EUROPEAN CENTRAL BANK
EUROSYSTEM

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Data as a core central banking asset – The strategy of the ECB

Big data workshop

Sveriges Riksbank, 9 September 2015

Overview

1. Big Data and Central Banking
2. Data: a core central bank asset
3. The strategy of the ECB: Integrating and leveraging available data
4. Integration of granular data collections

* The views expressed are those of the author and do not necessarily reflect the position of the ECB.

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IFC Survey on Big Data

Preliminary survey results on

"Central Banks' use of and interest in big data"

Should central banks statisticians play a role, contribute and develop the concept of "Big data" or is it only a temporary phenomenon ?

IFC Survey on Big Data

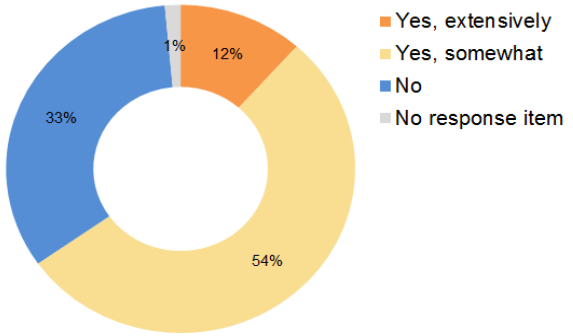
- IFC on-line survey was launched in January 2015
- Survey was answered by **69** IFC members and monetary authorities (**83%** response rate)
- Aim was to assess central banks' experiences and interest in exploring big data related to financial and economic topics of interest to central banks
- The concept is not clearly defined. Different understanding and perception
  - While some central banks may consider single sourced data, such as granular "administrative data" (credit registers) or micro "financial information data" (security-by-security datasets) as "big data"; others
  - may take a more holistic approach of complexity of combining size, formats and sources mainly focused on private web-sources
- **Big data is not just about large data sets.** The 4 Vs (IBM) relates to Volume, Velocity, Variety and Veracity.

*Draft paper "Big data – The hunt for timely insights and decision certainty. Central banking reflections on the use of big data for policy purposes" P. Nymand- Andersen (2015)

Central banking findings

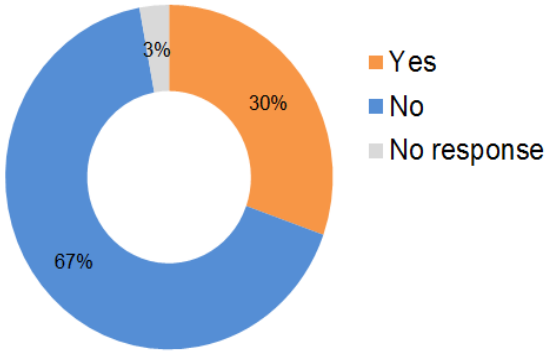
1. At senior policy level, there is **significant interest** in big data within the central banking community

66%



2. Despite the interest, central banks have **limited experience** in use of big data

30%



3. Central banks are interested in **cooperating together** on specific topics to explore the usefulness of big data

71%

Address key statistics topics

- Relevance of sources
- Quality
- New indicators/statistics
- Statistics methods
- Sampling & representativeness

Central banking findings

4. Big data can be useful for central banking purposes and is perceived as useful for supporting central banking policies

→ Macro-economics
Forecasting/nowcasting
Financial stability
Business cycle analysis
Supervisory purposes (micro-economics)
Sentiments and behaviour indexes
Improve quality

5. Central banks are interested in cooperating together in a structural approach

→ Setting up
- a road map
- identify joint pilot projects
- sharing experience

6. Explore synergies to overcome barriers and challenges

→ Barriers and challenges
- Resources and costs
- Skilled human capital
- IT constraints

Examples of future central banking projects

- **Databases within central banks and national statistics offices** → **Micro-economic behaviour, modelling of SME, Network analysis, improve quality controls**
- **Public authorities sources** → **Analysis of micro-statistics on loans, derivatives, government balance sheet Transactional data for network analysis**
- **Internet based data** → **Macro-economic indicators (such as unemployment), Economic sentiments House indexes, consumer price dynamics, Improve web-based quality**
- **Databases of financial institutions** → **Credit data and risks, loans to loans, securities holdings, mutual funds data, investor behaviour/expectations, Financial markets liquidity and patterns**
- **Media and social networks** → **Perception of central banks**

IFC way forward

a) **to define and contribute to a central bank "big data" roadmap**

b) **Share and contribute to selected big data pilot projects**

i. **administrative dataset** (e.g. corporate balance sheet data)

ii. **web search data set** (e.g. Google type search info)

iii. **commercial dataset** (e.g. credit card operations)

iv. **financial market data** (e.g. high frequency trading, bid-offer spreads)

ECB & Google search data

- ECB receives weekly data from Google search machines in a CSV file
- The data is an index of weekly volume changes of Google queries by geographic location and category
- Google search data is more accurate and uses much larger samples than Google Trends
- Google search data includes the following 14 countries: Austria, France, Italy, Slovenia, USA, Belgium, Germany, Netherlands, Spain, United Kingdom, Denmark, Ireland, Portugal, Sweden
- Google search data includes 26 categories and 269 subcategories
  E.g. Finance is a category and Banking is a subcategory
- The data are normalised starting at 1, one can see the relative change in Google searches by category but nothing can be said about the absolute search volumes

ECB & uses of Google search data/big data

- Findings of the ECB Statistics Paper Series released on this topic
  - "Nowcasting GDP with electronic payments data" by John W. Galbraith and Greg Tkacz
    - Electronic payment transactions and cheques can be used to formulate nowcasts of current gross domestic product growth
    - Assesses this technique and finds that debit card transactions contribute most to forecast accuracy
  - "Social media sentiment and consumer confidence" by Piet J. H. Daas and Marco J. H. Puts
    - What is the relationship between the changes in Dutch consumer confidence and the Dutch public social media?
    - The changes in social media sentiment have the same underlying phenomenon as Dutch consumer confidence
    - Could be used as an indicator for changes in consumer confidence and as an early indicator

ECB & uses of Google search data/big data (cont'd)

- Forthcoming publications by the ECB staff

  - "Big data – the hunt for timely insights and decision certainty: Central banking reflections on the use of big data for policy purposes" by Per Nymand-Andersen

  – Big data might lead to new economic theories with statistical algorithms applied to multiple big data sources from various disciplines finding new causations
  – Big data as opportunity for the central banks to apply expertise in testing existing and new models, data sets and theories; to explore new data sources and to obtain new, timely knowledge from the feedback loop between monetary policy and market reactions
  – Central banks need to start by taking a structural approach to systematically testing the use of non-official big data sources

  - "Predicting euro area unemployment rate using Google data: Central banks interest and use of big data" by Per Nymand-Andersen and Heikki Koivupalo

  – explores how Google search data has been used for macro-economic and financial purposes within the literature
  – tests how Google search data can be used for predicting the euro area unemployment rate in advance of the official statistics
  – demonstrates that applying Google data within a simple model can improve the predictability of the euro area employment rates
  – Google search data used as part of central banking statistical and analytical toolkit?

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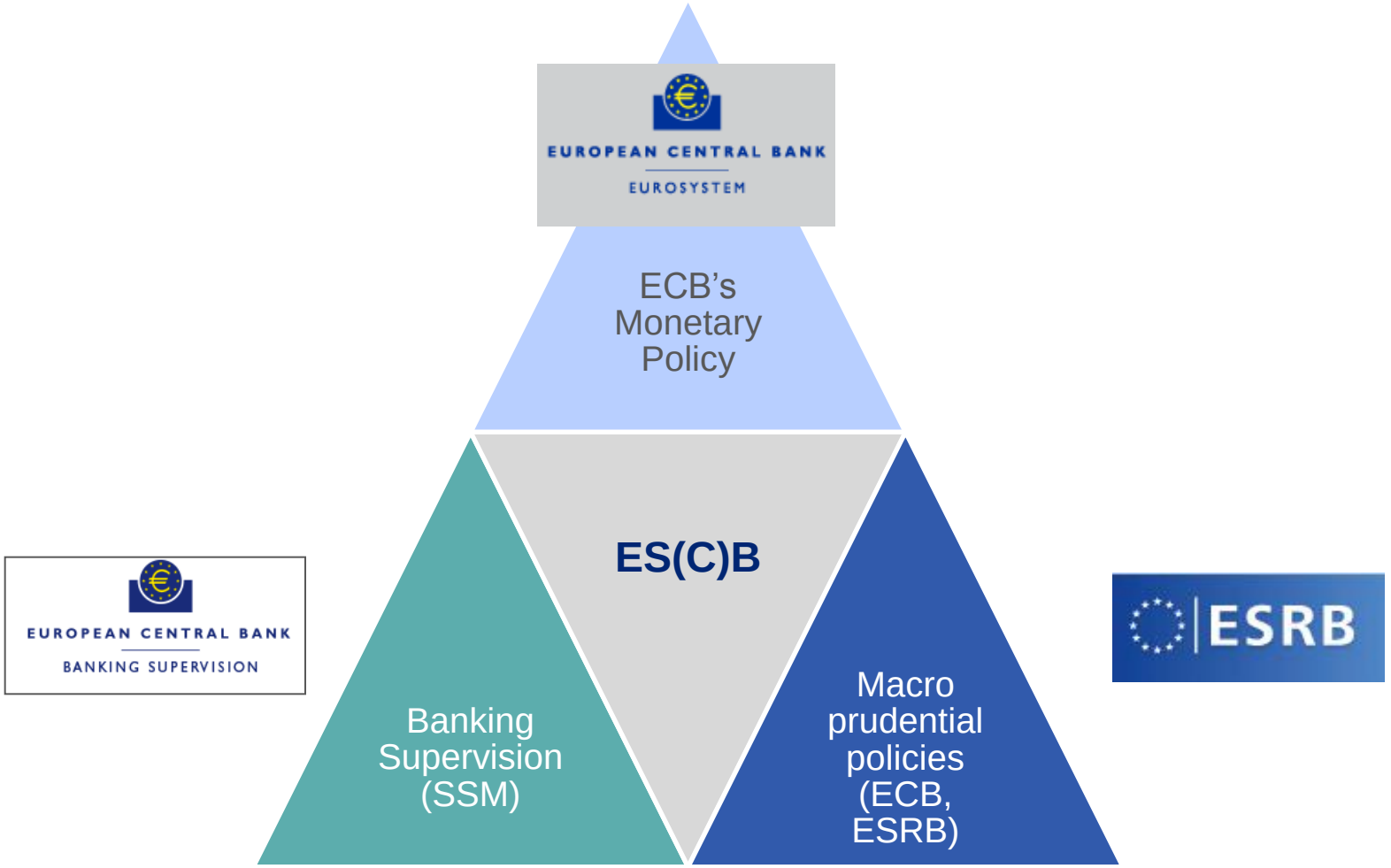
Rapid expansion of needs for policy-making



Challenges

Reports and data collection systems have been developed

- At different times by different teams
- Following different concepts and legal foundations
- Serving different requirements, which itself changed over time

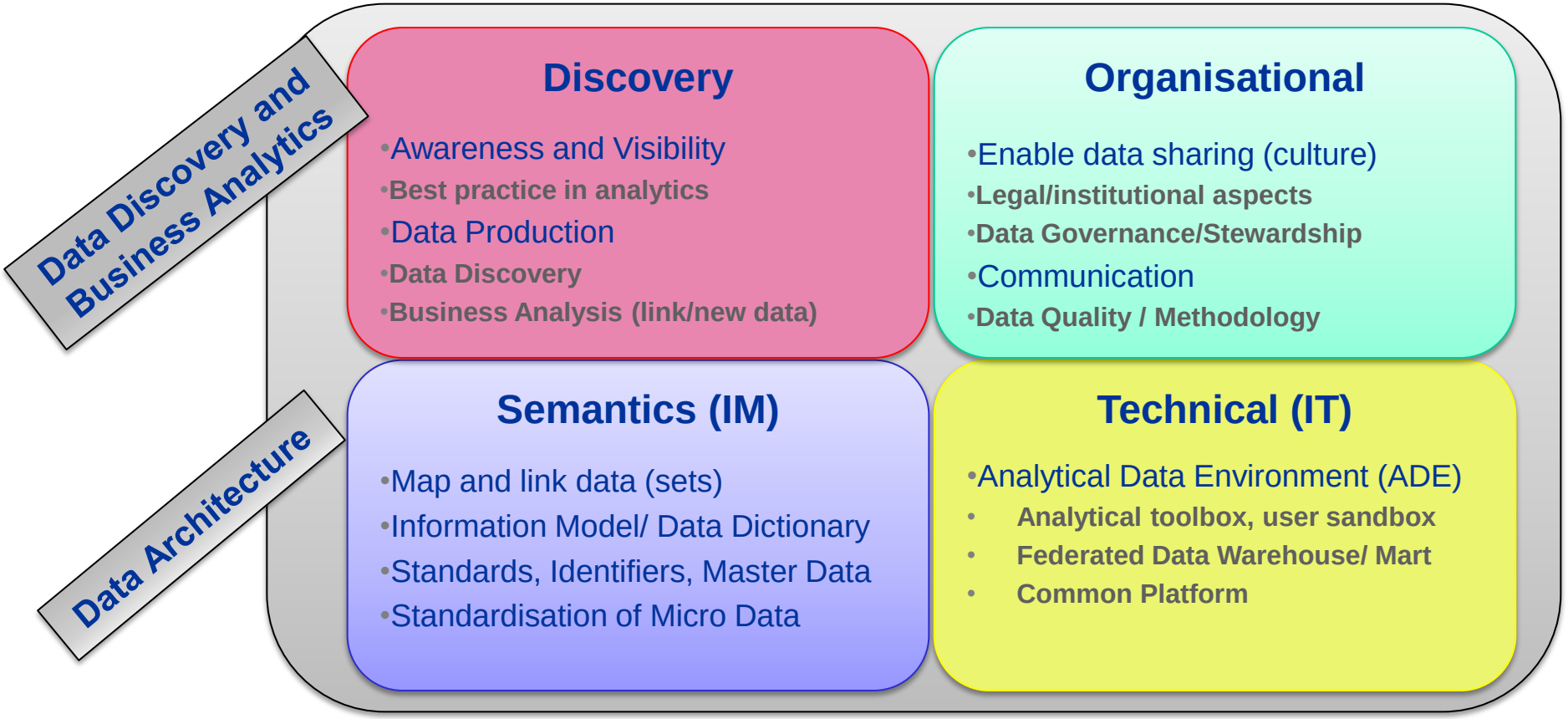
For historical reasons, information about the same phenomenon is collected several times in different reports referring to *slightly different*

- definitions
- filtering and aggregation rules
- derivation algorithms and valuation principles

The system presently is in place is compared with **stove pipes** or **silos**

The strategy to get through this situation is **integration** and **long term harmonisation**

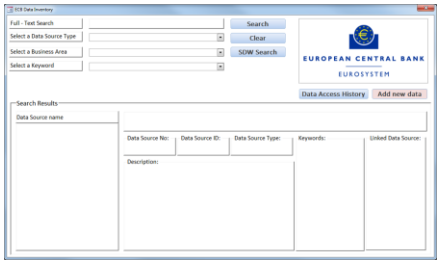
ECB integrated Data Management (EiDM)



One integrated View on ECB data

Data Inventory: ECB wide access via the ECB intranet

- ***Description* of ≈ 500 ECB datasets**
- **Accessed every two business days on average**



- **Benefits:**
  - Enables usage and leveraging existing data
  - Search for ECB data in both ***user terms and keywords***
  - **Finding *"new" data*** and support in access
  - Enables ***new analyses*** **and research**
  - Supports ***policy making*** **and supervision**
    - ABS, SSM Data Sharing, ESMA cooperation
  - Little effort **to maintain**

Common Data Dictionary and Semantics

Interoperability of Information and Data → Common processing of information (regardless of its origin)

What is required?

Common semantics → "Central Banks" = "the central bank"

AU = AUT, ECB = EZB = BCE

What is a non-performing loan?

"People can't share knowledge if they don't speak a common language" [1]

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Data Quality requires holistic approach: from *Source* to *Final use*

"The ECB has every interest to facilitate and promote *integration and standardisation* also on the *"input side",* in the *internal systems of the banks*, for only this will ensure *coherent* information."

Mario Draghi, Seventh ECB Statistics Conference (15/10/ 2014)

1. Banks' Integrated Reporting Dictionary (BIRD): Common language with the industry

- A logical description of data and transformation rules
- Common reference, to which reporting requirements can refer

2. ECB Single Data Dictionary (SDD): Common language within the ECB

3. European Reporting Framework (ERF)

- **Vision**: single and integrated ERF for the ECB and EBA (ITS), ultimately for the EU
- "one" report replacing the multiple, overlapping reports
- BIRD will allow "short" term reports as the data and data structure hold is known

BIRD description

- The BIRD aims to provide a standardised model for organising the banks' internal data warehouses in an integrated way, and the transformations to the reports that the banks need to transmit
- The BIRD consists of **documentation**, it is **not an IT tool**
- The application of the BIRD by the banks is strictly **voluntary**
- **Responsibility** for the correctness of the data remains with the banks
- The BIRD is **not adding reporting requirements**
- Advantages:
  - better quality data at source
  - more efficient, and, in the longer run, less costly report production
  - more consistent and harmonised data
  - univocal interpretation and clarity of regulations

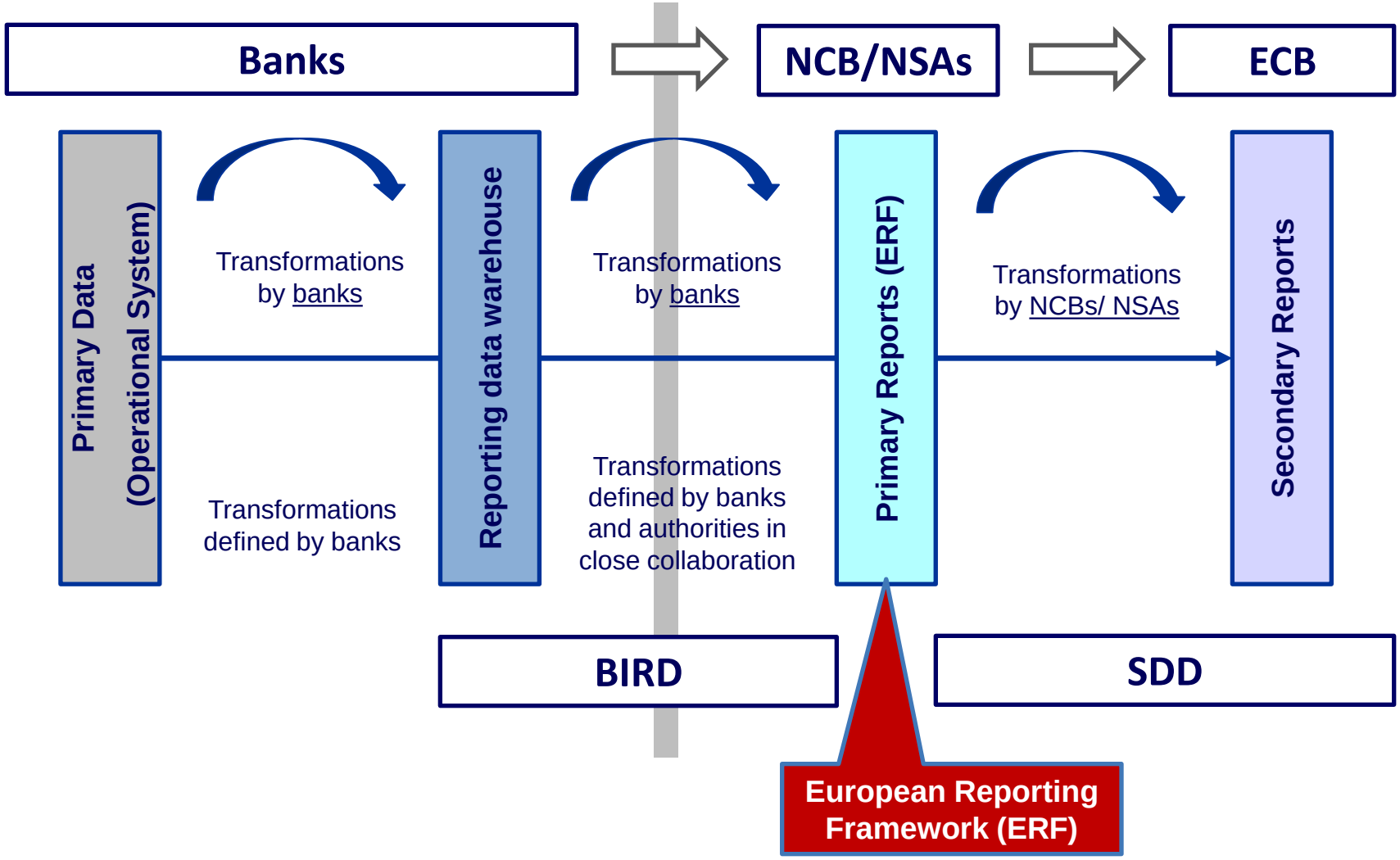
Single data dictionary (SDD)

- The SDD is a single data dictionary, developed by the ECB/DG-S
- Goal: methodological and semantic integration of existing European reporting frameworks
- How:
  - by creating a **common information model and methodology** (SMCube), able to read and process all relevant file exchange formats;
  - by creating **clear, non-overlapping definitions of the data** (SDD) - the meaning of the data will be reconciled across several regulatory frameworks.
- Benefits:
  - reconciliation done once and available for all users;
  - enables the creation of an integrated statistical and analytical system;
  - unified data definition, collection, processing, dissemination, and its final use.

European Reporting Framework (ERF)

- Integrated and harmonised cross-county reporting scheme for banks, covering most reporting requirements of ECB and EBA.
- Best practice for collecting banks' data for different purposes, **avoiding duplication** across various reports.
- Basis for **harmonised production of secondary statistics** via unique transformation rules.
- Project in its early stages: design, adoption and timeline of eventual implementation are "work in progress".
- ERF key facts and information (June 2015) available at:
  http://www.ecb.europa.eu/pub/pdf/other/europeanreportingframeworkkeyfactsandinformation062015.en.pdf

The Role of BIRD, ERF and SDD



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The example of Money Market Statistical Reporting

- The Money Market Statistical Reporting (MMSR) aims to provide a standardised reporting of daily transactions on the money market (unsecured, secured and derivatives) in an automated way
- The MMSR has been prepared with the reporting agents via multiple contacts, in particular to prepare Reporting Instructions and XML schemas
- The Reporting Instructions have been approved as an ISO 20022 standard
- The MMSR abides with the statistical data dictionary and uses standard referential: e.g. Register (RIAD) for the identification of reporting agents and their counterparts (using the Legal Entity Identifiers)
- <u>Advantages:</u>
  - better quality data at source (for large daily volumes: ca 50,000 reports per day)
  - efficient data transmission (after initial teething problems)
  - timely production and delivery to users (8:30 a.m. the next day)
  - standard/harmonised data, shareable with other systems

Analytical credit datasets

- Several National Central Banks traditionally hold “Central Credit Registers”, e.g. for supervisory purposes or to assist the banking industry in their assessment of credit risk
- Such Credit Registers are rather heterogeneous due to their history and main functions
- Harmonisation in coverage, definitions and concepts and standardisation of transmission features (e.g. frequency, timeliness, instruments covered) help increase the relevance, also for benchmarking
- The Analytical credit datasets will be a distributed system
  - Allowing NCBs to keep with national specificities and needs; also
  - Abiding with the statistical data dictionary and using standard referential: e.g. Register (RIAD) for the identification of reporting agents and their counterparts
- <u>Advantages:</u>
  - better quality data at source, consistent and harmonised big dataset (Terabytes)
  - efficient and stable system over time (lower production cost)
  - Supporting a wide range of user needs, in an agile way

Conclusion

Data: **a core central bank asset**

- Statistics/Data Management to keep up with the ever increasing inflow of data
- From stove pipes to **data integration** from source to final use
- Integrated granular data provides new insights, enables new macroeconomic forecasts and more **informed (economic) policy making**.
- **Big Data (r)evolution:** Data collection and analysis done in a single place, with common standards - just one keystroke away for the users

With **data integration**, such seemingly (r)evolutional ideas might become a reality …

Thank you for your attention

Any questions?