A Discussion of Internet Configuration Systems

Jörg Rahmer, Andreas Böhm, Heinz-Jürgen Müller, Stefan Uellner

Technologiezentrum
Deutsche Telekom AG
D-64307 Darmstadt
Tel: +49 6151 83-{5578,,,}
Fax. +49 6151 83-4124
Email: {rahmer,boehm,muellerhj,uellner}@tzd.telekom.de

Introduction

During the last years sales support is getting increasing demand in Deutsche Telekom. This discussion is enhanced in conjunction with eCommerce. Since product configuration is an essential process in eCommerce systems it is straight forward to evaluate configuration systems for this purpose. We also evaluated our own prototypical implementations of a configuration system, the KIKon-System, for the usage as an internet configuration tool in an eCommerce-environment. Interestingly, we had to learn that our approach was not adequate. Simply because the level of support was to complex for the regarded end user. A much more simpler form of configuration, for example selection-based configuration, would be more adequate.

In order to develop a sales support system, choosing the adequate level of support by the configuration system is a crucial factor for the success of the system. To identify the adequate level of support, we have developed a framework based on a classification of configuration. This framework is presented in the next section. To evaluate this framework we have carried out an evaluation of configuration systems available on the web and mapped them to our framework. This mapping is presented in the fourth section. The paper concludes with a short discussion.

Basics

Configuration tasks are usually described by
- Configuration objects (often called components)
- Conditions (constraints) on the consistency among the configuration objects
- Requirements of the user on the configured product.

For our purpose it is unimportant, if configuration objects are regarded as atomic and composed objects. But we differentiate in objects that are a configuration per se (which are the final product of the user) and those, which are not. Regarding the configuration of IT-systems a notebook could be a configuration object (which sometimes could be splitted in smaller parts) and also a configuration. A monitor is simply a configuration object. A configuration is complete if all requirements are fulfilled and no constraints are violated. We further distinguish between a sceleton-oriented configuration and a free configuration. A sceleton -oriented configuration is based on a frame which describes the structure of all possible configurations.

Different classes of support

Configuration tasks have different levels of complexity. This levels of complexity allow a classification of configurators according to problem classes.

Class 1: Direct selection

Configuration objects are presented in different choice boxes. The user selects the desired configuration objects. Compatibility restrictions are observed by the underlying configuration tool. For the control we have two options:
- The configuration tool is offering only such configuration objects which are compatible to the current partial configuration of the user.
- The configuration tool rejects the selected configuration object if it is incompatible with the current partial configuration of the user.

Within this class free and skeleton-oriented configuration is possible. Requirements do not have to be represented as they are given implicitly by the choices done by the user. But, the user must have a certain amount of knowledge about the configuration domain or for each configuration object online-help must be available.

Class 2: Multicriterial search

In this class a user selects the properties of the desired configuration objects, which are given by choice boxes. The user interface assists mainly the selection of predefined properties. With each choice of the user, the configurator restricts the possible set of configurations until one resulting configuration remains. If the chosen requirements are to restrictive, then the process ends without a result. In this case, often a step-wise resetting of chosen requirements is possible (backtracking).

Class 3: Soft search and adaptation

If configuration objects can be clustered and if there is additional information about the similarity of configuration objects and their clustering available, a kind of soft search can be realized. In addition to exact matching results also configurations can be presented to the user which only partially match her requirements. To sum up, this class is defined as an extension of the description of configuration objects plus the addition of soft constraints.

Class 4: From-scratch configuration based on a complete and consistent problem specification

If the adaptation of an existing solution is not satisfying, a from-scratch configuration is becoming necessary. In principle, the from-scratch configuration can either be done interactively, semi-automatically or fully automatically. Beside of knowledge for the requirement specification, a domain model is necessary, which can be expressed in a constraint-, rule-, skeleton-, port- or resource-based approach. Which knowledge representation technique is to choose, depends on the application domain.

Class 5: From-scratch configuration based on incomplete and inconsistent problem specification

In some domains, in relation to problem class 4, one has to expect incomplete specifications, which result in an increased number of alternative solutions and problem specifications. Hence, beside of generating solutions for the user, the user has to be assisted in specifying her requirements. Especially, the comparison of, the navigation through and the integration of alternative configurations has to be supported by the system. This last form is comparable to explorative design and therefore known as explorative configuration. Case-based reasoning methods can also be used to complete the requirement specifications.

Evaluation of configurators in the WWW

Table 1 shows a list of configurators found in the web. The goal of this study was to get a rough overview of the methods and players in the web configurator market. For the evaluation, we have looked at different criterias, like the product domain (what is getting configured), the methods used, the result and its presentation, is online-ordering possible and finally the ergonomics of the user interface. Furthermore we classified the configuration tools according to the above discussed classification scheme.

Discussion

The analysis leads to the following results:

- Most of the described configurators fall in class 1. Typically, a choice of configuration objects is offered to the web customer. By selecting from this choices the web customer designs her configuration. A highlight in this category is the configurator of Pacific Micro Data which allows to state more general requirements about the desired product. The configuration systems uses this input to produce a prototypical suggestion which is then refined by the user selecting configuration objects. Another highlight is the configuration system of IBM Canada. Step by step possible components are selected. After each selection a consistency check is done and new objects are introduced automatically, if there is no choice available. Such kind of inferences are normally not available or not transparent to the user.

- We also identified some systems up in the classes two and three. But none of the systems, can be compared with a full configuration system. In our opinion there are two reasons: Acquiring the domain knowledge for a configuration system is really a very demanding task that can not be done by sales people. So often this task has to be done by the designers of the configuration systems. But those wont like to maintain the knowledge base over a couple of years. The second reason is the web customer who has to use the configuration system. She should be able to understand the handling and the way the web-configurators within a couple of seconds. But configuration systems from class 4 and 5 often require an experienced user who is definitely not the standard web customer.

- All configurators are used for the configuration of goods. Therefore they could easily be integrated in the workflow of a merchandise planing and control system. Regarding the special eCommerce-situation, we find quite often online-ordering possibilities integrated with the configuration system.

Conclusions

According to our experience and the trends that can be regarded on the WWW, we believe that there are two demanding tasks for configuration system designers:

- How can the user-interfaces of a configuration systems of class 4 or 5 used by a web customer?

- How can the costs for knowledge acquisition and maintenance of a configuration domain model be lowered? Or alternatively, how can this job be simplified in order to be done by a normal web editorial department for an online-shop?

Nr.	Company	Homepage	Class
1	Aberdeen LLC	http://www.aberdeeninc.com/abcatg/SCMAIN.HTM	2
2	Compunity	http://www.compunity.com/shop/start.icl?ORDERIDENTIFIER=icat_orde rid&shop=1&UID=	1,2
3	Dell Computer Corp.	http://wincgi2.us.dell.com/scripts/cybercgi.cgi?method=2&machine=6233 GxaM	
4	Gateway 2000 Inc.	http://www.gateway2000.com/frameset.asp?s=corp&a=nsseries	2
5	Hewell-Packard Company	http://www.hp.com/vectra/assembly/	2
6	IBM Canada Ltd.	http://www.can.ibm.com/config/	1,2
7	IBM United States	http://www.pc.ibm.com/partner/us/netfinity_products.html	1,2
8	Pacific Micro Data Inc.	http://www.pmicro.com/new/pmd/build/buildintro.pht	3
9	PNY Technologies Inc.	http://www.pny.com/pnyapps/configurators/pny/manufacturer.cfm	2
10	Seneca Data Distributor Inc.	http://www.senecadata.com/config.htm	2
11	State Street Direct Online	http://www.ssdonline.com/pcconfigure.cfm	2
12	Sun Data	http://208.133.53.67/sundata/configtrigger.cfm	2
13	TNPG - The New Power Generation	http://www.tnpg.com/	
14	Tiger Direct	http://199.227.78.208/config1.asp	
15	ttec Computer B.V.	http://www.ttec.nl/doit/loadva/software/w3/MAR_LOG_HTML/pckonf_N .html	2
16	Vobis Microcomputer AG Deutschland	http://bach.vobis.de/cgi/konfigurator_ausgabe.exe?cmd=begin;	2
17	Arcor Mannesmann Telecommunication	http://www.arcor.de/tarife/arcortarife.html	2
18	AT&T	http://www.catalog.att.com/cgi-bin/portals/cmd/ppps.cgi	3
19	British Telecom phones_finder	http://www.shop-athome.bt.com/phone_finder/index.html	2
20	British Telecom call_pricer	http://www.shop-athome.bt.com/call_pricer/index.html	2
21	Cisco Systems Inc.	http://www.cisco.com/pcgi-bin/front.x/config_root.pl	2
22	Adam Opel AG	http://www.opel.de/cgi-bin/webc/www.opel.com/german/frameset.cgi?7058	2
23	Audi AG	http://www.audi.de/gebrauchtwagen/audi/kfz/index.html	
24	BMW	http://www.bmw.de/automarkt/index.htm	2
25	Daimler-Chrysler AG	http://mbks2.mercedes-benz.com/default.htm	2
26	Ford AG	http://www.ford.de/home.html	3
27	Porsche Deutschland GmbH	http://www.porsche.de/modelle/carconfigurator/default.htm	2
28	SEAT AG	http://www.seat.de/gwb/asp/kndgwframe.asp	3
29	Volkswagen AG	http://www.volkswagen.de/gebrauch	3
30	SperrMüll – Zeitung	http://www.sperrmuell.de/scripts/suchmask.idc?ukat2=3&Ukat=1&Katego rie=4&urs=0	3
31	Artist-Computer	http://www.senn-multimedia.ch/konfig/cmpindiv.asp	2
32	BSB-Software	http://195.34.191.11/config/	2
33	Comedia Computer	http://www.pcmarkt.com/index10.htm	1,2
34	Conrad electronic	http://www.conrad-conmark.de/wwws/frame-bto-conrad.htm	2
35	Furniture.Com	http://www.furniture.com/	1,2
36	NetConvoyer Configurator	http://netconveyor.com/configurator/conveyor1.html	2
37	Microsoft CarPoint	http://carpoint.msn.com/BuyNew	

Table 1 WWW-Configurator