TECHNOLOGY AUDIT

Price Intelligence Suite
Lixto

SUMMARY

IMPACT

The Lixto Price Intelligence Suite is a solution that extracts price-comparison information from competitor online web channels and combines it with internal data sources so organizations gain greater visibility into the factors that might influence price. The suite works by navigating and extracting competitive product and pricing information from predefined online data sources before standardizing, combining, and loading this information into a BI data warehouse for role-based analysis and reporting. The Price Intelligence Suite is specifically targeted at companies in the travel and transport and consumer products industries where product and price competition is particularly volatile, fast moving, or time-based. In Ovum’s opinion the Lixto Price Intelligence Suite should appeal to organizations that need to closely monitor competitors and channel web prices in a more coordinated and automated way.

KEY FINDINGS

Strengths:
- Provides reliable and efficient data-extraction and translation processes for web data sources.
- Visual developer tool assists less technically orientated users and enhances the data connector creation phase.

Weaknesses:
- There is no support for intra-day extraction and reporting.
- Requires manual configuration of connectors for each web data source.

Key Facts:
- Provides predefined reports specific to revenue, pricing, sales, channel and category managers, and senior decision-makers.
- Uses cloud infrastructure such as Amazon EC2 for improved scalability and processing performance.
OVUM VIEW

The Internet has become the definitive and foremost source of competitive information relating to companies and the products they sell. To sustain a competitive advantage in the market, organizations are increasingly required to react quickly to external threats and opportunities in areas such as product and price revisions as consumers and businesses become better informed and more savvy about where to shop and place their business. There is also a need for agility in areas where there is a finite lifespan of a product or in markets that are particularly competitive such as the travel and consumer-products industries. The Lixto Price Intelligence Suite is designed to support organizations that want a faster and more automated way of extracting, analyzing, and distributing intelligence about products, customers, and competitors to support executives and managers in their decision-making, particularly since the alternative can involve error-prone and unwieldy manual extraction and collation processes.

The Lixto Price Intelligence Suite provides a set of components and tools that enable developers to create connectors that extract data from specific websites, convert this into a structured format, and model and leverage the information through a set of BI reporting and dashboarding tools. The suite can be used by travel and consumer-goods companies to gather competitor and market intelligence information from public websites, compare prices to check whether their own pricing levels are appropriately set, recognize when competitor pricing changes, and ensure pricing consistency within a distribution channel. For example, in the travel industry a hotel could monitor its distribution-channel websites to ensure that hotel-room prices remain within a competitive price range. The Price Intelligence Suite delivers business value by automating and bringing scale to what is often a manual and fragmented data-collection task and by helping organizations achieve effective price and margin management.

The suite uses several sophisticated technology components to extract and translate web data into a business-ready consumable format. Data extraction is based on data-pattern recognition and web-page navigation. This process is enhanced through the use of a visual extract connector developer tool called the Lixto Visual Developer that allows less technically orientated users to quickly build up an extensive list of web-page sources to be monitored. Users should be aware that there is a manual overhead in the initial creation of the web-extraction connectors because separate connectors have to be created and maintained for each data source. However, once the connectors have been generated the Price Intelligence Suite uses an automated and reliable way of extracting data using a heuristic-based method.

The suite also provides highly targeted reports and a dashboard for a range of different roles involved in price management. This includes revenue, pricing, sales, channel and category managers, and senior decision-makers. Ovum would like to see Lixto improve the latency of data in the Price Intelligence Suite so users are able to see intra-day price changes ripple through to an end-user reporting and analysis environment. This would increase the timeliness of data and improve the ability of users to react to changing market conditions.

The Lixto Price Intelligence Suite is what Ovum would term a hybrid SaaS solution where it can be deployed on-premise or hosted in a Lixto data center and accessed via a web interface. The suite can use the cloud infrastructure such as Amazon’s EC2 for improving the performance and scalability of the data-extraction and transformation phases, particularly when there is a need to process data that is spread across thousands or even ten of thousands of separate commercial entities, product lines, or categories.

Lixto – Price Intelligence Suite

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Ovum believes that regardless of the on-premise or off-site location of components of the suite, organizations will need to integrate with internal applications such as pricing and revenue-management systems or BI systems in order to devise an optimal pricing strategy and gain greater insight into all the factors influencing price. This in turn may require additional development and integration work, which will need to be factored in to implementation timescales and costs.

FUNCTIONALITY

SOLUTION OVERVIEW

The Price Intelligence Suite allows companies to access and monitor information on hundreds of products and price points across many websites on a standardized and continuous basis where minor format or pricing change on selected web pages can be dealt with in an automated way. The captured information can then be used to assess the current price position, recognize when competitors change products or prices in online channels, understand the market position, and police online sales channels for price and rate compliance.

SOLUTION ANALYSIS

From an architectural perspective the Price Intelligence Suite is 100% Java-based and has been built from the ground up on web standards such as XML schema, XSLT, SOAP, and J2EE. The software uses a proprietary extraction language called ELOG, which can manipulate, translate, and deliver information from various semi-structured sources into a structured XML format.

Role-based reporting and analysis

The Lixto Price Intelligence Suite is available as a complete suite of offerings or as individual modules designed to support specific roles and reporting requirements.

Price operations — This module is targeted toward pricing managers, product managers, and category managers, and provides a comprehensive set of competitive price data reports that enable customers to improve price positioning, compare product offerings and rates at different levels of granularity, and identify competitive pricing in a more timely way. For example, the detailed reporting capability can be used for analyzing availability and price per competitor or per category.

Price analytics — The price analytics module supports channel managers and brand managers by identifying major price deviations. For example, a hotel could monitor its distribution channel websites to ensure that room prices remain within a competitive range.

Price strategy — The price strategy module gives senior managers and executives a consolidated overview of a product’s position and performance in the market by including “meet beat ratios” that detail what percentage of offers the customer is meeting or beating in comparison with its competitors. In Lixto’s view the amount of revenue a customer may receive from an offer depends on how competitive they are. The sweet spot is between 40% and 75% competitiveness for maximizing revenues, otherwise customers are liable to lose revenue or not make enough profit.
Platform – tools and middleware

The architecture of the solution comprises four main building blocks (see Figure 1): the data-acquisition infrastructure for gathering data from online web channels otherwise termed as the harvesting phase, the data normalization and transformation process known as the consolidate phase, the analyze phase, and the execute phase. Lixto has developed its own visual web data extraction and server products to support elements of the harvesting and to consolidate phases, whereas the data warehouse and associated dashboard, reporting, and analysis capabilities of the analyze and execute phase are based on Oracle Business Intelligence Enterprise Edition.

Figure 1: Lixto Price Intelligence Suite building blocks

Using Lixto Visual Developer

Lixto Visual Developer is an integrated development environment (IDE) based on Eclipse. It has two primary functions: to define data-extraction rules and patterns from representative sample web pages, and to enable developers to visually define web-navigation sequences.
The Visual Developer tool (see Figure 2) enables less technical users to quickly build up an extensive list of web-page sources to be monitored. These sources are defined in the Mozilla browser, which is embedded within the tool, by visually selecting relevant data items on the web page for dynamic extraction. During the extraction process the software drills into the web page content structure, or more accurately the HTML tree structure of the target website, and searches using heuristic methods for the best match in the HTML tree. Rules are also applied to the data (such as to select only lines on the web page that begin with the word “price”) to ensure the correct data is identified for extraction. The solution can handle web pages built with rich web application technologies such as Asynchronous Javascript and XML (Ajax) and can tolerate minor changes in the page structure such as appearance or positioning of page elements. The tool’s point-and-click interface makes it more appealing to less technically orientated users because it can shield and mask the complexities of the underlying web data sources and does not rely on the user having knowledge of ELOG, HTML, or XML for defining data structures and extraction routines.

Figure 2: Lixto Visual Developer

Source: Lixto
Apart from defining data-extraction rules, the Visual Developer also handles web-page navigation by dynamically recording and replaying web-page navigation sequences such as mouse and key events. This can help overcome some of the common difficulties involved in extracting web data such as navigating to pages behind logons, the requirement for form filling, cookies, and non-HTML data formats. During this stage typically only one page needs to be used as a navigation example because the software can recognize similarly structured web pages during the extraction phase. In this sense the Price Intelligence Suite learns by example, so a developer has to visit a site and navigate through the data to identify the data patterns and enable the creation of the data-extraction rules (programs). While it can cope with small changes, major changes to the site necessitate another iteration of the process. The positive side of this interactive learn-by-example, or supervised-learning, technique is that it eliminates the time-consuming and expert task of creating and manually labeling a data model.

Harvesting

During the harvesting process, the Extraction Server, which is the runtime environment for processes developed within Visual Developer, extracts and translates website information from HTML to a structured XML format. The Transformation Server is then responsible for processing the XML data generated by the Extraction Server. The server retrieves web data automatically, based on an event such as a request for a price lookup on a website or a defined time-based schedule. The Transformation Server can also integrate data from different extraction routines, and aggregate, reformat, transform, and deliver this information to a designated target data warehouse.

The whole process of modeling the workflow and data flow is done in a graphical user interface in the Lixto Transformation Server. Graphical objects are used to symbolize components, and the flow of data and the workflow are graphically defined by drawing connecting arrows between the objects. In addition, the transformation server supports the runtime, administration, and monitoring of the whole process to assist with common system-management tasks. The server can, for example, send out a notification email to an administrator if a website is inaccessible or the web server is down during the extraction phase.

During the harvesting phase a load-balancer manages volatile demand where multiple queries are running at one time. It provides scale-out and can deploy new instances of Extraction Servers as needed by distributing the workload across physical resources to maximize throughput and avoid overload.

Consolidate

The Consolidate phase performs the normalization, data-matching, and cleansing operations on structured XML data which is then delivered ready for end-user analysis and reporting. For example, when receiving an XML data message the software validates the data structure and stores the data package in a temporary data queue. The data is then extracted, transformed, cleansed, and loaded via JDBC or SQL-stored procedures into an Oracle data warehouse. The data model used by each customer is typically defined and designed upfront to fit the needs of the specific application or industry domain. Users need to invest time upfront in harmonizing and mapping the different web channels to this data model. In certain circumstances this can take a number of weeks if the domain is new, but if there is already a customer using a similar domain then set-up time can be reduced to a couple of days.
Analytics

This phase involves aggregating content on a daily basis for end-user analysis and reporting according to different roles and the level of data granularity required. The module gives end users a set of pre-defined drillable reports and dashboards that provide an analytical overview of pricing trends or a detailed view for analyzing availability, price per competitor, per category, or for verifying the data quality of source data. Similarly, management dashboards provide a summarized overview of the product and pricing landscape and how a customer’s products and prices compare to the competition.

Execute

In the execute phase internal data such as demand and sales volumes and the consolidated competitive price information are combined to compute the optimal price according to a given pricing strategy. This process requires the Lixto Price Intelligence Suite to integrate with other internal systems such as the revenue-management and pricing applications. The new prices are then pushed onto the web channels to close the loop and start a new processing cycle.

Administration and Control panel

Lixto provides several administration tools for expediting system-management tasks such as query scheduling and system performance monitoring. Functional areas include query scheduling, a reporting server, and load-balancing.

Query scheduling allows administrators to define a schedule for the extraction processes. This can either be set as a regular repeatable schedule or on an ad hoc basis. The latter is particularly useful if a customer wants to investigate price points at a specific moment such as during the course of a promotional offer.

A reporting server acts as central-management resource that gathers service-execution reports based on a cluster of extraction servers. It allows an administrator to use the information produced within a set of reports and dashboards to spot extraction connectors that are not performing, perhaps because there has been a change in the web environment, and to repair and reschedule the connectors.

Load-balancing intelligently distributes the extraction process load to available resources.

IMPLEMENTATION

The Lixto Price Intelligence Suite offer a SaaS option that uses cloud-computing resources such as Amazon Elastic Compute Cloud (EC2) to improve the scalability and processing power of the Extraction Cluster. This allows for improved scaling, particularly for companies that have volatile levels of demand and might need to extract and process hundred thousands of price points every day. Other components of the Price Intelligence Suite such as the data warehouse are typically run on-premise or at Lixto’s data center in Austria where they are accessed via a web interface. Unlike other popular SaaS applications the suite does not use full multi-tenancy where there are multiple user organizations sharing the same application instance.
Instead, customers of the Price Intelligence Suite share infrastructure but are provided with an individual solution with their own access credentials, with login to their own system where they can see only their own data. Similarly, the application itself is usually extended or customized according to customer needs. For integration with in-house systems, Lixto provides an XML-based API and a set of connectors. The suite is available as a complete suite of offerings or as a set of individual modules.

During the setup of the harvesting phase a designer is required to visit each website and navigate through the data to identify patterns and create a set of data-extraction rules. This is usually carried out by Lixto in conjunction with the customer. The length of time needed varies according to the amount of data that needs to be processed and the individual customer requirements. Once the extraction connectors have been generated the Price Intelligence Suite uses an automated and reliable way of extracting data through a heuristic approach. Customers need to invest time to specify requirements for the design of the data model to ensure the correct web data is mapped to the correct tables and columns in the data warehouse. Organizations therefore need a data-management/modeling specialist (either in-house or an external consultant) during the planning and deployment phase.

In a typical deployment scenario a pilot project would take about five days with help from one trained Lixto engineer. A departmental deployment would take about 30 days and require four Lixto engineers, and an enterprise-wide deployment with about 500 users would take 60 to 90 days and require six engineers.

The solution can be deployed with server operating systems such as Windows (Windows Server 2003) and Linux (SuSE 11Pro). The client component runs on a web browser, which could be Internet Explorer or Mozilla Firefox. The suite uses third-party BI tools and data-warehousing infrastructure from Oracle including the Oracle 11g database and Oracle BI Server, Oracle BI Answers, and Oracle BI Interactive Dashboards from the Oracle Business Intelligence Enterprise Edition (OBIEE) suite.

Lixto uses a standard SLA to guarantee uptime and continuity of service for its SaaS offerings. Technical helpdesk support is offered during working hours (GMT time zone), and customers are encouraged to nominate in-house experts to service novice or casual users who require end-user support. As part of the SLA Lixto monitors and manages its computing performance, and customers can receive reports about usage patterns, server response, maintenance, and environmental performance to ensure the availability and reliability of the system.

The Lixto Price Intelligence Suite has been adopted by about 20 companies worldwide including Fujitsu Technology Solutions that uses it for computer competitive pricing, Sony that uses it for consumer electronic competitor pricing, and hotel chains such as Iberostar Hotels and Resorts that uses it for hospitality competitive pricing.

**PRODUCT STRATEGY**

Lixto focuses the marketing and sales efforts of its Price Intelligence Suite on a global list of 5,000 companies in the consumer products, travel, and transport industries.
The company’s product strategy focuses on interactively and visually defining expressive and flexible web data-extraction and translation routines within a visual designer tool to provide an automated and reliable way of extracting web data using a heuristic approach. It also provides an analytics platform that models, integrates, and stores structured web data for analysis and reporting purposes.

The company is actively repackaging and repurposing components of its middleware suite to target other industries and functional requirements. For example, Lixto has a risk, governance, and compliance suite designed to integrate business processes across the supply chain based on web data extraction from supplier portals.

The Lixto Price Intelligence Suite offers a SaaS option with annual subscriptions based on the number of web data connectors, the number of users, and the number of price points used. The entry level of a Price Intelligence Suite SaaS installation is €50,000 annually with license costs accounting for 80% and services costs at 20%. Average SaaS installations cost in the region of €100,000 annually of which 85% is software costs and 15% services costs. Higher-end SaaS installations cost in the region of €200,000 annually, 90% of which is software costs and 10% services costs.

Lixto sells most of its products (about 80%) through a direct sales channel with the remaining 20% through resellers in Germany and the US. In 2010 the company invested in a US expansion program by establishing an operations base in Sunnyvale, California. Lixto also strengthened its technology foothold by gaining a US patent for its technology in automated Web Information Extraction field.

Lixto’s main technology partner is Oracle. It also partners with companies that provide pricing and revenue optimization software and services including PROS, Vendavo, Zilliant, and SAS IDeaS.

Lixto’s release schedule is based on quarterly minor releases and one major release per year. The company is planning an extensive list of updates. It plans to enhance the product’s pattern-matching algorithms and expand the suite to other industries. In 2011 it plans to provide support for the analysis of qualitative competitor information such as those found on social media websites like forums and review sites to enhance the depth of competitive intelligence delivered to customers. In 2012 the company will extend support for price execution.
### Table 1: Contact Details

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<thead>
<tr>
<th>Lixto Headquarters</th>
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<tbody>
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Source: Lixto

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