

Pentaho BI Suite

Performing MDX queries and quick OLAP analysis with mondrian

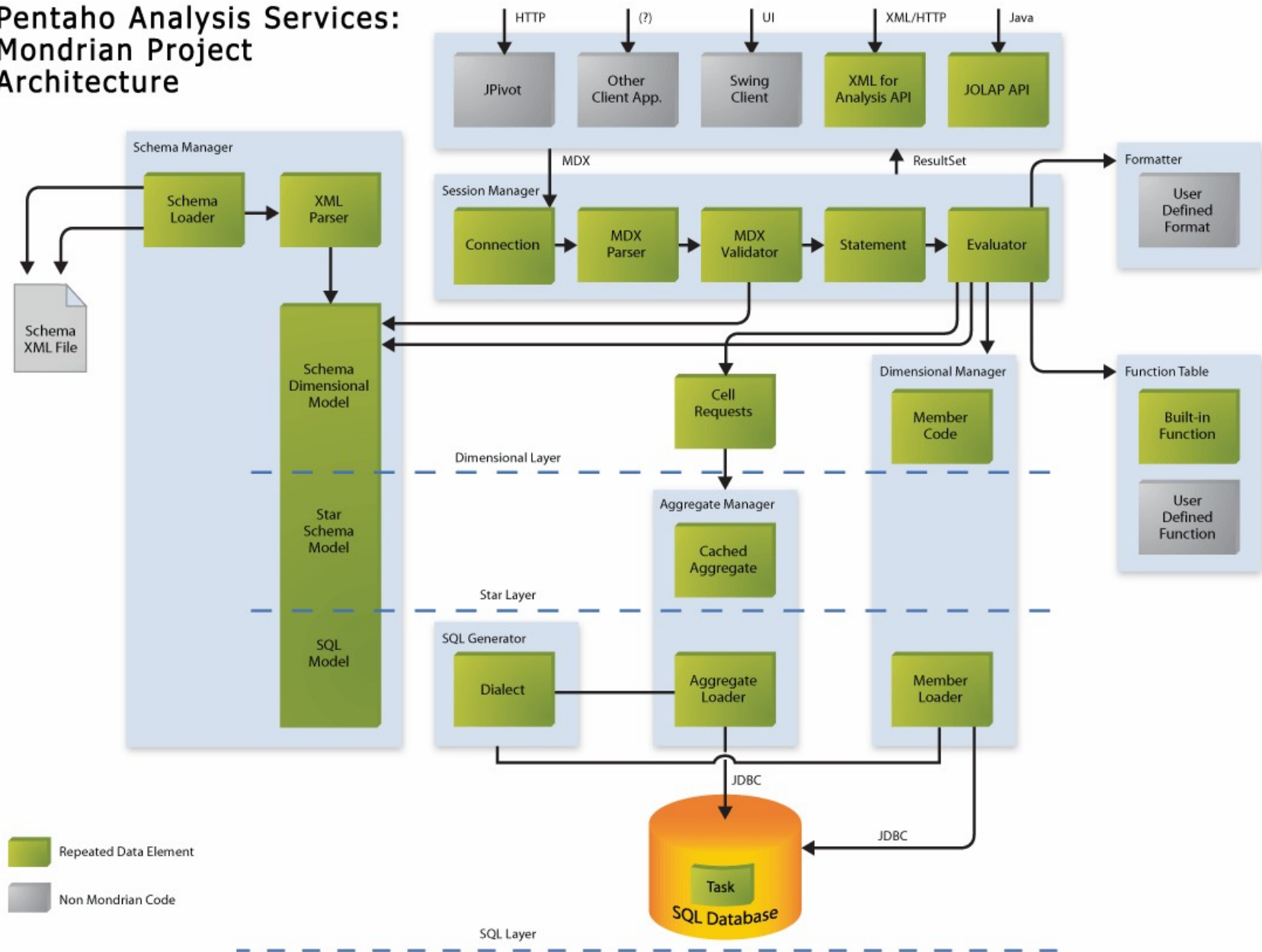
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Mondrian

- Mondrian is an OLAP engine written in Java. It executes queries written in the MDX language, reading data from a relational database (RDBMS), and presents the results in a multidimensional format via a Java API
- It is composed of four levels:
 - presentation level
 - dimensional level
 - star level
 - storage level

Mondrian architecture

Pentaho Analysis Services:
Mondrian Project
Architecture



Multidimensional Expressions (MDX)

- MDX It is the main query language implemented by Mondrian
- It was introduced by Microsoft with Microsoft SQL Server OLAP Services in around 1998, as the language component of the OLE DB for OLAP API. More recently, MDX has appeared as part of the XML for Analysis API. Microsoft proposed MDX as a standard, and its adoption among application writers and other OLAP providers is steadily increasing
- Since the first implementation of MDX was as part of Microsoft SQL Server OLAP Services, the language inherited the built-in functions available in that environment, namely the Visual Basic for Applications (VBA) specification
- A basic MDX looks like this:

```
SELECT {[Measures].[Unit Sales], [Measures].[Store Sales]} ON  
COLUMNS, {[Product].members} ON ROWS  
FROM [Sales] WHERE [Time].[1997].[Q2]
```

Mondrian specific functions - I

- Filter() function and NOT IN operator

```
SELECT {[Measures].[Unit Sales]} ON COLUMNS,  
    FILTER([Product].[Product Family].MEMBERS,  
        [Product].[Product Family].CurrentMember NOT IN  
        {[Product].[All Products].firstChild,  
        [Product].[All Products].lastChild}) ON ROWS  
FROM [Sales]
```

- MATCHES function compare a string with a java regular expression

```
SELECT {[Measures].[Org Salary]} ON COLUMNS,  
    Filter({[Employees].MEMBERS},  
        [Employees].CurrentMember.Name MATCHES '(?i)sam.*') ON ROWS  
FROM [HR]
```

Mondrian specific functions – II

- Every member has a FORMAT_STRING property, which affects how its raw value is rendered into text in the user interface

```
WITH MEMBER [Measures].[Profit] AS '([Measures].[Store Sales] -  
[Measures].[Store Cost])',  
FORMAT_STRING = "$#,###.00"  
SELECT {[Measures].[Store Sales], [Measures].[Profit]} ON COLUMNS,  
{[Product].CurrentMember.Children} ON ROWS  
FROM [Sales]
```

The format string can even contain 'style' attributes

```
WITH MEMBER [Measures].[Profit] AS  
    '([Measures].[Store Sales] - [Measures].[Store Cost])',  
    FORMAT_STRING = Iif([Measures].[Profit] < 100000, '|#|style=green',  
    '|#|style=red')  
SELECT {[Measures].[Store Sales], [Measures].[Profit]} ON COLUMNS,  
    {[Product].CurrentMember.Children} ON ROWS  
FROM [Sales]
```

Mondrian specific functions - III

Function	Specification
Aggregate	Returns a calculated value using the appropriate aggregate function, based on the context of the query. <Numeric Expression> Aggregate(<Set>) <Numeric Expression> Aggregate(<Set>, <Numeric Expression>)
AllMembers	Returns a set that contains all members, including calculated members, of the specified hierarchy. <Hierarchy>.AllMembers
Avg	Returns the average value of a numeric expression evaluated over a set. <Numeric Expression> Avg(<Set>) <Numeric Expression> Avg(<Set>, <Numeric Expression>)
Crossjoin	Returns the cross product of two sets. <Set> Crossjoin(<Set>, <Set>)
CurrentMember	Returns the current member along a dimension during an iteration. <Dimension>.CurrentMember
Filter	Returns the set resulting from filtering a set based on a search condition. <Set> Filter(<Set>, <Logical Expression>)
Hierarchize	Orders the members of a set in a hierarchy. <Set> Hierarchize(<Set>) <Set> Hierarchize(<Set>, <Symbol>)
IIf	Returns one of two dimension values determined by a logical test. <Dimension> IIf(<Logical Expression>, <Dimension>, <Dimension>)

Mondrian GUI

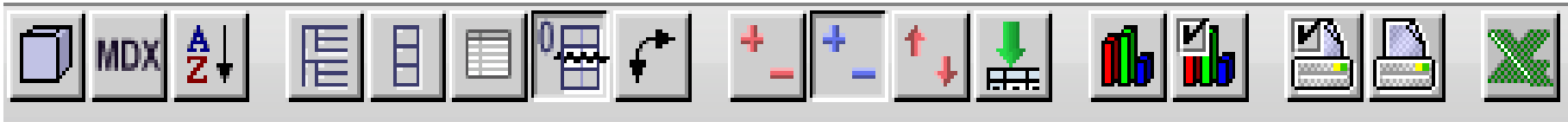
Connecting to a cube

- Open New Analysis View
- Choose a schema : Sample Data
- Choose a cube: Quadrant Analysis

Take a look at [Manuale_Pentaho.pdf](#) for detailed basic instructions



Main GUI Tools



- Olap Navigator
- MDX editor
- OLAP Table Configuration
- Swap Axis
- View/Configure graphs

Cube

- The initial view

- Choosing Measures

						Measures
Sesso	Patologia	Eta'.Eta	Paziente	CMV	EBV	• n
+ All Sessos	+ All Patologias	+ Tutte le eta'	+ All Pazientes	+ All CMVs	+ All EBVs	49,82

Slicer:

- n
- l
- m
- e
- luc
- %n
- %l
- %m
- %e
- %luc
- wbc
- Numero
- Mediana WBC
- Mediana E

- Selecting OLAP navigator

Columns

- Measures

Rows

- Sesso
- Patologia
- Eta'.Eta
- Paziente
- CMV
- EBV

Filter

OK Cancel

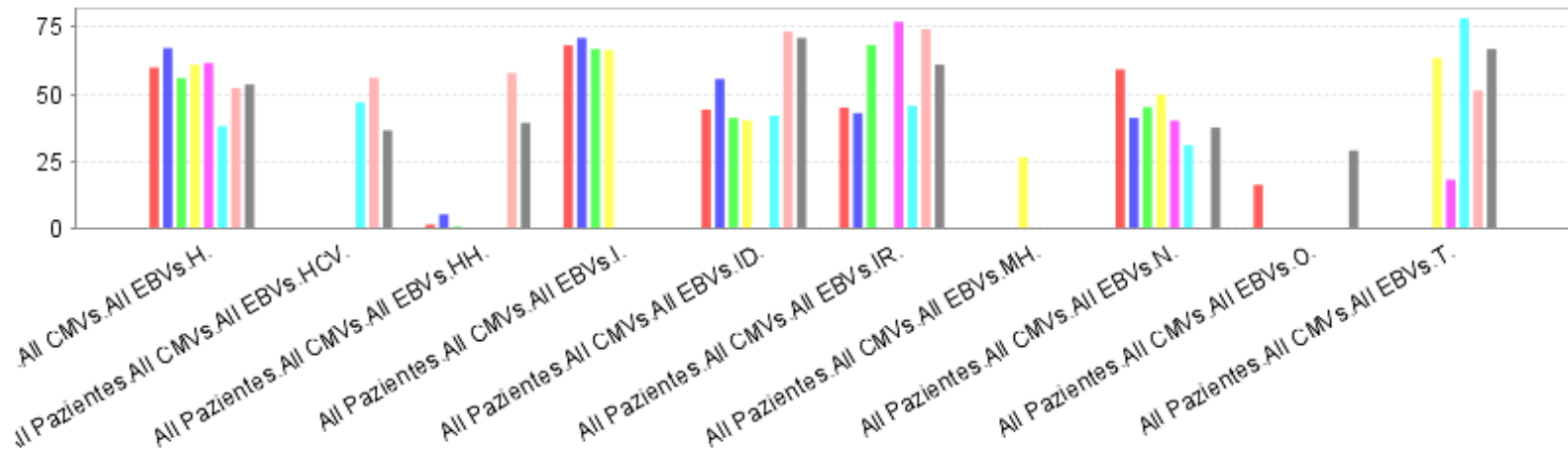
- Choosing sex

Sesso

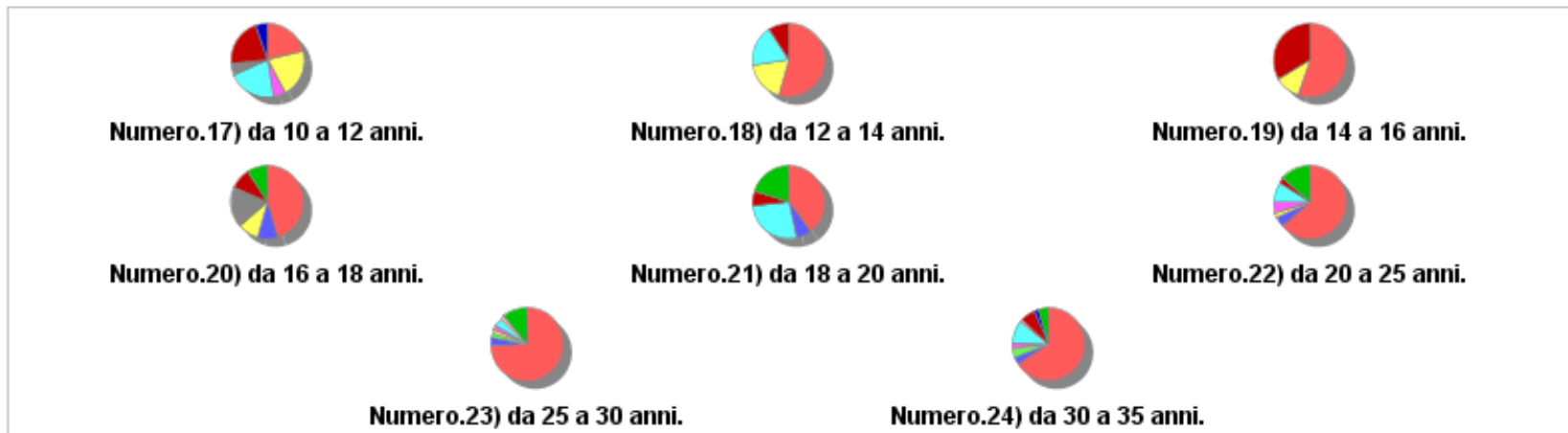
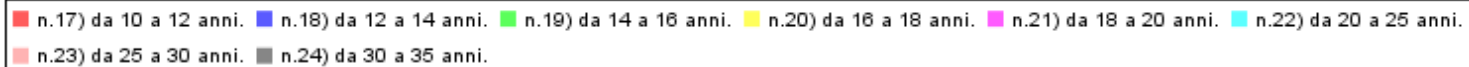
- All Sessos
- #null
- F
- M

None Flat OK Cancel

Graphic examples - I



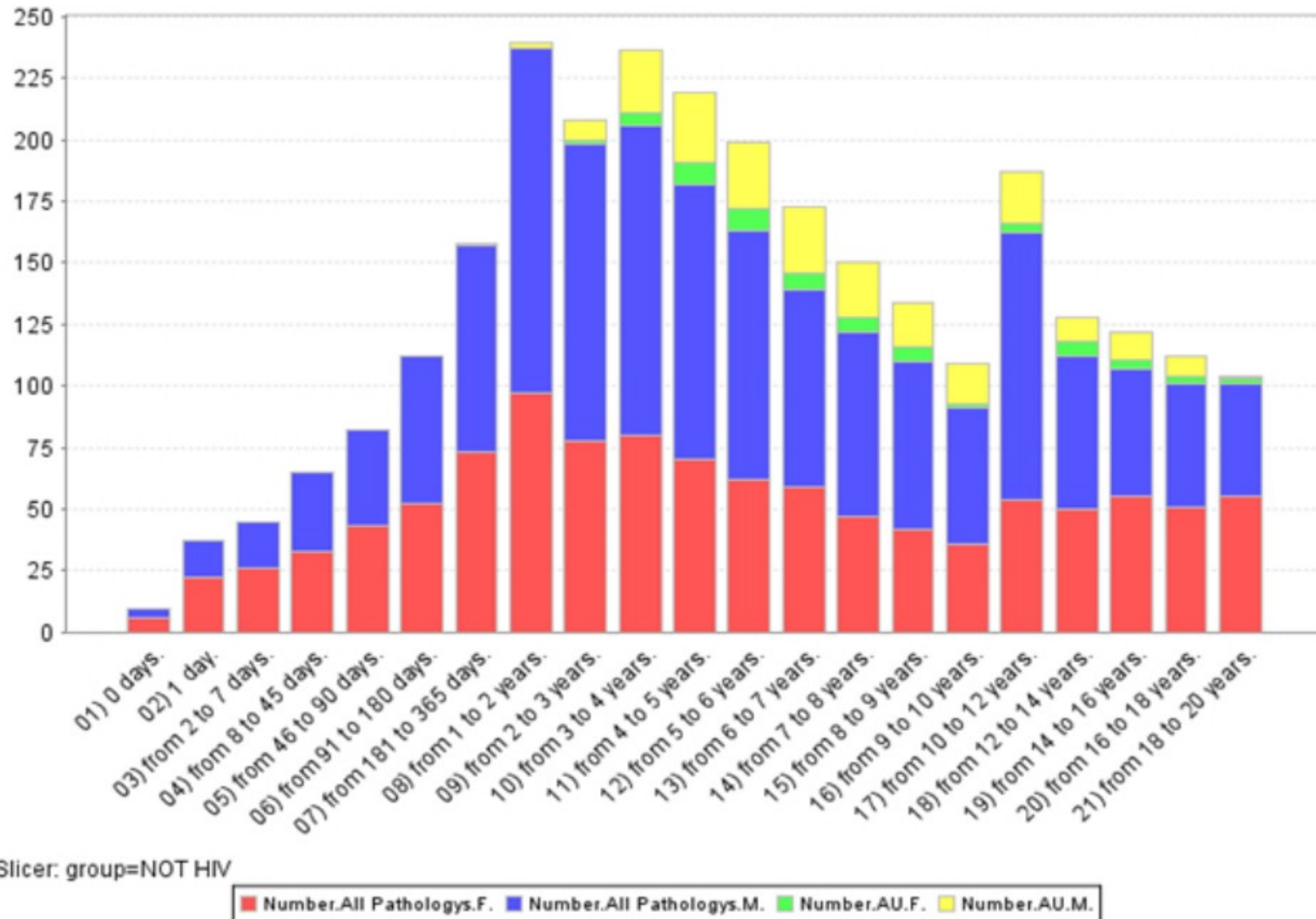
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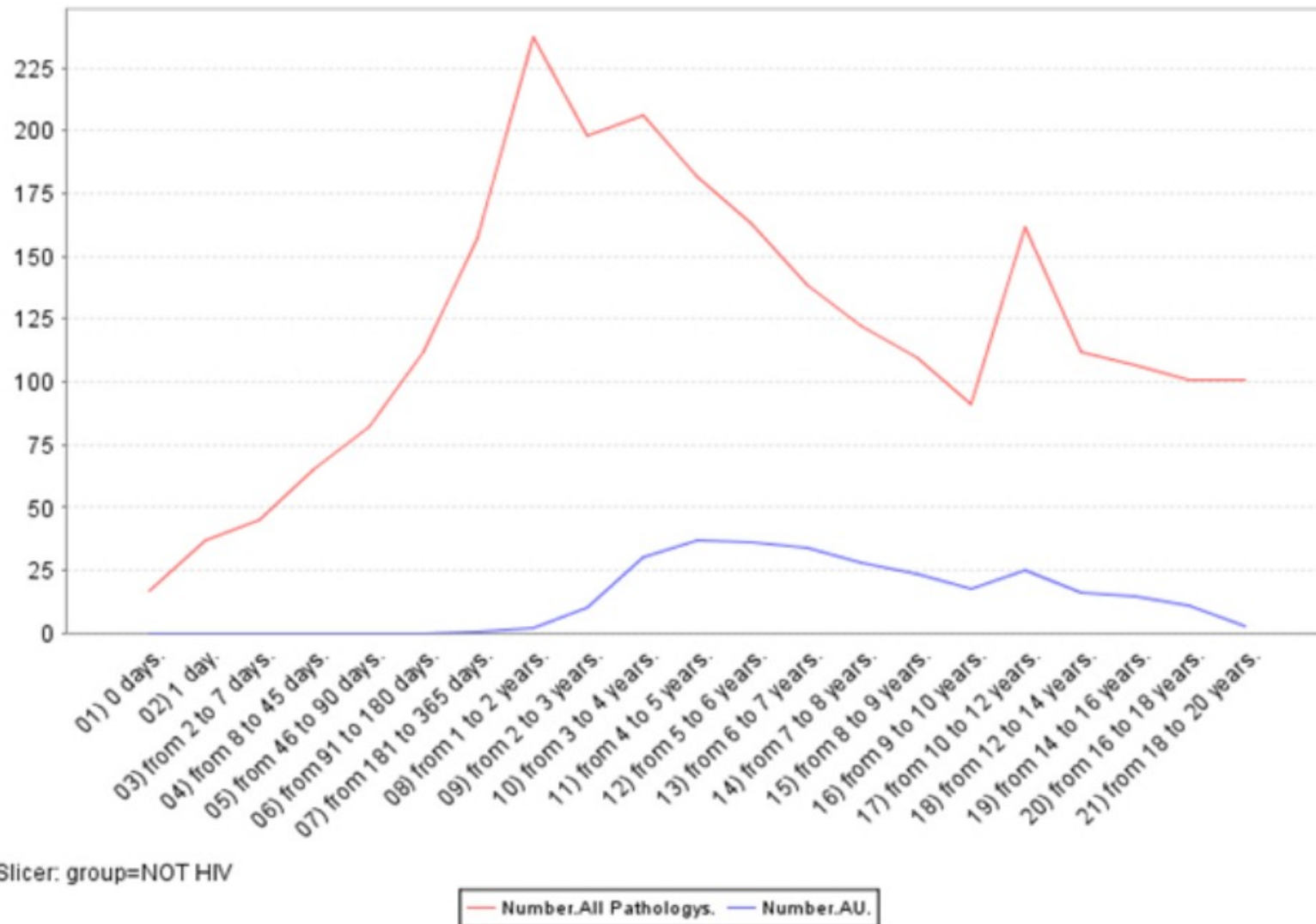
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Graphic examples II



Graphic types – examples III



Workshop

In this workshop you'll have to build some MDX and to create correspondent graphics, where asked

- **Select Actual values, for Central and Eastern region**
- **Same as the above using Filter and Matches function (see the example from this lesson)**
- **Select Actual values where the region is all but Central using regular expression within Matches function**
- **Create a new measure called NewActual, defined as “Budget - Actual”, and if its value is under 100000 than mark it as green, otherwise as red, for all regions but central one**
- **Build a vertical bar graph, where each region has its own color (select All regions separately), with Positions: Account Executive, Administration, Administrative Assistant and a Budget measure (hint: Put the measure on ROWS)**
- **Build a pie chart for the Budget of Central region, Departments: Executive Management, Finance, Sales and Positions: Administrative Assistant, CEO, CFO, Controller, District Manager**
- **Build a stacked vertical bar 3D with for all regions and following departments: Executive Management, Finance, Human Resource, Marketing & Communication, Product Development, Sales and moreover using this positions: CEO, CFO, Administrative Assistant, Controller, Administration, EOE, Analyst Relations, Engineer. Use the measure of your choice**
- **Bonus track: Perform table reports for the above requests, using new ad-hoc report**