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METHOD TO CREATE MARKET-SPECIFIC CUSTOMER PROFILES FOR ENHANCING POSITIVE USER EXPERIENCES IN CARS

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1. Introduction

Designing positive driving experiences is not trivial. Not only do the parts of the complex system "car" have to fit together, but also context factors and drivers' preferences have to be taken into consideration. User experience designers strive for bringing those factors into harmony by working user-centred, multi-disciplinary and with the support of useful methods and techniques [Roto et al. 2010]. Scenario-based methods, like the use case, storytelling, storyboarding and persona techniques, are popular tools to work with in the aforementioned context. In particular, the persona technique offers a time- and cost- effective way to involve potential users indirectly in the development process and brings along many benefits [Miaskiewicz and Kozar 2011]. Personas are fictitious, specific, concrete representations of a customer of a real target group, based on behaviours and attitudes of observed real users [Cooper et al. 2007]. Persona is an excellent method to discuss and prioritize different types of users and their needs in a memorable way and to turn designers' attention on satisfying those customers' needs, making the entire development process more customer-oriented. However, critics of this approach mention that, despite its benefits, the persona technique can fail, when: personas appear implausible and are not associated with a methodological approach and use of real data; their use results into bias and stereotypes; the approach is not clear to the design team; the management does not accept personas; personas are communicated poorly [Adlin and Pruitt 2010]. Without suggesting that personas can replace real users, we are convinced that, if created in a formal procedure and base on real data, customer profiles can indeed be a powerful means to create a better understanding of users' characteristics, needs and behaviour and thus lead to the creation of positive experiences. In this paper, we present a methodological procedure to overcome the aforementioned difficulties and deliberately use the differentiated term "customer profiles" (vs. "persona") for its result [Michailidou et al. 2014]. The customer profiles would help understanding putative, potential or future users through developing a database with evaluated customer data and a vivid visualization of essential data.

Our work has a special focus in the automobile domain. [Lindgren et al. 2007] describe their experiences from working with personas and scenarios in the automobile context. In our literature review, however, we did not identify works that tackle the particularities of user experience design when working with user representations in automobile design. Those are exactly the two special aspects of this work.

Our paper consists of five sections. Section 2 describes our research approach and its limitations. Section 3 gives an overview of the suggested procedure towards creating customer profiles, highlighted by an example of applying the method in a real case. In the subsequent section, we discuss implications of our work, before concluding with the main results and suggestions for future research.

2. Research methodology and objectives

In a three-year multi-disciplinary research project in collaboration with a major automobile manufacturer, we investigated current practices of user experience design and developed an improved approach [Bengler et al. 2014]. One of the methods we have identified as useful for early design phases was the method to create market-specific customer profiles. After a literature review, we could identify that existing approaches to create personas lack a special focus in the particularities of the automobile domain or focus in user experience-related factors. Therefore, we iteratively developed a new method that addresses these issues. The method leans on the process described by [Nielsen 2007]. Our approach is data-driven and company-specific for the reasons [McGinn and Kotamraju 2008] argue. The main problematic they explain in their work is that personas are not accepted if they do not base on real data or if the link to data can not be traced. Previous works of [Blomquist and Arrola 2002] and [Pruitt and Grudin 2003] highlight the same problem. McGinn and Kotamraju conclude that personas are more readily accepted by clients when based on real data. Specifically, if data is gathered especially for creating personas, their traceability and thus acceptance are higher. Our work is in the same line. We explored elements of existing persona approaches and selected the ones that would be more useful for user experience. To do so, we reviewed literature on user experience and made use of the elements proposed by [Ariza and Maya 2014]. Moreover, our work emphasizes in creating an applicable in real-world setting method, which would fit to needs and current practices of user experience designers. Developing the method was a hand-in-hand process with our industry partner. We applied and evaluated the method in two cases, in which nine profiles were created: five profiles corresponding to one car type represented in five markets and three profiles corresponding to a second car type represented in three markets. Lessons learnt from those applications were incorporated in the method. [Chang et al. 2008] suggest that practitioners usually apply personas in ways that reflect their experiences and needs and not necessarily guidelines from literature, while they identify a need for more emphasis on actual practices. We believe that sharing our suggestions and experiences from applying personas in industrial practice can be valuable for researchers and practitioners interested in personas.

A limitation of data-based approaches is that reliable usage data can only be gather after a period of usage of a system. Therefore, results are applicable for developing this system further. The approach is applicable in configuration/adaptive design projects rather than new product development/original design. A further limitation of the current work is that the research was conducted in the specific frame of one project, so the results can not be generalized without further validation in other settings. The suggested procedure was tailored to the needs of a specific company. However, we see an added value in our case study approach and propose ideas for applying the method in different settings in the discussion section.

3. Proposed method to create profiles

In this section, we present the procedure to create market-specific customer profiles and exemplary results of application in automobile case studies. Table 1 gives an overview of the method.

3.1 Procedure

The proposed method is suitable for creating representative visualizations of typical customers of a certain product type (car type) corresponding to the main markets, in which the product is sold. In the first phase, all relevant data are collected and documented in a database. In the second phase, the most important data are summarized and compiled into a template (Figure 1), which can be used in following development activities. Phase 2 can be conducted within a workshop.

Customer profiles resulting from the method we introduce base on real data concerning pre-defined user groups. Besides data on usage, e.g. figures of system used in a specific market, and environment of use, e.g. climatic and geographic surroundings, findings on the social environment, the emotional behaviour and needs that are important for experience design, should be collected in a database. The database should enhance the perceived validity of the profiles and allow a more in-depth analysis for the technical design of functions in further stages. The following sections describe essential data.

Table 1. Overview of method for creating customer profiles

General planning	Minimum resources	Data gathering - 2 hours; Data analysis: 16 hours; Workshop: 2 hours/person; Adaptations: 2 hours
	Method characteristics	Data-driven approach, workshop application, quantitative (database) and qualitative output (text and images)
	Stakeholders	User experience design team, marketing, development, management
Input	Potential user group (segmentation), structured and unstructured customer data	
Collect data	Collect the necessary data from the appropriate company-internal sources: (i) Collect production and sales figures and specify the market; (ii) Define geographic surroundings and climatic conditions; (iii) Define social environment, use behaviour and the use of products; (iv) Examine emotional behaviour and prioritize psychological needs.	
Workshop	Discuss in a workshop with all stakeholders the contents of the database and enter a summary of its essential part into the template.	
Visualize	Create a vivid illustration in form of a profile. The database of the customer profiles allows for a more in-depth questioning and analysis of the data for the technical design of functions.	
Output	Database with evaluated user data, customer profiles, use cases.	
Downloads	Set of needs; Template for profiles	

Climatic and geographical surroundings

First, a representative country and city of the selected market are defined. To achieve this, the production and sales data are examined. Depending on the largest market shares, the market is defined. Then, climatic data of the selected area are retrieved according to meteorological statistics. For the driving experience, average and extreme temperatures, sunshine hours, as well as humidity and precipitation values are highly relevant. The geographical and climatic surroundings set the context of the car utilization.

Product utilization

For the selected product type and market, it now has to be examined which car type variant is most popular. Then, data on the frequency and styles of driving are retrieved. Depending on the company-specific data loggers following information can be useful, if available: number of drives per day, average driving lengths and percentages of driving in highway/land road/city, number of drives on working days/weekends, daytime of start of drive, number/duration of stops, velocity distribution. It could also be interesting to document how many persons live in the household and are potential drivers of the car. Furthermore, qualitative statements on the perception of drivers towards the car, often available in online sources, are relevant.

Social behaviour

For deriving information on customers' social behaviour and values, we recommend the application of a SIGMA-milieu categorization. Milieus outline social groups, whose value orientations, goals, lifestyles and attitudes are sufficiently similar [Ascheberg and Gebauer 2009]. Marketing and customer studies determine which milieu(s) are relevant for the selected product type and market.

Emotional behaviour

Besides the personal values described in the milieus we recommend considering the prioritization of psychological needs that are mostly relevant for the selected market. Hassenzahl claims for a need-driven approach towards experience design [Hassenzahl 2010] and has defined eight psychological needs that relate to car usage [Hassenzahl 2011], based on [Sheldon et al. 2001]. The needed data can be gathered in customer studies. In short, the process to understand the emotional behaviour includes (i) selecting a basic set of needs, (ii) description of needs for company-specific products, (iii) adaptation of description according to culture/understanding in each region, (iv) prioritization of needs.

Personal data

Various data concerning the person of the driver are useful, i.e. average age, marital status, stage of life, annual income, profession, leisure activities. Those would give a human face to the created profile. Buyer/customer surveys provide the corresponding data.

Applicability

Once the database is created, the most important information is summarized into a template (Figure 1). This could be done within a workshop with involvement of various stakeholders (Table 1).

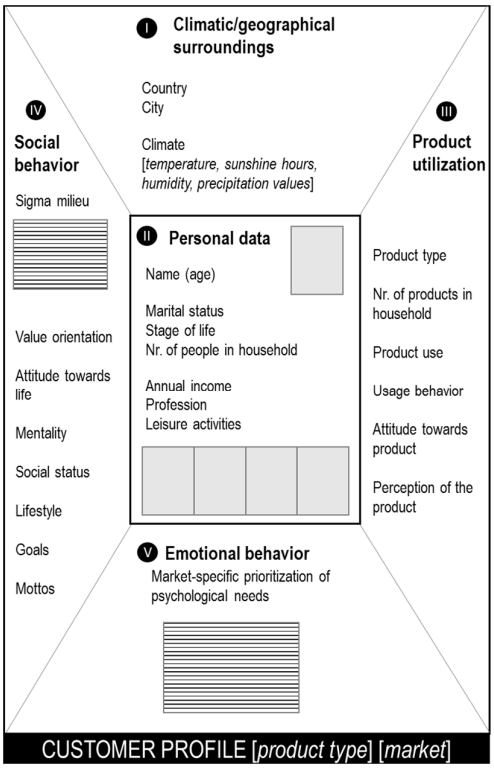

Figure 1. Template for creating customer profiles

Finally, a vivid representation of the profile is illustrated. This is relevant particularly for the "personal data" area in the middle of the template, in which fields for inserting pictures are provided. This is the only part of the method, in which fictive data, i.e. name and pictures, may be used. The use of names and images would give to the profile a human face and thus boost its memorability.

Some recommendations on the described procedure were identified. The process steps should be clear to the design team, while the management should approve the results. The customer profiles can be used in following process steps for inspiring designs, deriving requirements and as archetypes for selecting subjects participating in concept evaluation.

3.2 Exemplary application

We have applied the proposed method in cooperation with a major automobile manufacturer. Goal was the creation of representative customer profiles for two car types. In the following, we will highlight the process towards creating profiles with an example. For the publication, we replaced the data retrieved from company-internal studies and loggers with fictive ones because of confidentiality reasons.

First, we examined production and retail data of the past 3-5 years for a specific car type T1. We compared the data in five regions R1-R5, to select the ones with the most sales. As depicted in Figure 2, R1, R2 and R5 are significant, so for T1 at least three customer profiles corresponding to those three markets have to be created. For a given car type T1, the sales department tracks how many cars of T1

are sold every year in every country. In the specific case of the collaborating company, the statistics did not only concern individual countries, but also regions. Regions are defined by the marketing and may include a cluster of more countries with similar characteristics. The retail data were, in our case, retrievable from a company-internal database and included the number of cars T1 sold in each of six regions (R1-R6) per year. We retrieved the total numbers for the past three years and created Figure 2. As highlighted in grey, R1, R2 and R5 are the regions with the highest numbers. Based on that, we concluded to create three profiles corresponding to those three significant markets.

Region	Year 1		Year 2		Year 3	
R1	48477	*33%*	79999	*30,5%*	71294	*28%*
R2	29345	*20%*	55667	*21,5%*	62000	*24%*
R3	20223	*14%*	38867	*15%*	39001	*15%*
R4	9880	*6,5%*	15001	*5,5%*	14997	*6%*
R5	9654	*7%*	18002	*6,5%*	20987	*8%*
R6	27223	*19,5%*	55111	*21%*	47999	*19%*
Total **retail**	131008	*100%*	296548	*100%*	267211	*100%*

Figure 2. Retail data (number of cars sold) for car type T1, in years 1-3, in regions R1-R6

Then we continued with the creation of the first profile representing R1. According to the described method, we defined a representative city of this area. We then investigated meteorological statistics for this area, as depicted in Figure 3.

Ø T	< 5 °C	5,1 - 10 °C *100%*	10,1 - 15 °C	15,1 - 20 °C	20,1 - 25 °C	> 25 °C
Ø T_max	< 5 °C *25,00%*	5,1 - 10 °C *16,50%*	10,1 - 15 °C *16,50%*	15,1 - 20 °C *16,50%*	20,1 - 25 °C *25,00%*	> 25 °C
T_max	< 15 °C *8,50%*	15,1 -20 °C *16,50%*	20,1- 25°C *16,50%*	25,1 - 30 °C *16,50%*	30,1 - 35 °C *33,50%*	35,1- 40 °C *8,50%*
Ø T_min	< 0 °C *33,00%*	0,1 - 5 °C *25%*	5,1 - 10 °C *17,00%*	10,1 - 15 °C *25,00%*	15,1 - 20 °C	> 20 °C
T_min	< -20°C *16%*	-19,9 - 15 °C *17%*	-14,9 - 10,0 °C *8%*	-9,9 - 5,0 °C *17,00%*	-4,9 - 0,0 °C *17%*	0-5 °C *25,00%*
Ø rel. humidity	40 - 50 %	50,1 - 60 %	60 - 70 %	70,1 - 80 % *59,00%*	80,1 - 90 % *41,00%*	
Ø sunshine hours/day	0 - 2 *17,00%*	2,1 - *24,50%*	4,1 - *25,00%*	6,1 - 8 *33,50%*	8,1 - 10	10,1 - 12
rainy days/ year	< 40	40 - 80	81 - 120	121 - 160 *100%*		
precipitation/ year	300 - 500 mm	501-700mm	701-900mm *100%*	901-1100mm	1100-1300 mm	1300 - 1700 mm

Figure 3. Climatic data for region R1

For exploring the product utilization, in the next step we specified which model of T1 is driven most frequently in R1 (Figure 4). Knowing the specific model, we then proceeded with the derivation of driving-related data (Figure 5).

Model	%	Total
M1	65,50%	8975
M2	16,20%	1803
M3	10,30%	1093
	…	…
	100%	10438

Figure 4. Retail data for models M1-M3 of T1 in region R1

Trips per week	3,3	average velocity	59km/h
Driving under 15 min / day	1,1	Velocity distribution (time share)	
middle distance / driven day	97km	0-40km / h	29,50%
average annual kilometers	27600km	40-70km / h	21,50%
Vacation trips km / year	2030km	70-110km / h	18%
Private weekend trips> 50km / year	21	110-150km / h	14,50%
Highway (time share)	3210km	> 150km / h	4,50%
Country road (time share)	37%	Duration of the trip	19,5min
Urban Transport (time share)	19%	Stops / hour	19
Times of the day (start of trip)	45%	Stops / 100km	28
18h- 6h	12,50%	average duration of parking	6,7h
6h 9h-15h-18h &	27,90%	average duration of parking / driving day	19,5h
9-15h	33,50%		

Figure 5. Utilization data for T1, M1 in R1

We continued by defining the social environment of typical drivers of M1, T1 in R1. According to the SIGMA Milieu studies [Ascheberg and Gebauer 2009], the upper conservative segment and the milieu of social climbers were relevant. We included their specific descriptions into the database.

To create an understanding of the emotional behaviour of typical drivers of the selected market, we analysed company-internal studies performed by the marketing that described a prioritization of psychological needs and their meaning in different cultures. To give an example, the need for security generally describes "the feeling of being safe and under control, rather than feeling of insecurity and threat" [Sheldon et al. 2001]. However, customer studies show that security has different meanings in different markets. For customers of M1, security was correlated to personal security and confidence in the environment, while customers from M2 described security as predictability in daily life, financial security and strong personal networks.

In the next step, we have collected personal data of typical drivers of T1 in R1. A summary can be seen in Figure 6.

Ø age	49,3	entrepreneur	35%
60+	29%	academic	25%
50-59	39%	public service	13%
40-49	19%	independent	4%
30-39	5%	pre-family	1%
<30	1%	young family	3%
male	95,10%	family with young children	20%
married / in partnership	91,30%	family with adult children	30%
nr. persons in household	3,1	family with grandchildren	40%
nr. cars in household	1,8	commuting home-work	65%
Ø annual income	77000	business	70%

Figure 6. Personal data of buyers of T1, M1 in R1

Finally, we summarized the most important aspects of the database in the profile depicted in Figure 7. To do so, we used the Template of Figure 1 and conducted a workshop (Table 1), in which the database has been discussed. Then, the most relevant data was selected and entered into a large print of the template. After the workshop, we digitalized and the result (Figure 7). This summary is the "front-page" of a document including all relevant data (i.e. contents of database), available for further analysis.

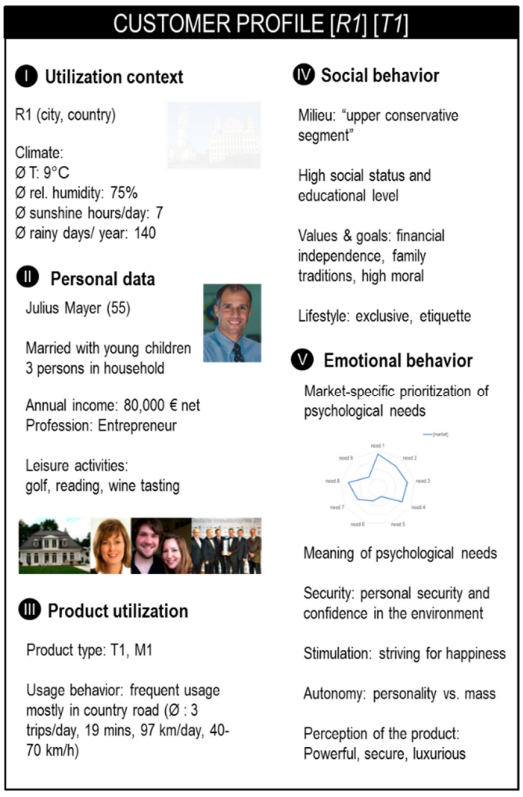

Figure 7. Exemplary visualization of a customer profile

4. Discussion

This paper describes a framework for creating market-specific customer profiles for enhancing user experiences in cars. Its main contribution lies in the formalized character of the method, a focus for application in the automobile domain, as well as inclusion of experience (psychological/behavioural) aspects. Those three characteristics are not adequately stressed in known frameworks. This section highlights some aspects that are in our opinion worth further discussion.

4.1 How does the method and its result influence the design and decision making processes?

We propose a framework that brings together data from various sources. The suggested profiles and database compile information created during the first steps of design in a way that is both traceable and understandable. The proposed profiles can influence following decisions:

- Derivation quality requirements: In our case, the profiles were used in requirements workshops as representatives for real users
- Prioritization of requirements: In our case, the profiles influenced the decisions for region-specific variants of car features
- (Primary) assessment of concepts: Profiles provide a user perspective
- Selection of subjects for user testing: Profiles were used as archetypes for selecting and clustering real users
- Creation of marketing strategies: Characteristics of profiles can influence marketing strategies

Customer profiles can and should be used in further stages of the development process for personalizing use scenarios, evaluating concepts, deriving and reflecting on requirements. In our case, profiles and database have not only been used in requirements workshops, but also for creating use scenarios and identifying representative evaluation subjects. In scenario creation, we could identify context factors (Figure 3) and plausible or critical use cases (Figure 5) for selected markets. Furthermore, the human face of the profile enabled the team to create a story around a well-built character. Particularly the description of psychological needs and their prioritization contributed to the creation of meaningful user experience stories [Michailidou et al. 2013]. The differentiation of markets was evident in the created stories. Finally, the profiles serve not only as archetypes for scenario characters, but also for selecting appropriate subjects for user tests.

4.2 How is the result of this method better than the ones already implemented?

A major challenge that we identified in our research project is that, although experience designers need a deep understanding of users, user-related data are usually documented in a less usable format, while personas are in many cases not used throughout the design process. Big companies, like our industry partner, do have qualitative and quantitative data concerning needs and behaviours of customers. However, the results of individual studies could "disappear", if they do not have a useful format or if they are not brought in relation to other information. We believe that our framework provides a structure to include important results in a useful way. Existing approaches (reviewed in introduction) rarely focus on behavioural and emotional aspects, which are crucial when designing experiences. We included those aspects in our framework. Our approach is formalized to synchronize activities of various departments and stakeholders. The proposed persona database could easily be used as part of a requirements workshop (as applied in our case). In our case, acceptance was the key for using personas and our approach to raise it was by raising their traceability.

Although it might take some effort to put the data together, we see a great added value in bringing them in correlation. Data concerning various aspects of drivers and the driving environment create, when put together, a representative image and help developers empathize and anticipate better the driving experience. With the inclusion of social behaviour and emotional aspects, developers would be able to anticipate the experience of representative customers. In the case study described, we observed a positive impact when the profiles where used for inspiring the elicitation of requirements for features of car T1. Realistic usage situations and particularities of different markets have been taken into account. This considered aspects of usage context (location, climatic surroundings), identification of critical situations, but also personal characteristics and psychological aspects in particular. The identified requirements are more reliable (ground on the database) and more rich in emotional aspects. The format of the profiles (database and visualization) was perceived usable, reliable and helpful. This reflects the opinion of our industry partner discussed in workshops during and after the completion of the method application. However, to generalize this result, further evaluations (in different companies) should take place.

4.3 In how far is the method applicable in other cases?

Our work has the limitations of case study research, i.e. results refer to a specific setting and are not per se generalizable. Here we suggest possible points to consider when adapting for future applications.

Segmentation

The first decision is which profiles to create and the type of segmentation to consider. Possible segmentation strategies include regional-, market-, brand- or need- specific segmentations. The decision for a strategy could be made according to data availability and company practices.

Data availability

Another interesting question is what happens if data needed for the creation of profiles are not available in the company. We worked with a big company, which supported the execution of marketing studies and the inclusion of machinery, like many automobile manufacturers do. What if less data are available? We definitely recommend conducting studies, because the power of the suggested method lies in the relevance of data. This could be seen as a limitation of this approach but is meanwhile its basis. Agreeing

with [McGinn and Kotamraju 2008], we recognize that data gathering is a time consuming process. However, it is still faster and cheaper than high quality ethnographic studies. Of course, each company has to decide, if similar data to those required are available and could be used to save some effort.

Availability of resources

As already mentioned, the data gathering and analysing processes are the most time-consuming ones, but at the same time the ones that are the key to a successful method application. An issue worth discussing, however, is the number of profiles that should be created, because this is an aspect were a company can invest or save up resources. Our recommendation is to create at least one or two profiles per significant market (region). In critical cases, it might be useful to create a third, "extreme" profile. Extreme profiles can be useful for deriving and assessing specifications. Profiles can be used in an analogous to anthropometrics data (percentiles) manner: if the feature/product fits to average and extreme profiles, it will fit to the majority of customers.

Product domains other than automobile

The emphasis and strength of the proposed method lies in its focus in the automobile domain. However, we have some suggestions about possible adaptations in the procedure, if willing to apply the method in another domain. Adaptations concern the data on utilization context and product utilization. In case of outdoor product utilization (like in the case of driving a car), climatic data retrieved from meteorological statistics of the selected area are relevant: an exterior experience could be influenced by average and extreme temperatures, sunshine hours, as well as humidity and precipitation values. In case of indoor usage, however, those aspects are of no value. Instead, properties of the interior environment could be listed. For instance, characteristics of domestic environment or a room set the context of indoor product utilization. In the field of utilization data, you see following information as useful for all product categories: usage frequency per day, frequency on working days/weekends, daytime of usage, as well as (if applicable) number/duration of paused usage. It could be interesting to document how many persons live in the household and are potential users of the product. Furthermore, qualitative statements on the perception of users towards the product, often available in online sources, could be relevant.

5. Conclusions

A better understanding of drivers and driving environment is an excellent basis for designing positive user experiences. In some cases, including representations of typical customers might reduce the effort of real user participation but still have positive effects. This is only possible, if representations are created systematically based on real data, approved by the management and communicated effectively. In our literature studies we could not identify works dealing with the systematic creation of user representations for the automobile domain within the challenging context of user experience design. We address these issues with a new method that was developed and positively assessed in a research project with a major automobile manufacturer. We propose collecting and structuring data concerning a specific car type in representative markets to characterize typical drivers and driving environments. The main contribution of the method lies in the formalized character of the method, its focus for application in the automobile domain, as well as the inclusion of experience-related (psychological/behavioural) aspects. Furthermore, we put emphasis on the applicability of the method and provide pragmatic descriptions, templates and visualizations that we consider usable for real-life industrial practice. Future work aims at supporting more extensively the step of condensing the data into a few profiles. This could be challenging especially if different data sources are available or if the company uses a different kind of market segmentation (instead of geographical). We also believe that it is worth studying whether and with which modifications the method could be applicable to other product domains.

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