

Open APIs
for Open
Minds

Effective data visualization and analysis using SpagoBI

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SpagoBI is the 100% open source
Business Intelligence and Big Data
analytics

Engineering Group & SpagoBI Labs



- Leader is software and IT services in Italy
- 8,100 professionals + 3,000 external resources
- 8% market share in Italy
- 878 mn€
- Worldwide offices: Italy, Belgium, Republic of Serbia, Norway, South America and United States
- All vertical markets and 4 main business units: Public Administration & Healthcare, Telco & Utilities, Industry & Services, Finance

Engineering Group & SpagoBI Labs



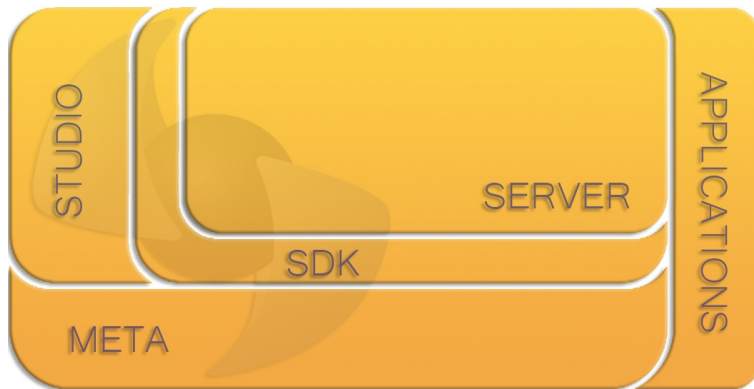
- 40 skilled high professionals
- More than 100 integrators partners
- 5 continents support provided by partners

An unique solution

- Pure Open Source Model
- Released at no license fee
- Full flexibility and scalability
- Comprehensive set of analytical solutions
- No software and vendor lock-in → right to use the software is separated from the purchase of professional services
- Embracing innovation, integrating emerging technologies, results coming from research activities and contributions

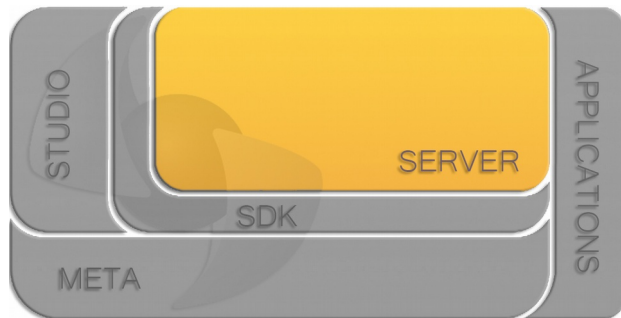
SpagoBI architecture

Providing the right tool for each type of user, from business users and decision makers, to developers and administrators.



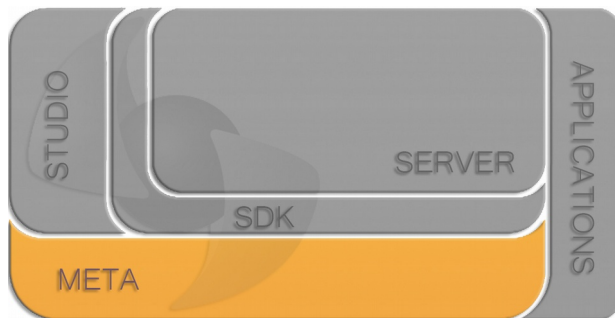
- 5 Modules to cover the entire project life cycle

SpagoBI modules



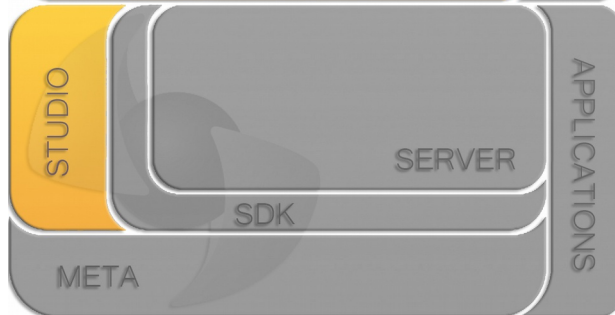
SpagoBI Server

the core of the suite including the analytical tools and features

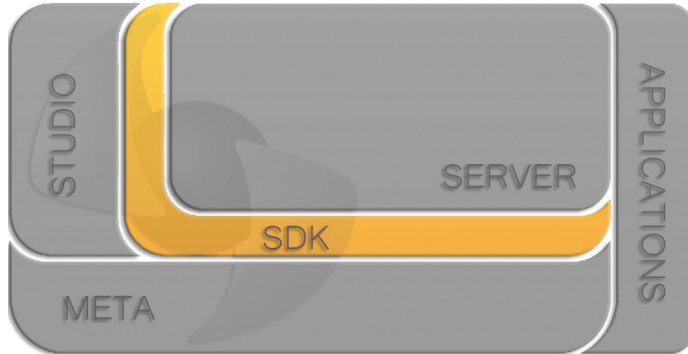


SpagoBI Meta and Studio

the integrated development environments to organize data and create analysis

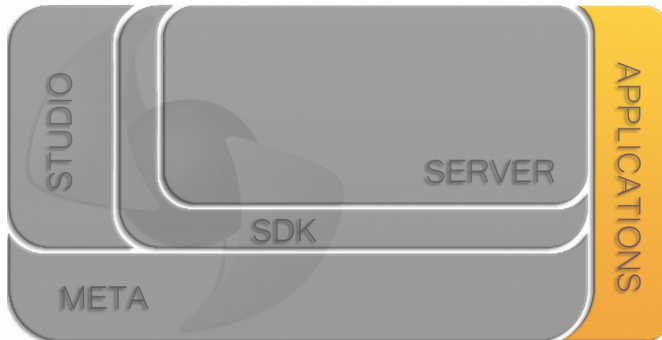


SpagoBI modules



SpagoBI SDK

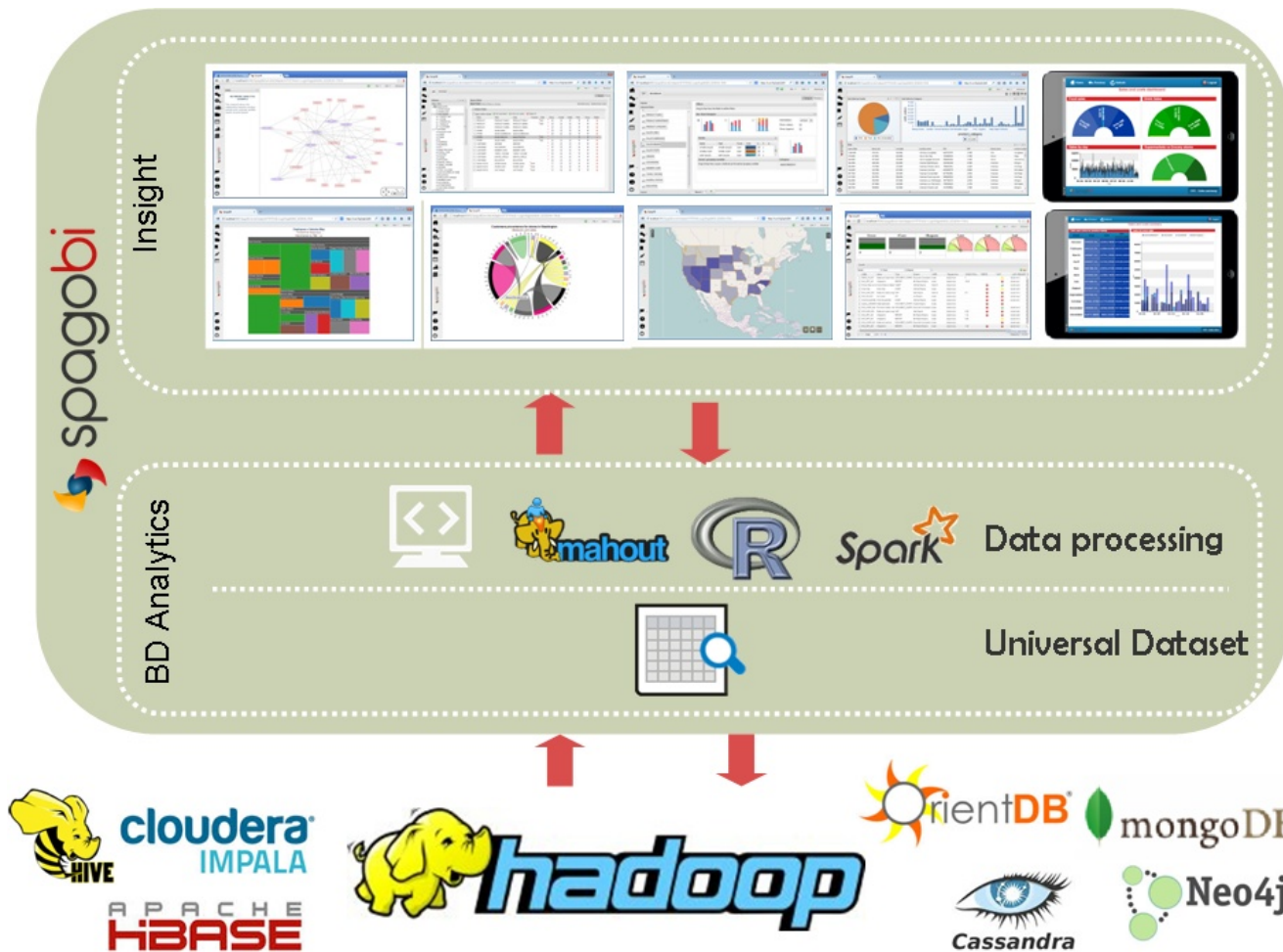
the integration layer allowing to use SpagoBI with external tools



SpagoBI Applications

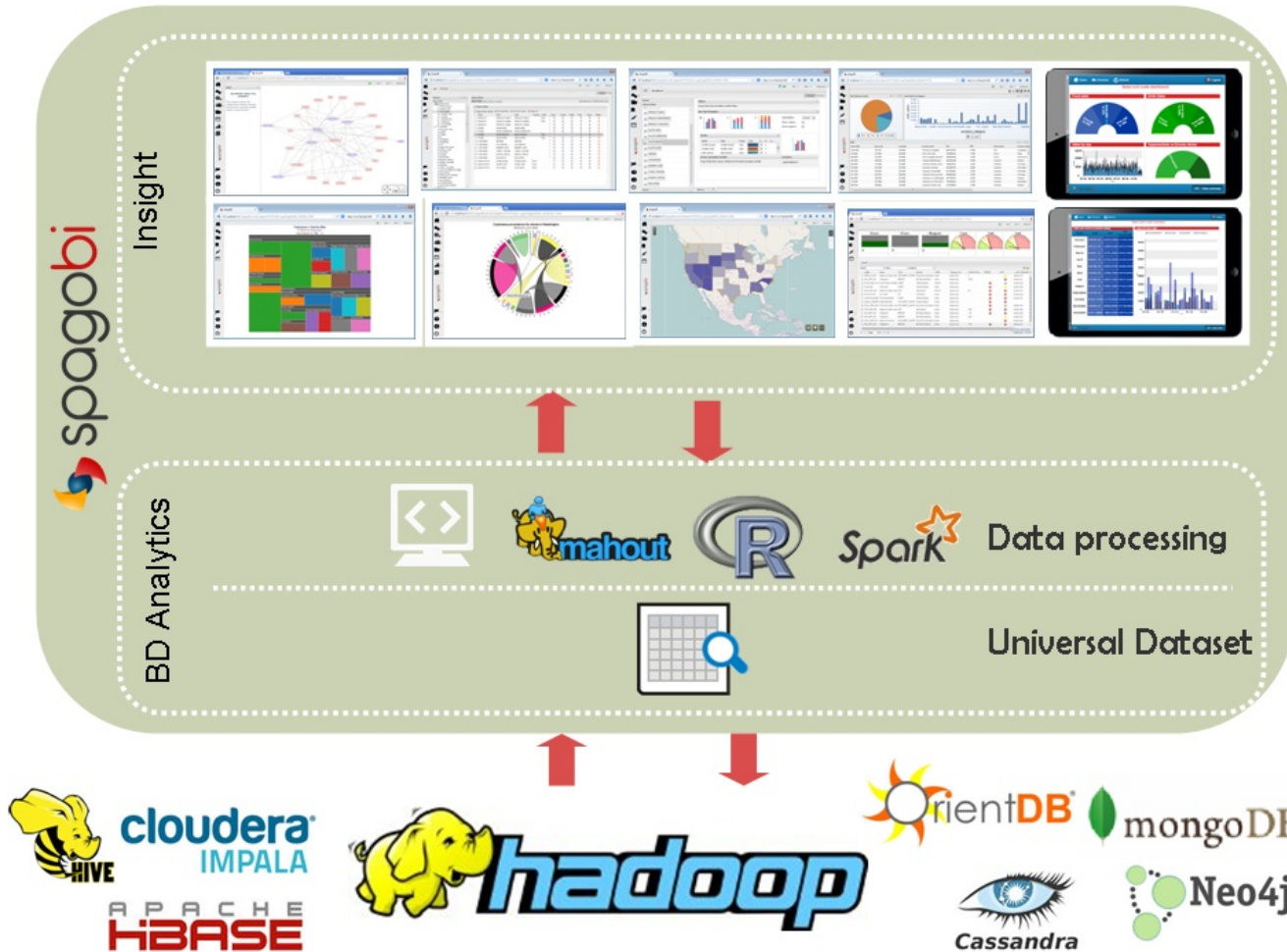
a collection of vertical analytical models that are developed using SpagoBI

Big data analysis



- Big data = Enterprise data + external data
- Data / text mining
- Combined views
- Mash-up capabilities
- Advanced visualization (networks, etc.)

Big data analysis

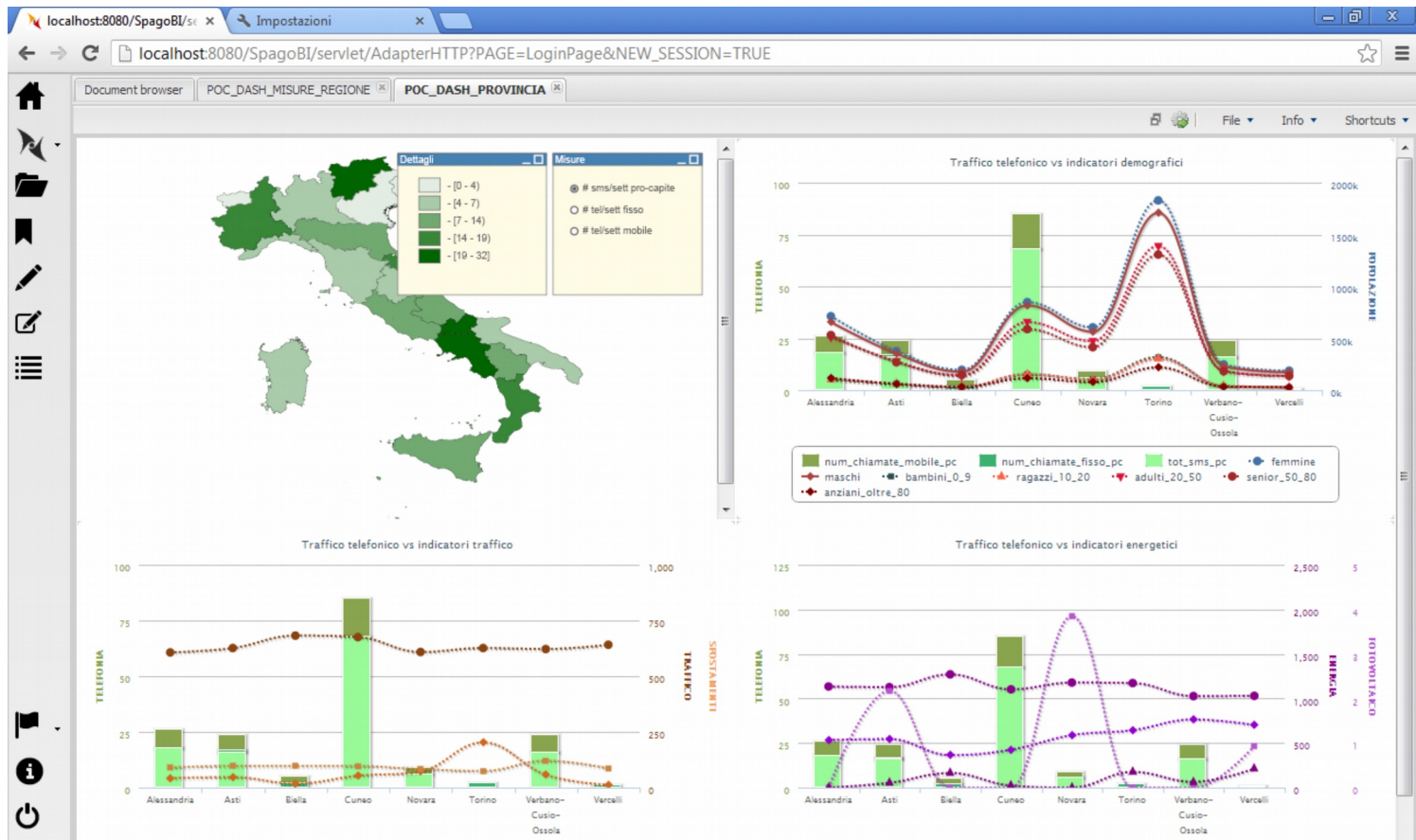


- DataSet component drives big data as data towards analytical engines
- DataSet can be processed by advanced techniques (mining)
- DataSet is an abstraction layer from data sources' variety

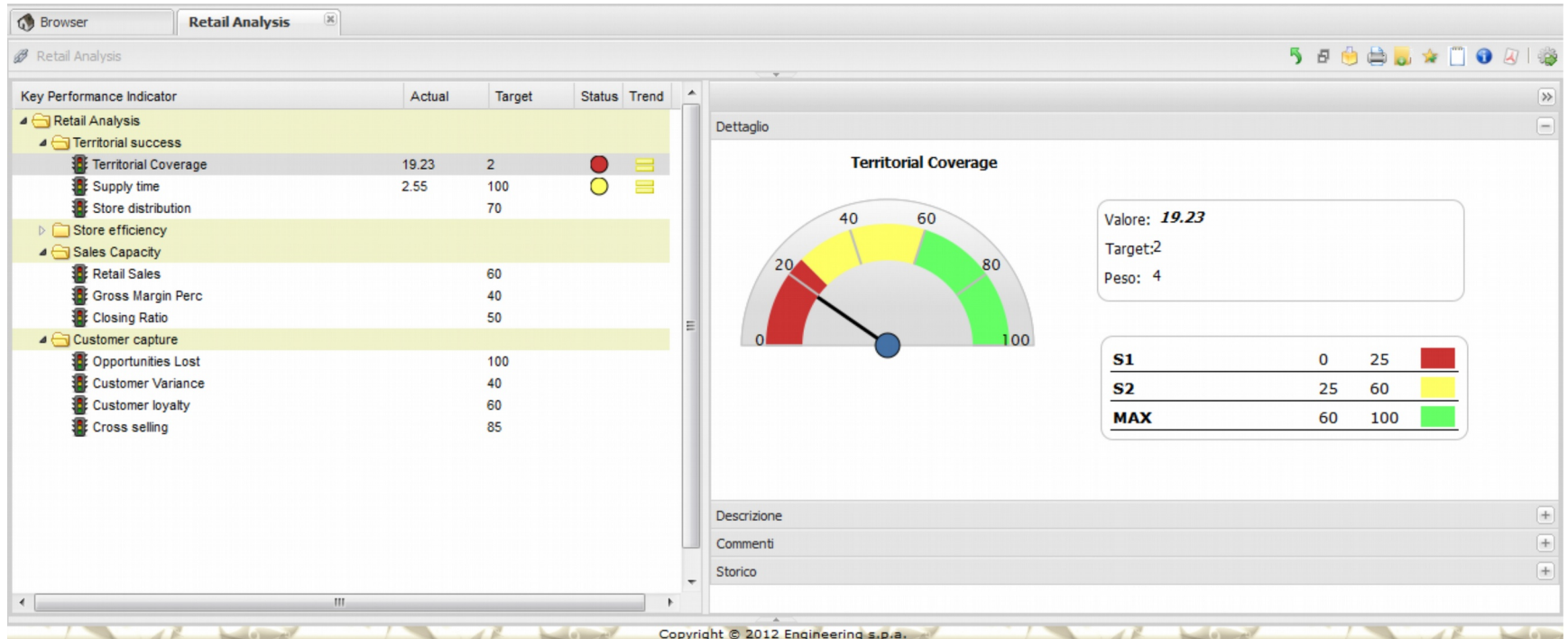
Full analytical capabilities

- **READY TO USE:** Report, Chart, Interactive Cockpit, KPI
- **BUILD BY YOURSELF:** Ad-Hoc Reporting, Self-service BI, In-Memory Cockpit
- **EXPLORATIVE:** OLAP Cubes, Visual Inquiring
- **ADVANCED ANALYTICS:** Location Intelligence, Data mining, RT console, Network analysis, What-if, Social listening

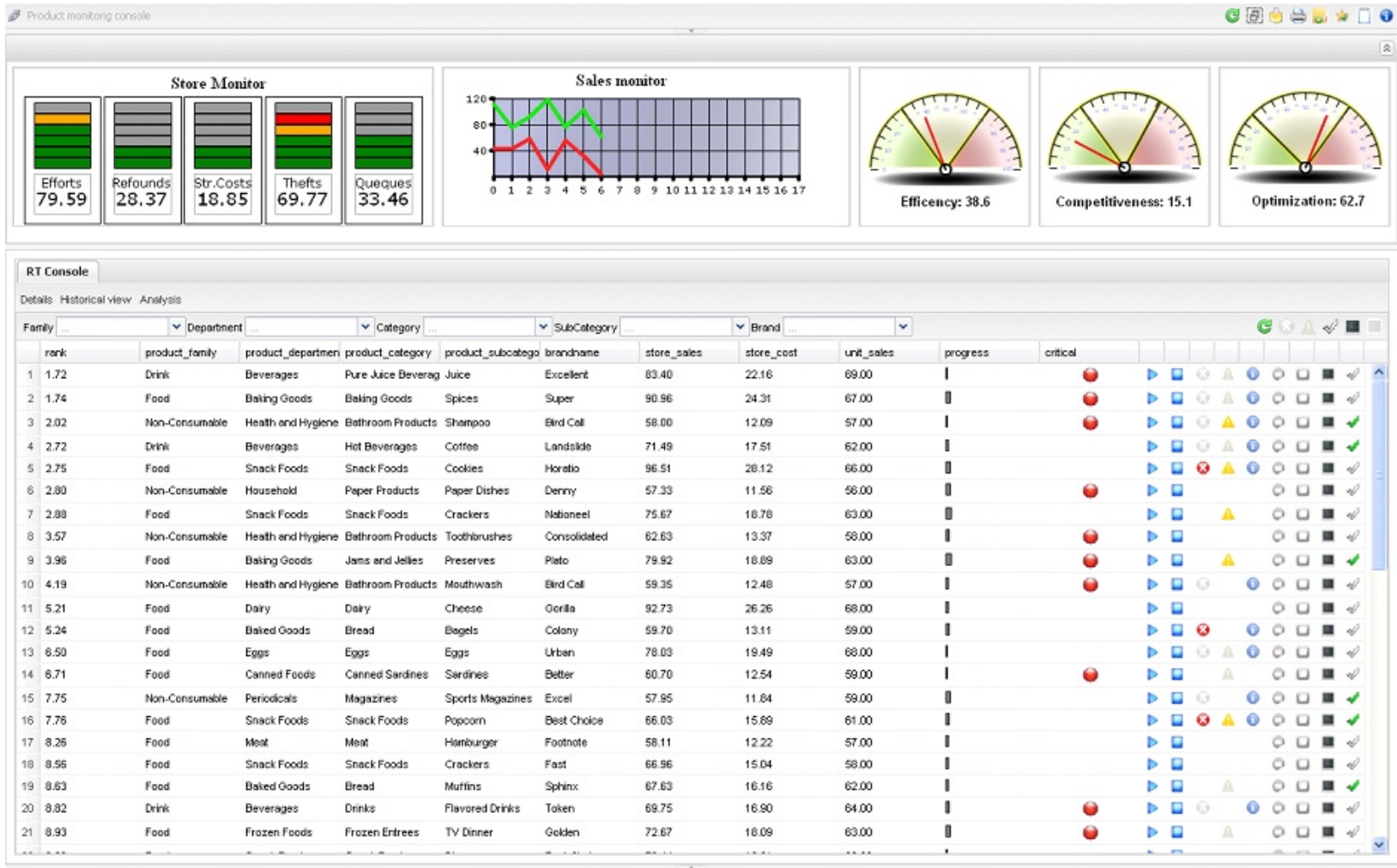
Composed dashboard



KPI document



Real-time analysis



Free enquiry

The screenshot displays the QlikView interface with the following components:

- Schema:** A tree view on the left showing the database schema for 'foodmart', including tables like 'Sales Fact 1998' and 'product'.
- Query Editor:** A central pane with a 'Select Fields' table. It lists 8 fields with their respective functions, orders, and visibility settings.
- Query Catalogue:** A pane on the right showing a list of queries, with 'query-q1' selected.
- Results:** A table at the bottom showing the query output. It includes columns for product details and sales metrics. A context menu is open over the 'productDepartment' column, showing options for sorting and columns.

Entity	Field	Alias	Function	Order	Group	Include	Visible	Filter	Having
1	productClass	productFamily	productFamily	ASC		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	productClass	productCategory	productCategory	ASC		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	productClass	productSubcategory	productSubcategory	ASC		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	product	brandName	brandName	ASC		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	productClass	productDepartment	productDepartment			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Sales Fact 1998	Unit Sales	Unit Sales	SUM		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Sales Fact 1998	Store Sales				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Sales Fact 1998	Store Cost				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

productFamily	productCategory	productSubcategory	brandName	productDepartment	Unit Sales	Store Sales	Store Cost
1	Drink	Beer and Wine	Beer	Good	7.00	1,455.90	2.48
2	Drink	Beer and Wine	Beer	Pearl	5.00	995.10	1.72
3	Drink	Beer and Wine	Beer	Portsmouth	3.00	2,110.58	3.71
4	Drink	Beer and Wine	Beer	Top Measure			
5	Drink	Beer and Wine	Beer	Walrus			
6	Drink	Beer and Wine	Wine	Good			
7	Drink	Beer and Wine	Wine	Pearl			
8	Drink	Beer and Wine	Wine	Portsmouth			
9	Drink	Beer and Wine	Wine	Top Measure			
10	Drink	Beer and Wine	Wine	Walrus			
11	Drink	Carbonated Bevera	Soda	Excellent			
12	Drink	Carbonated Bevera	Soda	Fabulous			
13	Drink	Carbonated Bevera	Soda	Skinner	1,233.00	2,381.17	2.31
14	Drink	Carbonated Bevera	Soda	Token	1,322.00	1,599.38	1.52
15	Drink	Carbonated Bevera	Soda	Washington	1,140.00	2,680.28	2.88
16	Drink	Dairy	Milk	Booker	1,617.00	3,439.82	2.64
17	Drink	Dairy	Milk	Carlson	1,834.00	3,148.42	2.14
18	Drink	Dairy	Milk	Club	1,470.00	2,194.81	1.86
19	Drink	Dairy	Milk	Even Better	1,652.00	2,376.86	1.86
20	Drink	Dairy	Milk	Gorilla	1,561.00	3,070.52	2.40
21	Drink	Drinks	Flavored Drinks	Excellent	994.00	2,585.32	3.14
22	Drink	Drinks	Flavored Drinks	Fabulous	1,078.00	3,367.67	3.87
23	Drink	Drinks	Flavored Drinks	Skinner	1,078.00	2,438.75	2.76
24	Drink	Drinks	Flavored Drinks	Token	970.00	1,604.82	2.11
25	Drink	Drinks	Flavored Drinks	Washington	816.00	1,389.53	2.01

Ad-hoc reporting

Worksheet designer

Selected fields

- Store Cost
- Unit Sales
- Store Sales

Palette

- Bar Chart
- Pie Chart
- Line Chart
- Table

Layout

Filters

Drag & drop here the fields to define filters

Crosstab definition

Columns

- productFamily

Rows

- education
- gender

Measures

- Store Cost (SUM)
- Unit Sales (SUM)
- Store Sales (SUM)

Sheet 1 | Sheet 2 | Sheet 3 | Sheet 4

Worksheet designer

Selected fields

- Store Cost
- Unit Sales
- Store Sales

Palette

- Bar Chart
- Pie Chart
- Line Chart
- Table

Layout

Filters

Drag & drop here the fields to define filters

Bar chart designer

Orientation: horizontal

Show values:

Show legend:

Series

Name	Field	Func	Color	Show	Precision	Suffix
Store Sales	Store Sales	SUM	#4472C4	<input checked="" type="checkbox"/>	0	
Unit Sales	Unit Sales	SUM	#C0504D	<input checked="" type="checkbox"/>	0	

Category: productDepartment

Worksheet sales

		Drink			Food			Non-Consumable			Total		
		Store Cost	Unit Sales	Store Sales	Store Cost	Unit Sales	Store Sales	Store Cost	Unit Sales	Store Sales	Store Cost	Unit Sales	Store Sales
Bachelor Degree	F	4,948.35	6,239.00	12,420.83	41,735.46	48,951.00	104,091.24	11,156.53	13,034.00	27,776.17	57,840.35	68,224.00	144,290.24
	M	4,586.04	5,692.00	11,425.71	38,615.79	45,125.00	96,099.01	9,922.53	11,699.00	24,739.16	53,124.36	62,516.00	132,263.88
	Total	9,534.39	11,931.00	23,846.54	80,351.25	94,076.00	200,190.25	21,079.06	24,733.00	52,517.33	110,964.70	130,740.00	276,554.12
Graduate Degree	F	1,077.09	1,398.00	2,738.61	8,388.22	9,936.00	21,039.42	2,324.60	2,682.00	5,811.83	11,789.91	14,016.00	29,589.86
	M	892.01	1,096.00	2,195.77	6,841.91	8,110.00	17,880.18	1,943.73	2,253.00	4,862.76	9,677.64	11,461.00	24,138.71
	Total	1,969.10	2,496.00	4,934.38	15,230.13	18,046.00	38,119.60	4,268.33	4,935.00	10,674.59	21,467.56	25,477.00	53,728.57
High School Degree	F	5,687.94	7,099.00	14,206.83	46,077.88	54,142.00	114,895.44	12,248.14	14,339.00	30,584.00	64,013.96	75,580.00	159,686.27
	M	5,598.43	7,014.00	13,979.19	45,565.92	53,440.00	113,604.05	12,201.11	14,283.00	30,548.13	63,365.45	74,737.00	158,131.37
	Total	11,286.37	14,113.00	28,186.02	91,643.80	107,582.00	228,499.49	24,449.25	28,622.00	61,132.13	127,379.41	150,317.00	317,817.64
Partial College	F	1,829.90	2,275.00	4,565.83	14,687.41	17,163.00	36,649.00	3,959.64	4,662.00	9,830.79	20,476.95	24,100.00	51,065.62
	M	1,501.36	1,950.00	3,785.56	14,320.32	16,764.00	35,740.27	4,041.32	4,707.00	10,054.62	19,863.00	23,421.00	49,580.45
	Total	3,331.27	4,225.00	8,351.39	29,007.73	33,927.00	72,489.27	8,000.96	9,369.00	19,885.41	40,339.96	47,521.00	100,646.07
Partial High School	F	5,688.80	7,115.00	14,241.54	48,091.50	56,129.00	120,058.96	12,275.25	14,314.00	30,553.45	66,051.55	77,558.00	164,853.97
	M	5,690.75	7,074.00	14,182.29	47,669.23	56,163.00	118,858.21	13,002.57	15,137.00	32,506.60	66,362.54	78,374.00	165,547.10
	Total	11,377.55	14,189.00	28,423.83	95,760.73	112,292.00	238,917.19	25,277.82	29,451.00	63,060.05	132,414.10	155,932.00	330,401.07

Sheet 1 | Sheet 2 | Sheet 3 | Sheet 4

Self-service cockpit

The screenshot displays the SpagoBI self-service cockpit interface. The main dashboard contains three primary visualizations:

- Sales by product family:** A pie chart showing the distribution of sales across Drink, Food, and Non-Consumable categories.
- Sales by region:** A bar chart comparing STORE_SALES and STORE_COST across five regions: Center, CenterEast, CenterWest, EastCost, and WestCoast.
- Sales by month:** A line chart showing STORE_SALES, STORE_COST, and UNIT_SALES over 11 months.

Below these charts are two data tables:

PRODUCT_CATEGORY	SALES_REGION				
	Center	CenterEast	CenterWest	EastCost	WestCoast
Baking Goods	10,171.98	4,113.89	7,881.88	3,984.10	4,611.52
Bathroom Products	8,477.10	3,628.89	6,527.65	3,025.24	4,196.07

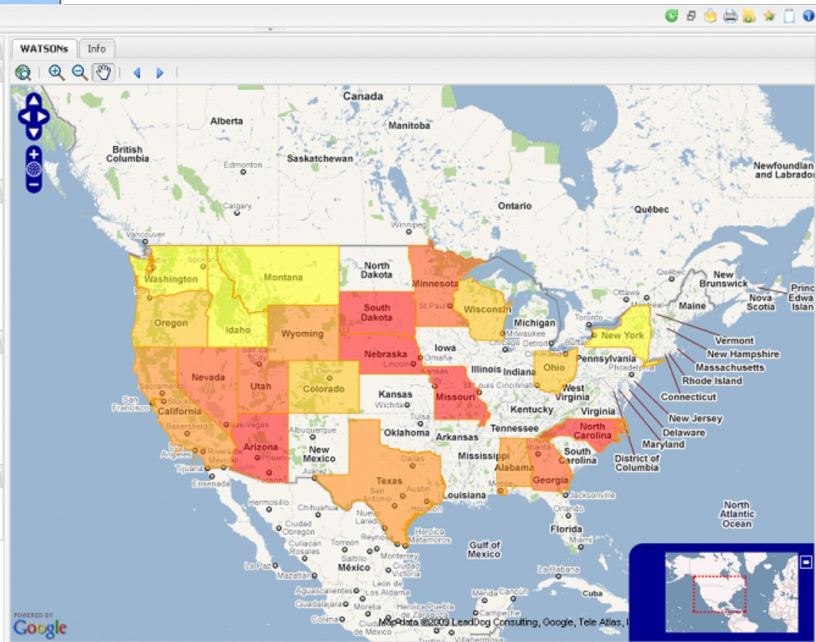
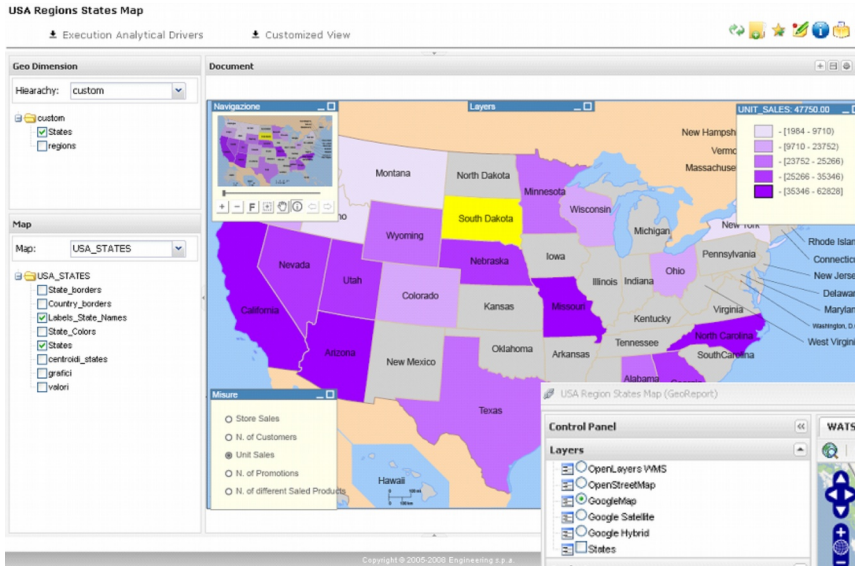
MONTH_	PRODUCT_CATEGORY	PRODUCT_DEPARTMENT	STORE_SALES	STORE_COST	UNIT_SALES
1	Pure Juice Beverages	Beverages	152.80	59.92	76.00
1	Pure Juice Beverages	Beverages	132.95	54.38	70.00
1	Pure Juice Beverages	Beverages	187.16	81.28	92.00
1	Pure Juice Beverages	Beverages	424.97	168.08	229.00
	Beverages	Beverages	359.08	143.37	178.00
	Beverages	Beverages	150.06	61.31	79.00
	Beverages	Beverages	265.70	94.80	119.00
	Beverages	Beverages	182.66	74.68	86.00
	Beverages	Beverages	184.64	71.96	100.00
	Beverages	Beverages	371.79	146.40	196.00
	Beverages	Beverages	147.05	58.60	70.00
	Beverages	Beverages	389.40	160.02	202.00
	Beverages	Beverages	265.13	108.59	145.00
	Beverages	Beverages	165.66	69.25	79.00
	Beverages	Beverages	365.62	146.57	182.00
	Beverages	Beverages	265.61	108.92	131.00

The **Widget editor** is open, showing the **Line chart designer** configuration for the 'Sales by month' widget. The configuration includes:

- Series:** A table defining the data series for the chart.
- Series' grouping variable:** A dropdown menu set to 'Month'.

Name	Field	Function	Color	Show Preci	Suffi
Units Shipped	Units Shipped	SUM	#9372A7	<input checked="" type="checkbox"/>	2

Location intelligence



What-if analysis

The screenshot shows the SpagoBI web interface. The browser address bar displays `localhost:8080/SpagoBI/servlet/AdapterHTTP?PAGE=LoginPage&NEW_SESSION=TF`. The interface includes a navigation sidebar on the left and a main content area with filters and a data table.

Filters are set to: Customers: All Customers, Region: All Regions, Time: 2012, Version: v0.

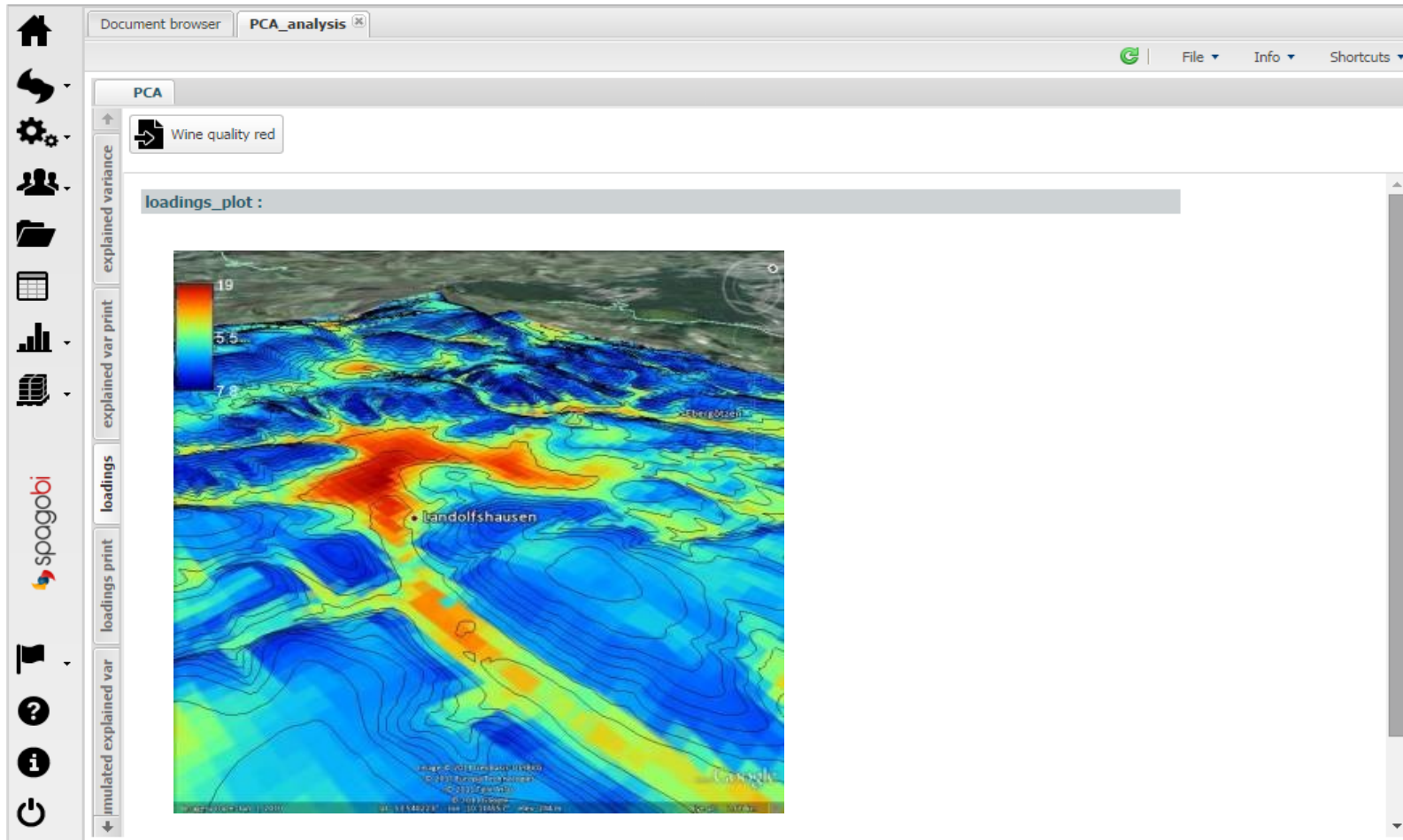
The data table has columns: Product, Sales Count, Store Cost, Store Sales, and Unit Sales. The 'Food' category is expanded, showing sub-categories like Baked Goods, Baking Goods, etc.

Two callout boxes illustrate what-if analysis:

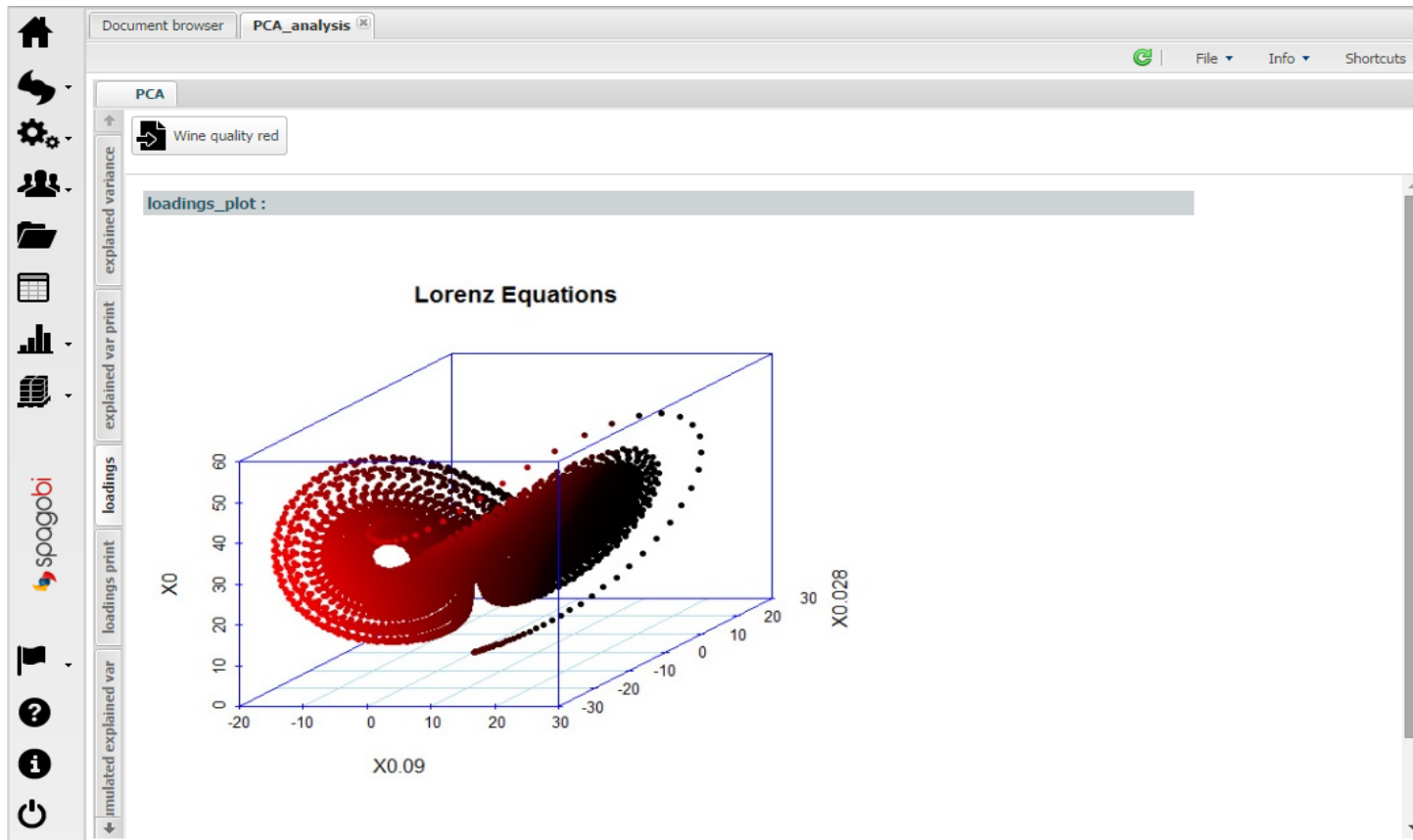
- Top Callout:** Shows a calculation for 'Baked Goods' in 2012. The formula is `311,931.70 + 30%`, resulting in a Store Cost of 311,931.70, Store Sales of 155,240.74, and Unit Sales of 365,852.
- Bottom Callout:** Shows a calculation for 'Baked Goods' in 2011. The formula is `12,786.96 + 20%`, resulting in a Store Cost of 12,786.96, Store Sales of 6,755.24, and Unit Sales of 14,979.

Product	Sales Count	Store Cost	Store Sales	Unit Sales
Food	118,122	311,931.70	155,240.74	365,852
Baked Goods	4,833	12,786.96	6,755.24	14,979
Baking Goods	12,533	29,993.39	14,729.26	38,937
Breakfast Foods	2,138	5,416.26	2,756.01	6,640
Canned Foods	11,626	30,010.30	14,845.87	35,881
Canned Products	1,088	2,494.43	1,247.53	3,440
Dairy	7,876	22,766.78	11,434.42	24,282
Deli	7,378	19,352.60	9,727.49	22,992
Snacks	4,276	11,094.47	5,503.50	13,212
Starchy Foods	3,140	8,851.79	4,241.93	9,810

Data/text mining and advanced visualization



Data/text mining and advanced visualization



Social listening

The screenshot shows a web browser window with the URL `localhost:8081/SocialAnalysis/`. The application interface includes the following fields and controls:

- Search type:** Radio buttons for On-line monitoring and Historical data.
- Starting from:** A dropdown menu set to `1`.
- Repeat every:** A dropdown menu set to `1`.
- Logical identifier:** Text input field containing `spagobi campaign`.
- keywords:** Text input field containing `spagobi spagobi50`.
- Platform selection:** Checkboxes for Twitter, Facebook, and LinkedIn.
- Accounts to monitor:** Text input field containing `@spagobi, @gcazzin`.
- Resources:** Text input field containing `http://bit.ly/rzhLn, http://bit.ly/SpagoBI`.
- Impact on business:** Empty text input field.
- Up to:** A dropdown menu set to `3`.
- Frequency:** A dropdown menu set to `Month`.
- later:** Text label.
- Frequency:** A dropdown menu set to `1`.
- Day:** A dropdown menu set to `Day`.
- Search:** A button to execute the search.

Below the configuration form, a table displays search results:

ID	first	spagobi	09/26/2014 12:54	@spagobi, @gcazzin	None		
1							

Summary

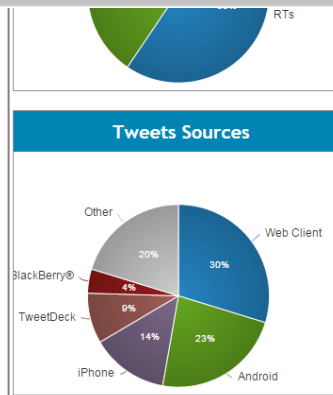
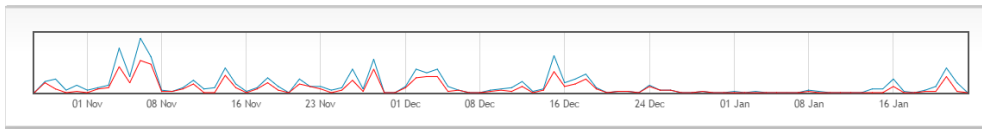
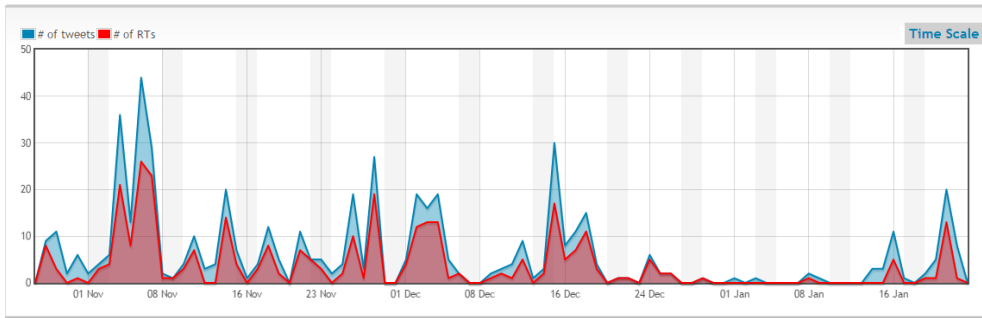
538
tweets

184
users

172,626
reach

541,752
impressions

28-10-2014
22-01-2015
Search Range



Tweets

EngineeringSpa 14 Nov
Engineering 3° trim. 2014: EBIT supera l'n (+37%). Pandozy: confermati it di fine anno. <http://t.co/R36s9wTdTX> <http://t.co/SbJdrQSwEo>

EngineeringSpa 06 Nov
L'Europa incontra la Bay Area. @PugliaSmartLab a San Francisco per parlare di #Sostenibilit  e Green-Tech Cities <http://t.co/SFMvk0mKXn> #sostenibilit 

EngineeringSpa 18 Dec
Oggi a Palermo a presentare i progetti @frontierCities @finodexproject @FABulous_FL <http://t.co/g3EdEApLDY> #fiware <http://t.co/TVyyXNBWp0> #fiware

EngineeringSpa 21 Jan
22/1 Innovation Day 2015. La nostra vision su #BigData, Cloud, Managed Operations <http://t.co/9mhmEWQo9H> <http://t.co/XTc7Ag7H1M> #bigdata

Recent Tweets

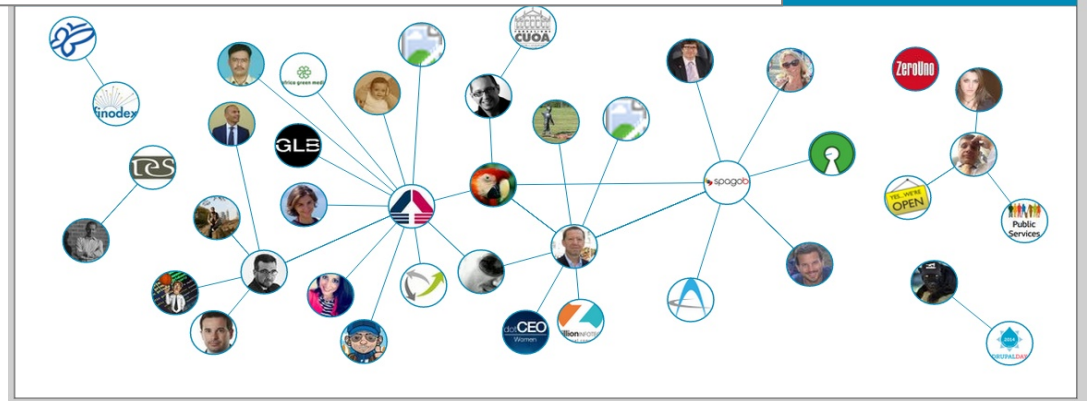
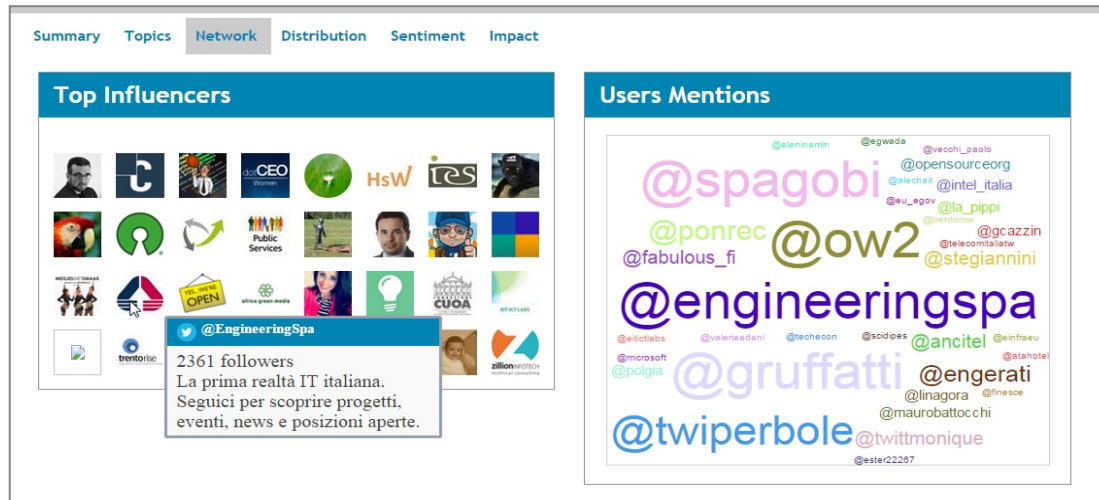
SpagoBI 22 Jan
Today #spagobi is at the "Innovation Day 2015" organized by @EngineeringSpa, with a speech on #bigdata by @gcazzin | <http://t.co/QgiVLRoCki> #spagobi #bigdata

IvanRenesto 22 Jan
How to extract value from your #BigData. An event to learn how to increase your business. Invite: <http://t.co/ih98UmtCIC> @Engineeringspa #bigdata

OpenSourceOrg 22 Jan
RT OSI Sponsor @EngineeringSpa: "The New Stakeholder Era: ICT & Knowledge Projects": Workshop a @Uniluiss <http://t.co/LwNrhImqGD>

OpenSourceOrg 22 Jan
RT @gruffatti: What I'm going to say next week about #opensource <http://t.co/WFnWDU2ARn> @SpagoBI @ow2 @EngineeringSpa @TrianaGroup #opensource

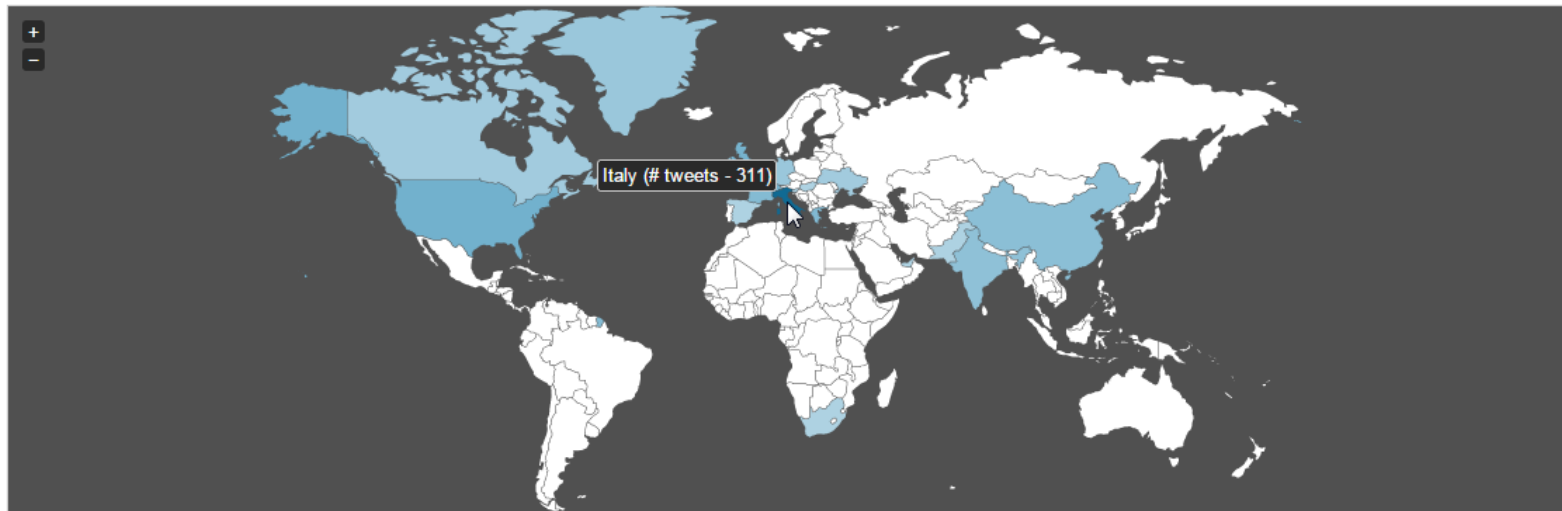
Networks



Distribution

Summary Topics Network **Distribution** Sentiment Impact

Location Tweets[®]



Sentiment

Summary Topics Network Distribution **Sentiment** Impact

Tweets Polarity



83.3%
70

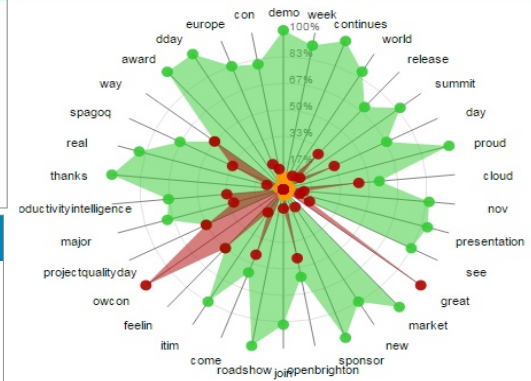


2.4%
2

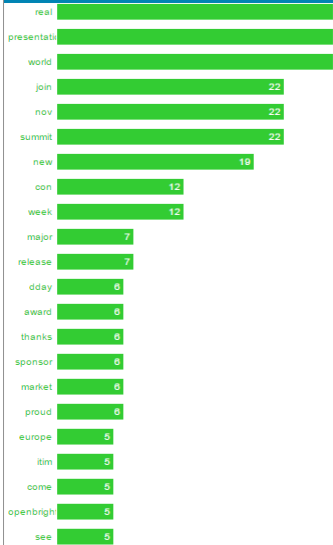


14.3%
12

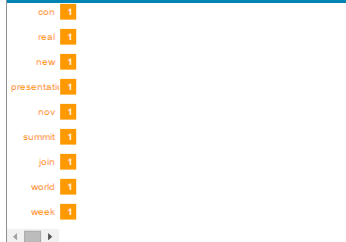
Sentiment Radar



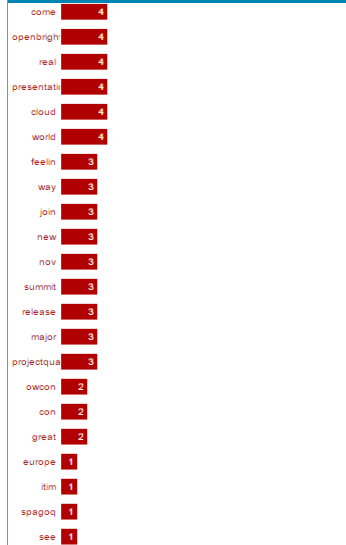
Positives Topics



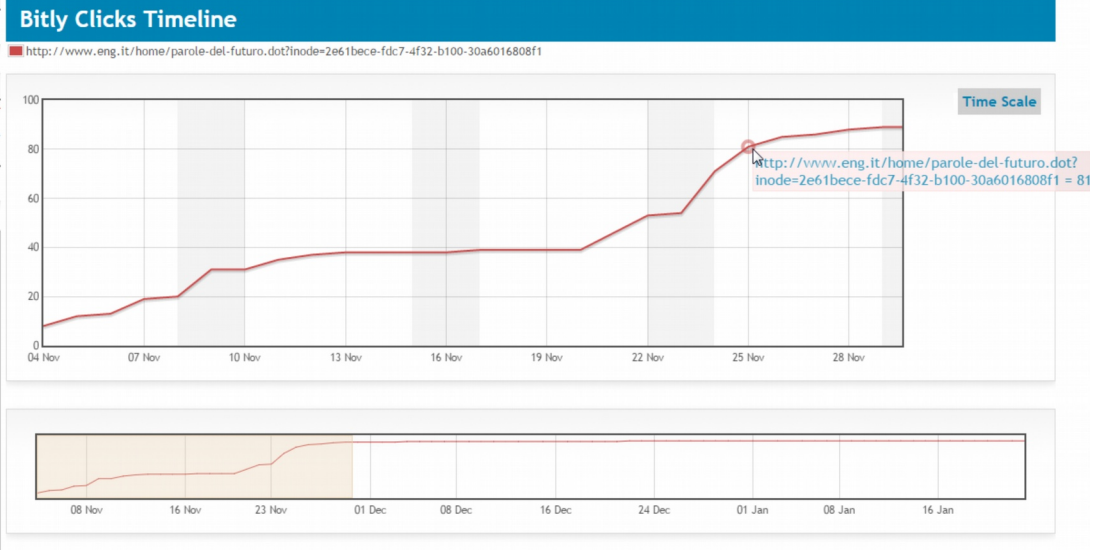
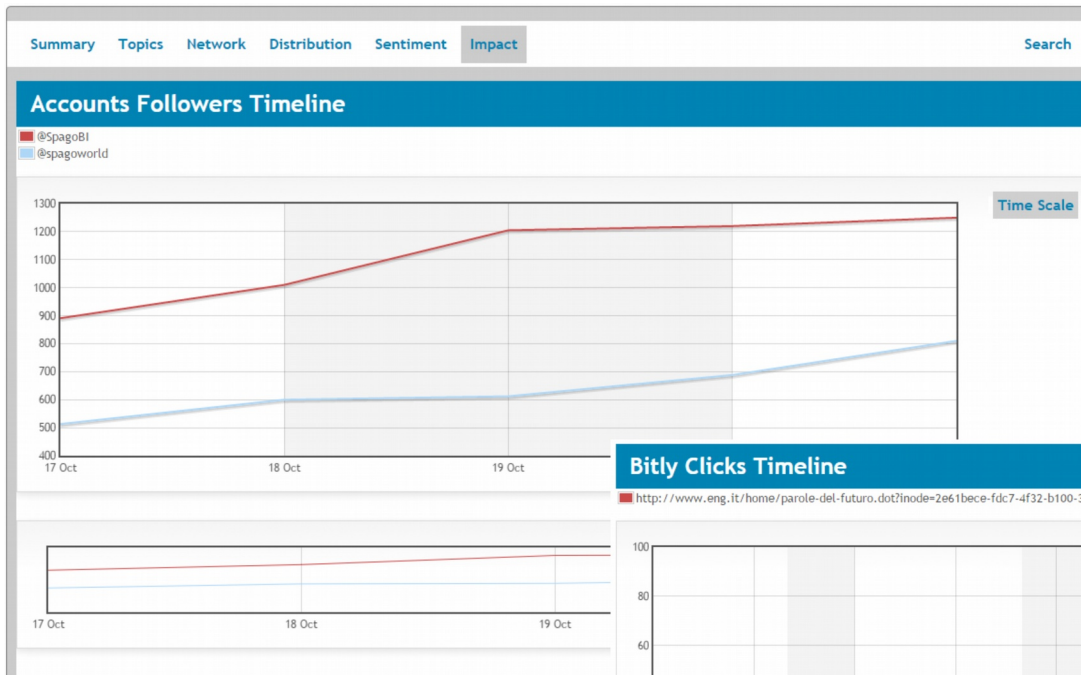
Neutrals Topics



Negatives Topics



Impact on business



Who choses SpagoBI suite

“SpagoBI proved to be an application that goes beyond the conventional concept of BI, and it doesn't leave anything to be desired compared to other products. [...]”

David Oliveira, Technology and Quality Executive at Sepaco Hospital



**Ministry of
Education and Science**



AUTONOME
PROVINZ
BOZEN
SÜDTIROL



PROVINCIA
AUTONOMA
DI BOLZANO
ALTO ADIGE

“Thanks to SpagoBI, we have enhanced our decisional processes and managed our production process effectively. [...]”

Italian customer in the Industry & Services domain

SpagoBI as FIWARE Data Visualization GE

SpagoBI was enriched with:

- REST & JavaScript API
- cloud deployment scripts (Docker, Chef, FIWARE Lab image/blueprint)
- integration with other FIWARE GEs:
 - IdM (OAuth2)
 - Publish/Subscribe Context Broker
 - CKAN open data portal
 - Big Data Storage (Cosmos)

REST API examples

To execute a static report and retrieve result:

```
POST /restful-services/2.0/documents/<document_label>/content  
BODY  
[... parameters ...]
```

To get the content of a dataset:

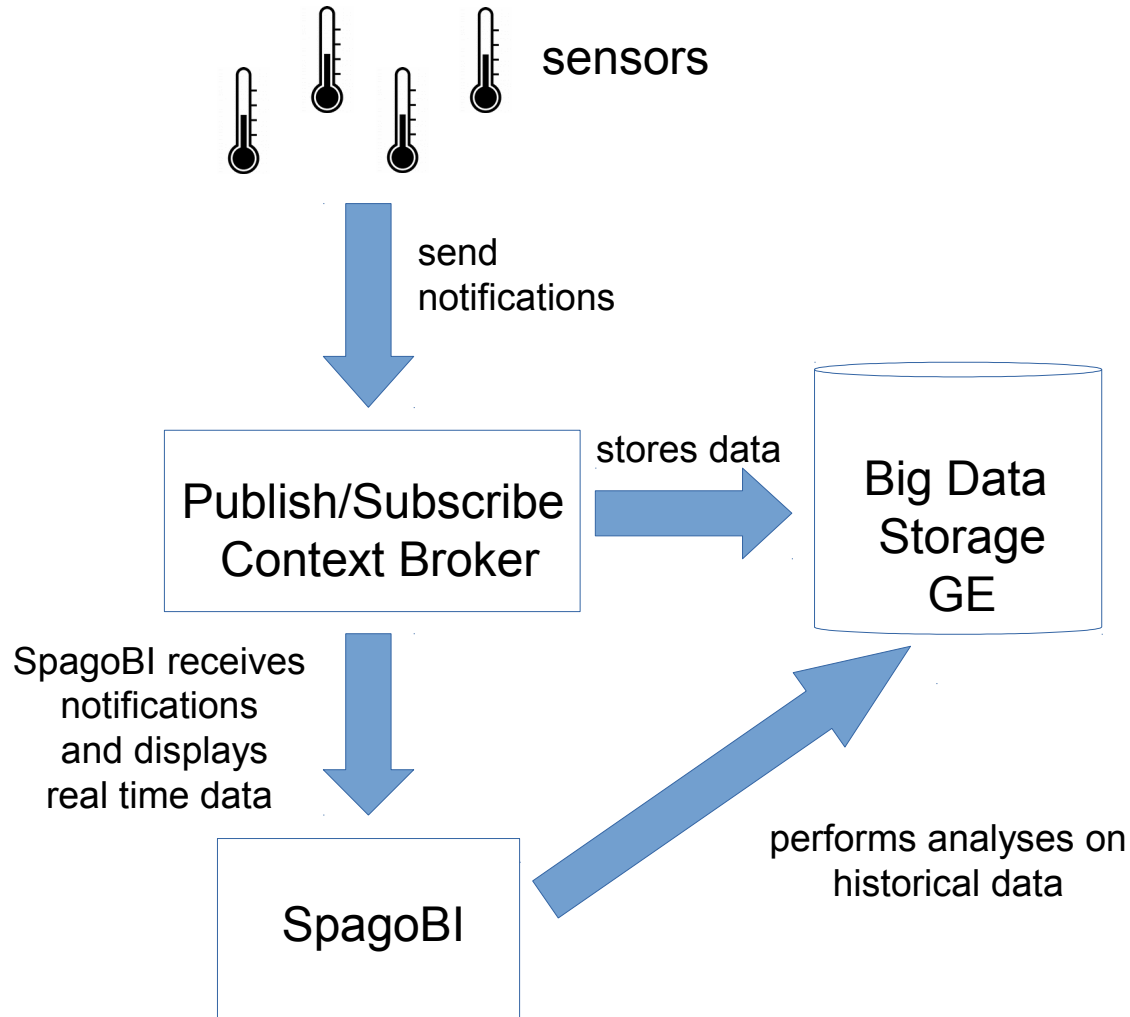
```
GET /restful-services/2.0/datasets/<dataset_label>/content  
QUERY PARAMETERS  
parameter_1=value_2&parameter_2=value_2&...
```

JavaScript API examples

To display a SpagoBI analytical document within another web application:

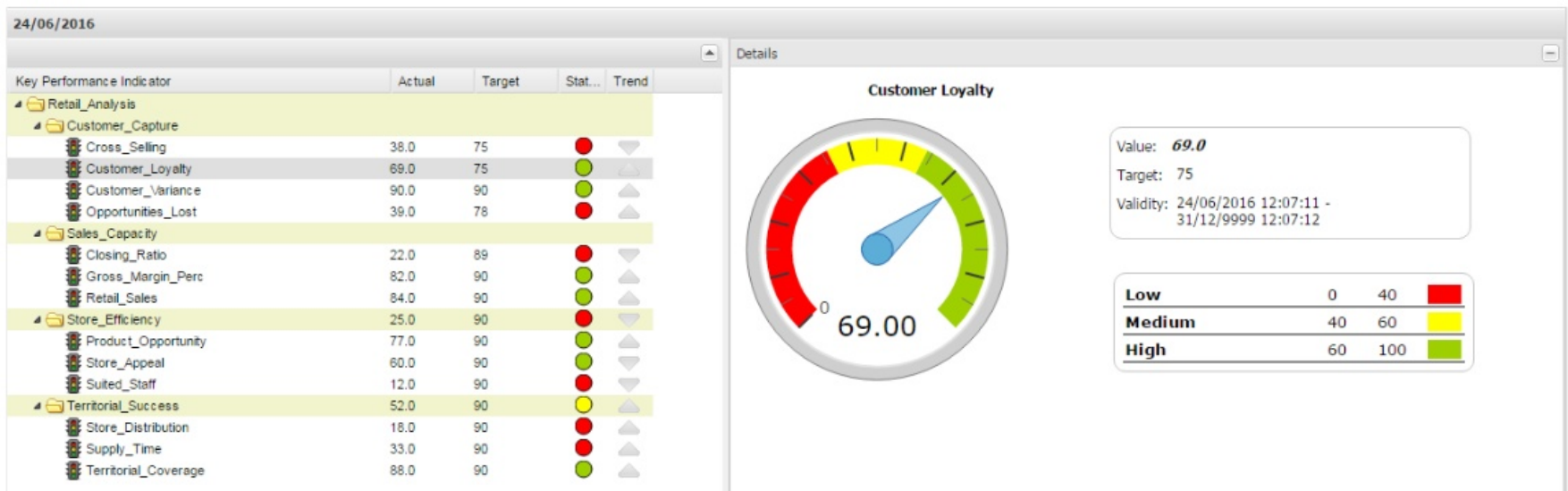
```
Sbi.sdk.api.injectDocument({
  documentLabel: '<label of analytical document>'
  , executionRole: '<user role to be considered>'
  , parameters: {<parameters' values>}
  , iframe: {
    height: '500px'
    , width: '100%'
    , style: 'border:1px solid grey;'
  }
});
```

An IoT scenario



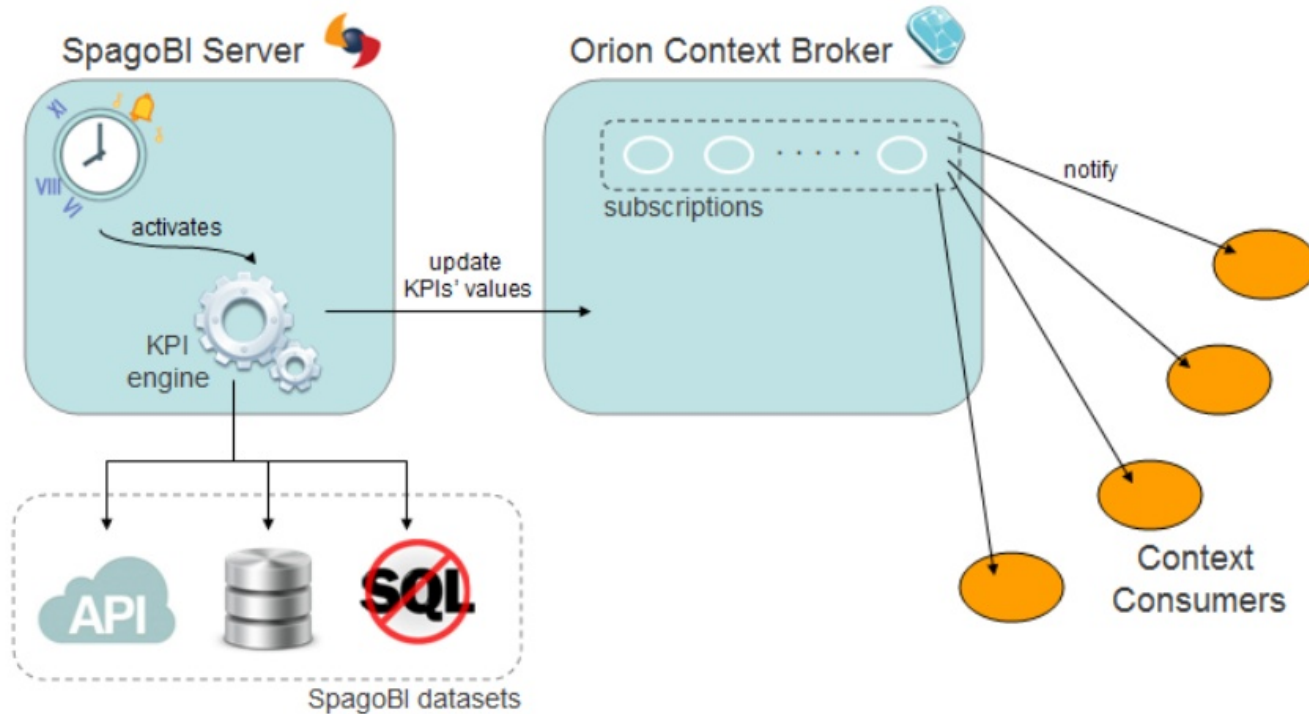
SpagoBI KPI engine

SpagoBI KPI document: business Key Performance Indicators



SpagoBI as context data producer

SpagoBI sends KPI values and alarms as context data



Useful links

SpagoBI web site:
www.spagobi.org

FIWARE catalogue entry:
<http://catalogue.fiware.org/enablers/data-visualization-spagobi>

REST API:
<http://docs.spagobi.apiary.io/>

JavaScript API:
<http://spagobi.readthedocs.org/en/latest/user/JS/README/index.html>

Integration with other FIWARE GEs:
<http://spagobi.readthedocs.org/en/latest/index.html>

SpagoBI courses on FIWARE academy:
<https://edu.fiware.org/course/view.php?id=141>

Thank you!

<http://fiware.org>

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