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# EU-SBAS INFORMATION DAY

**A SHORT-TERM BASED ANTICIPATORY SYSTEM FOR THE EUROPEAN  
LABOUR MARKET TRENDS, SKILLS DEVELOPMENTS AND VET POLICY**



## *THE EU-SBAS TOOL*

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OVERVIEW

CONSTRAINTS

COMPONENTS

***PROJECT***

# PROJECT: OVERVIEW

- **OBJECTIVE:** providing an instrument for **producing information on skill needs** for a targeted group of labour market and policy actors.
- **EXPECTED RESULTS:** an anticipation tool for complementing and integrating existing European solutions, methods and data to **identify labour market trends, emerging competencies and short-term skill needs.**
- **OUTCOMES:** a fully functioning **system producing timely information** on emerging competencies and skill needs at EU and MS level.



# PROJECT: CONSTRAINTS

- INTEGRATION WITH CEDEFOP FORECASTING AND IT STRUCTURES
- COMPLEMENTARITY WITH EXISTING TOOLS AND METHODOLOGIES
- LINK WITH THE COMMUNITY OF STAKEHOLDERS



EU-SBAS information day, Brussels, 13/02/2015

# ***PROJECT: COMPONENTS***

- **CONCEPTUAL FRAMEWORK:** Methodological approach and strategy.
- **STATISTICAL SYSTEM:** Comprehensive focused datasets, metadata and database.
- **IT TOOL:** A prototype of the model, fully tested and validated by conducting ex-post evaluations and sensitivity analysis on the past trends.
- **STAKEHOLDERS COMMUNICATION FACILITIES:** workshops, conferences and a web-based platform for exchanging, communicating and disseminating.
- **MAINTENANCE,** Training, technology transfer



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SOURCES

INDICATORS

CHALLENGES

***DATA***

# DATA: SOURCES

## ■ FINALLY FEW SOURCES



ECONOMIC AND FINANCIAL AFFAIRS



# ***DATA: INDICATORS***

## ■ **GDP AND MAIN COMPONENTS**

- ✓ **GDP (Vol.)**
- ✓ **GDP Prices Indices**
- ✓ **Imports / Exports (Vol.)**
- ✓ **Gross value added at basic prices (Vol.)**
- ✓ **Private final consumption expenditure, (Vol.)**
- ✓ **Private investment at current prices**

# ***DATA: INDICATORS***

## ■ **INTEREST RATES**

- ✓ **Long term interest rates (Unit and percentage)**
- ✓ **Short term interest rates**
  - **Day-to-day rates**
  - **1-month rates**
  - **3-month rates**
  - **6-month rates**
  - **12-month rates**

# ***DATA: INDICATORS***

## **■ LABOUR**

- ✓ **Employment by occupation and economic activity**
- ✓ **ISCO 3 digit**
- ✓ **Unemployment by sex, age and nationality**
- ✓ **Previous occupations of the unemployed, by sex**
- ✓ **National Accounts by 21 branches - employment data**
- ✓ **Labour productivity - annual data**
- ✓ **Unit labour cost**

# ***DATA: INDICATORS***

## **■ OTHERS**

- ✓ **Industry production index**
- ✓ **Government deficit/surplus, debt and associated data**
- ✓ **Business and consumer surveys (Source: DG ECFIN), monthly**
  - **Consumers, industry, construction, retail sales, services, Euro-zone Business Climate Indicator, Financial services**
- ✓ **Market capitalization (Source: Federation of European Securities Exchanges)**

# DATA: CHALLENGES

## ■ CHOOSING THE LINKING VARIABLE FOR CONNECTING INDUSTRY PRODUCTION INDEX

**SECTORS <-> JOBS <-> EDUCATION**

- **NACE BREAK:** The NACE Rev.1.1 (1988) ends on 2010. The new classification Rev.2 (2008) starts from 2008
- **ISCO BREAK:** Time series continuous from 1998 but series had a break from 2008 until End Dec 2010.





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## ***INFRASTRUCTURE:***

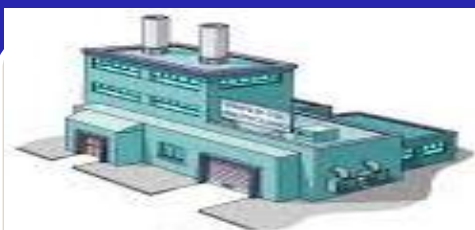
OBJECTIVES

ARCHITECTURE



### **RECEPTION**

Connect sources  
Schedule updates  
Apply basic checks  
on data



### **PRODUCTION**

Make the  
econometric  
routines running  
for production of  
forecasts



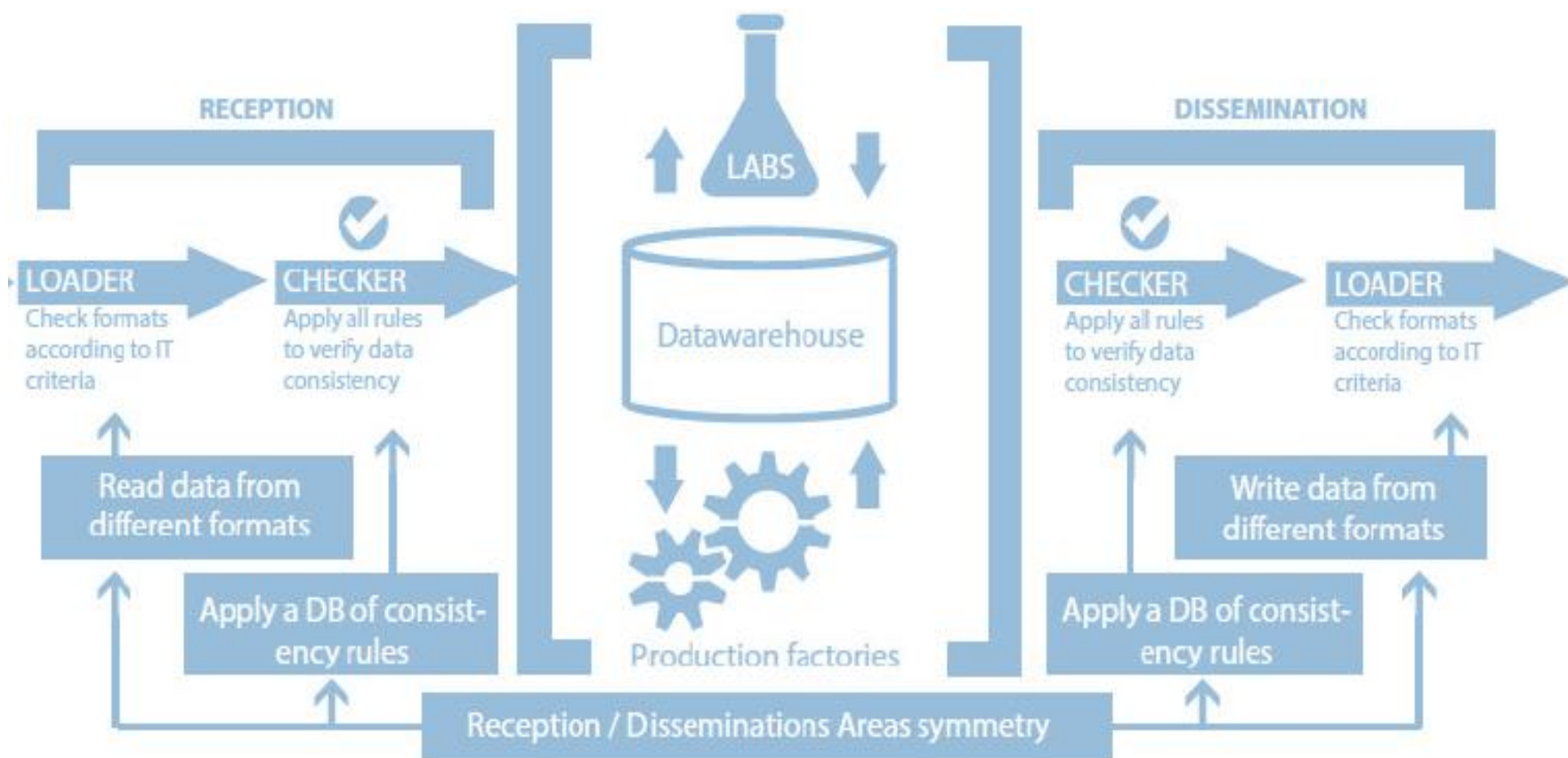
### **DISSEMINATION**

Make results  
available  
Various Media  
Web, Reports, ...

# ***INFRASTRUCTURE: OBJECTIVES***

- **INTEGRATION OF RECEPTION – PRODUCTION – DISSEMINATION**
- **AUTOMATION: CONNECT THE SOURCES IN A DYNAMIC WAY AND ALLOW LIVE UPDATES**
- **MASSIVE COMPUTATION IN PRODUCTION: WITH ROBUSTNESS, I.E. USER ACCESS TO REPORTS FOR ACTIONS RATHER THAN INTERACTIVE MENUS;**
- **IMPLEMENT OF THE SOLUTION IN WEB TECHNOLOGY: HIGHER CAPACITY OF INTEGRATION, ALLOW COLLABORATIVE ACTIVITY.**

# INFRASTRUCTURE: ARCHITECTURE







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PRINCIPLES

DIMENSIONS

SCHEME

DATA LOADER

## ***THE INFORMATION SYSTEM (IS)***

# IS: PRINCIPLES

## ■ BASED ON SDMX: STORAGE OF DATA AND METADATA

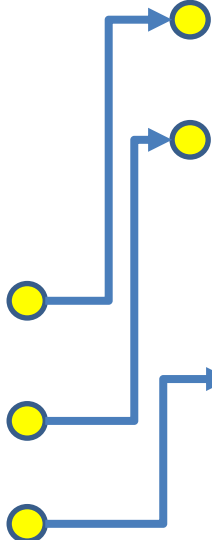
### Example:

## ■ FULL IMPLEMENTATION OF THE CONCEPTS

- ✓ Data Source Definition (DSD)
- ✓ Dimensions
- ✓ Items

### Forecast\_EDUC,

### *Country\_LevelEduc\_WeightType*



The diagram shows three yellow circles on the left, each with a blue line and arrow pointing to a specific part of the 'Country' table. The top circle points to the 'Country' header, the middle circle points to the 'Austria' row, and the bottom circle points to the 'Bulgaria' row.

<i>Country</i>
Austria
Belgium
Bulgaria
Croatia
...

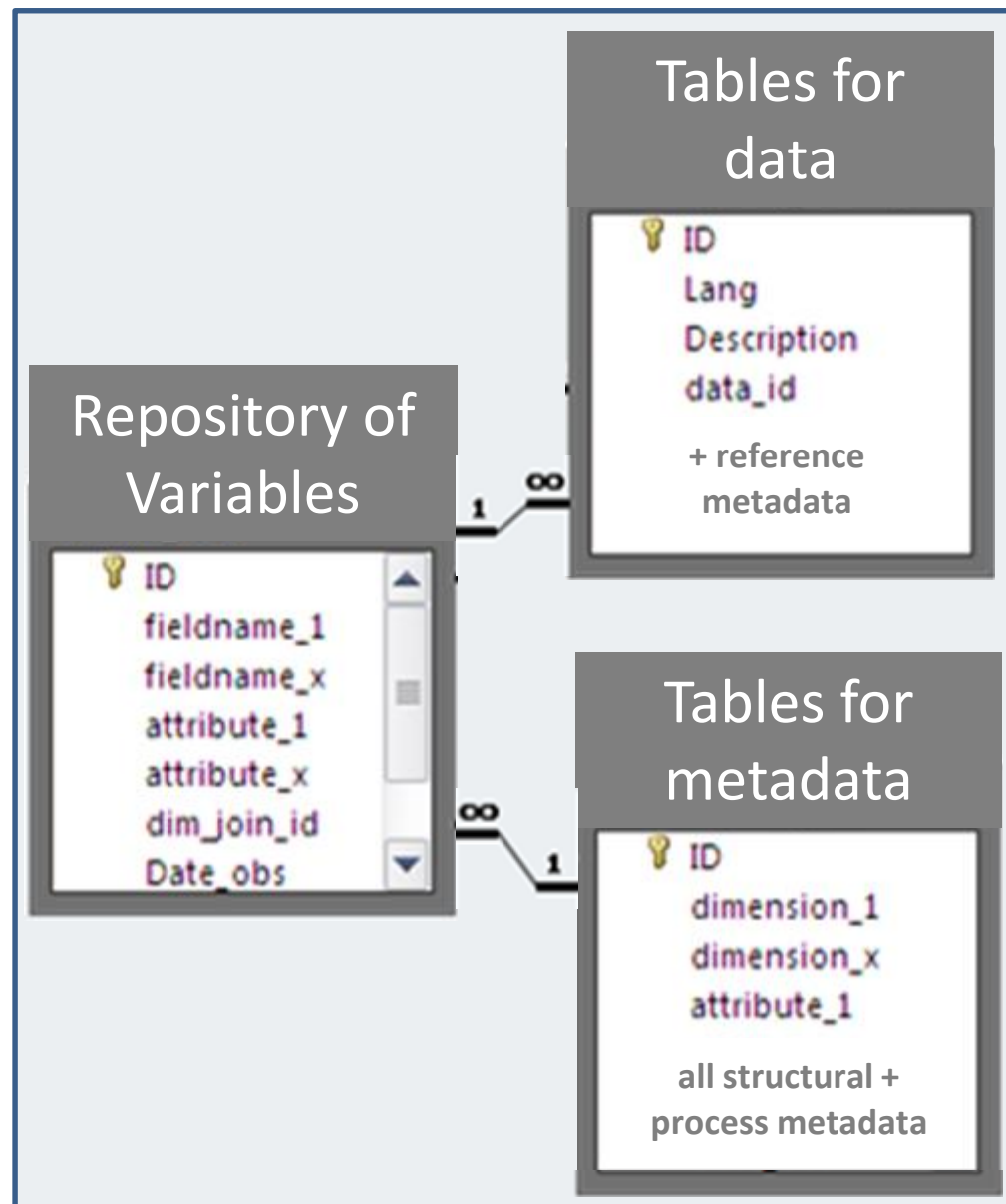
<i>Country</i>
High
Medium
Low
...

# IS: *DIMENSIONS*

Shared	Specific
Age (14-24, 25-49, ...)	Level (High, Medium, Low)
FREQ (A, Q, M, ...)	ISCO (Std codes)
Geo (AT, BE, BG, CY, ...)	NACE (Std Codes)
METHOD for error measurement (MAE, RMSFE, SSR)	
MODEL (Type of model)	
Sex (M, F)	
TECHNIQUE (REC, ROL)	

# IS: THE SCHEME

- AN INFORMATION SYSTEM IN SQL SERVER (RDBMS)
- REPOSITORY OF VARIABLES THROUGH METADATA AND DATA TABLES





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THE SECTIONS

PREPARE AND SHRINK

MEASURE QUALITY

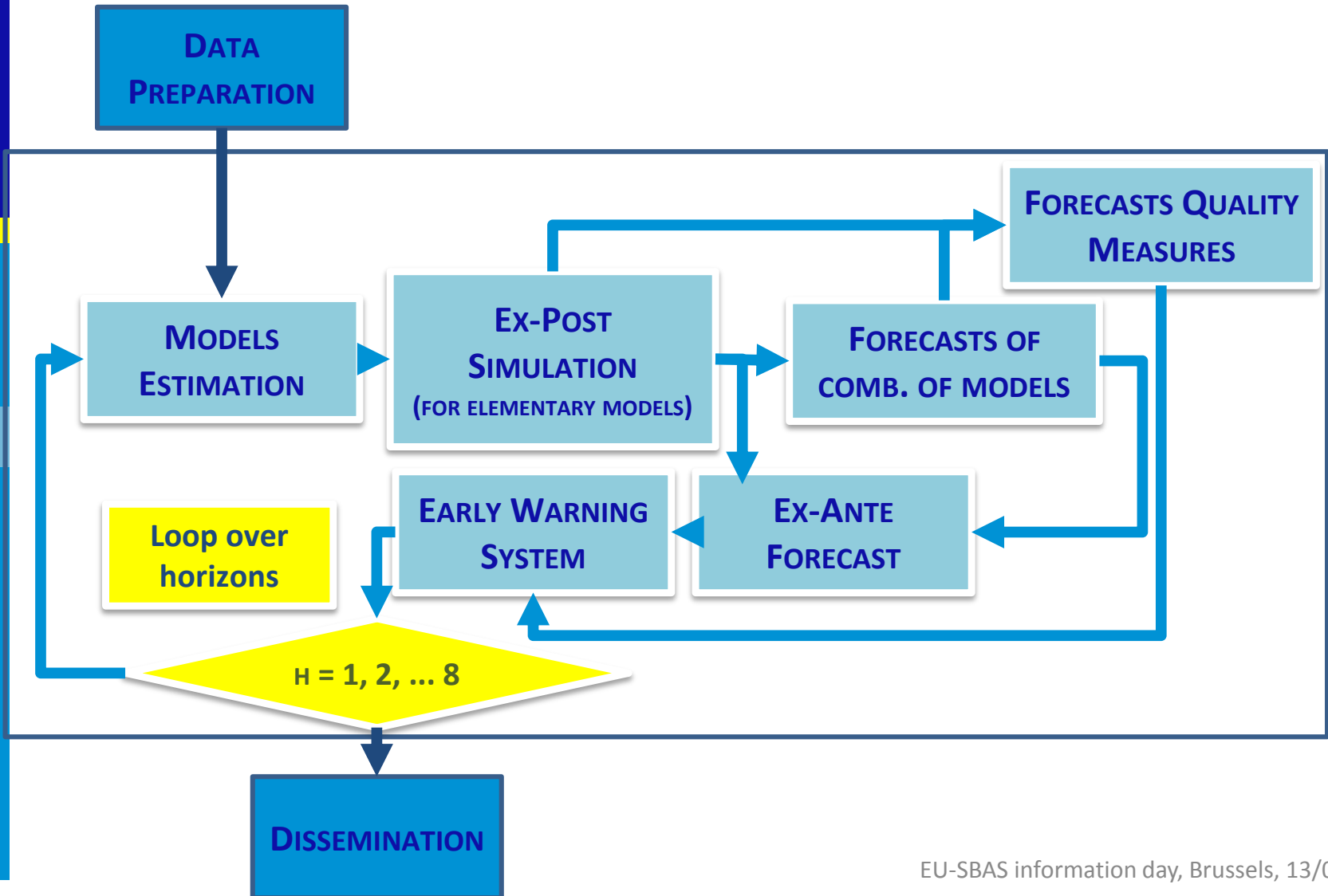
FINAL

## ***THE PRODUCTION AREA***

# ***PRODUCTION: THE SECTIONS***

- **MODEL ESTIMATION**
  - ✓ **Data Shrinkage**
  - ✓ **Estimation**
- **EX-POST SIMULATION**
- **FORECASTING ABILITY MEASURES**
- **EX-ANTE SIMULATION**
- **FORECASTS COMBINATIONS**
- **EARLY WARNING SYSTEM**

# PRODUCTION: THE SECTIONS



# ***PRODUCTION: PREPARE AND SHRINK***

## ■ **PREPARATION: VARIOUS TRANSFORMATION TO Q DATA**

### **DATA SHRINKAGE**

Principal components

Partial Least Square

Bayesian Shrinkage

### **ESTIMATION**

AR: OLS

ARMA: Iterative OLS

## ■ **SHRINKS:**

- ✓ Cascade of methods
- ✓ Some 50 variables at the beginning
- ✓ Shrinks to some 4 variables at the end

## ■ **ESTIMATES:**

- ✓ Cascade runs of AR and ARMA
- ✓ 168 models in total



# **PRODUCTION: MEASURE QUALITY**

## ■ **EX-POST SIMULATION: ACCESS TO RESIDUALS**

### **FORECASTS QUALITY MEASURES**

**Forecast errors**

**RMSFE**

**Diebold-Mariano**

**SSR**

**Coverage rates**

**Forecast errors**

**Density forecasts**

## ■ **MEASURES:**

- ✓ **Diff. Forecast - Historical**
- ✓ **Root Mean Square Forecast Error (smaller better)**
- ✓ **Comparison to AR(1) model**
- ✓ **Sign Success Ratio**
  
- ✓ **Computation of the probability of each point of forecast**

# ***PRODUCTION: FINAL***

- **EX-ANTE SIMULATION:** PRODUCTION OF FORECAST POINTS
- **FORECASTS COMBINATION:** USE HEURISTICS TO ASSEMBLE MULTIPLE FORECASTS AND GET BETTER ONES
- **EARLY WARNING SYSTEMS:** PROVIDES A WARNING IF A SUBSTANTIAL INCREASE OR DECREASE IS EXPECTED OVER THE NEXT QUARTERS COMPARED TO THE RECENT PAST.



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NEEDS

HOMEPAGE

VARIABLE FOCUS

VARIABLE ENVIRONMENT

OTHER BREAKDOWNS

## ***THE DISSEMINATION AREA***

# ***DISSEMINATION: NEEDS***

- MAKE THE FORECASTS AVAILABLE THROUGH **A WEB SOLUTION;**
- ADDRESS THE **POLICY MAKERS' PROFILE;**
- IMPLEMENT A **DATA NAVIGATOR** ALLOWING TO EXPLORE MANY VARIABLES AT THE SAME TIME;
- **OPTIMIZE THE REQUESTS TO THE DATABASE FOR PERFORMANCE PURPOSE.**



## ■ QUERY (BASED ON SDMX)

## ■ VARIABLE FOCUS

- ✓ Possibly multiple var.
- ✓ Graph and Table
- ✓ Window to technical

## ■ VARIABLE IN ENVIRONMENT

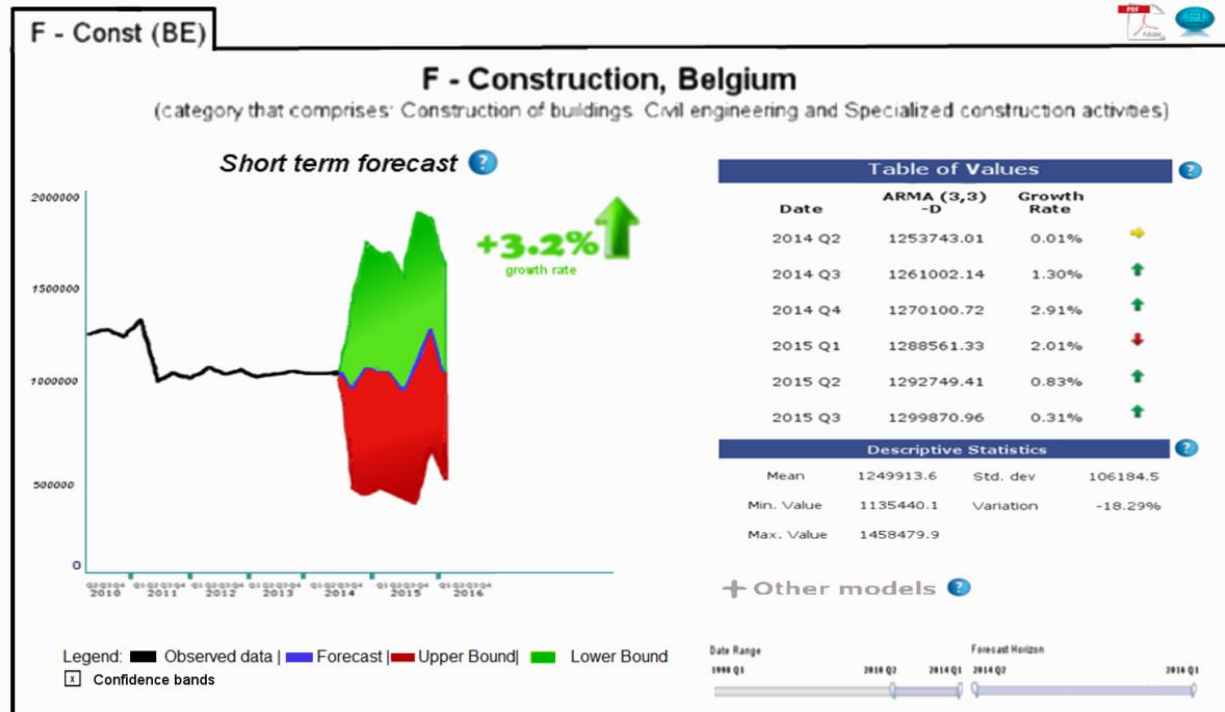
- ✓ Geo. breakdown
- ✓ Sectoral breakdown

## ■ OTHER BREAKDOWNS

- ✓ By Gender
- ✓ By Age Group

# One variable, multiple dates

## DISSEMINATION: VARIABLE FOCUS



- QUALITY AND TREND QUICKLY ACCESSIBLE
- ACCESS TO THE MODEL INFORMATION
- DYNAMIC IN THE GRAPH THROUGH A ZOOM
- OUTPUT AS A PDF REPORT

## One dates, multiple variables

Zoom in/out

2016 Q1

No.	Country		
1	Italy	(8.2%)	↑
2	Denmark	(3.1%)	↓
3	Belgium	(2.9%)	→
4	France	(2%)	↑
5	Spain	(1.8%)	↓
6	Germany	(1.6%)	→
7	Luxemburg	(1.2%)	→
8	Greece	(0.5%)	↑
9	Slovakia	(0.3%)	→

No.	Sector	ISCO/NACE/EDUC code	
1	Construction	F	→
2	Financial and insurance activities	K	→
3	Education	P	↑
4	Human health and social work activities	Q	→
5	Manufacturing	C	↑
6	Professional	M	↓
7	Accommodation and food service activities	I	↑
8	Transportation and storage	H	↓
9	Electricity	D	→

- GEOGRAPHICAL RANKING AND AGGREGATES COMPUTATION;
- DOMESTIC RANKING, FOR NACE, ISCO AND LEVEL OF EDUCATION;
- DYNAMIC IN THE TABLES THROUGH A ZOOM ON A SINGLE DATE

# DISSEMINATION: OTHER BREAKDOWNS

One dates, multiple variables



- BREAKDOWN BY GENDER (ONLY WITH ISCO)
- BREAKDOWN BY AGE GROUP (ONLY WITH ISCO)
- DYNAMIC IN THE TABLES THROUGH A ZOOM ON A SINGLE DATE, SYNCHRONOUSLY WITH THE PREVIOUS AREA.





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## ***CONCLUSIONS***

# CONCLUSIONS

- **STATE OF THE ART METHODOLOGIES**
- **IMPOSES THE IMPLEMENTATION OF A FULL TECHNICAL FRAMEWORK**
- **ON GOING PROJECT**
  - ✓ June 2015, The Dissemination Area
  - ✓ Sept 2015, A New round of Forecast,
  - ✓ Dec 2015, stabilized system for daily use
- **IMPLEMENTATION OF A GENERIC SOLUTION**