data amplified™
2018 | the future of business reporting

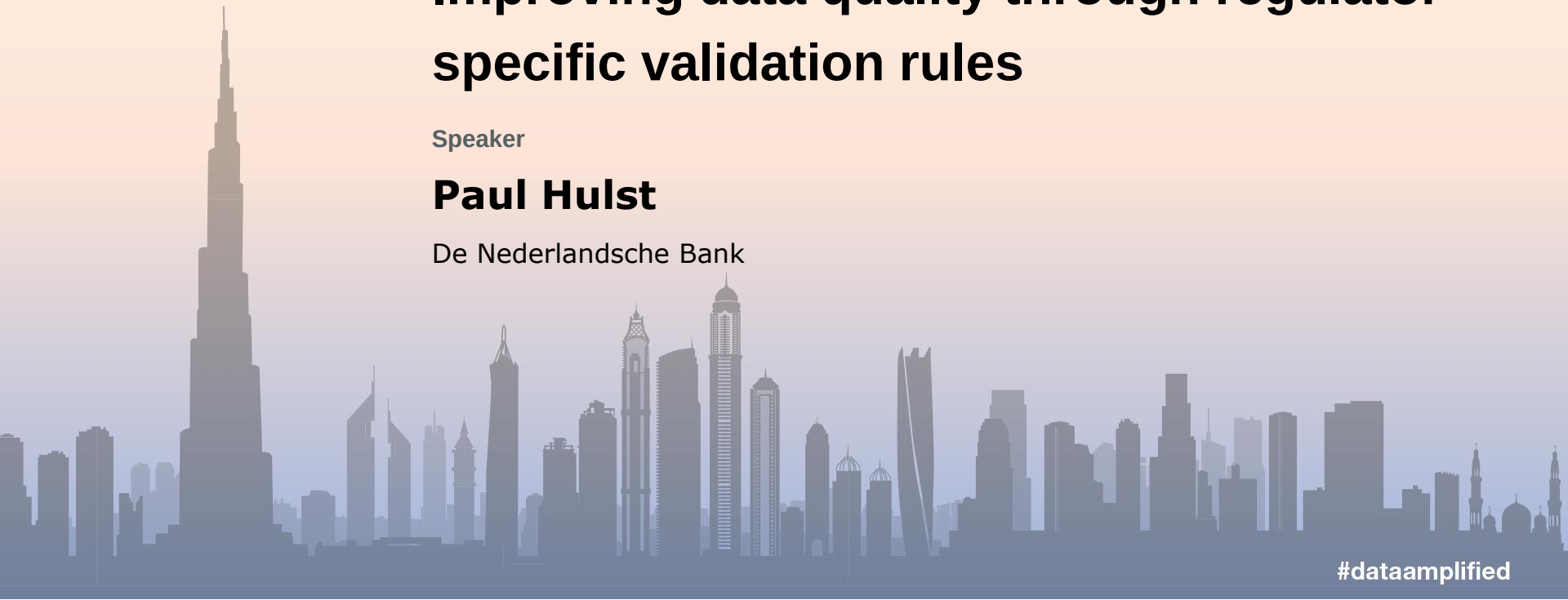
Dubai 2018

Improving data quality through regulator specific validation rules

Speaker

Paul Hulst

De Nederlandsche Bank



#dataamplified

Speaker

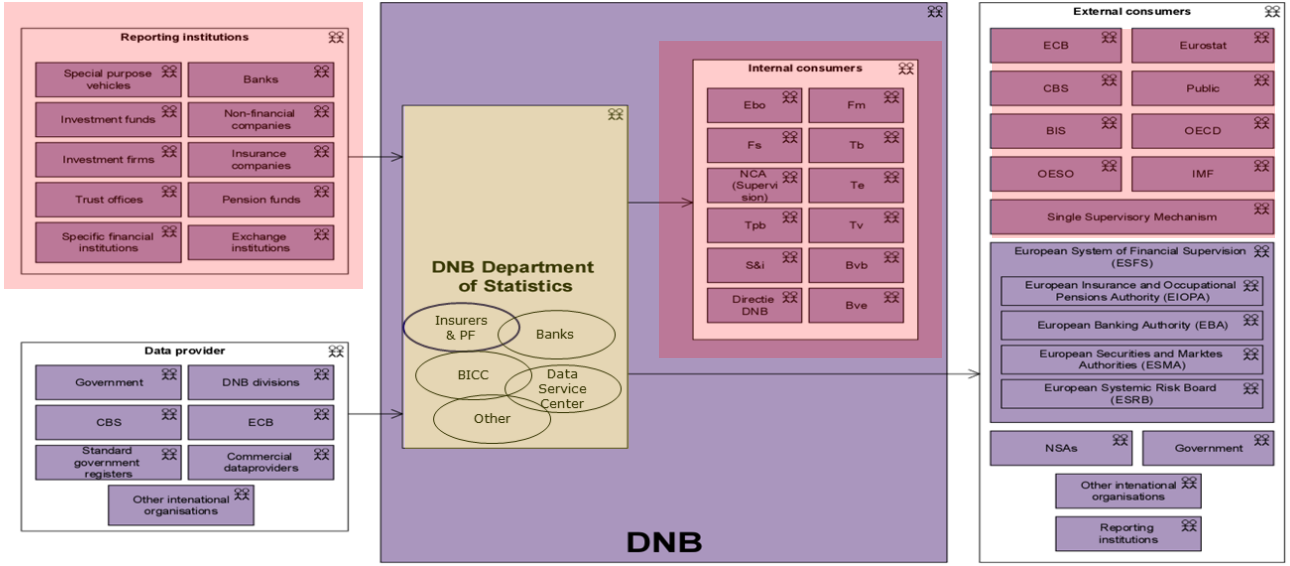
Paul Hulst

- Architect for the process collecting, validating, exposing and dissemination structured data at De Nederlandsche Bank (DNB)
- Member of BPB - Taxonomy Architecture Guidance Task Force
- Member of XSB – Open Information Model
- Board member XBRL Netherlands

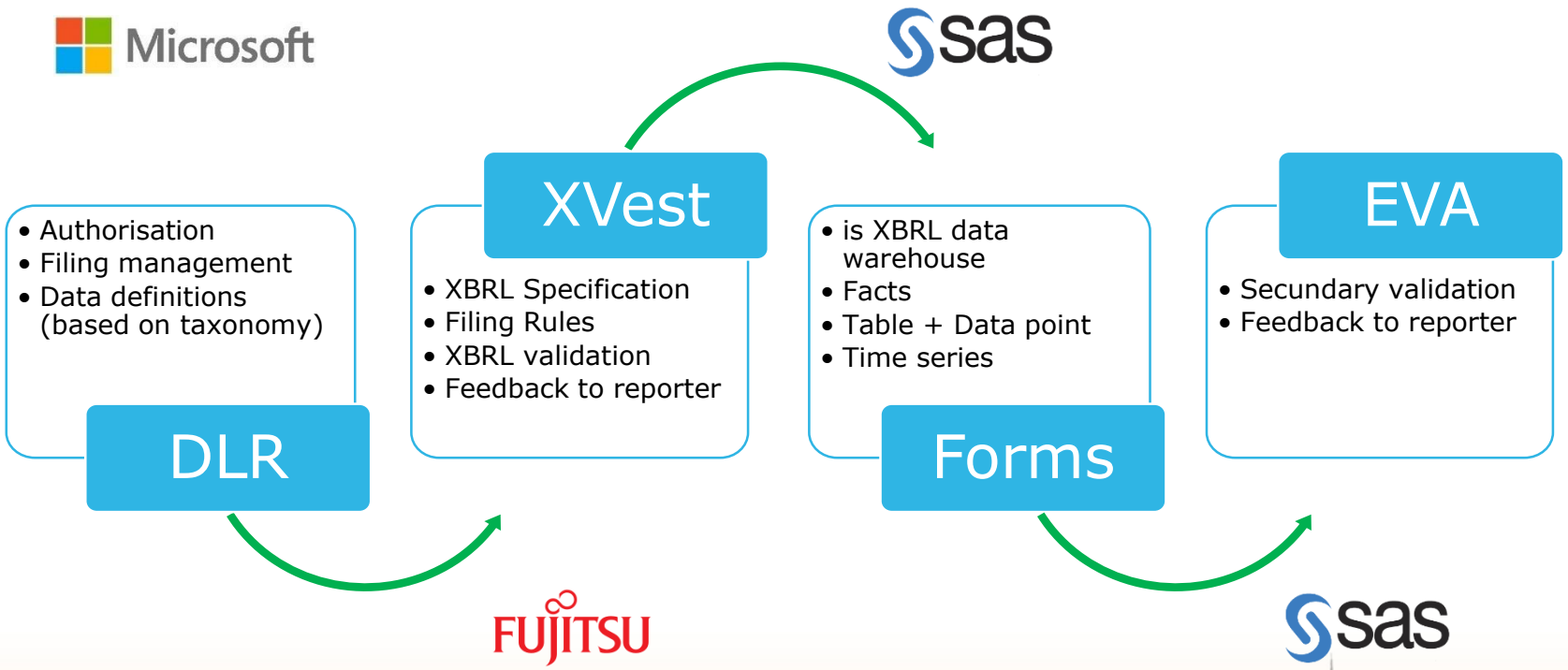
Note:
This presentation contains the views and opinions of the speaker and is not an official position of De Nederlandsche Bank.

About De Nederlandsche Bank

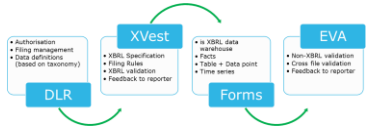
- DNB is the central bank, supervisor for the financial sector and resolution authority for the Netherlands. DNB also advises the Dutch government on economic matters.
- Collecting, validating, enhancing and disse-minating data is a key role of the Statistics Department.



Overview of current system



XVest and EVA

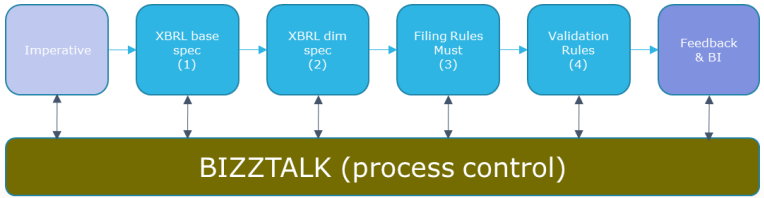


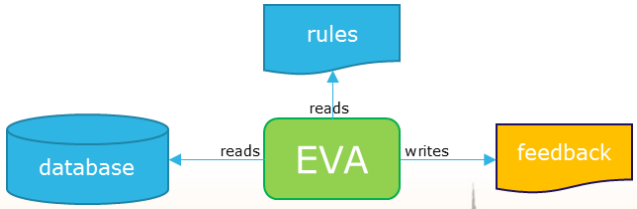
XVest

- Built by DNB using Fujitsu components
- Technology: Microsoft .NET
- Processes data in XBRL instances
- Rules defined through the XBRL formula linkbase

EVA

- Developed by DNB itself
- Technology: SAS
- Processes data shredded to a relational database
- Rules defined in a DNB-defined syntax, similar to the syntax of the EBA.

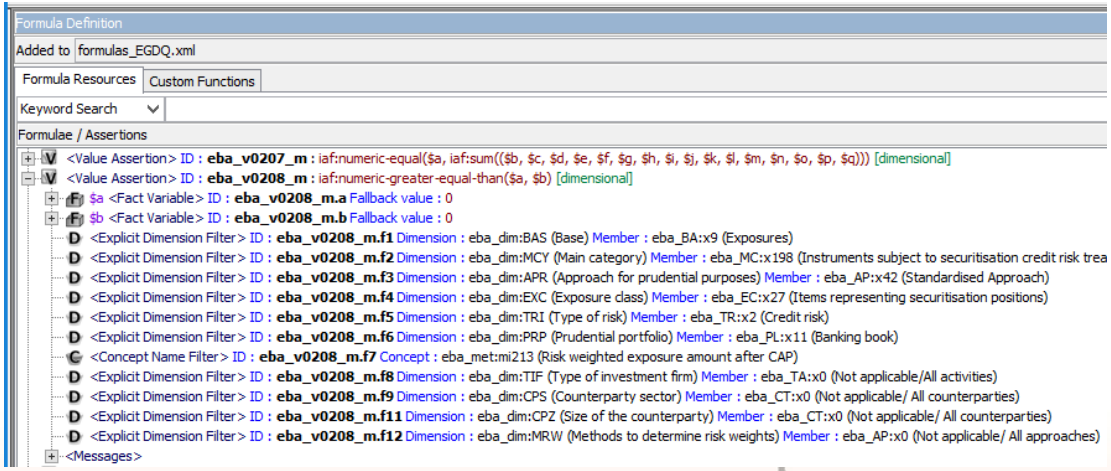




Validation rules

Example of EVA and XBRL syntax

ID	Type of rule	Main table	Rows	Columns	Sheets	Formula	Severity	Fallback	Rounding
DNB_0001	Consistency	F 01.02		(010)		{r061} = +{r062} + {r063} + {r064} + {r065} + {r066}	Non-blocking	TRUE	Interval
DNB_0002	Consistency	F 01.02		(010)		{r141} = +{r142} + {r143} + {r144}	Non-blocking	TRUE	Interval
DNB_0003	Consistency	C 01.00	(010;015;020)			{c010} <> 0	Non-blocking	FALSE	Interval
DNB_0004	Consistency	C 03.00	(010;030;050)			{c010} <> 0	Non-blocking	FALSE	Interval
DNB_0005	Consistency	C 04.00		(010)		{r860} > 0	Non-blocking	FALSE	Interval
DNB_0006	Plausibility	C 22.00		(020;030)		{r130} > 0	Non-blocking	FALSE	Interval
DNB_0007	Consistency	C 24.00		(150;160)		{r010} >= 3	Non-blocking	TRUE	Interval
DNB_0008	Consistency	C 24.00		(140)		{r010} >= 0 and {r010} <= 250	Non-blocking	FALSE	Interval
DNB_0009	Consistency	C 07.00.a	(010-090;110;130-280)		(All)	{c200} <= {c150}	Non-blocking	TRUE	Interval
DNB_0010	Consistency	C 08.01.a	(010-070;180)		(All)	{c010} >= 0 and {c010} <= 1	Non-blocking	TRUE	Interval
DNB_0022	Consistency	C 17.00.a	(010-080)	(010-080)		IF {r010} = 1 THEN {r030} = {r040}	Non-blocking	TRUE	Absolute
DNB_0059	Consistency	C 02.00				{C 02.00, r140, c010} = {C 07.00.a, r010, c220, s009}	Non-blocking	TRUE	Interval
DNB_0073	Consistency	C 18.00				{C 18.00, r010, c060, sNNN} = 2 * {C 18.00, r010, c060, s001}	Non-blocking	TRUE	Interval



Issues with the current approach for DNB

Issues with the current implementation in EVA:

EVA is an DNB internal system, reporters can't use it.

Doesn't support the DNB goal of pushing validation to the reporter.

Reporters have to write their own code to implement the (± 5000) DNB checks.

- Which not all of them do, so no opportunity for them to improve their data systems.
- Implementation might be different than the DNB implementation, leading to discussion on the right interpretation

Separate feedback to reporters for EBA and DNB checks.

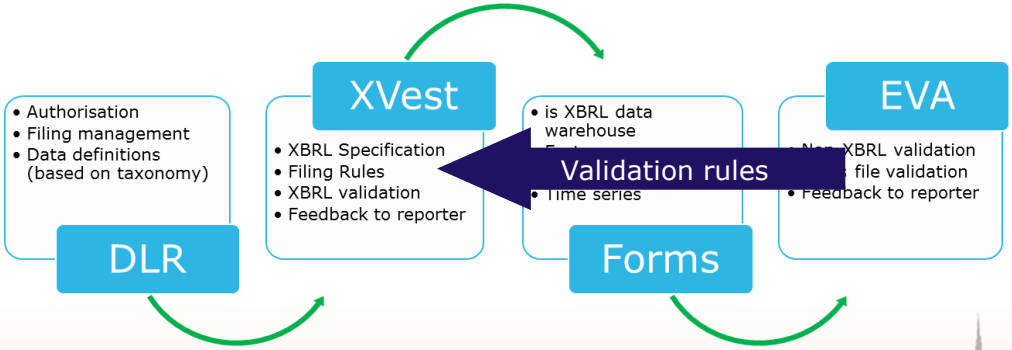
Requirements for alternative approaches

Requirements of DNB:

1. No changes to external taxonomies or instances provided by reporters.
2. Very limited impact on validation process / systems of reporters.
   So use technologies already available to reporters.

Solution

Move validation rules from EVA to XVest



New approach for DNB checks

Implementation

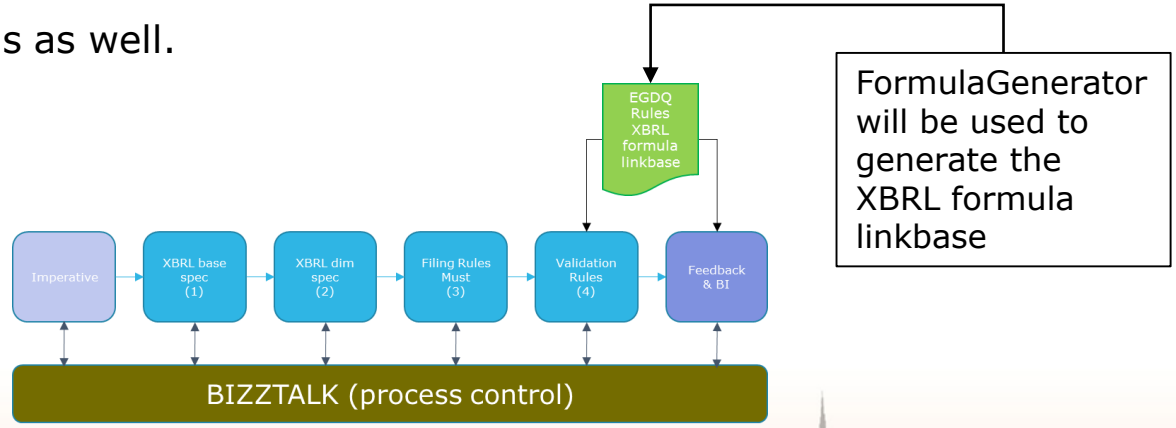
Create formula linkbase(s) containing the DNB rules

Adapt XVest to use existing features from the Fujitsu components

- Instruct XBRL formula validation component to load an additional formula linkbase
- Instruct Excel feedback generator to load that linkbase as well

Share the formula linkbase with the banks via the DNB website.

So that they use it in their systems as well.



FormulaGenerator

The FormulaGenerator is java application run from the command line that reads an csv file and creates an XBRL formula linkbase file using information from the mapping files also used by the Excel <-> XBRL convertors.

Input: id, formula expression, preconditions, usage of fallback value, severity level and the error message(s).

Formula expression language uses references to table, row and column provided by the table linkbase.

#assertionID	formulaExpression	precondition	useFallbackValue	severity	unsatisfiedMessage
EGDQ-0067	max({{T_C 28.00, R_NNN, C_230}}) >= 0.1	C 28.00	FALSE	WARNING	en:EGDQ-0067 - There should be at least one exposure with equal to 10.
EGDQ-0068	[T_C 30.00, C_020:C_250] -> [iaf:numeric-equal({T_C 28.00, R_NNN, C_210}, iaf:sum({{ T_C 30.00, R_NNN }}))]	C 28.00,C 30.00	TRUE	WARNING	en:EGDQ-0068 - Total of exposure value before application C.28.00 should equal the sum of the columns 020 to 250 of t

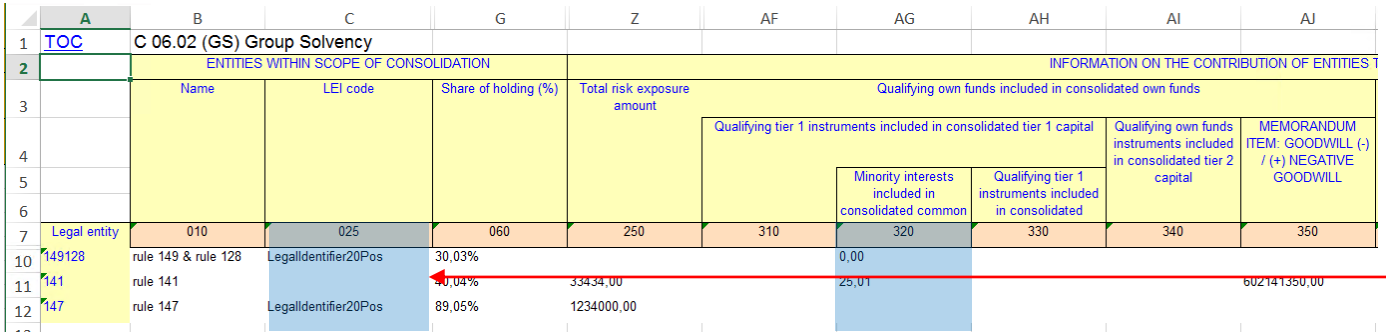
Some examples

	A	B	C	G	Z	AF	AG	AH	AI	AJ
1	TOC	C 06.02 (GS) Group Solvency								
2		ENTITIES WITHIN SCOPE OF CONSOLIDATION			INFORMATION ON THE CONTRIBUTION OF ENTITIES T					
3		Name	LEI code	Share of holding (%)	Total risk exposure amount	Qualifying own funds included in consolidated own funds				
4						Qualifying tier 1 instruments included in consolidated tier 1 capital			Qualifying own funds instruments included in consolidated tier 2 capital	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE GOODWILL
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated		
6										
7	Legal entity	010	025	060	250	310	320	330	340	350
10	149128	rule 149 & rule 128	LegalIdentifier20Pos	30,03%			0,00			
11	141	rule 141		40,04%	33434,00		25,01			602141350,00
12	147	rule 147	LegalIdentifier20Pos	89,05%	1234000,00					

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} < 1.0) else (true())]

For all rows

Some examples



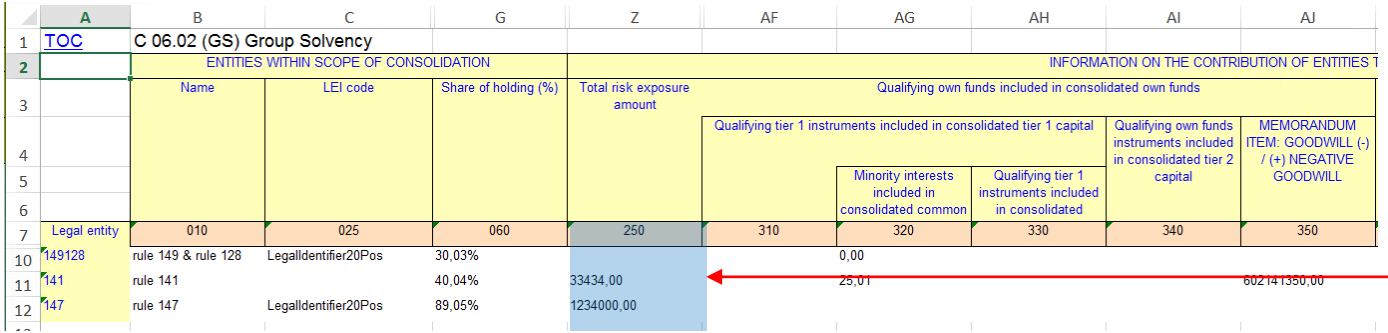
	A	B	C	G	Z	AF	AG	AH	AI	AJ
1	TOC	C 06.02 (GS) Group Solvency								
2		ENTITIES WITHIN SCOPE OF CONSOLIDATION			INFORMATION ON THE CONTRIBUTION OF ENTITIES T					
3		Name	LEI code	Share of holding (%)	Total risk exposure amount	Qualifying own funds included in consolidated own funds				
4						Qualifying tier 1 instruments included in consolidated tier 1 capital			Qualifying own funds instruments included in consolidated tier 2 capital	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE GOODWILL
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated		
6										
7	Legal entity	010	025	060	250	310	320	330	340	350
10	149128	rule 149 & rule 128	LegalIdentifier20Pos	30,03%			0,00			
11	141	rule 141		40,04%	33434,00		25,01			602141350,00
12	147	rule 147	LegalIdentifier20Pos	89,05%	1234000,00					

	A	B
1	http://www.eba.europa.eu/xbrl/crr/fws/corep/cir-680-2014/2017-04-04/mod/COREP_Con	
2		
3	Default Aspect	
4	category	value
5	Period Start	2014-01-01
6	Period End	2014-12-31
8	Identifier	LegalIdentifier20Pos
9	Scheme	http://standards.iso.org/iso/17442
10	Currency	EUR
	Language	en

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]
149	The parent entity should report no Minority interests	If c025=entity_id then c320=0	[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]

Using formula functions

Some examples



	A	B	C	G	Z	AF	AG	AH	AI	AJ
1	TOC	C 06.02 (GS) Group Solvency								
2		ENTITIES WITHIN SCOPE OF CONSOLIDATION					INFORMATION ON THE CONTRIBUTION OF ENTITIES T			
3		Name	LEI code	Share of holding (%)	Total risk exposure amount	Qualifying own funds included in consolidated own funds				
4						Qualifying tier 1 instruments included in consolidated tier 1 capital			Qualifying own funds instruments included in consolidated tier 2 capital	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE GOODWILL
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated		
6										
7	Legal entity	010	025	060	250	310	320	330	340	350
10	149128	rule 149 & rule 128	LegalIdentifier20Pos	30,03%			0,00			
11	141	rule 141		40,04%	33434,00		25,01			602141350,00
12	147	rule 147	LegalIdentifier20Pos	89,05%	1234000,00					

	A	B	C	D	E	F	G
1	TOC	C 02.00 (CA 2) Capital Adequacy - Risk Exposure Amounts					
2							Amount
3							010
4	TOTAL RISK EXPOSURE AMOUNT					010	1267434,00
5		Of which: Investment firms under Article 95 paragraph 2 and Article 98 of CRR				020	

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]
149	The parent entity should report no Minority interests	If c025=entity_id then c320=0	[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]
147	The sum of the RWAs contributed by each investee of the group should not differ greatly from the RWAs reported in C02	-0.01 < ((C02.00, r010, c010) - (sum(C06.02, c250)) / (C02.00, r010, c010)) < 0.25	if({T_C 02.00, R_010, C_010} != 0) then (iaf:numeric-greater-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), -0.01) and iaf:numeric-less-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), 0.25)) else (true())

Can become a bit difficult to read

Some examples

	A	B	C	G	Z	AF	AG	AH	AI	AJ
1	TOC	C 06.02 (GS) Group Solvency								
2		ENTITIES WITHIN SCOPE OF CONSOLIDATION			INFORMATION ON THE CONTRIBUTION OF ENTITIES T					
3		Name	LEI code	Share of holding (%)	Total risk exposure amount	Qualifying own funds included in consolidated own funds				
4						Qualifying tier 1 instruments included in consolidated tier 1 capital			Qualifying own funds instruments included in consolidated tier 2 capital	MEMORANDUM ITEM: GOODWILL (-) / (+) NEGATIVE GOODWILL
5							Minority interests included in consolidated common	Qualifying tier 1 instruments included in consolidated		
6										
7	Legal entity	010	025	060	250	310	320	330	340	350
10	149128	rule 149 & rule 128	LegalIdentifier20Pos	30,03%			0,00			
11	141	rule 141		40,04%	33434,00		25,01			602141350,00
12	147	rule 147	LegalIdentifier20Pos	89,05%	1234000,00					

Check No.	Issue / Explanation	Syntax EGDQ	Syntax FormulaGenerator
150	There should not be contributions to CET1 in 100% holdings	if c320<>0 then c060 < 100%	[T_C 06.02, R_NNN] -> [if ({C_320} != 0) then ({C_060} <= 1.0) else (true())]
149	The parent entity should report no Minority interests	If c025=entity_id then c320=0	[T_C 06.02, R_NNN] -> [if {C_025} = string(xfi:entity({C_025}))) then ({C_320} = 0) else (true())]
147	The sum of the RWAs contributed by each investee of the group should not differ greatly from the RWAs reported in C02	-0.01 < ((C02.00, r010, c010) - (sum(C06.02, c250)) / (C02.00, r010, c010)) < 0.25	if({T_C 02.00, R_010, C_010} != 0) then (iaf:numeric-greater-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), -0.01) and iaf:numeric-less-than(iaf:numeric-divide(iaf:numeric-subtract({T_C 02.00, R_010, C_010}, {{T_C 06.02, R_NNN, C_250}}), {T_C 02.00, R_010, C_010}), 0.25)) else (true())
124	LEI code should be unique for each investee	Flag if codes reported in c025 are not unique, when reported	manually done

I couldn't do it with the FormulaGenerator

Current status and future plans

Implementation of supporting logic (e.g. Xvest) is almost done.

FormulaGenerator is used

- for consistency checks on data from a single XBRL report,
- to create the additional validation rules on CRDIV as defined by the ECB (EGDQ),
- and also directly to be included in DNB taxonomies (DNB BSI-MIR, DNB CRDIV-BO)

FormulaGenerator

- Works well,
- can’t do all the checks we need, so those rules are built by XBRL experts manually.

Future plans: plausibility checks on a single instance and multi instance processing.

Conclusion

XBRL formula is well suited to improve data quality in reports that is part of the functionality all NCAs and reports already have.

With an XBRL formula generator your domain experts can develop (most of) the validation rules, so the XBRL experts can focus on the remaining complicated ones.
Resulting in more rules.

Questions?