



User Interfaces for Configuration Environments

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Design Principles for Configurator UIs

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5. Teach the Consumer



Customize the Customization Process

Table 8.1 Example of determining relevant questions on the basis of *collaborative filtering* (Konstan et al., 1997).

<i>User</i>	<i>CPU</i>	<i>MB</i>	<i>OS</i>	<i>Screen</i>	<i>HD</i>	<i>Internet</i>	<i>Applications</i>
1	1	4	2	5	3	6	7
2	3	1	2	4	5	7	6
3	1	3	2	5	4	7	6
4	1	3	2	4	5	6	7
5	2	1	3	5	4	6	7
Current	1	?	2	?	?	?	?

- Different users require different interfaces (e.g., experts vs. newbies, maximizers vs. satisficers).
- Interfaces should be flexible and present questions of relevance for the **current user**.



Example User Interface

The screenshot shows the 'Travel Plan' form on the NutKing website. The header includes the NutKing logo and navigation links: Home, Travel Plan, My Travels, My profile, and FAQs. The main content area contains a message: 'Please tell us what you'd like to do on this trip. Your answers will help the system to make the best possible recommendations. (The answers you give apply only to this trip. Why?)' and a tip: 'Tip: If you'd like to save your travel plans, please register now.' The form is divided into several sections: 'TRAVEL COMPANIONS' (Who will you travel with? alone), 'DEPARTURE' (Where are you from? [Select one]), 'ACTIVITIES' (What would you like to do on this trip? with checkboxes for Sports, Adventure, Relaxing, Art & Culture, Whine and Food, Environment and Landscape, and Fitness and Wellness), 'TRANSPORT' (How will you travel? train), 'PERIOD' (When do you want to travel? July), 'ACCOMMODATION' (What kind of accommodations do you want? hotel), 'PREVIOUS VISITS' (Have you ever visited Trentino? [Select one]), and 'What's your daily budget (for accommodation)? [Select one]'. A 'NEXT' button is located at the bottom right of the form.

The screenshot shows the search results page on the NutKing website. The header includes the NutKing logo and navigation links: Home, Travel Plan, My Travels, My profile, and FAQs. The main content area shows the search results for 'Accommodation' in the 'Valle dell'Adige, T' area. The search criteria are: Location: [List of Locations], Accommodation type: Hotel, Category: [Min] [Ma] [Max], Cost day / person: min [€] max [€], and Number of beds: 2. The results show 48 results. A message states: 'I found 48 results that matched your request. Below we suggest ways to modify your request and receive more refined results.' The suggestions are: 'Add "Cost" to your query.', 'Add "Category" to your query.', and 'Add "TV" to your query.' There is a 'Skip the refinement' link and a 'Get all results' button. A legend and search/reset buttons are also visible at the bottom.

T. Mahmood and F. Ricci. Learning and Adaptivity in Interactive Recommender Systems, Proceedings of the 9th International Conference on Electronic Commerce (ICEC'07), Minneapolis, Minnesota, USA, pp. 75—84, 2007.

Customize the Customization Process

Table 8.2 Example of determining relevant constraints on the basis of *collaborative filtering* (Konstan et al., 1997).

User	c ₁	c ₂	c ₃	c ₄	c ₅	c ₆
1	4	2	3	5	1	6
2	3	2	5	6	1	4
3	1	3	2	4	6	5
4	3	2	4	5	1	6
Current	?	2	?	?	1	?

- Different types of knowledge engineers (KE) (e.g., experts vs. newbies).
- Interfaces should be flexible and present knowledge base contents of relevance for the **current KE**.

Example User Interface

iCone Intelligent Assistance for Configuration Knowledge Base Development and Maintenance

PC

- Products
- Constraints
- Questions
- Status
- Analysis
- Administration

Structured Filter Constraints | Self defined SQL Constraints

ID	If	then
c0011	usage = multimedia	max_price < 800
c0012	usage = complex mathematical calculations	CPU = fast

New in the system

- new variables
- new constraints
- new test cases
- new dependencies
- Most viewed
- Take a look at ...

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FIGURE 8.1

ICONE Knowledge Acquisition Environment: Example of a simple *requires* relationship (see also Hotz et al., 2014).

Provide Starting Points (Default Values)

Table 8.3 Example of determining default values for the parameters of the computer configurator on the basis of *collaborative filtering* (Konstan et al., 1997).

<i>User</i>	<i>CPU</i>	<i>Motherboard</i>	<i>OS</i>	<i>Screen</i>	<i>HD</i>	<i>Internet</i>
1	CPUD	MBDiamond	OSAlpha	ScreenA	MedStore	Yes
2	CPUS	MBSilver	OSBeta	ScreenB	MedStore	No
3	CPUS	MBSilver	OSBeta	ScreenA	MaxStore	Yes
4	CPUS	MBSilver	OSBeta	ScreenB	MedStore	No
5	CPUD	MBDiamond	OSAlpha	ScreenA	MedStore	No
Current	CPUD	MBDiamond	?	?	?	?

- Static defaults: fixed parameter (e.g., internet = yes)
- Rule-based defaults: default value specified by rule (e.g., application = „programming“ → memory \geq xGB)
- Adaptive defaults: learning approaches (see above).

Example User Interface

RecoM^omobile



 *The preselected values are recommended, change them as you like!*

Do you want to use your mobile phone to read/write Emails?

- No
- Occasionally
- Daily
- All the time

Do you want to use your phone to connect your PC to Internet?

- No
- Occasionally
- Frequently



Support Incremental Refinement

Price	\$389	\$455	\$612
CPU	CPUS	CPUS	CPUD
MB	MBSilver	MBSilver	MBDiamond
...
Internet	No	Yes	Yes

Buy this! **Buy this!** **Buy this!**

Attribute	FirstClass	Business	Economy
CPU	CPUD	CPUS	CPUS
MB	MBDiamond	MBSilver	MBSilver
...
Internet	Yes	Yes	No
Price	\$612	\$455	\$389

Buy this! **Buy this!** **Buy this!**

- **Comparison interface:**
primed towards price
- **Alternatively:**
focus on relevant attributes (technical product properties)



Ranking of Configurations Based on Utility Functions

Table 8.4 Example list of user preferences.

<i>Price</i>	<i>CPU</i>	<i>MB</i>	<i>Internet</i>
5%	35%	35%	25%

Table 8.5 Example list of product utilities.

Attribute	Value	Utility	\$389	\$455	\$612
CPU	CPUS	4	4*0.35 = 1.4	4*0.35 = 1.4	–
	CPUD	7	–	–	7*0.35 = 2.45
MB	MB-Diamond	8	–	–	8*0.35 = 2.8
	MB-Silver	2	2*0.35 = 0.7	2*0.35 = 0.7	–
Internet	Yes	10	–	10*0.25 = 2.5	10*0.25 = 2.5
	No	1	1*0.25 = 0.25	–	–
Price	0–400	10	10*0.25 = 2.5	–	–
	401–600	7	–	7*0.25 = 1.75	–
	601–1000	3	–	–	3*0.25 = 0.75
<i>Total</i>			4.85	6.35	8.5

$$utility(x) = \sum_i^n importance(i) \times contribution(x, i)$$

Support Incremental Refinement

Repair(#Changes)	Repair Ω_1 (1)	Repair Ω_2 (3)
CPU	CPUD	CPUS (CPUD)
MB	MBDiamond	MBSilver (MBDiamond)
Price	\$612 (\$390)	\$390
Internet	Yes	No (Yes)

Accept Changes!

Accept Changes!

- **Repair comparison interface:** determined on the basis of diagnoses and a corresponding utility function.

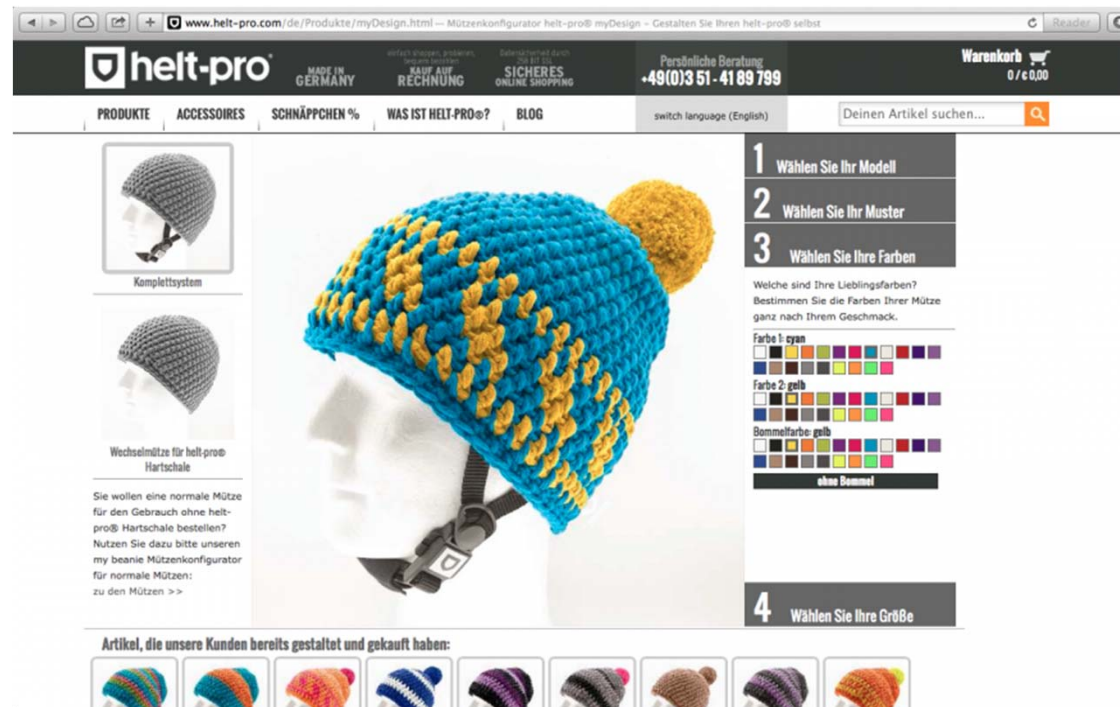
Exploit Prototypes to Avoid Surprises



FIGURE 8.6

COMBEENATION: Integrated development and visualization.

Exploit Prototypes to Avoid Surprises



- **Apparels:** new layout
- **Financial Services:** simulating the impact of a new portfolio
- **Railway Stations:** impact on throughput rate
- **Printer:** output quality

Teach the Consumer

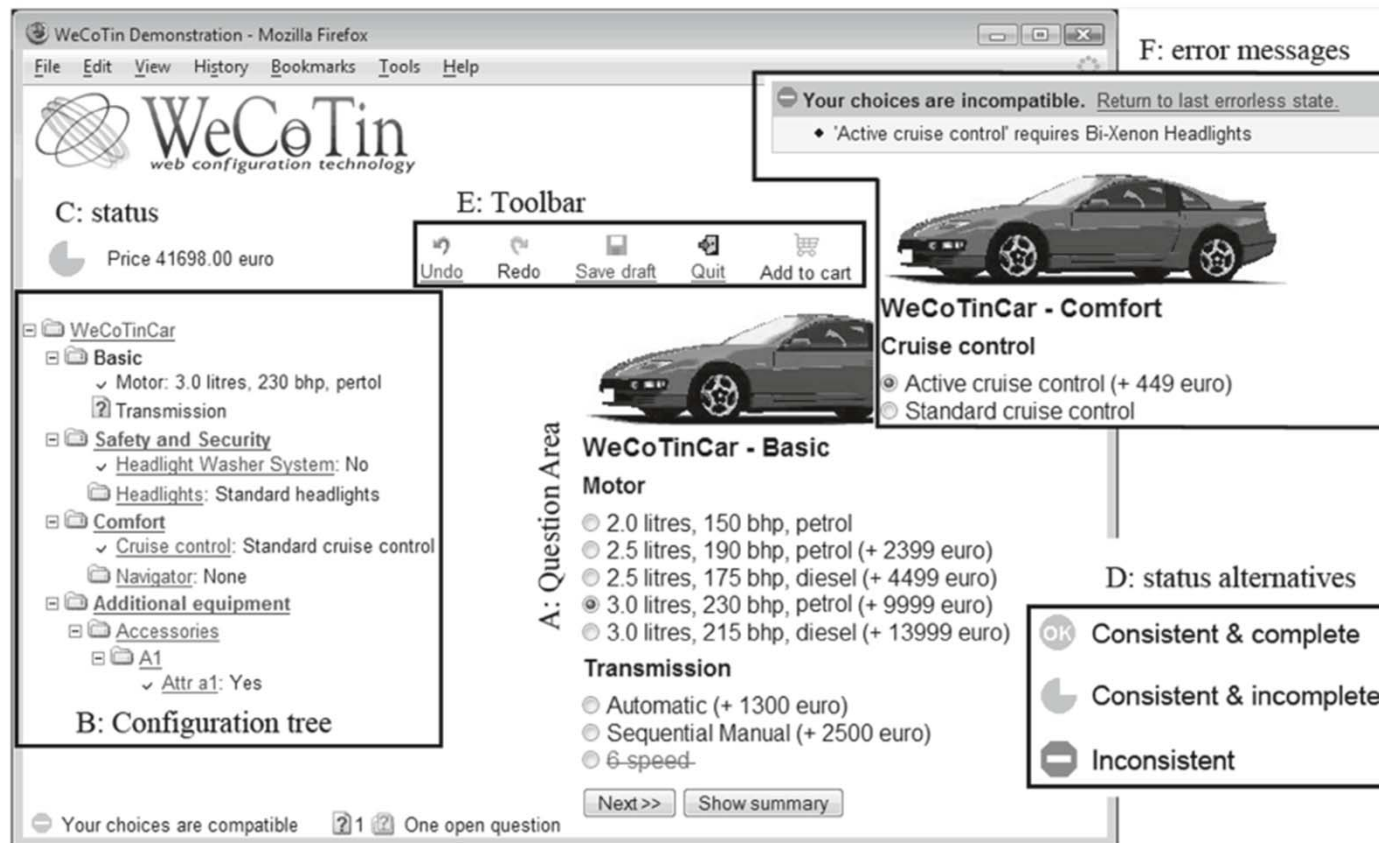


FIGURE 8.7

WeCoTin: Configuration environment (car configurator).



Example User Interface

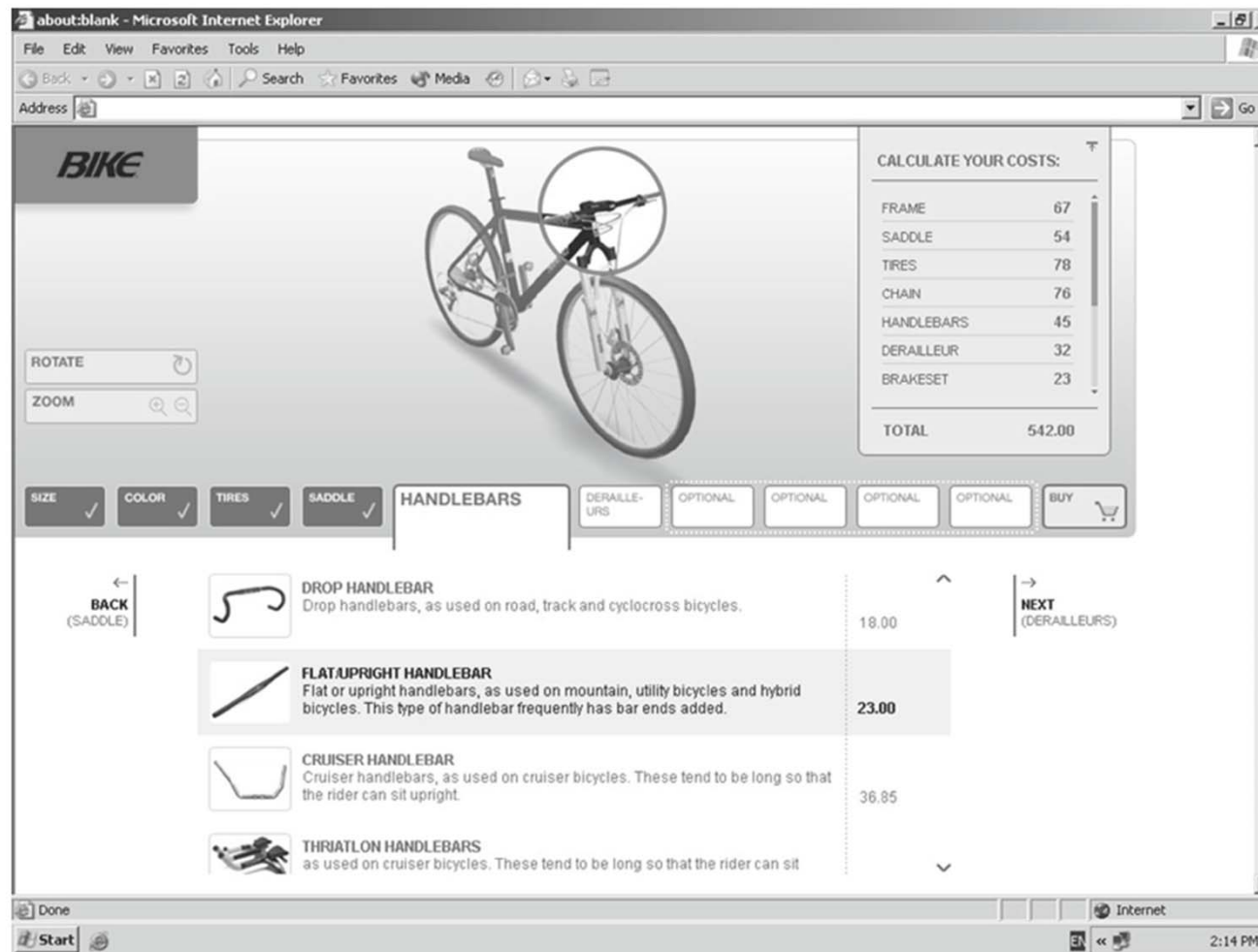


FIGURE 8.8

A prototype web-based bicycle configurator (see www.cyledge.com).

Summary

Table 8.6 Design principles of configurator user interfaces and technological foundations.

Principle	Technological Foundations
Customize the Customization Process	Parameter Selection (Falkner et al., 2011) Adaptive Knowledge Acquisition (Burke et al., 2011)
Provide Starting Points	Recommendation of Defaults (Falkner et al., 2011; Tiihonen and Felfernig, 2010) Recommendation of Knowledge Base Diagnoses (Felfernig et al., 2012)
Support Incremental Refinement	Configuration Comparison (Felfernig et al., 2006a; Heiskala et al., 2003) Diagnosis Comparison (Felfernig et al., 2009)
Exploit Prototypes to Avoid Surprises	Configuration Visualization (Fano and Kurth, 2003) Graphical Testing and Debugging (Felfernig, 2007)
Teach the Consumer	Personalized Diagnoses (Felfernig et al., 2009) Explanations (Friedrich et al., 2011)

Exercises

1. Provide an application example for the three mentioned types of defaults.
2. Choose an example product domain, define product attributes, related domains, and three example configurations.
3. On the basis of the defined configurations (in 2.), define a utility evaluation schema and rank the example configurations correspondingly (see the example on slide 11).



Thank You!

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