BANKING STRESS TESTING

THE NEED FOR A GLOBAL CODE OF PRACTICES

STRESS TESTING & FINANCIAL SYNTHESIS
MAY 28TH 2019

BNP PARIBAS

The bank for a changing world

What is banking stress testing?

Scenario definition
with macroeconomic components and risk specific expansions

Designed depending on the purposes of the stress test

Stress testing models
Statistical or expert based internal models
Supervisory models

Internal models are often floored or replaced by supervisory top-down approaches for regulatory stress test

Data collection
Historical risk parameters
Starting point balance sheet and risks

Adapted to the risks to be covered with the stress test on the perimeter targeted

Stress testing outcomes
Solvency, liquidity and profitability evolutions are analyzed

Since 2008 crisis, stress testing became a key supervisory tool with huge discrepancies in its usage

						
Regulator	**EBA/ECB**	**BoE/PRA**	**FED**	**HKMA**	**FINMA**	**MAS**
Coverage	Largest Eurozone(~48 Banks)	Largest UK banks & building societies	BHC & FB06; assets >10bn(DFAST), $50bn(CCAR)	Locally-incorporated AIs	All banks	All banks and FI's
Data Requirements/Reporting	Historical	FDSF4- Historical, Year-End Data &P&L Projections	FRY Reports-A/Q/M Data, P/L Projections	Projections required to be reported on HKMA-generated templates	Free format that needs to fulfill FINMA quantitative and qualitative requirements	No details available
Modelling Approach	Bottom-Up& Challenger/Top down; Firm's own models	Bottom-up/Granular; Firm's own models	Bottom-up; Firm's own models; Dynamic projections	Bottom-up; Firm's Own models, Static balance sheet assumption	Open	Bottom-up
Scenarios	Regulatory baseline, stress scenario	Common stress, Bespoke firm stress, common baseline	Baseline, Adverse, Severely Adverse, Firm's Scenarios	Single scenario. Has been based on China hard-landing for past 3 years	Baseline and severely adverse	Scenario analysis(Adverse)
Disclosure	Public disclosure of results by EBA	Public disclosure of results	Public disclosure of results	Disclosures made on risk basis	Only to FINMA	Shared with participating FI's(Does not disclose publically)
Frequency	Based on market developments (annual in principle)	Annual	Annual(Regulator-led), Semi annual(bank-led)	Annual (Feb. – May)	Annual	Annual

Ensuring coordination across jurisdictions with regards to local stress testing approaches is vital

- **As of today, heterogeneous stress testing frameworks between the various key regulations hamper:**
  - The consistency for international institutions between local stress testing and consolidated stress testing generating capital / liquidity add-ons and inability to integrate operationally in the steering of the banks;
  - The ability for home / host supervisors to capture a consistent understanding of how a banking group would react to a severe crisis and a limitation in the quality of information sharable around the stress testing of a given institution;
  - The ability to reduce the cost burden both in banking institutions and in local / group supervisions of stress testing exercises.

- **Working on a convergence of regulatory stress testing would foster the value addition of the exercises both for the banks and for the supervisors, while enabling greater efficiencies to free the means to work on new risks.**

- **A first step could be to define common methodological approaches for regulatory stress testing and common reporting templates. Scenario building and integration to supervisory decisions could be managed later on.**

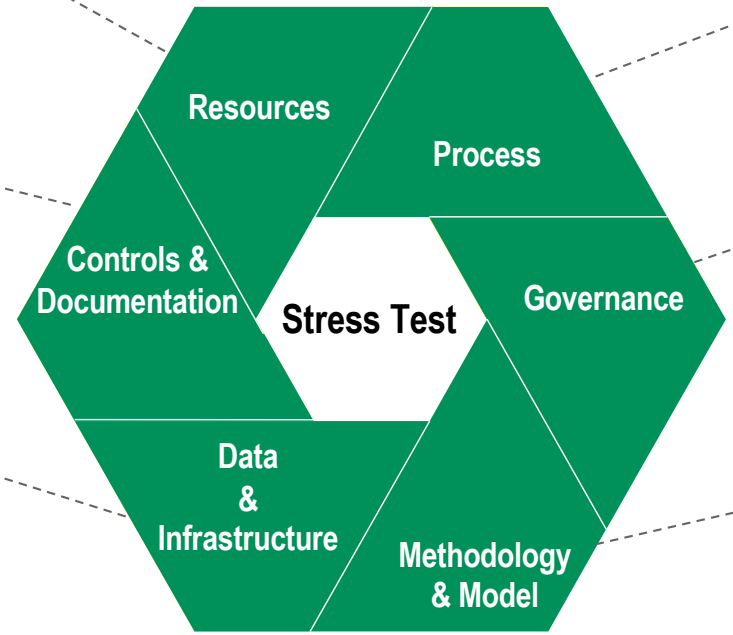
European increase of regulatory and internal stress testing requirements is steady

- The EBA confirms its **ambition** with regards to Stress Tests, reaffirms the principle of **proportionality**, and develops focus on **Reverse S/T** through the **guidelines on institutions' stress testing,** developed in accordance with Article 16 of Regulation (EU) No 1093/2010 and updating the existing EBA Guidelines on stress testing form 2010. The revised Guidelines replace the existing Guidelines and are applicable from 01 January 2019.

- Adequate human, financial and material resources according to institution size and complexity

- **3 LoD**
- Documentation
- **Model Risk Management**

- Accurate and reliable risk data and infrastructure with dedicated aggregation functionalities allowing **flexibility** and appropriate level of **quality** and **control**
- Full respect of **BCBS239** principles

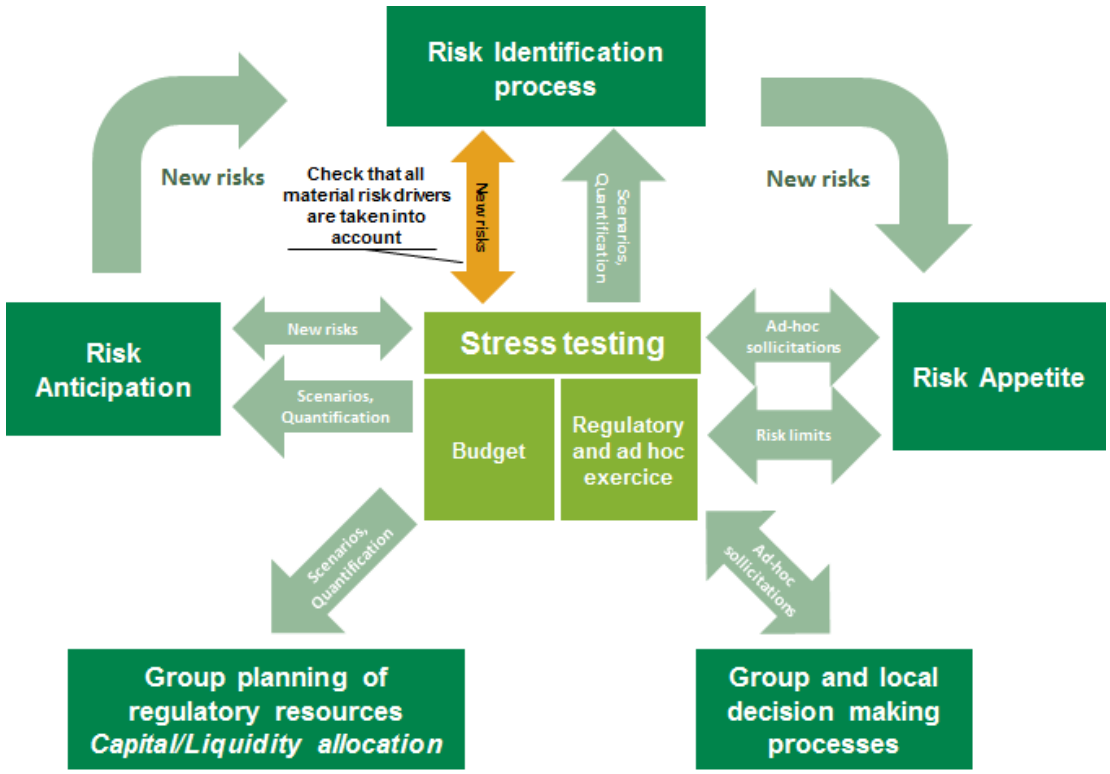


- Strong **operational insertion** of stress tests in Management and Business **decision-making** with **full consistency with other SREP** building blocks (Risk Appetite, ICAAP, ILAAP and recovery planning)

- Proper understanding of stress test by **Senior Management**, independently challenged and formally documented

- **Sophisticate modelling proportionate** to institution size and complexity and allowing multiple scenarios at regular frequency and sensitivity analysis
- **Reverse S/T**
- Consistency between **Capital and Liquidity**
- Consistency between **Capital and S/T**

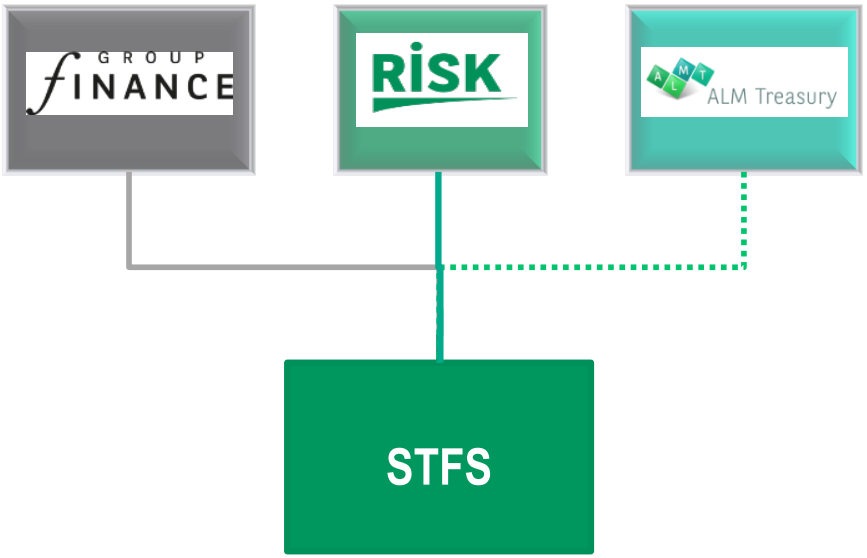
Stress Testing is becoming central in the steering of the Bank



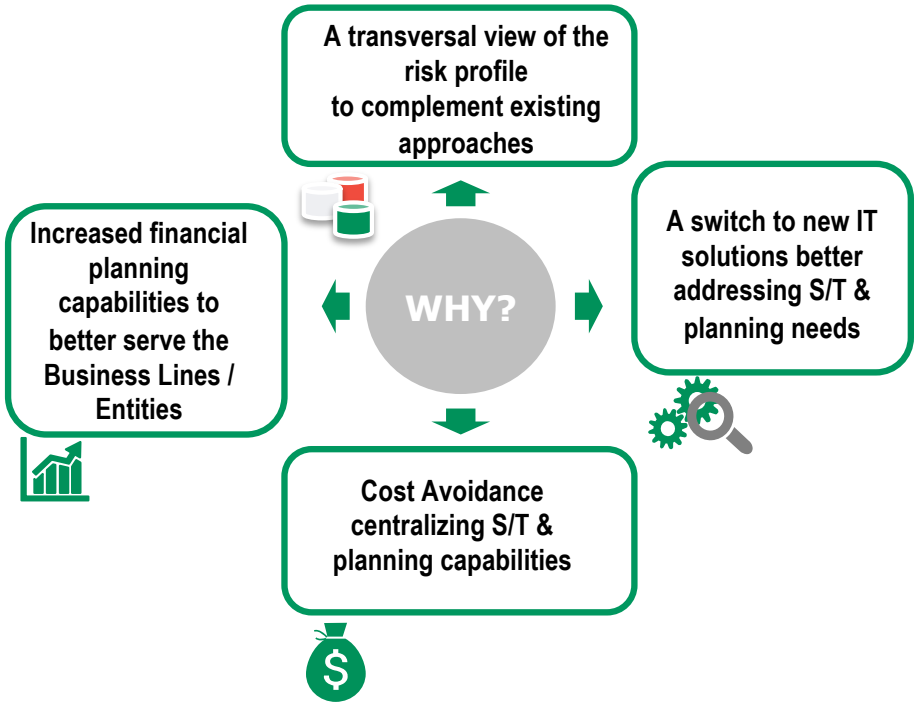
1. **Informs the Bank's management** on the potential impact of adverse unexpected outcomes
2. **Adequacy of the Bank's capital, internal or economic, as well as its liquidity buffers and key risk metrics**
3. Identification and validation of **remediation actions in Recovery conditions**
4. Awareness of **risk profiles and challenge Risk Appetite limits**
5. **Risk management**: IFRS9 ECL provisioning; Trading limit; IRRBB monitoring, Liquidity buffers
6. Forward-looking & **comprehensive risk and performance analysis**
7. Supports **the crisis management culture** within the Bank.
8. Contributes to the **stability of the financial system**

BNP Paribas invests on its stress testing & planning platform

STFS (Stress Testing and Financial Synthesis) Team launched early 2017



STEP (Stress Testing and Extended Planning) Program launched mid 2017



Five key features are driving the implementation of the STEP platform

Driving principles for the Stress Testing and Extended Planning platform

1 Transversal

- **Coherent and integrated IT**:
  - Unique Datalake
  - Shared planning tool
  - Library of models
- **Shared set of principles & guidelines**
- **Unique group Scenarios**

2 Flexibility

- **Level of sophistication** adjusted to the exercises objectives and context
- **Optimized calculation timeframe** to allow multiple iterations at different levels of BNPP organisation
- Shortened time development to foster adaptability
- Scenario library to manage different needs
- Ability to manage manual adjustments with compulsory audit trails

3 Operational insertion

- **Empowerment of BL/E accompanied by STFS servicing**
- **STEP platform as a business partner**
- **Insertion into strategic and decision-making processes**
- **Adequate Management actions** to ensure on-going profitability, solvency and liquidity of the Group and its Entities
- **Ability to manage 4 types of processes**:
  - Bottom-up
  - Centralised
  - Top down
  - Local

4 Operational efficiency

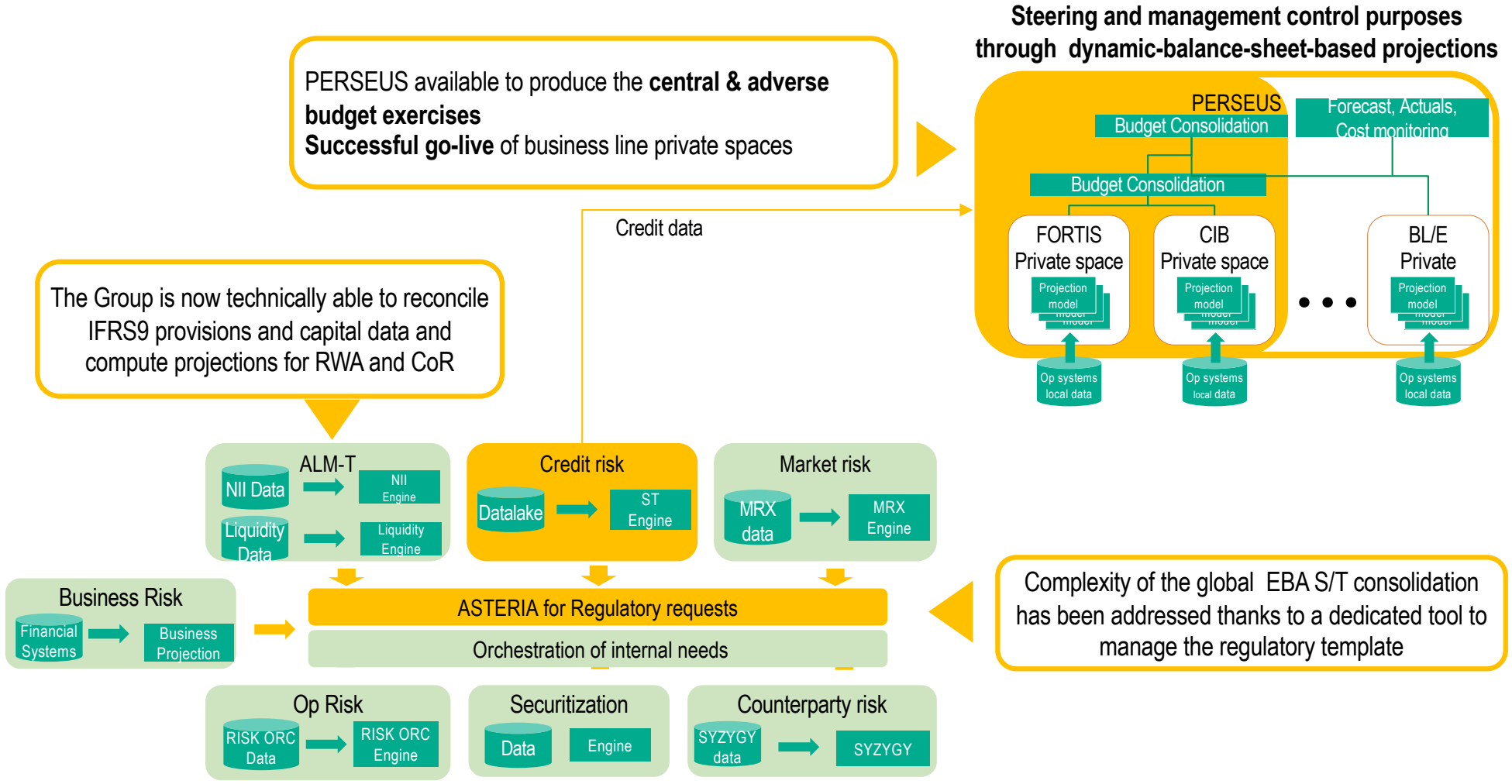
- **A central and industrialized framework to meet a growing range of requests at a lower cost**
  - EBA & ECB periodic or ad-hoc requests
  - Budget: Economic & Accounting P&L
  - ICAAP (pillar 2)
  - Ad-hoc management requests across the organisation
  - A larger number of scenarios
  - Baseline scenario or Reverse Stress Test
- **Build up of competency in the core team**
- **Leverage on already existing network**

5 Compliant with regulation

- **3 lines of defence (LoD)**
- **Complete and detailed documentation**
- **Full application of Model Risk Management (MRM)** standards to all models whatever sophistication and ownership
- **Compliance with BCBS239 principles**
- **Inclusion of all material risks identified**
- **Permanent regulatory watch in connection with bank experts**

2018 IT achievements

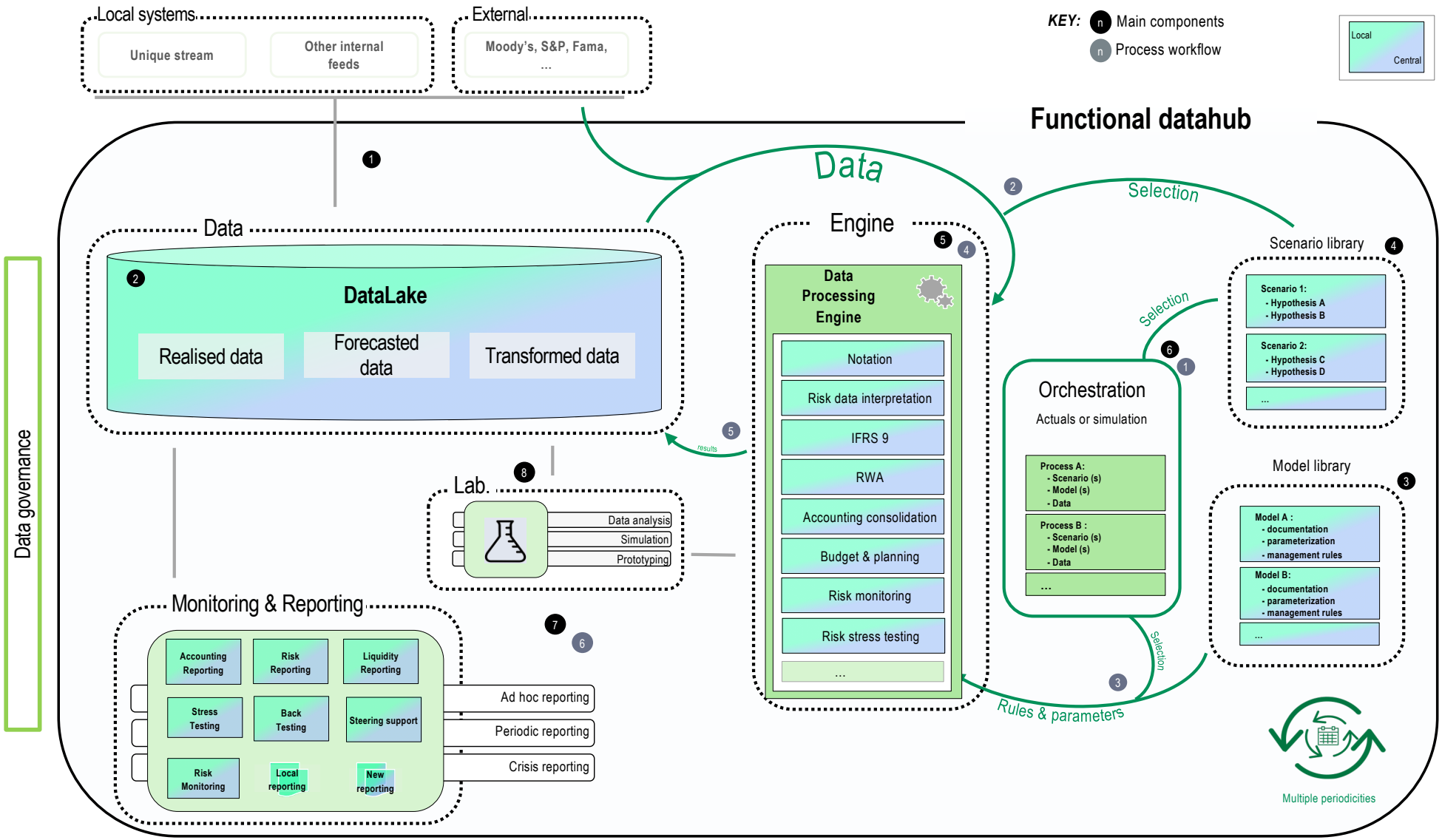
Three assets for the Group in line with STEP building path



Regulatory reporting and stress-testing based on complex computation and granular data

A long term IT strategy has been launched

A centralised platform to ensure consistency of Group usages



Lessons learnt on BNP Paribas' but also EBA's(1) side

The need for a continuous dialogue in 2019 on the evolutions required is highlighted

BNP Paribas' view

Methodology

- **Hybrid approach**: a bottom-up exercise that is excessively constrained and combined with penalties calibrated on ECB challenger models that are not shared
- The **static balance sheet assumption** is not representative of banks' models and particularly damaging for short term credit exposures
- **Capital market activities tend to be penalized**;
- Ensure that **internal models** are recognized at least for customer rates, ideally for balance sheet dynamics (i.e. prepayments).

Governance

- **Articulation between the JST and the DG IV**, or between EBA and ECB, was at times difficult

Process Management

- Increasing workload (over 2,000 people Europe-wide(2)), inflation in deliverables
- Operational problems: 5 versions of templates; FAQ up to last minute…

EBA's view(1)

Methodology

- **Constrained bottom-up approach** is increasingly complex
- The **static balance sheet** assumption is not consistent with banks' models and encourages banks to minimize the impact of the exercise

Governance

- Application of EBA methodology by various competent authorities (e.g. ECB) can result in **"uncoordinated actions"**
- **Decoupling of stress test results and supervisory actions**: major shortcoming EU vs. US

⇒ **2-stage way forward**

i. Some adjustments in 2020 (quick wins to address most obvious concerns)

ii. Potential major overhaul in 2022 (EBA top down calculation at industry level)

Call for dialogue to be coordinated with other banks

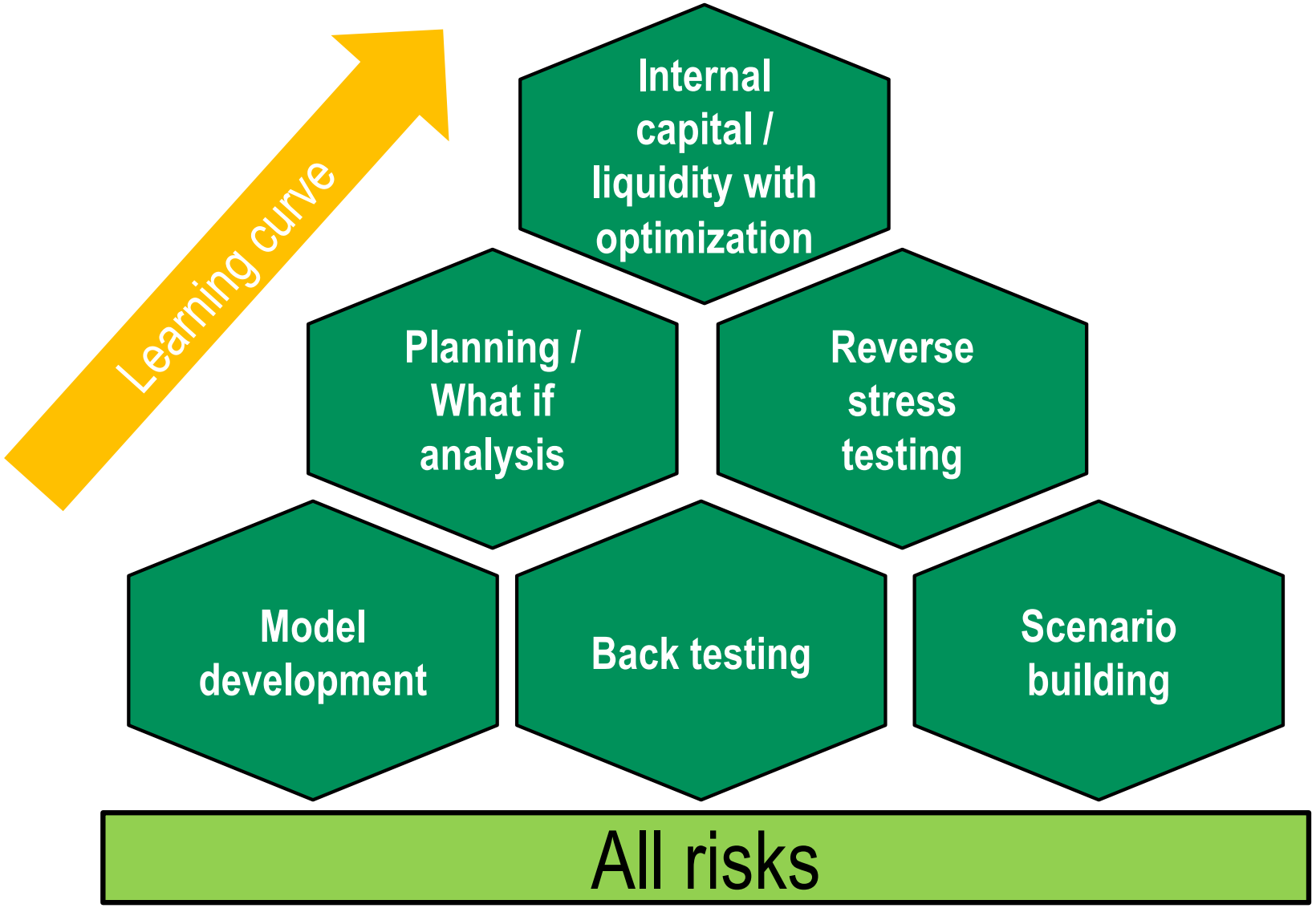
- Overall, EBA S/T guidelines should be more realistic and more closely aligned with banks' internal models
- **Credit risk:** Review the static balance sheet assumption and particularly its application to short term exposures
- **Market risk:**
  - Challenge the overall conservativeness of exercise for Market risk vs other risks
  - Review of floor, reserves shocks and recognition of client contribution modelling
  - Revert to a calculation from sensitivities or amend Quality Assurance process of Full Reval
- **Process organisation:**
  - The execution was tainted with multiple operational problems
  - The complexity of the EBA methodology has led to multiple questions by banks extremely late in the process (FAQ process)

⇒ STFS took part in a dialogue initiated by the EBA to make some adjustments to the 2020 exercise

⇒ Workshop with EBA is planned in June to start working on the design of a post 2020 regulatory stress testing framework

(1) Source: Speech by Andrea Enria to the National Bank of Romania on November 15th 2018 *(2) Source: Oliver Wyman*

The ultimate purpose of stress testing for BNP PARIBAS is the steering of scarce resources



Examples of research topics discussed with the Chair

Stress Test
RISK Management and Financial Steering
STfS

	Topics	Theoretical Aspects
Capital	▪ Optimizing Credit risk capital calculations based on Stress Tests	▪ Importance Sampling ▪ Monte Carlo
Reverse Stress Test	▪ Global Reverse Stress Test optimal split of the predefined loss on the different risk perimeters	▪ Machine Learning ▪ Clustering
Clearing Activity	▪ Stress test on Clearing Exposures (PhD topic definition ongoing)	▪ Random Graphs
Credit risk	▪ Credit sectoral correlation calibration & simulations	▪ Copula Theory
Market risk	▪ Long-term market risk stress test	▪ Probabilities theory ▪ LDA