Information Systems Group

Hasso Plattner Institut | Universität Potsdam

Data Quality and Data Cleansing

4.6.2013

Felix Naumann

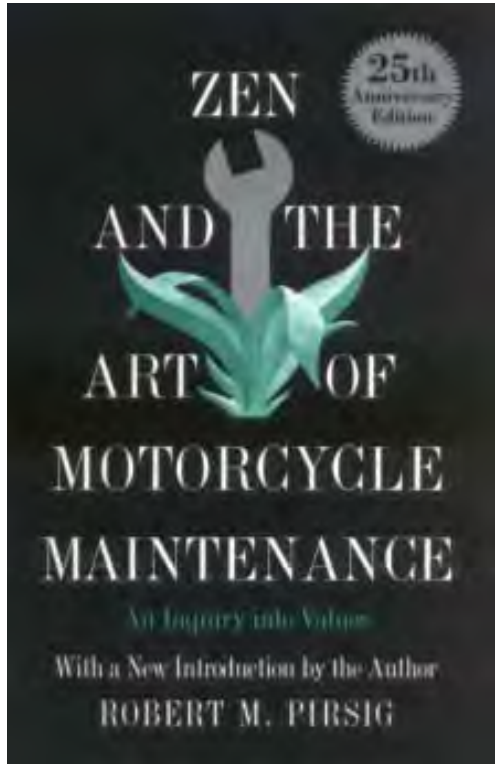
Overview

- Information quality
- IQ criteria
- IQ assessment
- Cleansing tasks
- IQ anecdotes

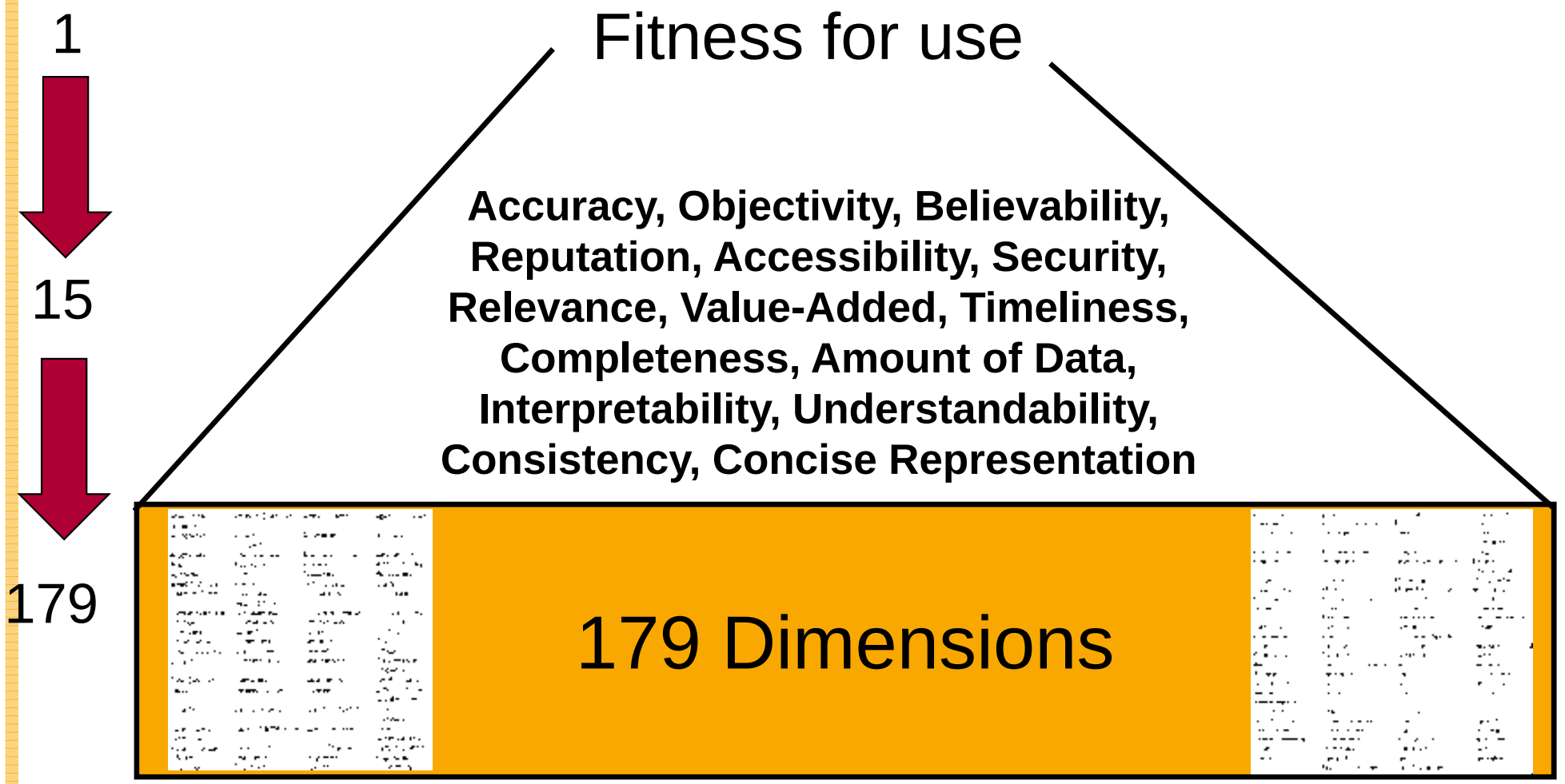
Quality

"Even though quality cannot be defined, you know what it is."

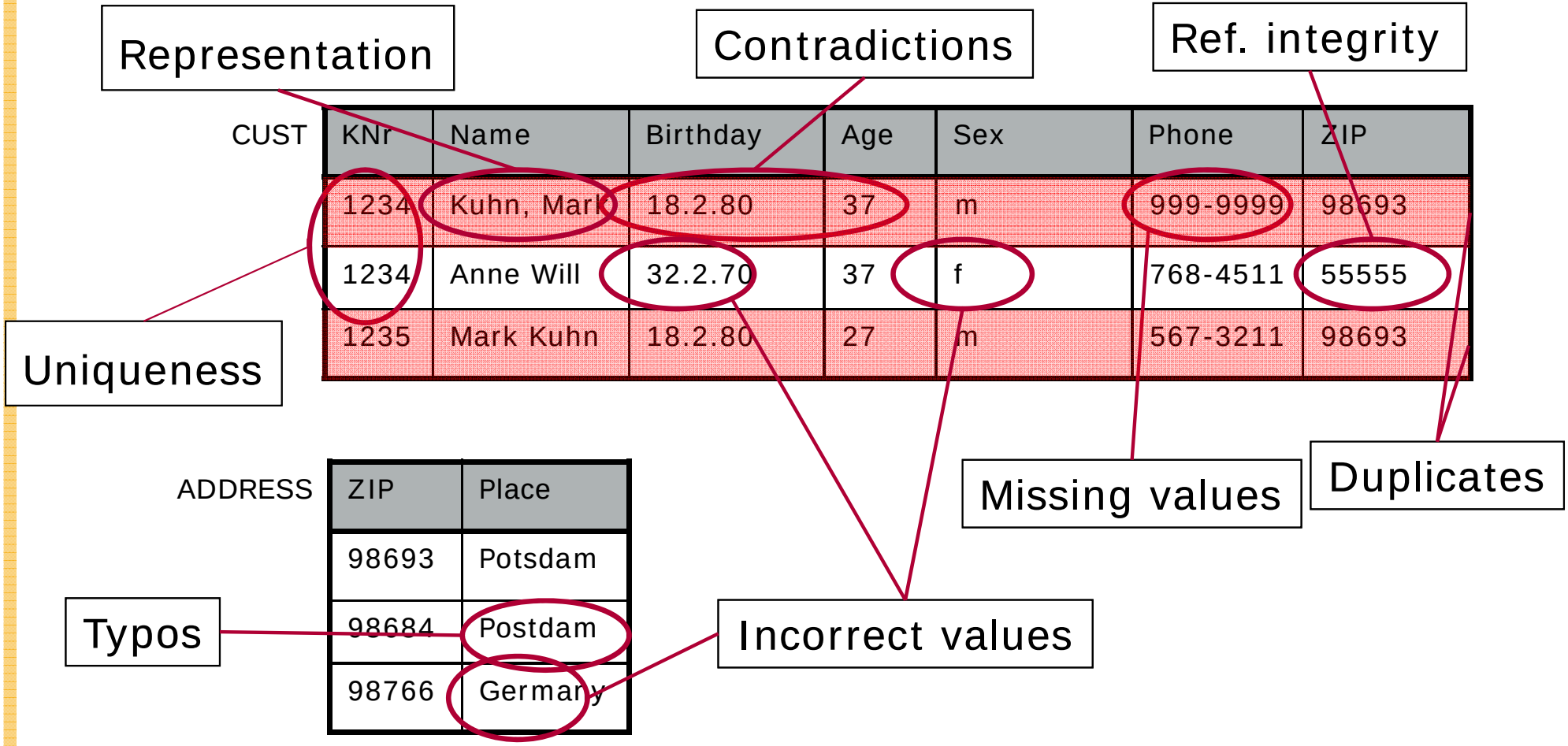
Robert Pirsig



Zooming into Information Quality



Data Quality: Problems



CUST

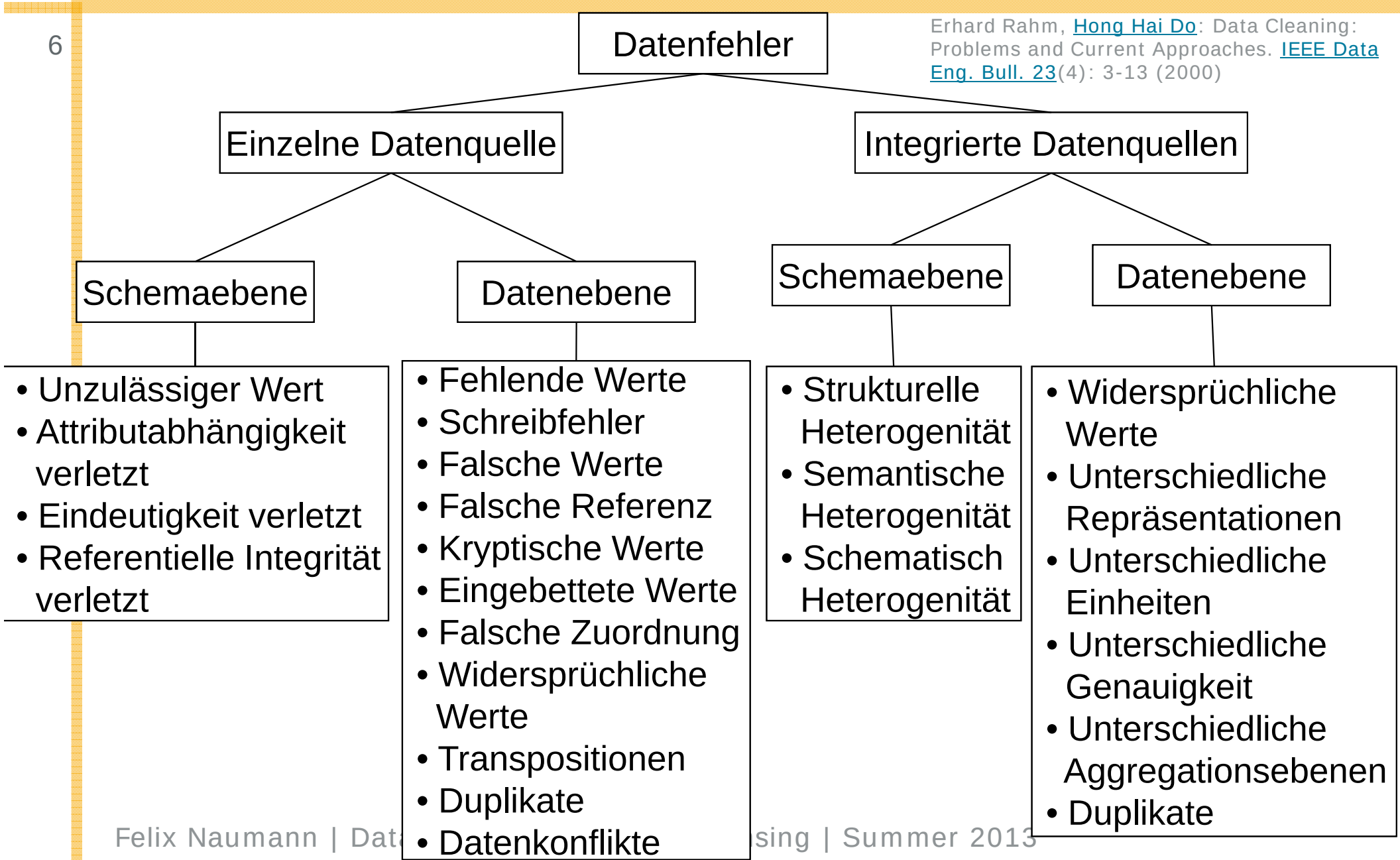
KNr	Name	Birthday	Age	Sex	Phone	ZIP
1234	Kuhn, Mark	18.2.80	37	m	999-9999	98693
1234	Anne Will	32.2.70	37	f	768-4511	55555
1235	Mark Kuhn	18.2.80	27	m	567-3211	98693

ADDRESS

ZIP	Place
98693	Potsdam
98684	Postdam
98766	Germany

Classification of Errors

Erhard Rahm, Hong Hai Do: Data Cleaning: Problems and Current Approaches. IEEE Data Eng. Bull. 23(4): 3-13 (2000)



DQ-Problems: Effects

- Incorrect prices in inventory retail databases [English 1999]
  - Costs for consumers 2.5 billion $
  - 80% of barcode-scan-errors to the disadvantage of consumer
- IRS 1992: almost 100,000 tax refunds not deliverable [English 1999]
- 50% to 80% of computerized criminal records in the U.S. were found to be inaccurate, incomplete, or ambiguous. [Strong et al. 1997a]
- US-Postal Service: of 100,000 mass-mailings up to 7,000 undeliverable due to incorrect addresses [Pierce 2004]

IRS might be after you — to mail you a check

Incorrect addresses stall nearly 1,500 Tennessee refunds

By BONNA de la CRUZ
Staff Writer

Now that Tilcia L. Menifee knows that she'll be getting $500 in a tax refund from Uncle Sam, she can do some Christ-mas shopping, she said.

Hidden values / hidden value

	Feld						
Datenelement	**Name1**	**Name2**	**Name3**	**Ortsname**	**Ortsteil**	**Straße**	**Summe**
Handy-Nummer	41	501	10	0	**2677**	297	3526
Festnetznummer	15	98	6	0	**221**	9579	9919
Kostenstelle	283	1112	73	2	**87**	16	1573
Registriernummer	11	583	1	1	**0**	3	599
Lieferungsnummer	55	390	9	0	**212**	15	681
Abteilung	3711	**9997**	115	60	**439**	175	14497
Sperrkennzeichen	129	143	2	0	**66**	9	349
Löschkennzeichen	1028	442	5	36	**113**	10	1634
Rechtsform	**131700**	66136	187	6	**64**	57	198150
Kreditoreninfo	0	100	11	0	**18**	0	129
Kommissionsinfo	216	352	1	2	**36**	10	617
Baustelle	2013	3452	42	5	**124**	222	5858
Abladestelle	2923	3808	94	1503	**958**	3065	12351
Behörde	13410	12461	172	19	**295**	7075	33432
Summe	155535	99575	728	1634	**5310**	20533	

Source: Joachim Schmid, FUZZY! Informatik AG

DBMS Quality vs. Quality of Integrated Data

DBMS		IIS
Complete (assumed)	⟺	Incomplete
Accurate	⟺	Inaccurate
Trusted	⟺	Untrusted
Fast	⟺	Slow
Free	⟺	Possible cost

High expectations
High quality

Low expectations
Low quality

Cost of Dirty Data

- A.T. Kearny: 25%-40% of operative costs due to poor DQ.
- Data Warehouse Institute: Industry and administration in US lose 600 billion USD annually.
- SAS study: Only 18% of German companies trust their own data.
- AT&T (70s): 20-30% of all phone lines unused due to poor data.
- 80% of all hospital records contain errors.
- ...

Overview

- Information quality
- IQ criteria
- IQ assessment
- Cleansing tasks
- IQ anecdotes

Information Quality (IQ)

- What is information quality ?
  - „Fitness for use“
  - “User satisfaction”
  - Application-dependent

IQ := {Understandability, Reputation, Reliability, Timeliness, Availability, Price, Consistency, Coverage, Response time, Density, Completeness, Amount, Accuracy, Relevancy, ... **}**

Classifying Information Quality Criteria

- Semantic-oriented classification (TDQM, Requirement survey)
- Process-oriented classification (MBIS, Weikum)
- Goal-oriented classification (DWQ, SCOUG, Chen et al.)

- TDQM (semantic-oriented)
  - intrinsic quality
  - accessibility
  - contextual quality
  - representational quality
- Mediator-based Information Systems (processing-oriented)
  - source-specific
  - view-specific
  - attribute-specific

Category	IQ Criteria	TDQM	MBIS	Weikum	DWQ	SCOUG	Chen
Content-related Criteria	Accuracy	Yes	Yes	Yes	Yes	Yes	Yes
	Documentation					Yes	
	Relevancy	Yes	Yes		Yes		Yes
	Value-Added	Yes				Yes	
	Completeness	Yes	Yes	Yes	Yes	Yes	Yes
	Interpretability	Yes			Yes		
Technical Criteria	Timeliness	Yes	Yes	Yes	Yes	Yes	Yes
	Reliability			Yes			
	Latency			Yes			Yes
	Performability			Yes		Yes	
	Response time		Yes	Yes			Yes
	Security	Yes		Yes	Yes		
	Accessibility	Yes	Yes	Yes	Yes	Yes	
	Price		Yes	Yes		Yes	
	Customer Support					Yes	
Intellectual Criteria	Believability	Yes	Yes	Yes	Yes	Yes	
	Reputation	Yes	Yes		Yes		
	Objectivity	Yes					
Instantiation related Criteria	Verifiability			Yes			
	Amount of data	Yes	Yes				Yes
	Understandability	Yes	Yes				
	Concise represent.	Yes					
	Consistent represent.	Yes	Yes	Yes	Yes	Yes	

An assessment-oriented classification

- 3 sources for IQ scores
  - The user (subject)
  - The source (object)
  - The query process (predicate)
- 3 classes
  - Subjective criteria (Understandability)
  - Objective criteria (Completeness)
  - Measurable criteria (Response time)

IQ Classification of Wang and Strong

- Intrinsic IQ
  - Believability, Accuracy, Objectivity, Reputation
- Contextual IQ
  - Value-added, Relevancy, Timeliness, Completeness, Amount
- Representational IQ
  - Interpretability, Understandability, Repr. Consistency, Repr. conciseness
- Accessibility IQ
  - Accessibility, Security

Wang, R. Y. & Strong, D. M.
Beyond Accuracy: What data quality means to data consumers
Management of Information Systems, 1996*, 12(4)*, 5-34

Content-based IQ Criteria

…concern the actual data.

Accuracy
- is the extent to which data is correct, reliable, and certified free of error. [WS96]

Completeness
- is the extent to which data is not missing and is of sufficient breadth, depth, and scope for the task at hand. [WS96]

Customer support
- is the amount and usefulness of human help via email or telephone.

Documentation
- is the amount and usefulness of documents with metadata.

Interpretability
- is the extent to which data is in appropriate languages, symbols, and units, and the definitions are clear. [WS96]

Relevancy (or relevance)
- is the extent to which data is applicable and helpful for the task at hand. [WS96]

Reliability
- is the degree to which the user can trust the information

Value-Added
- is the extent to which data is beneficial and provides advantages from its use. [WS96]

Technical IQ Criteria

…concern software and hardware.

Accessibility (or availability)

- of a DBMS is the probability that a feasible query is correctly answered in a given time range.
- Is the extent to which data are available or easily and quickly receivable [WS96].

Latency

- is the amount of time in seconds from issuing the query until the first data item reaches the user

Price (cost effectiveness)

- is the amount of money a user has to pay for a query.
- is the extent to which the cost of collecting appropriate data is reasonable [WS96].

Response time

- measures the delay in seconds between submission of a query by the user and reception of the complete response from the IS.

Security

- is the extent to which access to data is restricted appropriately to maintain its security [WS96].

Timeliness

- is the extent to which the age of the data is appropriate for the task at hand [WS96].

Intellectual IQ Criteria

...concern subjective aspects.

Believability

- is the extent to which data is regarded as true, real, and credible [WS96].

Objectivity

- is the extent to which data is unbiased, unprejudiced, and impartial [WS96].

Reputation

- is the extent to which data is trusted or highly regarded in terms of its source or content [WS96].

Instantiation-related IQ Criteria

...concern the presentation of retrieved data.

Amount of data

- is the extent to which the quantity or volume of available data is appropriate [WS96].

Representational conciseness

- is the extent to which data is compactly represented without being overwhelming [WS96].

Representational consistency

- is the extent to which data is always represented in the same format and are compatible with previous data [WS96].

Understandability (ease of understanding)

- is the extent to which data are clear without ambiguity and easily comprehended [WS96].

Verifiability (traceability, lineage)

- Is the extent to which data are well documented, verifiable, and easily attributed to a source [WS96].

IQ Criteria (classical)

- Accuracy
  - Definition:
    - Usually: Percentage of incorrect tuples
    - For integration: Percentage of incorrect data values
  - Assessment:
    - Domain and Constraint Testing
    - Lookup tables
    - Scientific measurements
    - Data-input experience
  - Improvement:
    - Often: Deletion
    - Better: “Data Scrubbing”

IQ Criteria (classical)

- Response Time
  - Definition:
    - Usually: Time until complete query result is received
    - For integration: Latency
  - Assessment:
    - “Cost Calibration”
    - Continuous assessment
  - Improvement:
    - Source selection
    - Classical optimization
    - Federated Optimization

IQ Criteria (new)

- Completeness
  - Definition:
    - Coverage: Number of real world objects represented
    - Density: Number of attributes covered
    - For IIS: NULL-values
  - Assessment:
    - Sampling
    - Existing Metadata
  - Improvement:
    - Source selection
    - “Best k” vs. “k best”

IQ Criteria (new)

- Reputation / Trust
  - Definition:
    - Reputation: Memory and summary of behavior from past transactions
    - Trust: Expectation about future behavior
  - Assessment:
    - Individual experience
    - Corporate guidance
    - Trust-networks
  - Improvement:
    - ???

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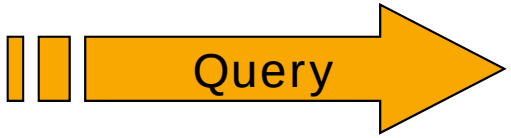
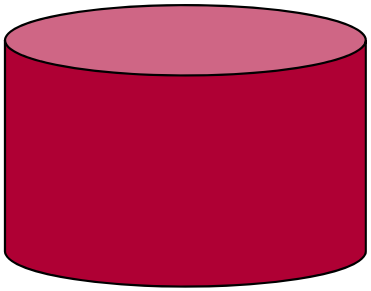
IQ-Assessment

Subject	Process	Object
		
• Relevance • Trustworthiness • …	• Availability • Response time • …	• Completeness • Timeliness • …

Assessment Class	IQ Criterion	Assessment Method
Subject Criteria	Believability	User experience
	Concise representation	User sampling
	Interpretability	User sampling
	Relevancy	Continuous user assessment
	Reputation	User experience
	Understandability	User sampling
	Value-Added	Continuous user assessment
Object Criteria	Completeness	Parsing, sampling
	Customer Support	Parsing, contract
	Documentation	Parsing
	Objectivity	Expert input
	Price	Contract
	Reliability	Continuous assessment
	Security	Parsing
	Timeliness	Parsing
	Verifiability	Expert input
Process Criteria	Accuracy	Sampling, cleansing techniques
	Amount of data	Continuous assessment
	Availability	Continuous assessment
	Consistent representation	Parsing
	Latency	Continuous assessment
	Response time	Continuous assessment

From [NR00]

Questionnaires

All items are measured on a 0 to 10 scale where 0 is not at all and 10 is completely. Items labels with "(R)" are reverse coded.

Accessibility. (4 items, Cronbach's Alpha=.92)
- This information is easily retrievable.
- This information is easily accessible.
- This information is easily obtainable.
- This information is quickly accessible when needed.

Appropriate Amount. (4 items, Cronbach's Alpha=.76)
- This information is of sufficient volume for our needs.
- The amount of information does not match our needs. (R)
- The amount of information is not sufficient for our needs. (R)
- The amount of information is neither too much nor too little.

Believability. (4 items, Cronbach's Alpha=.89)
- This information is believable.
- This information is of doubtful credibility. (R)
- This information is trustworthy.
- This information is credible.

Completeness. (6 items, Cronbach's Alpha=.87)
- This information includes all necessary values.
- This information is incomplete. (R)
- This information is complete.
- This information is sufficiently complete for our needs.
- This information covers the needs of our tasks.
- This information has sufficient breadth and depth for our tasks.

http://web.mit.edu/tdqm/www/tdqmpub/AIMQJun02.pdf

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Data Cleansing Tasks – Discovery

- Data source discovery
  - Metadata
  - UDDI / matchmaking
- Schema discovery
  - Schema matching and mapping
  - Profiling for metadata (keys, foreign keys, data types, …)
- Data discovery
  - Column-level: Null-values, domains, patterns, value distributions / histograms
  - Table-level: Data mining, rules
- Duplicate detection

Data Cleansing Tasks – Cleaning

- Extraction from sources
  - Technical and syntactic obstacles
- Transformation
  - Schematic obstacles
- Standardization
  - Syntactic and semantic obstacles
- Data fusion / consolidation
  - Semantic obstacles
- Loading into warehouse / presenting to user

But: Human Interaction

- Components to implement
  - Wrappers for technical heterogeneity
  - Schema integration based on correspondences
  - Similarity measure for schema elements
  - Similarity measure for records
- Knobs to turn
  - Thresholds for similarity measures
  - Partition size / window size
- Expert guidance
  - Rule selection / rule specification
  - Schema matching
  - Duplicate detection
  - Data fusion
- All in a nice GUI

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Death by Typo

‘Resurrected,’ but still wallowing in red tape

Government records incorrectly kill off thousands, and there’s no easy fix

By Alex Johnson and Nancy Amons
Reporters
MSNBC and NBC News
updated 6:21 p.m. ET Feb. 29, 2008

For a dead woman, Laura Todd is awfully articulate.

“I don’t think people realize how difficult it is to be dead when you’re not,” said Todd, who is very much alive and kicking in Nashville, Tenn., even though the federal government has said otherwise for many years.

Todd’s struggle started eight years ago with a typo in government records. The government has reassured her numerous times that it has cleared up the confusion, but the problems keep coming.

Story continues below |

Decimals

SPIEGEL ONLINE

28. Januar 2008, 11:27 Uhr

FRANKREICH

Telefonkundin erhält Rechnung über 63 Millionen Euro

Als eine Französin aus Lothringen unlängst ihre Telefonrechnung bekam, blieb ihr buchstäblich die Spucke weg: 63 Millionen Euro sollte sie begleichen. Dabei hatte sie ursprünglich nur um Korrektur einer Abrechnung in Höhe von 67 Euro gebeten.

Paris - "Da muss wohl ein Komma verrutscht sein", zitiert "Le Figaro" heute den Vizedirektor der französischen Telefongesellschaft Télé2, Olivier Anstett. Die Kundin aus dem Ort Herserange in der Nähe von Metz hatte sich zunächst über einen ihrer Meinung nach zu hohen Rechnungsbetrag von 67,69 Euro bei der Telefongesellschaft beschwert. Als eine Antwort ausblieb, schickte sie einen zweiten Brief. Daraufhin erhielt sie eine "korrigierte" Rechnung über die Summe 63.280.067,96 Euro.

"Uns bleibt nur, uns bei der Kundin zu entschuldigen und dafür zu sorgen, dass so etwas nie wieder vorkommt", so der lapidare Kommentar des Vizechefs von Télé2.

Common Sense

Southwest Newspapers

Published on Chanhassen Villager (http://www.chanvillager.com)

Property mistakenly valued at $189 million

By rcraw
Created 12/03/2007 - 4:46pm

Property mistakenly valued at $189 million results in tax adjustments in county

An $18,900 Waconia property that was mistakenly valued at $189 million is "throwing a wrench" into property tax statements and the Carver County budget. County officials issued a press release Monday detailing the problem that came to light last week.

An error was identified in the estimated market valuations used to calculate Pay 2008 Proposed Property Taxes, according to the release. The County Assessor's Office placed an incorrect estimated market value on a parcel located in the city of Waconia, apparently resulting in extra zeroes being added to the value.

The mistake results in an imbalance in the amount of property taxes the county was expecting to collect. The mistake added about $900,000 in expected revenue, according to County Administrator David Hemze.

The county is planning to consider recommendations to cut the 2008 budget by $900,000 so that proposed property taxes will match tax notices sent to residents in November.

"It kind of threw a wrench into everything," said Hemze. "It's unfortunate. It's a mistake and we're concentrating on responding to the mistake and trying to ensure that it doesn't happen again." If the county does not cut the budget by $900,000, the county portion of property taxes would go up for all properties in the county. The effect would be greatest in Waconia, but Hemze said the average-valued home outside of Waconia would also experience a $29 increase on top of the number indicated on the November tax notices.

Google searches for Britney Spears

488941 britney spears	29 britent spears	9 brinttany spears	5 brney spears	3 britiy spears	2 brirreny spears
40134 brittany spears	29 brittnany spears	9 britanay spears	5 broitney spears	3 britmeny spears	2 brirtany spears
36315 brittney spears	29 britttany spears	9 britinany spears	5 brotny spears	3 britneeey spears	2 brirttany spears
24342 britany spears	29 btiney spears	9 britn spears	5 bruteny spears	3 britnehy spears	2 brirttney spears
7331 britny spears	26 birttney spears	9 britnew spears	5 btiyney spears	3 britnely spears	2 britain spears
6633 briteny spears	26 breitney spears	9 britneyn spears	5 btrittney spears	3 britnesy spears	2 britane spears
2696 britteny spears	26 brinity spears	9 britrney spears	5 gritney spears	3 britnetty spears	2 britaneny spears
1807 briney spears	26 britenay spears	9 brtiny spears	5 spritney spears	3 britnex spears	2 britania spears
1635 brittny spears	26 britneyt spears	9 brtittney spears	4 bittny spears	3 britneyxxx spears	2 britann spears
1479 brintey spears	26 brittan spears	9 brtny spears	4 bnritney spears	3 britnity spears	2 britanna spears
1479 britanny spears	26 brittne spears	9 brytny spears	4 brandy spears	3 britntey spears	2 britannie spears
1338 britiny spears	26 btittany spears	9 rbitney spears	4 brbritney spears	3 britnyey spears	2 britannt spears
1211 britnet spears	24 beitney spears	8 birtiny spears	4 breatiny spears	3 britterny spears	2 britannu spears
1096 britiney spears	24 birteny spears	8 bithney spears	4 breetney spears	3 brittneey spears	2 britanyl spears
991 britaney spears	24 brightney spears	8 brattany spears	4 bretiney spears	3 brittnney spears	2 britanyt spears
991 britnay spears	24 brintiny spears	8 breitny spears	4 brfitney spears	3 brittnyey spears	2 briteeny spears
811 brithney spears	24 britanty spears	8 breteny spears	4 briattany spears	3 brityen spears	2 britenany spears
811 brtiney spears	24 britenny spears	8 brightny spears	4 brieteny spears	3 briytney spears	2 britenet spears
664 birtney spears	24 britini spears	8 brintay spears	4 briety spears	3 brltney spears	2 briteniy spears
664 brintney spears	24 britnwy spears	8 brinttey spears	4 briitny spears	3 broteny spears	2 britenys spears
664 briteney spears	24 brittni spears	8 briotney spears	4 briittany spears	3 brtaney spears	2 britianey spears
601 bitney spears	24 brittnie spears	8 britanys spears	4 brinie spears	3 brtiiany spears	2 britin spears
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544 brittaney spears	21 birtany spears	8 britneyb spears	4 brintne spears	3 brtinney spears	2 britmy spears
544 brittnay spears	21 biteny spears	8 britnrey spears	4 britaby spears	3 brtitany spears	2 britnaney spears
364 britey spears	21 bratney spears	8 britnty spears	4 britaey spears	3 brtiteny spears	2 britnat spears
364 brittiny spears	21 britani spears	8 brittner spears	4 britainey spears	3 brtnet spears	2 britnbey spears
329 brtney spears	21 britanie spears	8 brottany spears	4 britinie spears	3 brytiny spears	2 britndy spears
269 bretney spears	21 briteany spears	7 baritney spears	4 britinney spears	3 btney spears	2 britneh spears
269 britneys spears	21 brittay spears	7 birntey spears	4 britmney spears	3 drittney spears	2 britneney spears
244 britne spears	21 brittinay spears	7 biteney spears	4 britnear spears	3 pretney spears	2 britney6 spears
244 brytney spears	21 brtany spears	7 bitiny spears	4 britnel spears	3 rbritney spears	2 britneye spears
220 breatney spears	21 brtiany spears	7 breateny spears	4 britneuy spears	2 barittany spears	2 britneyh spears
220 britiany spears	19 birney spears	7 brianty spears	4 britnewy spears	2 bbbritney spears	2 britneym spears
199 britnney spears	19 brirtney spears	7 brintye spears	4 britnmey spears	2 bbitney spears	2 britneyyy spears
163 britnry spears	19 britnaey spears	7 britianny spears	4 brittaby spears	2 bbritny spears	2 britnhey spears
147 breatny spears	19 britnee spears	7 britly spears	4 brittery sp		
147 brittiney spears	19 britony spears	7 britnej spears	4 britthey sp		
147 britty spears	19 brittanty spears	7 britneyu spears	4 brittnaey spears		

Source: http://www.google.com/jobs/britney.html

Duplicate announcement in same newspaper on same d

KURZ & KNAPP

Musikschulfest in Kleinmachnow

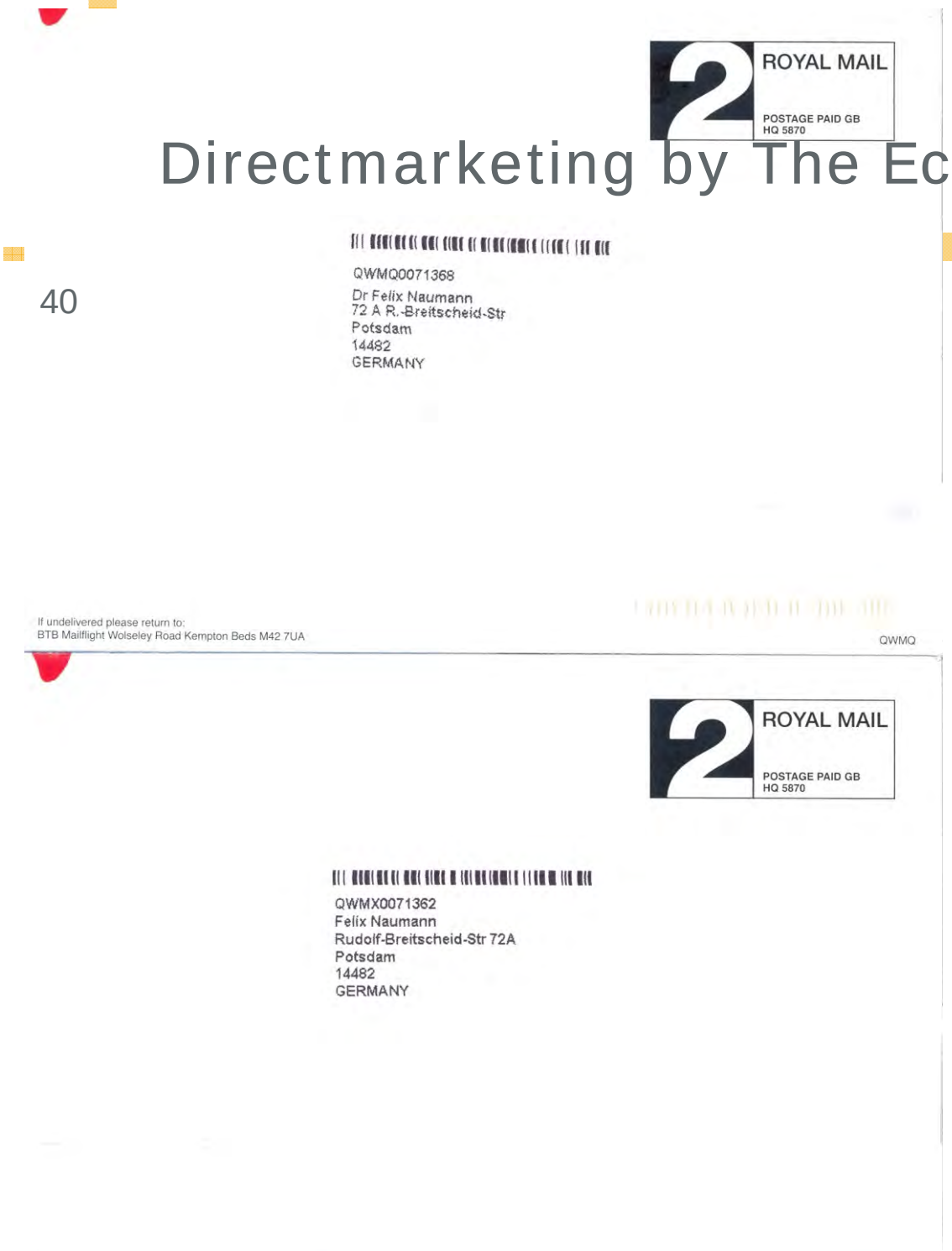
KLEINMACHNOW | Ein Musikschulfest veranstaltet die Kreismusikschule Potsdam-Mittelmark am Samstag, dem 19. Juni, in ihrem Haus in Kleinmachnow, Am Weinberg 20. Von 14 bis 20 Uhr werden Konzerte der Fachbereiche auf der Freilichtbühne, „Schnupperstunden" der Schule, das Quiz „Musikalischer Irrgarten" und vieles mehr geboten.

KURZ & KNAPP

Musikschule lädt ein

KLEINMACHNOW | Die Kreismusikschule „Engelbert Humperdinck" lädt für den kommenden Samstag, 19. Juni, zum diesjährigen Musikschulfest nach Kleinmachnow ein. Auf einer Freilichtbühne, in der Musikschule (Am Weinberg) und in der Aula des Weinberggymnasiums erwartet die Besucher von 14 bis 18 Uhr ein vielseitiges musikalisches Programm. Orchester, Ensembles, Bands und Solisten zeigen ihr Können. Um 15 Uhr wird „Alte Musik" vorgestellt, ab 15.30 Uhr geht es um die „Faszination Schlagzeug". Für das leibliche Wohl ist gesorgt.

Directmarketing by The Economist



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Dr Felix Naumann
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14482
GERMANY

If undelivered please return to:
BTB Mailflight Wolseley Road Kempton Beds M42 7UA

QWMQ

ROYAL MAIL
POSTAGE PAID GB
HQ 5870

QWMX0071362
Felix Naumann
Rudolf-Breitscheid-Str 72A
Potsdam
14482
GERMANY

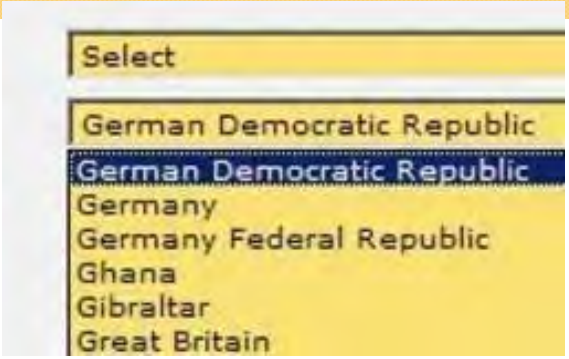
If undelivered please return to:
BTB Mailflight Wolseley Road Kempton Beds M42 7UA

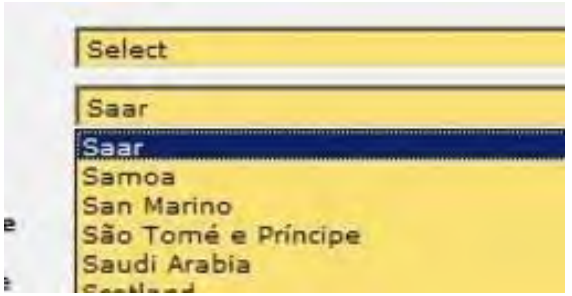
QWMX

QWMQ0071368
Dr Felix Naumann
72 A R.-Breitscheid-Str
Potsdam
14482
GERMANY

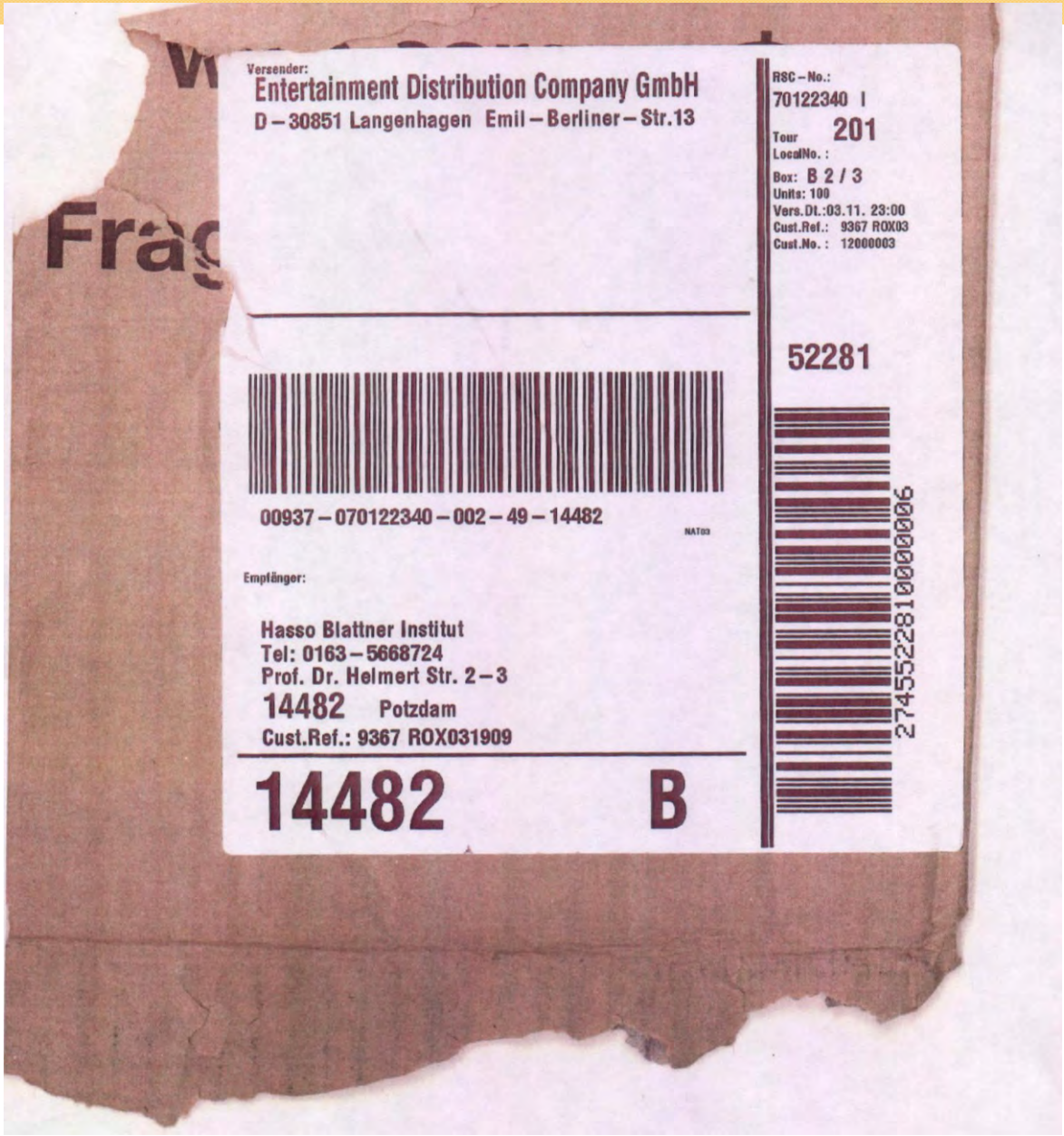
QWMX0071362
Felix Naumann
Rudolf-Breitscheid-Str 72A
Potsdam
14482
GERMANY

FIFA registration form (2010)





Hasso Blattner Institut, Potzdam



Fraudulent Transaction Duplicate

29.03	30.03	ELECTRONIC EDUCATIONAL 08779288701 CO		225,08	USD	1,341359	167,80
30.03	30.03	ENTGELT FüR AUSLANDSEINSATZ					1,67
29.03	30.03	ELECTRONIC EDUCATIONAL 08779288701 CO		225,08	USD	1,341359	167,80
30.03	30.03	ENTGELT FüR AUSLANDSEINSATZ					1,67

Product Duplicate

1. 

Acer P 5370 W DLP-Projektor HD-Ready (Kontrast 2000:1, 3000 ANSI Lumen, WXGA 1280 x 800 Pixel) schwarz von Acer (9. Januar 2009)

Neu kaufen: **EUR 729,00** 23 Angebote ab EUR 729,00

Lieferung bis **Dienstag, 5. Januar**: Bestellen Sie innerhalb der nächsten **1 Stunde** per Overnight-Express.

(1) Prime

Elektronik & Foto: Alle 6 Artikel ansehen

2. 

Acer P5370W HD-Ready Projektor HDMI (WXGA, 1280x800, 3000 ANSI Lumen, 2400 ANSI Lumen Eco-Mode, Kontrast: 2000:1) schwarz von Acer (9. Januar 2009)

Neu kaufen: **EUR 729,00** 2 Angebote ab EUR 666,40

Auf Lager.

(2)

Elektronik & Foto: Alle 6 Artikel ansehen

CD Duplicate

1. 
Dile Al Sol von La Oreja de Van Gogh (**Audio CD** - 2007)
Neu kaufen: **EUR 25,99** 20 Angebote ab EUR 4,95
Nicht auf Lager. Bestellen Sie jetzt und wir liefern, sobald der Artikel verfügbar ist
✓Prime

2. 
Dile Al Sol von La Oreja de Van Gogh (**Audio CD** - 1999)
1 Angebote ab EUR 4,99

3. 
Dile Al Sol von La Oreja de Van Gogh (**Audio CD** - 2007)
Neu kaufen: ~~EUR 16,99~~ **EUR 15,97** 8 Angebote ab EUR 6,46
Lieferung bis **Dienstag, 3. Juni**: Bestellen Sie innerhalb der nächsten **7 Stunden** per Overnight-Express.
✓Prime

CD Duplicate

1. 

Dreaming Through the Noise von Vienna Teng (**Audio CD** - 2007)

Neu kaufen: **EUR 18,95** 21 Angebote ab EUR 13,99

Lieferung bis **Samstag, 14. Juni**: Bestellen Sie innerhalb der nächsten **4 Stunden** per Overnight-Express.
Kostenlose Lieferung möglich.

★★★★★ (11)

Musik: Alle 3 Artikel ansehen

2. 

Dreaming Through the Noise von Vienna Teng (**Audio CD** - 2007)

Neu kaufen: **EUR 27,99** 21 Angebote ab EUR 8,00

Lieferung bis **Samstag, 14. Juni**: Bestellen Sie innerhalb der nächsten **4 Stunden** per Overnight-Express.
Kostenlose Lieferung möglich.

★★★★★ (11)

Musik: Alle 3 Artikel ansehen

3. 

Dreaming Through the Noise von Vienna Teng (**Audio CD** - 2007)

Neu kaufen: ~~EUR 40,99~~ **EUR 38,99** 2 Angebote ab EUR 16,67

Gewöhnlich versandfertig in 10 bis 14 Tagen.
Kostenlose Lieferung möglich.

Musik: Alle 3 Artikel ansehen

Reviewer Complaint (german)

Für Kunden: Stellen Sie Ihre eigenen Bilder ein.

Das neue Filmlexikon 2009 (DVD-ROM)
von United Soft Media Verlag GmbH

Plattform: Windows XP / Vista

(1 Kundenrezension)

Preis: EUR 30,95 & kostenlose Lieferung mit **Amazon Prime**.

Auf Lager.

1 von 1 Kunden fanden die folgende Rezension hilfreich:

Redaktionell lieblos erweitert, 22. Januar 2009

Von **Thomas Georg Maria Mainka** - Alle meine Rezensionen ansehen

Zuerst das positive: Gegenüber der 2006er Ausgabe ist die Software deutlich stabiler geworden. Abstürze, die man mit Affengriff und Taskmanager beseitigen muß, kommen glücklicherweise nicht mehr vor.

Ansonsten hat sich an der Software so gut wie nichts geändert.

Redaktionell mußte ich jedoch feststellen, daß die Anzahl an Doubletten (also Doppeleinträge ein und des selben Films mit geringfügigen abweichenden Daten wie Laufzeitunterschiede von 1 Minute, oder 35mm ./. Video bzw. teilweise unvollständigen Darsteller- bzw. Filmstab-Listen) deutlich zugenommen haben. (Zumindestens ist mir dies bei den Märchenfilmen - meinem privaten Sondersammelgebiet - besonders aufgefallen)

German Umlaute

dblp.uni-trier.de

Search Results for 'dessloch'

- Stefan Deßloch
- Stefan Dessloch

DBLP: [Home | Search: Author, Title | Conferences | Journals]
Michael Ley (ley@uni-trier.de) Thu Jan 31 10:44:06 2008

False Duplicates

Melanie Weis

List of publications from the DBLP Bibliography Server - FAQ

Coauthor Index - Ask others: ACM DL - ACM Guide - CiteSeer - CSB - Google

		2006
7	EE	Sven Puhlmann, Melanie Weis, Felix Naumann: XML Duplicate Detection Using Sorted Neighborhoods. EDBT 2006: 77
6	EE	Melanie Weis, Felix Naumann: Detecting Duplicates in Complex XML Data. ICDE 2006: 109
5	EE	Jan Hegewald, Felix Naumann, Melanie Weis: XStruct: Efficient Schema Extraction from Multiple and Large XML Docum
		2005
4	EE	Melanie Weis, Felix Naumann: DogmatiX Tracks down Duplicates in XML. SIGMOD Conference 2005: 431-442
3	EE	Alexander Bilke, Jens Bleiholder, Christoph Böhm, Karsten Draba, Felix Naumann, Melanie Weis: Automatic Data Fusior
2	EE	Melanie Weis, S. Müller, Claus-E. Liedtke, Martin Pahl: A framework for GIS and imagery data fusion in support of carto
		2004
1		Melanie Weis, Felix Naumann: Detecting Duplicate Objects in XML Documents. IQIS 2004: 10-19

Real-world false positive

Die doppelte Gabi!

Links Gabi, geboren am 10. August in Osterburg 1957, wohnt jetzt in Dresden, verheiratet, 2 Söhne (25, 27) und rechts Gabi, geboren am 10. August 1957, wohnt in Dresden, verwitwet, 2 Töchter (33, 34)

Foto: Dirk Sukow

Shipping problems

Shipment Travel History

Help

Select time zone: Select

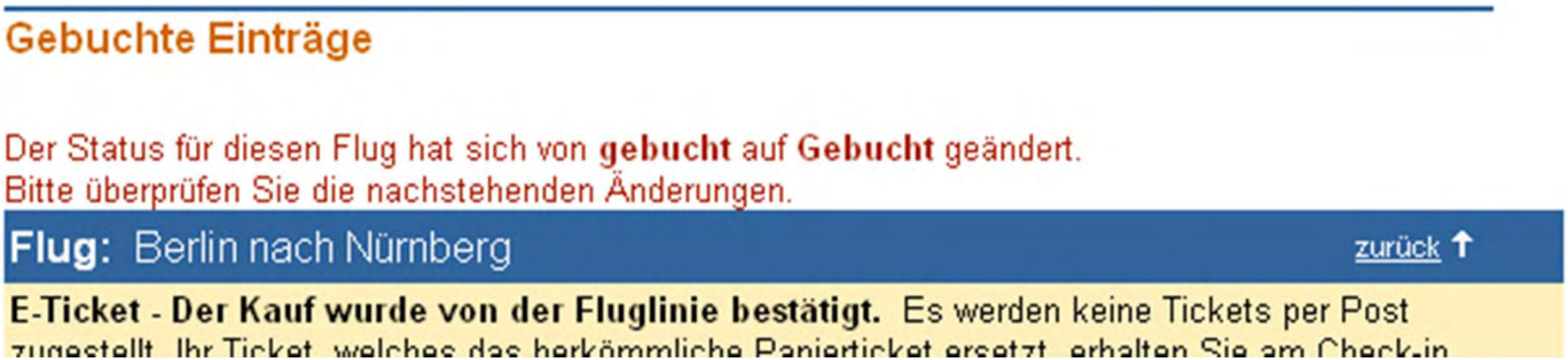
Select time format: 12H | 24H

All shipment travel activity is displayed in local time for the location

Date/Time	Activity	Location	Details
Jan 12, 2010 10:48 AM	Arrived at FedEx location	MEMPHIS, TN	
Jan 12, 2010 9:51 AM	Departed FedEx location	NEWARK, NJ	
Jan 12, 2010 8:08 AM	In transit	NEWARK, NJ	
Jan 12, 2010 7:47 AM	Arrived at FedEx location	NEWARK, NJ	
Jan 12, 2010 4:01 AM	Departed FedEx location	PARIS FR	
Jan 11, 2010 8:45 PM	Arrived at FedEx location	PARIS FR	
Jan 11, 2010 10:56 AM	Arrived at FedEx location	PARIS FR	
Jan 10, 2010 8:26 PM	In transit	MEMPHIS, TN	
Jan 10, 2010 7:32 PM	Departed FedEx location	MEMPHIS, TN	
Jan 10, 2010 5:41 AM	Arrived at FedEx location	MEMPHIS, TN	
Jan 10, 2010 4:09 AM	Departed FedEx location	PARIS FR	
Jan 9, 2010 11:30 PM	In transit	PARIS FR	
Jan 9, 2010 6:23 PM	Arrived at FedEx location	PARIS FR	
Jan 8, 2010 11:17 PM	At local FedEx facility	PARIS FR	
Jan 8, 2010 11:05 PM	Arrived at FedEx location	PARIS FR	
Jan 8, 2010 5:45 AM	In transit	INDIANAPOLIS, IN	
Jan 8, 2010 5:40 AM	Departed FedEx location	INDIANAPOLIS, IN	
Jan 7, 2010 2:26 PM	In transit	INDIANAPOLIS, IN	
Jan 7, 2010 11:33 AM	Arrived at FedEx location	INDIANAPOLIS, IN	
Jan 6, 2010 9:08 PM	At local FedEx facility	ONTARIO, CA	
Jan 6, 2010 9:08 PM	Left FedEx origin facility	ONTARIO, CA	
Jan 6, 2010 3:17 PM	Shipment information sent to FedEx		

FAIL

Status change from „booked“ to „Booked“



Gebuchte Einträge

Der Status für diesen Flug hat sich von **gebucht** auf **Gebucht** geändert.
Bitte überprüfen Sie die nachstehenden Änderungen.

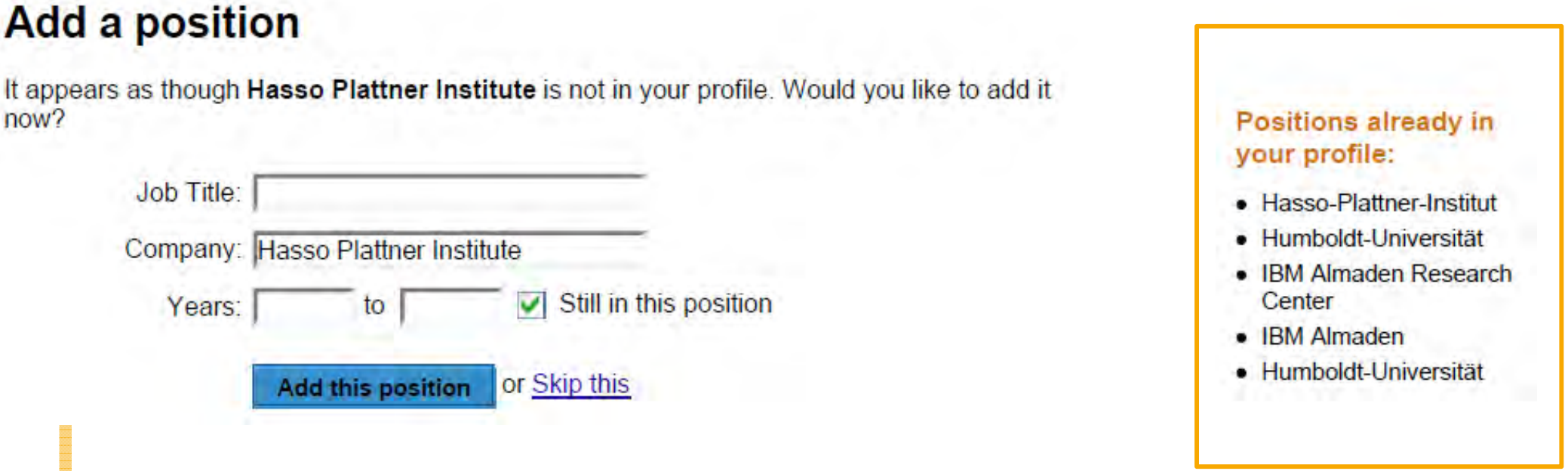
Flug: Berlin nach Nürnberg zurück

E-Ticket - Der Kauf wurde von der Fluglinie bestätigt. Es werden keine Tickets per Post zugestellt. Ihr Ticket, welches das herkömmliche Papierticket ersetzt, erhalten Sie am Check-in

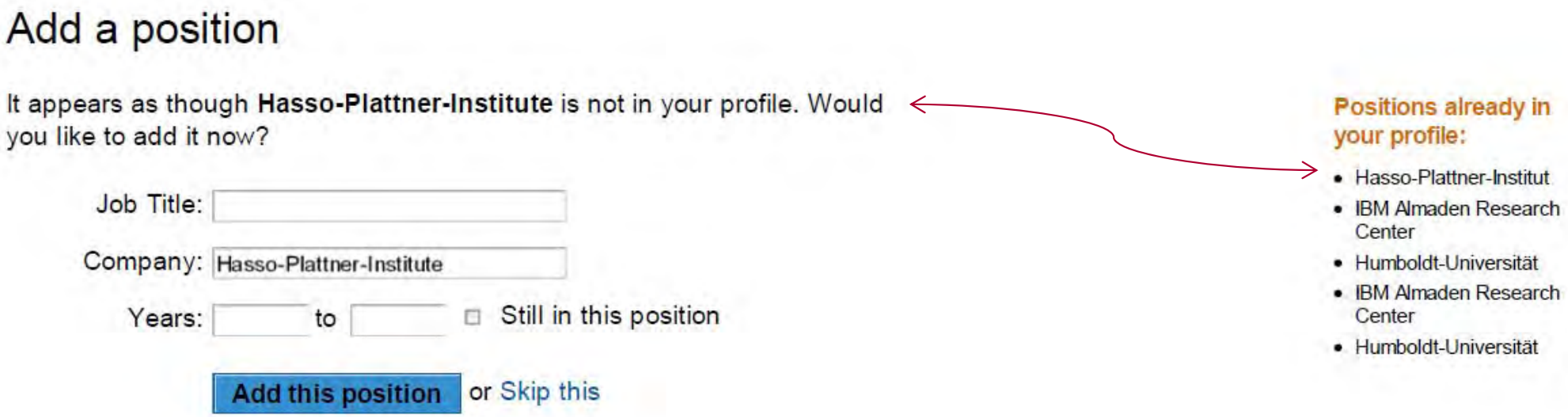
Manual Data Fusion

Mary: Hi, my name is Mary. How may I help you?
Felix Naumann: Hi, I am Felix
Felix Naumann: I am area editor of "Information System".
Mary: Hello Felix, how can I help you today?
Felix Naumann: I would like to assign a reviewer to a submission. The reviewer is already registered twice in the system. Once with an old email adress, and once with an incorrect name. The person is Barbara Pernici.
Mary: Ok, did you want me to merge her accounts?
Felix Naumann: Sure, merging her accounts would be a first step. The correct email address is barbara.pernici@polimi.it and of course her name is "Barbara Pernici" and not "Barbara Barbara Pernici".
Felix Naumann: Can you let me know, once the files are corrected. Thansk for your help!
Mary: Her name has been corrected and the accounts merged.
Mary: Is there anything else I can help you with?
Felix Naumann: No, perfect. Thanks, Mary.
Mary: You are welcome Felix.
Mary: It was a pleasure assisting you today. If you require any further assistance please contact us again. To close this chat session, please click the Close button in the top corner of this chat window.

LinkedIn Job Duplicates



LinkedIn Job Duplicates



Employee list

Kehl, Thomas	Get email address via email	IST	822	R-115E
Kehl, Tom	Get email address via email	IST	822	R-115E

An Ironic Duplicate

Details (Similarity: 0.9683)

▼ Same Attributes Values

Attribute	Value
booktitle	Proc. ACM SIGMOD Int. Conf. on Management of Data
year	2005
type	inproceedings
otherauthors	false

▼ Different Attributes Values

Dong05	Attribute	dong:sigmod05
Xin Dong, Alon Halevy, Jayant Madhavan	**author**	Xin Dong, Alon Y. Halevy, Jayant Madhavan
Reference reconciliation in complex information spaces	**title**	Reference Reconciliation in Complex Information Spaces
85–96	**pages**	85-96

Close

Translation problems

BBC NEWS CHANNEL

Page last updated at 11:45 GMT, Thursday, 19 February 2009

E-mail this to a friend Printable version

The mystery of Ireland's worst driver

Details of how police in the Irish Republic finally caught up with the country's most reckless driver have emerged, the Irish Times reports.

Poles are Ireland's largest immigrant population

He had been wanted from counties Cork to Cavan after racking up scores of speeding tickets and parking fines.

However, each time the serial offender was stopped he managed to evade justice by giving a different address.

But then his cover was blown.

It was discovered that the man every member of the Irish police's rank and file had been looking for - a Mr Prawo Jazdy - wasn't exactly the sort of prized villain whose apprehension leads to an officer winning an award.

In fact he wasn't even human.

"*Prawo Jazdy* is actually the Polish for driving licence and not the first and surname on the licence," read a letter from June 2007 from an officer working within the Garda's traffic division.

"Having noticed this, I decided to check and see how many times officers have made this mistake.

"It is quite embarrassing to see that the system has created Prawo Jazdy as a person with over 50 identities."

The officer added that the "mistake" needed to be rectified immediately and asked that a memo be circulated throughout the force.

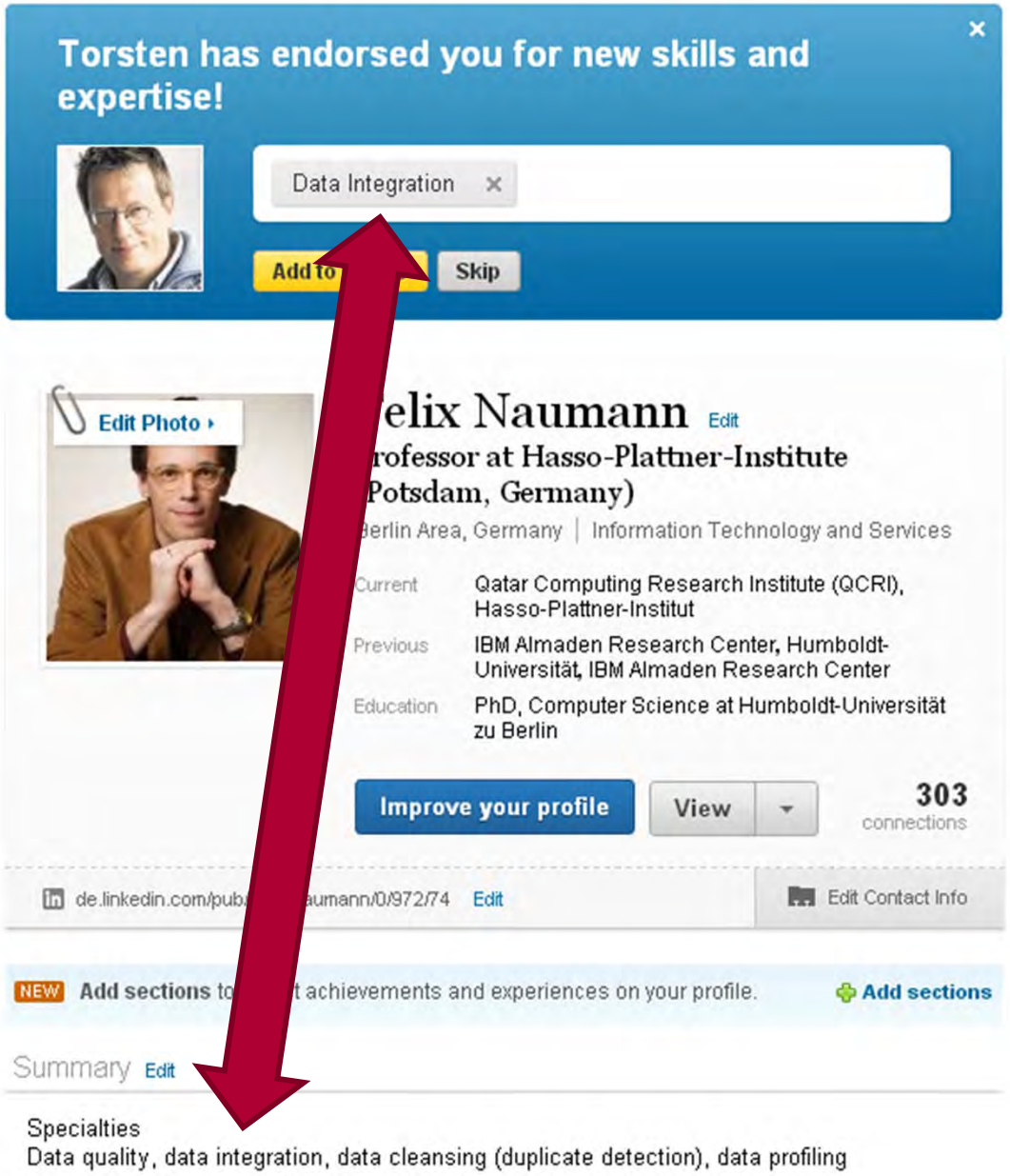
In a bid to avoid similar mistakes being made in future relevant guidelines were also amended.

And if nothing else is learnt from this driving-related debacle, Irish police officers should now know at least two words of Polish.

As for the seemingly elusive Mr Prawo Jazdy, he has presumably become a cult hero among Ireland's largest immigrant population.

5 Participants =>
5 Affiliations

Skill duplicate



Two different(!) LDOW 2012 papers

Metadata Statistics for a Large Web Corpus

Peter Mika, Tim Potter
Yahoo! Research
Diagonal 177, Barcelona, Spain
{pmika, tep}@yahoo-inc.com

April 14,

1 Introduction

Embedding metadata inside HTML pages is c
on the Web, often preferred by publishers an
ing structured data, such as publishing data
documents. Publishers prefer this method due
nance: since most webpages are dynamically
extending the template that produces the pa
already accustomed to processing HTML and
ing pipelines. The close coupling of the raw

Metadata Statistics for a Large Web Corpus

Peter Mika
Yahoo! Research
Diagonal 177
Barcelona, Spain
pmika@yahoo-inc.com

Tim Potter
Yahoo! Research
Diagonal 177
Barcelona, Spain
tep@yahoo-inc.com

ABSTRACT

We provide an analysis of the adoption of metadata standards on the Web based a large crawl of the Web. In particular, we look at what forms of syntax and vocabularies publishers are using to mark up data inside HTML pages. We also describe the process that we have followed and the difficulties involved in web data extraction.

1. INTRODUCTION

Embedding metadata inside HTML pages is one of the ways to publish structured data on the Web, often preferred by publishers and consumers over other methods of exposing structured data, such as publishing data feeds, SPARQL endpoints or RDF/XML documents. Publishers prefer this method due to the ease of implementation and maintenance: since most webpages are dynamically generated, adding markup simply requires extending the template that produces the pages. Consumers such as search engines are already accustomed to processing HTML and extraction

are a number of factors that complicate the comparison of results. First, different studies use different web corpora. Our earlier study used a corpus collected by Yahoo!'s web crawler, while the current study uses a dataset collected by the Bing crawler. Bizer et al. analyze the data collected by `http://www.commoncrawl.org`, which has the obvious advantage that it is publicly available. Second, the extraction methods may differ. For example, there are a multitude of microformats (one for each object type) and although most search engines and extraction libraries support the popular ones, different processors may recognize a different subset. Unlike the specifications of microdata and RDFa published by the RDFa, the microformat specifications are also rather informal and thus different processors may extract different information from the same page. Further, even if the same information is extracted, the conversion of this information to RDF may differ across implementations. Third, different extractors may be lenient in accepting particular mistakes in the markup, leading to more or less information extracted.

Bewerbung für das Wintersemester 09/10

Angaben zur Person

Nachname:	[redacted]
Vorname:	[redacted]
Geschlecht	männlich
Titel:	
Namenszusatz:	
Geburtsdatum:	24.07.1991

Hinweis: Ihr Online-Bewerbungssystem erfordert es, dass ich mich als ein Jahr älter ausgebe, also ich bin ("Das Mindestalter für den Hochschulzugang beträgt: 17"). Mein eigentliches Geburtsdatum ist der 24.7.1992, sodass ich zu Studienbeginn bereits 17 Jahre alt sein werde. Diese Änderung wurde mir durch das Studierendensekretariat empfohlen

Geburtsort:	Erlangen
Geburtsname:	
Staatsangehörigkeit:	Deutschland

30.07.09, 18:13 Drucken

Schnäppchen

Otto-Versand bot versehentlich Top-Laptops für 49 Euro an

Aufgrund einer Panne bot Versandhändler Otto für einige Stunden Top-Laptops für nur 49,99 Euro an, ein Mitarbeiter hatte einen Fehler bei der Preiseingabe gemacht. Das Versandhaus entschuldigte sich bei allen 2 565 Bestellern mit einem 100-Euro-Gutschein. Ein Anspruch auf die Notebooks zum angegebenen Preis besteht nicht.