DEUTSCHE BUNDESBANK
EUROSYSTEM

Changes in the IT landscape for External Sector Statistics of the Deutsche Bundesbank

Background

- Since the 70s, rapid increase of self-contained technical applications and data bases which exist side-by-side

- These isolated solutions made an integrated view on the data difficult (e.g. transactions & stocks)

- Furthermore, the multitude of industry standards (like IMS, DB2, MS & Oracle for DBs) complicated the daily work and led to ..

- **Growing technical backlog**, e.g. lack of documentation, maintenance intensive systems, declining number of staff members knowing to work with the old systems etc.

need for replacement and redesign

Strategy for the Bundesbank´s "new" External sector (ES) IT- system

- Development of an integrated, modular software system for:
  - Master and Meta Data
  - Analysis
  - Report Processing and
  - Communication

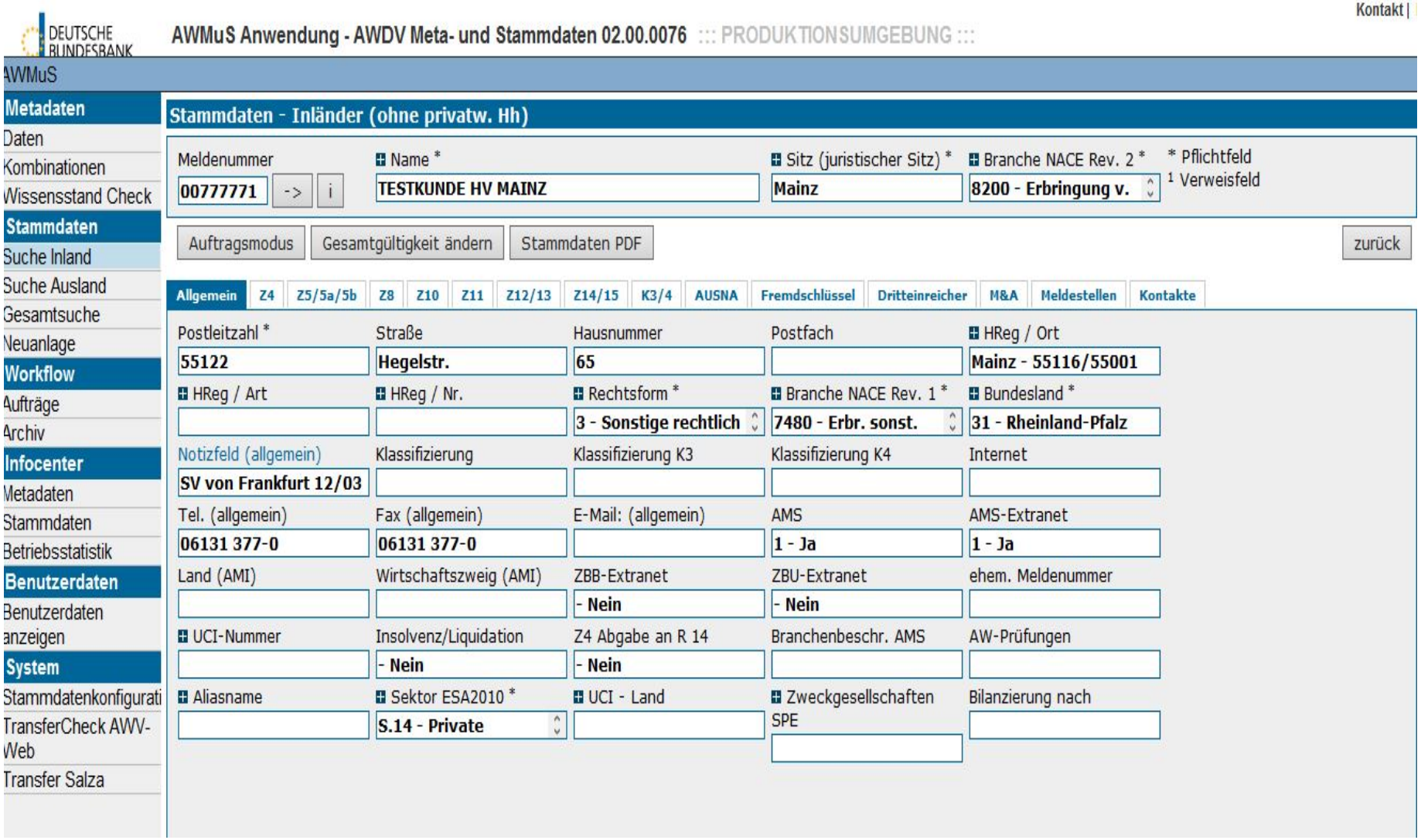
- In order to create a harmonized IT infrastructure that:
  - Allows integrated analyses for transactions & stocks
  - Streamlines statistical work processes and increases automation
  - Reduces Time-to-Publication
  - Leverages emerging technologies by using industry standards

- The new ES IT-system has been developed in various sub-steps

Starting point: Centralized Master and Meta data base

- In 2011, we started with the development of a centralized master and meta data base with following key features:
  - Harmonization of all reporter master data into one single reference data set (golden copy)
  - Keeping master data and meta data in same data base
  - Centralization of data updates (and creation) through a workflow process by dedicated staff
  - Creation of an interface to allow other applications online access to the master data
  - Full data historization
    - Not only keeping track of changes, but being able to analyze which information was valid at each point-in-time.
    - Existing data must not be deleted (also not in case of reporter liquidation) or overwritten (also not in case of reporter mergers & acquisitions), but new rows can be created in the data base for changes of existing data.

Starting point: Centralized Master and Meta data base
Example: Master Data view



Approach for Analysis

Previous system ZABDB	New system SALZA
Mainframe based	SAP BI-Server based
No micro data	Aggregated micro data per reporting unit
No GUI (Graphical User Interface)	MS Excel GUI (BEx-Analyzer) and Web Browser GUI (SAP Front End)
Performance limit reached with the changeover to BPM6	Broad OLAP/ BI functionality
No real OLAP/ BI functionality	Real-time data (updates on a daily basis)
	Versioning of data (stand-alone snapshots)
	Broad and flexible methods of analysis
	Drill down capability to the reporter
	Primary and secondary cell suppression (protection of confidentiality)

Old ZABDB *vs.* *New* SALZA

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ZA03                Zeit:  10:11:32    Datum:  12/09/17    Anwender:  S2504JM
          Anzeigen von Bausteinen und Aggregaten              Blättern:  . ...
TERMIN S 201201 - 201212 SAPO  A IAX0S51 LAND . LLL - ... BRANCHE . .... - ....
 (oder BEREICH . .. - .. ERG.ART . ..... )                  BRA2    . .... - ....

Zeile!  TERMIN !       SAPO ! LAND !   BRA !  BRA2 !     BETRAG in Tsd     !
  1   ! 2012  J !    1301900 !  LLL !       !       !         805.622 EUR !
  2   ! 2012  J !    1302900 !  LLL !       !       !       2.430.782 EUR !
  3   ! 2012  J !    3102270 !  LLL !       !       !      -1.084.612 EUR !
  4   ! 2012  J !    3108030 !  LLL !       !       !         808.871 EUR !
  5   ! 2012  J !    3108070 !  LLL !       !       !         532.032 EUR !
  6   ! 2012  J !    3108090 !  LLL !       !       !          -2.432 EUR !
  7   ! 2012  J !    3302270 !  LLL !       !       !       3.449.409 EUR !
  8   ! 2012  J !    8101070 !  LLL !       !       !       1.743.377 EUR !
  9   ! 2012  J !    8101080 !  LLL !       !       !         131.802 EUR !
 10   ! 2012  J !    8101081 !  LLL !       !       !       3.600.475 EUR !
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ZA02  O:    TERMIN: 201212    MASKE: 901 LAN: LLL BRA:      BRA2:        S2504JM1
Wichtige Posten der Zahlungsbilanz (fob/fob; Ursprungslandkonzept)

Land:     Alle Länder                              Stand: 12.09.2017
Branche:                                           Zeit:  Dezember 2012

in Mio Euro                                Einnahmen     Ausgaben        Saldo
-------------------------------------------------------------------------------
Leistungsbilanz                              123.611      103.203       20.408
 Warenhandel (fob/fob)                        76.618       64.778       11.840
  Außenhandel (fob/cif)                       78.217       65.992       12.225
  Ergänzungen, Transit. und NWG           -    1.599   -    1.214   -      386
   Ergänzungen (ohne Transit. und NWG)    -    3.229   -    1.730   -    1.499
 Unsichtbare Leistungstransaktionen          46.993       38.425        8.568
  Dienstleistungen                           20.944       18.738        2.206
   dar. Transportleistungen                   3.348        4.181   -      832
   dar. Reiseverkehr                          2.371        2.694   -      323
   dar. Geistiges Eigentum (ab 2013)          1.140          497          643
   dar. EDV- und Informationsdienstl.         2.873        1.651        1.223
   dar. Sonst.unternehmensb. Dienstl.         1.423        1.112          311
        dar. Forschung & Entwicklung          7.491        7.712   -      222
  Primäreinkommen                            22.116       10.468       11.648
  Sekundäreinkommen                           3.933        9.219   -    5.286
ZUGRIFF PER AGGREGATS-TABELLE
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Table

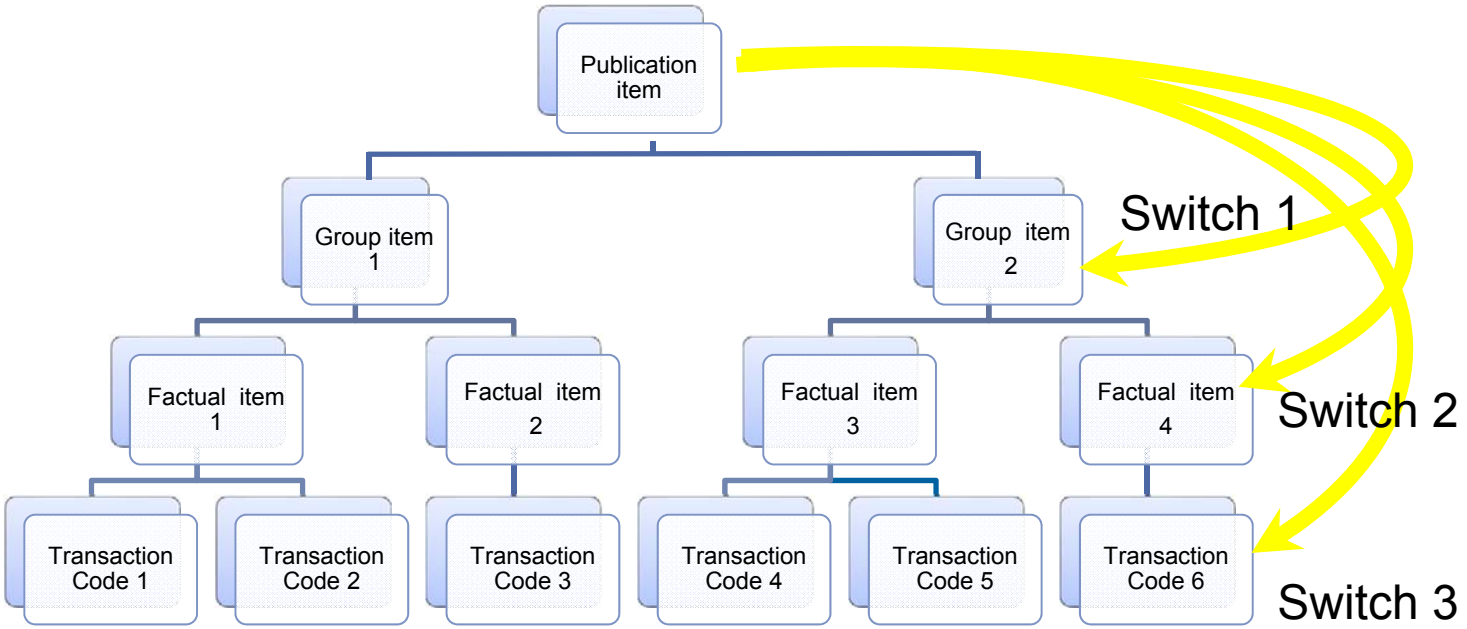
		Berichtsjahr	2017			
		Versionsstatus	Veröffentlicht			
		Datenversion	DIKAP	DM	ZUP	Ergebnis
			Transaktion DM/EUR	Transaktion DM/EUR	Transaktion DM/EUR	Transaktion DM/EUR
Bestandsart	SALZA-KEY		* 1.000.000 EUR	* 1.000.000 EUR	* 1.000.000 EUR	* 1.000.000 EUR
Einnahmen	DL, Ein	ZSGDXXUE51	215.035	3.250	54.574	272.860
	DL, Fertigungs-DL, an Werkstoffen anderer Eigentümer	ZSGDHXUE11	6.224			6.224
	DL, Instandhaltung u Reparatur, Ein	ZSGDIXUE11	8.336			8.336
	DL, TrL, Ein	ZSGDTXUE41	51.571	3.250		54.821
	DL, Reiseverk, Ein	ZSGDRXUE21			35.251	35.251
	DL, Bauleist, Ein	ZSGDBXUE11	1.829			1.829
	DL, Vers. u Altersvorsorge, Ein	ZSGDVXUE21	1.736		8.288	10.024
	DL, FinanzDL, Ein	ZSGDFXUE21	13.314		7.804	21.118
	DL, Gebü.f Nutz.geist.Eigent.					17.795
	DL, Telekom, EDV u Inform, Ein	ZSGDEXUE31	33.035			33.035
	DL, sonst unt.bez. DL, Ein					77.855
	DL, DL f pers. Zwecke, Kultur u Freizeit, Ein	ZSGDPXUE21	2.917			2.917
	DL, Reg.waren u -leist, Ein	ZSGDGXUE21	423		3.231	3.654
Ausgaben	DL, Aus	ZSGDXXUA51	181.275	26.956	80.744	288.975
	DL, FertigungsDL an Werkstoffen anderer Eigentümer	ZSGDHXUA11	5.320			5.320
	DL, Instandhaltung u Reparatur, Aus	ZSGDIXUA11	9.074			9.074
	DL, TrL, Au					
	DL, Reise					
	DL, Bauleis					
	DL, Vers. u					
	DL, Finanz					
	DL, Geb. f					
	DL, Telekon					
	DL, sonst u					
	DL, DL f pe					
	DL, Reg.wa					
Saldo	DL, Saldo					
	DL, Fertigu					
	DL, Instand					
	DL, TrL, Sa					
	DL, Reisev					
	DL, Bauleis					
	DL, Vers. u					
	DL, Finanzl					
	DL, Geb. f					
	DL, Telekon, EDV u Inform, Saldo					
	DL, sonst unt.bez. DL, Saldo	ZSGDSXUS31	-1.681			-1.681
	DL, DL f pers. Zwecke, Kultur u Freizeit, Saldo	ZSGDPXUS21	1.213			1.213
	DL, Reg.waren u -leist, Saldo	ZSGDGXUS21	-1.139		3.231	2.092

Table

			Einnahmen	Ausgaben	Saldo
		Versionsstatus	Veröffentlicht	Veröffentlicht	Veröffentlicht
SALZA-KEY		Datenversion	* 1.000 EUR	* 1.000	* 1.000
ZSA1105720	DL, Telekom.-, EDV- u Inform.-DL, Nachrichten- u Inform	DIKAP	93.856		
ZSA1105730	DL, Telekom.-, EDV- u Inform.-DL, sonst. EDV-DL, Ein	DIKAP	16.213.154		
ZSA1105740	DL, Telekom.-, EDV- u Inform.-DL, Speicherung v Inform.	DIKAP	1.294.500		
ZSA1105760	DL, Telekom.-, EDV- u Inform.-DL, KommunikationsDL, Ein	DIKAP	3.643.188		
ZSA1106130	DL, Telekom.-, EDV- u Inform.-DL, Nutz. v Computer-SW, Ein	DIKAP	11.576.845		
ZSA1106330	DL, Telekom.-, EDV- u Inform.-DL, Kauf/Verkauf v	DIKAP	213.836		
Gesamtergebnis			33.035.379		

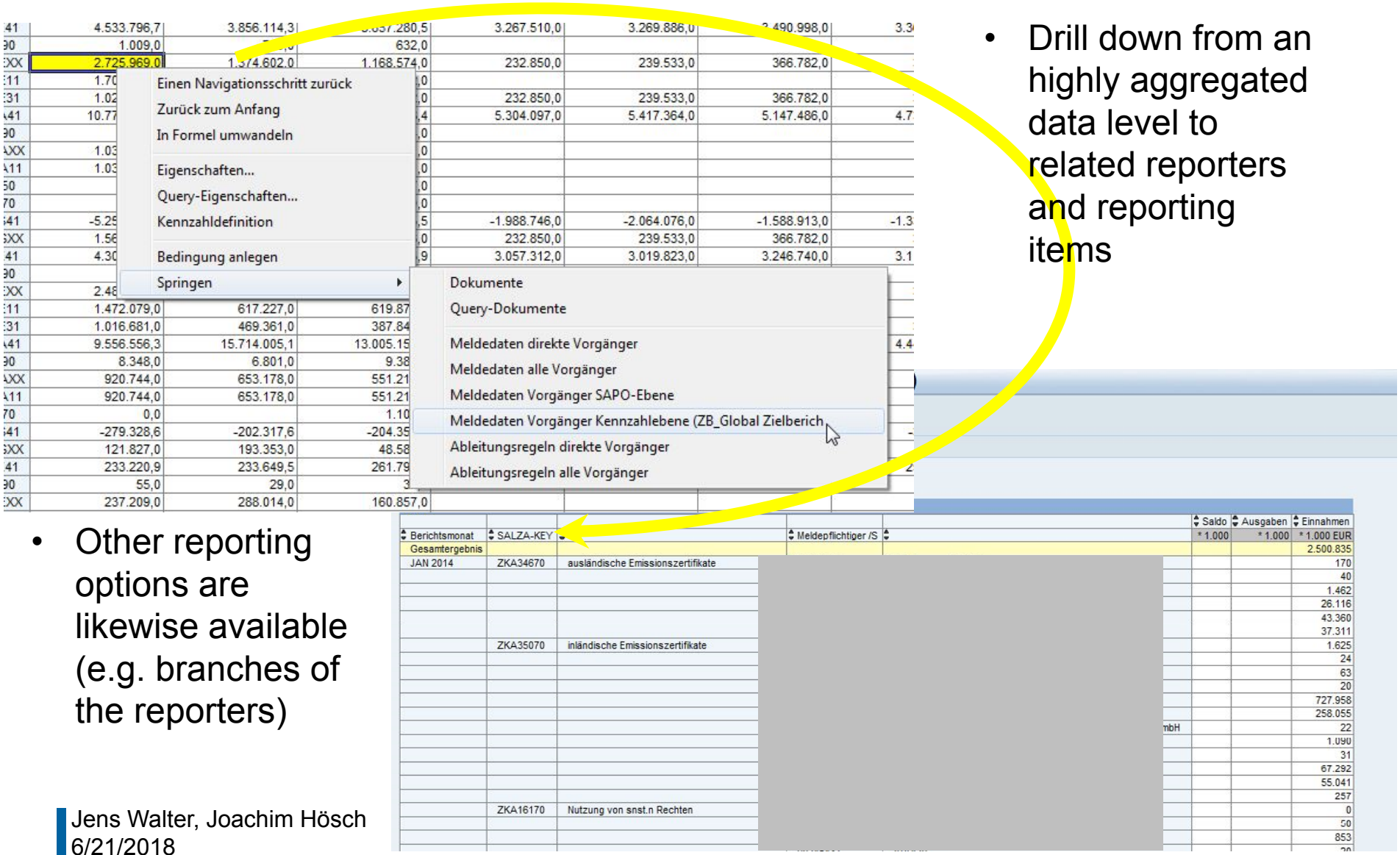
Jens Walter, Joachim Hösch

Drill down capability of SALZA



- Switch (1) to previous position
- Switch (2) to the factual item level
- Switch (3) to the reporter level (with transaction codes)

Drill down example in SALZA



- Drill down from an highly aggregated data level to related reporters and reporting items

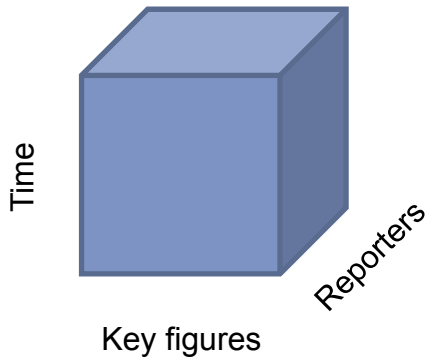
- Other reporting options are likewise available (e.g. branches of the reporters)

SALZA´s achievements

- SALZA creates SDMX time series for national and international publication commitments
- SALZA merges the publication process within a single application
- SALZA makes swift replies to external and internal inquiries possible
- Flexible data analyses
- Standardized reports with MS Excel GUI (first quality check)
- Integrated trend and estimation procedures
- Source and decomposition information for aggregated data
- Slicing and dicing from aggregated data to reporter

Excursus: Slicing and dicing (the OLAP cube and Business Intelligence)

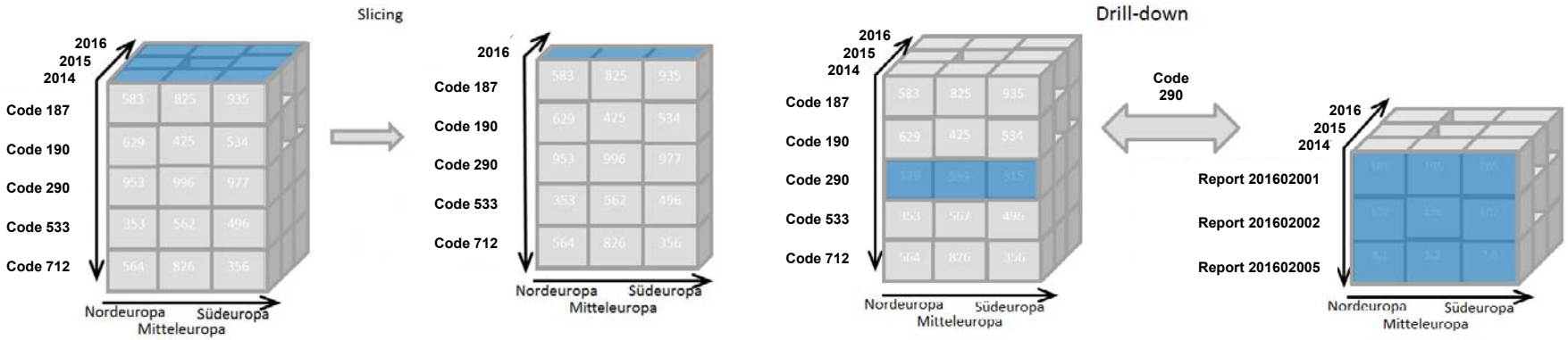
- Online analytical processing (OLAP) enables users to analyze multidimensional data interactively from multiple perspectives
- An OLAP cube refers to an multi-dimensional dataset, not limited to three dimensions technically but often visualized three-dimensional.



- Business intelligence (BI) encompasses a multitude of strategies and technologies for data analysis. OLAP is the technique used for our BI-system

Excursus: The OLAP cube offers three analytical operations

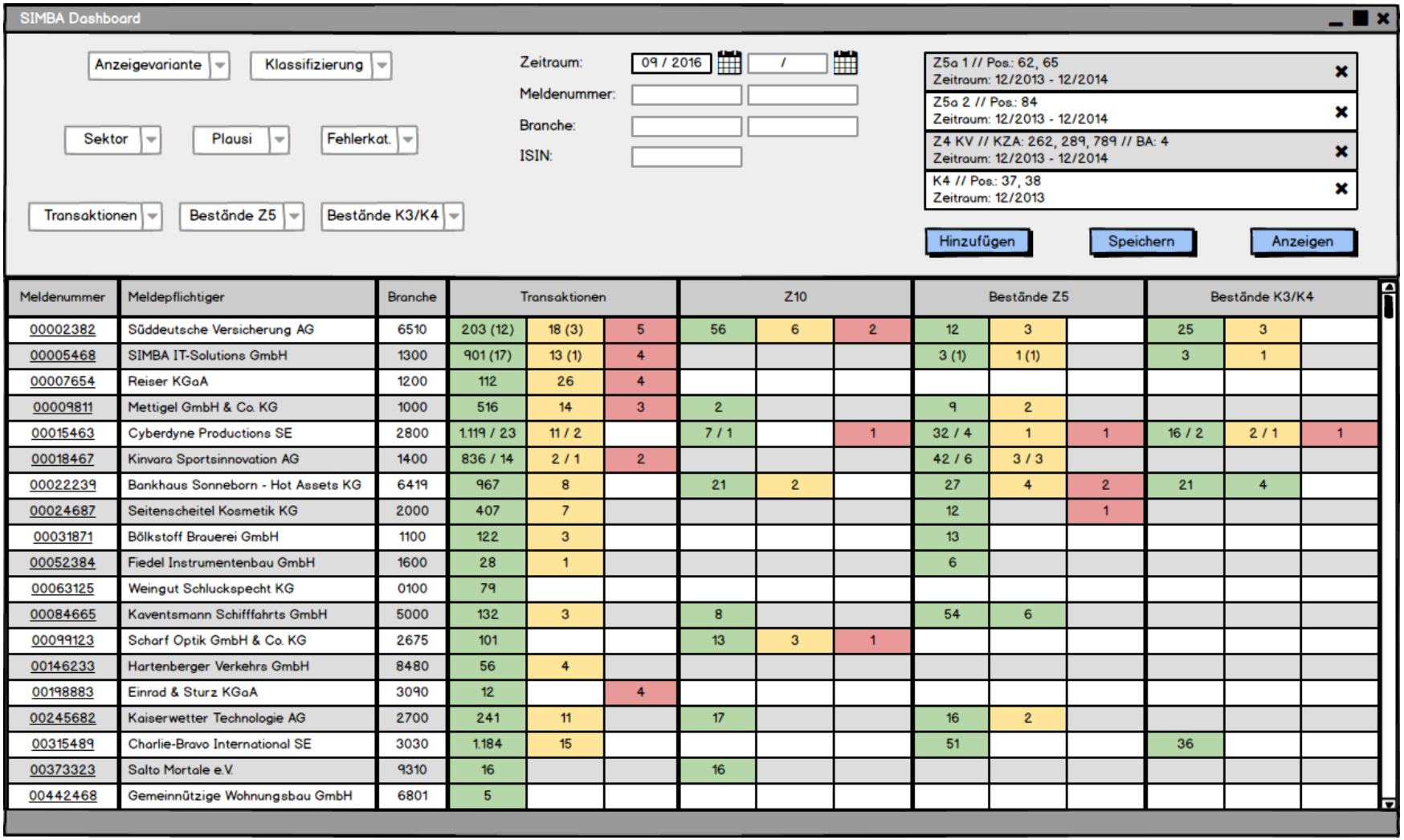
1. Slicing – Creation of a sub cube with one dimension less than before
2. Dicing – Creation of a sub cube with limited values but same dimensions
3. Drill Down and Drill Up – Navigation along the data levels, i.e. from most aggregated (up) to most detailed (down)



New approach for processing survey reports - SIMBA

Current Report Processing	Future Report Processing using the new system SIMBA
In general, manual processing of each reporting line	Focusing on invalid and implausible reports using a dashboard approach
Data validation by staff	Data validation by system (automated plausibility checks)
Various processing programs and data bases per section	Integrated platform and frontend for report processing for all external statistics micro data
Division of labour per reporting form	Focus on all external economic activities of a reporter instead of single reporting forms
	Dynamic crosstab analyses for transactions & stocks
	Plausibility editor to allow power users adding or modifying plausibility checks independent from support of the IT staff
	One face to the reporter – only one Bundesbank employee responsible for one reporting unit

Planned SIMBA dashboard for report processing



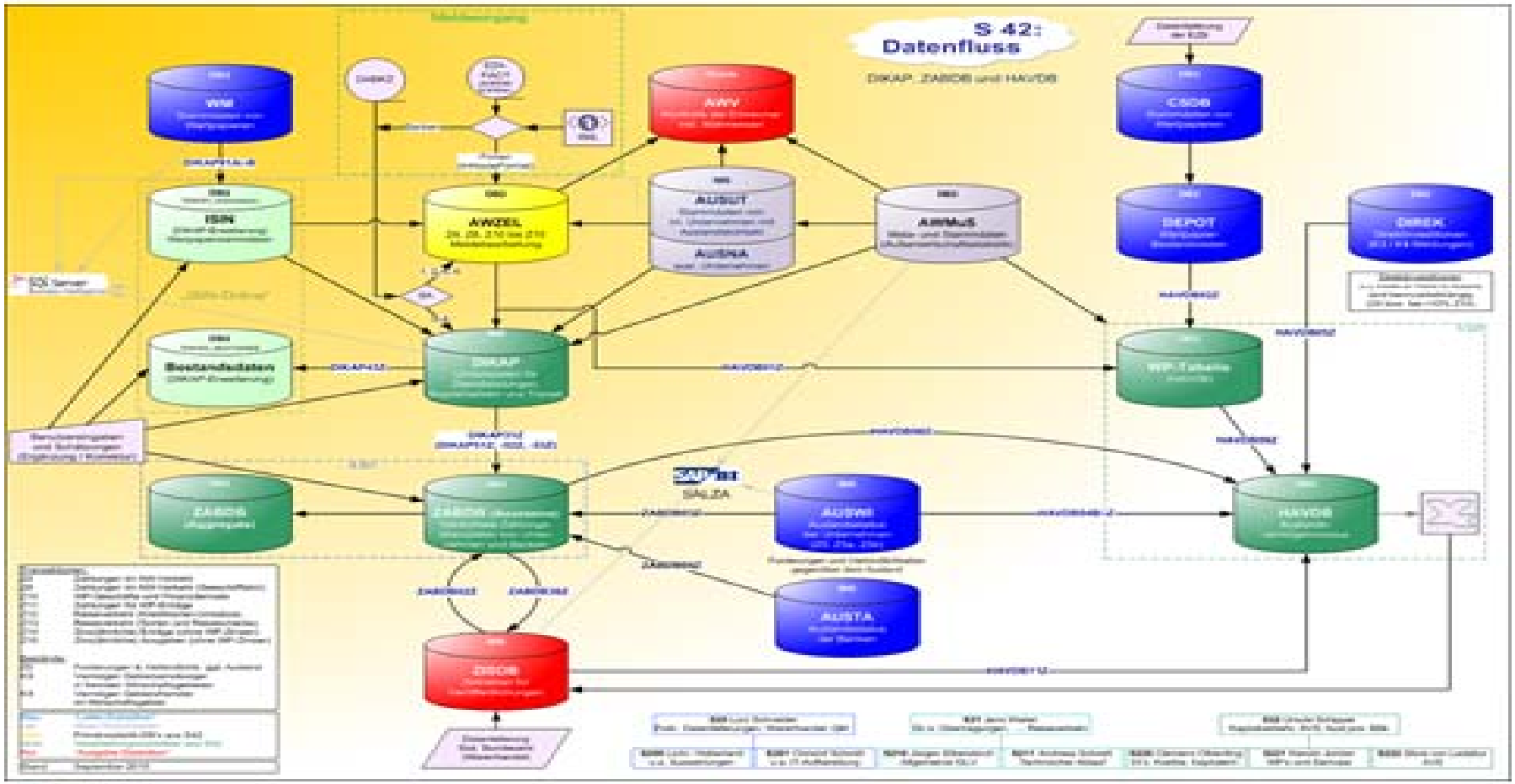
Meldenummer	Meldepflichtiger	Branche	Transaktionen			Z10			Bestände Z5			Bestände K3/K4		
00002382	Süddeutsche Versicherung AG	6510	203 (12)	18 (3)	5	56	6	2	12	3		25	3	
00005468	SIMBA IT-Solutions GmbH	1300	901 (17)	13 (1)	4				3 (1)	1 (1)		3	1	
00007654	Reiser KGaA	1200	112	26	4									
00009811	Mettigel GmbH & Co. KG	1000	516	14	3	2			9	2				
00015463	Cyberdyne Productions SE	2800	1.119 / 23	11 / 2		7 / 1		1	32 / 4	1	1	16 / 2	2 / 1	1
00018467	Kinvara Sportsinnovation AG	1400	836 / 14	2 / 1	2				42 / 6	3 / 3				
00022239	Bankhaus Sonneborn - Hot Assets KG	6419	967	8		21	2		27	4	2	21	4	
00024687	Seitenscheitel Kosmetik KG	2000	407	7					12		1			
00031871	Bölkstoff Brauerei GmbH	1100	122	3					13					
00052384	Fiedel Instrumentenbau GmbH	1600	28	1					6					
00063125	Weingut Schluckspecht KG	0100	79											
00084665	Kaventsmann Schifffahrts GmbH	5000	132	3		8			54	6				
00099123	Scharf Optik GmbH & Co. KG	2675	101			13	3	1						
00146233	Hartenberger Verkehrs GmbH	8480	56	4										
00198883	Einrad & Sturz KGaA	3090	12		4									
00245682	Kaiserwetter Technologie AG	2700	241	11		17			16	2				
00315489	Charlie-Bravo International SE	3030	1.184	15					51			36		
00373323	Salto Mortale e.V.	9310	16			16								
00442468	Gemeinnützige Wohnungsbau GmbH	6801	5											

SIMBA approach and objectives

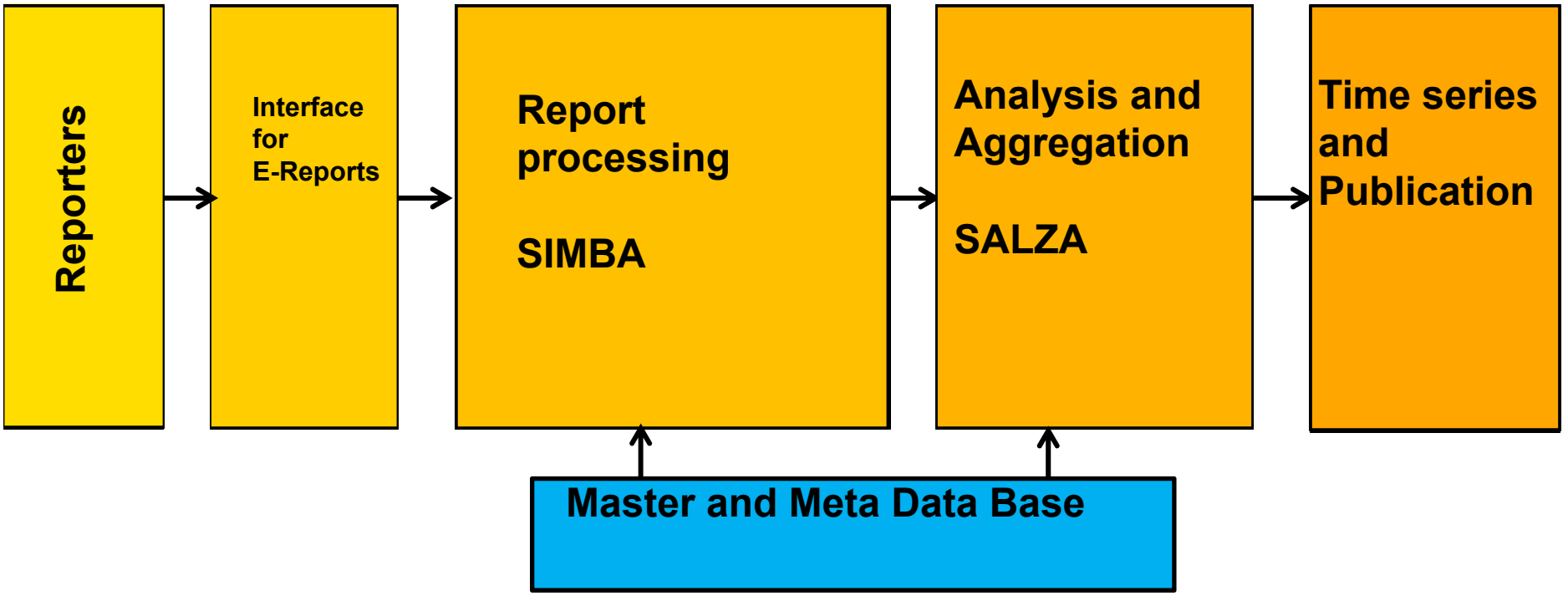
- Integrated platform and frontend for all BOP micro data
- Improve data consistency and therefore quality by a holistic view of a reporting unit
- Crosstab checks and analyses for transactions & stocks
- Process automation
  - System-supported plausibility checks
  - At a future stage, auto-correction functionality ideally with machine learned data
- Not only a new IT system, but process improvement by implementing traffic lights:
  - Intuitive status visualisation of a report
  - Automated work-in-process (WIP) overviews
  - Automatic processing of flawless and plausible reports

- Future extension of the base system to allow secure communication with reporters and a reminder mechanism for missing reports

Summary: Where we came from …



Summary: … and where we want to be.



.. a fully digitized process for the automated processing, integration and analysis of quality-assured primary and secondary statistical data. Online publication of the data supply with the users´ option for customized data requests.

Thank you for your attention!

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