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5 | 2020 **SCHWERPUNKT** Interview mit Guntram Friede (CMO Salesforce) • Sales- und Service-Bots im Vertrieb • Automatisierung in der B-to-B-Marktbearbeitung • Automatisierung in KMUs • Automated Product Suggestions with Needs-based Configurators • Digital-Sales-Enablement • Chatbots as Personalized Sales Agents **INSIGHTS** Oracle: The Art of War & Sales **KOMMENTAR** Die zwei Komponenten der Sales-Automation **SPEKTRUM** Co-Kreation der Marke in Brand-Communities • Kommunikative Ökosysteme

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"From insight to impact"

Automated Product Suggestions with Needs-based Configurators

Increasingly complex product portfolios make it more relevant than ever to match the right product to the right consumer. We show how needs-based configurators help to optimize consumers' choice processes by providing automated individualized product suggestions.

Johanna Hasenmaile-Aspin, Dr. Philipp Scharfenberger

Imagine buying a new car, yet feeling you lack product knowledge. You visit your preferred manufacturer's website, select your choice vehicle from a vast range, and navigate key features (e.g., drive variants, the vehicle's exterior and interior), each comprising dozens of subcategories with several hundred choices. How do you feel?

Increasingly complex product portfolios are requiring many companies to find new ways of efficiently suggesting the right product to consumers. One key tool for meeting this challenge is product configurators. Mass customization toolkits enable consumers to customize products (e.g., sneakers, cars) online. Customization, however, can be extensive, particularly for complex products. Even rather simple products (e.g., cereals) offer consumers up to 566 quadrillion configuration possibilities (mymuesli, 2020).

Most traditional configurators rest on attribute-based choice architectures. These enable choosing from diverse product attributes, based on which the customized product is developed (Huffman & Kahn, 1998). Consumers are increasingly perceiving such customization as overwhelming and frustrating. This poses a major challenge for companies with complex product portfolios: How might future systems be designed to refocus attention on the buying experience and to make sales more fun and efficient? How can companies optimize the complex matching process between highly diverse customers and manifold product offerings?

In cooperation with Audi AG, we investigated a new type of product configurator: needs-based configurators (NBCs). Such configurators analyze product-related needs and then create automated product suggestions. In this article, we embed NBCs theoretically and develop specific recommendations for their utilization based on a qualitative study and a best-practice analysis.

Theoretical Background

Predominant Types of Mass Customization Systems

Mass customization systems (MCSs) have attracted much research (e.g., Dellaert & Stremersch, 2005; Franke & Schreier, 2010; Hildebrand, Häubl, Herrmann, & Landwehr, 2013). This hybrid term, composed of mass production and customization (Fiore, Seung-Eun, & Kunz, 2004), has been defined "as a process in which consumers can choose levels from a set of predefined product modules to compose their own most preferred alternative" (Dellaert & Dabholkar, 2009, p. 44). Previous studies have focused largely on attribute-based configurators (ABCs). These are defined as product configurators based on individual attribute choices (Hildebrand, Häubl, & Herrmann, 2014).

Past research has discussed the advantages (Schreier, 2006) and limits of MCSs (Zipkin, 2001). Customizing each and every attribute can be onerous (Hildebrand et al., 2014), may entail feature fatigue (Thompson, Hamilton, & Rust, 2005), and probably fails to satisfy every consumer. To keep customization effort as low as possible, and to increase enjoyment in MCSs, companies need to minimize complexity (Dellaert & Stremersch, 2005; Franke, Schreier, & Kaiser, 2010).

Thus, more recent research focusing on optimizing customization systems has presented two alternatives: customization via starting solutions (CvSS; Hildebrand et al., 2014) and needs-based configurators (NBCs; Randall, Terwiesch, & Ulrich, 2007). CvSS means consumers select a starting solution from a set of preconfigured products, which is modified to create the final product (Hildebrand et al., 2014). This reduces complexity and increases choice satisfaction (Hildebrand et al., 2014). The notion of NBCs goes back to Randall et al. (2007).

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Table 1: Different Customization Types with Examples

Customization type based on	Definition	Examples	Typical questions / tasks during customization (selection)
Attributes (ABC)	Consumers can choose each product attribute from different levels, after which a customized product is developed (Huffman & Kahn, 1998).	e.g., Nike, Mymuesli, Audi, BMW, Porsche, Ray-Ban	Choose your · model and model variation · motorization and fuel type · wheels and accessories · exterior, interior color, and materials · equipment packages (light, vision, comfort, and assistance packages)
Starting solutions (CvSS)	Consumers select a starting solution from a set of preconfigured products that is then modified to create the final product (Hildebrand et al., 2014).	e.g., Stripped Pizza, Nike	Choose from different preconfigured products, which can in a second step be modified along the dimensions of the ABC
Needs (NBC)	Consumers specify the relative importance of their needs, and an algorithm recommends a matching product (Randall et al., 2007).	e.g., Cannondale (USA), Audi (GER), Fiat (GER), Mercedes Benz (GER), Toyota (USA), Vauxhall (UK), Volkswagen (UK)	· How many people will ride in the car? · How large does the trunk need to be? · What do you value most? · Where do you drive the most? · What is your budget? The product can subsequently be further modified.

Source: Authors' illustration.

In an NBC, "users specify the relative importance of their needs, and an optimization algorithm recommends the combination of design parameters that is likely to maximize the user's utility" (Randall et al., 2007, p. 278). NBCs consider consumers' needs instead of attributes, reduce complexity, and perform especially well for product novices (Randall et al., 2007).

Instead of consumers navigating endless features and options, NBCs automatically select a suitable product. Innovative NBCs additionally learn through previous selection processes. As such, they advance classic ABCs or CvSS by offering personalized starting solutions for configurations that closely match individual needs. Potentially, NBCs will become the next big thing in sales automation. New developments in algorithmic product recommendation systems also support such new solutions (Linden, Smith, & York, 2003; Wei, He, Chen, Zhou, & Tang, 2017). Table 1 outlines the predominant customization types.

Consumer Expertise and Perceived Complexity in MCSs

Generally, MCSs best suit consumers with well-defined, stable preferences (Simonson, 2005). Yet consumers often lack such preferences (Bettman, Luce, & Payne, 1998). Instead, their preferences are volatile and sensitive to how choice options are framed (Slovic, 1995). Less expertise might involve less preference clarity and greater choice insecurity. Consumers might not know which product options exist nor which ones they need. Thus, the perceived complexity of a customization system depends on its actual complexity, as well as on consumers' knowledge and preference clarity.

Management Summary

This article introduces a consumer-oriented approach to the future of automated product suggestions. It investigates a new type of product configurator: so-called needs-based configurators (NBCs). These analyze consumers' product-related needs and create analysis-based automated product suggestions. We discuss the specific qualities of NBCs and show why automated product suggestion systems potentially simplify product choices (especially for consumers with little product knowledge). Our ten recommendations for action are relevant for practitioners and future research alike.

NBCs are most effective when consumers perceive choice complexity as high and when they experience choice insecurity. This applies above all to novices (see figure 1). ABCs have the highest potential when perceived choice complexity and choice insecurity are low. This holds true especially for experts, who know what they want and have a good overall understanding of the available product options. CvSS can be located between ABCs and NBCs and are suited to choice structures with medium perceived complexity and choice insecurity.

Context and Methods

Previous research on MCSs has investigated ABCs and CvSS, mainly using quantitative methods. To our knowledge, no study has investigated the specific qualities of NBCs, especially in the context of complex products. We close this gap by exploring NBCs in the automotive sector—a highly relevant and increasingly complex application field of mass customization (Statista, 2019, 2020a).

We conducted two rounds of semi-structured interviews with product experts and novices, to learn more about their different configuration approaches and to identify the specific qualities of NBCs perceived as beneficial by consumers. Round one involved 24 in-person interviews at an international motor show in Germany, round two, 15 additional interviews in Germany and Switzerland. We deliberately chose two data collection contexts to find differently knowledgeable participants. Interviewees were aged between 20 and 70 years. Interviews (lasting 9 to 36 mins) were conducted in German, audio-recorded, transcribed, coded, and analyzed using summarizing qualitative content analysis (Mayring, 2000).

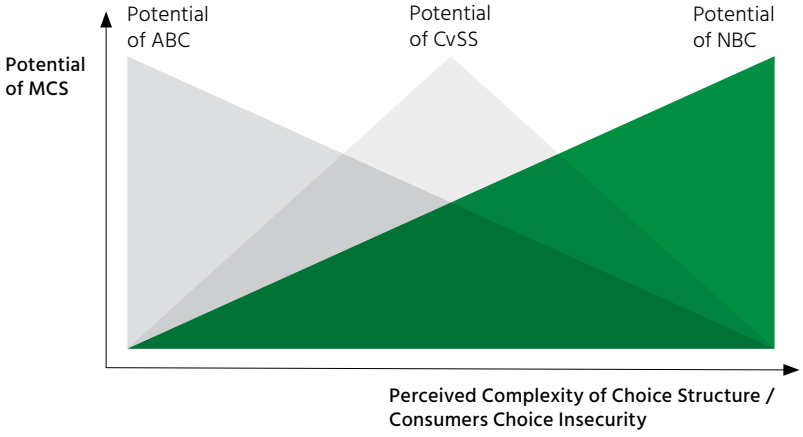
Interviewees were first asked to describe their previous experience with car configurators or configurators in general. Second, they customized a car with an Audi NBC app. The configuration process included eight needs-oriented questions (e.g., where do you drive most? What are your trunk requirements? What is your budget?). Third, interviewees answered questions about their customizing experience (e.g., first impression, strengths and weaknesses, suggestions for improvement, fit of recommendations), car expertise, car ownership, and demographics.

We supplemented the interview data by examining existing automotive NBCs. This approach illumined current NBC implementation standards. Also, we used this information to compare interviewee feedback with the features of other NBC implementations. Our sample of examined NBCs included solutions by Audi (GER), Fiat (GER), Mercedes Benz (GER), Toyota (USA), Vauxhall (UK), and Volkswagen (UK). Figure 2 provides examples.

Main Propositions

1. Traditional configurators are largely based on attribute-based choice architectures, which consumers often perceive as overwhelming and frustrating.
2. Needs-based configurators have the potential to become the next big thing in sales automation as configurators become more intelligent and are programmed in terms of consumer needs instead of product attributes.
3. Needs-based (attribute-based) configurators have the greatest potential when perceived choice complexity and choice insecurity are high (low) and perform best for novices (experts).

Fig. 1: The Increasing Relevance of Automated Choice Assistance for Increasingly Complex Buying Decisions



Source: Authors' illustration.

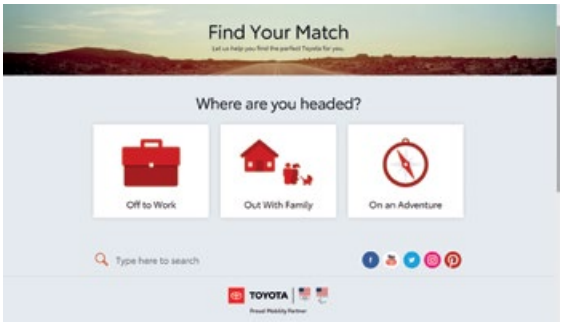
Findings and Recommendations

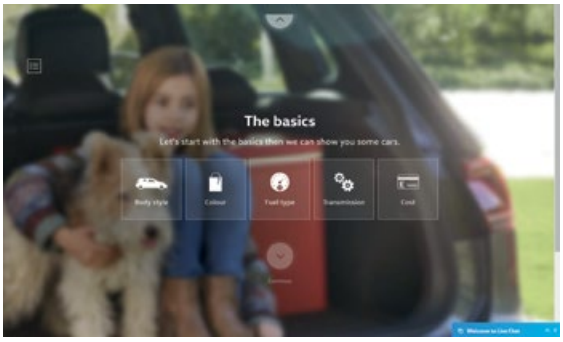
Analyzing the interviews and the examined automotive NBCs led to 10 key findings and recommendations for action.

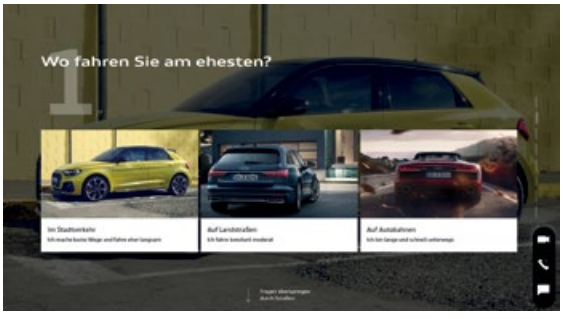
NBC Design and Ease of Use Are Rated Positively

Many interviewees described ABCs as complex, confusing, and complicated.

Fig. 2: Examples of NBCs







Source: Toyota (2020), Volkswagen (2020), Audi (2020).

They felt that this "traditional" approach was too lengthy, decision-heavy, frustrating, and nontransparent. As one interviewee said: "Having to make so many decisions overwhelmed me." In contrast, they enjoyed the tested Audi NBC, highlighting its straightforwardness, speed, appealing design, pictorial world, and simplicity.

"There are no technical terms. I think that's great, especially if you don't know anything about engines. It went superfast ... and didn't go too much into detail."
(Jana)

Participants found using the NBC helpful, intuitive, easy, self-explanatory, and output-driven. It facilitated identifying the right model with only a few questions, step-by-step, without excessive technical jargon, and requiring little product knowledge.

Around half of the aforementioned manufacturers positioned their NBC on the model overview page, yet not very visibly. The other half placed it on subpages. Only one manufacturer highlighted its NBC's advantages.

Recommendation 1: Position NBCs prominently and as a new, entertaining, fast, intuitive, and uncomplicated means of configuration beside traditional ABCs.

NBCs Target Consumers with Little Product Knowledge

Interviewees with large product knowledge (experts) stated that an NBC would not greatly benefit them. However, those with little product knowledge (novices) found the NBC both very helpful and convenient for gaining an initial overview and for receiving a fitting product recommendation.

"The app is handy. Even if you don't really know much about cars, you can quickly find a car that suits you."
(Holger)

Interview results also suggest that gender differences might exist depending on product category (e.g., many women had lower automotive expertise and therefore preferred NBCs). Only one manufacturer clearly guided consumers with low expertise to the NBC and those with high expertise to the ABC.

Recommendation 2: Provide clear instructions on which configuration type provides the best starting point. Guide consumers with high expertise to the ABC, those with low expertise to the NBC.

Limit the Number of Questions to Identify Needs

The tested NBC used eight questions to identify needs. Interviewees found this amount adequate. They expressed no clear preference whether additional questions (e.g., about optional equipment) should be integrated into the NBC or into subsequent configuration steps. We identified a crucial tradeoff: the more questions, the better the recommendations. However, more questions lead to increased usage time and task complexity. Our analysis found varying numbers of questions, from one to eight (5.3 on average), in the existing NBCs. One NBC enabled first answering mandatory questions, then additional ones optionally; two NBCs offered prioritizing by importance (this was also suggested as an attractive solution by study participants).

Recommendation 3: Limit the number of questions and offer additional topics that enable optional customization.

Novices and Experts Consider Different Features Important

"So, about color ... I wasn't asked about my favorite exterior color. Well, I didn't really feel understood. I don't think that I was asked questions that actually mattered to me."
(Desirée)

We found that novices and experts consider different feature categories important. When beginning their configuration, novices focus more on design aspects (e.g., exterior color and interior look), whereas experts pay particular attention to technical features. As the tested NBC included no questions about exterior color, some participants could not identify with the recommendations and disliked the whole process. We identified only one NBC with color options, whereas technical questions (e.g., fuel type) were more frequent, yet not overly important for novices.

Recommendation 4: Include questions in your NBC that ensure novices receive a high perceived recommendation fit. Make sure all questions are actually needs-based (e.g., ask about travel habits instead of fuel type).

Further Technical Information and a Chat Function are Beneficial

Participants would like additional information for technical terms (e.g., via an info button); they also requested a chat feature. Our best-practice analysis showed that no NBC provided additional technical information, while 50% had a chat function. The latter seems especially important, as novices (vs. experts) have lower product knowledge and often a weaker brand relationship. Thus, a chat function could support relationship building.

Lessons Learned

1. Offer choice architectures based on needs, attributes, and starting solutions to reflect the fact that consumers have different levels of expertise and hence different expectations of configuration processes.
2. Provide clear instructions on which configuration type provides the right starting point for consumers.
3. Follow the design guidelines for needs-based configurators (NBCs):
   - position NBCs as a new, entertaining, fast, intuitive, and uncomplicated way of configuration; be sure to communicate the benefits;
   - ask a limited number of questions and ensure they are need-based (e.g., travel habits instead of fuel type);
   - communicate pricing transparently;
   - program and test algorithms very carefully;
   - be transparent and show which needs are (or are not) considered in the recommendations;
   - clearly highlight the next steps to reduce configuration terminations and integrate a call to action.

Recommendation 5: Integrate info buttons and a chat function for further information.

The Right Format is Important

A mobile-optimized website reduces entry barriers, as participants are increasingly using mobile devices for surfing the web (Statista, 2020b) and would rather not download an app for just one product configuration. A log-in or account creation function should not be mandatory, as participants are very wary of providing personal details. If necessary, such a function should be integrated at the end. Visuals help to communicate technical features (e.g., showing a trunk with a small bag or bicycle instead of indicating holding capacity in liters). Participants also requested an "I do not care" option.

Our analysis showed that no NBC required creating an account. Only two enabled skipping irrelevant questions.

Recommendation 6: A mobile-optimized website is best suited to an NBC. Visualize technical details and enable users to skip steps.

Clear Price Communication is Crucial

Participants demand transparent pricing: Is the price shown for a basic or for a fully equipped model? Are additional features already included? Participants liked being able to indicate their budget but missed a leasing option.

While two NBCs included budget details (leasing vs. purchasing), it usually remained unclear what the indicated price included.

Recommendation 7: Communicate pricing transparently and clearly establish what is included in the price. Include a budget question and different financing options (lease or purchase). This can also help convert leads to sales.

A Small Number of Comprehensible Recommendations Works Best

"Having three suggestions is great, but five to eight might get confusing." (Jana)

Participants appreciated the number of recommendations (three) at the end of the process. However, they did not always understand the recommendation logic in the "black box" nor which needs were (or were not) considered.

While the six investigated NBCs provided between one and 18 recommendations, three recommendations are most common. One NBC enabled seeing more recommendations and indicated which needs were considered, and which were not.

Recommendation 8: Show three different model recommendations that match the stated needs. Be transparent and highlight which needs are (or are not) considered and explain how the answers to previous questions lead to these recommendations.

Unmatching Recommendations Lead to Frustration

Recommendations failing to match participants' model notions (e.g., a neglected budget) are confusing and frustrating. As interviewee Helga put it: "No way, that's a no go." Participants usually tried to find the error and sometimes even questioned their own entries.

Recommendation 9: Program and test all algorithms very carefully.

The Next Steps in the Customer Journey Need to be Obvious

"I don't know how the program will continue; I will now be able to select the model I suppose, but the special features will probably come up later?" (Petra)

Most participants did not know how to proceed after receiving the recommendations. They were unsure of the next steps (e.g., whether they needed to add special packages or should just buy the recommended product). Some NBCs routed consumers to model overview pages after displaying the recommendations, which might make consumers feel lost again. Only one NBC defined a clear customer journey.

Recommendation 10: Clearly highlight the next steps (e.g., continue your configuration or contact your dealer) to reduce configuration terminations and integrate a call to action to convert leads into sales.

General Discussion

New developments in the field of algorithmic recommendation systems enable new automated solutions for complex product configurators. In cooperation with Audi AG, we examined NBCs, a novel choice architecture, in a real-life setting. Interviews and a best practice analysis highlighted the potentials and specific qualities of NBCs. Our data indicated that NBCs are particularly suitable for consumers with low expertise and in cases of high perceived choice complexity. Simple design, transparent and correct matching of needs and recommendations, as well as easy and clear integration into the customer journey were identified as essential qualities of NBCs. Participants' overall positive responses underline our notion that NBCs have the potential to become an important tool in sales automation—especially as they become more intelligent and as product offerings including customization possibilities become more complex.

Theoretical and Practical Implications

Previous research has outlined that complex customization processes may frustrate consumers with little product expertise. Our results support this notion and show that NBCs may be a solution well suited to novices. Novices are more satisfied, less frustrated, and less overwhelmed in an NBC versus ABC situation. Hence, NBCs have the potential to ease product choices particularly for this target group and for complex product offerings.

Further, we claim that NBCs will not replace existing MCSs but complement existing approaches in helping consumers enter the best-suited configuration process. Currently, customization is moving from a more general approach ("one approach for everyone") to a more individualized approach ("the right approach for everyone"). Thus, combining different choice architectures (NBC, ABC, and CvSS) might be a promising solution for practitioners offering complex products.

NBCs and underlying sales automation algorithms make the sales process much more efficient for both consumers and manufacturers. Consumers are relieved from choice overload and can simply start buying. NBCs, being based on consumer needs instead of production processes, once again place consumers center stage and enhance the product choice experience. NBCs should provide "entertainment" rather than merely asking questions. Above all, they should meet users in their world and guide them to choose the right product via an easy and smooth customer journey.

Further, digitalizing and automating the product choice process is also

moving various industries (e.g., automotive) closer to selling directly to consumers (D2C), without including dealers as intermediaries in this process. NBCs are a step in this direction, as they replace traditional salesmanship with virtual consultancy. Furthermore, they ensure that knowledge about consumers reaches producers and is not retained by intermediaries. As a next step, many companies might combine NBCs with online sales applications. Against this background, NBCs have a strong potential to radically innovate sales automation.

Finally, NBCs might also be utilized by brand-independent retailers or overarching recommendation systems (e.g., the large number of election recommendation systems). Their simplicity and playfulness make NBCs potentially able to become highly influential components in important decision processes throughout various crucial fields of life.

Future Research

So far, there has been little research on NBCs. Our recommendations could be tested in a larger study and in other contexts (e.g., other industries as well as other application fields such as politics or health). Also, quantitative study designs comparing various types of MCSs could more specifically examine the differences between various configuration approaches, particularly regarding dropout rates, conversion funnel, satisfaction, and willingness to pay. As we have focused mainly on the advantages of NBCs, future studies could more carefully examine the disadvantages and risks (e.g., product configurators nudging consumers toward specific features or political NBCs nudging voters toward specific parties).

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