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How to Build Business Intelligence Using Oracle Real User Experience Insight

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Executive Overview

This whitepaper highlights how Oracle Real User Experience Insight complements traditional Web analytics technologies and solutions, enabling them to maximize their value to the business. Specifically, Oracle Real User Experience Insight enables the monitoring of closed environments, adds business context, provides integration with Business Intelligence (BI) systems, and supports user profiling.

This paper also describes how data can be selected using Oracle Real User Experience Insight, and built out to provide a BI solution. The process described is an example implementation using OBI EE software. Of course, all (real life) situations may vary, and the setup of a BI solution is always a customer-specific project.

Starting point

Nowadays, many organizations use the Internet, or internet technology incorporated in an intranet or extranet, to communicate with their customers, suppliers, personnel, branch offices, and so on. Common targets are to be more efficient, lower the use of other organizational resources, and fulfill the need of making the organization transfer to a 24/7 business.

Cost effectiveness is another main goal that holds a special place for creating online processes and services. The simple fact is that the cost of having support/sales resources allocated to answer “live customer questions/requests” is multiple times more expensive than handling the same request via an online service.

With this in mind, many organizations invest heavily in creating online services for their clients. But now, new questions arise:

- Are we losing clients/money because our services do not work as intended?
- Do we know what bottlenecks are present for our clients?
- What is the perceived experience of our services to clients?
- How do we validate complaints when clients start calling our helpdesk?

Some of the above questions are addressed in the following sections.

How to identify potential loss of revenue

This is the area where Oracle Real User Experience Insight is critical. With focus on all messages that might indicate functionality is failing the user, it provides all relevant information to analyze possible reasons for a transaction to be unsuccessful.

Consider the following situation. An organization wants to monitor a business-critical transaction in order to gain insight into failed conversions. In this case, it is a ferry booking application with five parts: routes and date details, passenger and vehicle details, payment selection, payment details, and transaction confirmation. This is shown in Figure 1.

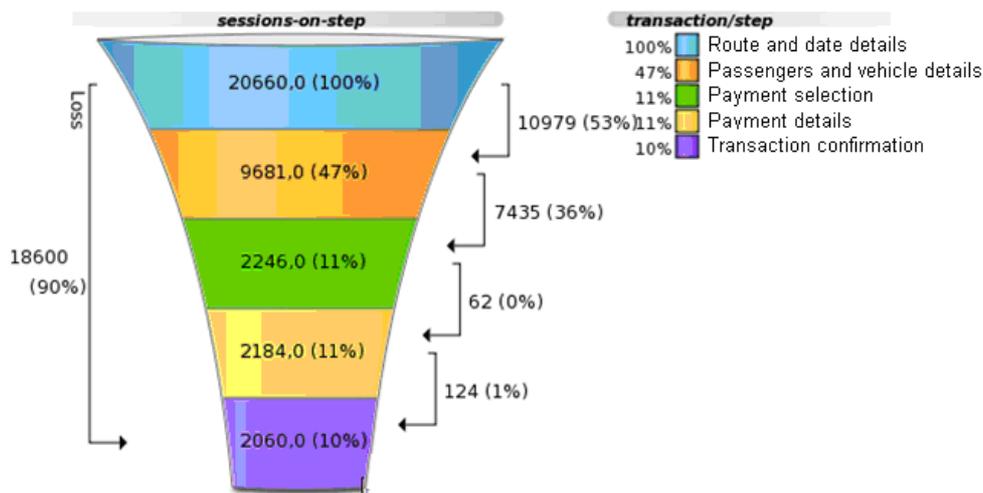


Figure 1: Transaction funnel.

Analysis of the transaction shows that a significant number of visitors fail to complete the transaction because of problems encountered on the fourth transaction page: payment details. The Business Manager is keen to obtain insight into what is happening at this stage. Is there something about the page that visitors find confusing or annoying? How many of these failed conversions are the result of credit-card payment rejections? Is there a problem with the interface between the booking application and the third-party credit-card payment service facility? Is the payment service performing to agreed SLAs?

Oracle Real User Experience Insight radically increases the Business Manger’s ability to analyze why transactions fail. It extends the functionality available from Web analytics solutions by enabling indexing of possible application messages presented to the user. It provides a replay capability of the request and response connected to this failure. It even extends the monitoring to Web services via XML-soap. In the situation such as the credit-card payment service described above, direct insight is available into the performance and availability of the payment service, as well as the messages it returns.

How to understand the users’ experience

What better way to try to understand the users’ experience than by knowing each individual communication between the users and the solutions. This provides all the basic information upon which to build insightful analyses. Oracle Real User Experience Insight provides the perfect validation point.

Oracle Real User Experience Insight offers you the ability to review complete user sessions, based on user ID or selected criteria, for a specified timeframe. You can easily identify any user session, and review all interaction the user had with your application, from either a functionality perspective or from an object perspective. Moreover, the session diagnostics facility allows you to review the complete session as your user experienced it.

Replay performance issues

Oracle Real User Experience Insight provides the capability to track exactly which error messages visitors receive, and when. With the ability to replay application failures, you can accurately and immediately take action to eliminate problems encountered on your Web pages.

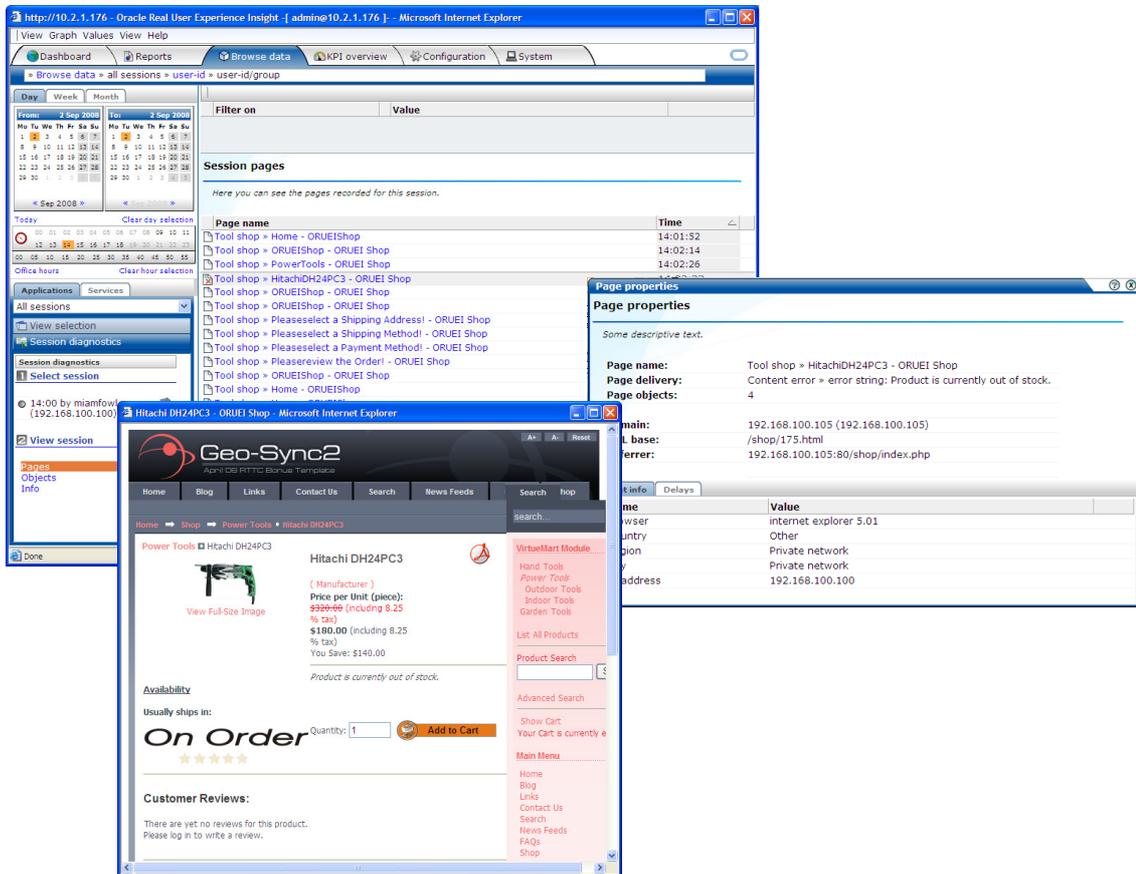


Figure 2: Session diagnostics locating user bottlenecks and replaying them.

To answer the questions described in the paragraphs above, you will need a monitoring solution that covers all applications, in open environments as well as closed environments. You will also need insight into your major Enterprise applications because the most important customer processes are offered via these platforms. Changes of address, upgrades of contracts, and logging services requests are all examples of critical customer processes handled via Enterprise applications. Oracle Real User Experience Insight offers monitoring on all of these processes and applications.

THE POWER OF BUSINESS INTELLIGENCE

Oracle Real User Experience Insight comes with a powerful data exchange function that allows you to export all user session information to any data warehouse for complete views of customer experience. In this way, you can integrate real-user data with other enterprise and CRM data.

You can also use this facility for more powerful analysis of real-user experience by extracting and exporting to Enterprise BI solutions, information about customers, products, and services that is otherwise not visible with other monitoring solutions. For example, you can now gain insight into actions that your customers did not take, which products and services were less frequently purchased, and what price points represented a high purchase threshold.

Understand real-user experience entities

Oracle Real User Experience Insight uses a number of entities to group and store all the details it captures. Many of these details are required to create customer profiles or built out BI solutions. The most important entities are explained in the following sections.

Looking at a single communication – entity ‘pageview’

When a user is using an Internet solution, each time the user performs an action, the solution responds by displaying the appropriate objects within the user’s browser. The user’s action initiates a single communication by sending the performed action (and possibly some additional data) to the solutions. The solutions then respond by sending the new information and layout that should be shown to the user. Both the request and the response can contain valuable information, and provide insight into the user’s experience. This type of communication is often called a ‘pageview’ in the world of Internet solutions.

Although a single pageview can contain valuable information, the sequence of pageviews performed by a single user adds context to what the user was doing or, at least, trying to do. This means it must be possible to group pageviews together for each user. Otherwise, there is no way of creating any context out of the large pile of individual pageviews. Oracle Real User Experience Insight is able to do this.

Looking at multiple communications – entity ‘sessions’

One important thing to be aware of is the fact that Oracle Real User Experience Insight distinguishes user sessions. A *session* is the group of pageviews a user saw during the time interval the session identifier (cookie) was available and the user was not inactive longer than the session idle time. In most cases, this means as long as the user keeps the Web browser open (so-called session cookies). For example, when the user starts the browser and goes to the Internet solution, a session is started. Then, while the user is out to lunch, does other things, and returns much later during the day (or even the following day) without closing their browser, the page still exists, the session is continued when they use the solution for the second time. If only the session identifier would be used, all the pageviews would be seen as a single group of pageviews.

From a user’s experience perspective, this is not really the best way to reflect the user’s behavior. It makes much more sense in this example to talk about two sessions: one in the morning, and

one after lunch (or next day) when returning again. Each session then represents a number of actions (pageviews) performed by the user that would logically make sense to be grouped.

A real-life example would be something like a user looking for a holiday destination and finding one during the morning. Then, after discussing the option with the family in the afternoon, the user returns to the booking, and confirms it. The fact that finding the destination and the booking were not done in one go, but with some time in between for analyses purposes, is important to know. It tells a lot about how the Internet solution is used in real life.

Therefore, Oracle Real User Experience Insight looks at the time between two consecutive pageviews within a session, and when this interval is longer than the defined time-out period (by default, 15 minutes) the session is reported to have ended, and a second session is counted.

Looking at session properties – entity ‘session detail’

Oracle Real User Experience Insight has the ability to log information about a user that remains constant during a session or visit. Examples of this type of information include the browser that is used, the user name, or language chosen.

By default, Real User Experience Insight logs the above information so that action is not required. However, some details may vary per client environment and still be important for analyses. In those cases, the software allows you to setup *custom dimensions*.

Basically, these are user entities you would like to store along with the session information. Within Oracle Real User Experience Insight itself, you can use up to five of these entities for analyses within the Data Browser. More explanation about custom dimensions is provided in the following section.

Looking at pageview properties – entity ‘pageview detail’

Oracle Real User Experience Insight has the ability to log additional information about any pageview. Examples include the product ID, price, and service name. By default, Real User Experience Insight logs only the name of each pageview.

Basically, these are user entities you would like to store along with the page information. For example, you might want to add a dimension “supplier” so that you could more easily track and analyze your organization’s suppliers. Using this facility, you could determine which suppliers have the highest conversion rates associated with them, or which suppliers attract the most pageviews on the organization’s Web site.

Each custom dimension has a unique name, and is based on a source. This can be page, session, or function-based. Optionally, you can also define a set of translations for each unique source value reported for the dimension. This can be used to make the reported information more readable. For example, the supplier’s name could be reported rather than just a supplier identification code. In addition, you can specify the level of dimension information that should

be retained. For example, you might want to capture information about the user's location using the three levels of country, region, and city.

This is where the strength of BI integration really comes into play. Consider the example of a search application such as the Yellow Pages. In this scenario, you enter some search criteria, and then a list is presented with companies that comply with the search criteria. For both of these pages, you might want to store all the search criteria and all the company results.

It was to accommodate these situations that the enriched data exchange facility was implemented in Oracle Real User Experience Insight. The use of this facility is described later in this document.

An Oracle example of how to set up the BI solution

The example set up described below serves as a starting point for discussion about any BI project. It is not intended to infer an 'out of the box' solution because this implementation, and the BI tools used, will probably vary between projects.

Oracle has a large expert and business partner community that can help scope and design such projects. The solution described below makes use of Oracle Business Intelligence foundation (part of the Oracle Fusion Middleware product family). This provides the most comprehensive BI and analytic capabilities available today. It offers category-leading products for OLAP interactive dashboards, ad hoc analysis, proactive detection and alerts, advanced reporting and publishing, mobile analytics, desktop gadgets, and more.

XML files to OBI-EE reports and dashboards

Oracle Business Intelligence Suite can provide access to the information that lies within the Oracle Real User Experience Insight XML files that can be generated by the .enriched data exchange facility. To put these files to use, an environment is required to process them and support further analyze and reporting.

OBI-EE expects a data warehouse upon which to work. Therefore, the XML files must be loaded into this data warehouse. Oracle has excellent tools to load these XML files into a data warehouse.

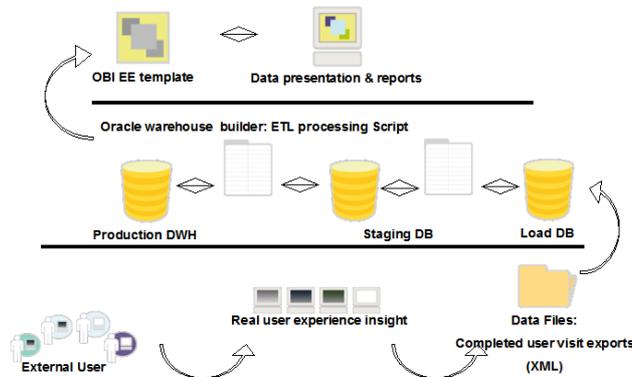


Figure 3: Simplified schematic overview.

The following paragraphs describe a possible implementation of the situation shown in Figure 3.

1. Configure and enable XML export.
2. Use Oracle Warehouse Builder (or ODI) to load the XML files into a staging area.
3. Use OWB to populate the data warehouse from the staging area.
4. An example data warehouse model for OBI-EE based on RUEI data.
5. Example reports and dashboards.

Oracle Real User Experience Insight XML exports

As previously explained, Oracle Real User Experience Insight is capable of exporting all measured pageviews per user session. When this feature is enabled, RUEI produces export files every five minutes, which amounts to a total of 288 files per day. Each file is in (gzipped) XML format, meeting the requirements of many other tools to read and parse these files.

Each pageview is an entry within the XML file containing information about the pageview. In addition, there are a number of entries containing different kinds of details of that pageview. The number of details can be a few or more than a hundred, depending on the defined custom dimensions and predefined entities in the enriched data exchange facility as described earlier.

Oracle Real User Experience Insight only exports pageviews once the end of a visit is reached. Therefore, an XML file only contains pageviews of completed visits. This means the pageviews are in a time range from the start of the visit (which can be quite some time ago if there was a lot of activity within the visit) until the end of the visit. Note more information is provided in the section covering the entity 'visits' and 'sessions'.

As explained earlier, Oracle Real User Experience Insight can generate export XML files at 5-minute intervals, creating 288 XML files per day. Each file can contain information about zero to thousands of visits. Therefore, between zero and thousands of pageviews could be present. Any visit can result in multiple pageviews.

A simple report in Oracle Real User Experience Insight can explain the number of expected pageviews and visits in the XML records. This can be per 5 minutes, per hour, or per day. Be aware that differences are possible because the system processes the data internally to provide near real-time information. However, the Data Browser supports scoping of the amount of reported records.

Enable ORUEI exports

It is important to configure Oracle Real User Experience Insight so that it can identify sessions, pages, and possibly users (IDs) correctly for an application. Without this, Oracle Real User Experience Insight is unable to group pageviews properly per session, and makes analyses of user behavior impossible.

Now, enable Oracle Real User Experience Insight to export the pageviews with details. Activating the **Enriched data export** feature does this. The feature can be found under the **Configuration** menu within the **Applications** tab.

Once activated, Oracle Real User Experience Insight starts producing XML files within the `xml-events` directory. By default, the XML records contain the information of all pageviews in a session, as well as the information gathered in custom dimensions as described earlier.

Now, let's use the example of a search application, such as a booking engine. The scenario is that you enter some search criteria, and then a list is presented of travel options that comply with the search criteria. For both these pages, you might want to store all the search criteria and all the travel option results.

The different travel options that are returned with the result could not be used in the RUEI custom dimension because there are multiple options listed on a single page. However, you can define a data item in the Enriched data exchange window (shown in Figure 4).



Figure 4: Enriched data exchange window.

You can use this option to select the information via, for example, an XPath expression, header information, or tags. By defining the value for which the system has to look, all the returned results will be scanned and placed in the XML record for that pageview. Each and every value is then available to be used in your BI environment.

Loading the XML files into a data warehouse staging area

With the use of Oracle Warehouse Builder (10.2 and higher) and the Oracle database (version 10 R2 or higher, which supports a number of XML parsing functions), the XML files can be loaded in the first stage database.

The generated PL-SQL depends on the 'XMLTYPE' function to make an in-memory XML object of the loaded file (loaded as binary using 'bfilename'). The in-memory XML objects can be examined through the use of the 'XMLSEQUENCE' function. With 'XMLSEQUENCE', a sub-tree of the XML object is retrieved, and an actual value of an XML node is extracted with the 'extractValue' function.

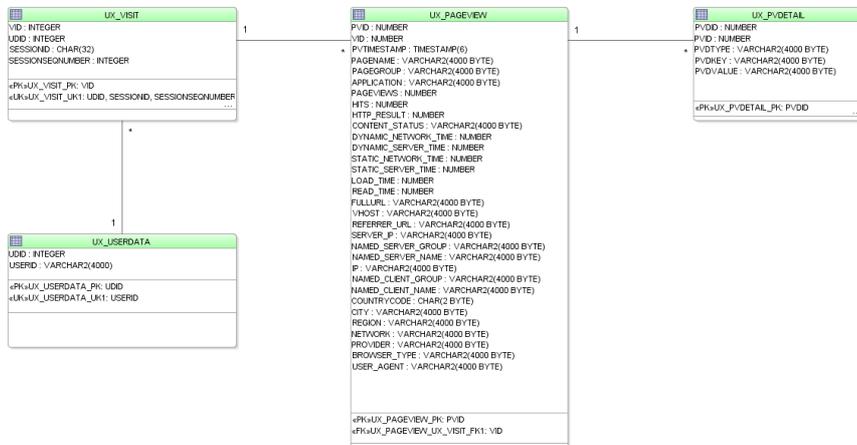


Figure 6: Data model.

The reason for a separate userdata table is to allow easy ‘joining’ with other DWH tables that can contain user related data such as data from a CRM system.

OWB performs the following four steps, one step per table.

1. UX_LOAD_TO_UX_STEP1; this step adds any new users to the userdata table.
2. UX_LOAD_TO_UX_STEP2; this step adds the visits. There are always new visits because each XML file only contains completed visits.
3. UX_LOAD_TO_UX_STEP3; this step amends the UX_PAGEVIEW table with each visit’s pageviews.
4. UX_LOAD_TO_UX_STEP4; this step adds all the pageview details to the detail table.

After these four steps, the data from the stage 1 tables is transferred, split, and converted to the correct stage 2 tables. Depending on how many users, visits, pageviews, and pageview details there are per hour, day, week, month and year, the tables can grow rapidly; especially the details table and the pageview table.

When working with volumes (more than 10.000 pageviews a day), it becomes necessary to add data-aging mechanisms and use aggregation tables to store aggregations. Pageviews and accompanying details older then a certain number of days should be discarded from the database (or at least moved) to maintain a workable DWH.

DWH model

Depending on what is required to be done next, the stage 2 database can be used as a starting point to load the data into an existing DWH, or the database model can be used as an underlying database for OBI-EE.

By adding views and some dimensions on top of the physical model, a workable model becomes available which can be used for reporting and dashboarding purposes.

Example reports and dashboards

So, what kind of reports and dashboards can be created using only the described presentation model? Basically, any combination of reports based on the entities' values exported from Oracle Real User Experience Insight. For example, the number of product views for a specific user, the products in which people have shown an interest, how often a user scrolled through the application over a certain time period, and so on. Some example reports are shown in Figure 7.

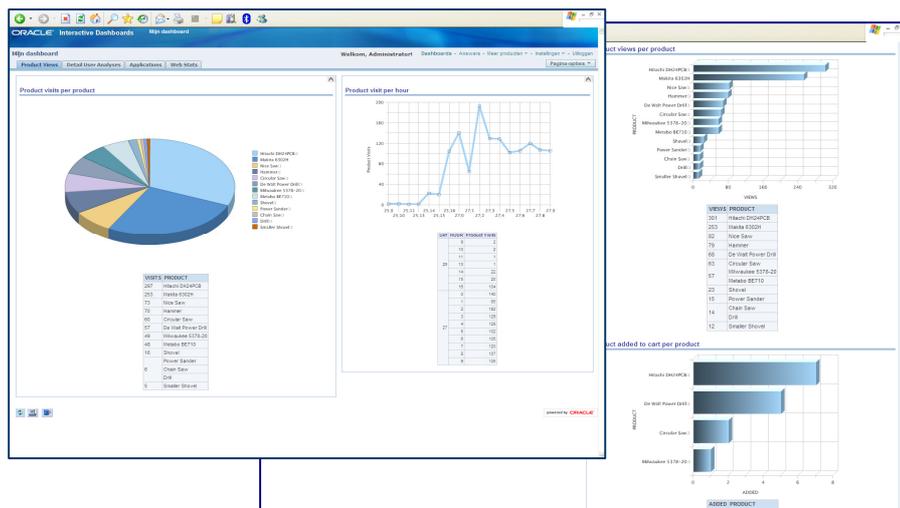


Figure 7: Example reports.

CONCLUSION

Oracle Real User Experience Insight complements and extends the value delivered to businesses by Web analytics solutions. It adds the business context necessary to improve the delivery and cost effectiveness of the key processes and services that drive business competitiveness. It provides service delivery metrics based on the experience of end users, real-time performance monitoring of specific applications or infrastructure components. Moreover, it makes

information available to every business stakeholder, from executive dashboards to detailed performance monitoring and service-level management.

But more importantly, it offers you the unique opportunity to combine information about your users' experience on any of your Web applications, with the customer profile already stored in your data warehouse solution.



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