

**FINOS**

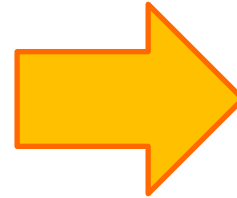
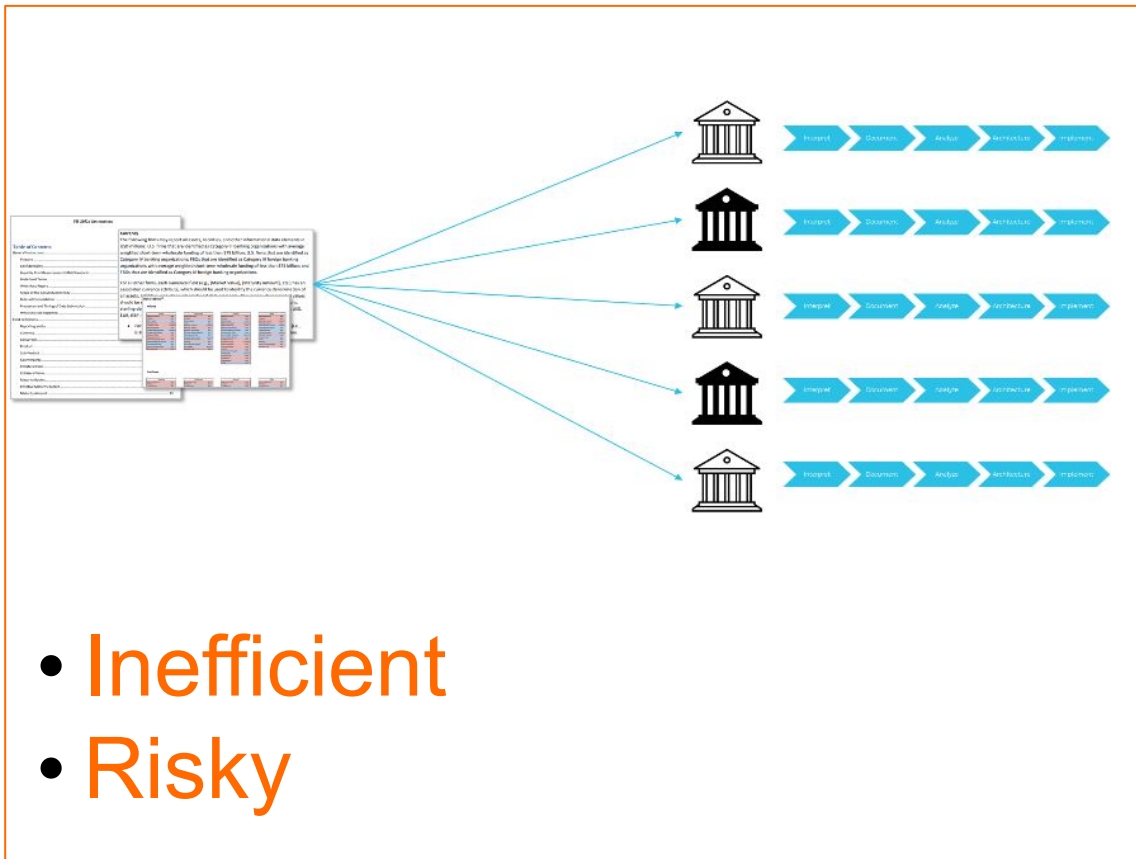
Fintech  
Open Source  
Foundation



**morphir**

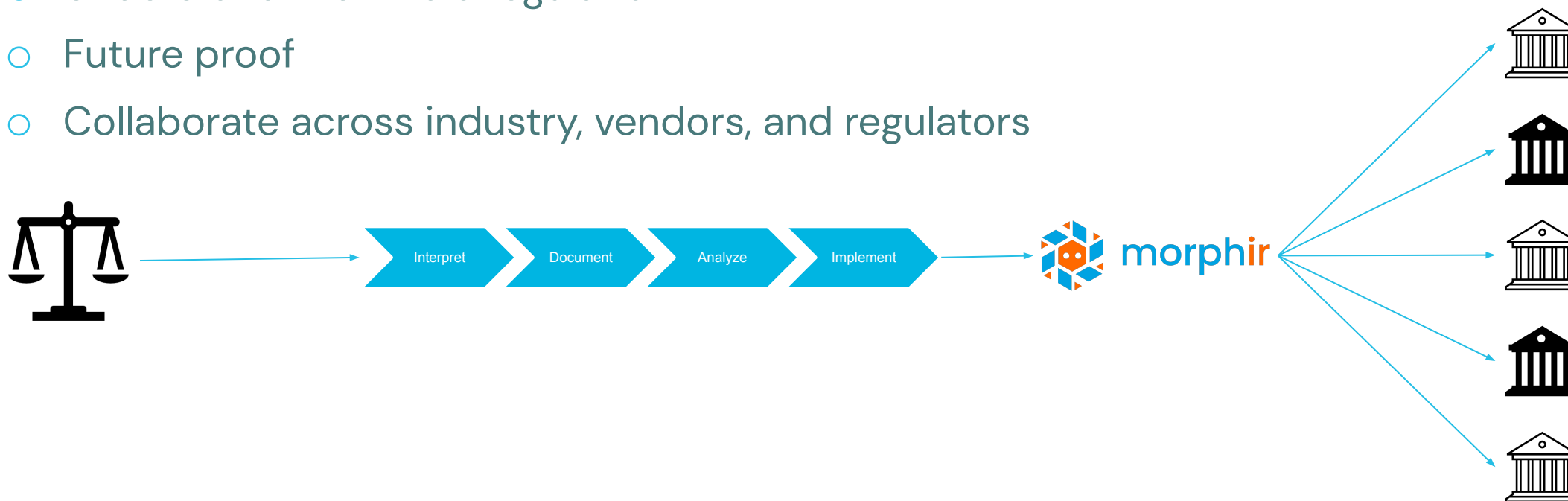


# Open Reg Tech

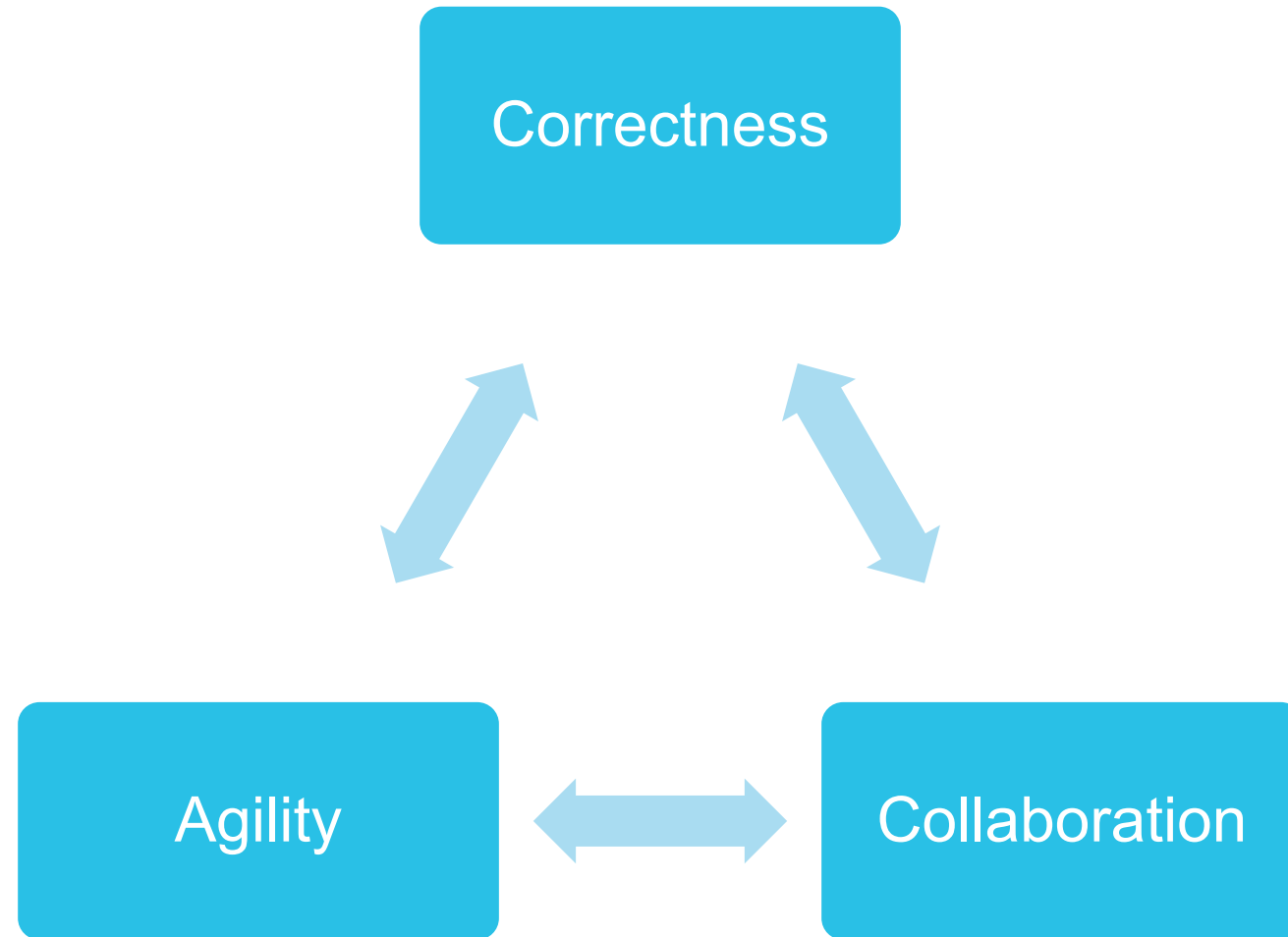


## For Regulation:

- Ensure it's correct
- Understand the whole regulation
- Future proof
- Collaborate across industry, vendors, and regulators



# Pillars of Open Reg Tech



# US Liquidity Coverage Ratio (LCR)

## Why

- Wide audience
- Well documented
- Perfect size
- Non-competitive

## What

- Categorize
- Aggregate
- Calculate

## Currency

The following firms may report all assets, liabilities, and other informational data elements in USD millions: U.S. firms that are identified as Category III banking organizations with average weighted short-term wholesale funding of less than \$75 billion; U.S. firms that are identified as Category IV banking organizations; FBOs that are identified as Category III foreign banking organizations with average weighted short-term wholesale funding of less than \$75 billion; and FBOs that are identified as Category IV foreign banking organizations.

For all other firms, each numerical field (e.g., [Market Value], [Maturity Amount], etc.) has an associated currency attribute, which should be used to identify the currency denomination of all assets, liabilities, and other informational data elements. All currency-denominated values should be reported in millions (e.g., U.S. dollar-denominated transactions in USD millions,

sterling-denominated transactions in GBP millions). Use the following currency conversion rates for EUR, GBP, CHF, JPY, AUD, and CAD.<sup>7</sup>

- For all other currencies, convert to USD according to the closing exchange rate (as of 6:30pm EST) on the as-of date (T) using the same currency conversion rates.

## HQLA Amount Values

### HQLA Additive Values

Field	
Reporting Entity	LCR Firm
PID	I.A.1, 2, and 3
Product	Matches PID
Sub-Product	Not Currency and Coin
Market Value	*
Lendable Value	#
Maturity Bucket	Open for I.A.3, # otherwise
Forward Start Amount	NULL
Forward Start Bucket	NULL
Collateral Class	HQLA (except A-0-Q for I.A.2)
Treasury Control	Y
Accounting Designation	#
Encumbrance Type	NULL
Internal Counterparty	#

## LCR Calculation<sup>2</sup>

$$LCR = \frac{HQLA \text{ amount}}{Total \text{ Net Cash Outflows}}$$

$$HQLA \text{ amount} = (Level \ 1 \ HQLA \text{ additive values} - Level \ 1 \ HQLA \text{ subtractive values}) + .85(Level \ 2A \ HQLA \text{ additive values} - Level \ 2A \ HQLA \text{ subtractive values}) + .5(Level \ 2B \ HQLA \text{ additive values} - Level \ 2B \ HQLA \text{ subtractive values}) - MAX[Unadjusted \ excess \ HQLA, Adjusted \ excess \ HQLA]$$

$$Unadjusted \ excess \ HQLA = Level \ 2 \ cap \ excess \ amount + Level \ 2B \ cap \ excess \ amount$$

$$Level \ 2 \ cap \ excess \ amount = MAX[0,$$

Largest net cumulative maturity outflow amount

$$= MAX \left[ \sum_{n=1}^m \left[ \begin{array}{l} \text{(Outflow values corresponding to .32(g), (h)(1), (h)(2), (h)(5), (j), (k), and (l)} \\ \text{with maturity bucket of } n * \text{Respective outflow rates)} - \text{(Inflow values} \\ \text{corresponding to .33(c), (d), (e), and (f) with maturity bucket of } n * \\ \text{Respective inflow rates)} \end{array} \right], \right. \\ \left. \forall m \in \{1, 2, \dots, 30\} \right]$$

Net day 30 cumulative maturity outflow amount

$$= \sum_{n=1}^{30} \left[ \begin{array}{l} \text{(Outflow values corresponding to .32(g), (h)(1), (h)(2), (h)(5), (j), (k), and (l)} \\ \text{with maturity bucket of } n * \text{Respective outflow rates)} - \text{(Inflow values} \\ \text{corresponding to .33(c), (d), (e), and (f) with maturity bucket of } n * \\ \text{Respective inflow rates)} \end{array} \right]$$



## Note 4

(21) Affiliated DI Commitments (§.32(e)(1)(i))	
Field	Value
Reporting Entity	LCR Firm that is a depository institution
PID	O.O.4 and 5
Product	Matches PID
Counterparty	Bank
G-SIB	#
Maturity Amount	*
Maturity Bucket	<= 30 calendar days
Forward Start Amount	#
Forward Start Bucket	#
Collateral Class	*3
Collateral Value	*4

<sup>3</sup> For the purpose of all tables mapped to commitment outflow amounts in section .32(e), the Collateral Class field should be used to identify commitment exposures that are secured by Level 1 or Level 2A HQLA, in accordance with sections .32(e)(2) and (3).

<sup>4</sup> For the purpose of all tables mapped to commitment outflow amounts in section .32(e), the Collateral Value field should be used to identify the amount of Level 1 or Level 2A HQLA securing the commitment exposure in accordance with sections .32(e)(2) and (3).

# Rule 72

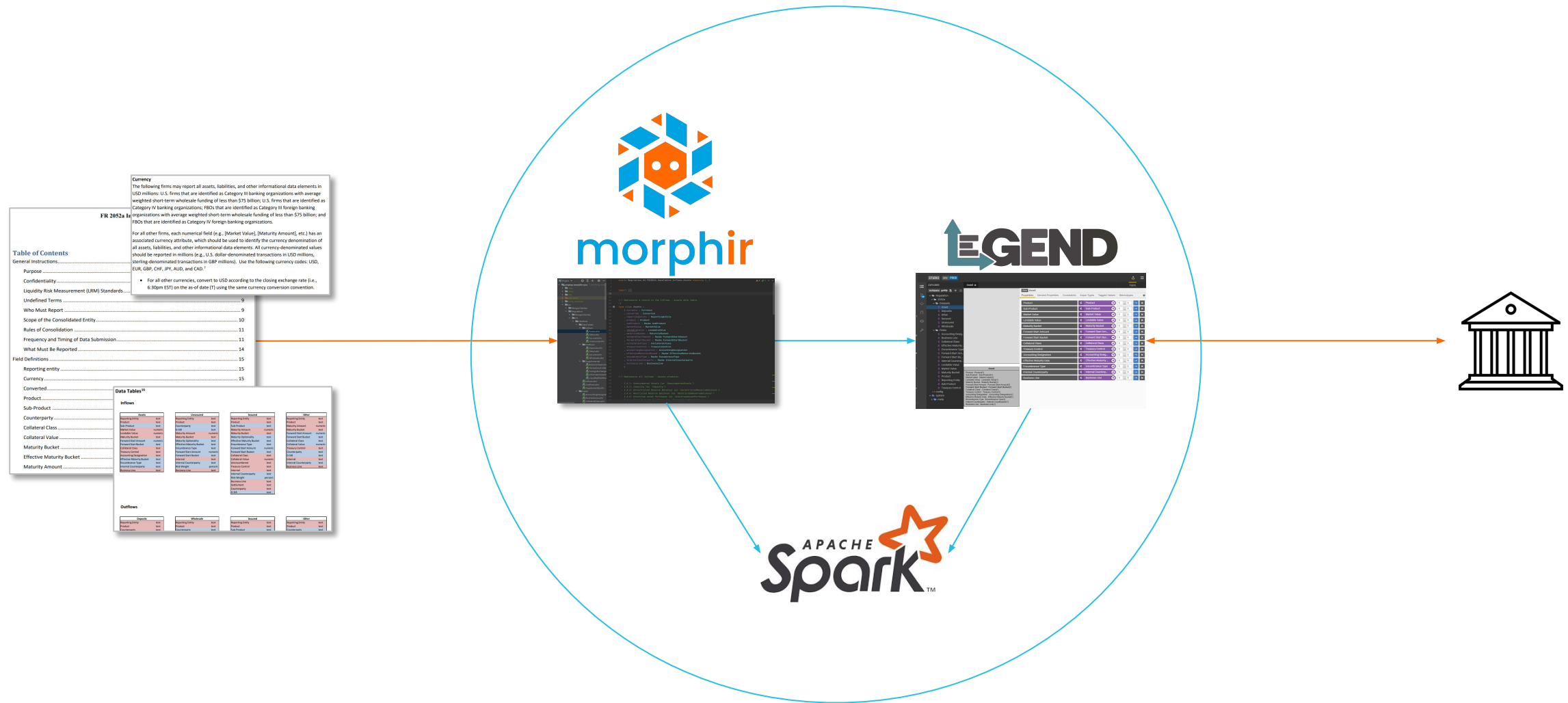


(72) Secured Funding L2B (§.32(j)(1)(iv))	
Field	Value
Reporting Entity	LCR Firm
PID	O.D.4 and 7 (only collateralized deposits) <sup>77</sup>
Product	Matches PID
Counterparty	Non-Financial Corporate, PSE, Other Supranational, Pension Fund, Bank, Broker-Dealer, Investment Company or Advisor, Financial Market Utility, Other Supervised Non-Bank Financial Entity, Non-Regulated Fund, Debt Issuing SPE, Other
G-SIB	#
Maturity Amount	*
Maturity Bucket	<= 30 calendar days
Maturity Optionality	#
Collateral Class	Level 2B HQLA
Collateral Value	To the extent the Collateral Value is less than the Maturity Amount, treat the Maturity Amount less the Collateral Value amount as unsecured wholesale funding under .32(h)
Insured	#
Trigger	#
Rehypothecated	Y
Business Line	#
Internal	#

<sup>7</sup> Secured deposits must meet the definition of a “collateralized deposit” under .32 of the LCR rule to be eligible for reporting under O.D.4 or O.D.7 (subject to the additional definitional requirements of these products). Secured deposits that do not meet the definition of a “collateralized deposit” should be reported under O.D.5 or O.D.6.



# Holistic platform with FINOS ecosystem



## What

- Categorize
- Aggregate
- Calculate





## An ecosystem of innovative features.

## Morphir Resource Centre

- Open-source Success
  - Incredible partnerships
  - Incredible potential
- Roadmap
  - Execution
    - Spark
    - Microservice
  - Creation
    - Scala and more...
  - Quality
    - More insight
    - More Bosque verifier
  - Integration
    - Data Management & Data Quality
    - Ontologies & semantic
- Get Involved
  - Your creativity

### FINOS Initiatives

[FINOS Projects on GitHub](#)  
[Engage the FINOS Community](#)  
[FINOS News and Events](#)

### Quick Links

[Browse Morphir Good First Issues](#)   
[Ask a Morphir Question](#) 

### FINOS Community

[FINOS Community Handbook](#)  
[FINOS Community Governance](#)   
[FINOS on LinkedIn](#) 

# Appendix



# Deposits Rule 72

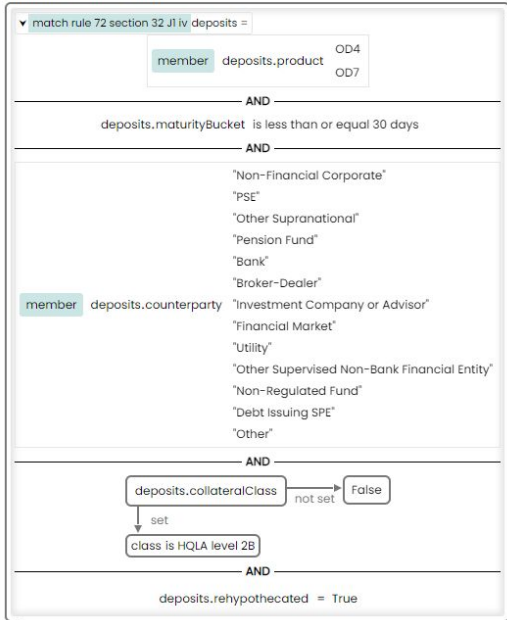


(72) Secured Funding L2B (§.32(j)(1)(iv))	
Field	Value
Reporting Entity	LCR Firm
PID	O.D.4 and 7 (only collateralized deposits) <sup>7</sup>
Product	Matches PID
Counterparty	Non-Financial Corporate, PSE, Other Supranational, Pension Fund, Bank, Broker Investment Company or Advisor, Financial Utility, Other Supervised Non-Bank Financial Entity, Non-Regulated Fund, Debt Issuing SPE, Other
G-SIB	#
Maturity Amount	*
Maturity Bucket	<= 30 calendar days
Maturity Optionality	#
Collateral Class	Level 2B HQLA
Collateral Value	To the extent the Collateral Value is less than the Maturity Amount, treat the Maturity Amount as unsecured wholesale funding under .32(h)
Insured	#
Trigger	#
Rehypothecated	Y
Business Line	#
Internal	#

## apply rule 72 section 32 J1 iv calculation

[ This definition has no associated documentation. ]

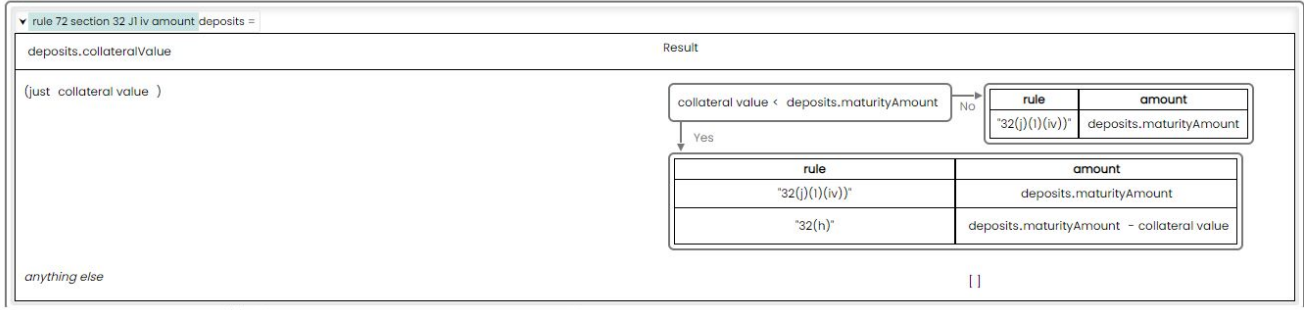
apply rule 72 section 32 J1 iv =



```
{-| (72) Secured Funding L2B (§.32(j)(1)(iv))
-}

match_rule_72_section_32_j1_iv : Deposits -> Bool
match_rule_72_section_32_j1_iv deposits =
  List.member deposits.product [ o_D_4, o_D_7 ]
  -- Maturity Bucket: <= 30 calendar days
  && MaturityBucket.isLessThanOrEqual30Days deposits.maturityBucket
  -- Counterparty
  && List.member deposits.counterparty
    [ "Non-Financial Corporate"
    , "PSE"
    , "Other Supranational"
    , "Pension Fund"
    , "Bank"
    , "Broker-Dealer"
    , "Investment Company or Advisor"
    , "Financial Market"
    , "Utility"
    , "Other Supervised Non-Bank Financial Entity"
    , "Non-Regulated Fund"
    , "Debt Issuing SPE"
    , "Other"
    ]
  -- Collateral Class: Level 2B HQLA
  && (deposits.collateralClass |> Maybe.map (\class -> CollateralClass.isHQLAlevel2B class) |> Maybe.withDefault False)
  -- Rehypothecated: Y
  && deposits.rehypothecated == Just True
```

<sup>7</sup> Secured deposits must meet the definition of a “collateralized deposit” under .32 of the LCR rule to be eligible for reporting under O.D.4 or O.D.7 (subject to the additional definitional requirements of these products). Secured deposits that do not meet the definition of a “collateralized deposit” should be reported under O.D.5 or O.D.6.





# Note 4



(21) Affiliated DI Commitments (§.32(e)(1)(i))	
Field	Value
Reporting Entity	LCR Firm that is a depository institution
PID	O.O.4 and 5
Product	Matches PID
Counterparty	Bank
G-SIB	#
Maturity Amount	*
Maturity Bucket	<= 30 calendar days
Forward Start Amount	#
Forward Start Bucket	#
Collateral Class	*3
Collateral Value	*4

<sup>3</sup> For the purpose of all tables mapped to commitment outflow amounts in section .32(e), the Collateral Class field should be used to identify commitment exposures that are secured by Level 1 or Level 2A HQLA, in accordance with sections .32(e)(2) and (3).

<sup>4</sup> For the purpose of all tables mapped to commitment outflow amounts in section .32(e), the Collateral Value field should be used to identify the amount of Level 1 or Level 2A HQLA securing the commitment exposure in accordance with sections .32(e)(2) and (3).

14

```
26 [ applyRule (match_rule_19_section_32_e_3 other) "32(e)(3)" other.maturityAmount
27 , applyRule (match_rule_18_section_32_b other) "32(b)" other.maturityAmount
28 , applyRule (match_rule_19_section_32_c other) "32(c)" other.maturityAmount
29 , applyRule (match_rule_20_section_32_d other) "32(d)" other.maturityAmount
30 , applyRule (match_rule_21_section_32_e_1_i other) "32(e)(1)(i)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
31 , applyRule (match_rule_22_section_32_e_1_ii other) "32(e)(1)(ii)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
32 , applyRule (match_rule_23_section_32_e_1_iii other) "32(e)(1)(iii)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
33 , applyRule (match_rule_24_section_32_e_1_iv other) "32(e)(1)(iv)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
34 , applyRule (match_rule_25_section_32_e_1_v other) "32(e)(1)(v)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
35 , applyRule (match_rule_26_section_32_e_1_v other) "32(e)(1)(v)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
36 , applyRule (match_rule_27_section_32_e_1_vi other) "32(e)(1)(vi)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
37 , applyRule (match_rule_28_section_32_e_1_vii other) "32(e)(1)(vii)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
38 , applyRule (match_rule_29_section_32_e_1_viii other) "32(e)(1)(viii)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
39 , applyRule (match_rule_30_section_32_e_1_ix other) "32(e)(1)(ix)" (note_4 other.collateralClass other.collateralValue other.maturityAmount)
40 , applyRule (match_rule_31_section_32_f_1 other) "32(f)(1)" other.maturityAmount
41 , applyRule (match_rule_32_section_32_f_1 other) "32(f)(1)" other.maturityAmount
42 , applyRule (match_rule_34_section_32_f_3 other) "32(f)(3)" other.maturityAmount
43 , applyRule (match_rule_101_section_32_l other) "32(l)" other.maturityAmount
44 , applyRule (match_rule_102_section_32_l other) "32(l)" other.maturityAmount
45 ]
```

## apply note 4 calculation

[ This definition has no associated documentation. ]

Insight View XRay View Custom Attributes

▼ Inputs

collateral class

text

S-1-Q

collateral value

real num.

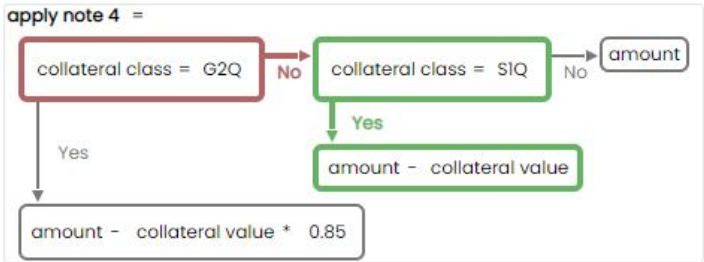
200

amount

real num.

4000

▼ Insight view



▼ Outputs

value = 3,800.00

G-2-Q

Save as new testcase

Update testcase #2

▼ Test Cases

collateral class	collateral value	amount	exp. output	
"G-2-Q"	200.00	4,000.00	3,830.00	
"S-1-Q"	200.00	4,000.00	3,800.00	

# Utilizing the FINOS Ecosystem

Goal: Foundation for open-source delivery and execution that is inclusive of current and future technologies.

- Coding the LCR (Morphir)
  - Holistic
  - Adaptable
  - Transparent
  - Integrated
- Verifying Correctness (Bosque)
  - Ensure correctness
- Executing (Spark)
  - Performant
  - Scalable
  - Cloud ready
- Integrating firm data (Legend)
  - Flexible
  - Fully catalogued and documented