Information Services: 
Customer Intelligence and Strategic Planning

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Bielefeld
The Wind of Change ...

- Information Technique
  - Information Market
  - Customer Perception

- Company Conditions
  - Budgetary Constraints
  - Input-Output-Orientation

... Forces New Strategies
Strategic Planning ...

• Appropriate vs. Advanced Services
  – Customer Relationship and Satisfaction
  – State of the Art (and Beyond?)
  – Skills and Resources of the Library

• Expectations vs. Behaviour of Customers
  – Traditional Views of Libraries
  – Internet-Oriented Everyday Life
  – Poor Information Competence

... Entails Effective and Efficient Services
The Customer‘s Point of View ...

• Public Surveys on
  – *Satisfaction with Established Services*
    • INFAS
    • LibQual+
  – *Preferred Services and Action Lines*
    • Conjoint-Analysis (DFG-Project, Bielefeld)
      – *Adaptive Conjoint-Analysis*
      – *Choice-Based Conjoint-Analysis*

• Measurement of Behaviour
  – *Data Warehouse*

... Must Be Accompanied by Expertise
Customer’s Preferences! ????

- Conjoint-Analysis with Respect to Searching
  - Catalog, Articles, Meta-Search, Search Engine
Effectivity of Services ...

• Mission Statement
  – Guiding Principles
  – Address of Services

• Catalog of Services
  – Recognition, Transparency, and Reliability
  – Depending on Demands, Skills, and Resources

• Service Level Agreements
  – Measurements of Services
  – Reliability of Resources

... Has to Be Accepted by all Parties
**Discussing Effectivity ...**

- Generating Ideas of Services
  - *Screening the Environment*
  - *Expertise from Employees*
    - Matching with Expectations and Skills

- Finding Proper Services
  - *Staff Meetings, Steering Group*
  - *Working Groups, Editorial Group*
    - Description of 200 „Services“ (or Routines)
    - Consolidation to Catalog of 50 Services

... Needs Involvement of Staff
Catalog of Services

• Content
  – The (General) Library
    • Scientific Literature
    • Comfortable Search
    • Customer Assistance
  – My Library
    • Personalized Portal/Services
    • Services on Demand
  – A Place to Work ...
    • Structure and Specialities
    • Research, Instruction, and Study
    • General Equipment
# A Service Description

<table>
<thead>
<tr>
<th>Produktname</th>
<th>Bücher, Zeitschriften, Artikel (inkl. Neuerscheinungen)</th>
<th>1.1.1.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produktgruppe</td>
<td>Die Bibliothek&lt;br&gt; Sie finden bei uns&lt;br&gt; Wissenschaftliche Literatur und mehr</td>
<td>1&lt;br&gt; 1.1&lt;br&gt; 1.1.1</td>
</tr>
<tr>
<td>Sie suchen (Ziele)</td>
<td>Sie möchten sich einen Überblick verschaffen, ob und wo zu einem bestimmten Thema Literatur vorhanden ist.</td>
<td></td>
</tr>
<tr>
<td>Wir bieten (Was und wie)</td>
<td>In unseren fachübergreifenden Datenbanken können Sie nach Büchern, Zeitschriften, Zeitschriftenaufsätzen und anderen Veröffentlichungen suchen, die in der Universitätsbibliothek Bielefeld vorhanden, über Fernleihe aus anderen Bibliotheken bestellbar oder frei im Internet zugänglich sind.</td>
<td></td>
</tr>
<tr>
<td>Zielgruppen</td>
<td>Alle&lt;br&gt; Studienanfänger (1.-3. Semester)&lt;br&gt; Fortgeschrittene Studierende inkl. Examenskandidaten&lt;br&gt; Tutors / Hilfskräfte&lt;br&gt; Wissenschaftler&lt;br&gt; Sonstige Hochschulangehörige&lt;br&gt; Schüler&lt;br&gt; Externe</td>
<td></td>
</tr>
</tbody>
</table>

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Efficiency of Performance ...

• Analysis and Optimisation
  – Transactions and Workflow
    • Organisational Development
    • Personnel Development

• Controlling
  – Customer Satisfaction
  – Performance Indicators
    • Reengineering of Business
    • Readjustment of Objectives

... Must Be Proofed Again and Again
Discussing Efficiency ...

- Identifying Fields of Activities
  - Assistance of Customers
  - Performance Indicators
  - Data Processing as a Foundation of Most Services

- Course of Discussion
  - Weak-Point Analysis
  - Necessity of Transactions and Workflow so far
  - Interdependence of Quality and Resources

... Must be Based on
Confidence of Staff and Acceptance of Customers
Customer intelligence and DS

What does “customer intelligence” mean?

“CI aims at gaining a comprehensive understanding of customers by means of intelligent tools, which enable a more pointed customer contact and a higher degree of customer loyalty.”

Questions to be answered:

- Who are the customers?
- What needs do the customers have?
- How do they use the library services?
- How loyal are the customers?
- Who are the “valuable” customers?

(Tomczak/Christofolini 2002; Janal 2000)

(IBM 2005)
Customer intelligence and DS

CI and CRM:

Forrester Research (2005): “… 98 % of the marketers rate customer analysis and analytics as the most important database element in producing successful results.”

The problem:

- No unanimous understanding of CI in science
- No clearly defined set of CI methods

But: Consensus regarding the use of data warehouse and data mining techniques in CI discussions
Customer intelligence and DS

The knowledge source:
1. Search and orientation
2. “Purchase”
3. Utilization and satisfaction
4. “Repeat purchase”

Resulting tasks:
- Exact process definition
- Location and evaluation of customer information
- Method selection and application
Customer intelligence and DS

Data warehousing in libraries:

- Service usage and circulation data
- Customer survey data
- Administrative data

Transformation programs

Data Warehouse (Data base)

Disaggregated data (archives)

Meta data base

Generating customer intelligence for decision support in library management

Ad hoc queries

OLAP

Data Mining

Interactive reporting system

Intelligent user guidance

(LiMIS = Library Management Information System)
Customer intelligence and DS

OLAP of library data:

Institute or department
- Biology
- Chemistry
- Physics

Media usage
- Monographs
- Textbooks
- Encyclopedia
- Journals
- CD-ROM/DVD

Quarter
1 2 3 4

350 590 1470 240

Quarter
3
1470

480 530 460

3rd Quarter

Slicing
Drilling down
Rolling up
**Customer intelligence and DS**

CI development process:

1. Identifying the relevant data structures
   - data heterogeneity

2. Determining the practical demands to LiMIS
   - information type and aggregation level

3. Implementing the data warehouse
   - separation of operative systems and DSS
   - definition of data syntax and semantics

4. … the transformation interface
   - adequate level of automation
Customer intelligence and DS

5. … an OLAP and data mining front-end
   ? process model (goal driven vs. data driven)

6. … a data mining “toolbox”
   ? selection of adequate fields and methods

7. Design of survey and observation techniques
   ? dealing with qualitative data / latent information

8. Implementing a reporting system
   ? hierarchy of relevance
   ? concepts of interestingness
Conclusion:
Meeting the CI challenge in libraries is much more than investing in modern IT infrastructure.
# Data warehousing success

Study by Ariyachandra/Watson 2006:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of items</th>
<th>Range of ratings or values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information quality</td>
<td>9</td>
<td>4.19 – 5.63 (Ø 5.04)</td>
</tr>
<tr>
<td>System quality</td>
<td>9</td>
<td>5.04 – 5.90 (Ø 5.39)</td>
</tr>
<tr>
<td>Individual impacts</td>
<td>5</td>
<td>5.03 – 5.91 (Ø 5.59)</td>
</tr>
<tr>
<td>Organizational impacts</td>
<td>6</td>
<td>4.53 – 5.50 (Ø 5.19)</td>
</tr>
<tr>
<td>Development costs</td>
<td>(3 arch.)</td>
<td>$ 1.4 – 2.4 million</td>
</tr>
<tr>
<td>Development time</td>
<td>(3 arch.)</td>
<td>8.8 – 11.4 months</td>
</tr>
</tbody>
</table>

Item 6: “Your data warehouse provides all the data needed by users and applications.”

Item 20: “Users can access the data more easily and quickly because of the data warehouse.”

(N = 454)
### DS with primary data

Preference measurement in academic libraries:

<table>
<thead>
<tr>
<th>Expansion of printed objects</th>
<th>Expansion of digital objects</th>
<th>Online reading lists</th>
<th>Educational software</th>
<th>Radio-archive</th>
<th>E-books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textbooks, dictionaries, and periodicals</td>
<td>Digital media, especially e-books and magazines</td>
<td>Online lists of recommended readings</td>
<td>Software for educational use</td>
<td>Radio archives</td>
<td>E-books currently offered for digital access (e.g., journals)</td>
</tr>
</tbody>
</table>

- ACA and CBC
- N \( \geq 3500 \) (academic library users)

-(Decker/Hermenbracht 2005)
DS with primary data

- Evaluation of service concepts by means of averaged part-worth utilities

<table>
<thead>
<tr>
<th>Services (ACA attribute levels)</th>
<th>Part-worth utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expansion of printed objects</td>
<td>0.263</td>
</tr>
<tr>
<td>Expansion of digital objects</td>
<td>0.159</td>
</tr>
<tr>
<td>Online reading lists</td>
<td>0.134</td>
</tr>
<tr>
<td>E-books</td>
<td>-0.022</td>
</tr>
<tr>
<td>Educational software</td>
<td>-0.147</td>
</tr>
<tr>
<td>Radio-archive</td>
<td>-0.152</td>
</tr>
</tbody>
</table>
Preference measurement in public libraries:

- **Must!**
  - Persönliche Auskunft
  - Online-Katalog
  - Online-Fernleihe
  - Medienkonto
  - E-Mail-Auskunft

- **Nice to have!**
  - Selbstverbuchungsplatz
  - Hotline
  - Professioneller Recherchedienst

- **Check!**
  - Internetseite
  - Online-Datenbanken
  - Multifunktionale Benutzerkarte
  - Forum

- **Self-explication**
- **N = 1490** (online)
- **N = 525** (p&p)

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(Decker et al. 2005)
Library acquisition budget allocation:

- Circulation database mining with ID3

<table>
<thead>
<tr>
<th>Department</th>
<th>Concentration</th>
<th>Connection</th>
<th>Budget [NTD]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public communication</td>
<td>2.1175 (max.)</td>
<td>1.5175 (low)</td>
<td>44 469 (min.)</td>
</tr>
<tr>
<td>Industrial management</td>
<td>2.0299 (medium)</td>
<td>2.3211 (low)</td>
<td>61 453 (low)</td>
</tr>
<tr>
<td>Fiber engineering</td>
<td>2.0271 (medium)</td>
<td>3.2114 (medium)</td>
<td>80 779 (medium)</td>
</tr>
<tr>
<td>Environmental engineering</td>
<td>1.9923 (low)</td>
<td>6.3602 (max.)</td>
<td>149 001 (max.)</td>
</tr>
</tbody>
</table>

Premise: The more a department makes use of its acquired materials in the present, the more budget it can get in the future.

(Kao/Chang/Lin 2003)
**DS with secondary data**

Pattern mining in media usage data:

- 3773 book profiles (34 items)
- Self-organizing neural network → 11 “prototypes”

<table>
<thead>
<tr>
<th>Items</th>
<th>Prototype 1</th>
<th>Prototype 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(short forms of statements)</td>
<td>(2655)</td>
<td>(126)</td>
</tr>
<tr>
<td>Number of available copies</td>
<td>1.20</td>
<td>2.10</td>
</tr>
<tr>
<td>Number of pages</td>
<td>250</td>
<td>375</td>
</tr>
<tr>
<td>Last edition</td>
<td>1.12</td>
<td>2.25</td>
</tr>
<tr>
<td>Year of publication</td>
<td>1991</td>
<td>1994</td>
</tr>
<tr>
<td>Total number of lendings</td>
<td>0.89</td>
<td>5.25</td>
</tr>
<tr>
<td>Number of reservations</td>
<td>0.04</td>
<td>0.66</td>
</tr>
<tr>
<td>Number of biweekly lendings</td>
<td>0.13</td>
<td>5.19</td>
</tr>
<tr>
<td>Number of copies lent during the term</td>
<td>0.57</td>
<td>3.70</td>
</tr>
</tbody>
</table>

(Decker/Hermelbracht 2004)
Thank You, ... and don’t forget

When the wind of change blows,

some build walls,

others windmills.

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