Why Should You Care About This Topic?

1. A primary function of recommender systems is to support (or at least influence) people’s choices
2. Doing so requires having a good general overview of how people make choices and how they can be helped to make better choices
3. A lot of knowledge about this topic is embodied in the knowledge base of the Chusapedia web application
4. Chusapedia also helps to reduce the complexity of applying this knowledge during the design and evaluation of recommender systems
5. Chusapedia also supports collaboration among analysts and researchers with regard to both
   – the formulation of general knowledge and
   – the working out of specific applications of that knowledge
Why Is This Topic Difficult?

Current Views of Choice and Decision Making
How People Make Choices – in a Nutshell

**Persuasion**
- Induce someone to choose a particular (type of) option
- Introduce or exploit bias

**Choice Support**
- Help someone to choose whatever option s/he will ultimately be satisfied with
- Minimize avoidable bias

They can be used together effectively.
High-Level Strategies for Supporting Choice
The ARCADE Model

Access Information and Experience

- Help the chooser to gain access to information and experience that is relevant to the current choice.
Access Information and Experience

Influence the way in which the chooser perceives the choice situation in such a way that the chooser's processing is facilitated.

Represent the Choice Situation

- Influence the way in which the chooser perceives the choice situation in such a way that the chooser's processing is facilitated.
Represent the Choice Situation

- Trial-and-Error-Based
- Socially Based
- Experience-Based
- Attribute-Based
  - When available, choose Collins
- Policy-Based
- Consequence-Based

Combine and Compute

• Process available information computationally in a way that facilitates one or more processing steps of the chooser.
Combine and Compute

- Encourage the chooser, implicitly or explicitly, to apply a particular (part of a) choice pattern (in a particular way).
Design the Domain

• Change the basic reality about which the choice is being made so as to make the choice problem easier.
Design the Domain

- Take over from the chooser some step in the processing that involves evaluation or choice among alternatives.

Evaluate on Behalf of the Chooser
Introduction to Chusapedia
Publications Are Not Enough

Chapter 18 Human Decision Making and Recommender Systems
Anthony Jameson, Martijn C. Wilkens, Alexander Pethoi, Marco de Gennaro, Paesende Lopes, Gianluigi Smeratore, and Li Chen

2015: Both works are available freely from my home page dfki.de/~jameson

Why Computational Support?

1. Help analysts put the many pieces together
2. Make available domain- and problem-type-specific knowledge
3. Integrate competing models
4. Support sharing and reusing of design solutions
What Can You Do With Chusapedia?

1. Analyze how particular existing recommender systems support and influence choices – and how they can be improved in this respect
2. Analyze issues and strategies concerning a particular type of recommender system
3. (Coming soon:) Help extend Chusapedia by formalizing general knowledge in an area of interest to you (see the next slides)
Applying Chusapedia to an Interactive Product Configuration System
During the remainder of this talk no further slides were presented. Instead, the presentation alternated between the following two related demonstrations:

1. Excerpts from a video-recorded demo of the configuration system Tacton CPQ – Heavy Vehicles.
   - Interested readers can view the entire demo video on the following page: http://www.tacton.com/resources/?resource_type=m205-demos
   - The excerpts discussed are taken from the first few minutes of the 12-minute video.
   (Note: The presenter has no affiliation with the company Tacton. This demo was chosen because the configuration system is a representative state-of-the-art commercial configurator and because the demo video is of high quality.)

2. A live demonstration of how the application Chusapedia can be used to analyze the choices made by a user of the Tacton CPQ configurator.
   - Interested readers can find the analysis shown in the following slides at http://chusapedia-app.chusable.com (at least through November 2017). This particular “intervention” should not be edited, but you can create a “separate copy” of it, changing its name, if you would like to experiment with the application by extending or modifying the analysis.
   - The following slides include screenshots and notes that convey the main points of this part of the presentation.
We are going to analyze selected aspects of Tacton CPQ – Heavy Vehicles (“the configurator”) using the Chusapedia App (available via http://chusapedia-app.chusable.com).

The app helps the user to analyze a choice-supporting intervention: any set of measures intended to help people make choices.

The “Features” table shown here lists a number of features of the configurator that support users’ choices in one way or another.

In the next few slides, using the table “Design Rationale” (collapsed in this screenshot), we will look closely at several choices that a user of the configurator needs to make and how they are supported by the listed features.

In most of these slides, a partial screenshot of the configurator will be shown in the top part and the corresponding part of the Chusapedia analysis will be seen in the bottom part.
The first question to be asked in Chusapedia is: Who are the “choosers”? That is, what individuals or groups are making choices that are being supported by this intervention?

In the case of this configurator, it appears that a customer is walked through the configuration process by a sales representative, who helps the customer to answer the questions posed by the configurator. So choices are being made by both of these individuals: The choices of the sales representative concern questions like how to help the customer make his own choices.

In the demo video, the presenter takes the role of a customer who is answering the configurator’s questions by himself. So in this presentation we assume this simpler scenario.

Experience has shown that even the apparently simple task of explicitly listing the choosers who are involved in an intervention can help analysts understand an intervention more clearly.
The first choice to be made by the customer concerns the truck “series” that should be used as a starting point for the configuration.

Chusapedia helps the analyst to take into account the fact that people can apply various “choice patterns” (described in the ASPECT model introduced in the book by Jameson et al., 2014; see the last slide for a link) when making choices like this. One clearly relevant pattern is the “consequence-based pattern”. This pattern comprises a number of “choice steps”, which Chusapedia offers to the analyst in a menu (not shown here); the analyst has chosen to analyze the two most important steps in this case. (Note: The names of the choice pattern and the two choice steps are shown in gray to indicate that the analyst has adapted the standard texts offered in menus by Chusapedia; texts formulated by the analyst him- or herself appear in black.)

The first of these choice steps, identifying the available options, is often quite difficult; but it is made very easy in this case because the configurator applies the straightforward “choice support tactic” of informing the user about the available options. It does so with the “feature” of listing all of the options explicitly on the screen.

The trickier step — for customers want a truck that does not fit one of the two “descriptions” much better than the other description — is that of anticipating the consequences of choosing a particular series: A possible negative consequence of this choice is to discover much later that it is impossible to configure the desired truck using the selected series as a starting point. In that case, the user might have to start the whole configuration process over again, using the other series is a starting point.

One straightforward tactic used by the configurator is to describe explicitly what sorts of trucks can be configured within each series.

A less obvious choice-supporting tactic was applied earlier, by the truck company itself, when the product offerings of the truck company were designed: The two truck series shown here are inherently relatively easy to choose between — as would not be the case, for example, if the distinction were between “Modern trucks” and “Traditional trucks”.

The ARCADE model of choice support that is included in Chusapedia (also introduced by Jameson et al., 2014) helps intervention designers and analysts to identify a wide range of choice support tactics, so that they do not have to rely on the more obvious tactics.

Another relevant choice pattern here is the “trial-and-error-based pattern”: The chooser tries out an option and observes whether applying it has the desired effect. On the positive side, the configurator shows the specific initial configuration that results from having chosen a particular truck series. On the other hand, this configuration doesn’t say much about what future choices will be possible if this series is chosen.
As can be seen in the right-hand side of the configurator’s screen, from this point on at any moment the configurator is managing a specific valid configuration for the customer’s truck.

Each choice made by the customer will in general result in some changes to this configuration.

By inspecting the new configuration, the customer may (or may not, partly depending on his domain knowledge) be able to evaluate whether his most recent choice has taken him in the right direction (cf. the description of the trial-and-error-based pattern on the previous slide).
The three questions on this screen are in many ways similar to the one about the truck series; but here we are told in the video that the customer has the option of skipping any of the questions. Hence one choice that the customer has with regard to each question from now on is whether to skip it. As the Chusapedia analysis indicates, the configurator offers less support for this choice than it does for the choice involved in providing an answer to a question.
A quite different type of choice is offered on this screen: Which of three possible criteria the configurator should use when “optimizing” the configuration — that is, automatically making choices that are not explicitly made by the user.

If the customer applies the trial and error-based pattern — simply checking which of the three offered criteria seems to yield the best result — the configurator’s feedback about the resulting configuration is even more helpful than in the example shown before: The configurator highlights the differences relative to the default criterion of “list price” (as can be seen in the color-coded substitution of a more expensive component in the right-hand column).

Moreover, it is easy to reverse a tentatively made choice — simply by clicking on a different radio button.

But suppose that the customer instead applies a different choice pattern, the “policy-based pattern”, taking into account his company’s policy with regard to this type of choice. If his company’s policy matches one of the three offered criteria, the choice is very easy. But suppose that the company has a somewhat more complex policy, such one that weights price and emissions equally: Then the customer has to determine which of the offered criteria best matches the company’s policy — a difficult step for which (understandably) no support is offered here.
In this screen, the customer is being asked to select a “wheel configuration” (e.g., which axles should be steerable). A difference here is that there is one recommended option, indicated by the dashed box.

While the choice patterns already discussed can also be applied here, there is an additional choice in this case: whether to adopt the configurator’s recommendation. One applicable choice pattern here is the “socially-based pattern”, which involves choosing on the basis of the advice, expectations, or examples of other persons.

 Whereas “advice” is traditionally something that comes from another person, when recommendation technology is being deployed the advice can be seen as coming from the configurator. General tactics for helping people to process advice appropriately are relevant here.

One such tactic is to somehow help the chooser to assess the credibility of advice giver. Specific variants of this tactic include (a) providing information about the advice giver’s “track record”; and (b) explaining the reasoning or computation that led the advice giver to give this particular advice.

As we can see, the configurator does not provide any such support here, instead leaving it to the user to assess how reliable the recommendation might be.
• This screen shows a relatively complex example of support for the trial-and-error choice pattern.
• In Step 1, the user has chosen what seems like an appropriate engine, with 360 horsepower.
• In Step 2, when proceeding to choose a gearbox, the customer sees that his preferred gearbox option “TC Tronic” is grayed out, which means that the option is not available given the choices that have been made so far.
• A sophisticated customer might recognize that the unavailability of TC Tronic is due to his choice of an engine, in which case he could backtrack and choose a different engine.
• The configurator makes the process of trial and error easier (Step 3 above) by (a) allowing the customer to choose TC Tronic despite its incompatibility with previous choices and (b) informing the customer about a specific change that he can make in his previous choices if he really wants to have the TC Tronic.
• As is indicated in the Chusapedia analysis, the configurator is providing unusually explicit support for the choice step of selecting the next option to try out once a previously tried option has proven to be unsatisfactory.
• But note that, like the configurator’s recommendation concerning the wheel configuration, the user needs to decide for himself whether he will accept the configurator’s recommended resolution of the conflict.
Foundations
The Science and Technology on Which Chusable is Based

In addition to the intellectual property Parallel Exploration transferred to Chausible AG by the German Research Center for Artificial Intelligence (DFKI), Chausible builds on the knowledge acquired by Anthony Jameson in several decades of basic and application-oriented research and project leadership, especially in the following areas:

Use of Computing Technology to Support Human Choice

There exists a huge amount of knowledge about how people make choices and also on how computing technology can help people to make better choices, but it has been difficult for people who design interactive applications to make use of this knowledge, because it is distributed over so many places and presented in so many different frameworks. One step toward solving this problem was the following book-length monograph, which offers a compact but comprehensive synthesis:

Choice architecture for human-computer interaction