

ProSeBiCA

Development of New Library Services by Means of Conjoint Analysis

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Library Assessment Conference – Charlottesville, Virginia
September 25-27, 2006

Motivation

Implications of the (self-) image of academic libraries as service-orientated institutions:

- Service development must be in line with user needs.
- User preference and acceptance have to be regarded as vital criteria for the assessment of library services.

Hence, this requires the implementation of marketing research techniques in order to

- establish and improve customer relationship management (CRM)
- create profound knowledge about the users and their needs (“customer intelligence”)
- implement appropriate control tools for the library management

“However, by constantly assessing actual and potential customer wants and needs, prioritizing customer markets, and identifying the competition, libraries can (and must) enter the fray of a world that is customer-driven.” (Christie Koontz, 2002)

Subject of the ProSeBiCA Project

ProSeBiCA is the German acronym for “prospective control of academic library services by means of conjoint analysis”.

Goals:

- Identification and assessment of possible future library services that presumptively satisfy user or rather customer needs
- Development of a comprehensive analysis and simulation framework for the whole range of library services based on preference measurement
- Empirical validation of a large-scale conjoint analysis design

Managerial perspectives:

- Preference-based library service development (short-term perspective)
- Preference-based strategic positioning of the library as a whole (long-term perspective)

Basics of Conjoint Analysis

What is conjoint analysis (CA)?

- Multivariate research technique developed in the 70s
- Measures how respondents (consumers) value attributes/components of a certain product/service bundle
- One of the most popular methods in marketing research

Main “streams” of CA:

- Traditional full-profile conjoint analysis
- Adaptive conjoint analysis (**ACA**)
- Choice-based conjoint analysis (**CBC**), or discrete choice modeling

Current research foci:

- Improving parameter estimation (e.g. Hierarchical Bayes (HB))
- Consideration of large sets of attributes
- Online surveying (web-based CA)

ACA and CBC – The Principles

What is adaptive conjoint analysis (ACA)?

- Combination of
 - self-explicated approach (relative desirability of attribute levels and relative importance of attributes) and
 - trade-off CA (paired-comparisons of subsets of attributes)
- Pairwise conjoint questions focus on attributes of most importance to respondents, and are customized to be relevant and informative

What is choice-based conjoint analysis (CBC)?

- Technique to measure the preference for pre-defined combinations of attribute levels (full-profile CA)
- Based on econometric choice modeling (e.g. multinomial logit or HB)
- Enables realistic simulations of individual choice behavior

The omnipresent problem: Service bundles offered by libraries are mostly characterized by numerous attributes and attribute levels.

Practical Implementation

- Funded by the German Research Foundation (DFG)
- Carried out by the Bielefeld University Library and the Department of Business Administration & Economics
- ACA and CBC as the methodological basis

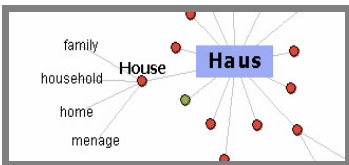
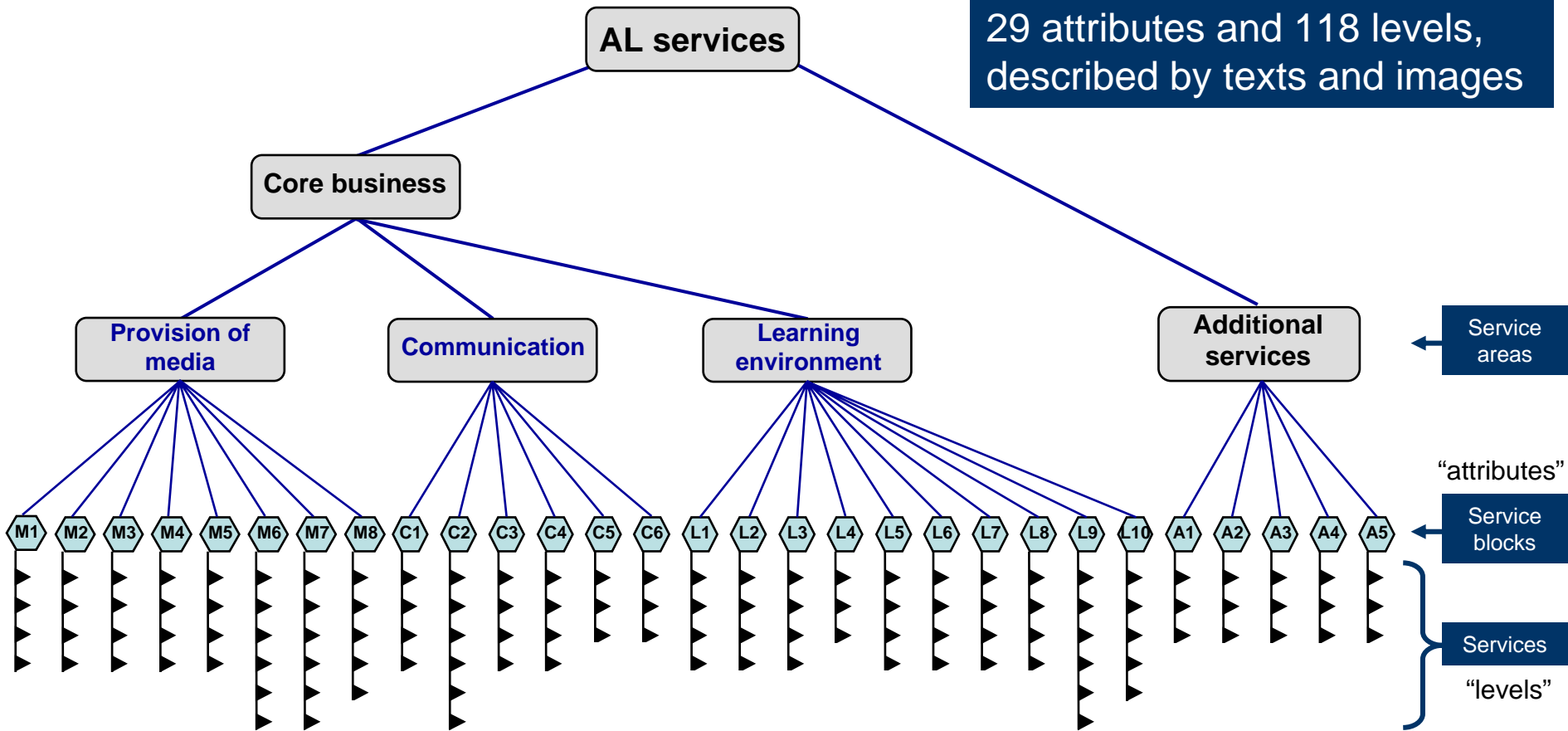
Milestones:



Idea generation step	ACA survey Bielefeld University	CBC survey Bielefeld University	ACA + CBC survey Cottbus University	Consolidation of results and preparation of CA guidelines
Mar – Aug 2004	Oct – Dec 2004	May – June 2005	Nov – Jan 2005/06	Feb – June 2006

The ProSeBiCA ACA Model



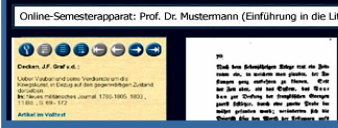
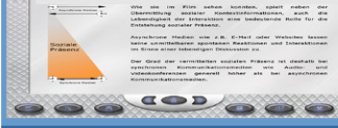
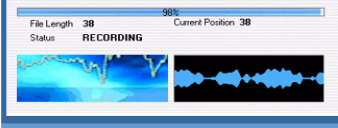
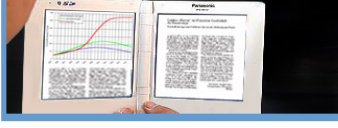
29 attributes and 118 levels, described by texts and images



ACA Survey at Bielefeld University

Four question types: attribute preference levels, attribute importances, paired-comparison trade-off questions, calibration concepts

Example: Rating of attribute preference levels for “media stock”

	<p>Expansion of printed materials: Increased expansion of the stock of printed monographs, bibliographies, journals and newspapers.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>Expansion of printed objects</p>
	<p>Expansion of digital objects: Increased expansion of the stock of digital media, especially in the area of journals and newspapers.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>Expansion of digital objects</p>
	<p>On-line reading lists: Provision of the contents of reading lists in the conventional way and additionally on-line – i.e. in digitized form.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>Contents of reading lists</p>
	<p>Educational software: In addition to the media currently offered, subject specific on-line courses and educational software from external suppliers are provided on CD and DVD.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>Educational software</p>
	<p>Radio archive: In addition to the media currently offered, radio and TV broadcasts relevant to teaching or research (e.g. Horizon) are recorded and made available in digital form.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>TV and radio archive</p>
	<p>E-books: In addition to the media currently offered, more electronic books will be brought into the library collection and made available on-line.</p>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>	<p>E-books</p>

ACA Survey at Bielefeld University

The sample

- Survey period: Oct. 13 – Dec. 10, 2004
- # of participants: $N = 2,120$
(students: 1,685; scientists: 174; others: 261)
- Sample representativeness: high ($p < 0.1$ for all demographics)

Demographics & additional questions: all

Provision of media

37 levels ($N = 578$)

Communication

24 levels ($N = 455$)

Learning and working environment

42 levels ($N = 540$)

Additional services

15 levels ($N = 547$)

General preferences

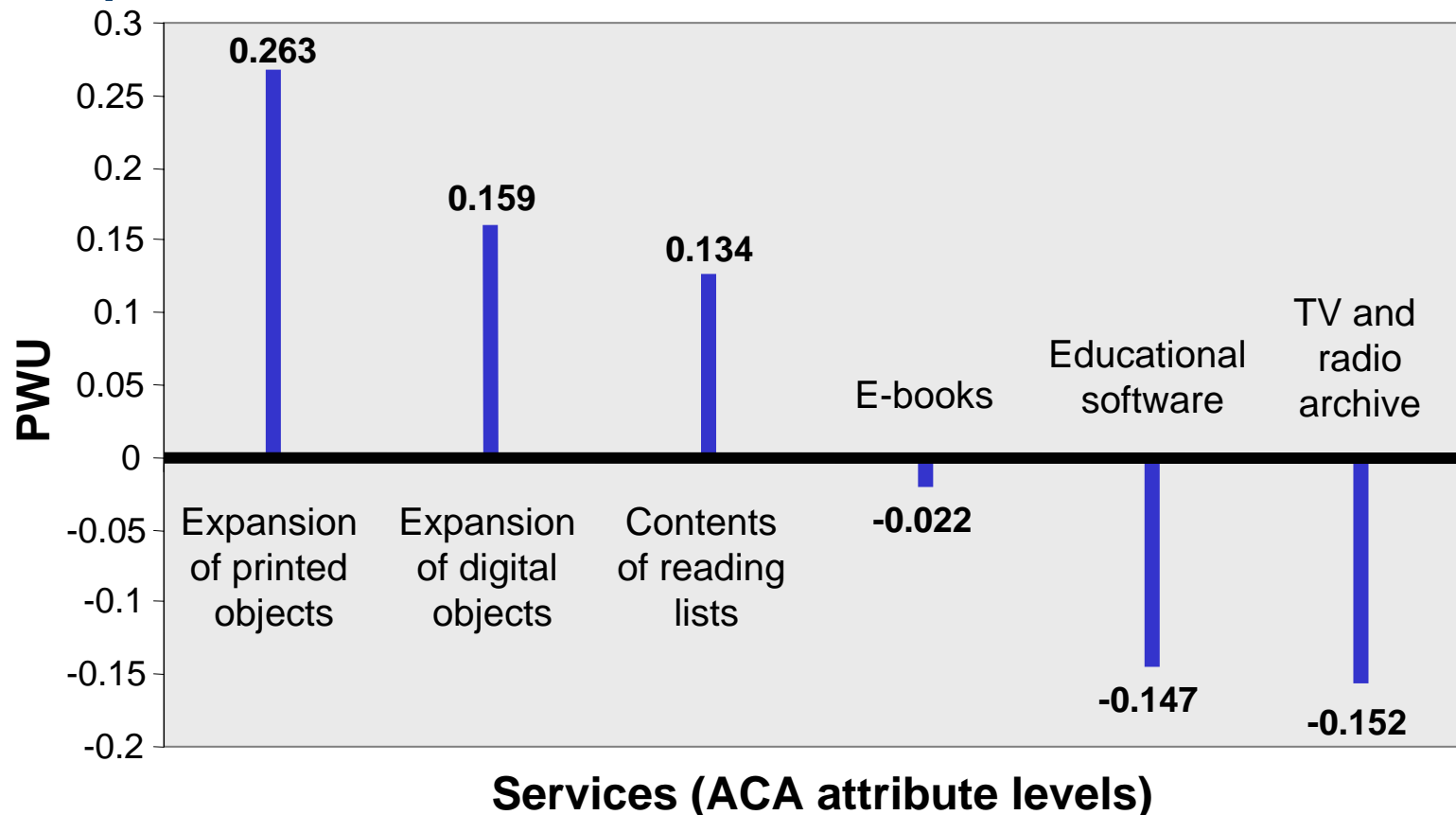
Distinction according to
a-priori segments

Allocation according to
benefit segments

ACA Survey at Bielefeld University

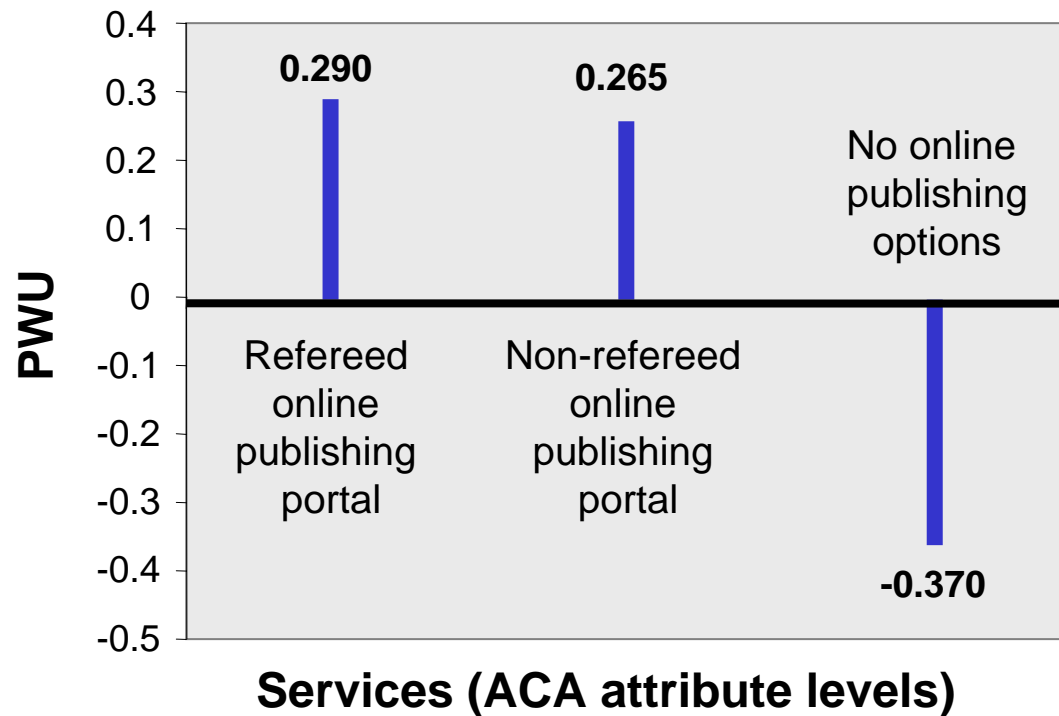
Evaluation of service concepts by means of averaged part-worth utilities (PWU) – general preferences

Example 1: “Media stock related services”



ACA Survey at Bielefeld University

Example 2: "Online publishing related services"

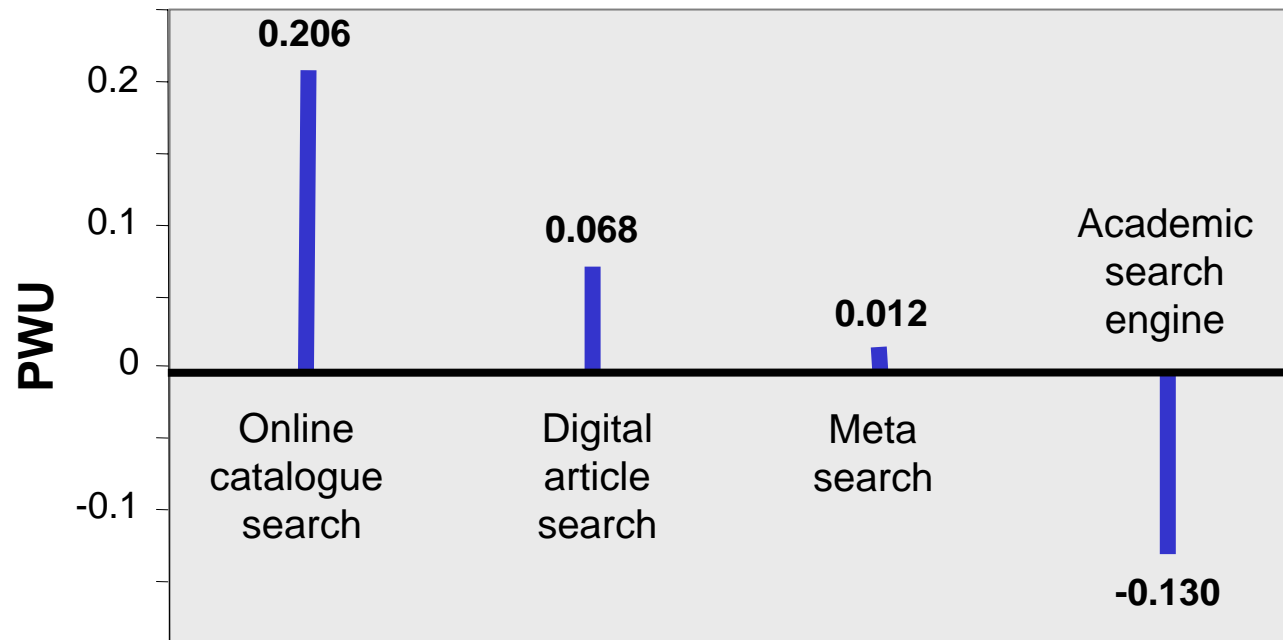


This result strongly supports the library's activities in the field of open access and meets expectations to a great extent, but ...

ACA Survey at Bielefeld University

... sometimes, CA can provide “disillusioning” results as well:

Example 3: “Search facilities related services”




















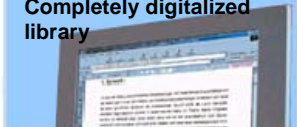
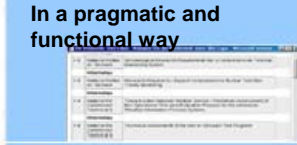
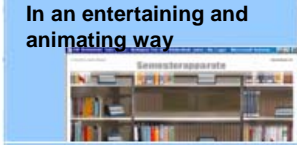
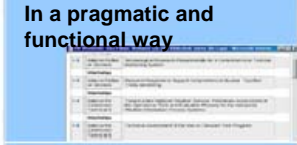
Services (ACA attribute levels)

Preference for the academic search engine does not meet the expectations, i.e. innovations in this field need strong promotion, particularly in a “Google world”.

CBC Survey at Bielefeld University


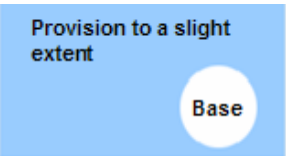



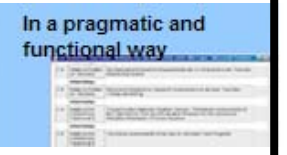

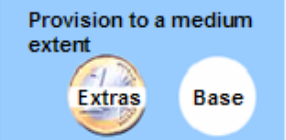
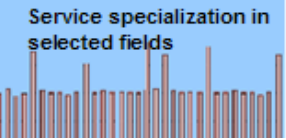

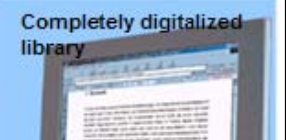
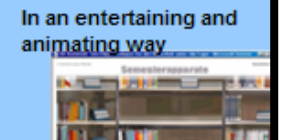

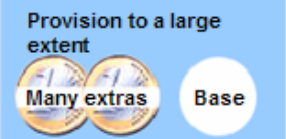
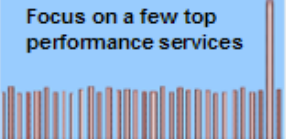

One question type: comparison of full profiles, including a NONE option

If these were your only options, which one would you choose? Choose by clicking one of the buttons below.

Innovation strategy	Reactive 	Selective 	Progressive 	
Add-on services with costs	Provision to a slight extent  Base	Provision to a medium extent  Extras  Base	Provision to a large extent  Many extras  Base	
Degree of specialization	No exposed service specialization 	Service specialization in selected fields 	Focus on a few top performance services 	
Level of support	Unsupported working 	Assisted work 	Task delegation to librarians 	
Degree of digitization	Completely digitalized library 	Conventional library 	Completely digitalized library 	
Presentation of services	In a pragmatic and functional way 	In an entertaining and animating way 	In a pragmatic and functional way 	

CBC Survey at Bielefeld University

PWU's and related "strategy path":

Innovation strategy	Add-on services with costs	Degree of specialization	Level of support	Degree of digitization	Presentation of services
 <p>Reactive</p> <p>-0.663</p>	 <p>Provision to a slight extent</p> <p>Base</p> <p>0.486</p>	 <p>No exposed service specialization</p> <p>0.231</p>	 <p>Unsupported working</p> <p>0.303</p>	 <p>Conventional library</p> <p>1.205</p>	 <p>In a pragmatic and functional way</p> <p>0.300</p>
 <p>Selective</p> <p>0.582</p>	 <p>Provision to a medium extent</p> <p>Extras Base</p> <p>0.676</p>	 <p>Service specialization in selected fields</p> <p>0.791</p>	 <p>Assisted work</p> <p>0.746</p>	 <p>Completely digitalized library</p> <p>-1.205</p>	 <p>In an entertaining and animating way</p> <p>-0.300</p>
 <p>Progressive</p> <p>0.081</p>	 <p>Provision to a large extent</p> <p>Many extras Base</p> <p>-1.161</p>	 <p>Focus on a few top performance services</p> <p>-1.021</p>	 <p>Task delegation to librarians</p> <p>-1.049</p>	<p>Normalized span (NS)</p>	
0.42	0.61	0.60	0.60	1.21	0.30

Basis: HB estimation

(N = 1,672)

Transferability

- The surveys have shown that CA can be successfully adapted to the basic conditions of Bielefeld University Library, but further questions still remain to be answered:

Contents:

Are the available results unique to Bielefeld?

Is it possible to derive some general advice for the development of new library services?

Method:

Is the analysis and simulation framework flexible enough to be used by other academic libraries (in Germany)?

- To answer these questions a reference survey was conducted at Cottbus University
... by co-operating with the local Information, Communication & Media Center and the Chair of Marketing & Innovation Management

The Combined Surveys at Cottbus University

- Full range ACA and CBC survey
 - with few, slight modifications (e.g. illustrations)
 - German and English implementations
- Survey period: Nov. 3, 2005 – Jan. 4, 2006
- # of participants: $N = 1,128$
(students: 843; scientists: 141; others: 144)
- Sample representativeness: high ($p < 0.1$ for most demographics)

- Demographics & additional questions: **all**
 - ACA survey: Provision of media: $N = 196$
 - Communication: $N = 196$
 - Learning and working environment: $N = 201$
 - Additional services: $N = 184$

 - CBC survey: $N = 351$

Contrasting Bielefeld and Cottbus Study

Degree of Convergence:

- Average rank correlation between Bielefeld ACA and Cottbus ACA (for shared attributes): $r = 0.85$
- ... and between Bielefeld CBC and Cottbus CBC: $r = 0.96$

Implications for service development:

- Individual preferences are partly determined by local conditions (e.g. the fields of study)
- Generalizability of the ACA results:
 - lowest for “learning and working environment” ($r = 0.68$)
 - highest for “communication” ($r = 0.94$)
- High cross-study homogeneity for scientists’ preferences

Implications for strategic positioning:

- Generalizability of the CBC results can be taken for granted
- Outstanding significance of the “degree of digitization”

Some Simulation Results

ACA-based utilization probabilities:

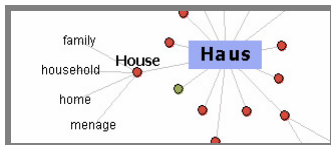
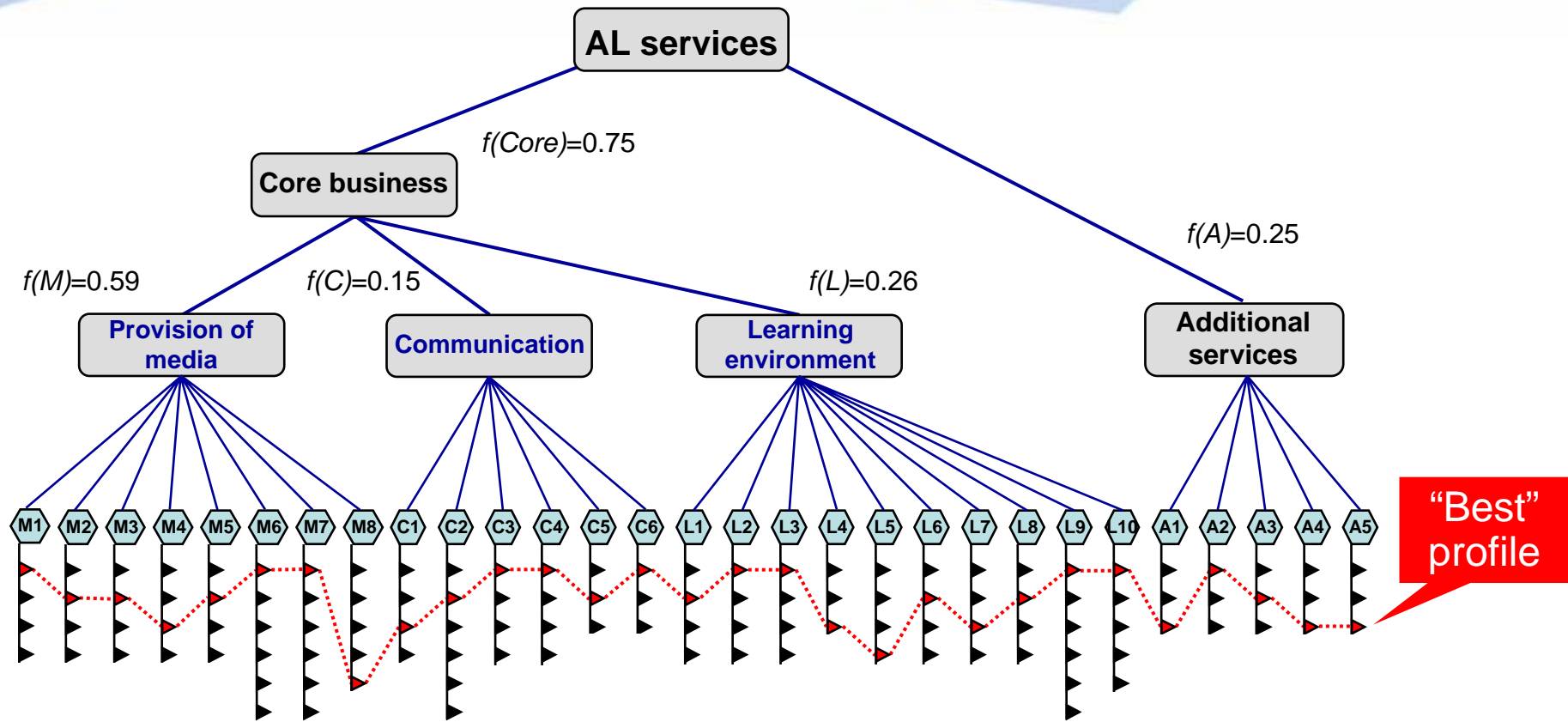
Bielefeld	Students (N = 1,581)	Scientists (N = 167)	Others (N = 232)	Total (N = 1,980)
Worst Profile	35.95 %	32.66 %	36.63 %	35.96 %
Best Profile	72.31 %	70.87 %	70.82 %	72.16 %
Real Library	60.29 %	64.83 %	60.10 %	60.74 %

⇒ (Relative) Improvement potential: **31.55 %**

Cottbus	Students (N = 732)	Scientists (N = 123)	Others (N = 119)	Total (N = 974)
Worst Profile	36.28 %	30.02 %	37.31 %	35.93 %
Best Profile	72.82 %	71.01 %	73.05 %	72.87 %
Real Library	59.28 %	56.91 %	57.83 %	58.62 %

⇒ (Relative) Improvement potential: **38.58 %**

The "Ideal" Bielefeld University Library



$PWU_{M2,2} = 0.165$

NS = 0.07



$PWU_{C4,1} = 0.411$

NS = 0.18



$PWU_{L5,4} = 0.283$

NS = 0.14



$PWU_{A1,3} = 0.251$

NS = 0.12

Concluding Remarks

Methodical implications:

- The abstractness/intangibility of many services is a special challenge in conducting CA in libraries.
- ACA can be integrated in a hierarchical framework to account for the large-number-of-attributes-problem ($r_{ACA,AHP} \geq 0.95$).
- CBC enables realistic strategy simulations without “economic” risk.

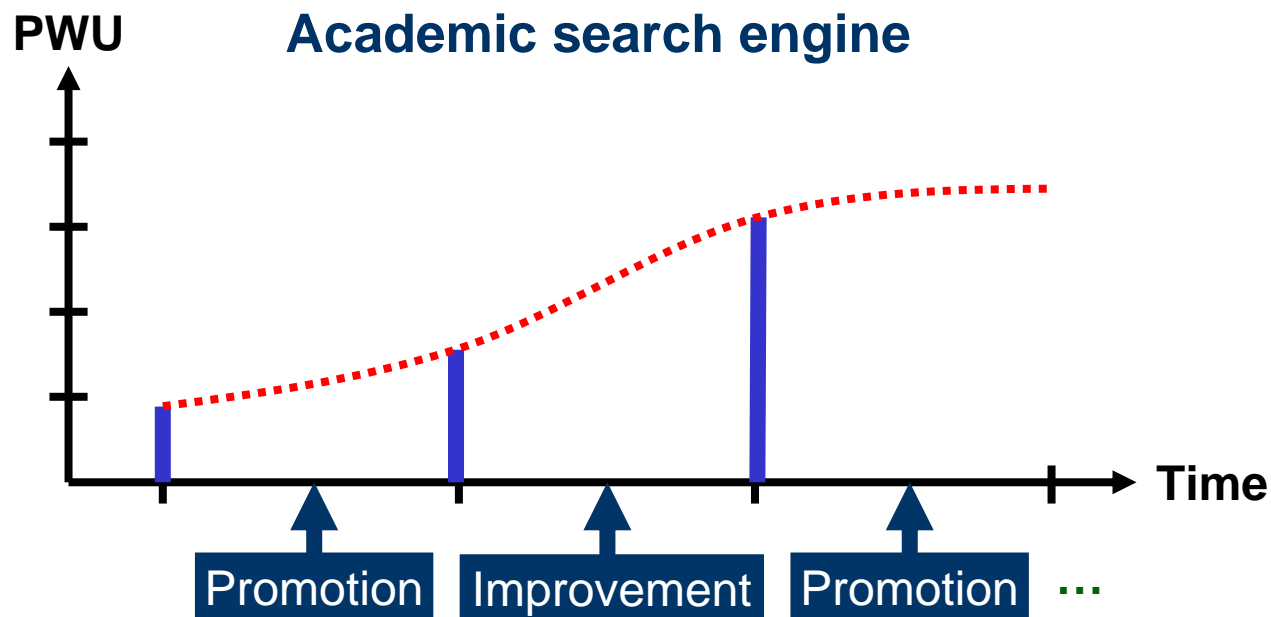
Managerial implications:

- Local conditions determine local preferences, so me-too innovations can only be the second best option for new service development. (further evidence: “public library study 2005”; $N = 2,015$)
- The ProSeBiCA approach cannot guarantee the success of new service ideas, but it can help to anticipate their presumptive acceptance.

Concluding Remarks

Open challenges (from a scientific point of view):

- Prediction of demand volumes
- More comprehensive consideration of costs and satiation effects
- Representation of interactions between different service areas
- Temporal monitoring of preference and acceptance



Future Prospects

Depending on the availability of adequate resources, we would like to

- ... adapt the ProSeBiCA approach to other library systems, e.g. in the US
- ... “synchronize” the ProSeBiCA approach with the techniques offered by CAPM and LibQUAL+, where possible
- ... improve customer intelligence by integrating preference, circulation, and administrative data within a data warehouse
- ... build an interactive website providing tools for data-based decision support and monitoring

More information at www.prosebica.de

ProSeBiCA Papers (Selection)

Decker, R. and Hermelbracht, A., Planning and Evaluation of New Academic Library Services by Means of Web-Based Conjoint Analysis, forthcoming, *Journal of Academic Librarianship*.

Decker, R. and Hoepfner, M., Strategic Planning and Customer Intelligence in Academic Libraries, forthcoming: *Library Hi Tech*.

Hermelbracht, A. and Senst, E., Ideas for Innovative Services in Academic Libraries, *Bibliotheksdienst*, Vol. 39, No. 1, 2005 (in German).

Hermelbracht, A. and Koeper, B., The Use of Conjoint Analysis in Academic Libraries – Improving the Image by Service Development „Close to the Customer“, in: Luelfing, D. and Siebert, I. (eds.): Proceedings of the 94. Deutscher Bibliothekartag, Frankfurt, 2006 (in German).

Hermelbracht, A. and Senst, E., The ProSeBiCA-Project, in: Gupta, D.K. et al. (eds.), *Marketing Library and Information Services: International Perspectives*, Munich, 2006.