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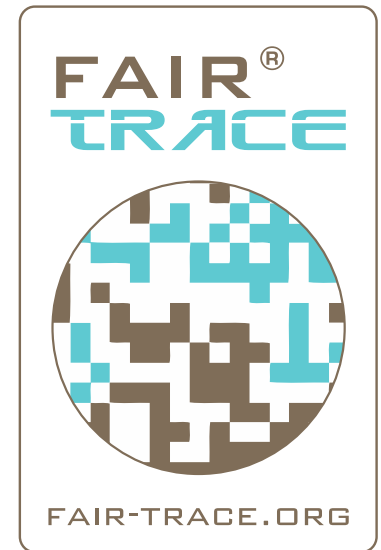
Commission for Technology and Innovation CTI

KTI/CTI
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Fairtrace

Tracing the textile industry

A Semantic-Web Oriented Traceability Solution Applied To The Textile Industry



Bruno Alves

ICEIS2013, Angers
6th July 2013

Definition

Trace·a·bil·i·ty

/ ,treɪsə'biləti / noun

”

*the ability to discover information about where
and how a product was made*

Source: <http://dictionary.cambridge.org/dictionary/business-english/traceability>

Problem statement

Would you believe ?



And this, can you believe ?

Greenpeace finds toxic chemicals in branded clothing

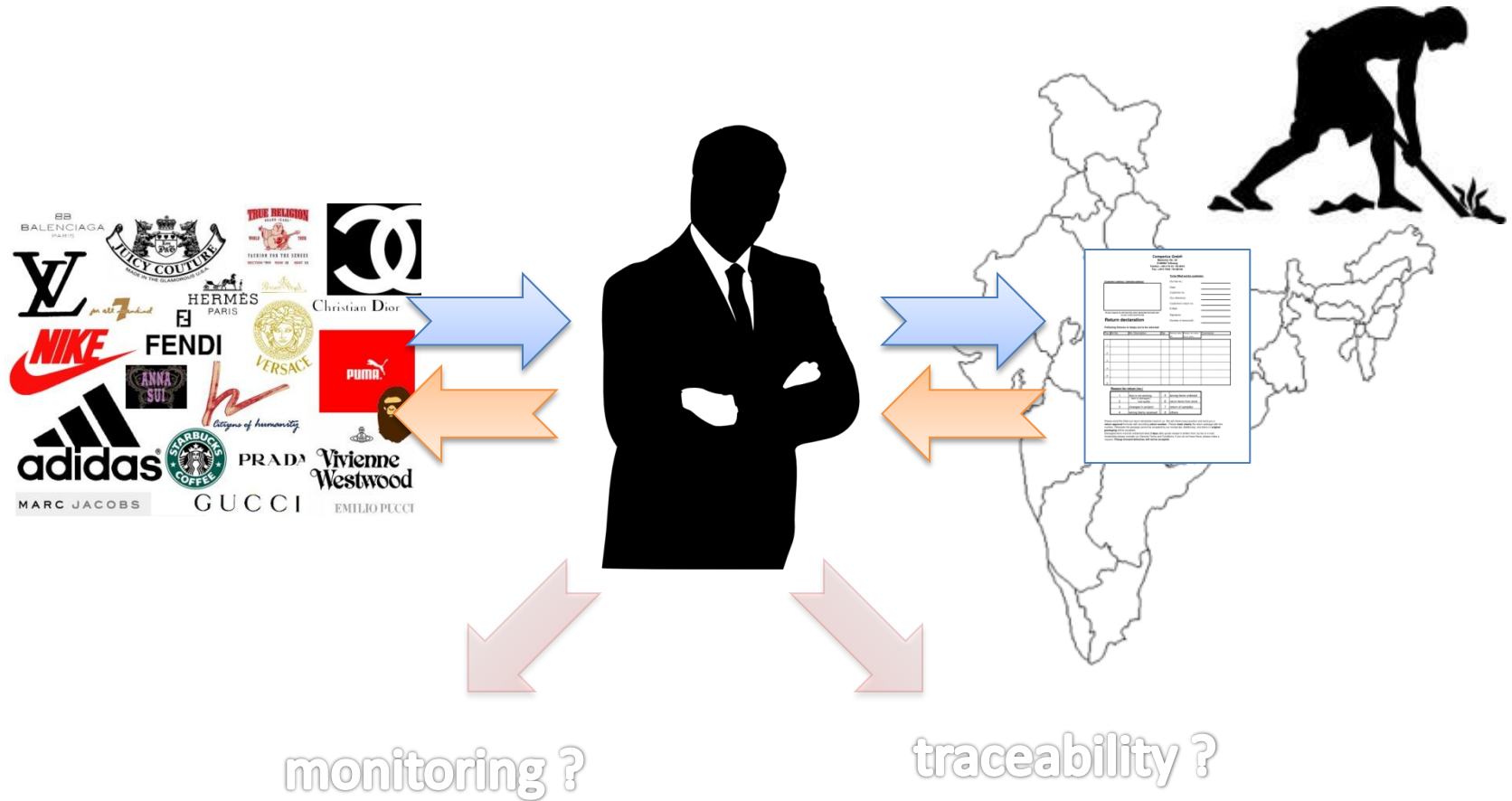
August 23 - Traces of toxic chemicals harmful to the environment and to human health have been detected in products made by 14 top clothing manufacturers, Greenpeace said Tuesday.



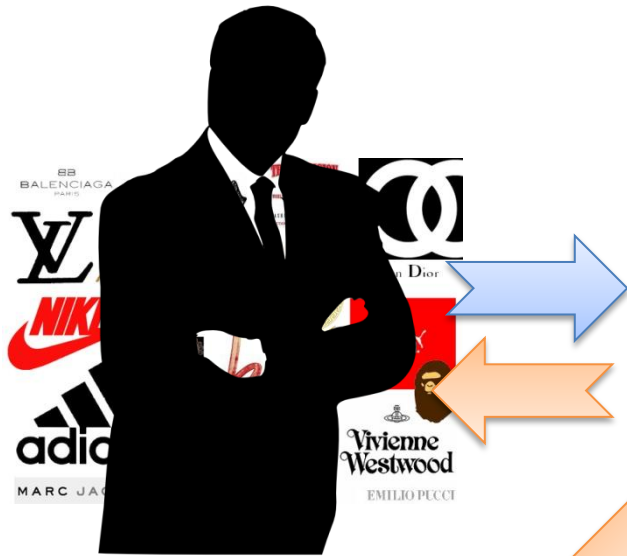
Greenpeace activists dressed as referees enter Adidas' flagship store in Hong Kong. - photo: afp

Samples of clothing from top brands including Adidas, Uniqlo, Calvin Klein, H&M, Abercrombie & Fitch, Lacoste, Converse and Ralph Lauren were found to be tainted with the chemicals, known as nonylphenol ethoxylates, the watchdog said at the launch of its report "Dirty Laundry 2".

Negotiation pattern



The right(eous) way



domain-specific

Comptex GmbH
Bismarckstr. 10
7430 Metzingen
Tel: +49 7141 93-100
Fax: +49 7141 93-1000

Bitte füllendieses Formular aus:

Name: _____
 Kunden Nr.: _____
 Old-Adresse: _____
 Kunden's return no.: _____
 Artikel: _____
 Menge: _____
 Anzahl der Artikel: _____

Return declaration

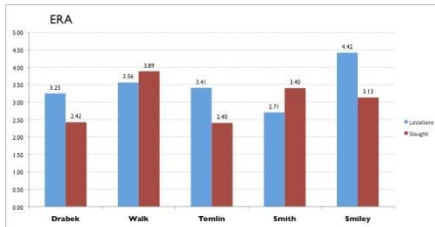
Bitte füllendieses Formular aus:

Item	Quantity	Reason for return
1		
2		
3		
4		

Reason for return (only)

1	Wrong item ordered	1	Wrong item ordered
2	Wrong quantity	2	Wrong item description
3	Wrong price	3	Wrong item description
4	Wrong item description	4	Wrong item description

Please note that the return declaration form is only valid if it is filled out correctly and sent to us within the specified time limit. Please note that the return declaration form is only valid if it is filled out correctly and sent to us within the specified time limit. Please note that the return declaration form is only valid if it is filled out correctly and sent to us within the specified time limit.



KPI

certificates



consumer

Our proposed solution

Fairtrace

General Traceability Framework

Fairtrace is made to be **Simple**

Fairtrace is made to be **Generic**

Fairtrace is made to be **Adaptable**



Fairtrace

Objectives

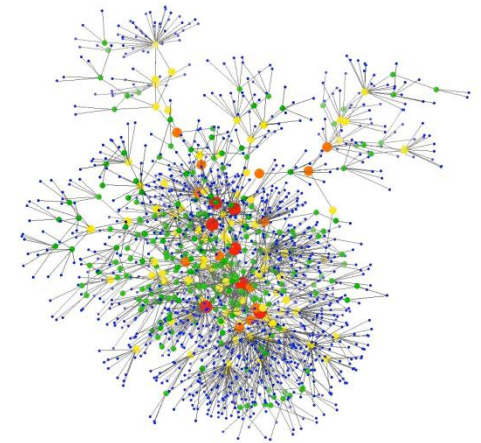
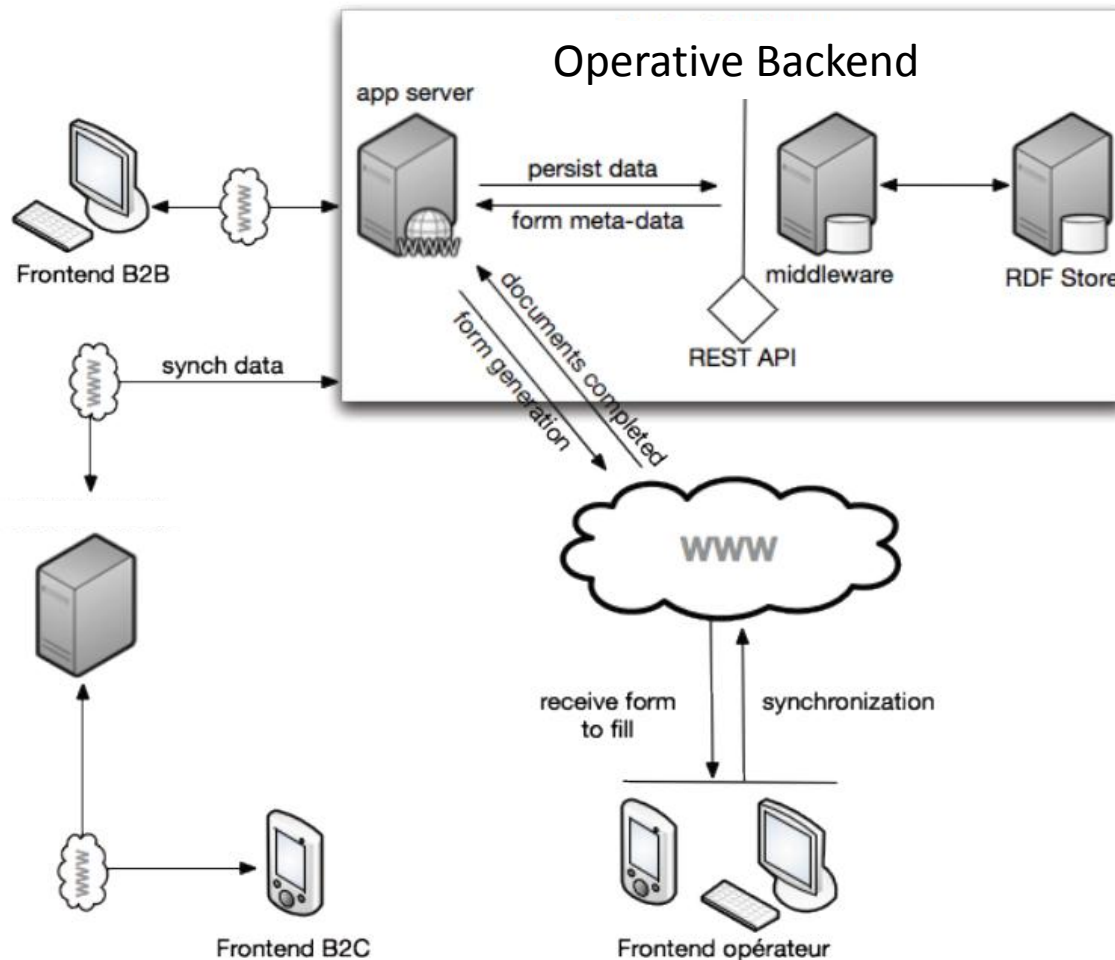
- Identification of the supply-chain (analysis)
- Order management (dashboard)
- Tracking and problem reporting (validators)

Target audience

- Brands and resellers
- Consumer market



Prototype overview

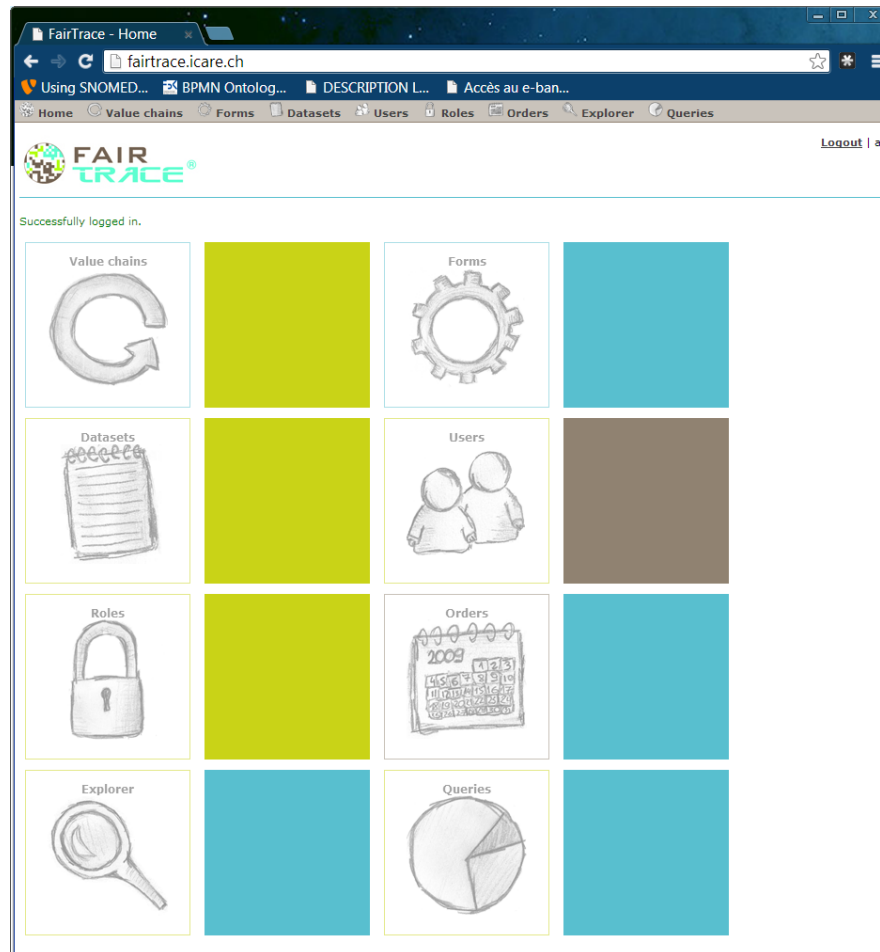


Prototype infrastructure

Backend	VM-Linux Server + BigOWLim 3.5 + Apache Tomcat 6 + Spring MVC (3.0)
B2B Frontend	Ruby On Rails (Fontend), VM- Linux Server (HTML5 + JS)
B2C Frontend	Print-to-mobile (custom)
Partners	One android phone each

... < 10000 triples per order (including the model)

Dashboard



Order management & problem tracking

The screenshot shows a web browser window with the URL `fairtrace.icare.ch/orders`. The page title is "Dashboard" and it includes a navigation menu with items like "Home", "Value chains", "Forms", "Datasets", "Users", "Roles", "Orders", "Explorer", and "Queries". A "Logout | alr" link is visible in the top right corner.

The main content area displays a table of orders. At the top left of the table area, it says "Show 10 entries" with a dropdown menu. A search box is located at the top right of the table area.

Order ID	Reference ID	Fairtrade ID	Delivery Date	Forms	Validation
CA16576	2219	18753	2013-07-05	100%	<ul style="list-style-type: none">This is an informational message !This is a warning message !This is a severe message !
CA20000	FE00001	21234A	2013-07-05	0%	<ul style="list-style-type: none">This is an informational message !This is a warning message !This is a severe message !

At the bottom of the table area, it says "Showing 1 to 2 of 2 entries" and "FirstPrevious1NextLast".

Designing formulars

The screenshot shows a web browser window titled "Editing form" at the URL "fairtrace.icare.ch/forms/form012/edit". The interface includes a navigation menu with options like "Home", "Value chains", "Forms", "Datasets", "Users", "Roles", "Orders", "Explorer", and "Queries". A language selection dropdown is set to "anglais", with a "Traduire" button and a "Non" option. The main workspace is divided into three panels: a "Toolbox" on the left, a central form editor, and a "Properties" panel on the right. The "Toolbox" contains sections for "Container" (section, group), "Text" (textfield, datepicker, textarea, rich text editing), and "List" (select). The central form editor displays a form with several sections: "Informations generales" (Qualite de la maille, Grammage (g/m2) (GSM), ID Fairtrade, Numero de commande, Reference tissu, Libelle, Commentaires), "Informations teinture" (Code couleur Pantone, Poids (en kg)), "Composant chimique" (Type de substance, CAS / EC code, Poids (en gpl), Nom de la substance), and "Detail de la transaction" (Date de livraison, Consommateur, Fournisseur). Each field in the form is accompanied by a small edit icon.

Exploring data

The screenshot shows a web browser window with the URL `fairtrace.icare.ch/explorer?root_id=order001`. The page title is "EXPLORE" and it includes a navigation menu with items like "Home", "Value chains", "Forms", "Datasets", "Users", "Roles", "Orders", "Explorer", and "Queries". A search bar is visible at the top left. The main content area displays a hierarchical tree view of data. The tree is expanded to show a list of GOTS certificate images under the "yarn" category. The list includes the following items:

- label: GOTS
- description
- 20120225121951_GOTS_1.jpg
- 20120225121953_GOTS_2.jpg
- 20120225121955_GOTS_3.jpg
- 20120225121958_GOTS_4.jpg
- 20120225121959_GOTS_5.jpg
- 20120225122002_GOTS_6.jpg
- 20120225122004_GOTS_7.jpg

Other visible items in the tree include:

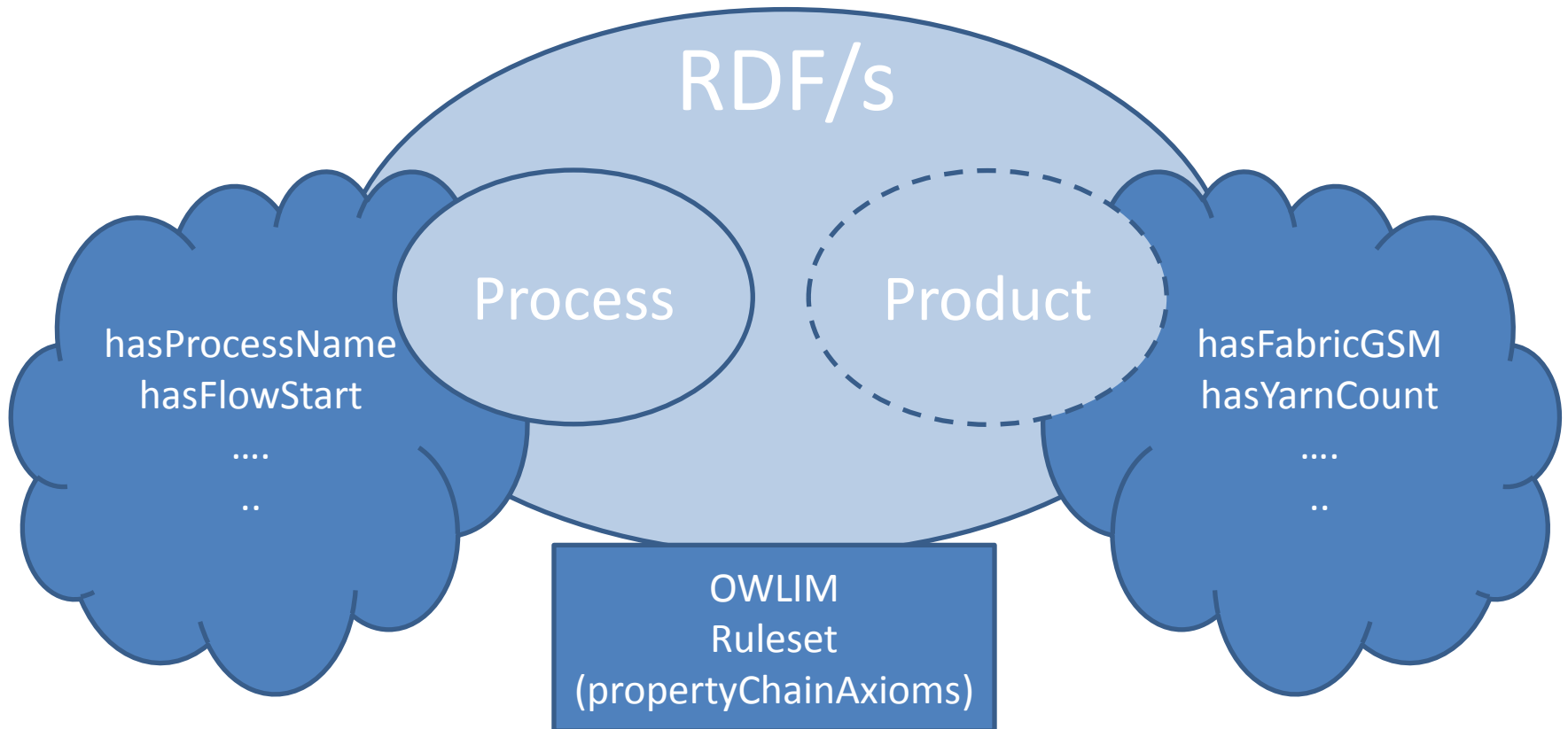
- processed_fabric001
- fabric001
- yarn001
- order001
- certificate006
- certificate007
- mixing_lot001
- Organic & Fairtrade
- 30/1 COMBED
- 128.0
- 18815
- yarn013
- color001
- CA16576
- batch001
- transaction001

Modelling methodology

1. **Picture analysis**
2. Critical traceability path
3. Basic data model
4. Complete data model
5. Ontology engineering
6. Deployment



Ontology



Linking forms and model

Databinding

– Bind a field to a property of the product model

- Example: Fabric#name

```
<fpo:Fabric> <fpos:hasFabricName> “value”^^xsd:string
```

Instantiation

– Assert triples from data in the forms

- Values are instantiated following databinding name
- A dataset links a user, collection point, ts and context

Databinding example

The screenshot shows a web browser window titled 'Editing form' at the URL 'fairtrace.icare.ch/forms/form012/edit#'. The browser's address bar shows 'Using SNOMED...' and 'BPMN Ontolog...'. The page has a navigation menu with 'Home', 'Value chains', 'Forms', 'Datasets', 'Users', 'Roles', 'Orders', 'Explorer', and 'Queries'. The form is titled 'Teinturerie' and is divided into several sections:

- Informations generales:** Contains fields for 'Qualite de la maille' (dropdown), 'Grammage (g/m2) (GSM)' (text input, highlighted with a red box), 'ID Fairtrade', 'Numero de commande' (dropdown), 'Reference tissu' (dropdown), 'Libelle', and 'Commentaires' (text area).
- Informations teinture:** Contains fields for 'Code couleur Pantone' and 'Poids (en kg)'.
- Composant chimique:** Contains fields for 'Type de substance' (dropdown), 'CAS / EC code', 'Poids (en gpl)', and 'Nom de la substance'.
- Detail de la transaction:** Contains fields for 'Date de livraison' (date picker), 'Consommateur' (dropdown), and 'Fournisseur' (dropdown).
- Document complementaire:** A section at the bottom.

On the right side, there is a 'Properties' panel with a table of field properties:

Name	Value
Nom	p_f_gsm
Libellé	
fr	Grammage (g/m2) (GSM)
en	GSM (g/m2)
Obligatoire	false
Aide	
en	
fr	
Multiplicité	from: 1 to: 1
Liaison	ProcessedFabric#gsm (circled in red)
Options HTML	()

Problems & solutions

Genericity can yield holes in the traceability chain

- Design smart rules (Order -> Fabric -> Yarn)

Automatic **classification** of the data

- Simulating class restrictions with
rdfs:subPropertyOf and rdfs:domain

Optimize **querying** patterns

- Aggregate data at function points

Advantages

Flexibility

- No static schema
- No recompilation

Expressivity

- Using inference rules to achieve desired behaviour



Disadvantages

- Structuration
 - Thinking in terms on inferences and not in terms of structure
- Can be substantially slower
 - Uses an underlying DBMS
- Maintaining the coherence of the data
 - Easy to create contradicting statements

Current situation

- Prototype tested in India with a real order
 - 5 indian partners
 - Complete order lifecycle
- Patent pending
- Prototype -> Commercialization process
- Fairtrace SA (Ltd)
- Many companies showed interest (Reizl, Gantt, Migros, ...) and state organisms (Army)

Fairtrace promotional Tee-Shirt



Future developments

- Commercialization process
- Transition model to OWL2 RL (no need for specific rules)
- Strong validation support
 - Inbound rules
 - Outbound rules
- Integration with ERP systems



Thank you !



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