pr14	24.11.2017	Syb Tjepkema	City of Zwolle	Netherlands	Skype Interview
AI1	11.04.2018	Kathrin Munt	Ostfalia	Germanny	Informal talk
		Sandra Fortuna			
AI2	11.12.2019	Ulla Greiwe	TU Dortmund	Germany	Personal Interview

Table 3: Shortcut list of interviewees

1.7.4 Interview guidelines

In order to find out how near practice-teaching in mobility management can be designed properly, three major question fields about status quo must be found an answer to:

- Question field one: How is mobility management claimed and defined in practice?
- Question field two: What is done within mobility management practice projects?
- Question field three: How is mobility management teaching made?

Table 4: Major question fields for the expert interviews

These three major question fields shall be understood as being preliminary to the research questions from chapter 1.4.2.

Hence, the author made two different types of interview guidelines. One larger version for teaching persons and one smaller version for professionals in the field of mobility management. The guidelines appeared in English and German because of the international structure of thesis.

The guideline has been prepared as follows:

Personal role in mobility management:

What is your professional status related to mobility management? Which are the important steps in your career and education that made you an expert in your field now?

When did you first get into contact with mobility management?

What was your opinion about mobility management by then? How did that change until now?

Mobility management was first established with the term 'transport demand management' in the early 1980s. In the 1990s, sustainable transport development was growing from both ecological aspects and aspects of traffic safety. The term 'mobility management' came up around the year 2000. During the last decade, 'mobility management' established with a number of topics and methods (This is the author's personal point of view. However, the important steps of mobility management are stated in most articles and monographs used for this thesis, e.g. RP03, RP06, RP14). So the first contact and the professional status can be related to the historic timeline and topical development of mobility management.

Content:

In your own words: What is mobility management?

Do you think mobility management is a priority task for transportation engineers? Or should there rather be other professionals?

During preparation of the guidelines, these two questions were meant to give a statistic overview about what mobility management includes and how it must be conducted. However, during the second interview with Mrs. Eva Hannak the author received a totally new point of view towards what mobility management is. Therefore, within the upcoming interviews, the question changed a bit. It then went to be a rather basic question about the general importance of mobility management. This means, the understanding of these two questions became very important in terms of the whole project and thesis. Beforehand, in the author's point of view, mobility management was topic of integrated planning, which must be learned differently to other topics of integrated planning. After the interview, the author got the imagination, that mobility management can also be a stand-alone discipline, which stands beside integrated planning, but of course both overlap with each other. However, in the following interviews as well as in the online questionnaire, the question turned to a question of choice between...

... Mobility management rather to be something with a small value for sustainable development and integrated planning.

... Mobility management rather to be something valuable for sustainable development and useful for integrated planning

... Mobility management rather to be a stand-alone process aiming towards sustainable development.

Derived by these two questions and the process during the interview phase then led to the following wording (e.g. used within the online-questionnaire – see chapter 1.7.5):

Please choose:

Mobility management to me is/will be:

- A less necessary part of sustainable transport planning
- An important part of sustainable transport planning
- An intrinsic, stand-alone field of work

The follow-up questions then went more into detail concerning the methodology of mobility management (in comparison to integrated planning) and the scenarios, in which mobility management operations take place in reality.

What are the most important tasks in mobility management today?

Do you think mobility management is a priority task for governments? Or is mobility management more an intrinsic task which also companies should work with?

How do you think this will change in the next 10-20 years?

Why do you think so?

What are the tasks in mobility management that tend to have the best return on investment?

How do you think this will change in the next 10-20 years?

Why do you think so?

The follow-up questions then focus on the human beings who are or will be in charge of tasks from mobility management and integrated planning.

Which personal skills are needed to be a successful mobility manager?

... Theoretical skills?

- ... Practical skills?
- ... Soft skills?

Please identify the most important challenges for a mobility management professional!

The next part of the interview dealt with teaching and education. This part was conducted differently for teachers and professionals. In some cases, interviewed teachers provide professional consulting in mobility management (mostly CMM). In some cases, professionals interviewed were also working as teachers. The author knew about the overlap. However, the guideline was meant to force the interviewees into the position of either a teacher or a professional.

Teachers: Which study courses?
Teachers: Do your students have the option to choose interdisciplinary lectures?
Teachers: What kinds of assessments (e.g. exams) do you use?
Teachers: What is most important?
Teachers: Do you co-operate with a) municipalities and/or b) consultants in concerns of mobility management lectures?
Professionals: Do you co-operate with universities in concerns of mobility management? How is that co-operation working?
How is that co-operation working?
Teachers: Did you supervise doctor, Masters or bachelor theses dealing with mobility management recently?
Teachers: Can you tell me some details about?
Teachers: If you think about students who passed your classes, do you observe that they systematically lack something a mobility manager should have?
Professionals: If you think new employees at your company do you observe that they systematically lack something a mobility manager should have?
If no: What is missing?
If yes: Why?
The last part of the interview then was meant as a political statement and a personal branding towards mobility management.

What constitutes good teaching when it comes to educating the mobility management professionals

How should teaching react towards the ongoing changes of the mobility marketplace?

Teachers: Please describe, how YOU teach mobility management?

What would you suggest in terms of mobility management for the near and distant future?

... Teaching?

of the future?

... Policy?

... Common practice?
1.7.5 **Online Questionnaire**

Derived by the results of the expert interviews, the author designed an online questionnaire mainly based on the same question fields (see Table 4 page 25) as for the expert interviews. The online questionnaire was conducted between December 2017 and March 2018 in two steps. In a first step, comparable to a pilot survey (engaged as 'pretest'), the author requested all 27 interviewees plus the supervising professor of this thesis – Prof. Dr. Ulrike Reutter – to take part on the online questionnaire. 13 interviewees and Prof. Reutter took part on that pretest. The author did not get any suggestions for improvement in the feedback emails, so he decided not to change the online questionnaire and take the fourteen answers for the upcoming analysis. However, during the first dataset analysis, the author found a few suggestions for improvement inside of the free text answers. This fact, too, will be mentioned in the critical reflection in chapters 11.1 and 11.2). The most important indication within the suggestions was that the part of the questionnaire dealing with teaching and exams is too complex. Therefore, the author decided to add a third step of empirical research, especially focusing on teaching and exams (see chapter 1.7.8).

The online questionnaire targeted at representatives of three major groups: Transport planners at municipalities of main cities of a region, Teachers or researchers at universities offering transportation sciences (see chapter 5.4.1) and consultants. These groups were then subdivided into eight groups as follows:

Adressees	Sheer population
Interviewees	27
Further Adressees	
Main cities of a region in D	122
Main cities of a region in A	17
Main cities of a region in CH	9
Universities/UAS for transportation sciences D	78
Universities/UAS for transportation sciences A/CH	7
Members of DEPOMM	24
Other consultancies (Non-members of DEPOMM)	19
International consultants (members of EPOMM)	32

Table 5: Addressees of the online questionnaire

The author used the classifications from the German¹⁶, Austrian¹⁷ and Swiss¹⁸ federal offices of land use planning (status quo from November 2017) to identify all main cities of a region. The term main cities of a region is meant as an equivalent to the term 'central places' from the 'central places theory.'¹⁹ This list of municipalities, the list of members of DEPOMM, the list of universities and UAS were completed by a list of non-DEPOMM consultants participating in the 'mobil gewinnt' (roughly: 'mobility wins') - workshop in 2016.²⁰ This all was the basis for a two-step analysis to find out ONE representative for each institution. In a first step, the author and one student assistant analysed EACH

¹⁶ Source: https://www.bbsr.bund.de/

¹⁷ Source: https://www.oerok.gv.at/

¹⁸ Source: https://www.are.admin.ch/

¹⁹ Source: Eaton, C., Lipsey, R.: "An Economic Theory Of Central Places", The Economic Journal, Vol 92 (365)/1982, p.56-72
²⁰ Comment: Dataset sent with friendly allowance by former DEPOMM-CEO Matthias Knobloch 11.1.2018

website of the more than 300 institutions in order to find out e-mail addresses of representatives. In approximately 30-40 cases, an additional telephone call was necessary to find out the referring e-mail-address. At the end of this process, the author had 305 e-mail addresses at his disposal. Hence, together with the group of interviewees, 333 invitations were sent. This led to eleven problem reports (e-mail delivery failed). Therefore, the total population of the used online questionnaire was 305 persons. The design of the online questionnaire is personalised so that the answers of each participant can be attributed personally. This is proved by an individual code and a closed list of addresses.

1.7.6 Questionnaire content

The invitation text was as follows:

"Dear Sir or Madam,

you are chosen to take part at my questionnaire concerning teaching in the field of mobility management.

This questionnaire will take approximately 20-30 minutes to fill in.

I would be very thankful if you take part on the questionnaire."²¹

Apart from the invitation text, the author wrote a short explaining text which was shown on the opening page of the questionnaire:

"This questionnaire is part of the empirical research for the habilitation thesis 'Near-practice Teaching in the Field of Mobility Management' which is now in process. It is based on three pillars.

First pillar is the experience and feedback from a Masters lecture called 'mobility management' at Ostfalia [UAS] by Prof. Dr. Christoph J. Menzel from 2011 to now.

The second pillar is the potential fact, that a certain design of study courses might lead to immediate 'employability' by graduating in mobility management. This is based on the core definition as follows:

In this questionnaire, the terms 'employability' and the attribute 'Being qualified and competent for jobs in mobility management' - are defined as follows according to the Pareto principle: 80% of graduating students are able to fulfill 80% of mobility management job tasks WITHOUT any on the job training. The remaining 20% of mobility management and other tasks can be trained during the first 6 months on the job. 'Employability' is one of the core goals of the Europe-wide 'Bologna' reforms, according to the London communique published in 2007.

The third pillar is a compilation of 27 expert interviews with teachers, consultants and planners between September and November 2017 done by Prof. Dr. Christoph J. Menzel."²¹

²¹ Comment: Text by the author, used during the online questionnaire between November 2017 and March 2018

The questions consist of four major content fields:

- Professional status (six questions),
- Attitudes and opinions (six questions),
- Education and employability (five questions),
- Didactics and lecturing content (13 questions).

And one personal field:

- Age and sex (two questions).

The whole questionnaire is a mixture of multiple choice and free text answers. In a few cases, only one answer option can be chosen, in most other questions multiple answers are also possible. The questionnaire was designed in German and English, so that all participants had the chance to choose their preferred language.

The questions were designed by the author with help from communication professional Christian Raupach in November 2017 after a first rough evaluation of the professional interviews. After that, the questions were transferred to an online version, using the online survey software 'limesurvey' licensed for Ostfalia UAS. The pretest was finished on 15th January 2018. The final questionnaire then was started on 18th January 2018 and closed on 26th March 2018.

1.7.7 Response rates

The author originally intended a response rate of 20% in order to get a broad basis. Therefore, after an initial response rate of approximately 10-12%, three reminder e-mails (four, six and eight weeks after the first invitation) were sent. The response rate finally increased to 17%. However, this is less than the intended rate (see Figure 9).



Figure 9: Response rate of the online questionnaire [design by the author]

However, a relatively high number of participants did not finish the questionnaire (i.e. stopped after having answered a reduced number of questions). Such answers also have a value for this thesis. Including incomplete answers, the response rate reached 35% without the pretest and 37% with the pretest.

Total sum of adressees	333		
Sum (without pretest)	305		
Problem reports	11		
Delivered mails	294	Pretest invitations	28
Complete answers	53	Complete answers	14
Incomplete answers	38	Incomplete answers	6
Incomplete answers first draft (completed in a follow-up draft)	9	Incomplete answers first draft (completed in a follow-up draft)	2
Incomplete answers with more than two drafts	6	Incomplete answers with more than two drafts	0
Number of persons with more thant two drafts	3	Number of persons with more thant two drafts	0
Usable incomplete answers	23	Usable incomplete answers	2
OptOut-Button	23	OptOut-Button	0
Response rate (complete answers)	18%	Response rate (complete answers)	50%
Response rate (complete answers plus usable incomplete answers)	26%	Response rate (complete answers plus usable incomplete answers)	57%
Response rate (c.a. plus u.i.a. plus OptOut)	35%	Response rate (c.a. plus u.i.a. plus OptOut)	57%
Cumulated response rates	37%		

Table 6: Specific response rates of the online questionnaire

The average time to fill in the questionnaire was 27 min 45 sec the median value 25 min 17 sec. This corresponds to the estimated time to fill in (see above). However, two participants needed more than 60 minutes (highest value 79 minutes), whereas the shortest times to fill in were 12 and 13 minutes.

1.7.8 Focus group discussions

The teaching and exams part of the questionnaire was too complex and the results, therefore, were not feasible enough for designing study course contents. [AD15] Hence, the author decided, after consultation of his supervising professor, to conclude with a third, additional empirical phase.

The method of focus group discussions is not at all meant to create representative results. However, it is the most effective method to create a deep and reflective pattern of opinions – in our case from teaching and practicing professionals in important fields of mobility management. [AD22]

The original plan was to conduct two focus group discussions with eight participants plus two moderators. The author acquired a student assistant with a focus on communications studies in order to prepare the setting of the two focus groups and for the role of moderating the discussion itself. Hence, Mrs. Helena Will, third year student in 'media communication' was now faced with the tasks of preparation.

The originally planned share of participants for the first group was as follows:

- Two moderators (Mrs. Will/the author)
- Two teaching representatives + two practising professionals who already took part on the online questionnaire
- Two teaching representatives + two practising professionals who were NOT involved to the project before

The originally planned share of participants for the second group was as follows:

- Two moderators (Mrs. Will/the author)
- Two teaching persons who took part in the first group discussion
- Two teaching persons who were not involved in the project before
- Two practising professionals with experience in teaching
- Two practising professionals without experience in teaching

The invitations for the first appointment came in June 2018. By September 2018, five participants confirmed their attendance for the first focus group discussion in November 2018. A few days before the planned date, one of the participants refused the appointment due to sickness. Hence, merely four people took part in the first focus group, all four teaching professionals, two of which took part in the online questionnaire.

The invitations for the second appointment came in September 2018. Five persons confirmed attendance, two of which took part at the first discussion, too.



Figure 10: First focus group discussion on 3rd November 2018 [screenshot from video file] - From left to right: Prof. Collin, Mrs. Will, Prof. Kowald, Prof. Sommer, the author, Dr. Busch-Geertsema [own picture by the author]

The appointment took place on 3rd November 2018 from 11:30 am to 2:30pm at Ostfalia UAS in Salzgitter. It was divided up into two parts with a length of approximately 1:15-1:30 hours and a break of 15 minutes in between.

Content of part one:

- Introduction to the topic, introduction of the participants
- Discussion about the distinction between methods of mobility management and transportation planning

Content of part two:

- Discussion about teaching, learning and exams in mobility management

Both parts were recorded with a camera. However, the recording of the first part stopped due to power supply problems after 30 minutes. Therefore, the second part was additionally recorded audio only plus video recording. Again, the video recording stopped after just ten minutes. However, the audio recording worked for the complete second part. The moderators also made a memorandum of both parts (see also chapter 11.2). Hence, for the first part, only 30 minutes of recording exist, the rest of the discussion (approx. 45 mins) is merely summarised in the written memorandum. The complete second part is available as an audio recording. The results of the first group were put into a paper consisting of a few datasets from the online questionnaire and a first draft for a Masters course for mobility management facing all suggestions towards teaching and exams that were mentioned in the first appointment (See chapters 9.6 and 12). The papers were then sent to the participants two weeks before the appointment, so that all participants got the opportunity to prepare detailed comments and suggestions before and during the discussion.

The second appointment took place on 9th February 2019 in the same room as before. All five confirmed participants took part. The group now consisted of two teaching professionals from the first discussion, one teaching professional with a second foothold in consulting and two practising professionals who took part at the online questionnaire beforehand.

Because of the failed video recordings in the first focus group, the author and his co-moderator decided to have more backups for the second focus group discussion. A different camera was used, and two redundant audio files were recorded. None of which failed.

Video_Schwerpunkt1_09022019.MTS - VLC media player Medien Wiedergabe Audio Video Untertitel Werkzeuge Ansicht Hilfe



Figure 11: Second focus group discussion on 9th February 2019 [screenshot from video file] - From left to right: Prof. Wotha, Mrs. Will (behind Prof, Wotha), Prof. Kowald, Mrs. Stiewe, Prof. Sommer, the author, Mrs. Krause – the board of statistics and preliminary results in the background [own picture and design of the board by the author]

Again, the discussion was divided up into two parts with a length of approximately 1:15-1:30 hours and a break of 15 minutes in between. The moderation and leading parts switched between the student assistant Mrs. Will and the author. The interview guidelines for the both moderators consisted of major questions and accompanying commentary phases as well as complementary information from the preliminary report and results of the first focus group, so that recurrent discussions from the first focus group session can be denied. The division of the two parts was as follows:

Content of part one:

- Evaluation of the curriculum, order of modules, most important modules, share of transportation engineering and communications, orientation semester and accreditation

Content of part two

- Content, assignments and interdependencies
- Form and duration of exams
- Criteria of permit

1.7.9 Additional interviews

During the research work and the supervising sessions, the author received a few hints containing deepening information about teaching didactics and organisational frameworking of near-practice teaching. Hence, the author decided to add two more interviews, conducted as free expert interview talks without interview guidelines but with a specific research content.

The first topic was teaching observation during a lecture.

Background: Ostfalia UAS offers special courses for 'professionals' (i.e. teaching professors and other lecturers). The course includes theory and practical conduct for didactic methods, interactions between students and teaching professionals, learning environment and evaluative feedback. One important part of this course is individual teaching observation in a real lecture done by a participant. The teaching observation itself is conducted by a staff member of the internal training section of Ostfalia UAS named ZELL. The author took part on two different examples of such special courses in 2017 (before the empirical phase of the thesis) and in 2019 (after the empirical phase of this thesis). In both cases, the author derived aspects of near-practice learning from the attended courses to this thesis and the design pattern of a study course for mobility management (see chapters 5.2 and 12.1).

The author needed an idea of how teaching observations can support successful teaching (and learning – see chapter 12.1) and how teaching observations can be transferred into a recurrent quality management process (see chapter 12.5). Therefore, he had an informal discussion with the chair of the university didactics unit of ZELL, Mrs. Kathrin Munt. The appointment took place on 11th April 2018. No minutes or recordings of the interview were made. The main intention was to get information about specific literature and some additional hints (see chapter 5.2). Nevertheless, this informal discussion is scheduled as 'Additional Interview' number one, Al1.

The second topic was best practice in project studies.

Background: The author took part in three of the semi-annual colloquia for PhD-students and postdoctoral candidates at the Chair for Public Transport and Mobility Management at University Wuppertal. During such colloquia, PhD-students and postdoctoral candidates report on the status quo and progress of their projects and theses. The supervising professor and the other attendants then can give statements and ask questions, so that valuable suggestions can be reflected to improve the quality of the theses. One such suggestion was that the Technical University Dortmund runs a specific project centre for course-related projects within the study course spatial planning (SPZ). Knowledge about practical experience, co-operation with external partner institutions and how to communicate with the concerned student groups is very helpful when it comes to near-practice teaching in planning contexts.

Therefore, the author visited the SPZ on 11th December 2019 and had a meeting with Mrs. Sandra Fortuna and Mrs. Ulla Greiwe. The interview was informal and not conducted following interview guidelines, but the author made an audio recording and recorded written minutes. The main intentions were to find out similarities between Spatial Planning study courses and the promoted idea of a new study course Mobility Management, organisational aspects of the projects' approaches and the allocation of effort within the faculty. Apart from some ideas for refinement of the proposed study course framework, the author gained an overview of how near-practice teaching works on large scale and based on long-term experience. The interview is scheduled as 'Additional Interview' number two, Al2. Huning and Schulz describe the core information about SPZ, too.²²

²² Source: Huning, S,; Schulz, F.: "Das Projektsstudium - Eine "weltfremde" Utopie?", Sub/Urban - Zeitschrift für kritische Stadtforschung 04/2016 (2/3), p.265-274 [AD16]

1.7.10 Abduction as a method of doing research

Usually, research is based either on deduction or induction. Transportation sciences and research mostly use deductive indications (e.g. existing traffic behaviour, real-time transportation volumes) to create research questions. Such derived research projects then mostly use inductive methods (e.g. 'critical' penetration rates, human beings as 'early adopters') to gain proof or results. Transportation sciences, however, are very highly related to time, space, socio-economic and political frameworks – the most important distinction from natural sciences. This means that inductive results (especially proof) change continuously. What used to be the (sort of) truth may not be valid anymore, when the framework (of society) changes. More information about the construction of abductional conclusions are stated in chapter 5.2.

In cases like the one of this thesis, the number of researchers and teaching professionals dealing with mobility management worldwide is very low. Therefore, the idea of an inductive method to proof the hypotheses (chapter 1.6) will not be sufficient. Therefore the research results must be monitored continuously. At the time of publication of this thesis, the likeliness of proof for the hypotheses cannot be measured. There are merely indications for proof. So the main idea of this thesis must be put into a differing (real) framework and then must be checked, either through a quality management circle or through a stress test. This means, this thesis uses abductional conclusions (see chapter 10).²³

This thesis provides the idea of something new, based on some empirical results but also based on something which teachers often call 'professional experience', which – from a didactic point of view – is not measurable, a subjective assessment, maybe just a feeling. This leads to the fact that the results of this thesis must be monitored continuously after implementation. Concerning the idea of the study course mobility management (see chapter 12), this continuous monitoring must be done by institutional quality management (e.g. evaluation, see chapter 12.5) and by each advisory board related to a particular university that offers the study course (see chapter 12.4).

Research about near-practice teaching in the field of mobility management occurs necessary. Mobility management topics need specialised, educated and experienced employees. The threestep empirical results and the personal teaching experience of the author offer an overview of what can be when mobility management develops into a stand-alone field of work and how nearpractice teaching can support such developments. However, more supporting research must follow.

Quickview 1: Chapter 1

²³ Source: Reichertz, J.: "Die Abduktion in der qualitativen Sozialforschung - über die Entdeckung des Neuen" [AD06]

2. Definitions

This chapter defines a few basic terms that directly concern mobility management. The aim behind this is to introduce a basic understanding of the differences between the methodologies of mobility management and sustainable transport planning. The most simple terms 'mobility', 'traffic', 'transport', 'transportation' and 'management' are basically defined in dictionaries, so that such definitions are used for this thesis.

2.1 Mobility

The New Oxford Dictionary of English defines mobility as 'the ability to move or be moved freely and easily'.²⁴ The author usually complements this definition with 'the ability, capability [and possibility] of moving [from place to place]'.²⁵ This includes physical and mental requirements from the human being as well as access to transport modes and access to transport infrastructure.

The extent to which mobility really must be 'free' and 'easy' can be the subject of political debate. However, what mobility means for (permanently) disabled or (temporarily) handicapped persons is also of importance. Concerning political correctness of terms, transport engineers often speak of 'people with limited mobility'. Therefore, it is necessary to specify the above-mentioned degrees of 'capability' and 'access' in order to have a clear view of personal mobility. Hence, it is necessary to define minimum requirements (e.g. technically, socially) for human beings to be 'mobile' in a common usage sense. Identifying such minimum requirements is therefore in itself a task to be learned within an academic study course (see chapter 12).

2.2 Transport

In the English language the term 'transport' means 'a system or means of conveying people or goods from place to place by means of vehicle, aircraft, or ship', whereas 'transportation' merely means 'the action of transporting someone or something or the process of being transported'. American English (US) uses both terms in nearly the same sense. 'Traffic', on the other hand, simply means "vehicles moving on a public highway [i.e. a road]" used in the sense of (individual, mainly motorised) vehicles²⁴. Other sources give a broader definition like "the movement of vehicles, passengers, etc. along a route"²⁶ or "the number of vehicles moving along roads, or the amount of aircraft, trains, or ships moving along a route"²⁷. All three terms have one aspect in common. They refer to what the author defines as 'actual movement'. Concerning human beings, this is an active manner. Concerning goods, this is passive. Transport therefore mostly includes technical, operational and organisational matters, such as vehicles, infrastructure and supporting IT.

2.3 Traffic Management

Referring to the above-mentioned definition of 'traffic', it is firstly necessary to define the term 'management'-"the process of dealing with or controlling things or people" (Oxford Dictionary). Managing traffic is therefore mainly an organisational and operational topic and it is – most important – a process.

30.3.2017 at Széchenyi István University, Györ/Hungary

²⁴ Source: The New Oxford Dictionary of English, updated edition, Oxford 2001

²⁵ Source: Menzel, C: "Integrated solutions for mobility management", presentation at the Conference on Transport Sciences Győr 2017–

²⁶ Source: https://chambers.co.uk/search/?query=traffic&title=21st

Traffic management's major topic is steering, controlling, organising and optimising of interacting vehicle-infrastructure-systems, too. The latter is closely related to actual planning (see chapter 6.2), which means that both terms overlap when it comes to infrastructure planning processes.

The methodology of traffic management and therefore the necessary requirements in qualification for conducting traffic management in practice differ in many aspects from those for mobility management.

Traffic management includes a high number of real-time technical measures for transport infrastructure (e.g. signalling, dynamic sign-posting, dynamic lane allocation), long-term technical measures for infrastructure (e.g. self-explaining road design, specialised crash barriers) as well as solutions and devices concerning vehicles (e.g. ADAS, autonomous driving systems).

2.4 Transport management

Transport management refers to the management, from an organisational or business perspective or transport systems or network. This includes the implementation and operation of institutions, companies and business models offering transportation services (e.g. public transport companies, car fleet owners, carsharing companies) and its derivatives (e.g. ridesharing companies, MAAS-providers, software developers, consultancies). Therefore, in English speaking countries, there is an additional distinction, which does not exist in German speaking countries. The necessary requirements in qualifications for transportation managers are typically related to business, management and organisational subjects, for example supervising personnel and project management.

2.5 Travel demand management

Travel demand management is the derivative of the formerly used term 'transportation demand management' abbreviated TDM.^{28,29} Most institutions working with mobility management denominate TDM the progenitor of mobility management.^{30,31}

The history behind this term is the massive increase of car traffic during and after World War II in the USA. By then, the government started to implement political strategies aiming to reduce car traffic. In the late 1970s, such strategies had been merged under the label 'transportation demand management'.

Transportation Demand Management, however, is rather a strategic policy for sustainable transport than a clearly defined term. It provides a large number of methods from the so-called 'push&pull'strategy, first implemented in the 1980s. [Te13] ³²

Push&pull strategies (or 'carrot-and-stick'-strategies) aiming to make unsustainable forms and modes of transportation (i.e. car traffic) as unattractive as possible (e.g. through road pricing) and to make sustainable forms and modes of transport (i.e. ecomobility) as attractive as possible (e.g. through funding programmes). Push&pull can include operational measures (e.g. bicycle-friendly traffic light priority), infrastructure measures (e.g. redistribution of public places), fiscal measures (e.g. the above mentioned) and marketing measures (e.g. traffic safety campaigns).

²⁸ Source: Reutter, U./Stiewe, M.: "Mobilitätsmanagement - Wissenschaftliche Grundlagen und Wirkungen in der Praxis" [RP06]

²⁹ Source: Expert Interview with Robert Cervero [Te13]

³⁰ Source: Expert interview with Tom Rye [Te5]

 ³¹ Source: Finke, T.: "Wirkungen von Mobilitätsmanagement-Programmen" [RP20]
 ³² Source: https://difu.de/projekte/2014/push-pull.html

With the understanding that transportation demand management is an all-embracing 'push&pullpolicy' it cannot be used as a synonym for mobility management. Therefore, the author uses the term 'travel demand management' – also abbreviated as TDM – as the equivalent to mobility management at the English-speaking countries outside Europe, in order to make clear that strategies in the USA and Australia (probably also Canada) differ from the European approach [Te13] ³³, whereas in the UK, the term mobility management is gradually replacing TDM.[Te5] ³⁴

2.6 Mobility Management

In this thesis, the author uses the EPOMM-definition [BP18] (see Definition 2 page 21) and the content boundary from Figure 7 page 18. However, some researchers do not agree with that boundary. Discussions about mobility management show that infrastructural measures (e.g. deconstruction of single parking lots or car parks, construction of facilities for bicycle use), operational measures (e.g. densification of public transport schedules, priority cycle for pedestrians at traffic lights) or changes in policy (e.g. funding of shifting programmes) are often included in the content boundary of mobility management.³⁵ This larger boundary, however, makes it harder to clarify distinctions and, therefore, tasks and topics of the rather new fields of mobility management (see chapter 7.7). This leads to the fact that a closer view on the methodology of mobility management can be summarised as what is the meaning of transportation demand management (see chapter 2.5).

2.6.1 Core opinions about mobility management

The very first results of the professional interview were classifications of three attitudinal groups concerning mobility management.

- 1. Mobility management is/will be a less necessary part of sustainable transport planning.
- 2. Mobility management is/will be an important part of sustainable transport planning.
- 3. Mobility management is/will be an intrinsic, stand-alone field of work.

Figure 30 on page 118 shows the experts' opinions compared to the results of the questionnaire. Both interviews and questionnaire show that mobility management is believed to be an important part of sustainable transport planning. However, the group of practicing professionals has a higher rate in believing that mobility management is or will be stand-alone. Anders Söderberg stated in his interview that he can see progress from 2 to 3 since he first started with his work in the early 2000s.³⁶ Hence, one key topic for the future is to provide a more detailed perspective on how this attitude might change. Since the author himself belongs to group three, it is surely sensible to add further research on how mobility management develops in the next ten years.

All three groups have in common that particularly push&pull measures are necessary in order to make mobility and transport (more) sustainable. Of course, there are also political and scientific opinions that that there is no need at all to change anything in the transportation sector³⁷. Results in detail are displayed in chapter 9.3.

³³ Source: Expert interview with Chris De Gruyter [Te10]

³⁴ Source: Expert interview with Matthew Clark [Pr4]

³⁵ Source: Schwedes, O.; Sternkopf, B.; Rammert, A.: "Mobilitätsmanagement in Deutschland - Eine kritische Bestandsaufnahme" - Discussion Paper [RP14]

³⁶ Source: Expert interview with Anders Söderberg [Pr12]

³⁷ Comment: This group of doubters, disbelievers or 'worryguts', however, is not a helpful group in terms of this thesis and will therefore not be displayed.

Group one brings forward the argument that mobility management has a very small value compared to what 'effective' measures (i.e. infrastructural and operational) can reach. The leverage of mobility management – in their opinion – is very low. This hostile opinion reaches from 'nice to have' in the sense of marketing³⁸ to 'non-valeur'³⁹. In their opinion, there is few proof of the recoverability of mobility management compared to the effects of infrastructural or operational changes. Merely, the long-term evaluations from Socialdata[™] play a role.⁴⁰ The most deprecatory statement was, that in some cases, mobility management is used as a 'political term to avoid effective measures'. [Te3]

Group two – which has the largest share of all participants – sticks to the point of view of what the common associations of transport professionals (e.g. FGSV) spread. In their opinion, mobility management – in itself - has a large value. They agree on specific requirements for professionals, too. However, mobility management cannot be a stand-alone field. It is rather a complex methodology beyond other methodologies, altogether being a part of sustainable transport planning. This point of view is to be seen all around the world. Their opinion is that there is no specific need to make detailed distinctions between mobility management and sustainable planning because it all aims to sustainable development in transport.⁴¹

Consequently, when it comes to conceptual Masterplans (i.e. for municipalities), there are a few variations of how to do it (see chapters 6.2, 6.3 and 6.4). Mobility management does not (yet) appear as a stand-alone concept. In most cases of nowadays SUMP or other conceptual development plans (e.g. travel plans) works, mobility management is an important but subsidiary part of the whole concept.^{42,43}

The participants of the focus group recommended clearly defining the differences and interdependencies between sustainable transport planning and mobility management in detail rather than strictly separating the fields. This will on one hand lead to a better comprehension of mobility management matters and, on the other hand, ensure that both fields share the same aims.⁴⁴

2.6.2 Discussion about soft policies/hard policies

The very strong opposing view against how good mobility management can perform from group one is mainly derived from the unclear cause-and-effect-chain of the different transport and/or mobility management measures. Louen [RP10] connected a defined list of measures with transport modelling processes⁴⁵. Finke [RP20] as well as Walther, Kistner, Arnold, Kowald and Bruns [RP25] use tools like before-and-after-comparisons and user questionnaires in order to get an idea of how successful a single measure was in comparison to other measures [RP20]⁴⁶. Schwedes, Sternkopf and Rammert [RP14] criticise a significant lack of evaluation and – even if evaluation is conducted – a lack in observance of (unmeasurable) framework effects. [RP14] Such framework effects can be driven through news coverage, policy changes, social media and even hearsay. One documented example of a framework effect occurred in 1991 right before the well-known tram-train model in Karlsruhe went

³⁸ Source: Expert interview with David Metcalfe [Pr5]

³⁹ Source: Expert interview with Kay Axhausen [Te3]

⁴⁰ Source: Brög, W.; Erl, E.; Ker, I.; Ryle, J.; Wall, R.: "Evaluation of voluntary behaviour change: Experiences from three continents" [RP22]

⁴¹ Source: Expert interview with Katalin Saary [Pr3]

⁴² Source: Expert interview with Chris de Gruyter [Te10]

⁴³ Source: Expert interview with Stefan Schneider [Pr13]

⁴⁴ Source: Jürgen Collien during the first focus group discussion [FG1]

 ⁴⁵ Source: Louen, C.: "Wirkungsabschätzung von Mobilitätsmanagement - Ansatzpunkte zur Modellierung & Ableitung von Potenzialen und Wirkungen am Beispiel des betrieblichen Mobilitätsmanagements" [RP10]
 ⁴⁶ Source: Walther, S.; Kistner, R.; Arnold, A.; Kowald, M.; Bruns, A.: "Evaluationsstrategien und Monitoringinstrumente zur Hessenstrategie

⁴^o Source: Walther, S.; Kistner, R.; Arnold, A.; Kowald, M.; Bruns,A.: "Evaluationsstrategien und Monitoringinstrumente zur Hessenstrategie Mobilität 2035 und zur Hessischen Nahmobilitätsstrategie - Abschlussbericht zum Forschungsprojekt Mob_Eval" [RP25]

into service. By then, the operating company merely changed the vehicles without changing anything else (i.e. same line, same service frequency).⁴⁷ Just because of the new vehicles used for the service, the number of passengers increased. Hence, it is not clear to what extend 'soft' measures (i.e. mobility management) have interdependencies with 'hard' measures (i.e. infrastructural and operational changes). Further research concerning measuring of cause-effect chains is necessary (see chapter 10.9).

Furthermore, it is not clear, how far framework effects have an impact on both. However, Anders Söderberg is sure: "Yes, you can change people's behaviour just by soft measures."³⁶

Many terms and topics occur in transport sciences that appear to be similar but are in fact not. The most important distinction, however, is the one between mobility and transport, which has a direct impact on what mobility management is now and what it can be in the future. EPOMM delivers a good, but not an exact or conclusive definition of mobility management.

Quickview 2: Chapter 2

⁴⁷ Source: https://www.avg.info/fileadmin/user_upload/avg/Dateien/Unternehmen/Geschichte_AVG.pdf

3. Educational Formats in General

State-run education is divided into four sectors. The primary and secondary sector is run entirely by schools and relates to children, adolescents and young adults before graduating from schools. Mobility management tools can be integrated to educational formats in the primary and secondary sector and even before that (see chapters 7.3.2, 7.3.3 and 7.5.1).⁴⁸

However, professionalisation is located in the tertiary and quaternary sector. The tertiary sector is mostly run by universities, UAS and similar state-run or private institutions. Private institutions in the tertiary sector, nevertheless, must have a governmental accreditation, too. [AD19]

The shape and scope of the tertiary sector of education is homogenised to a large extent through the Bologna-contracts (i.e. the ECTS-system).⁴⁹ However, this homogenisation led to an offset concerning the share of science-focused and profession-focused study content, especially at universities. Hence, when it comes to graduation aspects, UAS and universities became very similar. This leads to a new discussion about the core aspects of employability. [AD19] Following Axhausen [Te3], graduates are – and shall not be - 'trained for the job', at least not too much. However, engineering sciences and economic sciences have a higher applied approach than natural or arts sciences. Concerning this thesis, the focus actually lies on employability rather than on academic abilities. Hence, the measured effects from study course homogenisation are welcome.

3.1 Training and studying

The tertiary and quaternary sector meet at two points. First, study courses can be changed or extended to sandwich courses which can lead to dual graduations (i.e. science and vocational Bachelor). A preliminary stage of such sandwich courses can be co-operative study courses in which the students join the study course only (without practical courses) but do the practical years at a partner company or institution.

Second, universities and UAS offer advanced vocational training study courses with different formats (e.g. evening classes, remote study, full time study, training 'on the job'). All of which can be very expensive so that employing companies often co-operate with universities and UAS in conducting such courses.

3.1.1 Study course

When it comes to mobility management, study course offerings worldwide are very rare. Apart from the very low number of specific courses (see chapter 5.4.1 and 4.1) the content and methodology of mobility management is mostly located within classical study courses – taught within transportation modules. The likeliness of practical elements for exams is rather low.

In most cases, the first two or three semesters within bachelor (undergraduate) study courses dealing with mobility and transport issues do not differ from other (similar) study courses. It merely depends on the superordinate group or field of study course (i.e. normally engineering, business, geography), in which it is placed. This, on one hand, results in a flood of written exams during the first semesters and on the other hand in a predominance of theoretical content. From the third semester on, the following rule is mostly valid: Less theory, more practical, less general content, more specific content,

⁴⁸ Source: Hepp, G: "Bildungspolitik in Deutschland" [AD19]

⁴⁹ Source: Busemeyer, M.: "Bildungspolitik im internationalen Vergleich" [AD20]

less written exams, more project assignments. UAS and universities don not differ very much concerning this structure.

However, Masters (postgraduate) courses differ heavily between UAS and universities. Masters courses at UAS offer very many project courses instead of written exams and theoretical content, whereas universities offer a mixture of (amplified) theory and projects.

In terms of mobility management and transport contexts, times seem to change slowly but measurably. The first and only bachelor study course named 'mobility management' in Germany, for example, starts with project assignments in the first semester already. While the students (automatically) do not have enough experience to come to feasible project solutions, the lecturer accepts that nearly all of the projects will fail. Creativity and self-reliance of the students count more than the actual results. This type of lecturing is called 'smooth shipwrecking'.⁵⁰ The didactic idea behind a change of structure and using 'smooth shipwrecking' as a matter of learning is described in chapters 5.2.1, 10.2 and 12.1.

3.1.2 Advanced vocational training

In most cases, private educational institutions offer advanced vocational training and study courses both for bachelor and Masters degrees. However, also state-run universities and UAS offer various study courses, with a clear emphasis on Masters courses.

In each case, students must pay a comparatively high fee for applying. 100%-correspondence study courses with a high number of participants (more than 100) cost between 500 \in and 1,000 \in per semester. Study courses with a higher compulsory attendance cost 2,000 \in – 10,000 \in semester or more.⁵¹

⁵⁰ Source: Expert interview with André Bruns [Te7]

⁵¹ Source: https://www.studieren-berufsbegleitend.de/kosten-finanzierung/ueberblick-kosten/

Nearly all advanced vocational training study courses are designed as on-the-job study courses. Hence, three models of teaching (and examination) have prevailed:

- 1. Correspondence only
- 2. Correspondence with occasional (weekend) compulsory attendance (including blended and online lectures)
- 3. Predominant weekend workshops

The advanced vocational training option is of most interest for those planning a change of career, especially when industrial sectors decline (e.g. coal mining) or become massively digitalised (e.g. surveying and mapping, machine programming). In other cases, persons with an undergraduate or bachelor degree who worked for some years have an interest in higher qualifications (indirectly: higher salary).

In concerns of mobility management, the potential for advanced vocational training will typically gain interest from career changers than from persons seeking higher qualifications, due to the fact, that mobility management is not yet on a stand-alone level. For such persons, the author recommends that mobility management topics occur within continuous and further education courses (see chapter 3.1.3) or on-the-job training (see chapter 3.1.4).

3.1.3 Continuous and further education

Numerous institutions offer opportunities for further education, most of which are private academies (e.g. language schools), state-run institutions (e.g. adult education centres) or spin-offs from occupational unions (e.g. academies). For transport and mobility topics in Germany, the VDI Wissensforum⁵², the VDV Akademie⁵³ the VDEI Akademie⁵⁴ offer a broad portfolio of courses. A few NGOs are preparing academies as well.⁵⁵

Most of such offers are merely designed for participating without examination. Certifications (e.g. based on international norms form CEFR⁵⁶ and IPMA⁵⁷) are set at three to six different skill or taxonomy levels (e.g. A1- C2 or A-D).

In Germany, two further education courses specifically on mobility management exist. Firstly and most common, the regional chambers of industry and commerce offers a course for CMM⁵⁸. Secondly, the regional transport association of Northrhine-Westphalia (VRS) offers a course called 'mobility management for municipalities'⁵⁹ (see chapter 7.2).

A third one, especially for initial consultation purposes, is planned for the near future.⁶⁰

Furthermore, a handful of institutions provide offers for further education concerning participations for planning processes, general policy guideline approaches or mediation processes. These offers are summarised by a German NGO network for participation (Netzwerk Bürgerbeteiligung). More than 30 different institutions and consultancies offer special education programmes for participation⁶¹,

⁵² Source: https://www.vdi-wissensforum.de/

⁵³ Source: https://www.vdv-akademie.de/home/

⁵⁴ Source: https://www.vdei-akademie.de/home.html ⁵⁵ Source: https://www.adfc.de/artikel/die-adfc-akademie-1

⁵⁶ Source: https://www.auic.de/arike//de/adic-akade/ine-1

⁵⁷ Source: https://www.gpm-ipma.de/startseite.html

⁵⁸ Source: https://www.ihkplus.de/upload/NRW_Flyer_65792.pdf

⁵⁹ Source: https://www.zukunftsnetz-mobilitaet.nrw.de/LehrgangKOMM

⁶⁰ Comment: The author and Ecolibro developed a concept for further education courses in Lower Saxony

⁶¹ Source: https://www.netzwerk-buergerbeteiligung.de/professionelle-anbieter-der-buergerbeteiligung/

whereas mobility management is roughly offered by three or four institutions which means a massive underrepresentation.

All further education courses are interesting for both long-term professionals and career changers with a certain experience in transportation topics but not for persons from outside the subject area.

3.1.4 Internal Training on-the-job

Large companies, municipalities and NGOs often offer internal vocational training courses (e.g. specific software applications). Such training is either conducted by external trainers or specialised internal staff members. In Sweden, a few larger companies have already installed internal mobility managers for both consultation of staff members and to provide training for internal stakeholders.⁶² However, before that, internal trainers must receive a certification by joining a train-the-trainer-seminar. Many municipalities as well as freelancers in Sweden and The Netherlands offer such seminars.^{63,64} In Germany and Switzerland, internal mobility managers must not necessarily receive an official certificate. However, in most cases, the mobility managers voluntarily took part in special courses mentioned in chapter 3.1.3 before starting their own internal training.^{65,66}

In a long-term perspective, mobility management shall become either an internal staff unit or a special section of the human resources management unit of a company, institution or municipality.^{67,68}

3.2 University settings in Europe

With the Bologna resolutions, universities harmonised graduate degrees (see chapter 1.3.1), but not the university settings. In France, for example, the 'grand écoles' are comparable to the professional schools in the Anglo-Saxon systems. Such are specified and elite universities with a small number of students and high levels of admission qualification. All other universities are more or less on the same level.

In Scandinavia, the DACH-states and BENELUX the university system consists of universities and UAS. In Eastern Europe, the system consists of universities and academies. Both private and state-run universities exist worldwide. In nearly all systems, vocational schools and co-operative universities complement the portfolio of adult education institutions, though the latter often do not directly fit in the Bologna graduate degrees. Merely courses with an official accreditation are on the same level as such from universities or UAS.

Despite the Bologna declaration not being mandatory, it led to more co-operation throughout European universities and UAS. The co-ordination of this process led to higher aims concerning the worldwide competition (especially with the elite universities in the USA). [AD20]

⁶² Source: Expert interview with Caroline Ljungberg [Pr11]

 ⁶³ Source: Expert interview with Representative from Advier [Pr9]
 ⁶⁴ Source: Expert interview with Syb Tjepkema [Pr14]

⁶⁵ Source: Expert interview with Knut Petersen [Pr1]

⁶⁶ Source: Expert interview with Johannes Auge [Pr7]

⁶⁷ Source: Expert interview with Eva Hannak [Pr2]

⁶⁸ Source: Expert interview with Anders Söderberg [Pr12]

Regulations of nearly all universities and UAS refuse admission of equality for any undergraduate degrees from co-operative universities, academies and vocational schools. This circumstance led to a historic lawsuit in Germany after 1989. In the former German Democratic Republic (GDR), which used to run the eastern European system with academies, many technical and engineering degrees have not gained equal recognition to West German Diploma degrees. Hence, people from eastern Germany who had such degrees have been reclassified as 'without a degree' and therefore earned less income than people from Western Germany with Diploma degrees. This problem was solved by setting the option of 'Post-Diplomas' or 'Redegree-Diplomas' (e.g. in case of at least three years of proven practical experience).⁶⁹

3.2.1 University

Universities mainly offer the highest degrees of scientific entitlement. The main purposes of universities are doing fundamental research and teaching theoretical content, followed by applied research and near-practice teaching. The clearest difference between universities and UAS exists within humanities, medical sciences, natural sciences and mathematics, where fundamental research and high cluster teaching have both a long-term tradition and a high importance for the future content of science and education. Research and lecturing often go hand in hand. PhD-students build the link between practical experience and scientific work.

Nevertheless, concerning engineering, computer sciences, business economics and welfare sciences, universities and UAS do not have a clear distinction between each other. Concerning, transportation topics, many study courses at universities focus on theoretical lectures rather than on near-practice lectures.⁷⁰ However, the importance of near-practice lectures, and therefore practical skills, at universities increased during the last few decades.^{71,72,73} The sharing of fundamental research with transportation and business sciences is near zero.

3.2.2 University of applied sciences

The term 'applied sciences' alone shows that lectures and research at UAS are nearly always nearpractice. This does not necessarily mean lowering sights in terms of scientific quality. Unfortunately, newly admitted students at UAS often show larger lacks of skills and knowledge than students at universities. This is often due to the fact that admissions at UAS have lower requirements. In some cases, admissions go out to persons with school leaving qualifications that do not include the general qualification for university entrance. However, UAS do a lot of applied research in mobility contexts. Specific UAS research promotion programmes and co-operative PhD-programmes since 2010 are blurring the lines between universities and UAS, which leads to the conclusion that study courses in mobility management will likely have no distinction as to whether they are conducted at universities or UAS.

⁶⁹ Source: https://www.kmk.org/themen/hochschulen/bildungsabschluesse-der-ddr.html

⁷⁰ Source: Expert interview with Kay Axhausen [Te3]

⁷¹ Source: Expert interview with Christian Holz-Rau [Te6]

 ⁷² Source: Expert interview with Carsten Sommer [Te9]
 ⁷³ Source: Expert interview with Oliver Schwedes [Te11]

The process of renewal at UAS already started in the 1990s when the landscape of research and teaching merged between East and West Germany. UAS with a technical focus that always had a branch in doing empirical research thrived from a large demand for applied research. Apart from this, a mixture of engrained structures at established universities and dynamic group-specific arrangements at UAS led to a switch of award procedures at the research project executing organisations, so that UAS increased their level of scientificism.⁷⁴

An educational framework for near-practice teaching in mobility management is given. The opportunities of the various settings allow prospective students to individually decide which way to go. A large problem exists when settings change and certain grades do not match any more. The transparency between the different settings, due to the Bologna-reform, is high but not completely unproblematic.

Quickview 3: Chapter 3

⁷⁴ Source: https://www.boeckler.de/pdf/stuf_proj_leitbild_teichler_2009.pdf

4. Mobility Management Contexts in University Teaching

In Germany, mobility management does not yet exist as a stand-alone study course for Masters students and just one specific, but engineering-oriented, course is available for bachelor students.⁷⁵ However, there are numerous study course where mobility management is taught either as a separate specific lecture (e.g. at Ostfalia UAS) or embedded with other topics in various lectures. Apart from Axhausen [Te3] and Rodriguez-Valencia [Te12], all teaching interviewees mentioned mobility management content in various lectures and formats. Bruns [Te7] is the person in charge for the 'mobility management' study course in Wiesbaden. Sommer [Te9] and Schwedes [Te11] offer project lectures with mobility management topics in Germany. Zweibrücken [Te4] does the same in Rapperswil, Switzerland and Mingardo [Te2] in Rotterdam, Netherlands. Koglin [Te8], De Gruyter [Te10], Rye [Te5] and Cervero [Te13] offer theoretical content with the lectures in mobility management. Holz-Rau [Te6] merely mentions mobility management in his basic lectures, whereas mobility management project topics follow at a later stage of the study courses in Dortmund. [AI2]

4.1 Study Courses in Engineering

Transport and mobility course settings appear at three major engineering courses:

- Civil engineering
- Mechanical engineering
- Rural and spatial planning

Nevertheless, civil engineering has the largest reference to transport topics. Underground construction, road construction, railway construction, bridge construction and tunnel construction are key fundamental elements of civil engineering. Hence, nearly all transport engineers before the 1970s were civil engineering graduates.

In the 1970s some mechanical engineering courses started specific transport lectures with regard to automotive engineering.

The Dresden school of railway engineering 'Friedrich List' was originally founded in 1949 in Eastern Germany. It became the elite university for railway engineering in the German Democratic Republic (GDR) of course with some political purpose. By then, in Western Germany, railway engineering took place merely in civil engineering courses.

In parallel, rural and spatial planning emerged in the field of engineering courses. Nevertheless, most of which appear to be somewhat 'engineering light' courses.⁷⁶ Engineering mathematics, mechanics, construction design, which are often defined as basal topics of engineering, do not have the same weight in rural and spatial planning study courses as in civil or mechanical engineering.

In the 1990s, the first hybrid study courses merging engineering topics with business ecomomics were implemented (e.g. transport economics or transport economics engineering).

⁷⁵ Junghans, Jasmin: "Die Studienlandschaft im Bereich Mobilitätsmanagement an deutschsprachigen Fachhochschulen und Universitäten" [ST01] ⁷⁶ Source: Mechthild Stiewe during the second focus group interview [FG2]

The Bologna process then accelerated specifications and hybridisations of engineering study courses in the transport sector (both bachelor and Masters).

4.1.1 Transport Engineering

Mobility management content lectures appear in all explicit bachelor and Masters transport engineering courses. In Germany, transport engineering courses have existed since the 1970s with high class faculties in Berlin and Dresden. After 2005, several Masters courses arose from former civil engineering major courses. Mobility management appears – at best – as one module, mostly not as a project module. [ST01] In 2015, the University in Wuppertal installed a new professorship with a denomination including mobility management. Therefore, the appointed professor Ulrike Reutter includes aspects of mobility management in several lectures at both bachelor and master level⁷⁷.

4.1.2 Mobility Management

In Germany, only one study course is named 'mobility management'. It is conducted by the UAS RhineMain in Wiesbaden. UAS Deggendorf ran a second one between 2014 and 2017 as a vocational bachelor course. This course closed due to the demand being too low.

50-100 new students per year begin with their study course in Wiesbaden, whereas other study courses covering transport and mobility suffer slightly from a lack of demand.⁷⁸ Between 2010 and 2016, nearly the same number of students began with the hybrid study course called public transport management at Ostfalia UAS. After that, the number of first semester students decreased dramatically to less than twenty in the years 2017 to 2020.⁷⁹

Hence, mobility management seems to match with the requirements of young school graduates better than transport engineering study courses.

The bachelor study course in Wiesbaden already includes social sciences, communications and 'beyond-the-edge' content. The emphasis, however, lies on transport engineering content. Today, the course embraces six semesters with 180 CP. However, the persons in charge at UAS RhineMain currently plan to change this to seven semesters with 210 CP.⁸⁰

4.1.3 Communication Engineering

Communication Engineering mostly derives from computer sciences and media technologies.⁸¹ Therefore, communication engineering does not necessarily include social sciences like media and communications study courses do.

Mobility management and transport topics merely appear as specific application contexts (e.g. app programming, datamining at statistical research). However, mobility management refers to specified gaming-apps (e.g. for exercise), personalised advertising algorithms (e.g. personalised YouTube-channels), online-services (e.g. timetables and ticketing for public transport) but also specified devices (e.g. digital step counter watches) up to AR and AI application (e.g. ADAS, VR simulation). All of which have the claim to be intuitively usable.

⁷⁷ Source: https://www.oevm.uni-wuppertal.de/de/home/team/prof-dr-ing-ulrike-reutter.html

⁷⁸ Comment/Source: Official statistics from Hochschule RheinMain

⁷⁹ Comment/Source: Official statistics from Ostfalia UAS

⁸⁰ Source: https://www.hs-rm.de/de/fachbereiche/architektur-und-bauingenieurwesen/studiengaenge/mobilitaetsmanagement-beng

⁸¹ Source: https://www.ingenieurwesen-studieren.de/fachbereich-medien-und-kommunikationstechnik/

Due to the close relationship between IT-business and the automotive industry called ITS, mobility management topics are highly predestined to make use of specified digital solutions. The study course 'transport system management' at the UAS Karlsruhe combines computer and media sciences with transport topics.⁸²

4.1.4 Environmental Engineering

Environmental engineering combines geography with civil engineering. Several universities and UAS offer study courses (mostly bachelor). Transport topics occur as modules or specifications (e.g. at the university of Weimar⁸³). Environmental Engineering graduates therefore count as cognate to transport or civil engineers which means matching with specified job profiles (mostly at municipalities). Recently, municipalities specifically call for 'sustainability agents', 'bicycle traffic agents' or similar jobs, which match to both mobility managers and environmental engineers.

4.2 Study Courses in Economics

Similar to study courses in communications or computer science, mobility and transport topics usually appear within economics lectures when it comes to business models or certain applications. However, economic purposes play a crucial role in concerns of CMM projects (see chapter 7.1.1).

Hence, especially UAS developed a large number of hybrid study courses in which economic content dominates. Such hybrid study courses create quite a lot of unique selling points for studying bachelor study courses at UAS. The offer of hybrid (or even dual) study courses especially for those students who intend to start work at a low age is large. The demand is high.⁸⁴

4.2.1 Transport business

A few UAS offer specified economics courses with a direct reference to transport sciences. Heilbronn UAS offers the specified bachelor study course 'transport business economics and passenger traffic'.⁸⁵ The private UAS Fresenius offers 'mobility business' bachelor courses across locations.⁸⁶ Such study courses mainly embrace business economics content and economic basics. Transport and mobility topics appear later on in the specifications modules.

4.2.2 Urban and Regional Management

Urban and regional management mainly aims at city marketing and promotion of economic development. Most concerning units are run by municipalities, but also by NGOs or PPP-administrations. Transport and mobility topics play a role at site selection processes, participation processes and campaigns. In particular, mobility management objectives and skills play a role in long-term planning processes (e.g. industrial zones), co-operations with companies (e.g. concerning mobility of employees) and creation of awareness for stakeholders (e.g. sustainability aspects – see Figure 17 page 84). Urban and regional managers also come into play for mediation and moderation purposes when highly controversial projects are on the verge of failure.

A few UAS offer urban and regional management bachelor or vocational Masters courses (e.g. UAS Wismar⁸⁷, Ostfalia UAS⁸⁸).

⁸² Source: https://www.hs-karlsruhe.de/vsm-b

⁸³ Source: https://www.uni-weimar.de/?id=44917

⁸⁴ Source: https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/Publikationen/Downloads-

Hochschulen/studierende-hochschulen-ss-2110410207314.html

⁸⁵ Source: https://www.hs-heilbronn.de/vb-pv

⁸⁶ Source: https://www.hs-fresenius.de/studium/mobilitaetswirtschaft-bachelor-hamburg/ .../koeln etc.

⁸⁷ Source: https://www.wings.hs-wismar.de/de/fernstudium_Masters/integrative_stadtland_entwicklung

⁸⁸ Source: https://www.ostfalia.de/cms/de/iftr/srm/

4.3 Other Study Courses

Humanities and natural sciences study courses have many contact points with transport and mobility. However, such study courses do not include any specialisation in transport or mobility topics. Only geography (i.e. anthropogeography) and psychology (i.e. traffic psychology) offer such specialisations. Physics research frequently concerns traffic contexts (e.g. congestion research). The university Duisburg established a specified department for physics of transport and traffic.⁸⁹

4.3.1 Anthropogeography

Anthropogeographic research has many relationships with transport and mobility. In Germany, the universities in Trier⁹⁰, Frankfurt⁹¹ and Bonn⁹² are well known for long-term and large-scale research concerning behavioural aspects of transport.

The Goethe-University Frankfurt explicitly teaches mobility management aspects and offers student projects in that field.⁹³

4.3.2 Healthcare and Nursing

Healthcare and nursing usually has no, or very few, interfaces with transport and mobility aspects. Only barrier free planning and ambient assisted living (AAL) contexts are common aspects of both. However, one healthcare specification is healthcare management. Healthcare management is a special field of work for all kinds of institutions. Companies' human resources departments or work safety units often do corporate or occupational health management inside the company. Corporate healthcare management (CHCM) is a field for consultancies, too.

The projects, aims and methods of CHCM are very similar to CMM. In fact, CMM and CHCM are so close to each other that it literally surprised the author, that nearly no consultancy offers an integrated approach between CHCM and CMM.

This approach is worth doing research and integrated student projects on. Amongst other, The UAS Magdeburg⁹⁴, the University for health Bochum⁹⁵ and Ostfalia UAS⁹⁶ offer bachelor study courses in healthcare and nursing.

4.3.3 Media and communication

Mobility management meets a large number of topics from media and communication: strategic communication, campaigns, science communications, participation, IT-platforms (e.g. social media channels), public relations and many more.

However, transport and mobility contexts merely play a role when it comes to certain applications of strategic communications and marketing methods. Therefore, a new constellation of study course mixtures appears to be sensible, particularly for the students themselves.⁹⁷

⁸⁹ Source: https://www.uni-due.de/ptt/

⁹⁰ Source: https://www.uni-trier.de/index.php?id=29289

⁹¹ Source: https://www.uni-frankfurt.de/41601216/Home ⁹² Source: https://www.geographie.uni-bonn.de/

Source: Annika Busch-Geertsema during the first focus group discussion [FG1]

⁹⁴ Source: https://www.hs-magdeburg.de/studium/bachelor/gesundheitsfoerderung-und-management.html

⁹⁵ Source: https://www.hs-gesundheit.de/studieren-an-der-hsg/unser-studienangebot#Bachelor

⁹⁶ Source: https://www.ostfalia.de/cms/de/g/studium/studienangebot/management-im-gesundheitswesen/

⁹⁷ Source: Helena Will during the first focus group discussion [FG1]

A few UAS and universities offer media and communications study courses with many different specialisations and for both bachelor and Masters graduation (e.g. Ostfalia UAS⁹⁸, UAS RhineMain⁹⁹, UAS Collogne¹⁰⁰). Moreover, private and specified UAS with various places of location offer a few vocational study courses.^{101,102}

4.3.4 Sociology, psychology and human sciences

Human sciences study courses at universities merely deal with applied content (i.e. traffic behaviour, attitudinal aspects and acceptance) in theoretical lectures or in concerns of empirical surveys (e.g. questionnaires, surveillance). Many research reports deal with impacts on (physical and psychic) health or behavioural and attitudinal aspects of groups. Sociologists and geographers often join sociodemographic research.

Traffic psychologists developed a few educational formats for driving scholars and extra training (e.g. after accidents or severe breaches of traffic rules). Such educational formats can be adapted for mobility management purposes. Therefore, a study course in mobility management must include traffic psychology (see chapter 12.2).

The communications psychology deal with the question of individual reception concerning specific communications approaches (e.g. campaigns, individual marketing, and persuasive approaches).

4.3.5 School Teaching

In Germany, school teaching is divided into three major groups beginning with primary school teaching, teaching at secondary schools and teaching at vocational schools. All prospective teachers can choose between various concentration subjects, of which one is called 'education in sustainable development'.¹⁰³

The content reaches from basic knowledge to actual projects for the different grades.¹⁰⁴ The different approaches to sustainability must be embedded within diverse shapes of class. At primary schools, bicycle or pedestrian traffic can match with natural sciences (e.g. concerning resources, infrastructure), mathematics (e.g. range calculation) language (mother tongue - e.g. essay), arts (e.g. poster design), music (e.g. composing a song) and of course sports.

The older a child grows, the more contents can disperse. Issues of transport preferentially appear within geography classes, whereas mathematics, physics, social or political classes and nearly all other class formats often go away empty-handed. However, when teachers get to know about educational formats and options in sustainable development, the likeliness is higher that classes get a broad overview about mobility management methodology without ever having heard the term.

Teaching post students have no obligation to pass a specific sustainability course. However, there are several possibilities to catch up on it. The curriculum mobility helps teachers to shape such classes (see chapter 7.3.2). All teachers must pass vocational or professional training. This can probably merge with a Masters degree study course in mobility management.

⁹⁸ Source: https://www.ostfalia.de/cms/de/k/mm/

⁹⁹ Source: https://www.hs-rm.de/de/fachbereiche/design-informatik-medien/studiengaenge/media-management-bsc

¹⁰⁰ Source: https://www.rfh-koeln.de/studium/studiengaenge/medien/medienwirtschaft/kurzprofil/index_ger.html

¹⁰¹ Source: https://www.hmkw.de/hochschule/fachbereiche/wirtschaft/studiengaenge/ba-medien-und-eventmanagement/

¹⁰² Source: https://www.macromedia-fachhochschule.de/bachelor-studium/medienmanagement.html

¹⁰³ Source: https://www.bne-portal.de/de/einstieg/bildungsbereiche/schule

¹⁰⁴ Source: https://www.unesco.de/bildung/bne-akteure/bundesinstitut-fuer-berufsbildung-bibb-bbne-modellversuche

Nevertheless, study courses for prospective teachers at vocational schools in the field of construction technique include a large number of issues and topics from the field of sustainability (e.g. resources, recycling, energy consumption but also sustainable infrastructure).

Transport topics and mobility management build a cross section through numerous study courses. A specified study course on mobility management on one hand must cope with such cross sectional aspects. On the other hand, many different graduations lead to basal skills for mobility management professionalisation.

Quickview 4: Chapter 4

5. Literature Review

The author uses two different levels of literature. The primary level consists of important and recurring literature compounding valuable information for the core content of this thesis. The secondary level merely consist of further sources helping to understand the framework and interdependencies of this thesis. The primary level includes three topics. All primary level literature titles with the abbreviation AD (academics and didactics) subsume such monographs, articles, booklets but also websites that provide valuable information about teaching and learning.

All primary level literature with the abbreviation BP (best practice) subsume such monographs, articles, booklets and websites dealing with mobility management projects and results. Finally, RP (research and practice) subsumes literature concerning the theoretical and scientific approaches to mobility management. ST (student thesis) includes the theses from Helena Will, Jasmin Junghans (see chapter 1.7.1), Sinem Gülhan, Wyll Skiba and Florian Rehmstedt which were written as supporting texts for this thesis.

All primary level literature sources are summarised in the appendix, chapter 14.2. All other sources (secondary level) are listed in chapter 14.3 (appendix).

5.1 Research methodology background

The whole research of this thesis does not include representative quantitative results. However, the qualitative approach includes a broad selection of methodology (see chapter 1.7). The author orientates along three major publications and supporting background research (i.e. internet research, review of primary literature).

Firstly, the major scientific method is abduction, not on induction or deduction, which means, that the results of this thesis are NOT a verification or falsification of the hypotheses but recalibrated hypotheses which lead to new empirical work during the following implementation processes (i.e. of new lectures in mobility management). Therefore, the author follows the recommendations from Reichertz¹⁰⁵ and some biographic references about Charles Sanders Peirce (see chapter 1.7.10).

Secondly, the empirical research parts consist of three different qualitative empirical methods which all aim to result in high value specifications of the pursued study course design (e.g. concerning examination) and finely nuanced content (e.g. specified analytic methodology for CMM) to the detriment of representativeness. Therefore, the author follows the recommendations from Brosius, Haas and Koschel¹⁰⁶ in combination with personal recommendations from communication professionals (i.e. coaching hints from Christian Raupach during the preparation phase of this thesis, Denise Sommer beforehand and between the two focus group interviews and Helena Will during the supervision of her bachelor thesis).

Thirdly, the specific approach to the (originally not planned) focus group interviews was designed on the basis of the recommendations from the handbook by Krueger and Casey¹⁰⁷ as well as on the author's experience with the method of focus group interviewing during various observations at former research and student projects that took place at the Technical University Kaiserslautern in the years 2000-2005 conducted by various colleagues.

¹⁰⁵ Source: Reichertz, J.: "Die Abduktion in der qualitativen Sozialforschung" [AD06]

 ¹⁰⁶ Source: Brosius, H.; Haas, A.; Koschel, F.: "Methoden der empirischen Kommunikationsforschung – Eine Einführung" [AD15]
 ¹⁰⁷ Source: Krueger, R.; Casey, M.: "Focus Groups – A Practical Guide for Applied Research" [AD22]

Didactics 5.2

Didactics is a central part of education. It is one of the core elements of study courses for teachers. Beginning with birth, human beings learn – in the best case – lifelong. Didactic methods and approaches exist for each step of development from a human being, even for prenatal learning. In this thesis, the focus lies on nowadays routine didactic approaches for adult education, more precisely: university didactics. When it comes to 'near-practice teaching in the field of mobility management', the most important task of didactics is to determinate (and perfect) the so-called 'didactic triangle' between the teacher, the student and the learning matter. This includes the definition of the necessary and sufficient body of knowledge to be LEARNED (NOT to be taught) in order to be 'employable' (see chapter 1.4.1 and 0).

5.2.1 Intrinsic motivation

The learning process depends strongly on the individual presettings of the particular student. This, in turn, depends on the psychological and social framework of each person. A very important part of university didactics is the dependency on preliminary education (i.e. school education). However, the individual presettings of a student are also driven by parental influence, surrounding field effects and - maybe most important - personal preferences.¹⁰⁸

Hence, the learning matter is variable for each particular student. The largest mistake made in university teaching, therefore, is to start at a common 'scratch line' of learning matters. Students with a lack of experience or knowledge concerning this scratch line will have problems in understanding the teaching content. More experienced or educated students, on the other hand, will have a deja-vueffect which can bore the students. It is very likely, that none of the students has an individual presetting which is exactly matching the scratch line. This is mainly due to the fact that the teachers define that scratch line.¹⁰⁹

The aegis of university didadics is – other than the main principle concerning schooling didactics – the 'freedom of teaching'-rule. This basically means that teachers are free to determine the learning matter of their courses (as long as a defined core of the teaching content is ensured). Consequently, this means: The mistake of common scratch lines is not institutional, it is individually committed by the teacher.

However, didactics shall refer to the so-called four pillars of learning.¹¹⁰

- (Cognitive) attention
- Active Involvement (of the learner)
- (Cognitive) correction of mistakes -
- Consolidation (of learning matter)

University teaching didactics do not differ to such from school learning setting (for children). However, it occurs that the pillars attention, involvement and consolidation get easily integrated in (modern) teaching settings, whereas correction (i.e. failure) does not play a role. This circumstance accelerates

¹⁰⁸ Source: Biggs, J.; Tang, C.: "Teaching for Quality Learning at University" [AD23]

¹⁰⁹ Source: Trigwell, K.; Prosser, M.; Waterhouse, F.: "Relations between Teachers' Approaches to Teaching and Students' Approaches to Learning" [AD01] ¹¹⁰ Source: Castaignède, F.: "Die Schule von morgen", Television report, Arte, 12.9.2020 based on French research reports from 2017

the development of 'protean self'-constitutions.¹¹¹ Hence, failure is not a bad result of students' assignments, as long as the students get the chance to (cognitively) correct the results.

The project modules in the first two semesters of the study course of mobility management in Wiesbaden deliberately let the students deal with project tasks and topics of which they do not know the theoretic and methodological framework. The logical consequence of this procedure is (of course); They fail. After that, the students get to learn both methodology and theoretic backgrounds (i.e. of project management). After that, they must reflect on their projects, especially the mistakes they made. In the end, this leads to a high value of project competency. Bruns calls this teaching method "policy of soft shipwrecking" (see chapter 3.1.1). [Te7]

Nevertheless, even 'soft shipwrecking' can lead to demotivation and frustration. [Al1, AD11] Hence, the whole network of learning-teaching-interdependencies must always consider helping students on a lower (or at least other) level. Learn coaching can be the solution for this particular problem (see chapter 5.2.2).

The type of exam has a very high influence on intrinsic motivation. [AD23] Exclusively written exams are worst, hybrid examinations (e.g. near-practice assignments consisting of written and oral parts) are best when it comes to intrinsic motivation.

The conceptual formulation of (examination) tasks also plays a role in intrinsic motivation. The more individual assignments get the more intrinsic motivation is possible. Since the beginning of 2020, the author started to give his students assignments dealing with possible road redesign and bicycle traffic for roads and sites, which the students can choose individually. Hence, the students either chose site situations near their place of residence or site situations to which they had a personal reference.

The complexity and creativity shown towards optimising such situations was on a very high level even with rather mediocre students. In cases of sites, which the author chose, the very good students showed similar performance whereas mediocre students showed a low level of motivation as well as rather bad or even unacceptable performance.

However, the real performance of the exams depends utterly on the constellation of teaching and learning. Hence, even when a written exam stands at the end of a semester of lecturing, the teaching method itself can adequately create intrinsic motivation. Ideal constellations, therefore, exist, when both lecturing and examination promote evidence for intrinsic motivation. [AD23]

The level and intensity of intrinsic motivation is very individual. It is very likely that presettings concerning soft skills have an influence on that, too. Therefore, soft skill teaching and training must be integrated within study courses, the earlier, the better.

Figure 31 on page 118 and Figure 48 on page 137 show the results of the online survey concerning soft skills and how such skills can be considered in teaching settings.

5.2.2 How to manage a 'flow'

From a psychological point of view, studying can only be successful when (intrinsic) motivation drives the students. Some bachelor students may make it past quite a few semesters without any motivation, just by fighting themselves through. At the latest, the bachelor thesis will become the most exhausting

¹¹¹ Source: Keupp, H.: "Ambivalenzen spätmoderner Identitäten: Vom proteischen Selbst in den neuen Arbeitswelten" [AD11]

part of a study course. Of course, from the authors point of view, this drawback can be denied by issuing similar assignments beforehand - the earlier the better. This will prevent students from choosing the wrong educational path as early as possible. Especially those students understanding the aims of their tasks will develop a high level of intrinsic motivation. The most deciding moment of all study courses occurs after three semesters when the basic lectures are finished and the specialist subjects begin. The experience of the author shows that one in three students (who already has good marks) will seek close contact with the lecturers from that point on. Student two of three will develop a recognisable understanding of the applied issues of his studies without contact to the lecturer. Both will likely have more or less long lasting 'flows' during their work phases, especially when it comes to practical issues. The third of three students, nevertheless, needs support from either the lecturer or from specialised coaches - or at least by student tutors. Ostfalia UAS offers a specialised learn coaching programme featuring approximately one coach per faculty.¹¹² Apart from that, Ostfalia UAS encourages well performing students to help others in a parallel programme called writer's workshop.¹¹³ Similar programmes exist at other universities and UAS as well. However, concerning the qualification and breadth of the programmes, Ostfalia UAS has gained a unique selling point in Germany.¹¹⁴

All human beings have in common, that phases of 'flows' and phases of 'non-motivation' come from time to time, in most cases not projectable. "Non-motivation" phases can escalate to so-called 'writer's blocks' and even beyond. Worst case scenarios like durable depressions can occur. Such extend can only be managed through a psychological therapy. However, preliminary stages of that can be managed by learning coaches. 'Flow' phases, however, can also escalate. Worst case scenarios can be burn-outs or what Röhr calls the stage of grandiosity¹¹⁵, in which the ability to judge the own quality of work suffers massively. Therefore, students must be able to recognise a 'flow' and estimate its stability. This means that soft skills like self-reflection highly matter in terms of study courses, even more when it comes to mobility management (see chapter 9.6).

Hence, the core question is, in how far a 'flow' can be managed. That begins with the initiation and ends with the recognition of inadequacy of work. It is clear that a 'flow' cannot be switched on and off. However, one can set a supporting framework. One core element of course is the framework concerning the time and place of working as well as the companionship. The second core element is the framework of what is actually done during the working time (better at the start of it).

¹¹² Source: https://www.ostfalia.de/cms/de/zell/lerncoaching/

¹¹³ Source: https://www.ostfalia.de/cms/de/schreibwerkstatt/

¹¹⁴ Source: Richter, H.: "Lerncoaching: Beratung und Kompetenzentwicklung für Studierende", Journal Verhaltenstherapie & Psychosoziale Praxis, Vol. 3/2018, p. 593-600

¹¹⁵ Source: Röhr, W.: "Narzissmus – Das innere Gefängnis", eighth edition, Düsseldorf 2005

The fine-tuning aspects of that is to match the issue of working with the most supportive types of work in order to prevent procrastination.

According to Csikszentmihalyi, mimicry activities are the best to create a flow. Mimicry embraces dancing and drama on one hand, on the other hand arts and music.¹¹⁶ So, how can music, arts, dancing and drama match with transport engineering and specified issues of individual information? The trick can be to combine both into the study course. This idea matches with the opinions of Anders Söderberg [Pr12] and Jürgen Collin. [FG1] The study course design (chapter 12) therefore includes elements of mimicry in the schema curriculum.

Balancing between theory and practice 5.2.3

The share of theoretical (basics) lectures and lectures with practical issues is continuously blending in inverse proportion during most bachelor study courses at UAS. Usually, then consecutive Masters courses stay at a high level of practical lectures, whereas bachelor and Masters courses at universities compound a share of practical and theoretical lectures during the entire curriculum. This is mostly due to the fact that UAS encourages students to stay in cohorts through their studies, driven by a study course schedule, whereas university students must organise their schedules on their own, merely based on recommendations. [AD19] This leads to differing group dynamic effects during practice projects. Groups with stable compositions can develop group-specific assets and experienced teamwork styles, whereas groups with changing compositions increase individual adaptabilities. Hence, concerning mobility management, both settings shall occur. That, however, means that the composition of groups must be a topic at lecture preparation phases as well as at evaluation phases afterwards. It is also sensible to consider the actual content of the practical assignments. Some group compositions might match better with certain assignments.

Becker and Kaiser point to the fact that theoretical and practical content of study courses have a strict relationship. The core idea of 'employability' must not be misinterpreted as 'tickets to the job market'.¹¹⁷ Therefore, practical assignments must always include reflective parts and scientific classifications (e.g. mathematic approaches) to the practical results as well as adaptability aspects. Teachers must place emphasis on the relationship of the basic theoretical content (covered in the first years of the study course) and the advanced theoretical content as the skeleton of the practical solutions (covered in the later years of the study course). Again, the necessity for (different) teachers to coordinate their topics is highly important. Continuous monitoring of (especially) practical lectures regarding how far theoretical aspects play a role for the actual assignments can help to set necessary quality standards (see chapter 12.5).

Feldmüller and Weidauer created a feasible solution to cope with that.¹¹⁸ The key to high quality concerning practical lectures with a high taxonomy of theoretical background lies in a hybrid form of project lecturing. The students must act like project managers on one hand, thus, on their own initiative. One the other hand, the lecturer acts like a supervisor, so that various nuances of the individual competencies (e.g. project management competency, methodology, communication) can be deployed. It is very important in this respect that the learning competency (i.e. 'learning how to learn') is defined as one of the core competencies.

¹¹⁶ Source: Csikszentmihalyi, M.: "Flow" [AD14]

 ¹¹⁷ Source: Becker, T., Kaiser, S.: "Zur Rolle von Theorie und Praxis in der Hochschulbildung" [AD09]
 ¹¹⁸ Source: Feldmüller, D., Weidauer, C.: "Kompetenzentwicklung durch studienintegrierte Praxisprojekte" [AD07]

In 2017, the German Federal Ministry of Education and Research funded a programme for enhanced interaction between teachers and students. In this context, Tsipoulanidis created a project learning lecture, in which students had to find a solution for a specific (practical) problem on their own initiative, coached by a teaching team. However, other than with other project lectures, the students must transform the aftermath of the project into across-the-board guidelines for upcoming lectures.¹¹⁹

5.2.4 Building awareness towards sustainability

Most people actually know about negative aspects of their behaviour. Hence, in terms of mobility management, people know about (at least some) ecological impacts of car use (see chapter 6.1.1).

Empirical surveys done by the German Federal Ministry for the Environment, nature Conservation and Nuclear Safety show that people actually do reflect on their behaviour. However, a tangible change of behaviour has too much impact on accustomed and familiar (personal) processes. The individual 'comfort zone' is hard leave.¹²⁰

Nevertheless, change of behaviour starts with (holistic) awareness. Thus, as long as there is only some kind of understanding of sustainability which is not the same as comprehension, awareness cannot get any grip.

The key to holistic awareness is the knowledge about cognitive assimilation of cause-effect-chains. Causal cognition concerning environmental aspects is one of the core objects of investigation in the field of evolution and cognition psychology. The political debate with nature protection was mainly driven by comparatively easy to understand cause-effect-connections (i.e. sulphur-dioxide from car exhaust pipes chemically reacts with rain water to sulphuric acid (i.e. acid rain) which is toxic to trees and arenite grounds (i.e. forest dieback). It was so easy to understand by then because of the immediacy of the effect.¹²¹

Climate change takes much longer, the effects are much more complex as well as the chemical and physical processes behind it. Hence, even though knowledge about the climate change phenomenon and its background has been available since the early 1970s, it took more than 40 years until the public started to realise specific natural disasters as being a consequence of climate change. [RP35]

Nevertheless, even when a car driver is really aware of his own behavioural impacts, sustainability can only be reached by long-term and irreversible changes of behaviour and – even better – by influencing fellow human beings by the profit of a change.

Furthermore, individual behavioural aspects of sustainable mobility can be clustered. Hunecke and Haustein classified five different types of mobile human beings as well as specific incitements behind this. Hence, only few basic attitudinal aspects of mobility and sustainability can give an overview of the sheer likeliness of behavioural changes.¹²²

"Due to the fact that environmental education has to do with problematic issues that touch numerous dimensions of living together, a reflection on existing knowledge as well as a promotion of further knowledge concerning environmental education could support many other tasks of education [...]"¹²³

¹¹⁹ Source: Tsipoulanidis, A.: ""Frischzellen"-Projekt zur Förderung neuer Lehr- und Lernformen" [AD10]

¹²⁰ Source: Bundesministerium für Umwelt, Naturschutz und Nukleare Sicherheit (BMU): "Umweltbewusstsein in Deutschland 2018" [RP32] ¹²¹ Source: Becker, A.: "Reasoning about the complex nature of nature - Strukturen von Kausalkognitionen im Umweltkontext" [RP35]

¹²² Source: Hunecke, M.; Haustein, S.: "Einstellungsbasierte Mobilitätstypen: Eine integrierte Anwendung von multivariaten und

inhaltsanalytischen Methoden der empirischen Sozialforschung zur Identifikation von Zielgruppen für eine nachhaltige Mobilität" [RP33] ¹²³ Source: Kahlert, J.: "Zukunftsperspektiven der didaktischen Vernetzung in der Umweltbildung" in Beyer, A: "Fit für Nachhaltigkeit? - Biologischanthropologische Grundlagen einer Bildung für nachhaltige Entwicklung" [AD24]

Hence, the approach towards awareness must be more or less holistic and long-term. This leads to the conclusion that school matters like the curriculum mobility (see chapter 7.3.2) must connect to all study courses dealing with sustainability aspects.

Environmental education and causal cognition therefore must be taken into account for a study course in mobility management (see chapter 12.2.2).

Dobler, Suda and Seidl propose elements of strategic communications to create both awareness and acceptance, especially when it comes to complex topics. They suggest using narratives and role-playing games for that purpose. From their point of view, the humorous aspects of narratives and the possibility to switch positions within a role-play are important aspects towards gaining awareness and acceptance.¹²⁴

5.3 Practice reviews

Locally based best practice projects can be found nearly everywhere all over the world. However, there are states with long-term and high level governmental promotion and funding where best practice situations can be created widely. Those governments work together with industrial partners, researchers and new technology providers rather than with car manufacturers. Visibly more effort is made in the so-called SUNflower states Sweden, United Kingdom and The Netherlands, mostly driven by traffic safety issues. However, EPOMM lists a very high number of evaluated projects in the MaxEva evaluation tool.¹²⁵

The literature used is not conclusive but meant as an overview of good practice projects and contexts. More sources and aspects are included in chapter 7.

5.3.1 Recapulatory descriptions

In Germany, only a few publications describe the background, framework and actual performance of mobility management.

Langweg started to summarise the most important aspects of mobility management and started an approach towards a clear definition in 2007 already¹²⁶, so that further publications could refer to this pioneering article. He recapitulates the discussion about 'soft policies', too [RP21] (see chapter 2.6.2).

Stiewe and Reutter summarised a very basic approach to what mobility management actually is beginning with the historic background and then through methodology, interdependencies and policy and ending with cause-effect-chains and practice examples (see chapters 2.5 and 2.6). [RP06] This monograph appears in nearly all project reports and articles dealing with mobility management and can therefore be defined as 'basic literature'.

Schwedes, Sternkopf and Rammert [RP14, RP17 and RP34] offer a different perspective on mobility management. In their discussion paper [RP14], they provide a rather critical view on the actual impacts of mobility management compared to sustainable planning approaches, especially when it comes to infrastructural changes. This meta-level approach is widened in the second monograph [RP17], in which mobility management is described in contexts of policy making processes.

¹²⁴ Source: Dobler, G.; Suda, M.; Seild, G.: "Wortwechsel im Blätterwald – Erzählstrukturen für eine wirksame Öffentlichkeitsarbeit" [AD25]

¹²⁵ Source: epomm.eu/maxeva/ [BP18]

¹²⁶ Source: Langweg, A.: "Mobilitätsmanagement, Mobilitätskultur, Marketing & Mobilitätsmarketing - Versuch einer Begriffserklärung" [RP21]

Both publications suggest further research to be conducted about cause-effect chains of the different methods used during integrated planning processes.¹²⁷ The critical voice of both publications is that there is no clear proof that mobility management methods (alone) can change behaviour. This critical voice, however, might be understood as a general criticism of mobility management itself (like Axhausen¹²⁸ and the Representative from Transport for London¹²⁹ express). Nevertheless, Schwedes does not negate that mobility management has the desired effects, in his opinion, one simply does not know enough about the actual share of the origin when positive behavioural effects are measured.¹³⁰ Hence, the main message of Schwedes, Sternkopf and Rammert is, that more and more specified research on mobility management must follow in the next years. [RP34] Side note: This necessity of research can have good effects on how future study courses in mobility management are designed. Especially the implementation of reallab lectures will help with that (see chapter 12). Söderberg, nevertheless, states that the necessary proof of effectiveness concerning specific methods of mobility management has already been provided.¹³¹

Stiewe and Reutter [RP06] deliver a compendium of basics, applications and contextual articles from numerous professionals (i.e. teachers, consultants and planners). This offers an overview of the history and status quo of mobility management in transport contexts. The high level requirements for communications and the communication-related specific fields of work, however, seem to be underrepresented.

Blees, Bruns and Stiewe describe the increasing importance of mobility management during the first two decades of the 21st century. They consider a continuation and development of CMM-processes, a consolidation of approaches for communities and an increasing number of consultancies in the field of mobility management.¹³²

On the other side, IzR [AD17] delivers an overview about the professional requirements of mobility management from the human resources viewpoint. The monograph delivers a good overview about the specific interdisciplinary requirements in concerns of mobility management.

The potential share of competencies needed for mobility management professionals are basically communicative and engineering skills plus a variation of topics "beyond the edge". [AD17]

¹²⁷ Source: Schwedes, O.; Sternkopf, B.; Rammert, A.: "Mobilitätsmanagement - Möglichkeiten und Grenzen verkehrspolitischer Gestaltung am Beispiel Mobilitätsmanagement" [RP17]

¹²⁸ Source: Expert interview with Kay Axhausen [Te3]

¹²⁹ Source: Expert interview with David Metcalfe [Pr5]

¹³⁰ Source: Expert interview with Oliver Schwedes [Te11]

 ¹³¹ Source: Expert interview with Anders Söderberg [Pr12]
 ¹³² Source: Blees, V.; Brund, A.; Stiewe, M.: "Mobilitätsmanagement - Vom Mauerblümchen zum Erfolgsfaktor nachhaltiger Mobilität" [RP16]



Figure 12: Core competencies for a mobility management study course –design by the author, first published 2019 [AD17]

The largest, broadest and most up-to-date compendiums about mobility management, however, are on the internet. Both DEPOMM and EPOMM websites deliver information about recent projects, today's research, actors, definitions and new approaches. [BP17 and BP18]

Brög, Erl, Ker, Ryle and Wall evaluated 118 projects all over the world (half of which in Germany) that predominantly promoted public transport exclusively through individualized marketing methods.¹³³ They eventually refer to the trademarked dialogue marketing approach called 'Indimark' developed by Socialdata[™]. The most important step of this marketing method is to find out gaps in knowledge or misinformation from non-captive persons. Such non-captives have the choice between public and individual modes of transport but usually decide to take the latter. Change of behaviour can be reached by just informing such persons in the right way. Due to no infrastructural or operational reactions to the lack of information, this all can be defined as 'soft-policy only' conduct. [RP22] Specific research in concerns of mobility management projects in Lund after 2014 support these findings.¹³⁴

All recapitulatory descriptions have in common that they describe mobility management processes, projects and frameworks. None of the monographs, articles and websites provides a specified overview about teaching and educational requirements. Only IzR provides some information about today's study courses. [AD17]

An educational book about mobility management, therefore, must be an aim for the following years. This thesis can be used as a basal overview for that.

 ¹³³ Source: Brög, W.; Erl, E.; Ker, I.; Ryle, J.; Wall, R.: "Evaluation of voluntary behaviour change: Experiences from three continents" [RP22]
 ¹³⁴ Source: Experte interview with Anders Söderberg [Pr12]

5.3.2 Basic literature about strategic communication

Röttger, Gehrau and Preusse provide a broad compendium of the methodology or strategic communication in practice and three fields of policy making, business economics and science¹³⁵. Mobility management does not explicitly occur. However, image making processes of companies and policy making strategies are two of the most important fields of mobility management, so that the basal rules and empirical research in this field appear to be minimum as important as basal knowledge about transport and mobility.

Sandhu substantiates strategic approaches towards stakeholders and specified groups of society¹³⁶. He provides an overview about legitimisation strategies, especially concerning unpopular but objectively necessary political decisions (e.g. restrictions on car traffic). [RP37]

Hence, both promotion of soft policy measures (e.g. nudging) and comprehension of hard measures (e.g. parking charges) need knowledge about strategic communication.

5.3.3 Rules and Standards

The Road and Transportation Research Association Germany and the Swiss Association for Standardisation in Switzerland published rules and standards concerning the application and methodology of mobility management.^{137,138}

SNV defines recurrent systematic processes of mobility management. [RP15] The addressees of such systematic approaches are predominantly local and regional administrations. The rules concern organisational predestinations, process flow charts, rules of communication, steering and quality management processes.

FGSV seeks a short cut overview about mobility management [RP28] mainly referring to Stiewe/Reutter [RP06], Schwedes/Rammert [RP17] and Langweg [RP21]. However, the paper does not adequately copy the basal requirements concerning communications, especially rules of strategic communication.

The three SUNflower states do not have specific rules and standards concerning mobility management on a nationwide level. Merely local rules concerning eligibility exist. Clarke, Anapryenka, Das and Verloes, however, identify numerous gaps (or at least demerits concerning rules and standards) in the UK. They deliver a framework of possible changes of law that could promote integration of different approaches to sustainable mobility including economic and communicative standards.¹³⁹ This publication does not mention the need for rules and standards concerning mobility management by itself but concerning its opportunities to thrive.

¹³⁵ Source: Röttger, U.; Gehrau, V.; Preusse, J.: "Strategische Kommunikation - Umrisse und Perspektiven eines Forschungsfeldes" [RP36]

¹³⁶ Source: Sandhu, s.: "Gesellschaftsorientierte Unternehmenskommunikation: Stakeholderorientierung und Legitimation als Ziel der Public Relations" (RP37) 137 Geweichte Source Source State State

¹³⁷ Source: FGSV: "EAM - Empfehlungen zur Anwendung von Mobilitätsmanagement" [RP28]

¹³⁸ Source: SNV: "Mobilitätsmanagementsysteme - Anforderungen mit Anleitung zur Anwendung"[RP15]

¹³⁹ Source: Clarke, M., Anapryenka, O., Das, S., Verloes, A.: "Towards an appropriate legal and regulatory framework for smart futures on transport" [RP38]
5.3.4 Best practice of mobility management Masterplans

Up to now, no municipality published a specific mobility management plan. Mobility management, however, occurs at several stages of SUMP, travel plans or other long-term planning publications (See chapters 6.3 and 6.4).

The Swedish approaches, especially in Lund¹⁴⁰ and Malmö¹⁴¹ consider mobility management mainly for three purposes.

- Behavioural analysis and monitoring
- Modal shifting strategies
- Accompanying of infrastructural projects

All three elements occur both in specified chapters and casually through the methodological chapters of the planning frameworks. This approach is more basal and embracing all types of transport.

The approach of Canton Aargau is similar to the Swedish examples. However, the setup includes a specified CMM-strategy, too.¹⁴² The approach updates the good programmatic results of the prevenient strategy (i.e. including a measured proof of efficiency). The plan includes a segmentation of the different mobility strategies in primary multi-annual strategies and secondary specifications. The mobility management strategy flanks the entire strategic system concerning transport development. This approach, therefore, is more precise and independent than with the two Swedish examples.

The Anglos-Saxon approaches apply the mobility management methodology (more precisely: TDMmethodology, because some measures include 'hard policy'-elements) to more specified transport aspects (e.g. workplace travel). Marsden Jacobs Associates evaluated a state-driven funding programme enforcing local governments and companies to use TDM methods for modal shift policy especially for travel to work.¹⁴³ The programme gives a framework of scalable and measurable aims of travel to work change management (e.g. reduction vehicle kilometres travelled, reduction of CO₂emissions, increase in use of public transport modes). The report certifies that the state driven programme led to measurable enhancements. The return of invest occurs to be positive, too. [RP05] De Gruyter, Rose and Currie made a report about how travel plans impact residential development.¹⁴⁴ Hence, the two reports of Marsden Jacobs Associates and De Gruyter, Rose and Currie show the two different points of view: municipalities and business on one side and employees on the other side. However, whether there is a positive effect of travel plans on residential development (i.e. individual decisions of settlement) is unclear. This is mainly due to heterogeneous local strategies concerning travel plans and settlement policy, at least a delay between both contexts. The personal disposition of the people (e.g. job changes, children) has an effect of travel and settlement, too. The travel plan (e.g. special bicycle streets in residential areas), mobility management (e.g. 'nudging' packages) and settlement policy (e.g. funding programmes for electric mobility) surely has an impact on such individual dispositions. However, more research is necessary to proove this and provide more precise cause-effect-chains. [RP12]

¹⁴³ Source: Marsden Jacobs Associates (MJA): "Evaluation of the TravelSmart Local Government and Workplace Programs" [RP05]
 ¹⁴⁴ Source: De Gruyter, C., Rose, G., Currie, G.: "Enhancing the impact of travel plans for new residential developments: from implementation theory"

¹⁴⁰ Source: City of Lund: "Lundamats III" [BP05]

¹⁴¹ Source: City of Malmö: "Sustainable Urban Mobility Plan - Creating a more accessible Malmö" [BP07]

¹⁴² Source: Departement Bau, Verkehr und Umwelt des Kanton Aargau: "Mobilität - Strategie im Kanton Aargau – mobilitätAARGAU" [BP08]

[[]RP12]

Transport for London continuously measures traffic, uses questionnaires and monitors travel demand (e.g. by using customer data from journey planning apps). They conduct such analysis mostly annually. They derive specified measures (e.g. certain adjustments and replenishments to the public transport systems) and incentives (e.g. off-peak fares, business bike solutions). This strategy includes mobility management methods and aspects in an integrated manner.¹⁴⁵ The evaluation of the measures used appears to have positive effects on modal shifting and reducing congestion. [BP15]

5.3.5 CMM funding programmes

Mobility management needs at least initial funding. In Sweden and The Netherlands, the CMM-system, after initial funding in the early 2000s, has become independent.^{146,147} The process in Germany started in 2008 with a large-scale programme (3.7m €) called 'effizient mobil'. This multi-level programme included 15 regional processes, specific competitions and a supporting scientific evaluation process¹⁴⁸. The subsequent programme 'mobil gewinnt' was a funding programme for more than 300 CMM-processes.¹⁴⁹ Today, numerous, mostly open-end regional programmes for CMM and cognates are available or in preparation. Figure 13 gives an overview of the specific funding approaches after 2005 concerning CMM and cognate (i.e. energy consulting) programmes.



Figure 13: Funding programmes for CMM and cognates [design by Peter Vollmer]

Today, funding approaches are becoming more specific and – most importantly – low-threshold. The multi-level programmes – especially 'effizient mobil', however, produced high-level qualitative results to learn from. Regionally driven programmes like BMMhochdrei additionally consider local opportunities (e.g. across-company-solutions).¹⁵⁰

¹⁴⁵ Source: Transport for London (TfL): "Travel in London - Report 9" [BP15]

¹⁴⁶ Source: Expert interview with Representative from Advier [Pr9]

¹⁴⁷ Source: Expert interview with Caroline Ljungberg [Pr11]

¹⁴⁸ Source: Deutsche Energie Agentur (dena): "effizient mobil - Das Aktionsprogramm für Mobilitätsmanagement"[RP04]

¹⁴⁹ Source: B.A.U.M. Consult GmbH: "Mobil gewinnt - Nachhaltige Mobilität kennt nur Gewinner" [BP26]

¹⁵⁰ Source: Wuppertal Institut für Klima, Umwelt, Energie GmbH: "Betriebliches Mobilitätsmanagement im Bergischen Städtedreieck - BMM Hoch Drei" [BP14]

5.3.6 CMM-campaigns and promotion

In Germany, mobility management actors are unequally distributed. The regional and local governments around the metropolitan regions in the Southwest and West of Germany pioneer concerning mobility management promotion and campaigns. Other regions, especially in the North and Northeast are around ten to twelve years behind.

In 2003 a national funded project started, from which in 2005 the IVM was founded. Since then the IVM became the most active and sustainable co-ordinator of mobility management programmes and campaigns in Germany and one of the drivers of DEPOMM including the yearly conference on mobility management DECOMM.

The IVM published numerous brochures and best practice compendiums concerning CMM. One brochure deals with facts and alternative options for business trips and in-company mobility. The brochure published before 2020 does not yet include strategies of digital work (e.g. telecommuting) that emerged with the Covid-19-pandemic.¹⁵¹ Another brochure deals with organisational and operational frameworks for a higher efficiency of business travel and mobility aspects (e.g. fleet management). The main key to higher efficiency is a close view on actual car use and behavioural aspects (i.e. thorough analysis – see chapter 7.1).¹⁵² A specific brochure gives advice concerning bicycle use by employees. Companies can work on four different aspects to promote bicycle use (i.e. cycling infrastructure at the work place, incentives and organisational aspects of communication and company bikes or bike-sharing opportunities).¹⁵³ A second specific brochure deals with strategies towards public transport usage by commuters. The strategy mainly consists of co-financing reduced ticket prices for employees and providing information (e.g. app use, timetable notice). However, businesses can directly apply for changes of public transport (e.g. timetable adjustments for shift-workers, reallocation or replenishment of bus stops) at IVM.¹⁵⁴ The most specific and basic brochure deals with fleet management. Again, analytic steps and behavioural aspects are of importance. Additionally, IVM provides b2b concepts for company bicycles, carsharing and carpooling as well as cross-companyridesharing opportunities.¹⁵⁵

Many CMM-Guidelines provide methodological information about CMM but also more detailed examples and aspects of promotion and funding options with CMM plus a sample of best practice reports.¹⁵⁶ Such guidelines are closely related to vocational training concepts, too.¹⁵⁷

¹⁵¹ Source: IVM: "Umweltfreundliche Dienstfahrten" [BP09]

¹⁵² Source: IVM: "Mobilität im Unternehmen Effizient Gestalten" [BP10]

¹⁵³ Source: IVM: "Förderung des Radverkehrs" [BP11]

¹⁵⁴ Source: IVM: "Arbeitswege mit Bus und Bahn" [BP12]

¹⁵⁵ Source: IVM: "Effizienter Fuhrpark" [BP13]

 ¹⁵⁶ Source: Mittelstandsinitiative Energiewende und Klimaschutz: "Praxisleitfaden Betriebliches Mobilitätsmanagement" [RP23]
 ¹⁵⁷ Source: Ecolibro GmbH; Menzel, C.: "Beratungsleitfaden nachhaltiges Betriebliches Mobilitätsmanagement für KMU-Impulsberatung" [BP25]

5.3.7 Quality management approach towards follow-up care for CMM-projects

Most CMM projects in Germany are part of an official funding programme. Government-funded CMM projects usually have a fixed run-time.¹⁵⁸ Therefore, individually arranged CMM projects include long-term quality management agreements.¹⁵⁹ Project funding municipalities postulate evaluations concerning the consulting process itself but not concerning any implementation aftermath. This is due to a lack of subsidy.

Fully-fledged follow-up care, however, shall include long-term evaluating and monitoring processes after the consultation and conceptual phases of a CMM. In the best case, the quality management circle leads to a follow-up consultation six to ten months after the implementation of certain measures (e.g. newly built bicycle parking facilities, car parking fees, job tickets, work from home options).

Instituting a specified employment position or (even better) a whole department for mobility management inside the company gains the highest degree of quality management.

FGSV and SNV offer some short recommendations about pursuing mobility management processes. [RP15 and RP28]

5.3.8 Methods of evaluation

Cause-chain-effects of mobility management, especially the differentiation between measures of mobility management and other measures of sustainable planning are highly controversial (see chapters 1.3.3, 2.6.1 and 5.3.1). Finke started an approach to a methodology of evaluation on a programme level. [RP20] Louen used numerous sources to create a statistically substantiated methodology of evaluation. [RP10] However, neither author managed to disprove the main criticism of those who doubt the actual efficiency of mobility management.

Walther, Kistner, Arnold, Kowald and Bruns clustered evaluative concepts in the transport sector. Evaluations can lead to four different types of knowledge:

- 1. Perception of effects (e.g. real-time or cause-effect-chains)
- 2. Steering, controlling and monitoring (e.g. actual-theoretical comparison)
- 3. Learning function (e.g. temporary trials)
- 4. Legitimation (e.g. validation of political aims)

The publication does not specifically focus on mobility management projects and concepts. The whole research project aimed instead at methodological purposes of evaluation. The study, therefore, makes a differentiation between process evaluation and cause-effect evaluation.

In concerns of mobility management, both types of evaluation make sense. However, the process evaluation delivers more information about how communicative purposes individually differ. It delivers information about key moments (e.g. appraisal, awareness) of consulting processes (e.g. reflection or feedback sessions). Cause-effect evaluation concerning mobility management is still a necessary topic for the future. Merely Brög, Erl, Ker, Ryle and Wall deliver a broader and comparative report about certain effects of mobility consulting. [RP22]

¹⁵⁸ Source: Expert interview with Representative from IVM GmbH [Pr6]

¹⁵⁹ Source: Expert interview with Knut Petersen [Pr1]

Söderberg states an analytic learning curve between the various renewals of LUNDAMATS between the late 1990s and the latest version in 2016. [BP05]¹⁶⁰ The concepts distinguish between the effect of measures of mobility management (in other words 'soft' measures), infrastructural, operational and fiscal measures (in other words 'hard' measures). Söderberg emphasises palpable effects of 'soft measures', so that further editions of LUNDMATS can make more precise differentiations of aims and measures. [Pr12]

Urban development approaches with integrated mobility management 5.3.9

De Tommasi, Welsch, Rye and Plevnik benchmarked rules and practice of mobility management purposes and project settings with land use planning in a project funded by the European Commission.¹⁶¹ The focus was mainly on rules and laws concerning newly built areas (e.g. residential areas with private homes). The outcome of the report consists of basal recommendations towards transferability, setting of integrative standards and advisory platforms (e.g. EPOMM).

The German government funded a research project on this basis afterwards. Kemming, Reutter, Stiewe, Benden, Brandt, Witte, Bruns and Mühlhans evaluated structural basics like laws and rules, monitored ongoing or completed projects in Germany and abroad and finally re-benchmarked the framework situation in Europe.¹⁶² By then, the definition of mobility management was basically the same as today. However, the distinction between mobility management and sustainable planning was even weaker than today. Hence, the results merely reflect a status quo of the years before 2010. By then, urban development planning already included many aspects of sustainable transport (e.g. restructured parking lot calculations, enhanced bicycle traffic) and mobility consultation (e.g. CMMapproaches at newly built industrial areas, mobility centrals - see chapter 7.2.1). Transport development plans became more and more integrated with other plans (e.g. clean air plans, noise reduction action plans). The authors identify differentiated consulting options, multiple variations in participation and political influencing. The final recommendations, however, focus on the political framework concerning laws and rules, but not on new fields of work, higher levels of communicative approaches or ex-post evaluations of planning processes (e.g. feedback from inhabitants).

The author of this thesis suggests a reissue of the research project with a new focus on:

- Communicative and educative aspects
- Aspects of digitalisation -
- Distinction between sustainable planning methods and mobility management methods

5.3.10 Specific approaches

People typically plan trips for tourism purposes much further in advance than their daily trips to work. Mobility at touristic destinations also needs preparation. The traffic peaks at touristic regions massively differ from commonplace (e.g. urban contexts). Groß delivers a good overview about the specific requirements of touristic mobility.¹⁶³ Groß describes a touristic trip as a 'product'. Depending on the degree of service, the shape and scope of this 'product' reaches from 'backpacker' to 'all-inclusive'.

¹⁶⁰ Source: Expert interview with Anders Söderberg [Pr12]

¹⁶¹ Source: De Tommasi, R., Welsch, J., Rye, T., Plevnik, A.: "MaxLupo - Guidelines or the integration of Mobility Management with Land Use Planning" [BP01]

 ¹⁶² Source: Kemming, H., Reutter, U., Stiewe, M., Benden, J., Brandt, T., Witte, A., Bruns, A., Mühlhans, H.: "Mobilitätsmanagement in der Stadtplanung - Abchlussbericht FOPS 70.794" [RP03]
 ¹⁶³ Source: Groß, S.: "Mobilitätsmanagement im Tourismus" [RP01]

Tourists, therefore, get (and need) various options of choice (e.g. modes of transport, tariffs, accommodation) from multiple sources (e.g. internet, travel agencies, tourist information offices).

Mobility and sustainability aspects (i.e. consulting content for mobility management purposes) must take the trip to the destination and back together with possible 'via-trips', local trips and foreseeable behavioural aspects (e.g. nutrition supply, refuse disposal) into account.

Functional mobility management depends on the local disposition concerning

- The existence of local or regional mobility Masterplans
- Funding of sustainable tourist concepts (e.g. 'green tourism', 'gentle tourism')
- Intercommunal agreements between tourist departments
- Local arrangements concerning touristic transport (e.g. public transport tariff)
- Opportunities for disabled (e.g. barrier free tourism)

The existence of a mobility centre is helpful, too (see chapter 7.2.1). The best case would occur when the local tourist administration is the operator in charge of the mobility centre like in Constance.¹⁶⁴

Other specific approaches aim to specific groups or certain places. Chapters 7.2 and 7.5 deliver more detailed information and literature about that.

5.4 Supporting student theses

Beforehand and during this habilitation project, the author supervised five different student theses (one research thesis, three bachelor theses, one Masters thesis) which support the project content and framework. The first thesis was conducted beforehand focusing on study courses with mobility management context in the DACH-region. The second thesis had a close interdependency with the focus group discussions phase focusing on strategic communications approaches especially towards stakeholders. The third thesis was conducted in a late phase of the project flanking a consultation project of the author together with Ecolibro with the aim of a training concept of initiate CMM-consulting. The fourth thesis was conducted in a late phase of the project, too. It focuses on potential addressees of consulting concerning private car use and electric mobility. The latest thesis was initially started in 2019 but could not be finished before 2022. The focus of it lies on follow-up care approaches of CMM-processes.

5.4.1 Relevant study courses in Germany, Austria and Switzerland

Junghans did research on the question in how far mobility management specifically occurs within relevant study courses (i.e. related to transport sciences – see chapter 4.1). She approaches the topic from evaluating job advertisements heading 'mobility manager' (i.e. stated study course requirements). With that background, she evaluated the internet presence of all universities and UAS in Germany, Austria and Switzerland providing study courses that match with the stated requirements. After that, she clustered the study course offers in three categories. [ST01]

- 1. Study courses with mobility management in the name
- 2. Study courses with mobility management as a module
- 3. Study courses with mobility management as a secondary topic in certain modules

¹⁶⁴ Source: Menzel, C., Ruff, J.: "Erste Mobilitätszentrale mit internationalem Angebotsprofil" [BP24]

In 2017, six bachelor study courses, two consecutive Masters courses and two MBA courses with 'mobility management' in their name existed in Germany and Austria, none in Switzerland . One of these ended in 2018 (Deggendorf) due to low demand, two changed names in 2018 (Erfurt) and 2020 (Fresenius), because generic mobility management topics did not occur in the curricula (this circumstance played a role during the re-accreditation processes). Merely the two MBA courses in Berlin and Krems(A) as well as the basal course in Wiesbaden still exist in 2021. The bachelor course in Kapfenberg (A) does not specify mobility management. It is rather cognate to other study courses in environmental engineering (see chapter 4.1.4). The Masters course in Ingolstadt focuses on automotive management.¹⁶⁵ The following table gives an overview.

					Specified emphasis	Number
Name of the university/UAS	Name of the bachelor study course	Place	Country	Graduation	on mobility management	of semesters
HS RheinMain	Mobility Management	Wiesbaden	Germany	Bachelor of Engineering	Yes	6
	Automotive and Mobility Management					
HS Fresenius	now: Mobility business	Hamburg/Cologne/Munich	Germany	Bachelor of Science	No - renamed	6
	Mobility Management					
TH Deggendorf	(cancelled)	Deggendorf	Germany	Bachelor of Arts	No - cancelled	10
	Energy-, Mobility- and			Bachelor of Science		
FH Joanneum	Environmental Management	Kapfenberg	Austria	in Engineering	Partly	6
	Name of the master study course					
	Intelligent Trasnport Systems and Mobility Management					
FH Erfurt	now: Transport and Traffic	Erfurt	Germany	Master of Science	No - renamed	4
TH Ingolstadt	Automotive and Mobility Management	Ingolstadt	Germany	Master of Arts	No - renaming expedient	3
				Master of		
TU Berlin	Sustainable Mobility Management	Berlin	Germany	Business Administration	Partly	3
				Master of		
Donau-University Krems	Professional MBA Sustainable Mobility Management	Krems	Austria	Business Administration	Partly	4

Table 7: Study courses with mobility management in the name [design by the author based on Jasmin Junghans [ST01]]

Modules and other teaching formats named 'mobility management' occur in merely a few other study courses. However, it plays a role in nearly all study courses with transport matters (see chapter 4.1). All teachers interviewed (apart from Axhausen [Te4], Holz-Rau [Te6] and Rodriguez-Valencia [Te12]) provide at least a minimum overview (mostly one to three lecture sessions) about mobility management amongst transport management, planning or participation contexts.

Immediately after the expert interviews, Zweibrücken, Sommer and Schwedes consigned various brochures and information about the bachelor and Masters courses at Rapperswil, Kassel and Berlin in which they teach. The author received specified information about the 'mobility management' course in Wiesbaden because he teaches part of that himself. Mobility management contexts, especially practice projects including mobility management methods occur in several lectures, mostly on a Masters level.

Junghans recommends enlarging the study course offers in mobility management on all three above mentioned levels because of an empirically observable increasing demand for mobility managers (see chapter 1.3.2). [ST01]

¹⁶⁵ Source: https://www.thi.de/thi-business-school/studiengaenge/automotive-mobility-management-ma

5.4.2 Communication science's approach towards stakeholder teaching

Will combined an in-depth literature analysis concerning strategic communication theories with expert interviews. She identified two goal steps of persuasive approaches.¹⁶⁶ The first step is to gain problem awareness. This step is highly dependent on the individual disposition of the people to be persuaded (i.e. recipients of a consultation). The consultant (i.e. the mobility manager) must know about the existing knowledge (e.g. environmental impacts of traffic – see chapter 6.1.1) and political attitudes of the recipients. The consultant must take doubts, denial or ignorance into account. However, the sheer willingness of the recipients to receive a consultation is a very good precondition for a successful persuasive act. This persuasive act itself is the second step of the approach. The recipients learn about impactful decisions, behaviour and role model actions. Incentives and nudging methods help to flank this step.^{167,168}

One key aspect of the awareness setting process is that it must be as haptic as possible. Example for step one: The recipients eventually learn about the bad impacts of traffic noise as soon as they stand near a motorway with a noise measurement device. Example for step two: The recipients get a good overview of the advantages of an electric bike when they actually try it out.

Knowledge about the diffusion theory and the theory of assertion from innovations now helps the consultant to estimate when and to what extent recipients might reconsider their behaviour, attitude and decision-making processes.

The most important result of the thesis is that mobility management might work much better if mobility managers (i.e. people in charge of mobility management projects) knew more about these two communicative key strategies of persuasion and setting awareness. This leads to the conclusion that a mobility management study course must unconditionally include a very high percentage of content from communications science (see chapter 12.2).

5.4.3 Initiate consulting impulse approaches

CMM does not always start on a high level. In Switzerland, many municipalities (e.g. the canton Aargau) offer impulse consulting as a low-threshold service for companies¹⁶⁹. The strategy behind this service is embedded in the canton's mobility plan.[BP08]

Rehmstedt reviews low-threshold strategies with CMM-promotion programmes. He analyses the impacts of the Covid-19-pandemic on both consultation processes (i.e. online education formats) and mobility itself (i.e. telework-induced saving of trips). His recommendations lead towards a mixture of online and on-site analysis and consultation phases.¹⁷⁰ He closely orientates with the CMM-guideline edited by Ecolibro and the author (see chapter 5.3.6). [BP25]

 ¹⁶⁶ Source: Will, H.: "Stekeholder- und Multiplikatorenschulung im Mobilitätsmanagement - Ein kommunikationswissenschaftlicher Ansatz" [ST02]
 ¹⁶⁷ Source: Expert interview with Eva Hannak [Pr2]

¹⁶⁸ Source: Expert interview with Anders Söderberg [Pr12]

¹⁶⁹ Source: Expert interview with Stefan Schneider [Pr13]

¹⁷⁰ Source: Rehmstedt, F.: "Digitale Kommunikationspotenziale im Mobilitätsmanagement – Auswirkungen der Covid-19-Pandemie auf die Impulsberatung" [ST03]

He checked CMM-activities, methods and content in an online-survey for the target group of listed mobility management consultants on the DEPOMM-Website. [BP17] The survey's results show a change in methods of CMM (i.e. increased use of digital exchange platforms and video conferencing) and content (i.e. recommendations concerning telework) before and during the pandemic.

5.4.4 Incitements for changes of private car ownership

Gülhan described the background of decision-making processes concerning purchase and use of private cars. She reflected on her own situation (i.e. two-person household with two cars) and compared it to the household average in Germany. She described the levels of decisions (i.e. emotional, rational, pragmatic) and applied them to her own situation.¹⁷¹ The thesis included a view on the reasons that led to today's situation (i.e. one car per household member) and which circumstances might change the situation. She discussed and compared the following five transfer options:



Figure 14: Five steps of transferring a private family car fleet [design by the author]

She investigated family behaviour by using a travel diary with journey purpose and reasons of use of the selected mode for two weeks in autumn. The intuitive and comfort aspects derived from the sheer existence and 100%-availability of two comfortable mid-range cars dominated the decision-making process in particular.

¹⁷¹ Source: Gülhan, S.: "Beweggründe zur Veränderung von familiären Fuhrparken" [ST04]

The emotional (i.e. ownership-effect) and pragmatic barriers (i.e. review of costs) lead to step 1) maximum. Step 5) is merely possible with the via-step 3) for a while. However, in case of a change in the social and political framework the alternative opportunities might switch to more comfort and intuitive use (i.e. emotional re-thinking processes). [ST04]

5.4.5 Follow-up care of CMM projects

Skiba describes the situation with governmental funding of CMM projects, especially those from official programmes as described in chapter 5.3.5. He evaluated a handful local projects that were run in the years before the Covid-19-pandemic. He also compared the different approaches of follow-up care in the recent funding programmes. In the end, Skiba develops a strategic idea towards upcoming standardized processes of follow-up care which splits up into different stages and a synchronised toolbox.¹⁷²

The different stages of follow-up care are:

- 1. Accompanying Feedback during the actual CMM
- 2. Qualitative evaluation of the CMM-process
- 3. Feedback discussion after the CMM-project
- 4. Checkup concerning the implementation of measures from the CMM-project recommendations
- 5. Qualitative and quantitative evaluation of effectiveness of measures from the CMM-project recommendations

Especially the latter two stages need additional instruments concerning cause-effect chains and measurability of such (see chapters 1.6.2, 2.6.1, 5.3.4 and 7.1.4).

The literature review shows a good availability of research, best practice and methodological aspects and research results that can be used as a theoretical basis for study courses in mobility management. However, further research and practical review is necessary because of changes in the job market, the impacts of the Covid-19-pandemic and new opportunities of education.

Quickview 5: Chapter 5

¹⁷² Source: Skiba, Wyll: "Nachsorge als Baustein des betrieblichen Mobilitätsmanagements" [ST05]

6. Interactions and interdependencies between mobility management and strategic transport planning

As the discussion in chapter 2.6.2 shows, mobility management is intensely involved in strategic and conceptual transport and planning processes. However, the impacts of transport planning topics on mobility management and vice versa must become clear.

6.1 The transport sector as a major challenge for sustainable development

The German Council of Science and Humanities published a paper about the largest upcoming ('grand') challenges of society.¹⁷³ The paper focuses on sustainability and sustainable development several times, mostly driven by scientific facts such as global warming, the north-south-divide in social development and destructive consumption of resources, where the transport and mobility sector is highly relevant (e.g. the transport sector produces more than 20% of CO₂).¹⁷⁴

The paper also focuses on the close relationship between science and society. Research and scientific work must always find a resonance in the public domain (e.g. through advanced participation processes). [RP11] Otherwise, disbelief, doubt, reservation against the 'scientific elites' may have a dangerous political impact. The Covid-19-pandemic and the increased occurrence of populism with political leaderships after the publication showed how fragile the trust in science and political sanity can be.

Study courses, especially in mobility management, therefore, must take prevention of doubt, misunderstanding and handling of disinformation into account.

6.1.1 Environmental impacts of transport

Transport causes major damage on the environment and nature. The list of impacts is long. The German Pro Rail Alliance evaluated external costs of transport in Germany. External costs combine and compare negative impacts on environment (e.g. air pollution) and society (e.g. accidents) with the production costs (e.g. consumption of resources) and downstream effects (e.g. healthcare costs).¹⁷⁵

¹⁷³ Source: Wissenschaftsrat: "Zum wissenschaftspolitischen Diskurs über große gesellschaftliche Herausforderungen [RP11]

¹⁷⁴ Source: https://de.statista.com/statistik/daten/studie/317683/umfrage/verkehrsttraeger-anteil-co2-emissionen-fossile-brennstoffe/

¹⁷⁵ Source: Allianz pro Schiene/Infras: "Externe Kosten des Verkehrs in Deutschland", Zurich, 2019

Best known of all – due to public discussions in the last few years - are the various gas emissions. This list begins with the climate changing CO_2 . Also well known for being very poisonous is CO. NO_X is known for being harmful. Other emissions like dust particulates are also known, but merely concerns of combustion engines. Finally noise pollution plays a role in the public debate. However, the knowledge about what noise pollution actually means and how it is measured, is most likely very low.

It is highly likely, that public awareness for other emissions like heavy metal particles (tyre and power train abrasion), microclimatic impacts caused by water vapour and engine heat is near zero. The negative impact of land consumption and soil sealing for nature and global warming are presumably known but massively underestimated. This all results in attitudinal conflicts. Many people know about negative (global) aspects of their transport behaviour but they underestimate the dimension of their individual contribution to it.¹⁷⁶

Therefore, environmental psychologists develop strategies towards elucidation. Such strategies are of high value for many parts of mobility management and will therefore be included to the study course design (chapter 12).

The content of environmental education must include cause-and-effect-chains of (transport) behaviour¹⁷⁷, matters of sufficiency¹⁷⁸ (see chapters 6.1.1, 6.5 and 7.8) and also matters of environmental synergies with traffic (e.g. CO_2 -efficient roadside trees, biotopes or solar panels at noise protection walls¹⁷⁹) or environmental promotion (see chapter 6.6).

6.1.2 Traffic safety

Traffic safety is a very good field for campaigns. The idea of traffic safety elucidation through television, posters and events already started in the 1960s. However, campaigns mainly concern safety aspects of drivers and their impacts on other road users. Secondary effects of accidents like psychological disorders of indirectly afflicted persons do not play a role. Posttraumatic stress disorders do not only occur to victims of car crashes but also to paramedics or police officers.¹⁸⁰ Accidents can also cause heavy environmental impacts like fires, local emissions of poisonous or harmful substances (e.g. brake fluid, coolant, engine oil) as well as damage to road infrastructure and surrounding buildings.

Interdependencies to mobility management, therefore, do not only exist with traffic safety campaigns. Traffic safety aspects mobility management also address at awareness for accident costs and the above mentioned secondary effects.

¹⁷⁶ Source: Umweltbundesamt: "Umweltbewusstsein in Deutschland 2018", Dessau-Roßlau, 2019

¹⁷⁷ Comment: Behavioural change also concerns nutrition, energy consumption, consumerism, upbringing and use of media. It is unclear, in how

far a broader approach can be included into a study course of mobility management. ¹⁷⁸ Comment: This also includes the ethical aspect of "when is enough really enough?".

¹⁷⁹ Source: https://www.naturawall.de/gewerblich.html

¹⁸⁰ Source: Häller, P.: "Posttraumatische Belastungsstörung bei Rettungssanitätern", Dissertation, Saarbrücken, 2010

6.1.3 The Special field of stationary traffic

Car parking and stationary traffic play a large role for mobility management purposes. The impacts of car parking include land consumption and soil sealing. Apart from a very large number of vehicles , the dimensions of vehicles have constantly increased since the first mass productions began in the 1920s. Private cars are in use (i.e. in motion) for merely one hour (second cars even less) per day. Hence, the vehicles must stand on a parking lot for at least 23 hours per day. 40% of all vehicles do not move at all on an average day.¹⁸¹ Another negative impact comes from traffic movements while drivers are searching for parking spaces.

Therefore, parking management and strategic parking policies build a specific field in sustainable planning contexts. For example, in 2010 the city council of Constance published a preliminary specified concept about stationary traffic even before the mobility Masterplan strategy was concluded.¹⁸² The concept consisted of analytic parts concerning parking density, misconduct and group specific demand (e.g. inhabitants, shopping). The concept included infrastructural measures (e.g. parking facilities for inhabitants), fiscal measures (e.g. appropriation of taxes) an flanking measures (e.g. car sharing offers).

Petersen also emphasizes the necessity of including parking management in mobility management processes because the reallocation of parking facilities provides possible savings.¹⁸³ Both circumstances indicate a high relevance of parking management for both conceptual planning and mobility management purposes.

6.2 The idea of integrated conceptual planning

Planning contexts divide into sectoral and integrated approaches. Sectoral approaches (i.e. detached planning of single objects) do not fit in today's modes of operation anymore. Democratic needs of participation on one hand and needs of sustainable development on the other hand raise the pressure on sectoral planning structures. Hence, transport infrastructure planning must always include aspects of environment, urban and rural design, economic viability and – with an increasing importance – social aspects. However, merely including the above-mentioned aspects does not make planning processes more integrated. Integrated sustainable planning means including different conceptual approaches at eye level. The idea of administrative responsibility of certain departments foils that integration. The city council of Malmö, therefore, started to change the way of planning structures away from departments to project teams. Such project teams differ depending on the content of the planning context. Consequently, the projects get represented by a 'team leader' and not by a 'head of department'.¹⁸⁴ Several methods of sustainable and integrated sustainable planning processes exist. This chapter introduces two basic approaches. The first approach defines a concrete future goal vision (e.g. the smart city) and derives the necessary steps and parts for attaining that goal. The second approach picks up the intentions, ideas and desires of the public and works out processes and longterm goals in an iterative manner.

¹⁸¹ Source: http://www.mobilitaet-in-deutschland.de/pdf/MiD2017_Ergebnisbericht.pdf

¹⁸² Source: Menzel, C.: "Konzept ruhender Verkehr", Konstanz, 2010

¹⁸³ Source: Expert interview with Knut Petersen [Pr1]

¹⁸⁴ Source: Expert interview with a representative from the city of Malmö [Pr10]

6.2.1 Smart city approaches

Etezadzadeh describes cities in a holistic way. Cities are like living creatures in which several processes work together even without knowing they are dependent. The interdependencies concern energy, water supply, waste and sanitation, buildings and stationary facilities, safety and security, mobility and transport, technical facilities and infrastructures including data systems.¹⁸⁵



Figure 15: The Zurich E-Tram - an integrated solution for transport and waste disposal [own picture by the author]

She emphasizes on the basic purposes of sustainable development, shows the vulnerability of infrastructural consolidation and defines what actually makes a city 'smart'.

Mobility management and other integrated methods of sustainability in smart city approaches must learn to analyse 'critical' circumstances (e.g. infrastructure), the constraints of digitalisation and methods of building resiliency. The analytic part of mobility management must necessarily include behavioural information about customer consumption of goods and media.

The synergetic use of resources (e.g. space and energy supply) is able to drive behavioural changes. Governmental institutions must promote the decentralisation of energy production (e.g. photovoltaics at private properties) and the co-operation of necessary institutions (e.g. nursing and gofer services or transport and waste disposal like in Zurich). The United Nations can act as a distributor of 'good ideas' and best practice solutions.

¹⁸⁵ Source: Etezadzadeh, C.: "Smart City - Stadt der Zukunft?" [RP13]

6.2.2 **Continuous participation processes**

Mobility management and participation are comparable to a married couple. Each partner works individually but the twosome delivers the sustainable output. Keeping with this metaphor, the descendants of both can be established consulting institutions, permanent exchange between governmental and public attentions.



Figure 16: The foyer of the town hall in Ottensheim (A) where all council meetings take place [own picture by the author]

Nanz and Fritsche edited a broad handbook about sustainable participation methodologies. The concept includes strategic approaches (i.e. selection of groups, point in time, media communication) and proven formats of exchange (i.e. momentarily in presence and via internet, durably via helpdesk or mobile application). In the end, they compare the different approaches and give advice depending on the concrete case of application.¹⁸⁶ Sommer edited a similar approach with an overview about the proven formats of participation collecting several scientific papers. The main difference between both mentioned publications is that Sommer additionally reflects on a few best practice applications of participation processes dealing with ambitious content (e.g. handling of atomic waste).¹⁸⁷ Glaab delivers a rather basal overview about the interdependencies between participation and democratic processes. The authors in the compendium describe the possibility of contrary succession and results of both parallel processes as a paradox. The main message behind her collection from the point of view of political and social sciences is that all political processes (which projects in the field of mobility and transport are part of) need a high level of transparency and durableness to gain acceptance in both the public and the political opposition.¹⁸⁸ The worst thing that could happen is that the public starts doubting the reliability and authenticity of political processes (i.e. decision making). The actual conduct of mobility management purposes in participation processes is described in chapters 7.6, 7.6.2 and 7.6.4.

¹⁸⁶ Source: Nanz, P., Fritsche, M.: "Handbuch Bürgerbeteiligung - Verfahren und Akteure, Chancen und Grenzen" [RP07]

 ¹⁸⁷ Source: Sommer, J.: "Kursbuch Bürgerbeteiligung" [RP29]
 ¹⁸⁸ Source: Glaab, M.: "Politik mit Bürgern - Politik für Bürger - Praxis und Perspektiven einer neuen Beteiligungskultur"[RP27]

6.3 Strategic urban mobility planning

Strategic planning is a continuous process. This key perception has a large influence on the design and methodology of SUMP-processes. Published SUMP, therefore, consist of merely a shortcut concerning long-term planning approaches. Instead, the long-term view can result from general guideline participation processes (see chapter 7.6.1). Hence, the SUMP can be more precise, detailed, standardised and particularly binding than established transport development plans.¹⁸⁹

The German Road and Transportation Research Association (FGSV) published guidelines for transport development plans in 2013, in which basic indications of SUMP-processes are included.¹⁹⁰ However, Germany started a debate already in 2007 that transport development plans shall reform considerably, because, from a political point of view, they are a very weak arm to gather sustainable development.

Transport development plans therefore shall become

- Structurally comparable
- Continuously monitored
- Multi-disciplinary (esp. concerning participation and mobility management)
- Cyclical with short periods of validity
- Co-ordinated between neighbour municipalities
- Stringent and mandatory¹⁹¹

All of such are attributes of SUMP. It is inscrutable (rather inexcusable) why – until 2021 - neither FGSV nor the German government changed rules and guidelines like The Netherlands and Sweden recently did. From the author's point of view, especially the guideline for transport development planning [RP09] and the one for mobility management [RP28] must be completely re-edited as soon as possible.

This gap in relevant and up-to-date rules and guidelines concerning integrated planning processes makes educative formats a platform for discussions rather than for knowledge transfer.

SUMP programmes embed continuous mobility management processes (e.g. consulting opportunities, participation formats). [BP07 and BP08] Such proceeding is not just voluntary but standardised. The planning processes, therefore, needs parallel support, evaluation and audit.

Municipalities and project companies make use of specialised and independent SUMP coaches for such purposes. SUMP coaches receive advanced training and a certificate. Duportail and Meerschaert published an overview about audit proceedings including details about SUMP coaches' and mobility consultants' necessary knowledge. [RP26]

Other standardisations concern the maximum run-time of a SUMP and the topics stated above. SUMP, necessarily shall be comparable in order to benchmark both the sheer performance of the SUMP and the evaluation of projects derived by the SUMP.

¹⁸⁹ Source: Duportail, V., Meerschaert, V.: "Final Advance Audit - Scheme and Guidelines" [RP26]

¹⁹⁰ Source: FGSV: "Hinweise zur Verkehrsentwicklungsplanung" [RP09]

¹⁹¹ Source: Menzel, C.: "Die Notwendigkeit von Monitorings in der Verkehrsentwicklungsplanung" Straßenverkehrstechnik 06/2011, p.360-364, Hamburg, 2011

6.4 Mobility management as a key issue of mobility Masterplans

Today, mobility management issues occur within several mobility Masterplans (e.g. transport development plans, travel plans and SUMP – see chapter 6.3). Mostly mobility management topics flank and support long-term development processes (e.g. mobility marketing – see chapters 7.2.2 and 7.2.3). Some topics are more basal and separate (e.g. mobility centrals – see chapter 7.2.1).

Some analytic processes (e.g. behavioural and attitudinal surveys) directly influence mobility management matters but also specific planning issues (e.g. bicycle use strategies, public transport system configuration).

Self-contained mobility management strategy plans (i.e. in parallel to transport development plans), however, do not exist. This is a good indicator that the emancipation process of mobility management is in an early state (see chapter 1.3.3).

6.5 Integrated Environmental Planning

Some specific strategies and plans directly aim to change negative environmental impacts. Some of such plans are voluntary, some are mandatory (e.g. noise reduction plans, air pollution plans). However, because transport has such a large share in negative environmental impacts, every specific plan, project or strategy issuing environmental planning contains transport and mobility topics.

Hence, after 2010, more and more municipalities started integrating mandatory and non-mandatory conceptual planning on a meta-level. This, on one hand, led to integrated development programmes concerning urban areas, environment, energy supply, waste and – last not least – transport and mobility. On the other hand, special units (e.g. quality management departments) arose watching after timelines of strategic processes with the aim to harmonise structures.

Most plans and strategies merely aim to reduce environmental impacts (e.g. caused by traffic – see chapter 6.1.1). Continuous monitoring and measuring is an important part of such strategies (other than with transport development plans). However, specific mobility management approaches and contents often do not occur explicitly.

However, mobility management aspects can easily fit to environmental strategies. This begins with the responsibility to gain awareness of cause-effect-chains for citizens AND stakeholders. This includes the following issues:

- What is MY own responsibility concerning noise emissions?
- What is MY own responsibility concerning gas emissions?
- How can I reduce scarcity of resources?
- How can I support energy supply and production?
- How can I support sustainable development?
- How does SUFFICIENCY concern MY own wealth?

Mobility management approaches can start integrated processes to build awareness and understanding. This can include elucidation, but also elements of nudging (e.g. funding incentives) and gamification (e.g. online competitions). The basic ideas of sufficiency, however, are not compliant to the basic idea of growth (i.e. the policy guideline of all industrialised countries ever since the industrial revolution).¹⁹²

6.6 Ecoprofit[™]-Initiative

The basic idea of sufficiency stands behind the concept of synergetic sustainability, too. This led to the concept of Ecoprofit[™]-certification. The aim is to build co-operative business initiatives concerning water and energy supply, waste and pollutant removal. This includes quality management, educative human resources and monitoring processes, too.¹⁹³

Auge sees a close analogy between the preliminary consulting process from Ecoprofit[™] to mobility management approaches, especially with CMM.¹⁹⁴ The synergy between sufficient business production processes (e.g. joint and decentralised production of green energy) and sufficient human resources aspects (e.g. harmonised behavioural aspects of transport) is obvious.

However, integrated consulting approaches for business cases still do not exist (see chapters 7.1.2 and 7.8).

Sustainable development needs a high level of interdisciplinarity. Mobility management and strategic transport planning, therefore, have a very close relationship not only to each other but also to environmental planning and basal approaches of conceptual participation. However, this does not necessarily mean that one must be the part of the other. (Integrated) mobility management is able to perform without (integrated) transport planning and vice verso.

Quickview 6: Chapter 6

¹⁹² Source: https://wupperinst.org/themen/wohlstand/suffizienz

 ¹⁹³ Source: http://www.oekoprofit-nrw.de/global/download/Flyer%20%C3%96KOPROFIT%202009%20klein.pdf
 ¹⁹⁴ Source: Expert interview with Johannes Auge [Pr7]

7. Status Quo of Mobility Management in Practice

Mobility management projects have grown in European countries since the early 2000s. Either driven by research programmes and keen researchers or driven by local and regional planning procedures, mobility management projects usually started at and from municipalities. In many cases, consulting offers and mobility centres were developed and – in co-operation with local public transport operators – the municipalities started distributing incentives (e.g. cheap tickets for employees) to locally based employers. Therefore, the most powerful development, which today still seems to be a key instrument, started with the implementation of mobility management for companies (CMM). [RP06]

7.1 Mobility Management for Companies (CMM)

CMM appears to be the farthest developed form of mobility management. This is most likely due to the fact that companies have an open ear for short-term economic improvements. EPOMM lists a handful of consultancies at each participating country. Most of which are active in CMM and have large number of references beginning with made consultations and ending with guidelines for upcoming consultations. Ecolibro, for example, gives advice for municipalities how to gain interest with locally based companies as future customers for CMM.¹⁹⁵ The fact that only a few companies per country offer CMM as a product makes it difficult to distinguish between what is done for administrations and for companies.¹⁹⁶ The market has become quite dynamic.¹⁹⁷

7.1.1 Distinction between Companies, Administrations and other Institutions

The core methodology of CMM does not make a difference between companies, administrations and other institutions. The consultants offering CMM services mainly treat all three as employers. So, the CMM process for all three has a large part of analysis in common which merely looks at the mobility of staff members. Also, the part of analysing the organisational aspects of mobility (e.g. business trips, internal missions), analysing the local infrastructure (e.g. parking lots), analysing working time arrangements, teleworking opportunities and – finally – analysing business car fleets (i.e. company owned cars AND private car use for business purposes) makes no difference between the three types of employers.

However, differences exist concerning the exact method of analysis (e.g. specified software, questionnaire designs), so that consultancies can develop unique selling points and specifications within the acquisition competition.

The results of the four above mentioned analysing parts at CMM processes are summarised in a status quo report. This report often consists of the following aspects:

- Transport costs
- Operational costs for infrastructure and car fleet use
- CO₂-emissions and other environmental impacts
- Internal organisational effort

¹⁹⁵ Source: Expert interview with Knut Petersen [Pr1]

 ¹⁹⁶ Source: Expert interview with Tom Rye [Te5]
 ¹⁹⁷ Source: Expert interview with Matthew Clark [Pr4]

A few years ago, consultancies additionally began analysing healthcare aspects of the existing transport behaviour within CMM analysis parts. Hence, nowadays, the reports include the following aspects:

- Burned calories (sometimes in a humorous way e.g. chocolate bar-equivalent¹⁹⁸)
- Amount of stressors
- Accidents avoided (which is very hard to verify)

This information leads to the second major step during CMM projects. The consultants use different methods or strategic elements to change the analysed numbers to 'better' ones.

7.1.2 Integrated sustainability method

The process for CMM starts with a more or less deep analysis of the status quo of the company that receives the consultancy. Other than at governmental institutions or public authorities, commercial companies have both economic aims and economic constraints. An important step of the CMM process, therefore, is to identify the main goals of the company in concerns of sustainability.

Sustainable development often works with the so-called triangle of sustainability.¹⁹⁹ Applied to business economy at companies, this triangle of sustainability appears as follows.



Figure 17: Triangle of sustainability for companies [design by Vollmer, Petersen, Menzel with BP25]

¹⁹⁸ Source: http://lundskommun.rjdrift.se/rjweb/

¹⁹⁹ Source: von Hauff, M./Kleine, A.: "Methodischer Ansatz zur Systematisierung von Handlungsfeldern und Indikatoren einer Nachhaltigkeitsstrategie – Das Integrierende Nachhaltigkeits-Dreieck", 2005 [RP31]

This approach somewhat responds to the idea of Ecoprofit[™] (see chapter 6.6). The focus lies merely on transport issues. However, the approach is open. Hence, issues of energy, waste and water supply can easily adjust.

7.1.3 Initiate consulting approach

The success of CMM is highly dependent on local and regional commitment. Many CMM funding programmes are regionally restricted (see chapter 5.3.5). On the other hand, some metropolitan regions (e.g. Hanover, Stuttgart) include CMM funding and special consulting approaches in their mobility development plans, so that they are independent from higher-ranking governmental supervision.

Lower-Saxony recently started a project aiming at a low-threshold opportunity. [BP25] Rehmstedt evaluates this approach as a good opportunity for CMM to get a grip where it is not yet established. [ST03] The basic idea is to keep both the analysing part and the consulting part as simple (and cheap) as possible. The participating companies can carry out some basic analysis (e.g. parking lots and car fleet use) themselves. The consultant can conduct major consulting elements online. This reduces the effort for on-site-analysis and travelling. Hence, the costs for the initiate consulting is slightly higher than half the costs for the first consulting phase embedded in funding programmes (see Figure 13 page 66).

This approach can lead to three different results:

- 1. The participating company is not interested in CMM anymore (but uses the opportunity of getting certified)
- 2. The participating company identifies further need of consultation (for which the company has to pay on its own)
- 3. The participating company implements an internal unit for CMM

Concerning aspects of sustainability, even the first result has a positive effect, because CMM gains attention. It is likely that existing funding programmes switch their rules of application in case the idea of initiate consulting really works. However, further research must prove the requested effect.

7.1.4 Feedback and Consistency approach

Many CMM consulting processes have an abrupt ending [ST05]. The consultant hands over some conceptual advice concerning future handling of the company's mobility, perhaps extended content derived by the integrated sustainability method (see chapter 7.1.2). In some cases, the act of consulting itself is the subject of a CMM feedback a few weeks after the last appointment. I only a few cases, the company proves infrastructural changes or measures effects of organisational adjustment (see chapter 5.3.7). In most CMM-cases, however, the process ends with a summary project documentation.²⁰⁰

Hence, both governmental departments steering CMM funding programmes and consultants shall have an interest in durable solutions (e.g. quality management approaches). This must contain both feedback about the consultation itself and cause-effect-chains of the recommended measures. In how far a feedback and consistency approach already works or might work in future is another issue to conduct research on.

²⁰⁰ Source: Expert interview with Representative from IVM GmbH [Pr6]

Skiba gives advice about stages and toolbox approaches for follow-up care and durable results of CMM-processes [ST05].

7.2 Mobility Management for Municipalities

The portfolio of mobility management at municipalities is broad. Indeed, municipalities also do CMM or – at least – participate at funding programmes for CMM. However, the field of mobility management at municipalities is also quite complex. Beginning with the fact that municipalities are administrative institutions and, therefore, addressees of CMM (see chapter 7.1.1), the administrative units must prepare a multi-step process:

- 1. First-time in-house CMM, supported by external consultants
- 2. Implementation of a mobility management unit (or at least a person in charge)
- 3. Approach of a mobility management strategy or concept
- 4. Transfer of the mobility management strategy in development plans, SUMP etc.
- 5. Implementation of quality management tools and recurrent reports
- 6. Justification, consolidation and perpetuation

The units in charge for mobility management are mostly located at planning or construction departments, seldom at strategic departments or staff sections. In Sweden and The Netherlands, the units become more and more independent. The unit in Lund arose as a spin-off from the transport development unit during the recurring Lundamats processes.²⁰¹

Mobility management units mostly have independent purposes (e.g. stakeholder training, CMM funding, specific projects – see chapters 7.2.3, 7.3.1 and 7.5) but also co-operative projects (e.g mobility centrals – see chapter 7.2.1) and sub-ordinate functions (e.g. at participation processes – see chapters 6.2.2 and 7.6).

7.2.1 Mobility Centrals

A few types of specialised customer buildings exist in mobility contexts. Apart from very large real estate types like railway stations, airport terminals, central bus and coach stations, two (rather new) types of buildings have been implemented since the early 1990s. The first of which, bicycle stations, offer parking facilities for private bicycles, bicycle hire and service. In many European countries, bicycle stations (also called bike parking or cycle hubs) can receive a special label.²⁰² Bicycle stations must be close to railway stations and/or the city centre. Secondly, mobility centrals offer information, selling point and individual consulting services for public customers. Mobility centrals therefore belong both to infrastructural planning (i.e. construction or use of a specially shaped building or room) and to mobility management (i.e. working place for consulting and managing). Like bicycle stations, mobility centrals must be close to railway stations and/or city centres.

²⁰¹ Source: Expert interview with Anders Söderberg [Pr12]

²⁰² Source: https://www.radstation-nrw.de/radstation-werden.html

From the point of view of facility planning, there a few options for mobility centrals at stations and/or city centers:

- Integration of the mobility central and the bicycle station in one new built facility
- Integration of the mobility central in the existing station building
- Integration of the mobility central in the town hall (or other administrative buildings)
- Integration of the mobility central in a new built station building
- Integration of the mobility central in a near-station building (e.g. bus terminal, tourist information)
- Exclusively new built facility for the mobility central only

The choice of place heavily depends on the funding and operational concept of mobility centrals. The most common funding bodies of mobility centrals are public transport companies (e.g. operators, client bodies) and municipalities (including co-operatives with public transport companies). Only a few mobility centrals are in the hands of private companies or NGOs. Hence, when a railway company is responsible for the mobility central, it is very likely that it integrates in the station building and so on.

Just like bicycle stations, mobility centrals can also have subdivisions, especially when the station and the city centre are not close to each other. Comparable to chain stores, the mobility central then has one main facility and one or more affiliates.



Figure 18: Integrated mobility central in the station building in Constance [own picture by the author]



Figure 19: Example for a new built facility next to a station: the Mobility Cube in Wolfsburg [own picture by the author]

The purposes and functions of the mobility central can vary depending on the funding body, too. Public transport companies focus on selling tickets, whereas municipalities focus on individual consultation opportunities for citizens. In some cases, the focus lies on touristic services.

One of the basic concepts of the implementation of mobility centrals is to set up durable and representative standards towards mobility management. Hence, corporate designs, reliable services and comfortable arrangements (i.e. renunciation from the idea of a sales booth) are indispensable for a successful concept. Such conceptual approaches can also lead to more affiliations under the label of mobility centrals (e.g. at meeting points in suburban quarters or 'quarter centrals' – see chapter 8.1.6, at village community houses). The lecture project in 'mobility management' in 2016 dealt with the regional allocation mobility centrals.



Figure 20: Screenshots from animated files showing interiour variations of mobility centrals [animations made by Kristin Reistel for a student assignment during the lecture 'mobility management' in 2016- see chapter 1.4]

7.2.2 Mobility marketing in general

Mobility marketing actually means making public transport more public. It picks up the idea of 'push&pull' or 'carrot-and-stick' (see chapter 2.5), but without the stick. The basic idea is to advertise using public transport. Campaigns for using bikes or pedestrian behaviour followed on. In combination with trial packages (i.e. trips for free), bonus programmes and all forms of sales management public transport companies, especially train operators, became quite creative when it comes to marketing of their products.

One of the most famous campaigns (in 2001) was a two-page advertisement from Deutsche Bahn in journals and magazines showing a steering wheel with a bite on the edge. Behind that, through the front window, the observer can see a large traffic jam. The advertisement used no words, just the logo of Deutsche Bahn.



Figure 21: Advertisement of Deutsche Bahn 2001 [design by Jung von Matt]²⁰³

FGSV created guidelines for municipalities and local public transport providers showing integrated management processes that help mobility policies (i.e. 'push&pull') gain more acceptance not only in public but also with important local players that have an influence on mobility (e.g. local retail, hotel and catering industry).²⁰⁴

The distinction between what FGSV describes as mobility marketing and mobility management is that the guideline addresses typical fields of 'handling' aspects of mobility as if it is a product for disposal independent from its framework (i.e. infrastructure, vehicles and operating environment). The (one and only) helpful message of the guidelines is that (sustainable) mobility needs some business management conduct.

However, there are a lot more approaches than just campaigns and advertisements to actually 'sell' sustainable mobility. Jönsson and Nilsson created a booklet that exaggerates the good and bad about transport using cartoon strips and funny sound bites.²⁰⁵ The key to all marketing strategies when it comes to mobility is individualism. Becker proves that the public awareness about the negative impacts of transport is quite high. [RP35] Gülhan also mentions something like a 'bad conscience' that resonates when one uses a car instead of public transport or a bicycle, but habit and comfort sensitivity finally put the persons behind the wheel. [ST04] Hence, mobility marketing must meet both.

²⁰³ Source: https://brand-history.com/deutsche-bahn-ag/db-deutsche-bahn/db-deutsche-bahn-db-deutsche-bahn-sujet-lenkrad

 ²⁰⁴ Source: FGSV: "Mobilitätsmarketing - FGSV Arbeitspapier Nr. 66" [RP02]
 ²⁰⁵ Source: Jönsson, P., Nilsson, C.: "Med humors hjälp för en bättre trafik" [BP02]

7.2.3 Mobility marketing at suburban quarters

Unlike mobility management approaches for specific groups (see chapter 7.5), many municipalities start locally based projects. This can involve CMM as well as specific projects for schools (see chapter 7.3.2), kindergartens (see chapter 7.3.3) or specific institutions (e.g. CMM for research establishments). Alternatively, municipalities can start an overall approach within specific geographical areas or localities (i.e. for inhabitants). For example, Socialdata[™] created a three-step approach for inhabitants of (suburban) areas called Indimark[™].²⁰⁶ Mostly financed by the local public transport provider (and/or the municipality itself), the concept defines a certain quarter (or a section of a city) with approximately 2500 to 5000 inhabitants (i.e. 1500-3500 households). The following figures shows the process of individualised mobility marketing for these individual areas.

Phase 1: Preperation and Marketing Composition of a local brochure Composition of specific incentives Composition of a list of recipients Local advertising	
Phase 2: Three step interaction Step 1: Contact to each household in the range of the quarter (by letter, email, telephone or combinations) Step 2: Short-cut consultation via telephone (alternatively: chat, social media) Step 3: Visitation (alternatively: video call)	Activation or appreciation "Thank you"-packages "individualised" Incentives "New citizen/ new user"- welcome packages
Phase 3: Evaluation and Documentation Proof of return-on-invest (sold tickets) Report and public reflection Evaluation (questionnaire) Application for further quarters	
Afterwards: Perpetuation or recurrence	

Figure 22: Process of individualised mobility marketing at quarters [design by the author derived by a project run by Socialdata™, the city council of Constance and the public transport operator in Constance SWK between 2008 and 2010 in two suburban areas of Constance]

The total costs of the entire marketing process and the specific employment of staff amounted to approximately $10-15 \notin$ per household. SocialdataTM stated that in a similar project in Nuremberg, the return on investment through ticket sales was reached within one year. The proof of return on investment, however, is not easy. Flanking effects (e.g. simple advertisement effects) or coincident effects (e.g. concurrent parking restrictions) cannot be precluded.

²⁰⁶ Source: http://www.Socialdata(TM).de/leistungen/indimark.php

Nevertheless, individualised marketing has a measurable effect on mobility behaviour that potentially increases with the communicative skills of the individual consultant²⁰⁷ (in step 3) and the quality of the whole process concerning strategic communication.²⁰⁸

Some municipalities offer specific consulting (e.g. consulting concerning residential locations with premises on sustainable transport), incentive approaches (e.g. individualised incentives for new citizens) and individual support (e.g. relocation management).

Mobility management for schools 7.3

Schools have different requirements concerning mobility. The primary schools mostly induce pedestrian traffic. Apart from teachers and other employees, nearly all pupils live next to the school. In Germany, it is not allowed to use a bicycle before the fourth grade. In rural areas, the children can use school buses or special school transport services. Nevertheless, even at primary schools, the phenomenon of 'parental taxis' is an immanent problem.

Secondary and vocational schools are more centralised. Therefore, such schools induce a higher variation of traffic. The problems caused by scholar traffic are as follows:

- Congestion, parking violations, conflicts and near accidents caused by 'parental taxis'
- Vandalism and theft of bicycles
- High peak demand at public transport especially in the morning hours (overlapping demand with commuter traffic)
- Public transport in rural areas is often not more than the school bus offers -

Mobility management at schools therefore consists of different approaches that fit to each other as layers.

- Mobility education (different layers from primary schools to secondary schools) -
- Traffic safety purposes (e.g. safe use of bicycles, helmet use)
- Aspects of sustainability (e.g. ecological aspects of motorised traffic)
- Social aspects (e.g. tutorials, role model aspects)

The idea of role model purposes especially is also a large field for teachers (especially form teachers and headmasters). In this part, mobility management for schools uses the same approaches as at CMM. Blees, Vogel and Wieskotten published an integrated guideline for mobility management at schools in 2013.209

7.3.1 Subsequent projects from municipalities

Strategic mobility management projects of municipalities often integrate school projects in their strategies. This has a few reasons. Firstly, the school system is under local administration. Hence, such sub-ordinate projects are (kind of) internal. Secondly, the idea of educative mobility management for the youngest implies longevity of effects.

²⁰⁷ Source: Jürgen Collien during the first focus group [FG1]

 ²⁰⁸ Source: Denise Sommer during the first focus group [FG1]
 ²⁰⁹ Source, Blees, V., Vogel, J., Wieskotten, G.: "Schulisches Mobilitätsmanagement" [RP08]

The SUMPs and travel plans of London, Malmö and Aargau, which the author evaluated for this thesis do not contain specific chapters concerning scholar traffic or mobility management for schools (see chapters 6.4 and 7.5.1). However, in each of the above mentioned SUMP cases, locally conducted projects (e.g. school travel plans) exist.

IVM regionally co-ordinates mobility management for schools with local administrations.²¹⁰ This includes initial advice and supervision of concrete projects.²¹¹ Some municipalities (and schools) make use of locally based consultancies concerning recurring mobility management projects or flanking measures (e.g. plans for the way to school, design of bicycle parking facilities).²¹² Many projects (e.g. in Kiel²¹³ and Münster²¹⁴) are conducted by a regional administration throughout the member municipalities containing local solutions.

The topic for the author's course in 2018/19 was a mobility management concept for a vocational school in Brunswick, which led to internal organisational changes at the school (see chapter 1.4.1).

7.3.2 Curriculum mobility

Transport and mobility occur as subjects of school education. In Germany, lectures about traffic safety and bicycle use have been mandatory since 1972.²¹⁵ The multiple facets of human mobility (especially the negative impacts of motorised traffic) led the responsible politicians to change the way of teaching as well as the taught content. Hence, laws changed in 2012, 40 years after the first approach.

However, the federal composition of Germany divides this law into 16 interpretations, one for each German Federal Land. In Lower Saxony, where the author lives, the ministry in charge published the Curriculum Mobility with a broad and deep strategy for teaching mobility in all school grades and all school forms.²¹⁶

Together with the topic of sustainability in general, many schools use the opportunity to gain funding when installing specialised teachers for both (i.e. mobility and sustainability education). Hence, schools integrate content from the Curriculum Mobility in several lecture topics.

The whole agenda splits into ten major topic 'bricks' to be applied for four bottom-up levels (starting with the primary school). Each 'brick' divides in multiple 'balance points' and addresses various (standard) school subjects (e.g. sports, history, geography, arts, physics).

Example: in the 'brick' called "enter – change – alight" pupils of the sixth grade can meet with the 'balance point' called "Modal Split, design and construction of modes of transport" with "individual preferences" and "draft, design, construction and development" of (sustainable) vehicles. [BP22] This can occur at "Geography, [...], Business, Technics, Native language [i.e. German], [...], Arts" [BP22] either throughout the school year at different phases or (better) during a defined period of time in the middle of the school year (e.g. the last four weeks before Easter vacations). In some cases, the schools prepare special projects, project weeks, project days, mobility weeks (days) or other occasions. The institute of transport management at the Ostfalia UAS (of which the author is a member) works

²¹⁰ Source: https://www.ivm-rheinmain.de/kommunaler-service/schulisches-mobilitatsmanagement/

²¹¹ Source: Expert interview with Representative from IVM GmbH [Pr6]

²¹² Source: Expert interview with Katalin Saary [Pr3]

²¹³ Source: https://www.kielregion.de/mobilitaet/schulischemobilitaet/
²¹⁴ Source: https://www.bezreg-muenster.de/de/schule_und_bildung/schule_mobilitaet/mobilitaetsmanagement/index.html

²¹⁵ Source: https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/1972/1972_07_07-Mobilitaets-Verkehrserziehung.pdf

²¹⁶ Source: https://www.nibis.de/mobilitaet_8255 [BP22]

together with a handful of grammar schools in the region of Brunswick in order to conduct projects derived by the Curriculum Mobility, so that a connecting factor exists between study course education and school education (see chapters 12.1.4 and 12.2.1).²¹⁷

7.3.3 Adaptive approaches at kindergartens

The Austrian Lebensministerium published guidelines of specific approaches including kindergartens.²¹⁸ Kindergartens and primary schools have in common that the children are not yet sufficiently educated concerning traffic rules. However, a few important distinctions have an influence on the specific strategy:

- Parents MUST chaperon their children on the way to the kindergarten and back
- The beginning and the end of the daily time at the kindergarten are flexible (at least more flexible than at schools)
- The children are not able to ride a bicycle or just recently learnt it -
- The children do not need tickets for public transport
- The children cannot read or write literary language _

Therefore, other than at schools, not the children but the parents are the main addressees of the approach and (since this addressing occurs indirectly) the measures must be easy-to-understand (i.e. graphic and haptic) and omnipresent (i.e. visible at and around the facility of the kindergarten, mentioned within information mails to the parents, stated at the website). For specified content, see chapter 7.5.1.

7.4 Mobility management for university purposes

The diversity of different groups (i.e. teaching staff, scientific staff, administrative staff, technical staff, students and guests) and their specific mobility behaviour makes universities special. This aspect gets even more important when sustainability and transport are part of the teaching curriculum or/and research purposes.

This leads to the fact that specific mobility management approaches for universities arise²¹⁹. However, specific research results and established concepts are still rare.

A few results from student approaches - similar to the ones from Ostfalia UAS in the years 2012 and 2013, however, can be helpful for broader and more integrated approaches (see chapter 1.4.1 Table 1).

The implementation of the study course in Wiesbaden was based on the 'whole institution approach'²²⁰. This means in detail that the institutional mobility management is conducted by the students of this study course, managed and supervised by the teaching staff.

Hence, the proposed study course (chapter 12) must indispensably make use of the 'whole institution approach'. The supervising institution can act in accordance to the proposed board (see chapters 12.4 and 12.5).

²¹⁷ Source: https://www.ostfalia.de/cms/de/ifvm/projekte/curriculum-mobilitaet/

²¹⁸ Source: Lebensministerium: "Mobilitätsmanagement für Kinder, Eltern und Schulen - Ein Leitfaden für Bildungseinrichtungen und Kommunen" [BP28] 219 Source: https://his-he.de/fileadmin/user_upload/Flyer_Forum_Mobilitaet_2019.pdf

²²⁰ Source: https://www.bne-portal.de/bne/de/einstieg/bildungsbereiche/whole-institution-approach/whole-institution-approach

7.5 Group-specific Mobility Management

Group-specific mobility management includes two major consulting topics. The first of which is the knowledge about group-specific use of transport modes, trip length and certain specific (physical) requirements. The second is the – in most cases more challenging – knowledge about how to communicate appropriately with members of the diverse groups. Finally, the process of specification of groups itself is a very challenging process. The ongoing process of diversity management identifies more and more individualised constellations (e.g. intersectional aspects). Further research concerning specific mobility aspects of diversity is necessary (see chapter 10.9). This leads to the fact, that group specific mobility management shall be done in teams.

In most cases, group specific aspects of transport and mobility play a role during planning processes. Therefore, the experience of participation processes is very helpful.

Group-specific projects usually do not have multiple variances. They either refer to a specific place (e.g. schools, retirement homes) or to a specific aim (e.g. bicycle traffic). [RP20]

7.5.1 Children

Children's traffic behaviour changes a few times before they become adults. New born and very small children aged less than three years are not a target group for mobility management, because their ability to recognise specific aspects of mobility is too low. The cognitive development of children concerning space and movement starts from birth. At the age between three and four years children begin to understand these aspects through construction of buildings, vehicles and other three-dimensional objects.²²¹

At the age of three years, children get to know different modes of transport on their way to the kindergarten. They also get to know different types of active moving with vehicles (e.g. balance bikes, tricycles, go-karts) with which they (usually) move faster than by foot.

²²¹ Source: Largo, R.: "Kinderjahre" [AD21]



Figure 23: Tricycle and balance bike [own picture by the author]

Last not least, three-year old children (even younger) begin playing with toy models of cars and other modes of transport.



Figure 24: Model toys from modes of public transport [own picture by the author]

It is clear that the indirect target group with mobility management for smaller children are the parents (see chapter 7.3.3). However, even smaller children can develop a good discernment about which modes of transport have a bad impact on the environment. Thus, parents as well as kindergartens have the opportunity to set the children's awareness to the positive attributes of public transport and bicycle traffic only by providing possibilities to play.



Figure 25: "Bobby train" [own picture by the author]

One of the best examples for such possibilities to play is the 'bobby train' which is provided by 'BIG' (the leading company of pedal cars in Germany²²²) and Deutsche Bahn.²²³

Apart from giving access to symbolic toys of sustainable transport, it is necessary to create awareness of the children's needs for orientation in traffic and how to gain their attention – for instance – of riding a bicycle. Hence, many NGOs and governmental institutions work on methods of elucidation for parents (as well as teachers) towards behaviour change suitable for children. They deliver various brochures²²⁴ and teaching programmes (see chapters 7.3.2 and 7.3.3).²²⁵ Most of the programmes mainly address the children's creativity and curiosity. [BP28]

7.5.2 Socially deprived people

Socially deprived people often suffer from lack of physical exercise. To make matters worse, the same people suffer from under-education.²²⁶ Socially deprived people very often do not make trips with sustainable modes of transport (e.g. bicycle) or trips by foot. This is because many people cannot afford bicycle repair, use of a public bicycle sharing system (or even bicycle ownership). This is aggravated by a lack of knowledge about adequate road links, shopping facilities in walking distance.²²⁷ Several sources deal with the topics of interdependencies between education, physical movement and social status. Hurrelmann (University of Bielefeld), Emrich (University of Saarbrucken) and many more do relevant research on this topic and how negative impacts can be avoided. However, the author keeps at the options with mobility management.

²²² Source: https://www.simba-dickie-group.com/de/presse/

²²³ Source: https://bahnshop.de/neuheiten/neu-im-shop/788/ice-bobby-train

²²⁴ Source: VCD: "Mobilitätsfibel – So wird Ihr Kind selbstständig und sicher mobil" [BP21]

²²⁵ Source: https://www.nibis.de/mobilitaet_8255 [BP22]

Source: Lampert T, Kuntz B, KiGGS Study Group: "Gesund aufwachsen – Welche Bedeutung kommt dem sozialen Status zu?", Berlin 2015
 Source: Yates, G., Whyte, B,: "Bikes for all: widening access to cycling through social inclusion" [BP19]

In Glasgow, back in 2010, a private initiative started collecting old and scrap bicycles (with help from the local authorities), toughened them up and then finally lent the near-mint bicycles to socially deprived persons.²²⁸ This initiative turned a donation funded NGO. The idea now is pioneering worldwide for several offshoot initiatives. The project topic for the author's Masters lecture in 2020/21 adapted this idea, too (see Figure 6 on page 17).

7.5.3 Elderly people

The diversity of older people is as high as it is in the whole community. This means that the first step in mobility management for elderly people is an analysis of their behaviour and specific needs. Similar to the course of action at suburban quarters (see chapter 7.2.2) and other site-specific approaches, the planners must step into contact to potential participants and find out about their current behaviour. This is mostly done by short paper questionnaires and supplementary telephone questionnaires. This first analytic step is necessary to find out which persons have a certain potential to change behaviour (i.e. change the used modes of transport). However, there are a few facts and aspects about elderly people that can be used as a basis for their group-specific mobility management: most elderly people have in common that they are no longer working and that they have established transport habits over a long time period. The share of persons with smaller handicaps up to being completely disabled is higher than the average of the whole population.²²⁹

That means that established, well-known and comprehensible offers, incentives and information (e.g. sponsored bus trips, barrier-free booklets, gift coupons) work better for elderly people than nudging offers and information (e.g. gamification apps, real-time and/or augmented reality information for smartphones, e-bike test drives).

Haustein and Stiewe [BP20] show that elderly people can be divided in four different mobility types: Public transport captives, self-determined mobiles, young and wealthy mobiles, car-fixated. This distinction is helpful towards methodical efficiency of mobility management, because the planners can focus on such groups that are most capable of being influenced. The self-determined mobiles are most promising when it comes to behavioural changes (e.g. supporting local dealers, waiving holiday flights, bicycle use), whereas the public transport captives are most promising when it comes to promoting role models and appreciating of sustainable behaviour.

Zukunftsnetz Mobilität NRW (Future network Northrhine-Westfalia) [BP23] presents posters of a few projects from the last few years such as specific campaigns and training concepts.²³⁰ The latter aim to get elderly people to use electric bikes focusing traffic safety and the interfaces with public transport. The research project INMOD which was conducted between 2011 and 2015 in a rural area in Mecklenburg-Hither Pomerania also made specific training concepts for elderly people to use electric bikes.²³¹ All projects have in common that they consist of a specified (short) booklet with helpful information (e.g. how to operate ticket machines), a short (individual) training and the provision of reliable contact persons (i.e. via telephone).

²²⁸ Source: https://www.bikeforgood.org.uk/about-us/history-mission/

²²⁹ Source: Haustein, S.; Stiewe, M.: "Mobilitätsverhalten von Seniorinnen und Senioren - zur Entwicklung zielgruppenspezifischer Mobilitätsangebote" [BP20]

²³⁰ Source: Zukunftsnetz Mobilität NRW: "Öffentliche Räume für alle - Mobilitätsmanagement für Senioren" [BP23]

²³¹ Source: Onnen-Weber, U: "INMOD – Revitalisierung des ÖPNV im ländlichen Raum Intermodal und elektrisch bestrieben", project report, Wismar 2017

During a three-year project from 2008 to 2010, the 'Bahn.Ville 2' consortium [RP24] addressed elderly people living in the catchment area of train stations in the region Rhine-Main with folders which explained how to use a ticket machine. Additionally, by a telephone inquiry option mentioned on the folder, they offered on-the-ground-training which was conducted individually or in groups.²³²

7.5.4 Disabled Persons

Disabled persons are often captives. In many cases of handicaps (e.g. blindness, paraplegia including arms), the particular person is not able or allowed to use cars. In nearly all other cases (e.g. paraplegia only legs, deafness), car use needs special equipment like ADAS or remodelling which is very expensive. Therefore, mobility management for disabled people does not aim at reducing car trips. The main topics for disabled persons are to avoid exclusion, provide help for all-day traveling and analyse specific needs of disabled persons concerning infrastructure, ride and booking information and configurations of devices (e.g. Smartphones). Several researchers from the field of AI developed intelligent devices for blind persons, that are able to recognize obstacles around a persons, do face recognition (e.g. friends and family) or interact with other devices (e.g. opening doors). The most promising devices 'blind cane' developed by the University of Arts in Zurich or the 'Xplor' cane developed by the Birmingham City University feature several functionalities that can help blind people manage all-day situations.²³³ However, such 'intelligent' white canes can overburden or at least distract blind persons. The worst problem is to hold the cane (which is heavier than the usual ones) permanently at the correct position. Hence, specially skilled trainers are necessary to make the devices easy to use for the blind.

Mobility management for disabled persons requires a very high knowledge of specific individual needs of the disabled persons. This includes especially moral aspects like inclusion of persons who do not dare to step out of their flats, esteem of persons with psychic or mental diseases (e.g. dementia) and – primarily – equal treatment of all human beings. Many disabled people do not even want help from other persons even when their all-day life seems more exhausting. Therefore, when it comes to mobility management, empathy, intuition and respect are of much more importance than detailed knowledge about particular diseases.

To understand what that means; here is one real life situation, which occurred to the author, back in 2008:

At the main train station of Constance, the author wanted to board a regional train to Singen, when a young woman in a wheelchair approached the same door. Between the floor of the train and the platform was a difference in altitude of approximately 20 centimetres. The author did not hesitate to ask whether he should help her board the train. The answer of the woman was very astonishing. Her answer was "no" and she added that she will ask for help when she needs it. One should not ask. After having said that, she took a few metres of run up and explicitly jumped with the wheelchair into the train. Inside the train, the woman asked the author for help getting off the train at Reichenau station, because there the difference in altitude was higher than 20 centimetres, which she mentioned still appeared manageable to her but would be too dangerous in case she failed it. She smiled all the time and thanked the author for the nice ride.

 ²³² Source: Bahn.Ville 2-Konsortium: "Die Bahn als Rückgrat einer nachhaltigen Siedlungs- und Verkehrsplanung - Synthesebericht zum Projekt
 Bahn.Ville 2" [RP24]
 ²³³ Source: https://www.trendsderzukunft.de/xplor-sehender-blindenstock-erkennt-gesichter-von-familienangehoerigen-und-freunden/

This situation shows the complexity of communication between human beings in mobility management contexts, especially, when it comes to disabled persons in all-day traffic situations.

Therefore, study courses in mobility management must involve situations of self-awareness. This can be to travel along defined (all-day) paths under different premises and with different devices (e.g. wheelchair, MAX²³⁴, white cane). The student must produce a documentation (e.g. photographs, GPS-tracks) and make approaches for better solutions.



Figure 26: Three examples of self-awareness practices during lectures or preparing phases [own pictures by the author]

Apart from that individual approaches, mobility management can play a role for monitoring and mentoring of inclusion processes (e.g. at schools, universities, working places). This also requires specific competences (e.g. all-day support, care documentation).

7.5.5 Multi-ethno Approaches

Mobility management needs multi-ethno approaches in contexts of local projects (i.e. certain city quarters) and large companies (mostly with shift working). The approach must take into account that the target persons have a large variety of socialisations concerning their mobility behaviour.

The specific problem is not trivial. On one hand, some specific deleterious attitudes to mobility (e.g. ownership of an expensive and powerful automobile as a status symbol) and lack of knowledge (e.g. concerning negative impacts of car use for the environment or the perception of noise pollution caused by car traffic) may occur unexceptionally often. On the other hand, the consulting method must never be cautionary. The risk of racist statements or attitudes is high.

²³⁴ Source: https://www.wolfsburg-ag.com/fileadmin/news_import/MAX-Flyer.pdf
Hence, multi-ethno mobility management must include a few aspects:

- Teamwork
- Knowledge of specific foreign languages (in the best case through mother tongue)
- Opportunities of identification (e.g. migrants as mobility managers or quarter managers)

Specific multi-ethno mobility management project approaches shall also include specific research and documentation so that a process of quality management up to practical advice and guidelines can develop. Up to now, no specific approaches or projects especially concerning mobility management exist. Merely, integration projects and local projects with socially deprived persons get broadly conducted with which mobility contexts are addressed along the way.

7.6 Participation processes

As described in chapter 6.2.2, mobility management and participation processes (i.e. those concerning urban development) are not the same but closely related. The field of participation is a major topic for vocational training courses, Masters courses and further educations for consultants and members of administration (e.g. at city councils).

Today's research concerning participation processes focuses on both (new) communicative approaches and (new) political standards. A major question is how to turn a temporary process to an ongoing stable process and how to preserve momentary acceptance.

Participation, therefore, has changed from being merely project-based to being complementary and durable. The following figure sums up the ideal integration of durable planning processes (i.e. SUMP preparations), single (large-scale projects with basal participation (i.e. guiding principles) under usage of persistent management methods (i.e. mobility and quality management). The whole process of renewal shall not take longer than ten years (i.e. the run-time of an SUMP).



Figure 27: Ideal integration of participation processes with mobility and transport topics [design by the author]

7.6.1 General guiding principles

There is a small and blurred border between long-term politics and general guiding principles of local governments. This includes a distinction between political positions (e.g. chief whip of a political party) and administrative positions (e.g. chief officer of a department). Living democracy thrives from political discourse. Hence, basic political decisions make use of three instruments:

- Elections of the local parliament
- Elections of the mayor
- Grassroots democracy acts (e.g. public decisions)

The political process concerning mobility management includes the following aspects:

- Preferences and privileges for certain modes of transport
- Charging and fare policy
- Educative concepts
- Dissociation from neighbouring municipalities (e.g. concerning business allocation)
- Funding programmes (e.g. for E-mobility)
- Many more...

The above-mentioned political processes change from election to election and, therefore, have a rather short longevity. The administrative stakeholders are in charge for general guiding principles, especially when it comes to participation processes. Such processes can (must) include discourses, too. It is helpful when a parliament and the political leaders of a municipality demonstrate unity concerning the initiate part of a general guiding process (e.g. with a 100% vote for the process itself).



Figure 28: The city council of Brunswick developed an overall concept in an intense participation process using various formats [own picture by the author]

Example: In 2015, the city council of Brunswick started a transdisciplinary, multidimensional multi-step process for all public matters (e.g. cultural, social, environmental, concerning business and – of course - concerning transport and mobility). Between 2015 and 2016, the city council and the consultants organised several events (i.e. local and city-wide), several forums (e.g. market booth, city hall, suburban quarter centres, internet, social media) and campaigns. Figure 28 on page 102 shows one of the major forum events during that process.

The aim was to build a guiding concept for the years until 2030.²³⁵ Both the initiative vote by the city parliament in 2015 and the concluding vote in 2016 (i.e. concerning the final concept²³⁶) were unanimous.²³⁷ The project team won an award for political concepts in 2016.²³⁸ The project results led to a continuous participation portal.²³⁹

7.6.2 Planning and project processes

The above-mentioned general guiding processes often include a high percentage of decisions towards transport policy (e.g. extension schemes for the public transport network). In the case of such successful, durable and appreciated general guiding processes, particular planning project approaches arise quasi automatically.

Even without a prevenient general guiding process, the most promising results for projects seem to come from very early (not too early) participation stages. The earlier the participation begins the greater (and deeper) the influence by the citizens. However, most projects (i.e. large-scale construction of transport infrastructure) need at least a basal elaboration by planning professionals before the first phase of participation.

This elaboration, however, is not trivial. In case of politically controversial planning projects the participation process will suffer from prejudice and bias form the very first moment. The level of bias is massively dependent on whether a project content has a history, especially when this history includes a rejection. Such projects can be stigmatised with a 'failed'-stamp.

Nevertheless, even this does not necessarily mean that the renewal or modified project must fail, too. The aim of the participation process in such cases changes from exertion of influence to moderation of interests.

Manz, Fritsche and Sommer give advice and good practice reviews about several methods and elements of success concerning participation within projects. [RP27 and RP29]

7.6.3 Special participation formats for disabled persons

As mentioned before, disabled and elderly persons need very sophisticated and individual treatment. This includes the specific awareness by the planners (see chapter 7.5.3 and 7.5.4) and specially adapted participation formats too.

The author conducted such a specified participation workshop in 2010. This workshop included certain preparations for blind persons (e.g. tactile planning brochure), deaf persons (e.g. two sign language

²³⁵ Source: https://archiv.urbanista.de/project/denk-deine-stadt/

²³⁶ Source: http://docplayer.org/122297979-Denk-deine-stadt-das-zukunftsbild-fuer-braunschweig.html

²³⁷ Source: https://www.braunschweig.de/politik_verwaltung/fb_institutionen/fachbereiche_referate/ref0120/stadtentwicklung/ISEK2030.php

²³⁸ Source: https://www.politikaward.de/rueckblick/winner-16/

²³⁹ Source: https://www.mitreden.braunschweig.de/

interpreters) and mentally handicapped persons (e.g. simple speech and self-explaining pictures). Every person involved in the project received an intense briefing before the workshop.²⁴⁰

The planning costs for this workshop alone amounted to more than 50.000 €. However, the knowledge gained from such specific participation formats is enormous. Together with continuous processes in education and mobility management contexts (see chapter 7.5.4), the whole idea of inclusion becomes relevant.

7.6.4 Follow-up care, evaluation and monitoring of projects

As stated in Figure 27 on page 101, all participation processes gain success when standardised methods of monitoring and evaluation come into play. On one hand, future processes can learn from recent ones (especially concerning mistakes made). On the other hand, the processes can become more standardised and (perhaps more important) citizens get used to using such platforms (in a constructive way).

Professional quality management methods conducted by an independent unit (e.g. a department for strategic development) help with that. [Pr10]

7.6.5 Continuing participative methods

Processes of public formation of opinion and awareness do not abruptly end with bringing a project into service and its evaluation. Mobility management and participation must work continuously. Low-threshold formats like specified apps, public service advertisements or simple feedback devices help to create long-term monitoring. This delivers indicators for amendment or replenishment.



Figure 29: Examples for continuous public exchange and feedback formats [own pictures by the author]

²⁴⁰ Source: Baron, S., Menzel, C.: "Shared Space - Kooperation hat Vorfahrt" [BP27]

Public transport, car-share and bike-share companies include feedback processes throughout the booking and ticketing processes. This can be a functionality in a smartphone app or a physical button (like in Figure 29). Municipalities and operators of transport facilities (e.g. train station, airport, car parking) act similarly.

7.7 Influencing and persuasive approaches

Mobility management aims to change people's behaviour. This includes methods that merely affect a rather small number of persons. Such persons can be political, organisational or other stakeholders who can make decisions that affect other people. Private volunteers and influencers (i.e. multiplicators) are reasonable target persons, too. The aim behind specific influencing and persuasive approaches of mobility management is to start so-called snowball-effects. Stakeholders and multiplicators not only have access to funding budgets and decision-making processes, but can also be role-models for subordinates.

Important side effects of mobility management in this context are psychological reactance or lacks of acceptance concerning those being 'influenced'. Doubt against political role modelling has similar effects. This means that the two communicative approaches of awareness, information and persuasion must be managed differently when it comes to 'other' customers (i.e. citizens).

7.7.1 Stakeholder training

Concerted programmes and evaluated projects concerning specific stakeholder training towards mobility management (i.e. seminars with the purpose of awareness building and influencing of political and strategic decisions towards sustainable mobility and transport) do not yet exist even though the method of stakeholder training, manager seminars and teaching awareness is quite well established.

The number of local or occasional training sessions driven by local mobility managers, however, increases.²⁴¹ The author suggests allocating some research funding to aggregated and monitored stakeholder teaching programmes.

Will identified some key specifications (e.g. the two-step approach – see chapter 5.4.2) for the teaching programme concerning the teachers and the taught content. [ST02]

The addressees of such teaching programmes are -apart from persons in charge at all municipalities and other governmental institutions - functionaries within political parties and NGOs. Today, so-called 'influencers' on social media must also be taken into account.

Leading managers of companies (of all kind) are also addressees, but with a slightly different content, because of the existing guideline approaches from CMM (see chapters 5.3.6, 5.3.7 and 7.1.1).

The aim is that all participants change their points of view concerning organisation, planning and financing of mobility (e.g. change of guidelines concerning business trips). They should all become role models of sustainable behaviour, too. Example: Celebrity politicians such as Mark Rutte (NL), Mathias Stein (D) or Boris Johnson (UK) purposely use the bicycle for short business trips.

²⁴¹ Source: Expert interview with Eva Hannak [Pr2]

7.7.2 Multiplicator building

The role-modelling factor does not only affect stakeholders. Everyone can be a multiplicator for the idea of sustainable mobility and transport. Concerted programmes towards multiplicator building exist at various occasions.

Some regional administrations, public transport providers or NGOs in rural areas work together with private volunteers in small villages as local contact persons for information about public transport offers²⁴².

The field of professional care giving (e.g. dementia support gofers) especially can include behavioural aspects of sustainable transport and mobility (see also chapters 7.5.3 and 7.5.4).

In case the multiplicator-building thrives, internal or privately driven groups of kindred spirits are the next consequence. This can lead to concerted group activity (e.g. company-facilitated sports activities). Intergroup communication (e.g. via social media) can even lead to independent networks of (spontaneous) mobility management.

Workers councils, human resources departments and – very important – internal healthcare management units provide concerted (sports) activities, too. Example: Many companies and other institutions take part on competitive activity campaigns (e.g. the yearly 'city biking' initiative²⁴³ or the '3000 steps extra'-campaign from 2005²⁴⁴) driven by governmental institutions.

The most sustainable case of development would be an internal unit managing all behavioural aspects of sustainability (i.e. apart from mobility: nutrition, upbringing, handling of resources and waste, energy consumption, consumption of goods).

7.8 Transdisciplinary Approaches in Concerns of Mobility Management

Mobility management is per se transdisciplinary. However, looking at the above-mentioned context of sustainable behaviour, many other aspects of manageable circumstances intersect with mobility management. The handling of infrastructure and resources, healthcare, energy and social circumstances (e.g. upbringing) needs profound consultation. The transdisciplinary integration of different consulting strategies, therefore, can be a good strategy in concerns of promoting mobility management.

7.8.1 Infrastructural Management

Today, infrastructural management in combination with capacity management subsumes various aspects of infrastructural planning that formally ran separately.

- Analysis of transport demand (e.g. simulation)
- Analysis of the actual state of the infrastructure (e.g. surface defects on roads)
- Planning (and procedure) of maintenance (e.g. repair)
- Planning (and procedure) of restructuration (e.g. regulations)
- Planning (and procedure) of extension/refurbishment/dismantling
- ... With the aim of economic efficiency.

²⁴² Source: https://mobilitaetsprojekte.vcoe.at/oepnv-multiplikatorenschulung-fuer-senioren

²⁴³ Source: https://www.stadtradeln.de/home

²⁴⁴ Source: http://www.presse-service.de/data.aspx/medien/55408P.pdf

The aspects of mobility management did not play a role with infrastructural management for many years. However, transdisciplinary approaches affect this, too. Therefore, as few intersections between both fields exist.

- Transport demand modelling includes prognosis of side effects and flanking interventions.
- Infrastructural analysis includes measuring gaps and potentials for non-motorised traffic (e.g. the width of bicycle paths)
- Maintenance planning includes construction site communications and methods of tactical urbanism²⁴⁵ (e.g. temporary re-allocation of surface areas)
- Restructuration and rebuilding includes participation

...with the aim of sustainability.

Since infrastructural management is an important part of transport planning and management (see Figure 7 page 18), its natural relationship to mobility management is close and full of interdependencies.

7.8.2 Healthcare Management

Healthcare management has significant interaction with mobility management concerning aims (e.g. promoting non-motorised movement) and methods (e.g. training and consultation). The optimisation of within-company organisation (aiming towards physical and psychological health) has major synergies with mobility management aspects (e.g re-organisation of business trips, teleworking). By creating an atmosphere of respect and appreciation between supervisors and members of staff (and of course between employees), both healthcare management and mobility management help to build a sustainable framework for contentedness within working environments.

The shared field between healthcare management and mobility management even increases when it comes to aspects of nutrition, uprising, use of resources and other behavioural aspects that affect health and mobility at the same time and to the same extent.

Nevertheless, even though both fields have such significant interactions, today's consultancy market is strictly divided. Healthcare managers do healthcare consulting. Transport engineers do mobility management.

7.8.3 Social Urbanism

Social urbanism is a phenomenon of and in Latin America. The rapid development of Latin America since the 1980s, after decades of civil war, oppression and drug trafficking led to specific circumstances. Other than in developing countries in Africa and South East Asia, the influence of the USA and European countries (i.e. former colonial rulers) on both governments and public is higher.²⁴⁶

Therefore, and because of the lack of established high-performing modes of transport, Latin American countries like Brazil, Argentina and Colombia developed some unique solutions for their social and transport-related problems. It was nevertheless important that the World Bank and many NGOs developed technically and socially appropriate solutions.

²⁴⁵ Source: https://parcitypatory.org/2020/07/31/tactical-urbanism/

²⁴⁶ Source: Leite, C., Acosta, C., Militelli, F., Jajamovich, G., Wilderom, M., Bonduki, N., Somekh, N., Herling, T.: "Social Urbanism in Latin America" [RP30]

This process includes new forms of public transport (e.g. bus rapid transit systems, cableway systems), work, safety and security programmes for people living in slums (especially in Colombia) and revaluation of public spaces (e.g. parks, gastronomy). The political support for such a radical change public space and land use policy increased with the local and regional business thriving from it [RP30].

However, together with increasing prosperity, the affinity to status symbols (especially cars) arose. 'Carrot-and-stick-policy' is not very popular. Hence, mobility management does not yet play a role. Today's focus still lies on social urbanism, promoting access to public transport and occasionally bicycles for socially deprived people and other groups without a good access to urban facilities (e.g. shopping malls).²⁴⁷ However, a change in attitude and behaviour seems to have been taking place for a few years now (see the citation in chapter 9.1.1).

Mobility management has become established. Various branches already use mobility management methods and consulting options for different purposes. Mobility management has many transdisciplinary aspects that affect various fields of work. Nevertheless, the importance of mobility management has not yet reached a high level. This is both because of a lack of sufficiently educated mobility managers within the job market and because of a lack in mobility management friendly policy.

Quickview 7: Chapter 7

8. Jobs in Mobility Management

The offer and variance of job profiles in mobility management and cognate fields has increased noticeably in the last few years. The range includes full-time jobs, part-time jobs, voluntary jobs and quotas in job descriptions (e.g. 75% transport planning 25% mobility management).

The term mobility management in job descriptions and job offers, however, is not always congruent with the EPOMM definition (see chapter 2.6). Nevertheless, the demand for transdisciplinarity with transport and mobility topics is high (see chapter 1.3.2).

8.1 Job Profiles and Descriptions

Before 2000, when the first core definitions of mobility management started to include the promotion of non-motorised traffic into mobility management, public transport companies started the first approaches towards using the term of mobility management and including corresponding content within internal job profiles.²⁴⁸

Hence, even today, public transport companies and governmental institutions in charge of public transport build the most common type of employing units. Such employers frequently use the term 'mobility manager'. [AD17] Other job descriptions use cognate terms like 'consultant', 'coach', 'planner' or 'representative'.

²⁴⁷ Source: Expert interview with Alvaro Rodriguez-Valencia [Te12]

²⁴⁸ Source: Thiesies, M.: "Mobilitätsmanagement – Handlungsstrategie zur Verwirklichung umweltschonender Verkehrskonzepte" [RP39]

Apart from governmental institutions (e.g. municipalities), public transport companies and NGOs (e.g. VCD), the field of mobility management noticeably affects the private business sector.

Firstly, private consulting companies gain increasing success in the market mainly in the field of CMM. Hence, the availability of specified jobs at such companies massively increased in Europe during the last decade.

Secondly, an increasing number of (large) private companies began installing internal units for CMMpurposes.

8.1.1 Mobility Manager

The job offer 'mobility manager' occurs mainly within municipalities. The related job descriptions, however, do not just include topics and methods that match with the core definition of mobility management. In many cases, the topics are more closely matched with transport planning or transport development planning than with mobility management. Nevertheless, in nearly all cases the job profile 'mobility manager' included responsibility for projects and concepts, which naturally means responsibility for participation processes.²⁴⁹

A few job offers mentioned the vocational training for CMM mentioned in chapter 3.1.3) either as a possible opportunity for the upcoming jobholder or as a benefit for applicants in case they successfully completed the course. Conceivably, the job offers might make this reference mandatory in the future.

Mobility managers at municipalities mainly write concepts and start projects in the field of the specific mobility management for municipalities (see chapter 7.2). Eva Hannak, nevertheless, sees mobility managers in charge of initial approaches at the policy-making level rather than being responsible for creating and conducting projects. [Pr2] In her point of view, the project level is ancillary to mobility management and, therefore, rather a job for mobility consultants. This means that a mobility manager also needs a higher level of education than a mobility consultant.

8.1.2 Professional Coach

Professional coaching in mobility management means high level consulting. Job descriptions and (unofficial) market requirements for such topics can be translated to 'senior consultant', 'senior professional' or 'experienced project manager'. Nevertheless, the main task for a professional coach in mobility management is to give advice to leaders or other persons in charge, on how to increase the level of efficiency concerning mobility (i.e. mostly in CMM contexts). Coaches must indispensably know about the integrated sustainability method (see chapter 7.1.2).

However, the demand for professional coaching might be higher if persuasion tasks dominate and, therefore, knowledge about persuasive and awareness-building communication become necessary. This specific job profile does not yet exist in specific concerns of mobility management. Coaching of (head) managers, however, is prevalent.

²⁴⁹ Comment: The author screened specified job offers from the social platforms XING and LinkedIN between 2017 and 2021.

In this case, the professional (CMM) coach must be able to think and act like the coached managers themselves. Apart from empathy (and humour), the coach shall have (at least basic) knowledge about play-acting. All mentioned topics can be taught and learned. This is why the study course design in chapter 12 (especially chapter 12.2.4) includes lectures in 'drama' and 'laughing yoga'.

Professional coaches can act as mediators for controversial participation processes too.

8.1.3 Mobility Consultant

When mobility managers are comparable to queen bees, the mobility consultants then are comparable to worker bees. On one hand, mobility managers can be supervisors to mobility consultants. On the other hand, mobility managers are in charge of organising the whole mobility management structure (and framework), whereas the mobility consultant is in charge of single projects within this structure.²⁵⁰ In The Netherlands and Sweden, the job market identifies both job specifications (alternatively 'senior consultant' and 'junior consultant').²⁵¹ In Germany, due to a lack of professionalised graduates, the differentiation of the two job profiles is still rather rare.

Municipalities and other governmental institutions often differentiate by the degree of the graduates, mostly in 'senior manager/planner' and 'junior manager/planner' stating the field of mobility management. Employees at municipalities do not often have just one specified topic in their job description, mostly a mixture of planning and management topics (e.g. support of project communication or participating processes). The job descriptions, however, often define a major topic, which has the largest share of the job.

A segmentation of job topics is helpful, because 100% full time jobs can easily divided into part time jobs, in which the mentioned percentage of topics transforms discretely, so that part time jobs with just one topic can evolve.

8.1.4 Transport Development Planner/Transport System Designer

This job field is mostly restricted for transport engineers, specialised civil engineers and cognates. Merely geographers and environmental engineers might have the chance to apply for such job offers. The latter can happen, when the number of specified applicants is low, which happens from time to time (see chapters 1.3.2 and 4.1.2). This circumstance can be problematic in the sense of this thesis (see chapter 1.6.1). The distinctions in job topics with transport engineers are analogous to the distinctions between mobility managers and mobility consultants. Transport development planners and transport system designers must design transdisciplinary and overlapping solutions for transport infrastructure, operation and administration. For that, they must take both participating processes and mobility management purposes into account. This means, that both mentioned job fields merge intensively with mobility management, but also with traffic and transport management (see chapters 2.3 and 2.4).

²⁵⁰ Source: Expert ingterview with Representative from Advier [Pr9]

²⁵¹ Source: Expert ingterview with Syb Tjepkema [Pr14]

8.1.5 Transport/Project Planner/Road Designer

Transport planners are the worker bees in transport planning. In many cases, they deal with many planning and building projects (and sometimes even the project aftermaths) at the same time.²⁵² Given that transport projects often are complex and the related political (and participating) processes are even more complex, the transport planner occasionally feeds the field of mobility management.

Mainly civil engineers with a focus on underground and infrastructural work (and design) hold such appointments. Most of them graduate with bachelor degrees in engineering from UAS. Unfortunately, mobility management topics do not play a large role in civil engineering study courses (see chapter 4.1).

Some transport planners have a focus on transport management (i.e. in steering ITS and technical resources) and therefore advanced knowledge in IT and operational topics. The involvement in participation processes and mobility management is low. However, even with them, a basal knowledge shall exist. (Mandatory) vocational courses or internal training (see chapters 3.1.2 and 3.1.4) are sufficient as long as other employees are in charge of mobility management topics. Otherwise, the level of involvement with mobility management must be congruent to the level of knowledge about mobility management, especially concerning communicative topics.

The planners must indispensably know about the interdependencies between their supervised projects and the effectiveness of mobility management methods. They must know about network effects of singular constructions (e.g. junctions), too.

Example: Intelligent traffic signaling systems along major roads need specified presetting concerning prioritisation and requirements of the different modes of transport. A prioritisation of public transport or bicycle traffic affects car traffic and may cause congestion. A prioritisation of car traffic, however, affects bicycle traffic and may cause delays in public transport. At the same junction, planners and road designers have an influence on dimensioning of road lanes and spatial design (e.g. turning curves, visual and haptic nature of the surface) which they can prioritise too.

It is unclear in how far the planners really take/took such meta-level cause-effect-chains into account. This is a question of further research (see chapter 10.9).

8.1.6 **Quarter manager**

Some urban quarters are somewhat problematic. This can include a high percentage of socially deprived persons, migrants, unemployed persons, delinquency rates, alcoholism and other social problems. This can include deficit in spatial design, a lack of adequate playgrounds, bad conditions of housing, accident back spots and other aspects of urban design, too.

Therefore, governments get the opportunity to obtain funding programmes for a change at concerning quarters. The European Social Fund (ESF+)²⁵³ or the European Regional Development Fund ERDF aspects of quarters). Additional governmental funding options differ by country.

One aspect of such 'social city' approaches, which are comparable to the social urbanism projects in Latin America (see chapter 7.8.3), is the implementation of quarter management concepts. Quarter

²⁵² Comment: In 2010, when working for the city council of Constance, the author had to do with 17 (!) planning projects in parallel, in three of which as the responsible project manager. ²⁵³ Source: https://www.esf.de/portal/DE/Foerderperiode-2021-2027/foerderperiode-2021-2027.html

management includes the workplace of (at least) one 'quarter manager' and – usually - a facility called 'quarter central' (which can be an affiliate of a mobility central – see chapter 7.2.1).

Quarter managers mostly have a transdisciplinary background (i.e. urban design, sociology, planning sciences) and fulfil requirements that reflect on the local diversity (e.g. multi-language knowledge, knowledge about religion, local origin). The tasks and topics of quarter management are manifold, one of which – though not the most important – is mobility management.

The transfer of mobility management multi-ethno approaches (see chapter 7.5.5) to the requirements and needs of the local inhabitants and the local companionship of participating processes are the most common applications of mobility management methods for quarter managers. This means that at least basal knowledge must exist. Vocational training is sufficient, because usually quarter managers prefer teamwork for conceptual approaches (a quarter-based mobility management approach would be such). Hence, a mobility manager or at least a mobility consultant necessarily takes part.

Large-scale social projects mostly include urban re-design. The reallocation of public space is a method that planners (and quarter managers) often use. This includes new built green zones, playgrounds but also pedestrian and bicycle paths. A second very common method is the conversion of unused industrial areas and former railway sidings, especially when it comes to housing shortage.

Example: In Brunswick, a recent tax-funded redesign of a whole quarter included the conversion of a former railway line into a bicycle and pedestrian path with newly built housing, playgrounds and recreation areas alongside. This project called 'Ringgleis' (circle track) was expanded to become a large-scale concept affecting the whole city.²⁵⁴ A similar project exists in Wuppertal called 'Nordbahntrasse' (northbound railway track), funded both by governmental funding programmes and private donations.²⁵⁵

8.1.7 Authorised Representatives

In most cases. authorised representatives are in charge of claiming and lobbying for group-specific purposes (i.e. equality of treatment). Since the early 2000s many institutions additionally installed authorised representatives for certain (internal) purposes concerning transport and mobility (e.g. 'bicycle traffic', 'mobility', 'sustainability', 'healthcare', 'safety and security'). In many cases, municipalities have the choice between internal staff, external freelancers and external volunteers (honorary post), whereas other institutions (e.g companies) usually designate members of their own staff.

Such authorised representatives on one hand have a large level of independency concerning the content and methodology of their job. On the other hand, they usually do not have any authority to make their own decisions. Their budget is usually low or even zero. However, authorised representatives can be good multiplicators for the idea of mobility management.

²⁵⁴ Source: https://www.ringgleis.de/

²⁵⁵ Source: https://wuppertalbewegung.de/nordbahntrasse

The idea of working with authorised representatives to promote mobility management for an initial project or a short timeline can open doors and minds. Sustainable development in this respect (i.e. durable mobility management purposes), however, needs instalment of either full-time jobs for mobility management or robust consultation by convenient institutions (e.g. consultancies).

8.2 Personal skills for the Specific Job Profiles

According to the core definition, graduates from mobility management course shall be able to overcome at least 80% of the tasks within the actual job (see chapter 1.6.1). However, job beginners often have a lot of tasks with the aim of becoming a full team member or to get to know the company/institution. Therefore, in the beginning of a new job, soft skills are more important than theoretical or practical skills. This changes piecewise in the first three to six weeks.

However, depending on the actual job profile and the role inside the institution, skill requirements can be different. This chapter will provide a view of the possible requirements for vocational education or various training in the job opportunities after graduation.

8.2.1 Trainees

Other than with internships, trainees are full members of staff and can have responsibility for projects or at least certain work packages within projects. The aim of companies and other institutions making use of traineeships is to find out the ideal positions or tasks for the trainees on one hand. On the other hand, the traineeship includes 'training' settings and phases. The human resources units are not mainly interested in 'employable' persons (see chapter 1.6.1) rather than in 'shapeable' persons. However, gaining 'employability' is the aim after the traineeship, which mostly takes one year²⁵⁶.

8.2.2 Junior Professionals

Trainees (in some cases graduates) switch to be junior professionals either directly after employment or after a probation or post-trainee period (e.g. six months). The skill adoption and familiarisation time is very short. It is unclear, in how far the 80/20-principle (see chapter 1.6.1) really works with junior professionals due to the differentiation between post-trainee and graduate. It is likely that posttrainees adopt faster and more sustainable than graduates do. Depending on the number of employees in the entire unit (institution), junior professionals will not have project responsibility at least for the probation phase.

The proper definition for junior professionals in distinction to senior professionals would surely be 'less experienced' and, therefore, depend on duration and intensity of project experience and levels of responsibility. The consequence of this definition would be the conversion of the employment contract to long-term status and the automatic switch to senior status after a certain period of time (plus references).

Unfortunately, some institutions misuse the term 'junior' as synonym for 'less educated'. This means, that the level of the final degree (i.e. bachelor or Masters) defines the distinction between 'junior' and 'senior' independently from the working duration. Another problem is that junior professional employments – other than senior professional employments – have a certain time limit.

²⁵⁶ Source: https://karriere.deutschebahn.com/karriere-de/jobs/studenten-und-absolventen/einstieg-als-absolvent/einstieg-als-absolventtraineeprogramm-2651752

Concerning mobility management jobs in larger institutions (e.g. municipalities), the author suggests the distinction between 'manager' and 'consultant' (see chapters 8.1.1 and 8.1.3) rather than 'junior' and 'senior'. The wage agreements for governmental institutions in Germany (which private institutions and companies can/shall adopt) includes a distinction between the level of competence (depending on the final degree) and the level of experience (depending on the working duration).²⁵⁷ Hence, personal development (i.e. wage increase) of employees is possible in two directions, of which the experience part works – in a way – automatically.

8.2.3 Senior Professionals

The switch from 'junior' to 'senior' can occur in different ways and depend of different aspects. The easier case is the internal switch (i.e. the employment merely changes the status. The unit and the working place remain). Nevertheless, the sheer duration of work is not necessarily the best indicator. Employees shall gain experience through an increasing level of responsibility, too.

Continuous monitoring of the work performance (e.g. through appraisal interviews) and individual incentives (e.g. through target agreements) help to define the right moment of switching.

More complex 'junior-to-senior' switches occur through an internal change of the work place (e.g. from one unit to another) – combined with a higher level of responsibility – or through a change of job (i.e. to a new employer). The estimation of appropriateness concerning the switch is part of the human resources management. The skilled labour shortage in certain branches may lead to potentially wrong decisions. A lack of experience combined with a higher level of education can accelerate the switch. Again, the above mentioned 'employability' target helps avoiding such situations.

The author suggests that employers both co-operate with universities and UAS concerning practice lectures and concerning human resources management monitoring (e.g. through alumni programmes).

The most complex option of switch occurs when successful and experienced persons execute a career change (see chapter 8.2.5). Politicians, managing directors or coaches sometimes change industrial branches or portfolios. Such persons will massively oppose a shortfall of a 'senior' status, although they sometimes do not have any specified experience. Hence, an independent unit (e.g. compliance unit) is necessary to accompany and confirm the entire switch process.

Concerning mobility management, the compliance unit might makeconduct specified mobility management training (see chapter 7.7.1) done by a professional coach mandatory for the leadership person who is willing to switch.

8.2.4 Trainers/Coaches

Most trainers and coaches (especially when employed at a specified institution) are in charge of human resources development purposes (e.g. methodological training, leadership development). This includes mentoring, mediation and didactics. They usually do not have responsibility for specified projects, especially not in concerns of transport planning.

²⁵⁷ Source: https://oeffentlicher-dienst.info/tvoed/

Concerning mobility management, the dividing lines between human resources management and project responsibility are blurring. The local and individual framework and constellation have an influence on whether mobility managers or mobility coaches are in charge of project work.

Sometimes, it is important that trainers/coaches act independently from the institutions, at which the training takes place. A possible constellation for that is a highly controversial planning project. In some cases, conciliators are necessary. They must not be part of the planning unit. Mobility management coaches shall be able to conduct mediations. Hence, the best option for conciliating within a struggling project is to consider an external coach (i.e. from a consulting or a freelancer). Second best is a person working for the compliance unit of the institution in charge of the project (e.g. a project development company or a municipality – see chapter 8.2.3).

The most important skills of trainers and coaches are:

- Leadership qualification
- Academics
- Persuasion
- Empathy
- Moderation and Mediation

In case of entire mobility management units in charge, a distinction between mobility managers and professional coaches (see chapters 8.1.1 and 8.1.2) is no more necessary. It is yet open, in how far the existing job profiles must cope with this circumstance.

8.2.5 Career Changers

Career changes are rare. Reasons are manifold. In many cases of persons deciding to have somehow the 'wrong' job, they start a second (third...) qualification (e.g. study course, vocational training). Such cases are not per se a career change, rather a second-chance education. Re-starting as freelancers or self-employed after a permanent employment is also not a career change, as long as the new job is not in a completely new field of work.

A career change, however, always combines ending a profession for something completely new, sometimes even with a cold start. The following options occur to be quite common:

- Change of a leadership position or political position in a new field of work (e.g. from producing industry to service providing industry)
- Change of the field of work as a freelancer (e.g. from design to consultation)
- Shortfall of branches (e.g. coalmining)
- Job-specific disadvantages (e.g. poor payment)

Especially the two latter aspects often lead to either the necessity of a new qualification (thus, no career change) or a phase of unemployment (in many cases long-term).

Some specified engineering jobs additionally suffer from digitalisation (e.g. topographical survey and mapping, programming of semi-automatic machine control). Holder of such formerly well-paid jobs have large problems finding an adequate alternative. Frequent consequences are early retirement, unemployment or precariousness.

Concerning mobility management, experienced planners and engineers have the opportunity to switch to moderators, mediators, consultants or trainers, depending on the personal level of communicative soft skills. The demand for such 'old stagers' or 'elder statesmen' because of their sheer life experience is quite high – at least when it comes to mobility and transport.

8.2.6 Freelancers

Freelancing and self-employment are quite common in concerns of mobility management. The options especially in the consultation contexts are large.

- Avocational consulting projects
- Lecturing and training
- Shareholder at a small company
- Company associate
- ...

Consulting and engineering companies, large companies in transport and construction branches, the entire IT-business and many more in the private sector already make use of project-based freelancing opportunities. Even municipalities and other governmental institutions recently started approaches for single projects using freelancers, mainly because of skill labour shortage, but also due to a higher flexibility and independency of freelancing professionals.

8.2.7 Re-integration of long-term unemployed persons

The above-mentioned group of persons suffering from the shortfall of branches or from digitalisation quite frequently turn unemployed. Due to their specialization, which is no more useful, re-training is unavoidable.

However, a large number of such persons do not want to take part in re-training, or are not able to take part, because of disadvantages concerning their place of residence, health and other aspects. This leads to long-term unemployment. Unemployment often goes together social exclusion, alcohol abuse, criminal acts and many more²⁵⁸. The behavioural effects of unemployment concerning mobility must be topic for further research (see chapter 10.9).

However, technical, engineering and local knowledge plus some individual aspects potentially make such persons good mobility consultants or analysts. Hence, mobility management concepts are synergetic to reintegration programmes (see also chapter 7.2.1).

Specified job profiles in mobility management are still rare. However, the opportunity of switching jobs and the large variance of topics and skills in mobility management makes the situation quite promising. Mobility management jobs will very likely prosper in the upcoming years.

Quickview 8: Chapter 8

²⁵⁸ Comment: Various sources deal with the socio-economic framework and cause-effect chains of re-integration processes. However, most of such are older than 10 years. Further research is necessary. The statement is speculative.

9. Research results

This chapter shows all results of the three empirical research parts and highlights such results that have an impact on the study course design in chapter 12. The description of the three parts is included in chapter 1.7. Specifically chapter 9.6 synthesises all decisions relating to the first approach of a study course design in mobility management and chapter 12.5 contains recommendations concerning the study course after the implementation. This is due to the fact that all empirical results are used for abductions. Hence, the status quo of requirements for students and practice must continuously be reviewed.

9.1 General introduction

The three empirical phases were undertaken between late summer 2017 and early 2019. Preliminary results (i.e. the study course analysis in chapter 5.4.1 and the evaluation of the author's own lectures in chapter 1.4) were recorded at an earlier stage. The parallel literature analysis was started in 2016 and ended in 2021. Newly implemented study courses after 2020 are not displayed.

The author published some selected results from the online questionnaire in an article in 2019. [AD17] The previously published results are marked in the text.

See chapter 1.7, especially chapter 1.7.5, for the basic statistic numbers of the empirical phases.

9.1.1 Statistics of the expert interviews

The expert interviews were prepared and conducted in late summer and autumn of 2017. The author recorded all interviews as audio files with his smart phone (see chapter 1.7.3). The exact list of interviewees and the classification of the two groups (practice and teaching group) are stated in Table 3 on page 25.

Although the interview guidelines for the practice interviewees were shorter than those for teachers, the average interview length for both groups was very similar. This was mostly due to the nature of the interviews – open and not focusing on single issues.

The author asked about two different statistical issues. The first issue was the general opinion towards mobility management. The second issue was the share of skills that graduates should Masters.

The statistics of the practice group show the rising importance of mobility management in practice, whereas the teaching group mostly agreed on the classical integrated transport engineering approach as being the best place for mobility management methods.

Most interviewees agreed that the author can use their clear names. Merely a few declined. Such experts are declared as 'representative from' (see chapter 1.7.3 Table 3).

The median value especially shows no difference between the two groups in walking through the interviews, even though the longest interview took more than four hours (practice group) and the shortest took only 31 minutes (teaching group). Three interviewees from the teaching group (Mingardo, Van Wee, Cervero) gave answers to written questions which were not touched on during the interviews right after the interview took place.



Figure 30: Group share of opinions towards mobility management, first published 2019 [AD17]

The majority of all interviewees agreed with the idea of mobility management as being an important part of sustainable transport planning, as did the participants of the online questionnaire. However, the highest value towards mobility management being a stand-alone field of work comes from the practitioners group.



Figure 31: Share of opinions towards the necessary skillset of graduated mobility managers – first published 2019 [AD17]

The statistics regarding the skillsets show no relevant differences at the first sight. A more detailed analysis of the individual opinions shows the spread of answers. Both interviewees stating the highest value for theoretical skills (Representative from Transport for London and Axhausen) also agreed on mobility management as being a less necessary part of sustainable planning. Anders Söderberg and André Bruns who stated the highest values for soft skills have in common that they mention a large need for graduate mobility managers.²⁵⁹ [Pr12], [Te7]

Expert interview				Expert interview			1
Practicioners	Theoretical skills	Practical skills	Soft skills	Teachers	Theoretical skills	Practical skills	Soft skills
Knut Petersen	k.A.	k.A.	k.A.	Bert van Wee	25%	75%	0%
Eva Hannak	33%	34%	33%	Giuliano Mingardo	25%	75%	0%
Katalin Saary	33%	34%	33%	Kay Axhausen	65%	10%	25%
Matthew Clark	33%	34%	33%	Klaus Zweibrücken	33%	34%	33%
Representative from Transport for London	70%	5%	15%	Tom Rye	10%	50%	40%
Representative from IVM GmbH	20%	60%	20%	Christian Holz-Rau	34%	33%	33%
Johannes Auge	33%	34%	33%	André Bruns	25%	25%	50%
Representative from DTV Consultants	40%	30%	30%	Till Koglin	20%	50%	30%
Representative from Advier	25%	50%	25%	Carsten Sommer	60%	30%	10%
Representative from City of Malmö	40%	20%	40%	Chris De Gruyter	20%	50%	30%
Caroline Ljungberg	50%	25%	25%	Oliver Schwedes	60%	30%	10%
Anders Söderberg	25%	25%	50%	Alvaro Rodriguez-Valencia	50%	35%	15%
Stefan Schneider	25%	50%	25%	Robert Cervero	15%	60%	25%
Syb Tjepkema	25%	25%	50%				
	35%	33%	32%		36%	37%	27%

Table 8: Individual skillset opinion by the interviewees

The findings from the interviews show that the ones with practitioners seemed to bring the author further forward with his idea of a near-practice study course in mobility management. Highlight (and most inspiring) interviews were the ones with Eva Hannak [Pr2], Tom Rye [Te5] and Anders Söderberg. [Pr12] The most ideas towards the study course setup and design are derived from these three interviews.

The author also recognised a decreasing distinction between the teaching goals from universities and UAS when it comes to sustainable development approaches. Science and practice seem to merge slowly in such matters.

To get an idea about the broadness of information gained from the interviews, here are a few soundbites:

Anders Söderberg: "Yes, you can change people's behaviour just by soft measures." [Pr12]

Kay Axhausen: "Mobility management to me is – in principle – a non-valeur." [Te3]

Robert Cervero: "I think the marketing aspect truly distinguishes what the Europeans [...] are doing." [Te13]

Katalin Saary: "The experience of what one can do from the point of view of a design draft. This is missing [with bachelor students in mobility management]" [Pr3]

Eva Hannak: "The abstract concept or non-abstract concept of mobility management is a tremendous bottleneck for the actual goals of it. "[Pr2]

Tom Rye: "You use [mobility management] as part of sweet of transport planning measures." [Te5]

Till Koglin: "I believe that people who work with mobility management should actually be social scientists." [Te8]

²⁵⁹ Source: Menzel, C.; Bruns, A.: "Anforderungen an Fachpersonen im Mobilitätsmanagement - Ein Werkstattbericht" in Bundesamt f
ür Bauwesen und Raumordnung: Mobilitätsmanagement - Ansätze, Akteure, Ausblick [AD17]

Matthew Clark: "The [...] challenge is inequality." [Pr4]

Chris DeGruyter: "[Concerning] the relatively new initiatives coming out: I think, getting students involved in the development of them or the evaluation of them can be of great benefit to the proponents who are [....] responsible for those initiatives"[Te10]

Alvaro Rodriguez-Valencia: "The way people perceive and approach their daily decisions is changing [over] time. Thirty years ago it was inconceivable that a professor comes to the university by public transportation because [of][...] the status and the perceptions of people using public transportation, but nowadays [not]."

Apart from Kay Axhausen who doubts any effect of mobility management, all experts present a massive bandwidth of what mobility management embraces. It also shows the different approaches to behavioural changes and transport policies between Europe and elsewhere in the world as well as the different steps of sustainable development and attitudes in the margin between developing countries and the SUNflower states.

This leads to the conclusion that a study course in mobility management needs both a broad spread on content and the possibility to get an overview about an individual status quo (e.g. for a specific group or a specific place) from a meta-level. Students must be able to estimate the level of development (i.e. concerning places) and the level of awareness (i.e. concerning groups). That is why sociology, psychology and communications must be covered in the same amount and on the same taxonomy level as engineering and geography (see chapter 12).

9.1.2 Statistics of the online questionnaire

The online questionnaire was available between November 2017 and March 2018 with a pilot phase ('pretest') directly before that. For statistics about population, response rates and time to complete see chapter 1.7.5. The basic population for all following figures is 76.

The professional status of the participants shows two major groups of respondents. The largest group, approximately 86%, embraces "employees, project managers and consultants", whereas "teachers and researchers" represent 50% of the total. This is due to the fact that several answers were possible. 165 answers were provided by 111 participants, so approximately one third of all respondents gave more than one answer.



Figure 32: Professional status of the participants

Most of the participants had an academic qualification. Nearly half were graduates of 'classical' transport planning study courses. Another 15% were geographers. Less than ten percent had graduated in economics. This shows a large gap between the sheer requirements of mobility management as stated and the present status quo of people working in the field where mobility management mainly falls.



Figure 33: Share of highest level of education by the participants



Figure 34: Participants' jobs (upper left hand: share of population invited to the questionnaire)

The share of jobs results in a value higher than 100%. This is due to the fact that 24 participants chose more than one option. Most of these persons predominantly worked as planners or consultants worked and as a lecturer as an additional part-time role. Apart from that, no significant differences exist between the percentage of jobs from the invited persons and those who finally participated.

9.2 Reasons for people becoming involved in mobility management

In order to find out what relationship the participants have to the field of mobility management, it is necessary to make clear, in which context the participants did work with mobility management the first time they were involved in the subject and how that relationship is today.



Figure 35: Participants' first involvement in mobility management

The results show a nearly fifty-fifty share between research and planning within projects followed by campaigns. The percentage for "other" most likely is due to the fact that mobility management does not occur as a project at most municipalities. Consulting activities in mobility management, too, often do not take place in close relation to specific projects, especially when it comes to public transport fares or car sharing access.



Figure 36: Participants' professional involvement today

An eye-catching distinction between the first involvement and today is the discrepancy for research projects (minus twelve percent) and planning/consulting (plus ten percent). Two different reasons for that are possible. First, the amount of research project activity dealing with mobility management decreased after the first involvements. This can be cross-checked by looking after the moment of the first involvement.



Figure 37: Point in time of the first involvement with mobility management

The highest number of participants got involved to mobility management in the early 2000s. Nevertheless, the differences between the points of time are not significantly high. Almost all of the participants had had at least some involvement with mobility management. Almost none had not had any involvement. A closer look shows a difference between consultants and researchers.

More than 25% of all researchers stated that they had been aware of mobility management since the 1980s when it first appeared within the field of transport research, whereas only six percent of the consultants had come into contact with mobility management that early. More than 60% of the consultants had their first involvement with mobility management after the year 2000.

Hence, there is a second possible reason for the above mentioned discrepancy. Persons who did research in the 1980s – 40 years ago – are mostly retired today. Hence, they do not do research anymore but are highly sought after as 'experienced sage' (i.e. consultants).

9.3 Attitudes concerning mobility management

Apart from the key question of what mobility management (itself) is or can be (see chapters 1.6.2 and 1.7.3 and Figure 30), the major tasks and challenges of mobility management are important to understand. The statements from the 27 expert interviews directly derive the selection of answers. The following two figures show the major tasks of mobility management now and in ten years from now.

One can see that incentives for behaviour change seem to have a major importance both now and in the future. This confirms what many of the experts stated in the interviews about push&pull methodology (see chapters 2.5, 2.6.1, 0). 'Push' has larger and better effects but 'pull' seems to be capable of winning a majority. Two more results are quite interesting. Firstly, behavioural analysis seems to be a major task for today, but so in the future. This does not match with the results of the expert interviews and also not with the results of the focus group discussion. Both groups attach great importance to (behavioural) analysis being a key topic within mobility management.



Figure 38: Tasks for mobility management today



Figure 39: Tasks for mobility management in ten years from now

Secondly, providing awareness and practical support to stakeholders seems not to have much importance. Even giving awareness and political support to decision makers does not get much attention. This does not match with what Eva Hannak calls the most important lever. [Pr2] Helena Will, too, states that strategic (persuasive) communication with stakeholders (i.e. important planners) and decision makers (i.e. politicians) can have large effects in concerns of mobility management, because such persons then can influence (and accelerate) decision sustainable making processes as well as they can act as role models and multiplicators. [ST02]



Figure 40: Delta count of mobility management tasks today and in ten years

One more result catches the eye. In ten years from today, the promotion of future sustainable transport concepts (which already for today has large importance) is the highest ranked task for mobility management. This is quite astonishing, because is mirrors hope and trust in technical innovation. However, the aspect of sufficiency does not seem having a large importance.²⁶⁰

Another important question is which tendencies or frameworking aspects might or will have an impact on mobility management in the near future. Again, the experts' statements during the interviews directly derive the response options.

²⁶⁰ Source: Scherhorn, G.: "Über Effizienz hinaus - Ökoeffizienz scheitert, wenn sie nicht mit Suffizienz verbunden wird, Ressourceneffizienz im Kontext der Nachhaltigkeitsdebatte", Baden-Baden, 2008



Figure 41: Impacts on mobility management in the near future

The highest value appears at MAAS followed by the fact that mobility management professionals enter the job market (promoted by the government). This matches with the highest value for "medium impact" for political promotion for mobility management. Hence, mobility managers shall be aware of MAAS products and solutions. Two more results attract attention. Firstly, the impact of fully automated driving opportunities is estimated to be comparatively low. This is interesting because some sources imply that automated driving might cause disruptive changes in the whole world of transport.²⁶¹ Secondly, the impact of increasing competition between consultants does not play a role. Today in Germany, very few consultants work in mobility management [Pr1], nor do they in United Kingdom. [Te5] Nevertheless, in The Netherlands and in Sweden, the number of consultants has increased because of an increasing number of companies and institutions demanding such consultancy. [Te1and2,Te8,Pr9,Pr11,Pr14] It is very likely that the same effect will appear in Germany with a few years delay.

²⁶¹ Source: Ritz, J.: "Mobilitätswende – autonome Autos erobern unsere Straßen", Cham(CH) 2020



Figure 42: Variables for measuring success of mobility management projects

Nearly all interviewees, especially Axhausen [Te3], Holz-Rau [Te6], Sommer [Te9] and Schwedes [Te11] agree with statements form the literature [RP06, RP14], that measuring success of projects and methods of mobility management must be made in future, because today this is not (sufficiently) the case. Merely Anders Söderberg [Pr12] stated that all mobility management projects should be evaluated. Hence, the key question is, which variables are best suited to the evaluation of the success of a particular project or method. Such variables must on one hand be measurable (preferably as exact as possible). On the other hand, the variables must have a high level of indication (for success). Trips and trip length can easily be measured and transferred to CO₂-equivalents. All monetary approaches need more or less complex formula. Monetary profit, healthcare costs and GDP are all connected to each other. Accident cost rates do not (sufficiently) reflect environmental impacts. This all leads to the conclusion that measurable monetary and chemo-physical effects in combination might lead to reliable validity (see chapter 7.6.4).



Figure 43: Methods of mobility management with a good return on investment

According to the participants' points of view, all listed methods do have a good cost-benefit ratio. However, driver training and participation processes tend not to be methods of mobility management, whereas promotional and incentive methods and campaigns show a high level of success. Car-sharing-setups, parking management and telecommuting reach the highest values concerning cost-benefit-ratios. Nevertheless, it is still unclear whether especially these three methods really belong to mobility management or not (see chapter 2.6, especially 2.6.2). More than 22% of the participants negate the effectiveness of public transport promotion campaigns. Keeping in mind that public transport companies' promotion mainly originally accelerated the process of mobility management in the late 1990s [RP39], this result is worth mentioning.

Looking in more detail at the differences between the teaching and practitioner group, the opinions mainly differed in relation to four different aspects (difference higher than ten percent). 74,32% of all practising professionals state that telecommuting has a large return on investment (teachers 57,89%), whereas promotion campaigns for public transport does not have a good return on investment for 27,03% of the practising professionals (teachers 15,79%). A very interesting fact at that point is that the positive answers are nearly equal (52,63% of the teachers, 51,35% of the practising professionals). Traffic safety campaigns are good for return on investment for practising professionals (39,19%) but not for teachers (26,32%). The largest difference exists between teachers and practising professionals when it comes to audits for companies and institutions. Teachers state that this is not a method of mobility management (34,21% - practising professionals 20,27%), whereas practising professionals merely state that the return on investment is not good (22,97% - teachers 10,53%). This difference might be because practising professionals mostly do CMM in a manner that is at a lower level than an audit would be. Another possible explanation is that company audits are well known and standardised in The Netherlands [Pr8,9,14] and Sweden [Pr11] but not in Germany. [Pr1,6,7]

9.4 Attitudes concerning professionals in mobility management

The main aim behind this question was to find out which lectures and content a study course in mobility management must focus on. All topics were mentioned in at least one of the preliminary expert interviews. Hence, the author does not recommend getting rid of the mentioned lecture content, even, when the majority of participants did not declare the topic as necessary (e.g. politics). However, the results of the online survey show what to put an emphasis on and what additional aspects to cover (see Figure 12 page 63).



Figure 44: Necessary requirements for future professionals in mobility management - first published 2019 [AD17]

The three major content topics are transport engineering, urban and spatial planning and communications followed by psychology, social sciences and business economics. The majority declines politics and foreign languages as being necessary. This leads to two conclusions. Firstly, a fifty-fifty share of communications and transport engineering might reach the main target best. Secondly, the knowledge of foreign languages must not be for the mobility manager alone.

In cases when foreign languages are helpful (e.g. for projects concerning places with a high percentage of immigrants) either teamwork can help (e.g. at the example of the Bebelbike-Project, chapter 1.4.1) or translations must be made by professional agencies.



Figure 45: Share of skillsets for professionals in mobility management

The share of skillsets plays a large role in this thesis. The author's hypothesis 2.II. as well as the title of this thesis lays a clear emphasis on it. However, the expert interviews showed no clear recommendation towards practical skills (see Figure 31 and Table 8 on page 119). Practitioners rank all three on approximately the same level, rating theoretical skills highest. Teachings rank practical skills highest, but not measurably different. Nevertheless, the results of the online questionnaire show a higher difference between practical skills and the others, ranking this highest.



Figure 46: Detailed share of theoretical skills

With a closer look at the recommended share of theoretical skills, it becomes clear which aspects play a role and why practical skills do not dominate the share as much as the author supposed. The knowledge about concepts, managing transport, psychological backgrounds of travel behaviour and even economic interdependencies builds the analytic basis of what mobility managers actually do in practice (see chapter 7, especially 7.1.2).

The participants stated 22 more theoretical aspects, of which most can be defined as part of the mentioned topics. Examples: "transport technique" (two responses) can be defined as part of both "conceptual planning processes" and "transport management", "marketing" (two responses) and "financing" can be defined as part of "economic interdependencies". One participant stated "health effects, especially exercise" as important theoretical aspect. Another participant stated "Insights of the operating mode of companies, administrations, schools etc. depending of what kind of institution is to be consulted".



Figure 47: Detailed share of practical skills

The detailed line-up of practical skills partly shows interdependencies with soft skills. Self-reflection and presentation especially can be placed in both skillsets. However, mobility managers can explicitly learn how to undetake specified self-reflection in mobility management projects and processes (see chapters 7.1.3 and 7.1.4). Today, teaching public speaking and presentation skills are parts of each of the lecturing line-ups (i.e. the so-called schema curriculum) at secondary schools as well as bachelor (undergraduate) study courses.

The results show that all practical skills mentioned play a role for mobility managers. An eye-catching result is the opinion on local knowledge with the second-highest value for "implicit need" but the highest value of rejection.

Furthermore, twelve free-text commentaries were stated. One stated "giving up on parochial, localbased thinking structures", one other "moderation". Also "self-experience in concerns of barrier free planning" and "change management" were stated.


Figure 48: Detailed share of soft skills

Just like the results for the selection of practical skills, each skill mentioned earns received support. Only humour has lower rates of "implicit" or "high need". The high rate of "implicit need" for "professional conduct" and the high rate of common consent for "progressive thinking" and "creativity" all catch the eye. These are all skills that are very far from classical points of view concerning transport engineering skillsets. Free-text comments state "moderation", "professional experience" which confirms that practical skills and soft skills are partly redundant. One statement is as follows: "no dogmatism, show no bias against different-minded, hence, [a] high level of tolerance and comprehension over individual situations. Make the best solution be the easiest." One other statement: "Skills vary by function. If running a mobility campaign, psychology and creativity are required. If convincing CEOs of large business, business economy, sales and convincing are more important. For urban planners at the town hall it's important to know about triggers that can create a shift in transport modes; one needs to deal with resistance e.g. when closing inner city roads or reducing the number of parking spaces. So there is no single prototype of a mobility manager."

Of course, teaching soft skills like those mentioned above is not easy. However, especially the discussion results of the two focus group sessions lead to some promising approaches concerning the actual study course design (see chapter 12).

9.5 Comparison between study course frameworks of transportation engineering and mobility management

One of the key issues of this thesis is how to make a clear distinction between transportation engineering and mobility management. Nearly all of the interviewees – even though most of them do not estimate mobility management as an intrinsic, stand-alone field of work (see chapter Figure 30 page 118) - agreed that mobility management, especially when it comes to Masters courses, offers enough specified topics to create a first cycle (or at least second cycle) study course.

Therefore, the participants of the online questionnaire got identical questions on didactic methods and examinations for both transport engineering courses and mobility management courses.



Figure 49: Comparison of didactic methods of lecturing in concerns of mobility management and transportation engineering courses

Most results are quite the same. However, three results catch the eye. Firstly, more than 33% of participants rated frontal lectures "good" or "best practice" in concerns of transport engineering whereas only 30 % rated "somewhat suitable" or "not suitable". When it comes to mobility management, the clear majority of participants rejected frontal lectures as being useful.

Secondly, real world case studies were clearly rated "best practice" for mobility management courses. These also had the highest rate of support (61,26 %) of all methods concerning mobility management. Concerning transport engineering, the highest rate of consent is at "interactive lecture" (also 61,26%). Here, the rate for mobility management is also very high (60,36%), whereas "real world case study" merely earns 56,76% of support concerning transport engineering. Thirdly, the "infrastructural design draft" earns a high rate of support (including 12,61% "best practice") concerning transport engineering, but a rejection (38,74% : 25,23%) for mobility management. This underpins the statements of many interviewees that mobility management is more a question of communication than of infrastructural planning.



The next question dealt with the probable types of exam with the two different study courses.







Here the differences are not so clear as in concerns of didactics. However, two apparent differences exist. Firstly, "written exams" are rated higher for transportation engineering. Secondly, "presentations" earn a very high percentage of "best practice" for mobility management.

The participants also got the option to recommend specific combinations of exams (the column on the far right of Figure 50 and Figure 51). The results are as follows:

	Favourite	2nd
Mobility Management	Oral Exam + presentation	Oral Exam + Scientific report + presentation
Transport Engineering	Written Exam + Oral Exam + Scientific Report	Oral Exam + presentation

 Table 9: Recommendations concerning combined exam types (highest number of entries each)

Again, the written exam earns higher rates with transport engineering than with mobility management and presentations reach high values with mobility management. What catches the eye is the fact, that a combination of three different types of exam get high rates in both study course settings. This implies the need for more individuality concerning exams. Students with different skillsets get a higher chance to even out individual deficiencies with certain types of exam.



Figure 52: Recommendations concerning the choice between summative and formative evaluation of students

According to the above mentioned proposed mixed or hybrid types of exam, the participants had the choice to vote for certain types of evaluation, i.e. the weighting between evaluating a certain (summative) result or a (formative) process. The question behind this is how to create a framework for what Dweck calls "process praising".²⁶²

²⁶² Source: https://www.ted.com/talks/carol_dweck_the_power_of_believing_that_you_can_improve?

Usually, evaluation of students' work means discrete marks. Likewise, evaluation usually refers to a specific result (e.g. a written or oral exam, a written report or a presentation) only. Even an evaluation of hybrid exams like the above mentioned merely refer to different results, of which at least some may include further developments from before (e.g. a scientific report AFTER a project presentation can include suggestions mentioned during the discussion). The participants mostly agree that hybrid assessment evaluation meets the specific performance of the students better than focusing on single results only. However, formative evaluation only rate the lowest of all options. The described results reveal two problems: Firstly, the online questionnaire is not a good method to get a practicable result of a complex didactic topic like this. Therefore, the evaluation setup was one of the topics discussed in the two focus group rounds (see chapter 1.7.8). Secondly, giving marks for results, which starts at primary schools and ends with PhD theses has a long and broad tradition. Changing this to Dwecks approach of process praising means the necessity of a completely new toolset of evaluation.

During the first focus group discussion, the participants predominantly agree about the necessity of appraisal and the advantages of process evaluation. However, the concrete conversion of the idea to marks is not easy, because of the laws for examinations, especially the mandatory aspect of written explanatory statements.²⁶³ The comparableness and the calibration and standards (e.g. learning outcomes) is complex, too. 'Study book' (i.e. written content evaluating the lecture content continuously and in a self-reflective manner) examinations, mixed examinations and intermediate examinations can help to document learning processes and, therefore, justify marks.²⁶⁴

9.6 Recommendations concerning study course settings

Study course settings change. However, a few basic framework settings help to describe how mobility management courses differ from other study courses (especially transport engineering). This framework touches on three aspects:

- 1. The level of degree
- 2. Organisation and tactics
- 3. Content share

As mentioned in chapters 1.7.6 and 1.7.8 the results of this part of the online questionnaire are not detailed enough so the author decided to add the focus group discussions for refinement and filtering the results. Nevertheless, the tendency of the results deliver a rough idea of what shape and scope a study course in mobility management can have (see chapter 12.2).

9.6.1 Recommendation concerning bachelor or Masters level

The participants answered quite clearly. Two third voted for Masters level. Of the less than one tenth that voted "other" 50% voted for "both bachelor and Masters". Two others mentioned the opportunity of a "certificate of advanced studies" or an "add-on to a Masters". Only one comment refers to the existing course of further education mentioned in chapter 3.1.3.

²⁶³ Source: Christoph Menzel and Jürgen Collien during the first focus group discussion [FG1]

²⁶⁴ Source: Annika Busch Geertsema and Denise Sommer during the first focus group discussion [FG1]



Figure 53: General decision towards the level of courses

The results (Figure 56 AND the commentary) include a few subtext messages. Masters students have a lot of basic knowledge from their bachelor level courses. Many Masters students have at least a short-term experience in practical work. Many students already failed at least once or twice during their bachelor courses. Hence, what mobility management students indispensably need is experience.

9.6.2 Organisational and tactical recommendations

This thesis deals with near-practice lectures and study courses. It is unclear how far 'near-practice' can go. The closest path to practice is actual practice. However, this means a clarified agent-client-agreement as well as an agreement on payment. Since bringing students from first cycle study courses to real practice with payment agreements is not conformable to the benefit law²⁶⁵ a fully-fledged real-time practice project is not feasible. However, the law offers a few loopholes (e.g. donation options). Hence, both the educational part of practice (gain of competence) and the sovereign supervision by the responsible teacher are mandatory. Certain aspects of professional agreements (e.g. specified data analysis or further support after finishing the student project), however, are still possible and help achieve higher levels of correspondence to reality.²⁶⁶

The participants also had the choice between certain levels of real-time practice and specific levels of external supervision.

²⁶⁵ Comment: "Beihilferecht" in Germany, this law does not permit students to benefit financially from their projects.

²⁶⁶ Source: Matthias Kowald during the second focus group discussion [FG2]



Figure 54: Recommendations concerning near-practice lecturing

The participants agreed that the highest possible levels of real-time application (likeliness of implementation and replication) gain the best effects. External supervision must be conducted at least occasionally, but not exclusively. This means that all student projects need a certain time of preparation between the supervising teacher and the external parties. The experience report from the SPZ Dortmund gives a good overview concerning preparation times and shares of supervision. [AD16]

Furthermore, real-time projects need clarifications concerning responsibility for subsidiary work packages, milestones, meetings and delivery of results. This firstly means that Gantt charts or at least conceptual formulations must be prepared before or in an early phase of the projects. This fact has an impact on the level of students' self-organisation as well as the frequency (translated as 'pulsing') of a near-practice lecture.



Figure 55: Recommendations concerning lecturing settings

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The participants preferred 'blocked interactive seminar' settings. The level of self-organisation concerning the conceptual formulations remains open. This corresponds to the strategy of the mobility management lecture done by the author (see chapter 1.4).

These results were refined during the two focus group discussions. Real-time application projects especially cause problems due to the differences in duration of work. Consultations, especially in CMM contexts take several months from the first phase of initial contact with companies, conducting necessary analysis (e.g. employees' mobility behaviour) to the actual act of consultation, whereas the student projects only have a duration of three to (less than) six months.

Furthermore, clients "long for continuous stroking" through the first two phases of a project which can only be done by experienced consultants.²⁶⁷ Nevertheless, the unbiasedness of the students appears to be beneficial for certain projects.

Consequently, the student projects' supervision on one hand must include sure instinct, professional conduct and long-term preparations. On the other hand, the students must get the chance to act freely and open-mindedly and over a longer project time than just one semester.

At least such projects that need an intensified analysis should be spread over two semesters. Furthermore, the definition of "predetermined break points" through a project (e.g. project redundancies like "replications of real-time applications") prevents students from causing unrepairable damage (e.g. reputational damage). The author's uncomfortable experiences with the two projects in Nienburg and Wunstorf (see Table 1 page 14) could have been avoided.

An advisory board for the study course, continuous evaluation and project-experienced lecturers build the framework for such "predetermined break points" and supervisory settings.

²⁶⁷ Source: Brigitte Wotha during the second focus group discussion [FG2]

9.6.3 Recommendations concerning content share in a study course mobility management

The online questionnaire provides an initial overview of the preferred share of content in a study course in mobility management at the Masters level.



Figure 56: Share of content concerning a study course in mobility management

The two focus group discussions and a selection of comments from the expert interviews then specified the recommendations concerning content.

The participants' first focus group discussion [FG1] led towards a detailed compilation of lecture topics for a study course in mobility management. The compilation splits up into a core curriculum from the above mentioned share and a specified curriculum with important lectures beyond the core.

The recommendations concerning the transport engineering core curriculum are as follows:

- Basic methodology (of mobility management)
- Statistics (Socio-economic, behavioural, transport)
- Megatrends (Social, technological, economic)
- Transport development and mobility concepts
- Data analysis methods
- Planning instruments
- Road design
- Climate and environmental protection
- Sustainability and ecological development

Recommendations concerning the communications and social sciences core curriculum:

- Economic theory of action
- Basal moderation training
- Conflict management
- Law
- Participation

Recommendations concerning specified curriculum:

- Alternative methods of planning (e.g. design thinking), specific instruments
- Transport modelling (ex-ante and ex-post)
- Strategic communication
- Persuasion management
- Campaigns
- Evaluative research
- Theory of acceptance
- Market research
- Drama

Some highlights from the discussion also apply to the curriculum. Tom Rye [Te5] recommended "humour" as an important skill. So the author asked "How can I teach humour?". Jürgen Collin answered "Laughter yoga", Denise Sommer added "Drama". [FG1] Hence, the author designed a hybrid module combination of laughter yoga and drama school to the schema curriculum (see chapters 12.2.4 and 12.3). However, Denise Sommer also recommends that the training-coaching-constellation must not "drift off" to "esotericism". "Some people simply do not want this".²⁶⁸

Anders Söderberg also recommends humorous and creative approaches.²⁶⁹ Hence, the drama elements must go hand in hand with other modules (e.g. campaigns, persuasion management).

Jürgen Collin and Matthias Kowald also recommended diversifying the methodologic modules. Transformation and implementation strategies (e.g. long-term transport development concepts) can take a very long time through political and planning processes. Jürgen Collin states: "Simply changing traffic behaviour a bit. This works faster."

The students must learn that current mediation procedures gain good results when planning engineers and communications professionals work together. Hence, in the best future case, one mobility manager can resume both the communications and the engineering part.

Subsequent content recommendations:

- Evaluation of planning processes
- Processes of grassroots democracy (especially referring political campaigns)
- Systemic changes of perspectives
- Documentation processes of project and participation workshops (e.g. 'Scetchnotes')²⁷⁰

²⁶⁸ Source: Jürgen Collien and Denise Sommer during the first focus group discussion [FG1]

²⁶⁹ Source: Expert interview with Anders Söderberg [Pr12]
²⁷⁰ Source: Juliane Krause during the second focus group discussion [FG2]

The author (together with his student assistant Helena Will) then transferred the recommended portfolio to a first approach of a pattern schema curriculum for a Masters course in mobility management.

One major task during that transfer process now was to compare basic knowledge and skills from the different bachelor study courses from which students switch consecutively to mobility management. This includes both the conformation of the learned content (e.g. mathematics, statistics, communication theory) and the different duration of the bachelor study courses (i.e. six, seven or more semesters) – and therefore different amounts of earned credit points.

As a consequence, the study course design includes one orientation (and alignment) semester before the actual study course (core semesters) start. This pattern schema curriculum built the basis for the second focus group discussion.

First semester	Second and third semester	Fourth semester			
Basic content, allignment and orientation	Kernel content and specifications	Master Thesis			

Figure 57: Basal construction approach of a Masters course mobility management

The participants of the second focus group then recommended individualising the orientation semester as much as possible so that a broad number of different bachelor graduates (especially those from either communications or transport sciences) can apply for the mobility management Masters course. The first semester, therefore, shall consist of multiple lectures, of which some must be obligatory and some must not. Hence, the emphasis lies in communications content for transport engineering bachelor graduates and vice versa, transport engineering content for communications graduates. Furthermore, voluntary lectures complete the first semester.

Matthias Kowald recommends specific empirical methods and statistics plus a basic introduction lecture to mobility management as additional content recommendations concerning the orientation semester. [FC2]

The second focus group discussion calibrated the preliminary design of the pattern schema curriculum in chapter 12.3, which then can transfer to the implementation and accreditation of a real study course at any university or UAS.

The three qualitative and empirical parts of this thesis identify both a lack of knowledge about the potentials of mobility management in case of an increased use of communicative methods and a lack of adequate educative formats to feed this idea. The two focus group discussions confirmed the need for an implementation of a new study course format and delivered a sufficient base and framework for a purposeful study course design. However, further accompanying research and monitoring is necessary to prove the accuracy of the idea on one hand and give advice for optimisations on the other hand.

Quickview 9: Chapter 9

10. Abductive conclusions

From a scientific point of view, this thesis does not deliver enough indicators for an actual proof of the concluding circumstances. This means that on one hand further research is necessary (see chapter 10.9). On the other hand this means that the results of the three pillars (i.e. literature, qualitative empirical survey and lecturing experience of the author) led to – in fact - new insights. Hence, all conclusions are abductive (see chapter 1.7.10).

Chapter 10 includes findings from all empirical parts and the literature review (chapters 10.1 to 10.6). All findings do not have a status as 'proven', because of all of them are abductive. This means, specific evaluative research must be conducted (chapter 10.9). The chapter also includes the outcome and ring closure (chapters 10.7 and 10.8) as described in Figure 2 page 10.

10.1 Abductive elements from the authors teaching experience

The 'experience by the author' pillar is the most vulnerable piece of insight. A few circumstances play a role in this context:

- Many teachers offer real-time projects concerning transport and mobility with external partners (see chapters 1.7.9 and 9.6.2).
- Freedom of teaching offers large variance.
- Many Masters courses at UAS differ from those at universities.
- Academic maturity depends on not only whether the degree is a bachelor's or a Master's.

Hence, the overview of the outcome of the previous projects (Table 1 page14) is good, but not good enough for actually drawing conclusions. However, Klaus Zweibrücken [Te4], Tom Rye [Te5], Till Koglin [Te8], Carsten Sommer [Te9] and Oliver Schwedes [Te11] confirmed the author's concept as good enough for training mobility management during their expert interview.

The abductive elements from the author's teaching experience are as follows:

- The chosen teaching format for mobility management is good for Masters degree study courses.
- Real-time projects with external partners in mobility management apart from CMM applications make sense.
- Feedback and reflection of the project's status must run continuously.

10.2 Abductive elements from the expert interviews

The interviews are to some extent the main core of this thesis. Apart from the two dissenting opinions (Axhausen [Te3] and Representative from Transport for London [Pr5]), all interviewees confirmed the necessity of considering mobility management as being the subject of a dedicated study course. The suggested approaches range from flanking transport planning purposes (Holz-Rau [Te6]) with mobility management via integration of mobility management and transport planning (Bruns [Te7], Sommer [Te9] and Schwedes [Te11]) to conducting it as a stand-alone subject (Hannak [Pr2] and Söderberg [Pr12]).

The dynamic development from TDM to mobility management makes Europe a good place to implement specific study courses with an international orientation (Cervero [Te13], De Gruyter [Te10] and Rodriguez-Valencia [Te12]). The largesignificant experience with projects and governmental frameworks related to mobility management in the SUNflower states must indispensably have an influence on the content of such study course settings. In how far Germany has already reached the SUNflower level of performance in mobility management, must be part of accompanying research in this field.

Mobility management has a dilemma. Although (transport) engineering skills are vitally important, the communicative and empathic aspects of consulting make the necessary skillset very complex. The existing study courses do not cope sufficiently well with this dilemma (Saary [Pr3] and Hannak [Pr2]). Most persons working in the field of mobility management must learn from project experience or take part at specific vocational training for communication (e.g. mediation, moderation, elocution).

Thirdly, mobility management has not yet reached a sufficient level of promotion. The projects, campaigns and supporting work from mobility management cause overloads, and hence overtime, for the persons in charge of mobility management (especially at municipalities). Hannak [Pr2] and Söderberg [Pr12] confirm this being a long-term process. Additional staff would not just help to manage the workload. Putting more persons in charge of stakeholder and multiplicator training (see chapter 7.7) could even build an upward spiral concerning successful mobility management, but this process needs to be monitored. Lastly, all interviewees even including the two doubters of mobility management agree that the negative aspects of transport and mobility (see chapter 6.1.1) have got worse and worse so that a paradigm shift has already begun. The time to act in the sense of a turnaround is now.

The abductive elements from the expert interviews are as follows:

- Specific study courses in mobility management makes sense, independent from the question of whether mobility management is, or will be, a stand-alone field of work.
- The demand for Masters degree graduates in mobility management is high, independent of the level of development that mobility management has reached in a particular country (see chapter 7.8.3)
- The distinction concerning near-practise teaching between UAS and universities concerning transport and mobility is already small and further decreasing.
- Various methodological challenges and best practices exist. Only CMM seems to be well established.
- Today, mobility management suffers from a lack of communicative knowledge and skills.
- An increasing number of specified mobility managers could cause an upward spiral towards more successful projects.
- The time is now!

10.3 Abductive elements from the online survey

According to the survey results, the major tasks for mobility management now and in the future are "designing incentives for behavioural change" and "promotion of sustainable future transport concepts" (see Figure 38 and Figure 39 page 128). Furthermore, the promotion of all-in-one-hand solutions (e.g. MAAS) and the development of staff (similar to the abductive results of the expert interviews in chapter 10.2) play a role. The entire survey shows a recurrent pattern: Specific mobility campaigns, promotion of specific approaches of sustainable mobility, communicative and engineering skills. Hence, mobility management consists of a 50/50 share of communication and engineering with some 'flavour mixture' made up for business, politics, law, sociology and computer sciences (see Figure 12 page 63 and Figure 56 page 146).

The abductive elements from the online survey are as follows:

- Mobility management is a field with a 50/50 share of communications and engineering, which already is or can be stand-alone.
- A lack of specifically educated persons in mobility management exists.
- A study course in mobility management must be at the Masters degree level.
- Study courses in mobility management and sustainable transport planning must be different from each other with certain intersections.
- Hybrid didactics concerning lecturing, evaluation and project topics are indispensable.

10.4 Abductive elements from the focus group sessions

The two focus group discussions gave all necessary elements for the construction of the study course design from chapter 12. The first discussion reflected elements of evaluation and frameworks of the course (e.g. the amount of workload). The discussion then led to a major change concerning the basis for this thesis. Firstly, the participants confirmed the suggested share of skills derived from the expert interviews and the online survey, but not the suggested share of real-time practice within the curriculum of the proposed study course.

The students should not only gain competences through conducting real projects. The theoretical knowledge and the reference to practice can also be gained through compiling, comparing and evaluating (best) practices.²⁷¹

A second strand of the discussion dealt with the share of soft skills and the potential lectures for that part of necessary competences. Especially 'empathy', 'enthusiasm', 'creativity' and 'humour' are very special and individual elements of the soft skill knowledge group. Being able to put oneself in the position of the customer (i.e. thinking and acting like the person receiving a consultation) is a very high-level outcome of a study course. However, the participants suggested elements like drama school and mimicry (see chapters 5.2.1 and 5.2.2).

²⁷¹ Source: Annika Busch-Geertsema during the first focus group discussion [FG1]

The abductive elements of the focus group sessions are as follows:

- A study course in mobility management shall not exclusively make use of real-time projects.
- Students can adequately learn soft skills elements.
- A Masters degree study course in mobility management shall include possibilities to compensate omissions from bachelor degree study courses (e.g. a lack of engineering content in communications courses).
- Otherwise, mobility management must integrate both a bachelor degree study course and a consecutive Masters degree study course.
- An advisory board and continuous monitoring of a study course in mobility management are desirable flanking elements.

10.5 Abductive elements from the supervised theses

Junghans [ST01] and Will [ST02] gave advice concerning unique selling points of the general framework and the content of a study course in mobility management, whereas Rehmstedt [ST03] and Gülhan [ST04] reflected on possible real-time projects and specified content. A fifth thesis, which was planned to deal with quality management and evaluative processes in concerns of CMM, was rejected in 2020. However, this topic is still sensible for further research.

The abductive elements from the supervised theses are as follows:

- A Masters degree study course in mobility management would be unique.
- This uniqueness would increase in case of a specified and balanced share of content (i.e. engineering and communications)
- Integration of study projects help creating subjects for further research or calibrate existing approaches.

10.6 Abductive elements from the used literature

The used literature focused mainly on the elements of didactics for study courses and mobility management in practice. The teaching and learning aspects must gain intrinsic motivation, reflection of individual predestination and preferences, sustainability and durableness of competences and awareness. The practical aspects must cover being up to date, interdependencies and transdisciplinarity concerning mobility and transport, methodology, factors of success and hindrances concerning mobility management.

The above-mentioned aspects affect the type of exam, marking methods, teaching methods, interactions between practice and teaching and the entire framework of the suggested study course design.

The specific abductive elements from the used literature are as follows:

- Mimicry and other creative activities can initiate or accelerate 'flows'.
- Drama school, especially role-play, helps to deepen aspects of empathy. An adaptation of the German TV show "Kessler ist..."²⁷² (Original Israeli TV show "How to be..."²⁷³) would be a good unit.
- All real-time projects must include 'trial-out' and 'on-the-ground' elements.
- The 'whole institution approach' is indispensable.

²⁷² Source: https://www.imdb.com/title/tt5575902/

²⁷³ Source: https://www.armozaformats.com/formats/factual/how_to_be

10.7 Answers to the research questions

The research questions and the reasons behind them are stated in chapter 1.4.2. Hence, this chapter merely focuses on the possible answers reflecting the following aspects:

- the theoretical background from chapters 2, 3 and 4
- the literature review from chapter 5
- the status quo in practice from chapters 6,7 and 8
- the results of the three qualitative empirical phases from chapter 1.7

Q0: Is mobility management more an administrative routine with objective aims or an intrinsic routine with a subjective aim?

A: Mobility management is both. The various points of influence on other fields of work (especially transport planning) and the large interactions with political, social and communicative topics make mobility management a large field of work. However, in the author's opinion, mobility management is (or can be) a 'stand-alone field of work'. The dynamic market development confirms this, even though the results from the interviews and the online survey merely show a minority that agrees. However, the majority agrees with mobility management being 'an important part of sustainable transport planning'. More research must follow to find a final assessment for this question.

Q0.I: Which is therefore the most precise definition for mobility management?

A: The EPOMM definition (Definition 2 page 21) used for this thesis is correct and comprehensive enough. The most important methods of mobility management are 'Increased accessibility for sustainable transport modes', 'Home office/ telecommuting promotion', 'Organisational measures for companies (e.g. business trip management, flexible working hours)', 'Public transport promotion campaign', 'trial-out/incentives', 'Cycling campaigns', 'School campaign', '(Car) Parking management' and '(Car) Fleet management' (see Figure 43 page 132). This mixture of methods show a balanced share between communicative and engineering topics.

Q1: Which are the key qualifications and skills for working contexts in mobility management – depending on the working area?

A: Chapter 8 shows how broad the field of work in mobility management actually is. Depending on the topics and personal responsibility of the various job profiles, the skillsets and necessary qualifications (e.g. final degree, competences, experience) are – in a way – different. However, the three skillsets 'practical skills', 'theoretical skills' and 'soft skills' for mobility management measurably differ from those for sustainable transport planning, especially concerning management, communication and creativeness on one hand and engineering, design and technical aspects on the other hand.

Q2: Which didactic methods are best for teaching such key skills and qualifications?

A: It is not just one method, but rather a mixture of methods that promotes successful skill training. The most promising composition concerning teaching and supervision of mobility management content is:

- a real-time application
- with partially supervision by external professionals
- in a blocked and interactive seminar

The best options for examinations in such contexts are:

- evaluative process praising
- presentations
- scientific reports
- oral exams

This constellation is merely a combined recommendation derived from the results of three empirical phases. There is yet no proof that this really works. The recommended study course setting (chapter 12) therefore must be monitored and evaluated continuously.

Q3: Which types of course and exams are best for proving key skills and qualifications

...for students?

A: The core targets 'employability' and 'transdisciplinarity' match best with a consecutive (or vocational) Masters course setting. The recommended share of theoretical, practical and soft skills emphasises on the practical part slightly higher (39/32/29) (see Figure 45 page 134). The recommended content is a share of two major fields (sociology and engineering), dominated in detail by transport engineering and communications (see Figure 56 page 146) supplemented by 'further content', which directly or indirectly affects mobility management, hence content 'on and beyond the edge'. A bachelor degree in mobility management is not sufficient to gain 'employability'.

... for trainees?

A: Trainees can choose between vocational training, training on-the-job opportunities and a (vocational) Masters course. Aspects of individuality, diversity and the variety of job profiles in mobility management make it impossible to define what is actually 'best' for trainees after their trainee time. However, a broader programme and selection of educational offers and formats concerning mobility management than today is desirable.

...for professionals?

A: Firstly, a distinction between 'junior' and 'senior' professionals is necessary. 'Junior' professionals need experience and responsibility to be successful and switch to 'senior'. This process can accelerate when they chose to take vocational training or (vocational) Masters courses. Nevertheless, due to aspects of individuality, diversity and variety of job profiles, a larger offer of vocational opportunities makes sense.

... for career changers?

A: The variety of aspects with career changers is even larger than with senior professionals. However, aspects of socio-professional re-integration and singling out individual predestinations (see chapter 8.2.7) make specified vocational training (e.g. concerning analysing parts of mobility management) sensible.

10.8 Revisal of the hypotheses

Proof is impossible because the empirical data is neither representative nor reflective of an existing study course in mobility management. However, there are a few tendencies to provide a view on.

H1: Mobility management is a field to be taught in study courses only, vocational and further training in mobility management are no sufficient educative formats.

This hypothesis must be revised in a way. For job beginners, high-school graduates and persons without any reference to mobility management, 'employability' and 'competence' can only be gained through academic courses. Senior professionals, career changers and decision makers must merely obtain specified training to deal competently with mobility management. The individual disposition (e.g. concerning soft skills) is crucial.

H1.I. Study courses can be properly shaped and scoped in order to enable students to become qualified and competent (Definition 1) for the job of mobility management.

H1.II. The combination of skills for mobility management is necessarily multidisciplinary.

Both sub hypotheses can be kept. The empirical results, the basic literature and the teaching experience of the author (i.e. all three pillars of this thesis) deliver evidence. However, the actual outcome, especially concerning 'employability' of the graduates is yet to furnish proof.

H2. According to expert's point of view, study courses teaching mobility management skills must be on a Masters level. A specified Masters course for mobility management can be either shaped as a consecutive course on multiple bachelor courses or as further education.

This hypothesis can be kept. Two of three participants of the surveys agree on the necessity of Master's courses (Figure 53 on page 143 shows this distinct tendency). The expert interviews and the focus group discussions confirm this tendency. A bachelor course in mobility management is helpful to reduce barriers (especially as orientation or to compensate for specific gaps in knowledge) for the consecutive Masters course. An adjustment of such courses to seven semesters (and/or 210CP) would avoid organisational problems with the respective admission and accreditation. The latter is what the only existing bachelor degree study course in mobility management at UAS RhineMain is currently switching to (see chapter 4.1.2).

H2. I. Mobility management students must have an intrinsic motivation (according to the theory by Ryan/Deci) for becoming qualified and competent (Definition 1). The likeliness of student's intrinsic motivation at Masters courses is essentially higher than at bachelor courses.

This sub hypothesis needs further review and research through monitoring and evaluation of the recommended study course in chapter 12. Merely the literature reviewed concerning didactics confirms this. The author's experience using real-time topics with bachelor and Masters course groups merely confirms a higher necessity of supervision with bachelor students, but not a difference concerning the intrinsic motivation.

H2.II. According to the expert point of view, practical skills are more important than theoretical skills in concerns of mobility management.

This sub hypothesis can be kept, but with reservations. Figure 45 page 134 shows the results of the online survey (39/32/29), which confirm to the author's point of view. The statements from both focus group discussions confirm this, too. However, Table 8 page 119 shows the results of the expert interviews (33/35/32), which count only soft skills lower than theoretical and practical skills. Further research and monitoring is necessary, especially when it comes to defining the distinctions between bachelor and Masters degree compositions.

H2.III. According to the expert point of view, at least 60% of mobility management courses must consist of case studies in real contexts, supervised by practical professionals. Notional tasks must be avoided as far as possible.

This sub hypothesis must be revised. The focus group discussions showed that notional tasks, reviews of recent projects and theoretical tasks and topics (e.g. analytics) are also suitable. However, the reference to real-time practice must be ensured. The online survey results show that real-time case studies, partly supervised by external professionals in an interactive and blocked seminar setting are highly rated. Hence, the format used by the author for the 'mobility management' module is a good opportunity to be kept, but not sufficient for a whole study course setting.

H2.IV. According to the expert point of view, case studies within mobility management courses must essentially include project management tasks, analytic tasks, conceptual tasks, communicative tasks, scientific working methods and presentation tasks.

This sub hypothesis can be kept. All empirical results and the review concerning didactics confirm the proposed mixture of tasks. The exact share of tasks and the allocation among the student group is an individual decision of the teacher (i.e. academic freedom).

H2.V. The related type of assessment and grading for case studies within a mobility management course must evaluate all tasks as in III. The weighting between the tasks can be individual.

Although the related sub hypothesis III must be revised, this sub-hypothesis can be kept. The results of the online survey and the focus group discussions deliver evidence that mixed formats and mixed examinations fit well.

H2.VI. Case studies described as in III are also useful, but less important for transport planning topics. The latter can also use notional tasks.

This sub-hypothesis must be revised. The results of the online survey do not confirm a clear distinction (see Figure 49 page 138). Nevertheless, the aims and content of study courses in sustainable transport planning and mobility management differ measurably.

H2.VII. Shaping a specified curriculum for mobility management courses on a Masters's level causes less effort than a curriculum for a bachelor's level. This includes both admission to the course (students must have a bachelor degree, only a few bachelor courses do not have the right specification for a consecutive mobility management course) and shape and scope of assessment (the minor part of modules within the course need written or oral examination).

This sub-hypothesis must be revised. Due to the high-level requirements in concerns of the accreditation of study courses, the effort is comparable. However, in case of an attempt to accredit a ten semester combination of a bachelor degree study course with a consecutive Masters degree study course in mobility management (i.e. a combination of the existing study course in Wiesbaden (see chapter 4.1.2) with the proposed one from chapter 12, the effort for the consecutive course is likely smaller.

10.9 Demand for further research

Due to the lack of existing study course formats, the proposed idea of a consecutive Masters degree study course based on various bachelor degree options must continuously be monitored and evaluated. The only existing bachelor degree study course in mobility management must also be revised, because a lack of alumni monitoring. Initial indications show that more graduates take classical jobs in sustainable transport planning than jobs in mobility management.

The major research questions derived from this thesis, therefore, are:

- Which job profiles exist or arise from a specified mobility management professionalisation as promoted in this thesis?
- How can study courses, vocational training and coaching sufficiently match with such job profiles?

These rather sociologic questions imply a rather basal and transport scientific question, to which this thesis does not give answer, but an indication.

Will mobility management evolve into a stand-alone field of science (and work)?

Together with this question, a lot of research must follow, because this means a completely new approach to sustainable transport might be possible.

Furthermore, this thesis identified some specific research demands.

- How did the Covid-19-pandemic affect mobility management and mobility consulting, especially concerning teleworking (from chapter 1.3.2)?
- How can cause-effect chains of 'hard' and 'soft' measures be differentiated (from chapter 2.6.2)
- How will the development of mobility management affect the structure of transport development planning (from chapters 6.2 and 6.3)?
- Which behavioural aspects of mobility have interdependencies with aspect of diversity (from chapter 7.5)?
- How can integrated consulting approaches establish in the future (from chapters 7.8.1 and 7.8.2)
- How can mobility management replenish social urbanism approaches in the future? (from chapter 7.8.3)
- How is the treatment of meta-level cause-effect-chains with (small-sized) planning projects (from chapter 8.1.5)?
- Which behavioural aspects of mobility are caused by long-term unemployment (from chapter 8.2.7)?
- What are the most important tasks of mobility management under the influence of promoted political changes (e.g. promotion of bicycle traffic, e-mobility) (from chapter 9.3)
- Is it possible to benchmark a best practice standard for mobility management performance derived by what the SUNflower states have already reached? How does Germany perform compared to that (from chapter 10.2)?
- How can quality management and continuous evaluations of CMM projects help to gain larger and more sustainable success of CMM as a whole (from chapter 10.5)?

Chapter 12.3 gives an overview about the draft design for a new study course. This model pattern will likely change throughout the accreditation process depending on the implementing university or UAS and on the accreditation group. This processes must be monitored. Furthermore, this thesis suggests a supporting advisory board (chapter 12.4) and continuous quality management after accreditation, so that a long-term monitoring phase is assured.

The three pillars of this thesis (i.e. literature review, the empirical research and the personal teaching experience) gave sufficient abductive results to answer each of the research questions and revise each of the hypotheses. Further results are – on one hand – many more research questions and – on the other hand most important – the necessity of monitoring the proposed process (i.e. the implementation of a new study course in mobility management).

Quickview 10: Chapter 10

11. Critical reflection and mistakes made

Five years from the initial idea to finishing of this thesis is a long time. Especially the dynamic process driven by climate protection endeavour and the pandemic situation after 2020 have changed points of view, the framework of study courses, mobility and transport. Teleworking massively improved, public transport wentbecame more flexible. Scientific work, exams, workshops and consultations went digital (at least more digital than ever before). Even the methodology of mobility management improved.

This thesis was made in parallel to the 'normal' work of a professor, although a few synergies exist. Hence, some mistakes occurred, of which a few are irreversible. Nevertheless, the author put some redundancies to cope with this deficiency.

11.1 Critical reflection of the three-step empirical research

The most critical circumstances of this thesis are – on one hand – the rather subjective selection of experts during the interview phase and for the focus group discussions. Doubters of mobility management are likely underrepresented. The focus group discussions took place without a second control group. On the other hand, all three empirical parts were qualitative (and abductive) research methods. Therefore, the revisal of the hypotheses, the answers to the research questions and all results can merely be considered as being representative of the situation at the time (subsequently to be proven or revised).

Both focus groups suffered from refusals at short notice. Focus group one took place with only four of the six invitees, focus group two took place with five of the six invitees. Some duplication occurred too. Jürgen Collin took part in focus group one and the online survey. Juliane Krause and Mechtild Stiewe took part in focus group two and the online survey. Matthias Kowald took part in both focus group discussions and the only survey. Denise Sommer took part in both focus groups. All such duplication was intentional. Nevertheless, this is one more reason why all results of the empirical research must receive some critical reflection. The international selection is incomplete, especially the lack of interviewees from Austria, since Austria has a large tradition concerning mobility management.

The original plan of the author was to conduct work and lecture observations. The idea behind this was to check adequate didactic methods for teaching mobility management. However, this plan proved to be impossible, so that the basic questions of didactic approaches took place in the online survey. However, this transfer – again – was found to be too complex for this bivariate survey method.

The main purpose of this thesis was to show new possibilities and challenges concerning mobility management and how educative approaches may cope with these. This, anyhow, succeeded.

11.2 Mistakes made

The two major irreversible mistakes were results of technical errors. Firstly, four of 27 interview audio files became damaged during conversion from '.m4a' to '.mp3' format. Interview content of between four and thirty minutes is missing for these, but the handwritten notes by the author compensate this. Secondly, the complete first phase of the first focus group discussion failed because of an automatic energy save shutdown caused by the camera used. No further discussion parts were affected. Helena Will and the author wrote minutes from memory for compensation.

The interviews with Bert van Wee/Giuliano Mingardo [Te1 and 2] and Robert Cervero were too short to complete the whole planned interview guideline. All three interviewees gave answers via e-mail after the interview to overcome this issue.

Other mistakes had less severe consequences. The author left out some commentary during the pilot phase ('pretest') of the online survey. Hence, the author put together both results (i.e. the 'pretest' and the actual survey) for evaluation. The author did not use up-to-date gender standards within the written parts of the online survey. Both the online survey and the interview guidelines were bilingual, so that translation mistakes or misunderstandings are possible.

Although a few circumstances hindered the success of this thesis, the main purpose is considered to have been achieved.

Quickview 11: Chapter 11

12.Study Course Design for Mobility Management

This chapter summarises all references and abductive elements concerning a future study course in mobility management. The basic idea of this design draft is to allow as much transferability as possible. Hence, in the best case, any interested university or UAS can adapt the proposed design (with distinctions in detail).

The following figure shows the approach including recommendations concerning the type of lecture, length and structure of the study course, share of content and obligatory aspects of levelling.



Modular Curriculum MoM (Master Mobility Management -MSc)

Figure 58: Approach for a Modular Curriculum of the proposed Masters degree study course [Draft version for Ostfalia UAS - own design by the author]

The first semester has the purpose of compensating for the different bachelor degree backgrounds of the students, especially the difference between communications and engineering. The total amount of 120 CP (= approximately 30CP per semester) is derived from recommendations for Masters degree courses. The approach includes a recommendation for a high cluster 'Masters of Science', although the rules for accreditation are more ambitious than with a 'Masters of Arts' or 'Masters of Engineering'. The idea behind this is that graduates combine two high level competences (i.e. communications and engineering).

The content of the modules is a result mainly of the first focus group discussion [FG1] with improvement from the second focus group discussion [FG2]. This approach takes today's situation at Ostfalia UAS into account, but does NOT only apply to there.

Each interested university or UAS can adopt this approach and change it in detail if necessary. The following sub-chapters give some additional explanations about this approach.

12.1 Proposed Didactics

The study course is at the Masters level. Hence, the didactic approach differs from the bachelor level. The students must prepare and create a high percentage of the content by themselves. This means that the lecturers must not only use activating methods but methods that cause intrinsic motivation to work and – in the best case- a flow (see chapters 5.2.1 and 5.2.2).

The didactic concept includes the recommendations from all empirical parts (i.e. interviews, additional interviews, online survey and focus group discussions). The concept uses specific information from literature (i.e. concerning intrinsic motivation) too.

The main purposes of the didactic approach are as follows:

- Levelling of competences and knowledge concerning the different types of bachelor degrees at the start [AI1]
- Transdisciplinarity and group dynamics
- Blended learning aspects
- Individualised, diversity-oriented and process-oriented evaluation [AI2]
- Balanced share of theory, practice and soft skills
- Dependency to practice
- Reversion of activity (i.e. students design lectures)

These purposes have a large impact on the following aspects of the study course:

- Number of semesters for the different types of bachelor degrees depending on the number of CP
- Share and structure of the schema curriculum
- Lecturing modifications and basic requirements for the students
- A balanced choice of tasks and topics
- Variability of project durations
- Teamwork between the teachers (and with external project partners if necessary)
- Active and durable lecture monitoring

Hence, an organisational backoffice of the study course (e.g. represented by the advisory board and/or a specified administration equivalent to the SPZ [AI2]) is necessary, even before the commencement of the study course. Teachers and external partners must be aware of the complexity concerning the didactic approach. This means a continuous exchange between all involved persons and potentially a basic implementation workshop before the start of the study course. However, teamwork between the teaching professionals is not self-evident. This implies a strong need for team-building processes beforehand.

12.1.1 Interactive Teaching

Today, frontal teaching at universities (even more at UAS) is no more up-to-date. Appointment committees already rate the interaction between teachers and students high during the mandatory presentation unit within an application procedure for teaching professors. However, a high level of interaction between teachers and students is not necessarily sufficient for gaining intrinsic motivation or sustainable knowledge. Single lectures usually have a defined duration of 90 minutes. Blocked lectures are a multiple of a 90-minutes-unit.

Hence, it is helpful to give every single unit a structure, in which the active parts for teachers and students are defined as precisely as possible. The following table shows a possible layout for a 180-minute double block unit concerning the topic 'public transport systems in Germany', which was originally designed for an international online business game, but can potentially apply to an introductory unit during the first semester.

Name	Block "Public transport systems in Germany" I																		
Minute	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
Content Interactive slide presentation						Students cluster the information											Pattern		
	about public trasnport systems						in aninteractive						Short					solu-	
	in Germany					(but supervised) manner						interactive		Short test			tion		
	including pictures and videos						they create an own figure						repetiti					for the	
	use of a whiteboard							or table on the whiteboard										test	
Name	Block "Public transport systems in Germany" II																		
Minute	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	
Content Short presentation Handout of a certain										Selected Students give									
	by a student number of												a presentation						
	with a discussion representatative Freehand-phase (e.g. business game)									about the business game				Feedba					
	on the meta level examples												results				session		
	concerning (Short-cut, wiki,											in front of the whole group							
	model syste	ms		web com	pilation	1)													

Table 10: Model pattern of a two block 180-minutes (online) unit (here: in the field of 'transport systems') [design by the author]

The structure shows the active parts (red = teacher talks, students react, brown = students talk, teacher reacts, yellow = discussion, blue = students work individually or in groups, the teacher is passive) and the share of content. Subsections embrace phases of 5, 10, 15 or 30 minutes. The 'Freehand' phase (i.e. a phase, which students decide themselves what to do) can be longer than 30 minutes if necessary. Online lectures can make use of breakout sessions for this purpose.

Figure 55 on page 144 shows recommendations for blocked and interactive seminars. Therefore, the responsible teacher must shape 4-6 one-day units in one semester. In some cases – especially with near-practice projects with a large part of analysis – the module can be split into two semesters.

The levelling phase at the beginning of the study course, however, has a higher share of theoretical content. The interaction between teachers and students (and among students) needs more planning than workshops concerning real-time projects would need.

Even with rather dry topics like law and statistics, which nevertheless are very important in concerns of mobility management, individualisation of lectures and phases of interaction are possible. The classroom setup can put the teacher in the middle (among) the students.

The content (e.g. an important judgement) can be divided into elements that students can analyse in small groups etc. The type of exam can be a 'study book', in which the student must individually reflect on the process of the lecture.²⁷⁴

12.1.2 Mixture of examination and evaluation

Individualisation and diversification of teaching and evaluation is very important. However, this is conflict-ridden. The comparability of exams (and evaluation) is very important, too. Table 9 on page 140 shows recommendations concerning mixtures of exam types. This recommended mixture compromises this. The differentiation shall affect tasks and topics, group constellations and working methodologies, but NOT the actual examination.

²⁷⁴ Source: Denise Sommer in both focus groups [FG1&FG2]

The author recommends the following aspects of examination and evaluation:

- The evaluation must happen continuously (or at least in phases) throughout the entire semester.
- Individual development (outcome) is more important than results alone (output).
- Blended learning requires a mixture of examination.
- All lectures and topics must include phases of interaction between the teachers and the students and among the students. This must be planned precisely.
- The whole study course including all exams needs external supervision and monitoring.

All in all a broad mixture of examination and evaluation within the proposed study course is necessary to cope with the differing background of the students on one hand and the complex requirements of mobility management on the other hand.

12.1.3 Continuous Practising Lessons

The difference between this chapter and the following one is the didactic methodology between continuous, rather theoretical and retrospective lessons and the real-time application project lessons. Mobility management projects sometimes are too long-term and complex for real-time handling.

Therefore, a reflection or post-term evaluation of practice is a good alternative for such types of mobility management methodologies. Lectures concerning law, psychology and statistics can make use of reflective evaluative methods too.

Continuous practice and case seminars throughout the semester shall not embrace less than four hours per week, so that a blended teaching and learning strategy can gain a foothold. A semester consists of 15 weeks. Therefore, every weekly session consists of two units. The lectures can be frontal (but interactive, practice and case seminars.

Potential sequences for continuous practising lessons (Selection according to Figure 58 page 161) can be as follows:

Module 'Laws of planning, transport and public' (frontal lecture plus case seminar) :

Week 1 Unit 1: Interactive lecture about the laws of transport planning

Unit 2: Evaluation of a sample judgement concerning a planning process

Week 2 Unit 1: Interactive lecture about the laws of railway systems

Unit 2: Evaluation of the juridical aftermath of a railway accident

....

Module 'basics and methods of mobility management' (case seminar only):

Week 1 unit 1/2: Evaluation of SUMP strategies concerning mobility management

Week 2 Unit 1/2: Reflection of a recent best practice in mobility marketing (e.g. Indimark in Nuremberg)

•••

Module 'Campaigns and psychological research' (frontal lecture and practice):

Week 1 Unit 1: Psychological background of campaigns in mobility management

Unit 2: Assignment 1 – Traffic safety campaign, impacts and lessons learnt

Week 2 Unit 1: Cause-chain-effects of awareness building processes

Unit 2: Assignment 1 – Traffic safety campaign, consulting session

...

The actual configuration and conclusion of this list is then dependent on the local academic committees and – at last – the teaching professors. The steps towards accreditation embrace a discussion about the modules, the composition of credit points, the levelling strategy and the personnel. Hence, the approach for a Masters degree study course in mobility management will most likely differ from university to university.

12.1.4 Practising Workshops

Blocked workshop concerning real-time practice projects, however, shall not differ too much. This is because the empirical recommendations (and the evaluation of the author's recent projects) are definite and obvious.

The teaching professors, the advisory board and the internal unit (the equivalent to SPZ [AI2]) must meet two to four times per year to prepare and create the assignments and partnership framework for the practising workshops. Concerning the approach of this thesis, practising workshops occur in the second and third semester. The strategy embraces blocked seminars in 'creative working', which can be a drama school event including the preparation for it, and 'individual mobility marketing – training and coaching', which can include role-play sessions too.

Five more modules consist of a theoretical part, which can be conducted continuously throughout the semester (e.g. by interactive lectures), and a project. The project parts shall all be conducted as blocked practising workshops.

Potential assignments for the mentioned modules are as follows:

Module 'Real-lab short-range mobility' Part A:

SWAT-analysis of an arterial road concerning appropriateness for pedestrian and bicycle traffic including methods of traffic measurement, conflict analysis and a short questionnaire-based survey of local residents.

Part B:

Short-term concept of change management for the above-mentioned road (e.g. tactical urbanism, change of rules, local campaigns, but NOT a design draft!)

Module 'planning and design of transport infrastructure' together with 'participation and project communication':

Design draft for a newly built or redesigned mobility hub (e.g. a main station or an inner-city place) including a strategy for participation and project marketing.

Module 'transport ecology and sustainability' together with 'conflict management and moderation':

Integrated investment approach towards noise and pollution reduction in a city or a region including surrounding and balancing strategies for inhabitants, industry and agriculture.

Either the basic idea behind the assignments (e.g. general settings and frameworks) or the real-rime application (e.g. place and region) of the same basic idea can/shall differ yearly. An important circumstance is that the real-time application shall not relate to ongoing projects, because this – according to experience - causes political trouble with the responsible planners (and politicians – see Table 1 page 14).

12.2 Fifty-fifty share between communications and transport sciences

According to the basic idea of a share of content focusing on communications and engineering but also including peripheral content and topics (i.e. law, business and didactics – see Figure 12 page 63) and combined with topics from 'beyond' the cure areas.

Figure 58 page 161 considers this share of content. The modules 'Reallab short-range mobility', 'evaluation and monitoring in transport' and 'Individual mobility marketing – training and coaching' are marked as 'specialisation' modules. This means that such modules – other than the engineering or communications modules – already include blended concepts of both basics (i.e. mobility management topics, in which communications and engineering merge completely).

The idea of 50/50 considers mobility management to be a field of work, in which both topics are covered in the same level of depth. Appreciation, empathy and awareness meet transport planning, technical analysis and policymaking.

Hence, graduates are not just "socio-scientific enlightened engineers"²⁷⁵, nor 'jacks of all trades devices' concerning mobility. They are 'hybrid experts' in communications and engineering.

12.2.1 Basic content of engineering and transport sciences

The proposed study course design contains five modules directly dealing with transport engineering content. Together with the three above-mentioned specification modules and a transport focus with the two business/law-modules, transport and engineering shares a little less than 50% of the whole programme.

All mentioned modules are directly derived from the empirical phases - especially the focus group discussions (see chapters 1.7.8, 9.6 and 10.4).

Measuring, modelling and prognosis in transport

This module is part of the orientation semester, mandatory for graduates from communications. Bachelor graduates from communications in particular must learn about measuring and the methodology of forecasting. This is necessary, because the students must have an idea of cause-effectchains going together with behavioural changes. Bachelor graduates from business-based transport study courses might not have much knowledge about transport modelling basics either. All other graduates do not need to select this module.

Urban and regional development

This module is part of the orientation semester, mandatory for graduates from communications. Again, this module is intended to develop competencies in planning processes and structural development (of land use and urbanism) for graduates from communications. However, specialised transport engineers (e.g. with focus on steering or construction of infrastructure) might have a knowledge gap concerning long-term planning methodology. This module has a large share of sociological and geographic content, too.

²⁷⁵ Comment/Source: This quotation comes from the expert interview with André Bruns [Te7] and from Matthias Kowald during the first focus group discussion [FG1]. The idea behind this is a short-cut description of what a mobility manager should be.

Basics and methods of mobility management

This module is part of the orientation semester, mandatory for graduates from communications. It contains a highly compressed overview of project approaches and methodologies of mobility management. The aim is to give a retrospective and evaluative overview of project purposes, employment settings and what mobility management actually embraces (see chapters 1.6.2, 6 and 7). This module is recommendable for all transport engineering graduates, because mobility management is often does not covered in such study courses (see chapter 4.1).

Planning and design of transport infrastructure

This module takes place in the first of the two core semesters. It must directly connect to the module 'participation and project communication'. Although all transport engineering graduates successfully completed a transport planning module before, this module is different, mainly because it is a real-time planning project and because of the direct relationship to the communications module already mentioned. The advisory board and the staff unit for projects prepare the project assignment and the external supervising setting. The two related teachers must arrange things with each other. Communications graduates get their first chance to plan something real. Transport engineers get the chance to apply their knowledge.

Transport, ecology and sustainability

This module takes place in the second of the two core semesters. It must directly connect to the module 'conflict management and moderation'. The main aim of the module is to show cause-chaineffects, detailed information of environmental impacts of transport and how to avoid that in a real project context. This includes reflections on short-term and long-term effects, local and global effects. Again, a real-time project (edited by advisory board and the staff unit for projects) shall give students an overview about the complexity of holistic approaches to mobility. This module is partly built on 'planning and design of transport infrastructure', but the characteristic of this module is more abstract than with 'planning and design of transport infrastructure', which explains its placement in the second core semester.

12.2.2 Basic content of communications

The proposed study course design also contains five modules directly dealing with communications content. Together with the three merged specification modules and two modules of didactics and languages, the share of this part concerning CP is slightly lower than the share of transport and engineering. However, the 'free choice' module balances this, because the students can choose any module (even from other universities).

Action theory ecology and business

This module is part of the orientation semester, mandatory for graduates from transport sciences. Action theory is a basic theory in sociological contexts. The focus on ecology and business shows the application of this theoretical approach to the sustainability triangle (see chapter 7.1.2). The students gain competencies in social, ecological and economic interdependencies. This rather basal and theoretical module is meant to help transport engineering graduates understand the functionality of social interaction. One key element of this module must be to illustrate and explain causal cognition processes (see chapter 5.2.4).

Campaigns and psychological research

This module is part of the orientation semester, mandatory for graduates from transport sciences. It is meant to give the students an understanding of strategic communication, the basic theories of diffusion and persuasion (see chapter 5.4.2) and some practical advice about communicative interaction between human beings including psychological effects of this. This includes individual approaches towards awareness, acceptance and behavioural change but also methods to avoid reactance and rejection.

The lecture includes information on established basic methods and demands application of which (e.g. the MaxLupo approach [BP01]) including a critical reflection of the proposed results.

Empirical research and statistics

This module is part of the orientation semester, mandatory for graduates from transport sciences. It focuses on social and economic research and measuring behavioural aspects of transport. Transport engineering graduates normally have knowledge concerning questionnaires and quantitative measuring methods. Therefore, the focus of this module lies in qualitative methods of social research (e.g. open interviews and focus group discussions). The students gain knowledge about social and psychological backgrounds of behaviour through empirical approaches. This includes competencies in moderation. One subsequent aim of this is to prepare students for initial analysing interviews mainly with stakeholders (e.g. during CMM-processes – see chapter 7.1.1).

Participation and project communication

This module takes place in the first of the two core semesters. It must directly connect to the module 'Planning and design of transport infrastructure'. The students must deal with various media channels (e.g. social media), group-specific participation concepts (most important: disabled and elderly persons – see chapters 7.5.3, 7.5.4 and 7.6.3), strategic project communication (e.g. public relation for projects, campaigns) and persuasive approaches at various stages of the correlated planning project. The teachers shall make use of professional support from external trainers or marketing professionals.

Conflict management and moderation

This module takes place in the second of the two core semesters. It must directly connect to the module 'transport, ecology and sustainability'. The students must learn and apply methods of individual and group-specific conflict management, compromising, negotiation and compensation. The related real-time project must therefore be conflict-ridden (e.g. because of noise, pollution, land use conflicts). Support by external conflict trainers and project management professionals is indispensable.

12.2.3 Merged specifications

As mentioned in the introductory text (chapter 12.2), a few modules run as 'specifications', which merge communications with transport sciences. All of these modules are meant to be project lectures with a large focus on teamwork and real-time application.

Reallab short-range mobility

This module is the lynchpin of the entire study course. The module embraces a long-term project in both core semesters. It has the largest amount of CP. The specification on short-range mobility (i.e. concerning pedestrian and bicycle traffic) has a political dimension. The students must merge their competencies in analysing behaviour, measuring traffic, infrastructural and operational knowledge and campaign design throughout one year. The advisory board and the staff unit must prepare the project annually. This is likely a project to gain interest from local administrations and media (e.g. local newspapers). This means, the project also has a political dimension. The term 'reallab' means that the teachers must make use of as many up-to-date technical instruments as possible (e.g. pedestrian detection devices, augmented reality presentations).

Evaluation and monitoring in transport

This module takes place in the first of two core semesters. The module is evaluative and retrospective. It deals with the simple question, whether certain programmes, mobility management and transport planning instruments succeeded or not and – even more importantly – which factors were responsible for the success. This module is necessary because of the lack of measuring instruments in concerns of mobility and transport development (see chapters 2.6.2, 5.3.1 and 6.1). The teachers, the advisory board and the staff unit must find appropriate (best) practices in transport development plans and mobility management projects. The students then must use qualitative analytic methods to evaluate the factors of success (e.g. charismatic protagonists) and the framework conditions (e.g. general awareness of climate change effects). Nevertheless, this module is most likely the one to receive the largest amount of replenishment through the first few years after accreditation, because of the largest of the social conditions (evelopment the world is in (see chapter 1.3.2).

Individual mobility marketing – training and coaching

This module takes place in the second of two core semesters. Again (like in two above-mentioned modules), this module deals with group-specific and individual aspects of mobility (see chapters 7.5.2, 7.5.3, 7.5.4 and 7.5.5). However, the focus shifts slightly, because individual marketing usually includes local aspects (see chapters 7.2.2 and 7.2.3). A second purpose of this module is to include aspects of 'train the trainer'. Even mobility management professionals need guidance and additional training, especially when it comes to new approaches or project ideas (see chapter 7.1.3). Hence, the students must cope with individual consulting situations in both the context of individual mobility marketing and the preparation phase of such.

12.2.4 Additional 'along-and-beyond-the- edge' lectures

Transport, mobility and communications are already topics with large overlaps with other scientific fields (e.g. healthcare – see chapter 7.8). Therefore, it is rather philosophic and – in a way – not important, in how far 'business' and 'law' are 'along' or 'beyond' the edge of mobility management. The dependencies between transport, mobility, law and business played a role in all three empirical phases. The same circumstances are valid for the interdependencies between 'communications' on one hand and 'foreign languages' and 'creative working' on the other hand. Hence, the proposed study course approach includes two of each 'edge'-fields at different stages of the study course.

Laws of planning, transport, public

This module is part of the orientation semester, mandatory for all students. This rather theoretical, but case-based module is meant to gain awareness for 'no go'-planning processes and avoidable mistakes. It shall provide knowledge about options of conciliation, adjustment and replenishment with (transport-related) planning, social programmes and business development. With a distinction between successful, failed and postponed projects, the students must learn about a sensible use of laws and guidelines of governmental actions.

Funding of planning projects

This module takes place in the first of two core semesters. Similar to the above-mentioned 'laws'module, it is case-based, theoretical and retrospective. Recurrent interdependencies between both modules are deliberate. On one hand, large-scale transport projects especially need a broad knowledge about funding opportunities and some 'creativity' concerning the handling of funding rules.²⁷⁶ The students must learn about the 'principle of subsidiarity', the 'standardised evaluation' and the 'benefit-cost-ratio', the principle of 'public-private-partnerships, the distinction between 'durable' and 'short-term' funding programmes, the different institutions in charge of funding (i.e. the governmental structures) and lastly the distinction between 'investment-based' and 'operation-based' funding. Again, a distinction between successful, failed and postponed projects is necessary. The students shall work in teams.

Creative working

This module takes place in the first of the two core semesters. The idea behind this module refers to the background of intrinsic motivation (see chapters 5.2.1 and 5.2.2), gaining empathy (see chapter 10.6) and the soft skill suggestions from the expert interviews (e.g. humour – see chapters 9.1.1 and 9.4). The module includes a 'drama school', 'laughing yoga' and an overview several other short-cut opportunities of making mobility management a bit less 'serious' but not 'ridiculous'. Dobler, Suda and Seidl give a good overview of such methods.²⁷⁷ Best practices and successful examples with a direct dependency to mobility management shall play a role in this context, too (see chapter 7.2.2). [BP02]

²⁷⁶ Comment: During his work at the city council of Constance, the author was often confronted with financial arguments against certain planning project ideas. An experienced colleague from the internal unit of road construction suggested him to develop some 'creativity' concerning financing concepts, especially when it comes to criterions of exclusion at funding programmes. Ten years later, during a professional meeting concerning the methodology of 'standardised evaluation' for public transport projects, he heard exactly the same sentence by an experienced consultant in Brunswick.

Brunswick. 227 Source: Dobler, G.; Suda, M.; Seidl, G.: "Wortwechsel im Blätterwald - Erzählstrukturen für eine wirksame Öffentlichkeitsarbeit" [AD25]

Specific foreign language course

Purposely placed in the 'mobility window' semester (i.e. the second of the core semesters), the students must learn or refresh a foreign language. They can choose between a specific English course for planning sciences and more general advanced courses (e.g. Spanish, French). However, concerning mobility management in Europe, the idea of 'multi-ethno-approaches' (see chapter 7.5.5) brings other language into focus: Arabic, Turkish, Russian, Polish, Albanian, Persian and other common languages among migrants will certainly help to gain trust between the mobility consultants and the consultees. Hence, even basic language courses are desirable. Hence, the universities and UAS with a study course in mobility management shall introduce co-operations with specified language schools.

Free choice module

This placeholder module is placed in the second of the core semesters. However, the students can shift it to the other semesters too. The students are free to choose a module not only from any other study course of the same university or UAS. They can allocate it at each university or UAS in the world (that offers the opportunity of extramural students). The only constraint on this free choice module is that it must be at the Masters degree level. The staff unit and the advisory board must monitor the students' choice in order to simplify the administrative approval of 'frequently used' modules. They shall work together with the internationalisation board of the university, too (e.g. concerning existing exchange programmes and co-operatives).

12.3 Model pattern schema curriculum

The basic information about the proposed study course is summarised in Figure 56 page 146, Figure 57 on page 148 and – most importantly – Figure 58 on page 161.

The study course consists of four semesters, of which the first is voluntary for graduates with a 210CP bachelor degree. The first semester, therefore, is a 'orientation semester' with the main aim of adjusting for the different backgrounds of graduates with 180 CP (plus voluntary graduates with 210 CP). A mixture of mandatory and compulsory modules (see chapters 12.2.1 and 12.2.2) aims towards levelling and orientation of all participating students, so that they have the sufficient knowledge and competencies for the following core semesters. The dependency to practice in this semester is merely evaluative and retrospective.

The two core semesters consist of a mixture of continuous and blocked lectures (see chapters 12.1.3 and 12.1.4) with a focus on real-time projects. This aims towards understanding of the holistic and stand-alone aspects of mobility management (see chapters 1.3.2 and 1.3.3).

The third semester includes the so-called 'mobility window', in which students preferentially get the chance to study abroad. This is the main reason behind the 'free choice' and the 'specific foreign language course' in this semester. The replacement for the other modules during the third semester depends on the specific learning agreements with the partner universities abroad.
The proposed advisory board and the proposed internal staff unit (see chapter 12.5) shall consider model patterns of learning agreements. This includes potential exchanges among partner universities and UAS in the initiative study field 'sustainable mobility'.²⁷⁸ (today: Ostfalia UAS, UAS Rhine-Main, UAS Karlsruhe and UAS Erfurt. Further co-operations are planned)

The final semester is a practice semester, which ends with the Masters thesis. This approach is similar to many existing Masters courses with 90 or 120 CP at UAS. Universities often do not put an explicit emphasis on an explicit final practice semester. Instead, universities offer options of practice application during the entire study course (for detailed distinctions see chapters 3.2.1 and 3.2.2).

The number of mandatory CP is 120, of which each semester has an approximate share of 30CP. In the proposed approach, the second semester has 31, the third 29 CP. This is merely a suggestion. The module setting can also switch to 30CP in each semester, if certain modules change their framework. This is a fine-tuning) process for the preparation and accreditation phases of a new study course.

12.4 Advisory board

Study courses must get an accreditation. This accreditation includes the schema curriculum with the complete module programme and the framework of the study course (e.g. facilities, laboratories, didactic approaches). An advisory board must not necessarily be part of the accreditation. However, it is highly recommended. The existing bachelor study course Mobility Management in Wiesbaden already has an advisory board. Accreditation agencies regularly recommend having these. With an advisory board, the offering universities or UAS have the opportunity to keep the whole idea of near-practice teaching up to date.

The recommended composition of the advisory board is as follows:

- Local and regional municipalities (3-4 stakeholders from different institutions)
- Mobility management consultants (1-2 senior consultants)
- Representatives from the 5 largest companies of the city where the study course is located (1 mobility management staff unit member or equivalent each)
- Representatives from transport engineering or planning agencies (1-2 senior planners)
- Representatives from professional advertising agencies and local media (2-3 stakeholders)
- Representatives from NGOs with reference to transport topics (in Germany VCD, BUND, 2 stakeholders)
- Teaching professionals from related or allied universities or UAS (1 professor, 1 member of staff doing research)

A positive side effect of a broad approach concerning the advisory board is the dynamic influence of sociological development (e.g. major attitudinal changes concerning modes of transport).

²⁷⁸ Source: http://studiumnachhaltigemobilitaet.de/

Hence, as a whole, the advisory board shall not exceed of 20 persons. The implementation of the advisory board shall take place during the preparation phase, before the accreditation. During that phase, and in the first two years of the study course, the group shall meet quarterly. After that, the frequency can decrease to biannually. During the re-accreditation phase, quarterly meetings are required again. The agenda of such meetings then shall include following topics:

- Assignments and projects for the upcoming year (referring to the procedure with the study course 'Regional planning' TU Dortmund)
- Evaluation and improvement of the 'whole institution approach'
- Opportunities for student practice phases
- Possible topics for Masters theses
- Recalibration of the schema curriculum
- Guest lectures
- Excursions
- Endowment of laboratory
- Others depending on topical events

12.5 Quality management and continuous monitoring

Given that the study course obtains support from an advisory board as mentioned in chapter 12.4), the author additionally recommends the installation of an internal staff unit for the study course (equivalent to the SPZ in Dortmund [AI2]).

This staff unit can work separately but shall interact with other staff units. Potential interdependencies of the 'mobility management course' staff unit with other units concern various aspects. The following table shows a possible structure for such interactions:

Name of the unit	Responsibility	Possible interaction
		Accreditation, financing, organisation, teaching staff,
		share of internal and external lectures,
Deanery of the faculty	All organisational, financial and didactic aspects of the study course	monitoring and evaluation, technical support and laboratory
Examination board and		Admission od students, approval of external attainment,
examination bureau	Examination, Evaluation and Graduation	learning agreements, hardship cases
	Organisational aspects of examination, registration and practise,	Approval of external attainment, learning agreements,
Service bureau for students	scholarships and federal training promotion	practise semester settings, interaction with the advisory board
		Interaction with the advisory board, practise semester settings,
Career service	Organisational aspects of practise and alumni	diversity management
		Monitoring, evaluation, trainings for responsible
Didactics board	Teaching didactics, evaluation an quality management	teaching professors, lecture shadowing, diversity management
Learning coaches	Individual problems and conflicts with students	Individual case management, diversity management
		Specific public relation support, interaction concerning
Communications unit	Public relation, social media support, internal website support	specific 'communications' modules

Table 11: Possible interactions between the study course staff unit and other internal units

The staff unit must ensure observance of compliance guidelines (especially concerning the independency of teaching and research), the intended balance of theory and practice (see chapter 5.2.3), accordance to the whole institution approach (see chapter 7.4) and social aspects of the studies (i.e. equality, diversity, respectfulness and appreciation). The latter aspect is even more important with mobility management than with other study courses, because the aspects mentioned previously are the core issues of success concerning mobility management.

The staff unit is responsible for the aspects of accreditation and re-accreditation, the organisation of the advisory board and the above-mentioned interactions with other internal units. Therefore, it makes sense to create and initiate a specific quality management strategy for the study course. The quality management circle (i.e. the recurring sequence of monitoring, evaluation and replenishment) must not start at the first accreditation and end at the next re-accreditation. An annual disposition (referring to the strategy of the SPZ [AI2]) desirable. The quality management circle can occur as follows:



Figure 59: Quality management process for the first five years after the primary accreditation [design by the author]

The transition from year one to year two is slightly merged, because of the more intense monitoring effects during this period. Modules, student evaluations and feedback from the advisory board may lead to content changes within modules, but also concerning the order of modules and other organisational aspects. This restructuring effort can be reduced for the third and the fourth year. Due to the ongoing process of re-accreditation during year four, the merging effects between year four and year five are comparable to the effects at the beginning of the accreditation cycle.

The staff unit works continuously, the advisory board meets semi-annually at the beginning and the end of the accreditation cycle, otherwise annually. The didactics board organises (or conducts) monitoring and shadowing of the lectures and projects during the first and last two years. During the third year, merely lecture shadowing occurs necessary. The annual reports summarise shadowing and monitoring results, suggestions from the advisory board and the students' evaluations. After the end of year two, alumni shall take part on a post-Masters interview. The results of such alumni interviews also feed the annual reports.

The students' evaluation takes place every semester. Such evaluations have a direct impact on lectures. The results also feed annual reports.

A Masters degree study course in mobility management with a 50/50-share between communications and transport sciences is a complex structure that needs professional handling and support. An advisory board, an internal staff unit, a structured quality management cycle and structured rules of admission are indispensable. However, the individualisation and concept of diversity behind the study course offers large variations and opportunities, especially concerning the practical part.

Quickview 12:Chapter 12

13. Prospects

The two major messages of this thesis are:

- Mobility management is developing into a stand-alone field of work (although the majority of experts in the empiric parts of this thesis did not agree to that statement)
- A study course in mobility management must have a share of 50/50 concerning communications and transport sciences

Therefore, universities and UAS, governmental units, municipalities, public transport, commercial companies and consultants must promote educational formats for mobility management. The level of professionalisation and indirectly the level of employability is dependent on the number and quality of study courses (and vocational offers) in mobility management.

This means – on one hand – restructuring of the existing portfolio. On the other hand, this means – even more importantly – implementation of new study courses. This process shall affect not just Germany or Europe, but the entire world.

The lack of specified graduates in mobility management (see chapter 8.1.3) combined with the change of job profiles (see chapter 1.3.2) will increase with the demand for new and more flexible educative formats. Even in the SUNflower states, a lack of adequate educative formats is visible.

Another derivative of this thesis is the proposed structure of the study course making use of a staff unit for organisational purposes in combination with an external advisory board. This circumstance affects the demand for near-practice experience especially.

In how far the structural suggestions concerning quality management processes are transferrable to other compositions of study courses or entire faculties, must be the topic of further research and the proposed monitoring processes.

The economic effect of graduates matching with the Pareto principle concerning their work performance will be very high. A desirable side effect of such direct correlations between teaching and practice can be private funding opportunities for specific research.

Mobility management and sustainable transport development will directly benefit from a larger number of concerned professionals. The better the core of mobility management (i.e. the 50/50 share of transport sciences and communications) works, the more awareness will spread, the more willingness to promote sustainable modes of transport will follow, the more behavioural change will occur.

Of course, the above-mentioned description of an upward spiral concerning sustainable development is rather a visionary and hope-driven construction. However, one of the core sentences of the abductive conclusions is: The time is now! (see chapter 10.2)

Lastly, this thesis gives the impression that mobility management and transport stands at the beginning of something new. The ongoing challenges concerning climate protection, healthcare, social development and many more can (and will) be drivers of this process.

14.Appendix

14.1 List of abbreviations

ADAS – Advanced Driver's Assistance Systems, supporting technologies for man-machine-interactions in vehicles (e.g. cars, trains)

AI – Artificial Intelligence, mainly used for devices to help make all-day actions easier (e.g. for disabled persons)

AR – Augmented Reality, mainly used for smartphones apps to ease orientation at complex places (e.g. airports, train stations, underground pathways)

BENELUX Union – Political-ecomomic union between Belgium, The Netherlands and Luxembourg

CMM – Mobility Management for (business) Companies

CP – credit point, see ECTS

DACH state – Germany, Switzerland and Austria, the three major countries in which German is the mother tongue. The letters D, A and CH are the international abbreviations of such countries. The selection includes Liechtenstein. Luxembourg and Belgium are not included.

DEPOMM – Deutsche Plattform für Mobilitätsmanagement (German platform for mobility management)

ECTS - European Credit Transfer System, aims and leads to comparability between study courses in Europe

EPOMM – European Platform Of Mobility Management

FGSV – Forschungsgesellschaft für Straßen und Verkehrswesen (German association for research in roads and transport)

IT – Information Technology, this includes hardware, software and digital data storage.

ITS – Intelligent Transport Systems, describes the close relationship between automotive, transport and computer sciences, sometimes described as a part of transport management

IVM - Integriertes Verkehrs- und Mobilitätsmanagement Region Frankfurt RhineMain, Regional service company co-ordinating all activities in concerns of mobility management in the Rhine-Main-Region.

MAAS – Mobility As A Service, integrated web-based applications for booking, information and payment of mobility services, mostly implemented as smartphone apps, integrates devices and software from ITS solutions

NGO – Non-governmental organisation, mostly working in the field of creating awareness for environmental impacts from transport (e.g. Greenpeace) or in business contexts (e.g. retail trade union)

PPP – Public Private Partnership, consortium between companies and governmental administration units. Frequently used project scenario for large-sized infrastructural projects.

SPZ – Studien- und Projektzentrum, the specific project centre for course-related projects within the study course spatial planning at TU Dortmund

SUMP – Sustainable (Strategic) Urban Mobility Plan

SUNflower state – Country or state with large experience in sustainable transport planning, mainly Sweden, the United kingdom and The Netherlands, of which the S, U and N come from.

TDM – transportation demand management, progenitor of mobility management, first implemented in the USA, nowadays translated to the term travel demand management as the Anglo-Saxon equivalent of the (international) term mobility management.

UAS – universities of applied sciences

VR – Virtual reality, used for training and simulation purposes

ZELL – Zentrum für erfolgreiches Lehren und Lernen (Centre for successful teaching and learning), the internal institution at Ostfalia UAS for advanced didactics training and teaching quality management purposes.

14.2 Used literature

Literature Academics/Didactics

No.	Title	Authors	Journal/Book series	Place	Year	Lanauaae	Type
		Trigwell, Keith; Prosser,					
	Relations between Teachers' Approaches to Teaching and Students'	Michael: Waterhouse.					
AD01	Approaches to Learning	Fiona	Higher Education 37(1), p.57-70	Amsterdam (NL)	1999	English	Article
		Ryan, Richard; Deci,					
AD02	Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions	Edward	Contemporary Educational Psychology 25, p.54-67	Amsterdam (NL)	2000	English	Article
		European Ministers of	· · · · · ·				
AD03a	The Bologna Decleration of 19 June 1999	education		Bologna (I)	1999	English	Booklet
	London Communiqué - Towards the European Higher Education Area:	European Ministers of					
AD03b	responding to challenges in a globalised world	education		London (UK)	2007	English	Booklet
AD04	Wie werden Soft Skills vermittelt?	Poggendorf, Armin	Die Neue Hochschule, 04-05/2011 p.190-192	Bonn	2011	German	Article
				Konstanz/			
AD05	Was ist Gesellschaft?	Schwietring, Thomas		München	2011	German	Monograph
AD06	Die Abduktion in der qualitativen Sozialforschung	Reichertz, Jo		Wiesbaden	2013	German	Monograph
		Feldmüller, Dorothee;					
AD07	Kompetenzentwicklung durch studienintegrierte Praxisprojekte	Weidauer, Christian	Die neue Hochschule 05/2014, p.150-152	Bonn	2014	German	Article
				Konstanz/			
AD08	Mediensoziologie	Wagner, Elke		München	2014	German	Monograph
		Becker, Timo; Kaiser,					
AD09	Zur Rolle von Theorie und Praxis in der Hochschulbildung	Sebastian	Die neue Hochschule 01/2016, p.18-21	Bonn	2016	German	Article
AD10	"Frischzellen"-Projekt zur Förderung neuer Lehr- und Lernformen	Tsipoulanidis, Alexander	Die neue Hochschule 04/2017, p.16-19	Bonn	2017	German	Article
			Gruppe Interaktion Organisation -Zeitschrift für				
	Ambivalenzen spätmoderner Identitäten: Vom proteischen Selbst in den		Angewandte Organisationspsychologie (GIO) p.23-			_	
AD11	neuen Arbeitswelten	Keupp, Heiner	30	Wiesbaden	2016	German	Article
		Haimovitz, Kayla;					
	Effects of person versus process praise on student motivation: stability and	Henderlong Corpus,					
AD12	change in emerging adulthood	Jennifer	Educational Psychology 05/2011, p.1-15	London	2011	English	Article
	Kooperation meets Interaktion - Veranstaltungen mit Praxispartnern im	Menzel, Christoph;					
AD13	Fach Mobilitatsmanagement	Kunnecke, Karsten	Die neue Hochschule 02/2018, p.26-29	Bonn	2018	German	Article
AD14	Flow - das Geneinmnis de Glucks	Csikszentminalyi, Minalyi		Stuttgart	2019	German	wonograph
		Brosius, Hans-Bernu;					
AD15	Mathadan dar ampirischen Kommunikationsforschung - Eine Einführung	Friederike		Wieshaden	2016	Cormon	Monograph
ADIS	methoden der empirischen Kommunikationsforschung - Eine Einführung	Huping, Sandra: Schulz	Sub/Urban Zoitschrift für kritische Stadtforschung	wiesbauen	2010	German	Monograph
AD16	Das Drojaktsstudium - Eina "weltframda" Utonia?	Frank	04/2016 (2/2) p 265-274	Porlin	2016	Gorman	Articlo
A010	bushtojekustuurun eine wertrennde otopie.	Rundesamt für Bauwesen	04/2010 (2/0), 0.200 2/4	bernin	2010	German	Articic
AD17	Mobilitätsmanagement - Ansätze, Akteure, Ausblick	und Raumordnung	Informationen zur Raumentwicklung 01/2019	Bonn	2019	German	Monograph
AD18	Pareto Prinzip und 80/20-Regel -www.pareto-prinzip.net	Schmidt-Vogt, Nicolas		Berlin	2020	German	Website
AD19	Bildungspolitik in Deutschland	Hepp, Gerd		Wiesbaden	2011	German	Monograph
				Konstanz/			
AD20	Bildungspolitik im internationalen Vergleich	Busemeyer, Marius		München	2015	German	Monograph
AD21	Kinderjahre	Largo, Remo		München	2011	German	Monograph
		-					<u> </u>
		Krueger, Richard, Casey,		Thousand Oaks,			
AD22	Focus groups. A Practical Guide for Applied Research	Mary		CA (USA)	2014	English	Monograph
		Biggs, John; Tang,		New York, NY			
AD23	Teaching for Quality Learning at University	Catherine		(USA)	2011	English	Monograph
	Fit für Nachhaltigkeit? - Biologisch-anthropologische Grundlagen einer						
AD24	Bildung für nachhaltige Entwicklung	Beyer, Axel		Opladen	2002	Deutsch	Monograph
	Wortwechsel im Blätterwald - Erzählstrukturen für eine wirksame	Dobler, Günter; Suda,					
AD25	Öffentlichkeitsarbeit	Michael; Seidl, Gerhard		Norderstedt	2016	German	Monograph

Literature Student theses

No.	Title	Authors	Journal/Book series	Place	Year	Language	Туре
	Die Studienlandschaft im Bereich Mobilitätsmanagement an						Research
ST01	deutschsprachigen Fachhochschulen und Universitäten	Junghans, Jasmin		Salzgitter	2018	German	Thesis
	Stekeholder- und Multiplikatorenschulung im Mobilitätsmanagement - Ein						Bachelor
ST02	kommunikationswissenschaftlicher Ansatz	Will, Helena		Salzgitter	2019	German	Thesis
	Digitale Kommunikationspotenziale im Mobilitätsmanagement –						Master
ST03	Auswirkungen der Covid-19-Pandemie auf die Impulsberatung	Rehmstedt, Florian		Salzgitter	2021	German	Thesis
							Bachelor
ST04	Beweggründe zur Veränderung von familiären Fuhrparken	Gülhan, Sinem		Salzgitter	2021	German	Thesis
							Bachelor
ST05	Nachsorge als Baustein des betrieblichen Mobilitätsmanagements	Skiba, Wyll		Salzgitter	2022	German	Thesis

Literature Best Practice

No.	Title	Authors	Journal/Book series	Place	Year	Languaae	Туре
_		De Tommasi, Roberto;				<u>,,.</u>	
	MaxLupo - Guidelines or the integration of Mobility Management with Land	Welsch, Janina; Rye, Tom;		Dortmund/			
BP01	Use Planning	Plevnik, Aljaž		Maribor (SLO)	2006	English	Monograph
PD02	Mod humors hills för on hättes tesfile	Jönsson, Peter; Nilsson,		Lund (S)	2007	Swedish/	Monarrat
8P02	ivieu numors njalp for en battre trafik	Cristina Arbeitsgemeinschaft		Luna (S)	2007	English	wonograph
		fahrradfreundliche					
		Städte, Gemeinden und					
	Parken ohne Ende? - Eine AGFS-Broschüre zum Thema Nahmobilität und	Kreise in Nordrhein-					
BP03	Autoparken	Westfalen (AGFS)		Krefeld	2012	German	Booklet
		Arbeitsgemeinschaft					
		städte, Gemeinden und					
		Kreise in Nordrhein-					
BP04	Wie Sie das Fahrrad erfolgreich für Ihr Innenstadt-Marketing nutzen!	Westfalen (AGFS)		Köln	2012	German	Booklet
						Swedish/	
BP05	Lundamats III	City of Lund		Lund (S)	2014	English	Booklet
DDoc	Klima.Schutz.Aktion Offenbach(M) - Auf die Plätze fertig los	Magistrat der Stadt		Offersha L (11)			De alul 1
BP06	Mobilitatsmanagement in Kitas und Schulen Sustainable Urban Mobility Plan - Creating a more accessible Malmö	Offenbach(M) am City of Malmö		Offenbach(IVI) Malmö	2015	German	Booklet
0-07	Sustainable orban mobility man - creating a more accessible malinu	Departement Bau.		aimo	2010	211811311	SOUNIEL
		Verkehr und Umwelt des					
BP08	Mobilität - Strategie im Kanton Aargau - mobilitätAARGAU	Kanton Aargau		Aarau (CH)	2016	German	Booklet
		Integriertes Verkehrs-					
		und					
		Region Frankfurt Phoi-		Frankfurt(M)			
BP09	Umweltfreundliche Dienstfahrten	(ivm)		i rankturu(M)	2016	German	Booklet
5.05		Integriertes Verkehrs-			2010	Serright	- somet
		und					
		Mobilitätsmanagement					
		Region Frankfurt Rhein		Frankfurt(M)			L
BP10	Mobilität im Unternehmen Effizient Gestalten	(ivm)			2016	German	Booklet
		und					
		Mobilitätsmanagement					
		Region Frankfurt Rhein					
BP11	Förderung des Radverkehrs	(ivm)		Frankfurt(M)	2016	German	Booklet
		Integriertes Verkehrs-					
		und					
		Nobilitätsmanagement					
BP12	Arbeitswege mit Bus und Bahn	(ivm)		Frankfurt(M)	2016	German	Booklet
0112	n weren ege mit bus une bum	Integriertes Verkehrs-			2010	Scillari	SOUNCE
		und					
		Mobilitätsmanagement					
		Region Frankfurt Rhein					
BP13	Effizienter Fuhrpark	(ivm)		Frankfurt(M)	2016	German	Booklet
	Retriehliches Mohilitätsmanagement im Bergischen Städtedreierk - BMMA	wuppertal Institut für Klima Umwelt Enorgie					
BP14	Hoch Drei	GmbH		Wuppertal	2016	German	Booklet
				and the second			
BP15	Travel in London - Report 9	Transport for London		London (UK)	2016	English	Monograph
		Brücken, Gaby; Dober,					
		Stefanie; Hake, Andrea;					
		Hanel, Anja; Hawle,					
		Mohrhardt, Michaela					
		Rainer, Gerhard; Schurv.					
BP16	Kleine Klimaschützer unterwegs	Caudia; Spitta, Philipp		Frankfurt(M)	2017	German	Booklet
		Deutsche Plattform für					
		Mobilitätsmanagement					
BP17	Deutsche Plattform für Mobilitätsmanagement - www.depomm.de	(DEPOMM)		Berlin	2021	German	Website
		European Platform for					
BP18	European Platform for Mobility Management - www.epomm.eu	(EPOMM)		Leuven (B)	2021	English	Website
	Benche www.ponnied	Yates, Gregor; Whyte,		(0)			
BP19	Bikes for all: widening access to cycling through social inclusion	Bruce		Glasgow (UK)	2019	English	Booklet
	Mobilitätsverhalten von Seniorinnen und Senioren - zur Entwicklung	Haustein, Sonja; Stiewe,					
BP20	zielgruppenspezifischer Mobilitätsangebote	Mechthild	Trends (ILS), 01/10	Dortmund	2010	German	Booklet
DD21	Mahilitätefikal Caused the Kind callest the discussion of the second state	Verkehrsclub Deutschland		Dorlin	2011-	Carry	Beeklat
BP21	Niconitatshoel - So wird inr Kind seidstständig und sicher mobil Curriculum Mobilität Niedersachsen -	(VCD) Niedersächsisches		berlin	2018	German	BOOKIET
BP22	https://www.nibis.de/mobilitaet 8255	Bildungsministerium		Hannover	2021	German	Website
		Zukunftsnetz Mobilität					
BP23	Öffentliche Räume für alle - Mobilitätsmanagement für Senioren	NRW		Köln	2017	German	Booklet
		Menzel, Christoph; Ruff,					
BP24	Erste Mobilitätszentrale mit internationalem Angebotsprofil	Jürgen	Der Nahverkehr 04/10, p.30-37	Hamburg	2010	German	Article
0025	Beratungsleitfaden nachhaltiges Betriebliches Mobilitätsmanagement für	Ecolibro GmbH; Menzel,		Traisarf	2000	Correct	Booklat
BP25 BP26	NMU-Impuisberatung	B A II M Consult GmbH		München	2021	German	Booklet
BF20	moon gewinner i Nachhaitige moonnar Kennt nur Gewinner	Baron, Sascha: Menzel		manchen	2018	Sernian	BOOKIEL
BP27	Shared Space - Kooperation hat Vorfahrt	Christoph	Internationales Verkehrswesen 02/2012, p.39-42	Hamburg	2012	German	Article
		Bundesministerium für		Ŭ			
		Land- und Forstwirtschaft,					
		Umwelt und					
	Mobilitätsmanagement für Kinder, Eltern und Schulen - Ein Leitfaden für	Wasserwirtschaft		Minn (A)		C	De alulat
BP28	Ionaangseinnantungen und Kommunen	(cepensministerium)	1	wien (A)	2012	Joerman	DOOKIET

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No.	Title	Authors	Journal/Book series	Place	Year	Language	Туре
RP01	Mobilitätsmanagement im Tourismus	Groß, Sven		Dresden	2005	German	Monograph
		Forschungsgesellschaft					
RP02	Mobilitätsmarketing - FGSV Arbeitspapier Nr. 66	Verkehrswesen (FGSV)		Köln	2006	German	Booklet
		Kemming, Herbert;					
		Reutter, Ulrike; Stiewe,					
		Mechthild; Benden, Jan;					
		Brandt, Tobias; Witte,		Dortmund/			
RP03	Mobilitätsmanagement in der Stadtplanung - Abchlussbericht FOPS 70.794	Mühlhans. Heike		Frankfurt(M)	2009	German	Monograph
		Deutsche Energie Agentur					
RP04	effizient mobil - Das Aktionsprogramm für Mobilitätsmanagement	(dena)		Berlin	2010	German	Monograph
		Marsden Jacobs					
RP05	Evaluation of the TravelSmart Local Government and Workplace Programs	Associates (MJA)		Perth (AUS)	2011	English	Monograph
8006	Mobilitatsmanagement - Wissenschaftliche Grundlagen und Wirkungen in der Pravis	Stiewe, Mechthild; Reutter, Ulrike		Essen	2012	German	compendiu
111 00	Handbuch Bürgerbeteiligung - Verfahren und Akteure, Chancen und	Nanz, Patrizia; Fritsche,		Essen	2012	German	
RP07	Grenzen	Miriam		Bonn	2012	German	Monograph
		Blees, Volker; Vogel,					
RP08	Schulisches Mobilitätsmanagement	Jens; Wieskotten, Greta		Frankfurt(M)	2013	German	Monograph
		Forschungsgesellschaft					
RP09	Hinweise zur Verkehrsentwicklungsplanung	Verkehrswesen (EGSV)		Köln	2013	German	Monograph
	Wirkungsabschätzung von Mobilitätsmanagement - Ansatzpunkte zur						
	Modellierung & Ableitung von Potenzialen und Wirkungen am Beispiel des						
RP10	betrieblichen Mobilitätsmanagements	Louen, Conny		Aachen	2013	German	Monograph
	Zum wissenschaftspolitischen Diskurs über Große gesellschaftliche					_	
RP11	Heraustorderungen Enhancing the impact of travel plans for new residential developments:	Wissenschaftsrat (WR)		Stuttgart	2015	German	Booklet
RP12	from implementation theory	Geoffrey: Currie, Graham	Transport Policy, Volume 40, p.24-35	Amsterdam	2015	English	Article
RP13	Smart City - Stadt der Zukunft?	Etezadzadeh, Chirine		Wiesbaden	2015	German	Monograph
	· ·	Schwedes, Oliver;					
	Mobilitätsmanagement in Deutschland - Eine kritische Bestandsaufnahme -	Sternkopf, Benjamin;					
RP14	Discussion Paper	Rammert, Alexander		Berlin	2016	German	Booklet
		Schweizerische					
RP15	Anwendung	(SNV)		Winterthur	2016	German	Monograph
	Mobilitätsmanagement - Vom Mauerblümchen zum Erfolgsfaktor	Blees, Volker; Bruns,			Long		ine Brebi
RP16	nachhaltiger Mobilität	André; Stiewe, Mechthild	Planerin 05/2017, p.8-10	Berlin	2017	German	Article
		Schwedes, Oliver;					
	Mobilitätsmanagement - Möglichkeiten und Grenzen verkehrspolitischer	Sternkopf, Benjamin;				_	
RP17	Gestaltung am Beispiel Mobilitätsmanagement	Rammert, Alexander		Berlin	2017	German	Monograph
		Verkehrsunternehmen					
		VDV; Bundesministerium					
	Die Mobilitätsberatung im ÖPNV - ein integraler Bestandteil des	für Verkehr, Bau und					
RP18	Mobilitätsmanagements	Wohnungswesen		Köln	2001	German	Monograph
RP19	Externe Kosten des Verkehrs in Deutschland	Allianz pro Schiene e.V.		Berlin	2019	German	Booklet
PD20	Wirkungen von Mobilitätsmanagement-Programmen - Entwicklung eines	Finko Timo		Aachon	2009	Gorman	Monograph
111 20	Mobilitätsmanagement, Mobilitätskultur, Marketing & Mobilitätsmarketing -			Addren	2000	German	Monograph
RP21	Versuch einer Begriffserklärung	Langweg, Armin	Stadt, Region, Land 82, p.43-52	Aachen	2007	German	Article
		Brög, Werner; Erl, Erhard;					
	Evaluation of voluntary behaviour change: Experiences from three	Ker, Ian; Ryle, James;					
RP22	continents	Wall, Rob	Transport Policy, Volume 16, Issue 6, p.281-292	Amsterdam (NL)	2009	English	Article
		Energiewende und					
RP23	Praxisleitfaden Betriebliches Mobilitätsmanagement	Klimaschutz		Berlin	2016	German	Booklet
	Die Bahn als Rückgrat einer nachhaltigen Siedlungs- und Verkehrsplanung -						
RP24	Synthesebericht zum Projekt Bahn.Ville 2	Bahn.Ville 2-Konsortium		München	2010	German	Monograph
		Walther, Sabrina; Kistner,					
	Evaluationsstrategien und Monitoringinstrumente zur Hessenstrategie Mohilität 2035 und zur Hessischen Nahmohilitätsstrategie – Abschlussbericht	Katael; Arnold, Alina; Kowald, Matthias: Bruns					
RP25	zum Forschungsprojekt Mob. Eval	André		Wiesbaden	2019	German	Monograph
		Duportail, Veerle;					
RP26	Final Advance Audit - Scheme and Guidelines	Meerschaert, Vincent	Deliverable D2 from www.eu-advance.eu	Brussels (B)	2013	English	Monograph
	Politik mit Bürgern - Politik für Bürger - Praxis und Perspektiven einer neuen					_	
KP27	BeteingungsKültur	Giaab, Manuela Forschungsgesellschaft		vvlesbaden	2016	German	Ivionograph
		für Straßen- und					
RP28	EAM - Empfehlungen zur Anwendung von Mobilitätsmanagement	Verkehrswesen (FGSV)		Köln	2018	German	Monograph
RP29	Kursbuch Bürgerbeteiligung	Sommer, Jörg		Berlin	2019	German	Monograph
		Leite, Carlos; Acosta,					
		Ciaudia; Militelli,					
		Guillermo: Wilderom.					
		Mariana; Bonduki, Nabil;					
		Somekh, Nadia; Herling,					
RP30	Social Urbanism in Latin America	Tereza	Future City, Volume 13	Cham (CH)	2020	English	Monograph
	Ivietnooischer Ansatz zur Systematisierung von Handlungsfeldern und	von Hauff Michaels					
RP31	Nachhaltigkeits-Dreieck	Kleine, Alexandro		Kaiserslautern	2005	German	Monograph
	v	Bundesministerium für					
		Umwelt, Naturschutz und					
		Nukleare Sicherheit		L			
RP32	Umweitbewusstsein in Deutschland 2018	(BMU)		Berlin	2019	German	Monograph
	multivariaten und inhaltsanalytischen Methoden der empirischen						
	Sozialforschung zur Identifikation von Zielgruppen für eine nachhaltige	Hunecke, Marcel;					
RP33	Mobilität	, Haustein, Sonja	Umweltpsychologie 02/2007, p.38-68	Lengerich	2007	German	Article
	Mobilitätsmanagement: Ein neues Handlungsfeld Integrierter	Schwedes, Oliver;					
RP34	Verkehrsplanung	Rammert, Alexander		Wiesbaden	2020	German	Monograph
RD35	Reasoning about the complex nature of nature - Strukturen von	Becker Appalone		Freiburg	2010	German	Master
11-22	Strategische Kommunikation - Umrisse und Perspektiven eines	Röttger, Ulrike: Gehrau		ricioulg	2018	Jernafi	1110315
RP36	Forschungsfeldes	Volker; Preusse, Joachim		Wiesbaden	2013	German	Monograph
	Gesellschaftsorientierte Unternehmenskommunikation:						
RP37	Stakeholderorientierung und Legitimation als Ziel der Public Relations	Sandhu, Swaran	Handbuch Unternehmenskommunikation, p.1-22	Cham (CH)	2020	German	Article
	Towards on appropriate logal and an electronic for the set of the	Clarke, Matthew;					
RP38	transport	Susmita: Verloes Alia		London	2020	English	Monograph
	Mobilitätsmanagement - Handlungsstrategie zur Verwirklichung	- shinay verices, Alla			2020	8121	monograph
RP39	umweltschonender Verkehrskonzepte	Thiesies, Michael	Verkehr und Technik, Volume 86	Bielefeld	1998	German	Monograph
		100					

14.3 Sources in alphabetical order of authors

Author(s)	Title	Journal/Book series	Number
Allianz pro Schiene e.V.	Externe Kosten des Verkehrs in Deutschland		RP19
Arbeitsgemeinschaft fahrradfreundliche Städte, Gemeinden und Kreise in	Parken ohne Ende? - Eine AGFS-Broschüre zum Thema Nahmobilität		
Nordrhein-Westfalen (AGFS)	und Autoparken		BP03
Arbeitsgemeinschaft fahrradfreundliche Städte, Gemeinden und Kreise in			
Nordrhein-Westfalen (AGFS)	Wie Sie das Fahrrad erfolgreich für Ihr Innenstadt-Marketing nutzen!		BP04
B.A.U.M. Consult GmbH	Mobil gewinnt - Nachhaltige Mobilität kennt nur Gewinner		BP26
	Die Bahn als Rückgrat einer nachhaltigen Siedlungs- und		
Bahn.Ville 2-Konsortium	Verkehrsplanung - Synthesebericht zum Projekt Bahn.Ville 2		RP24
Baron, Sascha; Menzel, Christoph	Shared Space - Kooperation hat Vorfahrt	Internationales Verkehrswesen 02/2012, p.39-42	BP27
	Reasoning about the complex nature of nature - Strukturen von		
Becker, Annalena	Kausalkognitionen im Umweltkontext		RP35
Becker, Timo; Kaiser, Sebastian	Zur Rolle von Theorie und Praxis in der Hochschulbildung	Die neue Hochschule 01/2016, p.18-21	AD09
	Fit für Nachhaltigkeit? - Biologisch-anthropologische Grundlagen		
Beyer, Axel	einer Bildung für nachhaltige Entwicklung		AD24
Biggs, John; Tang, Catherine	Teaching for Quality Learning at University		AD23
	Mobilitätsmanagement - Vom Mauerblümchen zum Erfolgsfaktor		
Blees, Volker; Bruns, André; Stiewe, Mechthild	nachhaltiger Mobilität	Planerin 05/2017, p.8-10	RP16
Blees, Volker; Vogel, Jens; Wieskotten, Greta	Schulisches Mobilitätsmanagement		RP08
	Evaluation of voluntary behaviour change: Experiences from three		
Brög, Werner; Erl, Erhard; Ker, Ian; Ryle, James; Wall, Rob	continents	Transport Policy, Volume 16, Issue 6, p.281-292	RP22
	Methoden der empirischen Kommunikationsforschung - Eine		
Brosius, Hans-Bernd; Haas, Alexander; Koschel, Friederike	Einführung		AD15
Brücken, Gaby; Dober, Stefanie; Hake, Andrea; Hänel, Anja; Hawle, Maria;			
Kleffner, Anja; Mohrhardt, Michaela; Rainer, Gerhard; Schury, Caudia;			
Spitta, Philipp	Kleine Klimaschützer unterwegs		BP16
Bundesamt für Bauwesen und Raumordnung	Mobilitätsmanagement - Ansätze, Akteure, Ausblick	Informationen zur Raumentwicklung 01/2019	AD17
Bundesministerium für Land- und Forstwirtschaft, Umwelt und	Mobilitätsmanagement für Kinder, Eltern und Schulen - Ein Leitfaden		
Wasserwirtschaft (Lebensministerium)	für Bildungseinrichtungen und Kommunen		BP28
Bundesministerium für Umwelt, Naturschutz und Nukleare Sicherheit			
(BMU)	Umweltbewusstsein in Deutschland 2018		RP32
Busemeyer, Marius	Bildungspolitik im internationalen Vergleich		AD20
City of Lund	Lundamats III		BP05
City of Malmö	Sustainable Urban Mobility Plan - Creating a more accessible Malmö		BP07
	Towards an appropriate legal and regulatory framework for smart		
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https://www.zukunftsnetz-mobilitaet.nrw.de/LehrgangKOMM

14.5 Interview lists

	Date Interviewnartner	Organisation	Country	Category	Practical role in MM	lohtitle	Media	I ength of Interview	Group
				cureboly					
<u>1</u>	18.09.2017 Knut Petersen	Ecolibro GmbH	Germany	Consultancy	Project manager	Licenced partner	Personal Interview	01:04	2
Pr2	28.09.2017 Eva Hannak	Region Hannover	Germany	Municipality	Project manager	Mobility manager	Personal Interview	01:38	3
Pr3	29.09.2017 Katalin Saary	Mobilitätslösungen GmbH	Germany	Consultancy	Project manager	Partner	Personal Interview	01:41	2
Pr4	09.10.2017 Matthew Clark	Steer Davis Gleave	United Kingdom	Consultancy	Project manager	Senior Manager	Personal Interview	00:58	2
Pr5	09.10.2017 Representative from	Transport for London	United Kingdom	Municipality	Project manager	Senior Manager	Personal Interview	00:58	1
Pr6	25.10.2017 Representative from	IVM GmbH	Germany	Project Developer	Project manager	Senior Manager	Personal Interview	01:33	2
Pr7	26.10.2017 Johannes Auge	B.A.U.M. GmbH	Germany	Consultancy	Project manager	Partner	Skype Interview	01:23	3
Pr8	06.11.2017 Representative from	DTV Consultants	Netherlands	Consultancy	Project manager	Director	GoToMeeting Interview	00:49	2
Pr9	06.11.2017 Representative from	Advier	Netherlands	Consultancy	Project manager	Director	Skype Interview	01:31	3
Pr10	13.11.2017 Representative from	City of Malmö	Sweden	Municipality	Project manager	Administrative Employee	Personal Interview	01:29	2
Pr11	14.11.2017 Caroline Ljungberg	Trivector	Sweden	Consultancy	Project manager	Senior Consultant	Personal Interview	01:02	2
Pr12	14.11.2017 Anders Söderberg	City of Lund	Sweden	Municipality	Project manager	Administrative Employee	Personal Interview	04:15	3
Pr13	23.11.2017 Stefan Schneider	Impuls Mobilität	Switzerland	Consultancy	Project manager	Director	FaceTime Interview	01:17	2
Pr14	24.11.2017 Syb Tjepkema	City of Zwolle	Netherlands	Municipality	Project manager	Senior Administrative Employee	Skype Interview	00:42	2
	1 Mobility management is less necessary part of planning						Average	01:27	
	2 Mobility management is important part of planning						Median	01:20	
	3 Mobility management is or will be stand-alone						Sum	20:20	
	Date Interviewpartner	Organisation	Country	Category	Practical role in MM	Jobtitle	Media	Length of Interview	Group
		TU Delft							
	Bert van Wee	Erasmus University				Full Professor			2
Tela	13.09.2017 Giuliano Mingardo	Rotterdam	Netherlands	Teaching	Researcher	Assistant Professor	Personal Interview	01:04	2
Te3	05.10.2017 Kay Axhausen	ETH Zürich	Switzerland	Teaching	Researcher	Full Professor	Personal Interview	01:10	1
Te4	05.10.2017 Klaus Zweibrücken	HS Rapperswil	Switzerland	Teaching	Researcher/Consulta	Full Professor	Personal Interview	01:42	2
Te5	10.10.2017 Tom Rye	Napier University Edinburgh	United Kingdom	Teaching	Researcher	Full Professor	Personal Interview	01:11	2
Te6	25.10.2017 Christian Holz-Rau	University Dortmund	Germany	Teaching	Researcher	Full Professor	Personal Interview	01:19	2
Te7	03.11.2017 André Bruns	HS Rhein-Main Wiesbaden	Germany	Teaching	Researcher	Full Professor	FaceTime Interview	01:44	2
Te8	13.11.2017 Till Koglin	TU Lund	Sweden	Teaching	Researcher	Assistant Professor	Personal Interview	02:01	ŝ
Te9	17.11.2017 Carsten Sommer	University Kassel	Germany	Teaching	Researcher	Full Professor	Personal Interview	02:02	2
Te10	20.11.2017 Chris De Gruyter	Monash University Melbour	Australia	Teaching	Researcher	Assistant Professor	Skype Interview	01:22	2
Te11	20.11.2017 Oliver Schwedes	TU Berlin	Germany	Teaching	Researcher	Administrative Professor	Personal Interview	01:30	2
Te12	21.11.2017 Alvaro Rodriguez-Valencia	Universidad de los Andes B	Colombia	Teaching	Researcher	Assistant Professor	Skype Interview	01:12	1
Te13	22.11.2017 Robert Cervero	Berkeley University	USA	Teaching	Researcher	Retired Full Professor	Skype Interview	00:31	2
	1 Mobility management is less necessary part of planning						Average	01:24	
	2 Mobility management is important part of planning						Median	01:20	
	3 Mobility management is or will be stand-alone						Sum	16:48	

Table 12: Complete interview lists with additional data

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