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Purpose of the ECB’s Statistics

• support to the monetary and macro-prudential policy-making and supervisory functions of the ECB

• providing data and related services to other public authorities, financial market participants, the media and the general public

Transparency and Credibility of the institution’s policy making
“Good user service is the lifeblood of any business.”

User surveys conducted for identifying and understanding the user’s needs → heterogeneous user needs

**Internal users**
- Economists, analysts
- Researchers
- Financial stability experts, supervisors
- NCBs, International Organizations

**External users**
- Consultants, political advisors
- Economists, analysts
- Media
- Academia
- Data vendors

Dissemination challenges at the ECB
The key dissemination channel of the ESCB statistics is the **Statistical Data Warehouse (SDW)**

Dissemination channels

**SDW Database**
- Internal portal
- ESCB-IO portal
- External portal

**SDMX WS**
- ECB website
- ECBstatsApp
What are the dissemination challenges?

- Since the launch of the SDW, large increase in the number of disseminated time series;
- 1,5 million time series (75 data-sets) in external SDW;
- 20,4 million time series (154 data-sets) in internal SDW;
- Since the financial crises users need more detailed and granular datasets.

Number of time series disseminated externally to the SDW
User Surveys launched on SDW

• Internal user survey addressing key users in the various business areas of the ECB
• External user survey targeted 140 users with various professional backgrounds
• Regular feedback received in Statistics hotline

The results of the surveys revealed that users have

➢ difficulties in data mining: barriers in browsing, filtering, searching and identifying the relevant series

➢ interest in interactive visualisations in order to be able to explore and analyse data
1\textsuperscript{st} user feedback: data mining features of SDW

Improvements have been achieved in

- Data browsing
- Data filtering
- Search
Data mining in SDW - Data browsing

Data browsing used to select data-sets by topic

User’s opinion: Navigation menu contained too many data groups that were not meaningful

Improvements:
• Number of the main data groups reduced (from 17 to 9)
• Navigation level hierarchy simplified (from 6 to 4)

• Full content – catalogue of data-sets added

+ ECB/Eurosysten policy and exchange rates
+ Money, credit and banking
+ Financial corporations
+ Financial markets and interest rates
+ Macroeconomic and sectoral statistics
+ Balance of payments and other external statistics
+ Supervisory and prudential statistics
+ Payments statistics
+ ECB surveys
+ Full Content
Data filtering used to narrow data selection

Filter dimensions are based on series key dimensions (DSDs)

User’s opinion varies based on their professional background:

- Data experts
- Economists
- Commercial data vendors
- Media
What do users demand from SDW?

The conflicting user feedback

Too many filters displayed                  Display all filters
Order of filters is not helpful                Order of filters matters
Automated refresh of pages                Pages refresh too slowly
Relevant metadata                              All metadata

Users’ needs depend on two factors:

- **statistical data knowledge**
- **experience in using SDW**
The idea of User Profiles in SDW

- Organising SDW features into Groups → each group is identified by a User Profile.
  - Most users have a typical profile describing his/her behaviour
  - There are times when they do not fit their Typical profile, when they fulfil some of their special needs.

- Priorities of the SDW features are set in each group separately for
  - data filters,
  - detail of metadata,
  - highlighting provisional observations …
Data mining in SDW - Data filtering

User Proficiency Diagram
(based on users’ self-assessment)

Knowledge of Data/Statistical Domain

Experience with the SDW website

New to SDW New to data

Statistical Domain

Dissemination challenges at the ECB
Typical Use Case: User #1

- First time SDW user
- General knowledge of statistics

User’s proficiency improves with time: both in SDW usage, and in the Statistical domain, depending on the user’s needs.

Most probably *not in a linear manner*, but in according to their learning curve:

(a) once learning about the Stat. domain
and
(b) at other times while familiarizing themselves with the SDW website.
Typical Use Case: User #2

- First time SDW user
- Data expert

User’s proficiency at SDW usage improves with time, depending on the user’s needs.

Focus on on-line help available for the self-learning features of the SDW website.
Recommended SDW user profiles (based on User Proficiencies)
Proficiency – Need for customisation

The more a user knows about the data, the more he/she knows about the features of the SDW website,

- the more useful the website becomes,
  and
  at the same time,
- the more the user start experiencing the limitations of the pre-set profiles.

Flexibility: each user profile is customisable.
Need for customisation

- Experience with the SDW website
- New to SDW
- New to data
- Knowledge of Data/Statistical Domain
- Customized User settings

Data mining in SDW - Data filtering
3+1 Solution: SDW User Profiles

(customise any predefined setting)

SDW Lite

SDW Metadata Intensive

SDW for Data Experts

My settings...

Users assess their own experience with SDW, and can select from any of the roles.
Data mining in SDW: data filtering

Example: User #1 SDW Lite

Example: filters for GDP

Selected filters appear in relevance order

Pre-selected relevant filters appear for GDP

Non-relevant filters are by default hidden
Data mining in SDW: data filtering

Example: User #3 data experts

Example: filters for GDP

All filters appear in relevance order

Fixed non-relevant filters appear for GDP

Dissemination challenges at the ECB
Search in SDW

- Non-expert users’ preferred way of finding data;
- Search as free text, series keys, list of series with wildcards;
- Google search option added for searching within documents (pdf reports);

Search ranking amongst other based on number of references in publications
2nd user feedback: interactive visualisations

Improvements have been achieved in two fields:

- New approach in visualisations
- New tools that facilitate modern visualisations
Users’ interest in interactive visualisations

- Understanding and exploring data have become more challenging with the increased detail and granularity of data-sets.
- Pre-defined static reports are *not effective* way of data communication.
- New approaches and tools have been sought to facilitate data exploration.

- Visual analytics for data mining
- Tableau – a new visualisation tool
Cycle of visual analytics

Data presentation that supports **analytical reasoning**

- not a linear progression, users may jump back and fourth between any stages in the cycle.

**Interactivity** – the instant change in the data view helps to understand and develop insights
Effective visualisation

Best practices and recommendations for designing effective data visualisations

- “A good story” – a clear point and focus;
- Depending on the audience exploratory or explanatory approach;
- Design decisions for visual forms used;
- Effective use of colour and dashboard design;
- etc…
Tableau – a new visualisation tool

Tableau supports the **modern approach** of visual analytics in form of dashboards

- Connects easily to any database;
- Drag and drop interface for developing dashboards’;
- Supports interactivity of filtering, highlighting, drilling up/down

- Time series related calculations are difficult/not possible

**Two successful pilot exercises:**

- Inflation Dashboard (*Example*)
- External Statistics Dashboards
Results of user surveys had shown that the ECB’s data dissemination had to be improved in two respects:

1. **Ease user access to data in SDW**
   Data browsing, filtering and search functionalities had been improved. The idea of SDW user profiles introduced in order to satisfy the diverse users’ needs

2. **Introduce innovative visualisation techniques**
   Visual analytics as a new approach and Tableau as a new tool has bee introduced.

Next Survey will tell how effective the changes are.
Thank you for the attention!

Questions and Answers