

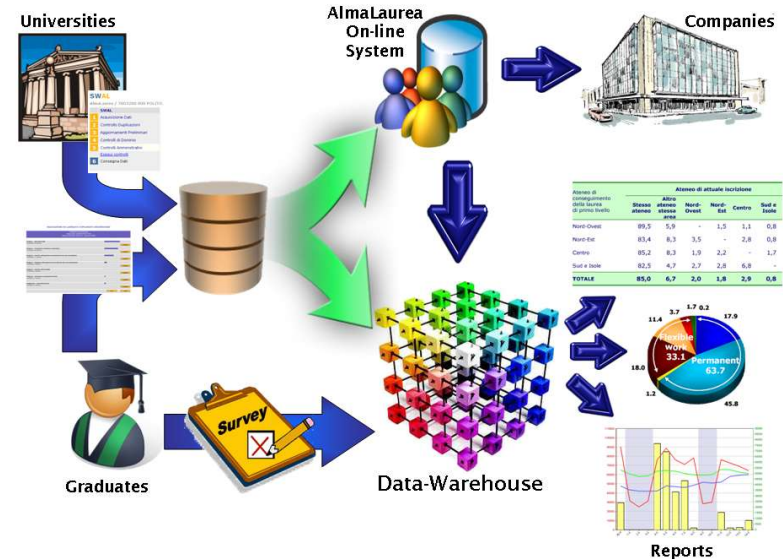
# Using Microsoft Analysis Service to analyze graduates' performances and working conditions

**Alberto Leone, Loris Cancellieri, Angelo Guerriero  
and Andrea Cammelli**

*Consorzio Interuniversitario AlmaLaurea, Italy  
Università di Bologna, Italy*

# Summary

- **AlmaLaurea**
- **Standard reports**
- **New Data warehouse design and implementation**
- **Software architecture**
- **First results**
- **Conclusions**





# AlmaLaurea

Universities



AlmaLaurea  
On-line  
System



Companies



Graduates



Data-Warehouse

| Ateneo di conseguimento della laurea di primo livello | Ateneo di attuale iscrizione |                          |            |            |            |             |
|---|------------------------------|--------------------------|------------|------------|------------|-------------|
|   | Stesso ateneo                | Altro ateneo stesso area | Nord-Ovest | Nord-Est   | Centro     | Sud e Isole |
| Nord-Ovest  | 89,5                         | 5,9                      | -          | 1,5        | 1,1        | 0,8         |
| Nord-Est  | 83,4                         | 8,3                      | 3,5        | -          | 2,8        | 0,8         |
| Centro  | 85,2                         | 8,3                      | 1,9        | 2,2        | -          | 1,7         |
| Sud e Isole   | 82,5                         | 4,7                      | 2,7        | 2,8        | 6,8        | -           |
| <b>TOTALE</b>   | <b>85,0</b>                  | <b>6,7</b>               | <b>2,0</b> | <b>1,8</b> | <b>2,9</b> | <b>0,8</b>  |



Reports

universities  
institutions  
press  
researchers  
students

# Standard inputs

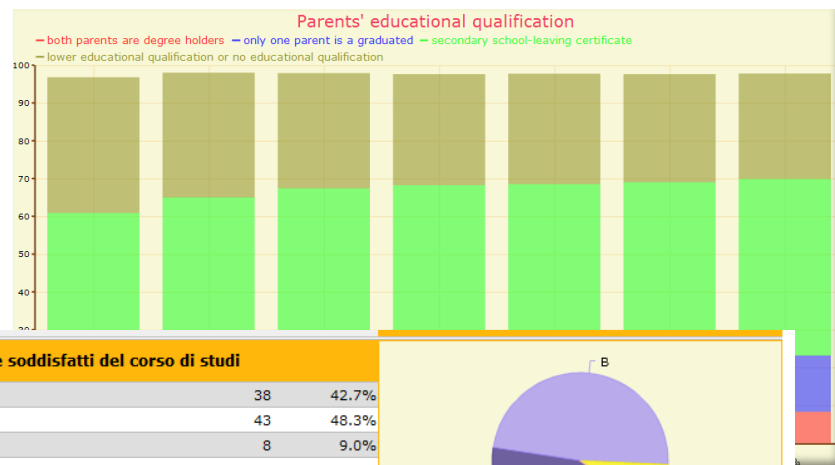
- **Administrative data from Universities (100%)**
- **Snapshot and survey at graduation (92%)**
- **Employment and studying conditions**
  - 1 year after graduation (90%)
  - 3 years after graduation (82%)
  - 5 years after graduation (76%)
  - 10 years after graduation ... *coming soon*

# Standard outputs

- **Graduates' profile**
  - June 2010: results about 2009
- **Graduates' working and studying conditions**
  - March 2010: results about 2009 survey
    - Graduates in 2008, 1 year after graduation
    - Graduates in 2006, 3 years after graduation
    - Graduates in 2004, 5 years after graduation
- **Documentation:**
  - Annual reports, general considerations
  - Detailed reports, at course level (available online)
  - Custom reports (e.g. transparency information)
  - Microdata (transferred back to universities' statistical bureau)

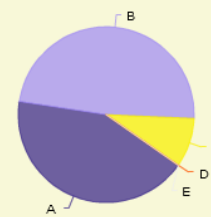
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## Sono complessivamente soddisfatti del corso di studi

|               |                |           |               |
|---------------|----------------|-----------|---------------|
| A             | Decisamente si | 38        | 42.7%         |
| B             | Piu' si che no | 43        | 48.3%         |
| C             | Piu' no che si | 8         | 9.0%          |
| D             | Decisamente no | 0         | 0.0%          |
| E             | Non risponde   | 0         | 0.0%          |
| <b>Totale</b> |                | <b>89</b> | <b>100.0%</b> |



# Standard report - sample

## 1. Personal details

2003

2004

### Parents' educational qualification

both parents are degree holders

7,4

7,8

only one parent is a graduated

13,2

14,2

secondary school-leaving certificate

40,3

43,0

lower educational qualification or no educational qualification

35,9

33,0

### Social class (%)

other province than the same region

24,7

23,7

22,5

21,8

20,7

21,0

20,8

abroad

0,4

0,4

0,4

0,5

0,6

0,6

0,6

## 2. Social background

### Selected cohort (compared by graduation year)

1-5

6-7

1-7

2003

2004

2005

2006

2007

2008

2009

### Parents' educational qualification

both parents are degree holders

7,4

7,8

8,6

8,6

8,4

8,3

8,3

only one parent is a graduated

13,2

14,2

14,7

14,9

14,8

14,6

14,9

secondary school-leaving certificate

40,3

43,0

44,1

44,7

45,3

46,1

46,7

lower educational qualification or no educational qualification

35,9

33,0

30,5

29,4

29,2

28,6

27,9

### Social class (%)

middle class

54,7

19,3

20,3

20,6

20,3

19,6

19,7

clerical middle class

14,5

31,0

30,9

30,6

30,8

30,2

29,3

lower middle class

22,4

23,1

22,2

22,2

22,1

22,0

22,3

working class

3,9

22,5

21,9

22,8

23,2

24,5

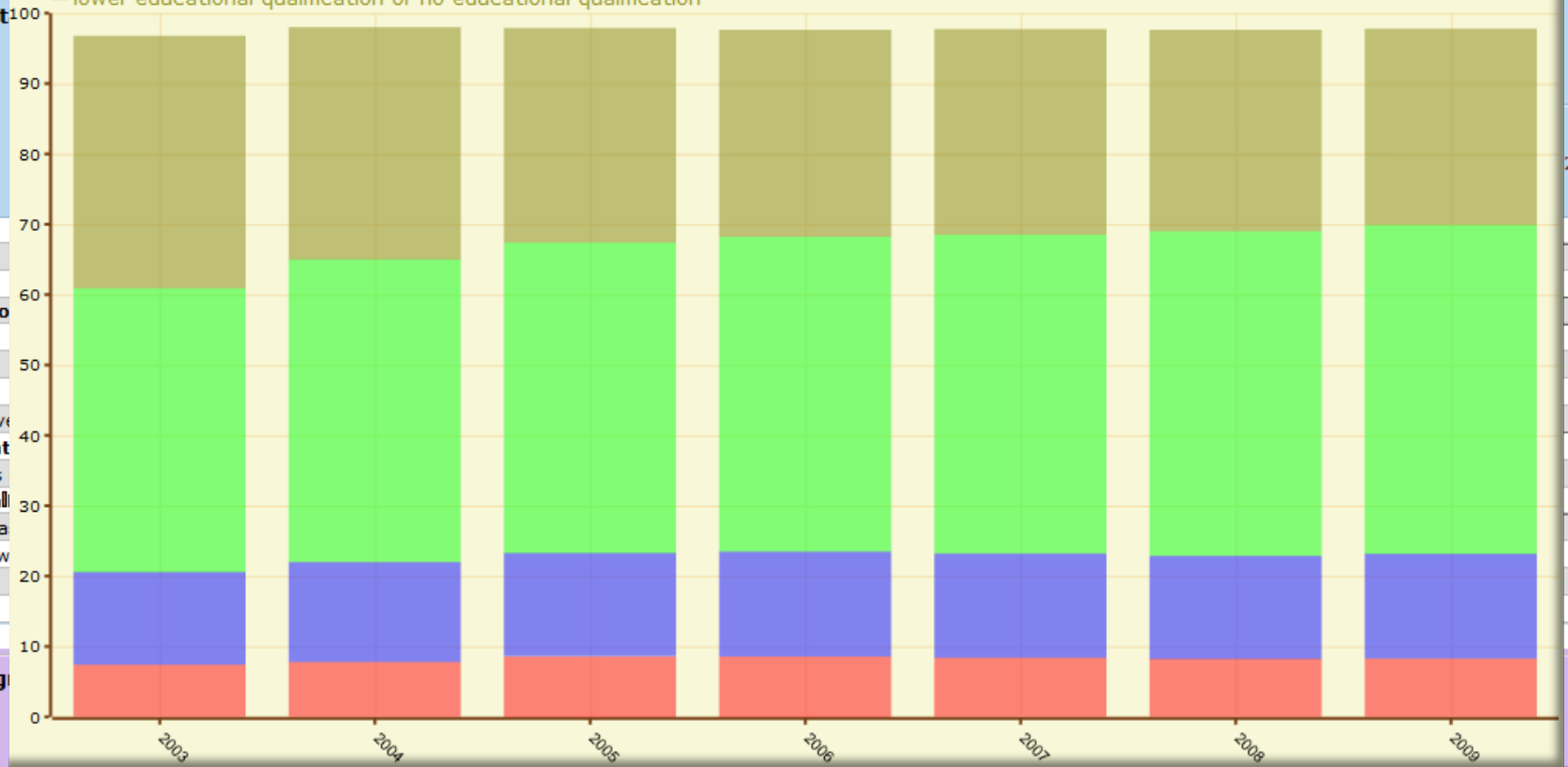
25,1



# Standard report - sample

## Parents' educational qualification

— both parents are degree holders 
 — only one parent is a graduated 
 — secondary school-leaving certificate 
 — lower educational qualification or no educational qualification



|      |      |
|------|------|
| 2009 | 40,5 |
|      | 59,5 |
|      | 28,7 |
|      | 34,1 |
|      | 15,4 |
|      | 21,8 |
|      | 26,2 |
|      | 2,7  |
|      | 52,7 |
|      | 25,8 |
|      | 20,8 |
|      | 0,6  |

### 1. Personal details

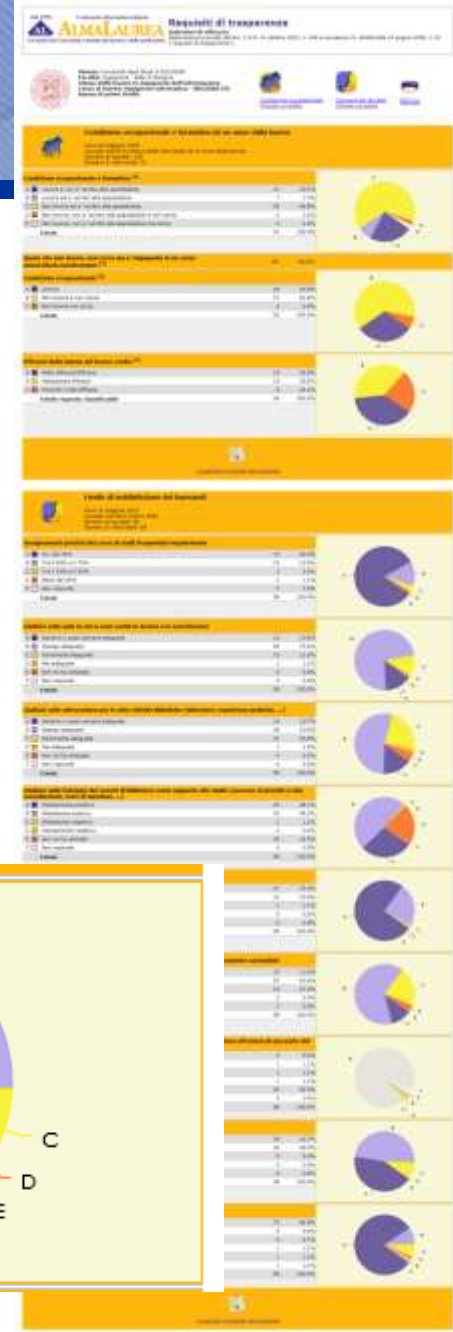
|                          |      |
|--------------------------|------|
| <b>Genre (%)</b>         |      |
| male                     | 40,5 |
| female                   | 59,5 |
| <b>Age at graduation</b> |      |
| under 23 years           | 28,7 |
| 23 to 24 years           | 34,1 |
| 25 to 26 years           | 15,4 |
| 27 years and over        | 21,8 |
| <b>age at graduation</b> | 26,2 |
| <b>Foreign citizens</b>  | 2,7  |
| <b>Residence (%)</b>     |      |
| same province as         | 52,7 |
| other province within    | 25,8 |
| other region             | 20,8 |
| abroad                   | 0,6  |

### 2. Social background

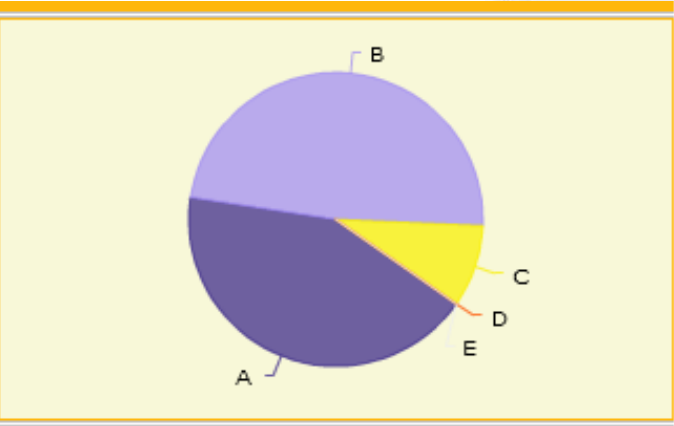
|   | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|------|------|------|------|------|------|------|
| <b>Parents' educational qualification</b>                       |      |      |      |      |      |      |      |
| both parents are degree holders                                 | 7,4  | 7,8  | 8,6  | 8,6  | 8,4  | 8,3  | 8,3  |
| only one parent is a graduated                                  | 13,2 | 14,2 | 14,7 | 14,9 | 14,8 | 14,6 | 14,9 |
| secondary school-leaving certificate                            | 40,3 | 43,0 | 44,1 | 44,7 | 45,3 | 46,1 | 46,7 |
| lower educational qualification or no educational qualification | 35,9 | 33,0 | 30,5 | 29,4 | 29,2 | 28,6 | 27,9 |
| <b>Social class (%)</b>   |      |      |      |      |      |      |      |
| middle class  | 54,7 | 19,3 | 20,3 | 20,6 | 20,3 | 19,6 | 19,7 |
| clerical middle class   | 14,5 | 31,0 | 30,9 | 30,6 | 30,8 | 30,2 | 29,3 |
| lower middle class  | 22,4 | 23,1 | 22,2 | 22,2 | 22,1 | 22,0 | 22,3 |
| working class   | 3,9  | 22,5 | 21,9 | 22,8 | 23,2 | 24,5 | 25,1 |

# Transparency info

- Detailed info about (requested by Ministry for orientation purposes)
  - Employability
  - Degree effectiveness
  - Assessment of university experience



| Sono complessivamente soddisfatti del corso di studi |                |           |               |
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| E  | Non risponde   | 0         | 0.0%          |
| <b>Totale</b>  |                | <b>89</b> | <b>100.0%</b> |



# Bologna process results: ten years after

- **Some statistical result:**
  - Number of students obtaining the degree within the legal duration:
    - **9.5%** before the Bologna process (2001)
    - **39.2%** after (2009)
  - Age at graduation
    - **27.2** years before
    - **25.0** years after (23.9 1° level, 25.0 2° level, 26.1 2° level European degree)
  - Number of graduates under 23 years
    - **None** before
    - **17%** after
  - Stage
    - **17.9%** before
    - **54,5%** after

# Summary

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# Available data Sources

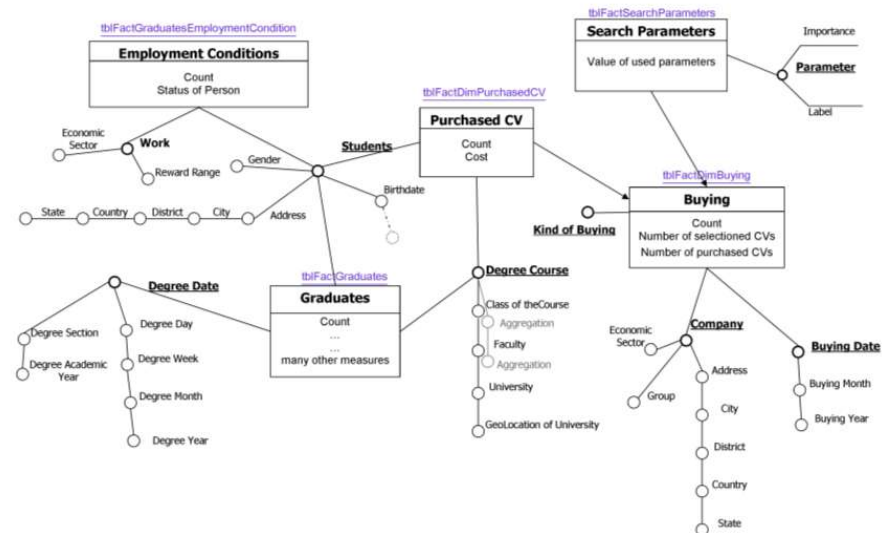
- **Standard sources**
  - Data from universities
  - Survey data
- **AlmaLaurea “events”**
  - Activity on the CV database
    - Browse, search and selection by employers
    - CV update by graduates
  - Activity on the website
    - Newsletters and alert response
    - Website navigation
    - Browse , search and apply to Job offers
    - Services usage
    - Help, faq

# Data collection process

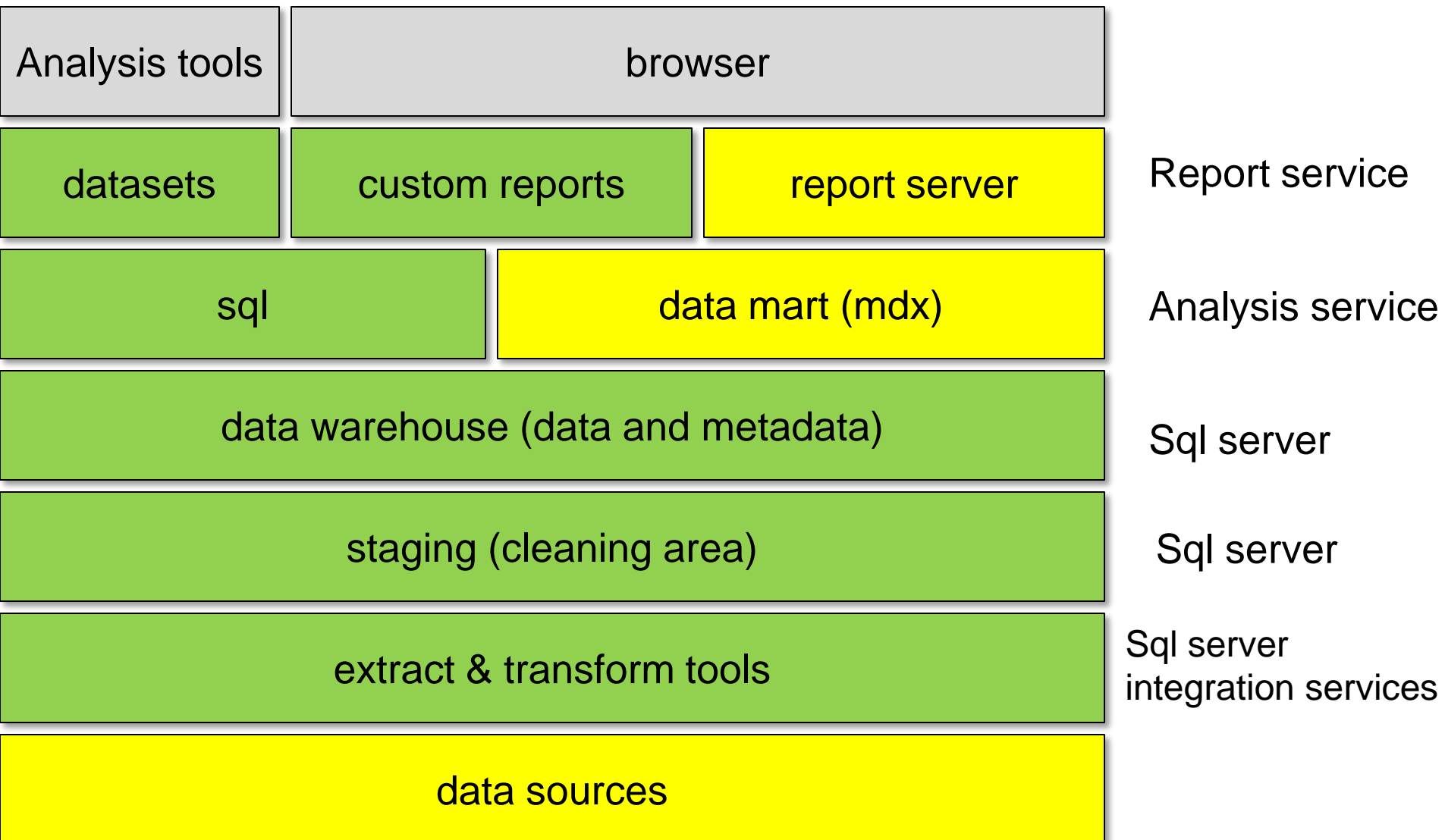
- **Data are collected by several and heterogeneous sources**
  - Online surveys (CAWI)
  - Telephone surveys (CATI)
  - Relational databases
    - Local database
    - Remote database (administrative data from Universities)
  - Log files

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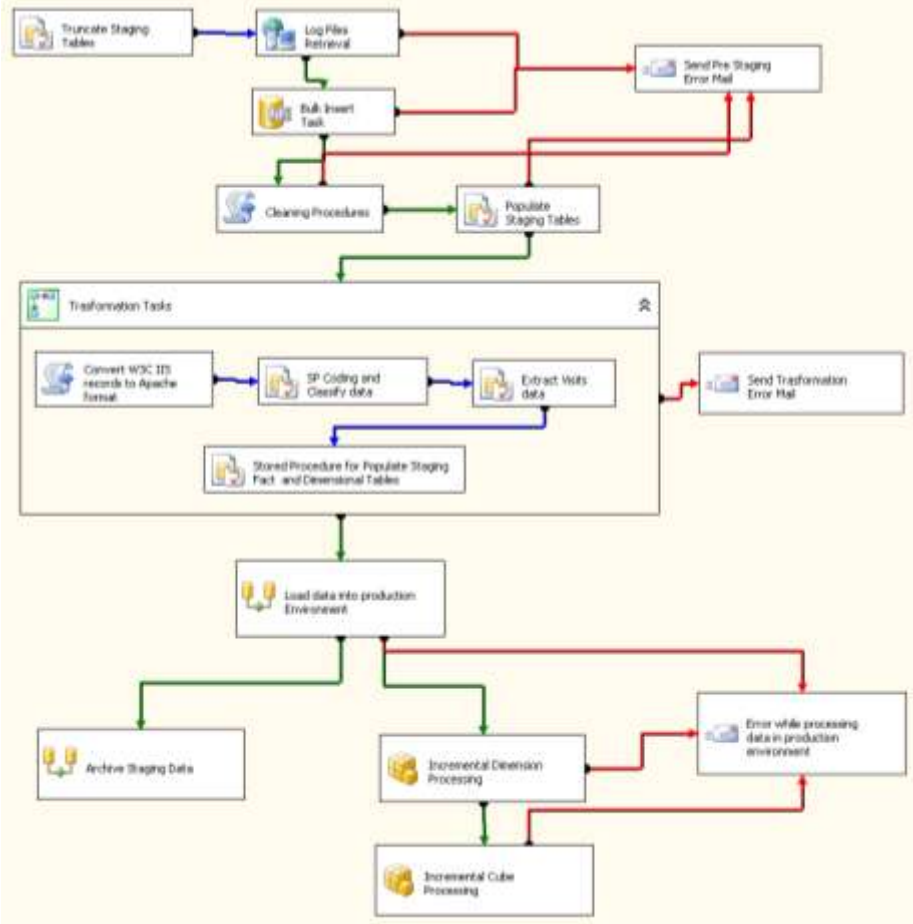


# Data Warehouse software architecture



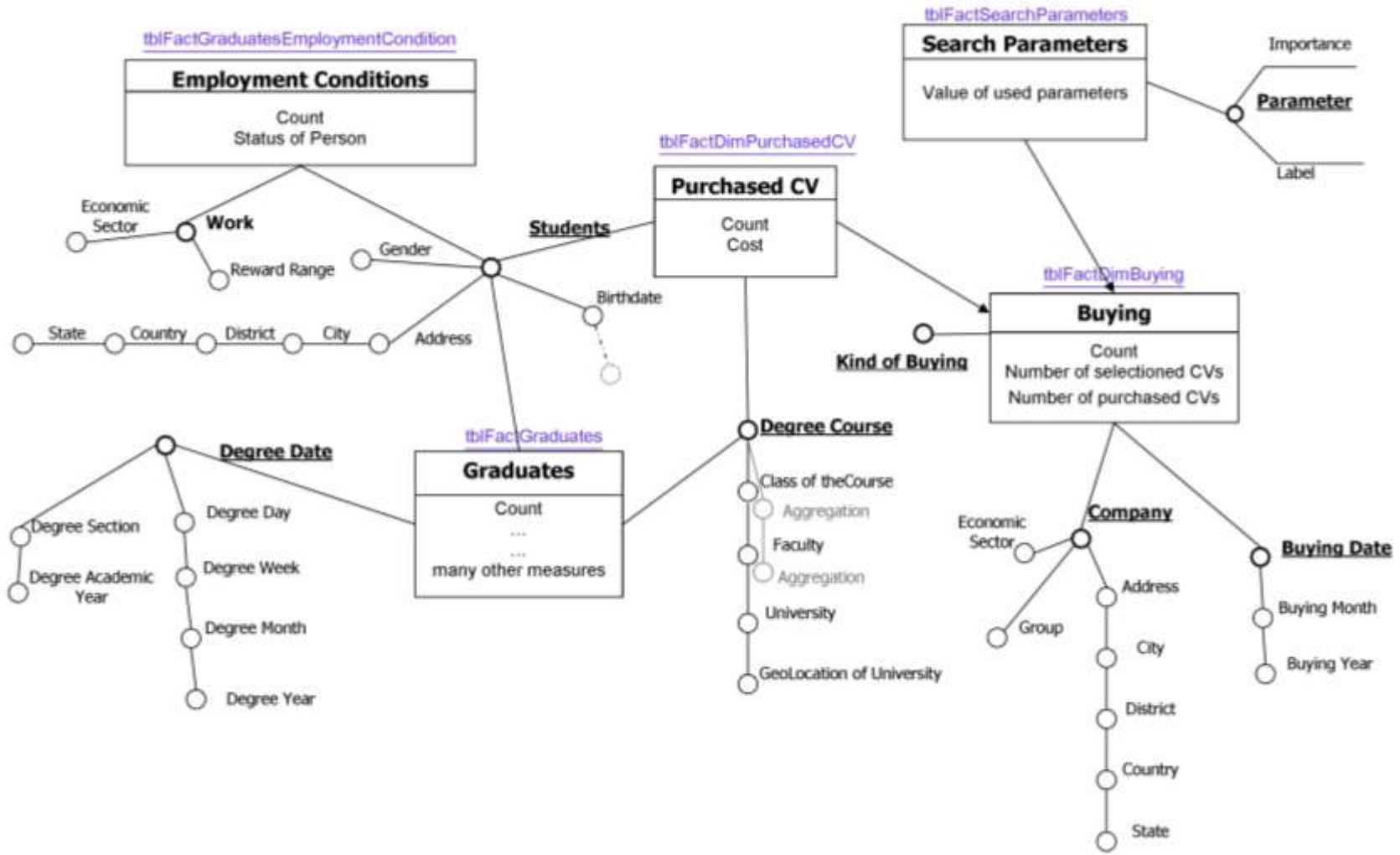


# ETL modules

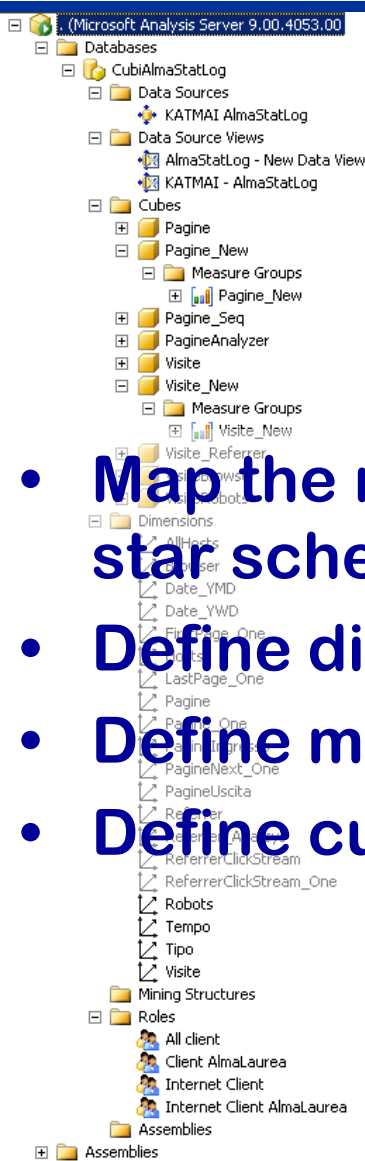


- ETL modules have been implemented by **Sql Server Integration Services** package
- **Remote databases:**
  - Web services (REST and SOAP)
  - Manual Data transfer
- **Custom interactive application for administrative data from Universities (SWAL)**

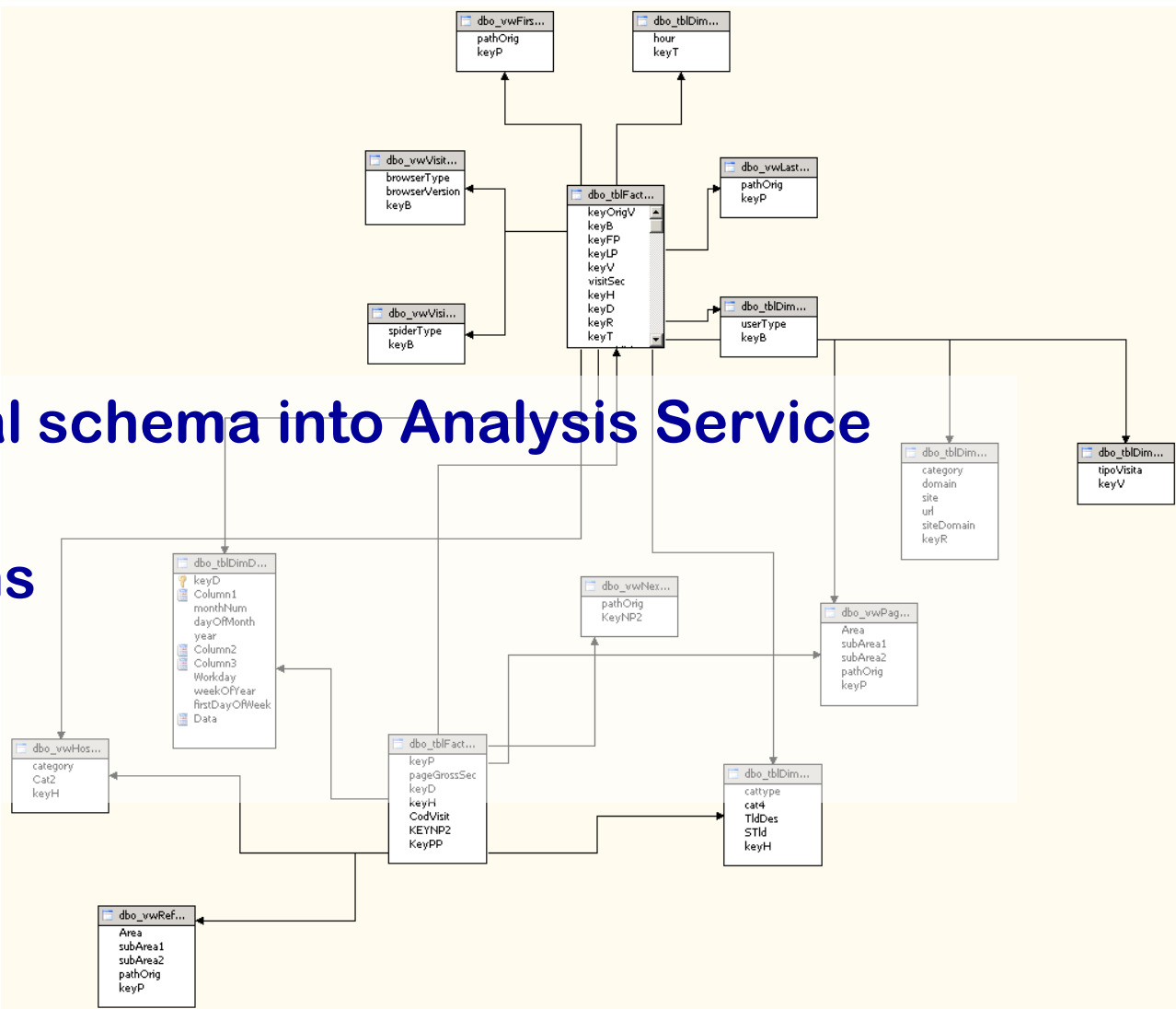
# Core data warehouse structure - Logical design



# Analysis Service: mapping the data



- Map the relational schema into Analysis Service star schema
- Define dimensions
- Define measures
- Define cubes



# Metadata

- **Technical (internal) metadata**
  - Mapping and transformations
  - Update status
- **Business (external) metadata**
  - Data description
    - Source, availability, reliability
    - Rights
    - Dictionary
    - Type

# Roles, reports: users vs report type

|                            | user      |            |                  |                |
|----------------------------|-----------|------------|------------------|----------------|
|                            | anonymous | researcher | University staff | Ministry staff |
| Dynamic report (pre-built) | YES (*)   | YES        | YES              | YES            |
| Static report              | NO        | YES        | YES              | YES            |
| Report builder             | NO        | YES        | NO               | NO             |

# Roles, reports: users vs data sets

|                      | user      |            |                      |                |
|----------------------|-----------|------------|----------------------|----------------|
|                      | anonymous | researcher | University staff (*) | Ministry staff |
| Graduation           | YES       | YES        | YES                  | YES            |
| Working Conditions   | YES       | YES        | YES                  | YES            |
| Company Activities   | NO        | YES        |                      |                |
| Graduates activities | NO        | YES        | YES                  | YES            |

(\*) limited to single university data

# Summary

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## Profilo - Indice di Ritardo

Gruppo disciplinare - Titoli dei genitori

| Gruppo Statistico    | Titoli dei genitori                    |              |                             |              |                                  |              |                                   |              |                        |              |             |              |             |               |
|----------------------|--|--------------|-----------------------------|--------------|----------------------------------|--------------|-----------------------------------|--------------|------------------------|--------------|-------------|--------------|-------------|---------------|
|                      | Solo uno dei due con diploma superiore |              | Solo uno dei due con laurea |              | Titoli inferiori o nessun titolo |              | Tutti e due con diploma superiore |              | Tutti e due con Laurea |              | Undefined   | Totale       |             |               |
| agrario              | 0.40                                   | 708          | 0.41                        | 482          | 0.53                             | 1034         | 0.40                              | 699          | 0.31                   | 278          | 0.72        | 317          | 0.46        | 3518          |
| architettura         | 0.47                                   | 1772         | 0.42                        | 1524         | 0.61                             | 2086         | 0.45                              | 2019         | 0.36                   | 1037         | 0.81        | 865          | 0.51        | 9303          |
| chimico-farmaceutico | 0.35                                   | 891          | 0.39                        | 841          | 0.49                             | 1267         | 0.34                              | 1047         | 0.32                   | 545          | 0.55        | 375          | 0.40        | 4966          |
| economico-statistico | 0.41                                   | 4918         | 0.38                        | 3342         | 0.54                             | 6396         | 0.38                              | 5267         | 0.30                   | 1926         | 0.79        | 2052         | 0.46        | 23901         |
| educazione fisica    | 0.33                                   | 531          | 0.31                        | 292          | 0.33                             | 556          | 0.30                              | 581          | 0.33                   | 101          | 0.30        | 483          | 0.32        | 2544          |
| geo-biologico        | 0.35                                   | 1755         | 0.32                        | 1289         | 0.48                             | 1977         | 0.33                              | 2017         | 0.30                   | 785          | 0.53        | 976          | 0.39        | 8799          |
| giuridico            | 0.67                                   | 2233         | 0.56                        | 2439         | 0.86                             | 3106         | 0.63                              | 2827         | 0.41                   | 1713         | 1.04        | 3110         | 0.73        | 15428         |
| ingegneria           | 0.45                                   | 4086         | 0.40                        | 3615         | 0.60                             | 4382         | 0.43                              | 4929         | 0.34                   | 2387         | 0.74        | 960          | 0.47        | 20359         |
| insegnamento         | 0.46                                   | 1992         | 0.44                        | 765          | 0.53                             | 3602         | 0.42                              | 1510         | 0.49                   | 250          | 0.54        | 1763         | 0.49        | 9882          |
| letterario           | 0.52                                   | 3193         | 0.47                        | 2853         | 0.72                             | 3796         | 0.48                              | 3887         | 0.39                   | 1821         | 0.81        | 2737         | 0.57        | 18287         |
| linguistico          | 0.40                                   | 2205         | 0.38                        | 1315         | 0.59                             | 2556         | 0.38                              | 2311         | 0.32                   | 739          | 0.80        | 1058         | 0.48        | 10184         |
| medico               | 0.16                                   | 3467         | 0.21                        | 2278         | 0.18                             | 5617         | 0.18                              | 3064         | 0.15                   | 1594         | 0.27        | 3258         | 0.19        | 19278         |
| politico-sociale     | 0.38                                   | 4872         | 0.38                        | 3421         | 0.43                             | 6824         | 0.36                              | 5435         | 0.33                   | 1901         | 0.50        | 2951         | 0.40        | 25404         |
| psicologico          | 0.34                                   | 2129         | 0.29                        | 1423         | 0.43                             | 2711         | 0.30                              | 2330         | 0.27                   | 826          | 0.46        | 586          | 0.35        | 10005         |
| scientifico          | 0.46                                   | 1049         | 0.44                        | 870          | 0.62                             | 1243         | 0.40                              | 1206         | 0.27                   | 631          | 0.63        | 502          | 0.47        | 5501          |
| <b>Totale</b>        | <b>0.41</b>                            | <b>35801</b> | <b>0.39</b>                 | <b>26749</b> | <b>0.52</b>                      | <b>47153</b> | <b>0.39</b>                       | <b>39129</b> | <b>0.32</b>            | <b>16534</b> | <b>0.65</b> | <b>21993</b> | <b>0.45</b> | <b>187359</b> |

# Reporting service development

- **Implementation of some test reports to verify**
  - Flexibility
  - Usability
  - Compatibility
- **Test reports:**
  - Data selection (by university, ...). Fixed report structure
  - Data selection. Drill down over rows or columns



# Report designer

DW2.0-Reports - Microsoft Visual Studio

File Edit View Project Build Debug Format Report Tools Window Help

Report Data

Design Preview

**Profilo - Indice di Ritardo**

| Gruppo disciplinare             |             | Titoli dei genitori |          |          |
|---------------------------------|-------------|---------------------|----------|----------|
| Gruppo Statistico               | Descrizione | Tito                | Totale   |          |
| [Descrizione_Gruppo_Statistico] | <<Expr>>    | [Sum(inc            | <<Expr>> | [Sum(inc |
| Totale                          | <<Expr>>    | [Sum(in             | <<Expr>> | [Sum(ir  |

Row Groups: [ matrix1\_Descrizione\_Gruppo\_Statistico\_IT ]

Column Groups: [ matrix1\_Descrizione\_Titolo\_Genitori ]

Properties: Selected Text, Action: None, Alignment, Indent, Color: White, Font: Tahoma; 10pt;

Error List: Ready

# Sample one: *delay in degree completion times study*

## Profilo - Indice di Ritardo

Gruppo disciplinare - Titoli dei genitori

All the universities

| Gruppo Statistico    | Titoli dei genitori                    |              |                             |              |                                  |              |                                   |              |                        |              |             |              | Totale      |               |
|----------------------|--|--------------|-----------------------------|--------------|----------------------------------|--------------|-----------------------------------|--------------|------------------------|--------------|-------------|--------------|-------------|---------------|
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# Sample one: *delay in degree completion times study*

## Profilo - Indice di Ritardo

Gruppo disciplinare - Titoli dei genitori

Bologna university

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|----------------------|--|-------------|-----------------------------|-------------|----------------------------------|-------------|-----------------------------------|-------------|------------------------|-------------|-------------|-------------|-------------|--------------|
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| agrario              | 0.21                                   | 94          | 0.26                        | 67          | 0.53                             | 87          | 0.37                              | 90          | 0.32                   | 49          | 0.85        | 32          | 0.38        | 419          |
| architettura         | 0.31                                   | 58          | 0.38                        | 41          | 0.38                             | 67          | 0.30                              | 58          | 0.41                   | 34          | 0.63        | 8           | 0.36        | 266          |
| chimico-farmaceutico | 0.28                                   | 63          | 0.33                        | 102         | 0.47                             | 95          | 0.31                              | 81          | 0.35                   | 68          | 0.43        | 19          | 0.36        | 428          |
| economico-statistico | 0.35                                   | 454         | 0.31                        | 382         | 0.39                             | 500         | 0.30                              | 489         | 0.22                   | 221         | 0.85        | 155         | 0.36        | 2201         |
| educazione fisica    | 0.37                                   | 47          | 0.24                        | 32          | 0.38                             | 47          | 0.31                              | 52          | 0.08                   | 12          | 0.55        | 39          | 0.36        | 229          |
| geo-biologico        | 0.22                                   | 119         | 0.25                        | 131         | 0.31                             | 96          | 0.22                              | 165         | 0.23                   | 74          | 0.43        | 54          | 0.26        | 639          |
| giuridico            | 0.66                                   | 163         | 0.48                        | 225         | 0.80                             | 173         | 0.59                              | 231         | 0.34                   | 177         | 0.98        | 161         | 0.63        | 1130         |
| ingegneria           | 0.39                                   | 372         | 0.35                        | 370         | 0.51                             | 364         | 0.40                              | 459         | 0.34                   | 287         | 0.97        | 31          | 0.41        | 1883         |
| insegnamento         | 0.30                                   | 199         | 0.49                        | 102         | 0.38                             | 307         | 0.31                              | 174         | 0.51                   | 40          | 0.54        | 90          | 0.38        | 912          |
| letterario           | 0.46                                   | 424         | 0.40                        | 459         | 0.56                             | 394         | 0.40                              | 492         | 0.40                   | 293         | 0.75        | 627         | 0.51        | 2689         |
| linguistico          | 0.31                                   | 169         | 0.28                        | 125         | 0.50                             | 163         | 0.30                              | 177         | 0.27                   | 89          | 0.76        | 54          | 0.37        | 777          |
| medico               | 0.17                                   | 195         | 0.16                        | 168         | 0.20                             | 242         | 0.17                              | 186         | 0.17                   | 136         | 0.24        | 112         | 0.18        | 1039         |
| politico-sociale     | 0.30                                   | 442         | 0.26                        | 422         | 0.47                             | 429         | 0.30                              | 511         | 0.26                   | 294         | 0.51        | 170         | 0.34        | 2268         |
| psicologico          | 0.12                                   | 116         | 0.19                        | 73          | 0.28                             | 117         | 0.15                              | 102         | 0.13                   | 36          | 0.66        | 8           | 0.19        | 452          |
| scientifico          | 0.35                                   | 106         | 0.46                        | 113         | 0.53                             | 132         | 0.29                              | 131         | 0.33                   | 80          | 0.62        | 28          | 0.41        | 590          |
| <b>Totale</b>        | <b>0.34</b>                            | <b>3021</b> | <b>0.33</b>                 | <b>2812</b> | <b>0.45</b>                      | <b>3213</b> | <b>0.33</b>                       | <b>3398</b> | <b>0.30</b>            | <b>1890</b> | <b>0.69</b> | <b>1588</b> | <b>0.39</b> | <b>15922</b> |

# Sample two: relationship between field of study and company type

Numero CV Acquistati

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| Facoltà  | Classe di Laurea   | Corso di Laurea                              | Tipo Azienda  |              |                                  |            |                    |           |                    |                    |                       |                   |              |               |               | Total |      |
|--|--|--|---------------|--------------|----------------------------------|------------|--------------------|-----------|--------------------|--------------------|-----------------------|-------------------|--------------|---------------|---------------|-------|------|
|  |  |  | Assicurazioni | Associazioni | Azienda Sconosciuta o di Sistema | Aziende    | Banche/Finanziarie | Enti      | Enti di formazione | Istituto Superiore | Liberi professionisti | Ricerca personale | Università   |               |               |       |      |
| <input type="checkbox"/> Agraria   |  | Totale                                       | 14            | 2            | 20                               | 192        |                    | 9         | 869                |                    |                       |                   |              |               | 70            | 263   | 1439 |
| <input type="checkbox"/> Architettura  |  | Totale                                       |               |              | 14                               | 96         |                    | 35        | 86                 |                    |                       |                   |              |               |               |       | 231  |
| <input type="checkbox"/> Chimica industriale                                   |  | Totale                                       | 1             | 1            |                                  | 114        |                    | 15        | 5                  |                    |                       |                   |              |               | 3             |       | 139  |
| <input type="checkbox"/> Conservazione dei beni culturali                      |  | Totale                                       | 12            | 2            |                                  | 12         |                    | 10        | 74                 |                    |                       |                   |              |               | 32            | 38    | 180  |
| <input type="checkbox"/> Economia - sede di Bologna                            | <input type="checkbox"/> finanza (19/5)  | Totale                                       | 10            | 19           | 4                                | 73         |                    | 84        | 6                  | 202                |                       |                   |              |               | 166           | 31    | 595  |
|  | <input type="checkbox"/> scienze dell'economia (64/5)                          | Totale                                       | 29            | 3            | 7                                | 189        |                    | 167       | 5                  | 626                |                       |                   | 1            | 381           | 69            | 1477  |      |
|  | <input type="checkbox"/> scienze dell'economia e della gestione aziendale (17) | economia aziendale                           | 33 1.07 %     | 8 0.26 %     | 4 0.13 %                         | 139 4.51 % | 259 8.40 %         | 24 0.78 % | 1179 38.24 %       | 6 0.19 %           |                       | 0.00 %            | 1379 44.73 % | 52 1.69 %     | 3083 100.00 % |       |      |
|  |  | economia e commercio - BOLOGNA               | 57 15.57 %    | 2 0.55 %     | 0.00 %                           | 13 3.55 %  | 32 8.74 %          | 1 0.27 %  | 94 25.68 %         | 0.00 %             | 0.00 %                | 167 45.63 %       | 0.00 %       | 366 100.00 %  |               |       |      |
|  |  | economia e gestione delle imprese            | 3 0.84 %      | 1 0.28 %     | 1 0.28 %                         | 24 6.72 %  | 67 18.77 %         | 0.00 %    | 198 55.46 %        | 0.00 %             | 0.00 %                | 47 13.17 %        | 16 4.48 %    | 357 100.00 %  |               |       |      |
|  |  | economia e management dei servizi turist ... | 11 20.37 %    | 0.00 %       | 0.00 %                           | 1 1.85 %   | 3 5.56 %           | 0.00 %    | 28 51.85 %         | 2 3.70 %           | 0.00 %                | 7 12.96 %         | 2 3.70 %     | 54 100.00 %   |               |       |      |
|  |  | economia e marketing                         | 42 2.67 %     | 1 0.06 %     | 4 0.25 %                         | 99 6.29 %  | 134 8.52 %         | 12 0.76 % | 888 56.45 %        | 1 0.06 %           | 0.00 %                | 361 22.95 %       | 31 1.97 %    | 1573 100.00 % |               |       |      |
|  |  | economia e professione                       | 13 1.37 %     | 3 0.32 %     | 1 0.11 %                         | 61 6.41 %  | 83 8.73 %          | 5 0.53 %  | 402 42.27 %        | 2 0.21 %           | 0.00 %                | 366 38.49 %       | 15 1.58 %    | 951 100.00 %  |               |       |      |
|  |  | Totale                                       | 159           | 15           | 10                               | 337        | 578                | 42        | 2789               | 11                 |                       | 2327              | 116          | 6384          |               |       |      |
|  | <input type="checkbox"/> scienze economiche (28)                               | Totale                                       | 39            | 1            | 7                                | 91         | 156                | 21        | 916                |                    |                       |                   | 655          | 56            | 1942          |       |      |
| <input type="checkbox"/> scienze economiche per l'ambiente e la cultura (83/5) | Totale   | 12   | 1             |              | 25                               | 24         | 1                  | 263       |                    |                    |                       | 48                | 5            | 379           |               |       |      |

# Summary

- AlmaLaurea
- Standard reports
- New Data warehouse design and implementation
- Software architecture
- First results
- **Conclusions**



# Conclusions

- **We are experimenting Microsoft Business Intelligence tools**
- **The data warehouse (still under construction) is a relational database (SQL server)**
- **The old reporting architecture provides:**
  - Data mart extraction (SPSS analysis)
  - Custom reports
- **The new reporting architecture (still under design) should provide**
  - Flexible reports
  - Compound data mart

# Conclusions ... the end

- **We are experimenting Microsoft Business Intelligence tools**
  - Analysis service integration
  - Reporting service
- **First results**
  - Easy to design, but more investment and training is mandatory
  - With respect to our custom reports architecture (sql based) we have:
    - Shorter development times
    - Better performances (even on the development architecture)
- **Open issues**
  - Performance and hardware dimensioning

Thank you!

## Questions?

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