

# Web Intelligence XI and XI Release 2

## Service Pack 2 Calculation Changes

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### Overview

This document describes the calculation engine changes in Web Intelligence XI Release 2 (XI R2) and Web Intelligence XI R2 Service Pack 2 (SP2).

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# Introduction

BusinessObjects XI Release 2 provided a new, improved calculation engine for Web Intelligence, and that calculation engine was updated again in XI R2 SP2. The new calculation engine might impact your report values after migrating to Web Intelligence XI R2.

This document describes the changes and the way in which they might affect the calculation and display of results in reports.

## Web Intelligence XI R2 Calculation Updates

### Multi-valued detail objects

The XI R2 synchronization mechanism requires merged dimensions to have no more than one row for each dimension value, so that the system can associate a unique value in a dimension to a unique value in another dimension.

This change impacts the behavior of detail objects associated with dimensions. Previous versions of Web Intelligence, in addition to Desktop Intelligence/BusinessObjects, treated detail objects as dimensions. Each dimension value could have multiple associated detail values, and the detail values were taken into account when calculating related measures.

In Web Intelligence XI R2, each dimension value can have one associated detail value only, and detail values are not taken into account when calculating related measures.

This is a change from previous versions of Web Intelligence and from Desktop Intelligence/BusinessObjects, which permitted multiple values but could not be synchronized in Web Intelligence or could not be properly synchronized in Desktop Intelligence.

The example below illustrates why the change was necessary. [Address] and [Age] are detail objects associated with [Customer], the merged dimension:

Data Provider 1

Customer	Address	Revenue
John	London	30
John	Paris	50
Paul	Paris	40

Data Provider 2

Customer	Age
John	10
John	40
Paul	20

Web Intelligence cannot synchronize the data providers because the relationship between the [Customer] dimensions is not clear. Which

“John” in data provider 1 should be associated with which “John” in data provider 2? It is not possible to say.

To solve this problem, Web Intelligence enforces a one-to-one relationship between dimension and detail values. As a result, detail objects with multiple values display the #MULTIVALUE error:

Customer	Address
John	#MULTIVALUE
Paul	Paris

### Workaround

To avoid the #MULTIVALUE error and return the same result given by earlier versions of Web Intelligence, the user can create a variable based on the detail (with the formula =[name\_of \_detail]), qualify the variable as a dimension, and use the variable in place of the detail. This has the effect of redefining the detail as a dimension (which is how it should have been defined in the universe in the first place).

Note that unless this dimension is created in the universe, no synchronization is possible on the dimension.

From SP2 onwards, the recommended solution is to use the block property **Avoid duplicate row aggregation**. This solution becomes possible because of the update to the way in which this block property affects the aggregation and display of data, as described in the section “

Displaying synchronized data with the Avoid Duplicate Row Aggregation property” on page 9.

## Drill filters and formulas

In Desktop Intelligence, formulas are not affected (filtered by) the drill filters if they:

- use the **In Report** calculation context.
- contain the **ForAll** operator applied on a drilled dimension.

In Web Intelligence, the drill filters always apply to the data used for any formula in the report.

To provide a similar behavior to Desktop Intelligence, the Web Intelligence **NoFilter** function ignores drill filters.

## Non-aggregative measures in cross-tabs

The way a non-aggregative measure is displayed in a cross-tab was improved in Web Intelligence XI R2.

To display a non-aggregative measure correctly, Web Intelligence previously added a special hidden row with its own row ID. This had the side-effect of adding unnecessary blank cells in cross-tabs, as shown below:

Year	2002	2003
Customer	Average Revenue	Average Revenue
John	30	
John		40
Paul	10	
Paul		50

In this example the blank cells are not necessary to the display because the revenue values occur in different years.

Web Intelligence XI R2 no longer inserts a hidden row ID. The missing dimensions are automatically added (but hidden) on the vertical axis to give a more appropriate result:

Year	2002	2003
Customer	Average Revenue	Average Revenue
John	30	40
Paul	10	50

## Web Intelligence XI R2 – SP2 Calculation Updates

### The ForAll and In operators in sections

From versions 6.0 to XI, Web Intelligence calculated results in a section based on the data in the current section only. For example, a formula that appeared in a [Year] section returned data for the current year only. If a formula that calculated total revenue appeared in the year 2005 section, it returned the total revenue for 2005.

This was the case even when the formula used the **ForAll** or **In** keywords. If, for example, the formula `Sum( [Revenue] ) ForAll( [Year] )` appeared in the 2005 section, it returned data for 2005 only.

Web Intelligence was modified in version XI R2 to base calculations on all data in the report in default aggregations. (A formula has a default aggregation when it does not include an aggregation function and Web Intelligence uses the default function defined in the universe to include this changed behavior for default aggregations only.)

The rationale for this change was that:

- it brings the formula result in line with the formula semantics (in the example, it is extremely likely that by including the **ForAll** keyword, the user wished to return the total for all years).
- it makes Web Intelligence behavior consistent with Desktop Intelligence behavior.
- it ensures that the formula always returns the same result, irrespective of the dimensions in the section.
- it ensures that the same dimensional context does not return different results depending on whether or not the report contains sections.

For example, if the formula `[Revenue] ) ForAll ( [Year] )` appears in the 2005 section in Web Intelligence XI, it returns the total revenue for all years (assuming that Sum is the default aggregation function defined in the universe for the [Revenue] measure).

This behavior is extended to explicit aggregations (where the formula includes an aggregation function) in SP2.

### How the change works

When the user wants a formula to aggregate detailed data with explicit keywords, Web Intelligence does not filter the data with the section value before performing the aggregation. Web Intelligence applies the filter after the aggregation.

If the user creates the formula `Sum ( [Revenue] ) ForAll ( [Country] )` under a section based on the dimension [Country], they expect to see the sum of [Revenue] for all the countries, irrespective of the current country in the section. As a result, the formula should give the same result in each section.

To get this result for the formula `Sum ( [Revenue] ) ForAll ( [Country] )` under a section based on the dimension [Country], Web Intelligence should not first filter the initial data with the current country; it should aggregate the initial data for all [Country].

The example, below shows the aggregation result in Web Intelligence XI R2 prior to SP2:

**France**

Year	Revenue	[Revenue] ForAll ([Country])	Max([Revenue]) ForAll([Country])	Max([Revenue]) In([Year])
FY1998	295,940	1,063,554	295,940	295,940
FY1999	280,310	1,107,240	280,310	280,310
FY2000	259,170	1,115,730	259,170	259,170

**US**

Year	Revenue	[Revenue] ForAll ([Country])	Max([Revenue]) ForAll([Country])	Max([Revenue]) In([Year])
FY1998	767,614	1,063,554	767,614	767,614
FY1999	826,930	1,107,240	826,930	826,930
FY2000	856,560	1,115,730	856,560	856,560

The default aggregation - [Revenue] ForAll ([Country]) - returns the revenue for all countries, whatever the current section instance.

The explicit aggregations - Max ([Revenue]) ForAll ([Country]) and Max ([Revenue]) In ([Year]) - give different results for the same year depending on the country in the section. The Max and Revenue columns return the same revenue because there is only one revenue value, which Web Intelligence has filtered by both year and country.

With SP2, the result is as follows:

**France**

Year	Revenue	[Revenue] ForAll ([Country])	Max([Revenue]) ForAll([Country])	Max([Revenue]) In([Year])
FY1998	295,940	1,063,554	767,614	767,614
FY1999	280,310	1,107,240	826,930	826,930
FY2000	259,170	1,115,730	856,560	856,560

**US**

Year	Revenue	[Revenue] ForAll ([Country])	Max([Revenue]) ForAll([Country])	Max([Revenue]) In([Year])
FY1998	767,614	1,063,554	767,614	767,614
FY1999	826,930	1,107,240	826,930	826,930
FY2000	856,560	1,115,730	856,560	856,560

The same dimensional context in a table also gives this correct result:

Country	Year	Revenue	[Revenue] ForAll ([Country])	Max([Revenue]) ForAll([Country])	Max([Revenue]) In([Year])
France	FY1998	295,940	1,063,554	767,614	767,614
France	FY1999	280,310	1,107,240	826,930	826,930
France	FY2000	259,170	1,115,730	856,560	856,560
US	FY1998	767,614	1,063,554	767,614	767,614
US	FY1999	826,930	1,107,240	826,930	826,930
US	FY2000	856,560	1,115,730	856,560	856,560

Prior to SP2, the results change to those shown in the first example in this section if the user makes [Country] into the section header.

### Migration

If you want your existing Web Intelligence documents to return old-style results after SP2, you must manually update the affected formulas as follows:

- Formulas using **ForAll** - remove the section dimension from the output context
- Formulas using **In** - add the section dimension to the output context

For example, in a report with a section on [Country]:

- `Max([Revenue]) ForAll([Country])` becomes `Max([Revenue])`.

This takes advantage of the default calculation context. The section dimension is part of the default context - by removing this dimension from the explicit output context, you reinstate it as a restriction on the calculation.

- `Max([Revenue]) In([Year])` becomes `Max([Revenue]) In([Year], [Country])`.

This explicitly reinstates the section dimension as a restriction on the calculation.

There should be few examples of `ForAll` formulas that require update, because, prior to SP2, inclusion of the section dimension made no difference to the result (precisely the behavior that SP2 changes).

In formulas are more likely to require update - a user might have created the formula without including the section dimension in the

output context, because they knew that Web Intelligence would add this dimension by default.

## Display of detail objects without their associated merged dimensions

When a detail associated with a merged dimension is used in a multi-DP block without the associated dimension but with dimensions from a different data provider, Web Intelligence returned #DATASYNC prior to SP2. Web Intelligence now supports this situation and returns the expected result.

The example below shows a data provider (DP1) that contains customer names and ages (as a detail of the customer) and a second data provider that retrieves revenue per customer. The last table shows the resulting synchronized table giving the revenue per age.

Data provider 1		Data provider 2		Synchronized Table	
Customer	Age	Customer	Revenue	Age	Revenue
Arai	18	Arai	8 036	18	19 012
Baker	64	Baker	441 594	19	8 420
Brendt	19	Brendt	8 420	22	
Diemers	18	Diemers	10 976	24	748 332
Dupont	72	Durnstein	4 400	29	400 899
Durnstein	36	Goldschmidt	18 715	34	4 380
Edwards	18	Kamata	359 808	36	4 400
Gentil	67	Kamimura	4 700	38	4 700

## Displaying empty dimension values in multi-data provider tables

The **Show rows with empty dimension values** table property causes Web Intelligence to display rows when some dimensions do not contain values. This is useful when data from synchronized data providers is displayed in the same table.

The following table shows two data providers synchronized on Country:

Data Provider 1

Country	Customer	Sales
FR	Jean	200
US	John	100

Data Provider 2

Country	Pop
FR	60
UK	65
US	300

Prior to SP2, Web Intelligence did not display the synchronization of these data providers correctly in the same table:

Country	Customer	Sales	Pop
FR	Jean	200	60
US	John	100	300

Web Intelligence now displays the synchronization correctly, with a row for "UK" even though it does not appear in data provider 1:

Country	Customer	Sales	Pop
FR	Jean	200	60
UK			65
US	John	100	300

To change this property, select the table, then edit the **Display > Show rows with empty dimension values** property.

You can also tell Web Intelligence to display tables in this way by selecting the **Extend merged dimension values** document property. To activate this property:

1. Right-click the report background.
2. Select **Document Properties** from the menu.
3. Check **Extend merged dimension values**.

## Displaying duplicate rows with the Avoid Duplicate Row Aggregation property

The **Avoid duplicate row aggregation** table property prevents Web Intelligence from aggregating rows that have the same dimension value when building a table. This property should be used to avoid #MULTIVALUE errors in detail objects. Before SP2, this property could result in unnecessarily complicated tables when displaying data from synchronized data providers.

The example below shows two data providers synchronized on Customer:

Data Provider 1

Country	Customer	Sales
FR	Jean	200
US	John	100

Data Provider 2

Customer	City
Jean	Paris
Jean	NY
John	LA

Before SP2, Web Intelligence displayed the synchronization of this data as follows when the **Avoid duplicate row aggregation** property was checked:

Country	Customer	City	Sales
FR	Jean		200
US	John		100
	Jean	NY	
	Jean	Paris	
	John	LA	

After SP2, the result is as follows:

Country	Customer	City	Sales
FR	Jean	NY	200
FR	Jean	Paris	200
US	John	LA	100

## Displaying synchronized data with the Avoid Duplicate Row Aggregation property

The **Avoid duplicate row aggregation** table property prevents Web Intelligence from aggregating rows that have the same dimension value when building a table. This property should be used to avoid #MULTIVALUE errors in detail objects. Before SP2, this property could result in unnecessarily complicated tables when displaying data from synchronized data providers.

The example below shows two data providers synchronized on Customer:

Data Provider 1

Country	Customer	Sales
FR	Jean	200
US	John	100

Data Provider 2

Customer	City
Jean	Paris
Jean	NY
John	LA

Before SP2, Web Intelligence displayed the synchronization of this data as follows when the **Avoid duplicate row aggregation** property was checked:

Country	Customer	City	Sales
FR	Jean		200
US	John		100
	Jean	NY	
	Jean	Paris	
	John	LA	

After SP2, the result is as follows:

Country	Customer	City	Sales
FR	Jean	NY	200
FR	Jean	Paris	200
US	John	LA	100

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