EUREX Architects of trusted markets

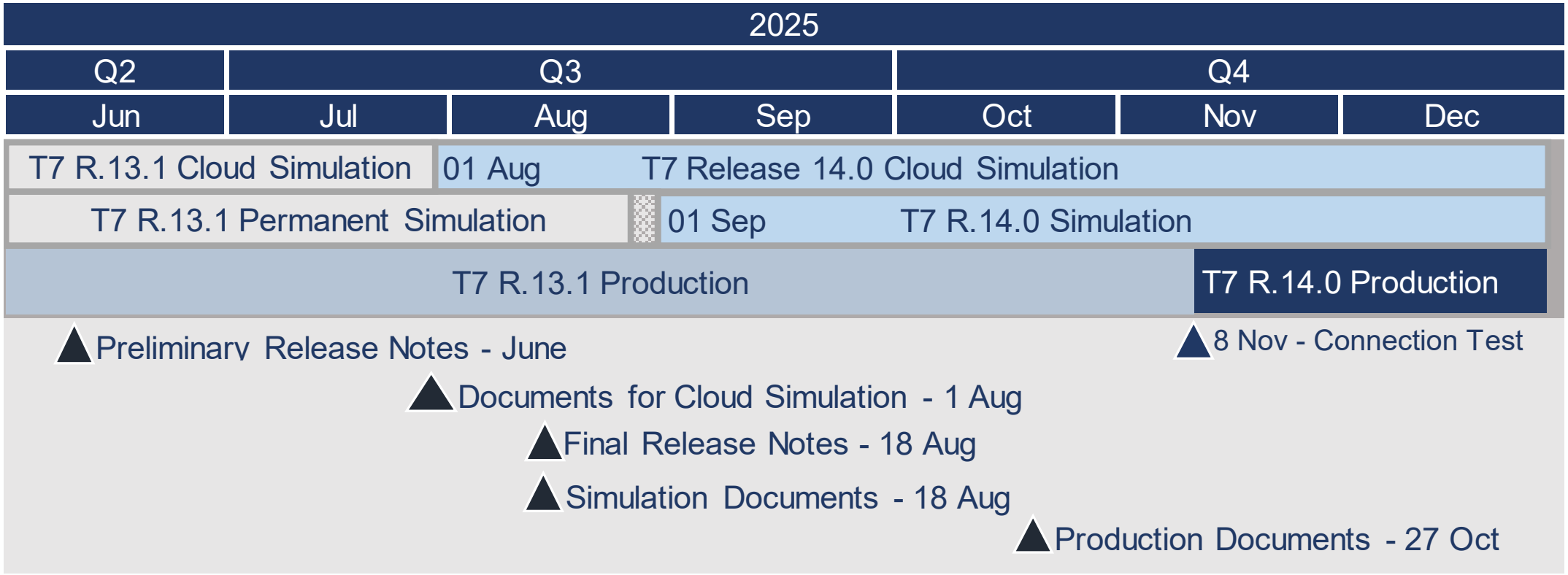
T7 Release 14.0

Derivatives Market Focus Call

3 September 2025

1 Overview and Introduction

Introduction Schedule



Release Milestones

T7 Cloud Simu
1 Aug 2025

Simulation
1 Sept 2025

Production
10 Nov 2025

Overview of Eurex T7 Release 14.0

MAIN FEATURES

1. Synthetic Matching for Butterflies and Condors in STIR Markets
2. Self-Match Prevention Enhancements
3. Sponsored Access
4. TRF Forward Implied Spreads
5. Extension of the Validation of the Customer Handling Instruction

Backwards compatibility for trading interfaces	NO
Backwards compatibility for market and reference data interfaces	NO

2 Synthetic Matching for Butterflies and Condors

EUREX

Synthetic Matching in T7

Currently

Synthetic matching for simple instruments and calendar spread instruments available for various futures products at Eurex

STIRs product suite offers additional complex instruments like futures condors and butterflies with four leg instruments

With Release 14.0

Synthetic matching in condors and **butterflies** complements already existing calendar spread synthetic matching and enhances orderbook liquidity and transparency in these products

Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

Terminology

Expiries

Expiries A, B, C, D ordered by shorter expiry first, meaning $A < B < C < D$

Instrument and Instrument Side

Simple instrument with expiry A denoted by $SI(A)$:

buy (sell) $SI(A)$

Calendar spread with expiry $A < B$ denoted by $Spd(A, B)$:

buy (sell) $Spd(A, B)$ → buy (sell) A, sell (buy) B

Condor with expiry $A < B < C < D$ denoted by $Con(A, B, C, D)$:

buy (sell) $Con(A, B, C, D)$ → buy (sell) A, sell (buy) B, sell (buy) C, buy (sell) D

Butterfly with expiry $A < B < C$ denoted by $But(A, B, C)$:

buy (sell) $But(A, B, C)$ → buy (sell) A, sell (buy) twice B, buy (sell) C

Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

Concept of Synthetic Matching (1)

Notation $synbuy\ SI(A)$, $synsell\ But(A,B)$, $synbuy\ But(A,B,C)$ or $snysell\ Con(A,B,C,D)$ is indicating **a synthetic combination** resulting in the corresponding orderbook side.

Closed Match Paths and Synthetic Path

- Considering **orderbook sides with best price level** and **accumulated quantity of best price level**
- Orderbook sides are combined in such way that combination is completely balanced and results to a **closed match path**

Any orderbook side of a closed match path can **represent the incoming orderbook side** containing the incoming order with corresponding price and quantity; remaining orderbook sides on passive side create **synthetic path opposite to incoming orderbook side**

Any closed match path has specific orientation; change of orientation results to a change of side of incoming orderbook and of synthetic path but does not change the fundamental order book combination

Example

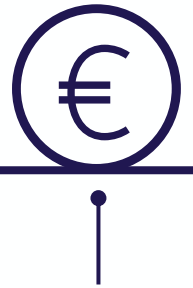
Closed match path:
$buy\ SI(A) \oplus sell\ Spd(A,B) \oplus sell\ SI(B)$

Incoming $sell\ SI(B)$ is opposite to $buy\ SI(A) \oplus sell\ Spd(A,B) =: synbuy\ SI(B)$

Opposite orientation of above $sell\ SI(A) \oplus buy\ Spd(A,B) \oplus buy\ SI(B)$

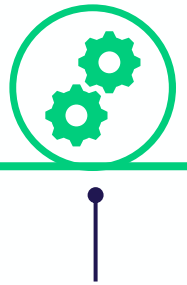
Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

Concept of Synthetic Matching (2)



Match price condition

- **Sum of sign-adapted price** of orderbook sides along a closed synthetic match path including incoming orderbook side must be **equal to or larger than zero** (sign-adapted price: any ask price is multiplied by (-1) before summing up).
- Consequently, the price limit of an incoming buy (sell) order must be equal to or higher (lower) than the price limit of the synthetic path on passive orderbook side opposite to incoming aggressive one.



Match quantity condition

- **Minimum over quantity contributions of all orderbook sides** including incoming orderbook side along a closed path must be **strictly larger than zero**.
- For complex instruments with leg ratio 1 involved in a closed synthetic match path, the match quantity condition is automatically satisfied.

Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

Condor Synthetics – Closed Match Paths for Condor

Only the most essential synthetic condor combinations are considered

Condor synthetics is based on **4 different closed match paths** consisting of one side and additional orderbook sides of simple instruments or **calendar spreads**

Closed match path of length 4	$buy\ SI(A) \oplus sell\ SI(B) \oplus sell\ SI(C) \oplus buy\ SI(D) \oplus sell\ Con(A,B,C,D)$
Closed match path of length 3	$buy\ SI(A) \oplus sell\ SI(B) \oplus \mathbf{sell\ Spd(C,D)} \oplus sell\ Con(A,B,C,D)$
Closed match path of length 3	$buy\ Spd(A,B) \oplus sell\ SI(C) \oplus buy\ SI(D) \oplus sell\ Con(A,B,C,D)$
Closed match path of length 2	$buy\ Spd(A,B) \oplus sell\ Spd(C,D) \oplus sell\ Con(A,B,C,D)$

Reminder: closed match paths have two different orientations; only the sell side of the condor orderbook is given above

Other closed match paths containing **one or more condors are not considered**

Condor composed of diagonal calendar spread: $buy\ SI(A) \oplus sell\ Spd(\mathbf{B,D}) \oplus sell\ SI(C) \oplus sell\ Con(A,B,C,D)$

Match path containing two condors: $buy\ Spd(A,B) \oplus \mathbf{sell\ Con(A,B,C,D)} \oplus \mathbf{sell\ Con(C,D,E,F)} \oplus sell\ Spd(E,F)$

Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

Condor Synthetics – Closed Match Paths for Butterfly

Butterflies can be treated as specific condors. Butterflies handled as specific condors with second and third condor leg identical to each other

Consequently, the following 4 different closed match paths consists of one side and orderbook sides of simple instruments or **calendar spreads**

Closed match path of length 4	$buy\ SI(A) \oplus \mathbf{sell\ SI(B)} \oplus \mathbf{sell\ SI(B)} \oplus buy\ SI(C) \oplus sell\ But(A,B,C)$
Closed match path of length 3	$buy\ SI(A) \oplus sell\ SI(B) \oplus sell\ Spd(B,C) \oplus sell\ But(A,B,C)$
Closed match path of length 3	$buy\ Spd(A,B) \oplus sell\ SI(B) \oplus buy\ SI(C) \oplus sell\ But(A,B,C)$
Closed match path of length 2	$buy\ Spd(A,B) \oplus sell\ Spd(B,C) \oplus sell\ But(A,B,C)$

Again, closed match paths are characterized by their orientation, only sell side of butterfly orderbook mentioned above

Other closed match paths containing **one or more condors are not considered**

Match path containing two butterflies: $buy\ Spd(A,B) \oplus \mathbf{sell\ But(A,B,C)} \oplus \mathbf{sell\ But(B,C,D)} \oplus sell\ Spd(C,D)$

Please see appendix for further detailed information on Synthetic Matching for Butterflies and Condors

3 Self-Match Prevention (SMP) Enhancements

Status Quo

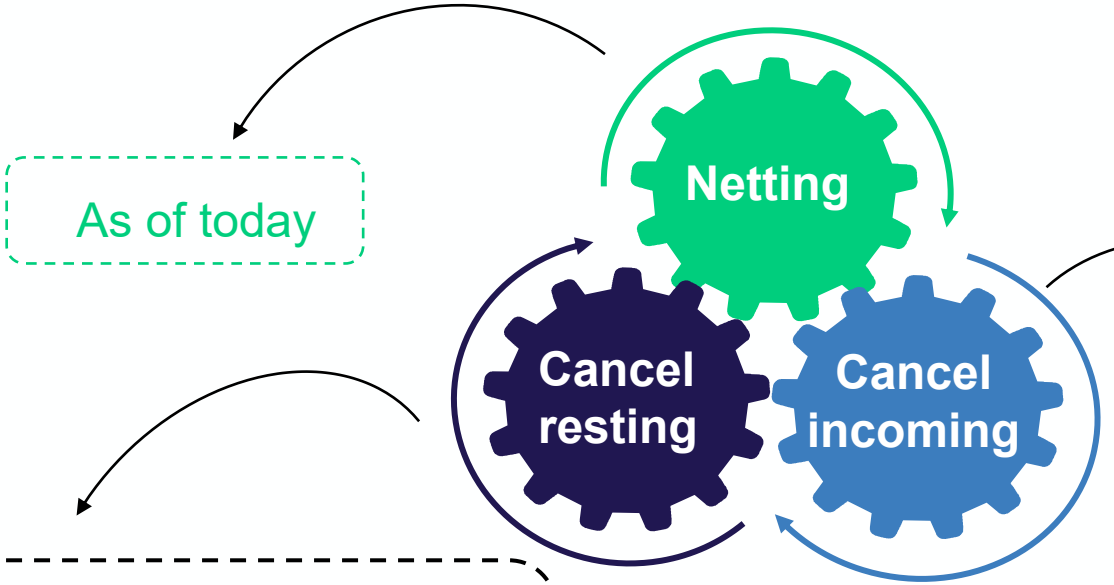
- T7 offers Self-Match Prevention (SMP) implementation called **netting**
- **Quantities of incoming & resting SMP order/quote** belonging to same business unit & having same SMP ID are processed as a “trade”. They are netted/reduced on both sides, and only the order/quote with higher quantity does survive.

- SMP functionally was enhanced to allow **matching over multiple price** levels; prior to that matching cascade was stopped on the price level where the SMP event was detected

- Eurex introduced **Market-wide SMP ID** which can be used by **different trading members** providing execution services to the same end-client; thus, **an aggressive order** containing a market-wide SMP ID is **prevented** from execution in case the opposing book order contains the same market-wide SMP ID regardless of the trading members owing the orders

Envisaged Changes

When entering an order, a trader can choose one out of three different ways how to resolve a SMP event by specifying the SMP deletion instruction which applies in case of a SMP event



As of today

Passive book orders with same SMP ID as incoming order is completely cancelled **without any reduction** of incoming quantity

After detection of SMP event, incoming order having the same SMP ID as resting book order is deleted without any reduction of quantity of the resting book order.

With T7 R14.0

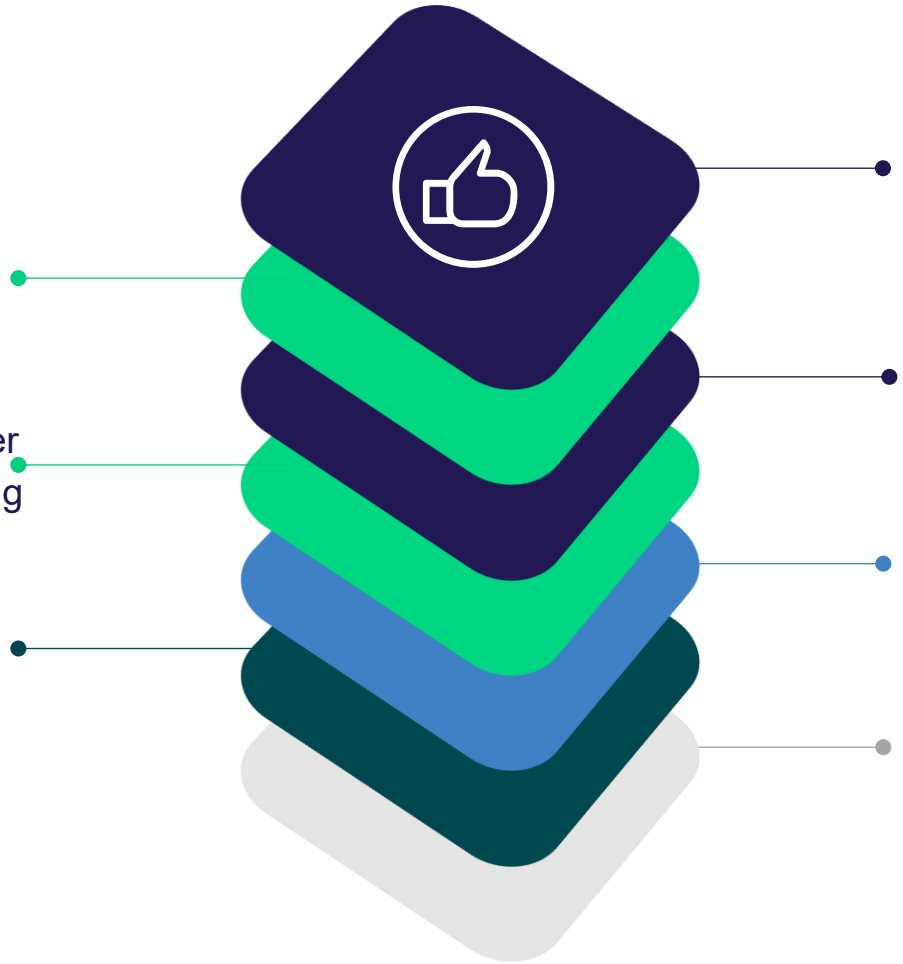
Major Design Elements of Enhanced SMP Deletion Scope

SMP applies in **continuous trading only**

Order Allocation "Time" (FIFO):

- Check of SMP event is done order-by-order
- Consequently, Matching Engine is matching as much as possible before detecting and resolving a SMP event

All elements of new SMP apply in the same way for **local SMP ID** and for **market wide SMP ID**



Incoming order defines the SMP deletion instruction

Order Allocation of type Pro-Rata:

- Check of SMP event is done for all price best orders before matching starts
- Consequently, Matcher Engine is resolving the SMP event before starting to match aggressive against passive orders

Out of scope for SMP: Synthetic matching & Eurex Improve

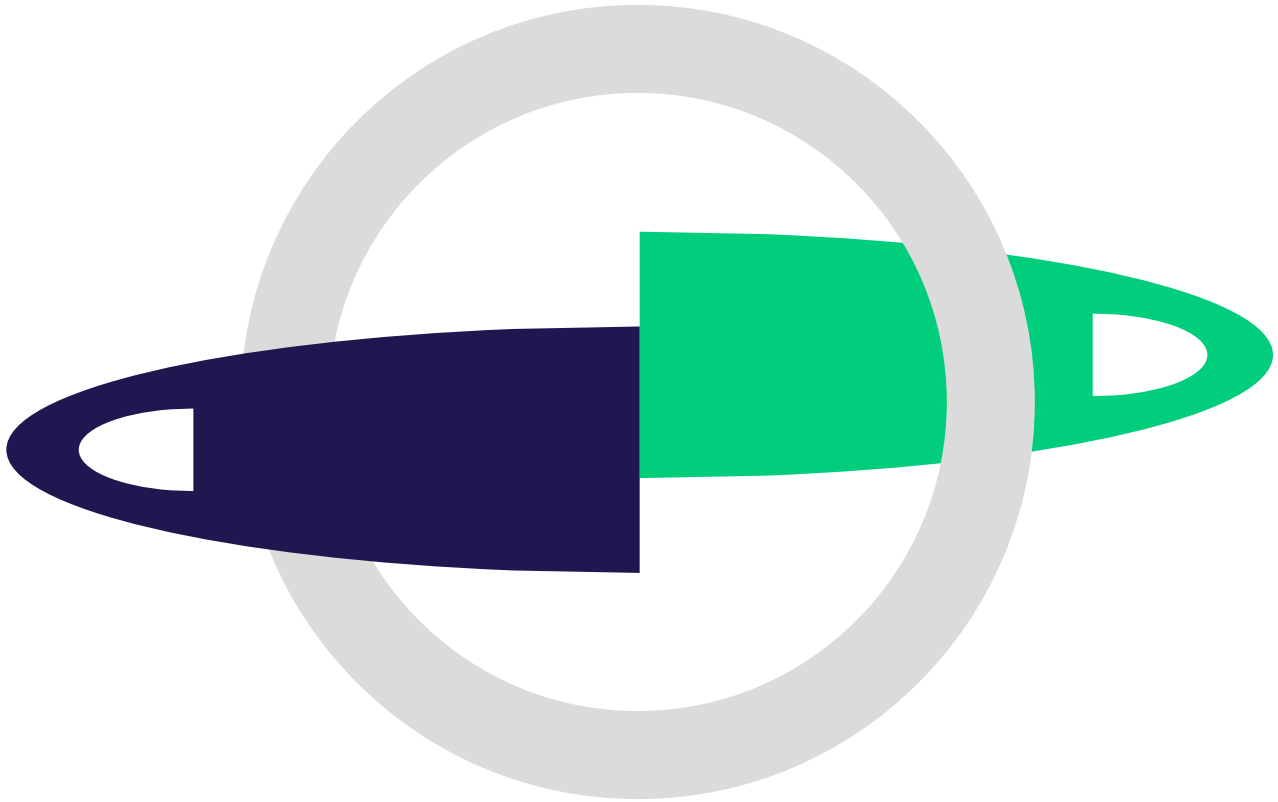
Default rule for SMP instruction, in case SMP ID is provided without dedicated SMP instruction, default deletion instruction **Cancel resting** applies

4 Sponsored Access (SpA)

SpA Definition

An additional T7 access for indirect participants who

- **Are not registered** at Eurex as an exchange participant **but would like to trade at Eurex**



- Would like to **use their own trading infrastructure** to technically **connect to T7**

Initial Offering

Any order type including lean orders

Optimistic order execution messages

Legally binding trade notifications (both on SpA provider and SpA user company level)

New ETI HF and ETI LF, and FIX LF BO Session usage

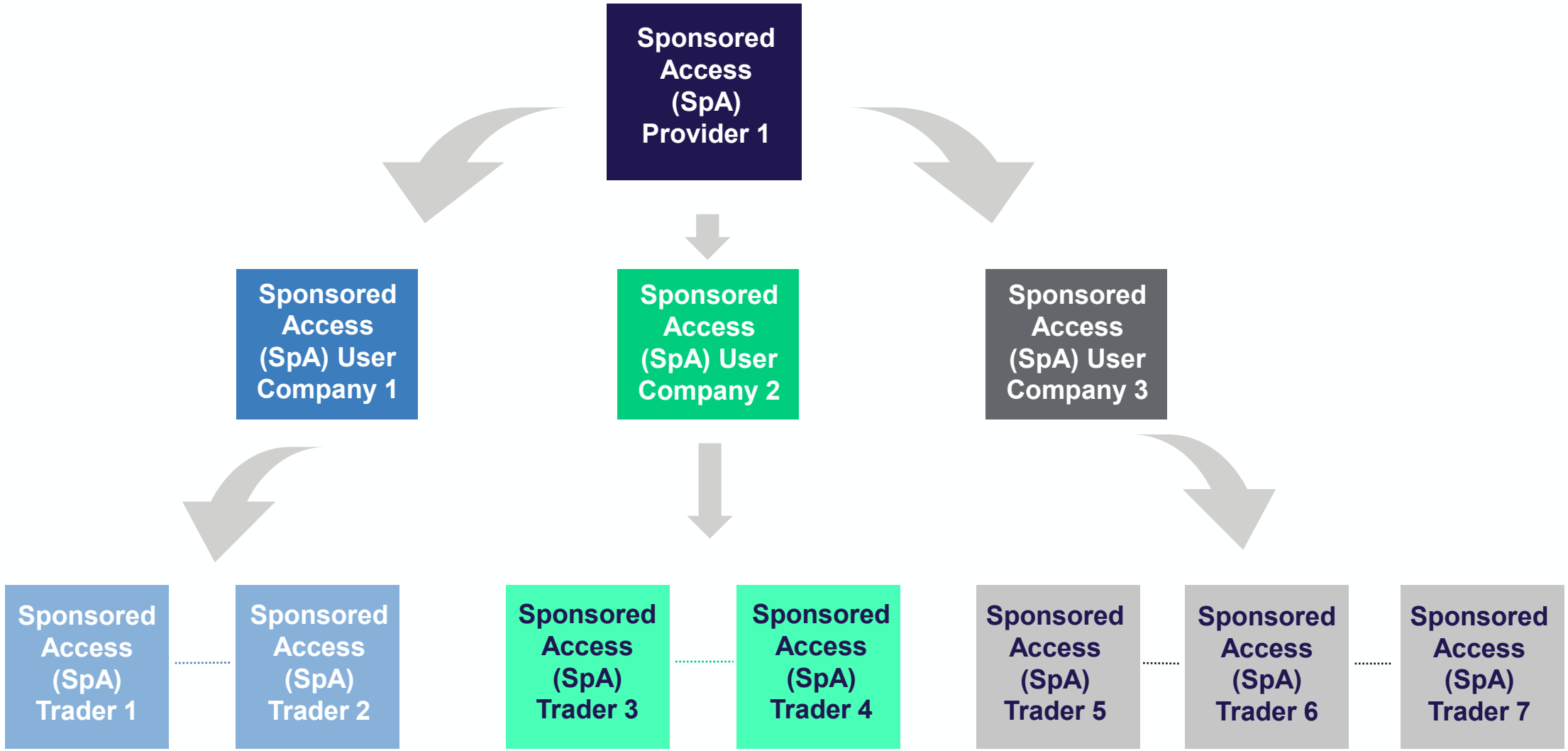
Pre-trade risk monitoring

Order drop copies via EDC interface for pre-trade risk monitoring (for SpA provider only)

Sponsored Access Roles

SpA provider	Each Eurex member who intend to provide access to indirect participants in T7 trading platform
SpA user company	Indirect participants linked to one or multiple SpA providers
SpA traders	Traders who are associated with the corresponding SpA user companies

Sponsored Access Relationship Structure



New Sponsored Access Configuration, Role and Maintenance

Configuration & Maintenance

- **Service Administrator of SpA provider** is responsible for maintaining SpA user companies and associated SpA traders **via T7 Admin GUI.**
- SpA providers will be able to define **UserGroup, UserRiskGroup, TSLUserGroup** on User Maintenance window to set relevant risk limits for SpA user companies.

New Role: Sponsored Access Trader

- Inherits all resources of the current trader role **except GUI and RDS resources.**
- **TES, EnLight, and Quote trading** are **disabled** for this role.

Role Assignment Rules

- Service Administrator of SpA provider can only assign user level “**trader**” or “**head trader**” to any SpA trader of a SpA user company.
- **None of SpA traders** can be assigned as **supervisor**.

Trading Capacity Restrictions

- SpA traders can **only trade under capacity "A (Agent)“**
- Orders using **"P (Proprietary)" or "M (Market Maker)" capacities** will be **rejected.**

New Sponsored Access Specific ETI and FIX LF Back Office Sessions

Session Setup & Access Control

- New **SpA-specific ETI HF and LF trading and back-office sessions** will be created in addition to existing ones.
- Each SpA user company is assigned a dedicated session by its SpA provider.
- **Access is restricted**: SpA users cannot access other sessions **under the same Business Unit (BU).**
- Session access is validated **via Gateway (GW) and Session Manager**

Business Unit (BU) Structure

- SpA user companies will be included in the **same BU of SpA provider**.
- There is a **1:1 relationship** between:
  - SpA trader
  - SpA user company
  - Assigned session

FIX LF Back-Office Session

- A **new SpA-specific FIX LF back-office session** supports the ETI LF session.
- Provides **drop copy** of **standard (non-lean) orders** for the current business day.
- Order data is copied from the **ETI HF session** of the SpA provider.

T7 Risk Management Solution for Sponsored Access

Functionality	Objectives / Use Cases
Market Maker Protection (MMP)	Prevent too many simultaneous trade executions on quotes to reduce market risk
Pre-Trade Risk Limit (PTRL)	Check whether the open position limit would be breached before an order is accepted
Maximum Order Value (MOV)	Prevent erroneous order by setting max order value per user
Transaction Size Limit (TSL)	Prevent erroneous order by setting max order quantity per BU/ User (group) / Product (group) for OB / TES / Spread
Safeguard for TES Uploading	Prevent abuse when loading trades on other platforms to the clearing system via T7
Price Validation	Prevent erroneous price and potential mis-trades
Advanced Risk Protection (ARP)	Define multi-level individual risk limits for themselves (CMs) and for associated NCMs
Panic Cancel	Delete all on-book orders and quotes
Stop Button for Trading	Stop Further Entry of OQ from BU or Trader and delete all on-book and TES OQ
Stop Button for Clearing	Stop further entry of OQ from dependent NCM and delete all on-book and TES OQ
Change of Member Status	Stop further entry of OQ from BU if status is “INACTIVE” or “HALT”, does not delete OQ
Negative Roles	Prevent a BU or Trader from using a specific functionality (via new Sponsored Access Trader role)
Kill Switch	Stop the processing of transaction from traders in emergency situations
ETI Throttle	Prevent vital components of T7 be harmed from excessively high transaction rates
Fuse Box	Prevent denial-of-service triggered by flooding of orders and quotes entered by user
Access to Broadcast Streams	Retrieve drop copy of standard orders (and lean orders) for pre-trade risk monitoring


5
TRFs for
Forward Implied Spreads
EUREX

Total Return Futures Forward Implied Spreads

In the T7 Release 14.0, Eurex will broaden the range of TRF strategies by introducing **TRF Forward Implied Spreads,** allowing investors to **speculate on the spread** between two points along the forward financing curve.

1. A new subtype of the TRF Strategy complex instrument, called **Forward Implied Spread (FIS)**, has been introduced.

2. The TRF strategy will consist of two leg contracts:
   - BUY an Index TRF contract in the back month.
   - SELL an Index TRF contract of the same product but in the front month expiry.

3. The back month BUY leg is called the **negotiable leg**. The overall strategy price corresponds to the back month futures price.

4. The front month SELL leg is known as the **anchor leg**. Its price is either fixed within the strategy definition or determined by the Market Price at execution.

5. While TRF FIS resembles a standard Calendar Spread, the structure and pricing mechanism are fundamentally distinct.

6. TRF FIS will be available for trading as **TAM or TAC**.

7. Eurex will facilitate both **on-book and off-book** trading of TRF strategies.

TRF Forward Implied Spread Subtypes

Name	1st Leg Buy (Negotiable)	2nd Leg Sell (Anchor)	Basis	Custom Udrlyng.	Anchor Leg Price	Preliminary Clrg. Price	TES	CLOB
FTAM-TF	TRF (Far Dated Expiry)	TRF (Near Dated Expiry)	No	Yes	Fixed	No	Yes	Yes
FTAM-TM	TRF (Far Dated Expiry)	TRF (Near Dated Expiry)	No	Yes	Market	No	No	Yes
FTAC-TF	TRF (Far Dated Expiry)	TRF (Near Dated Expiry)	No	No	Fixed	Yes*	Yes	Yes
FTAC-TM	TRF (Far Dated Expiry)	TRF (Near Dated Expiry)	No	No	Market	Yes*	No	Yes

(*) Both legs will be either traded as TAM or TAC, which also means that custom underlying is applied to both leg instruments. Preliminary clearing prices are applied to both legs.

6 Extension of the Validation of the Customer Handling Instruction

Extension of the Validation of the Customer Handling Instruction

Current situation

- Customer Handling Instruction (Rate ID) currently validated only for Trading Capacity "**Agency**" but not for Trading Capacity "**Proprietary**" or "**Market Maker**"
- Trade Enrichment Rules **do not validate** this field

Future situation

Trading Capacity Validation

- "**Agency**": **Strict validation** remains (only valid values W, Y, C, G, H, D - **no empty values**)
- "**Proprietary**" & "**Market Maker**": **valid values** or **empty value** allowed

Trade Enrichment Rules

- Validation becomes **stricter**: (only valid values - no empty values)
- With launch of release empty / invalid values will be **converted** to default value D via

TES Auto Approval Rules

- Only **valid values** allowed
- **Empty value** only allowed if Trading Capacity is **not "Agency"**
- Existing rules will be updated to reflect only valid values

Valid values

W – Desk, Y – Electronic, C – Vendor provided platform billed by Executing Broker, G – Sponsored Access via Exchange API or FIX provided by Executing Broker , H – Premium Algorithmic Trading Provider billed by Executing Broker, D – Other, including other-provided Screen

7 Further Changes & Enhancements

Further Changes and Enhancements (1/2)

1 Increase of Capital Adjustment r-Factor

- Possibility will be given to define higher values for r-factor used in Capital Adjustments
- Currently, r-factor is restricted to values up to 9999, in future, r-factor will have the format *decimal 14, 8* (corresponding to max. value of 999999.99999999)

2 Switch from mass deletion to session-specific broadcasts

- Currently mass deletion broadcasts are sent out
- Mass deletion broadcasts will be session specific

3 Enhanced GUI handling of PTRL and TSL maintenance views

- GUI handling of Pre-Trade Risk Limits (PTRL) and Transaction Size Limits (TSL) views will be improved
- Inclusion of new filters in Admin and Clearer GUIs

4 Modified Handling of field membClgIdCod in T7 XML Reports

- Modifications will be applied to T7 XML Reports
- TE810 T7 Daily Trade Confirmation: membClgIdCod will be filled with the clearer instead of external member ID.
- TE812 Daily Prevented Self-Matches: membClgIdCod will be removed.

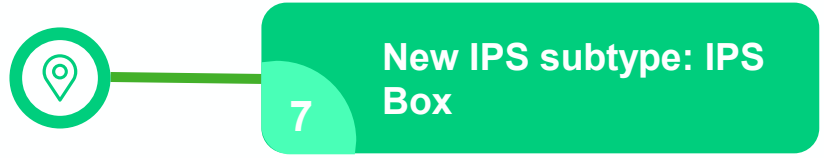
Further Changes and Enhancements (2/2)

5 Restoration of the ETI field FIXClOrdID

- With T7 Release 13.1, the obsolete field FIXClOrdID (FIX tag 30011) had been removed from a number of ETI messages
- Field will be restored in response to request from numerous participants

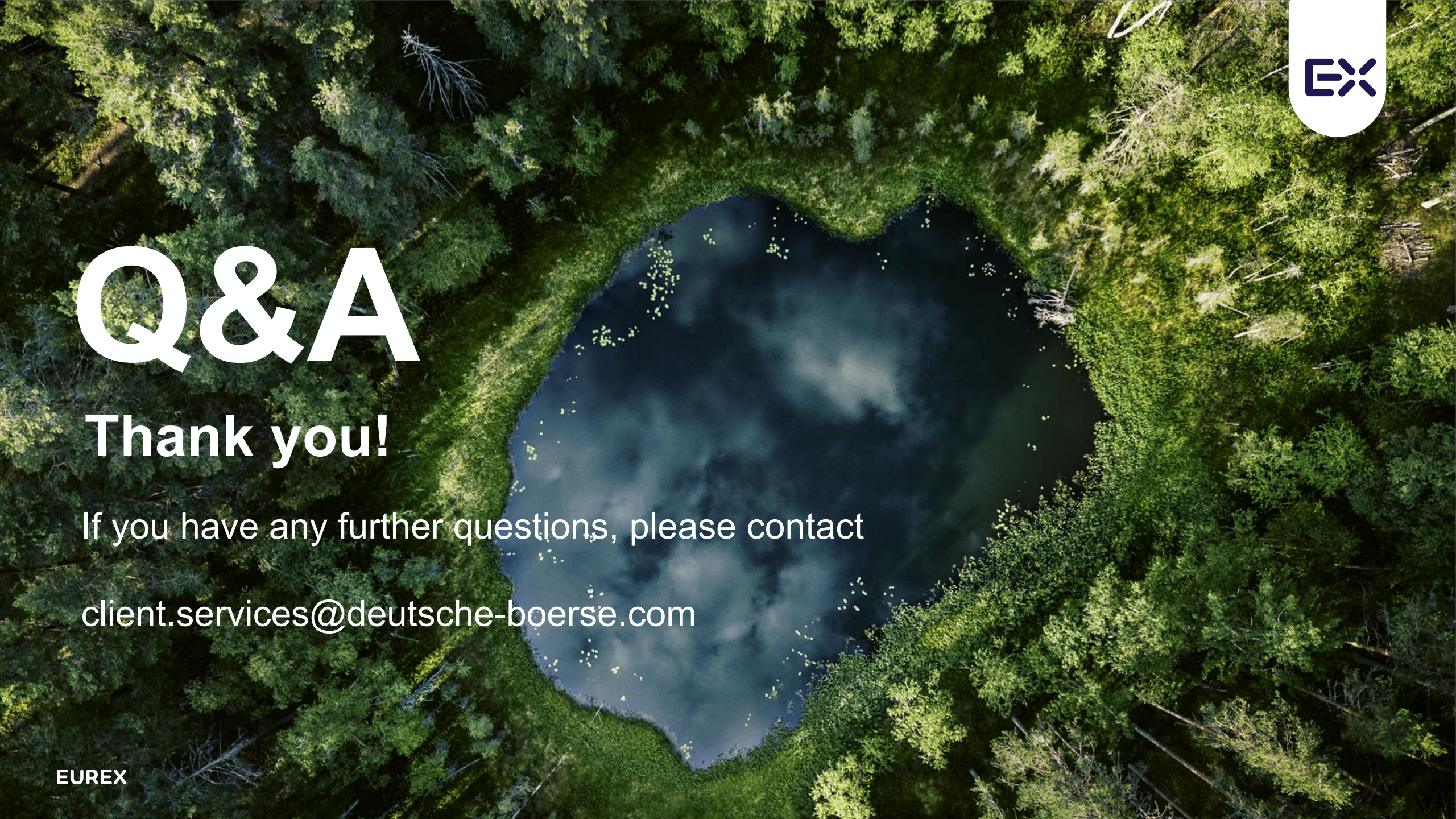
6 Individual component trade expiries for Equity Bespoke Baskets (EBB)

- Introduction of the possibility to define moderately differing expiries for individual EBB-component trades (for selected EBB baskets)
- Enables entry of EBBs consisting of component trades belonging to products with different expiry patterns
- New attribute *Maximum Difference of Expiration Months* will be defined by exchange for buckets & distributed via RDI
- Attribute reflects max. allowed difference in nr. of months of earliest expiration of component trade compared to basket expiration (if attribute is 0, all component trades have same expiries –reflection of current status)



7 New IPS subtype: IPS Box

- Introduction of new instrument subtype IPS-BOX (Inter-Product Spread Box) to instrument type IPS
- IPS- Box is essentially a calendar spread of IPS
- Technical set-up
  - Leg 1: Buy product A, contract with expiry T1
  - Leg 2: Sell product B, contract with expiry T1
  - Leg 3: Sell product A, contract with expiry T2 > T1
  - Leg 4: Buy product B, contract with expiry T2 > T1
- New instrument subtype will be included in instrument subtypes CSV file in product parameters file on Eurex website.


Q&A
Thank you!
If you have any further questions, please contact
client.services@deutsche-boerse.com
EUREX

8 Appendix
Synthetic Matching
Butterflies & Condors

Condor Synthetics – Category 1 versus Category 2 Paths

- To avoid crossed orderbook situations, condor synthetics distinguishes between different categories of synthetic paths
- All paths resulting to synthetic butterfly or synthetic condor are handled as synthetic paths of category 1 (implied-in), i.e., **any price or quantity update of a synthetic butterfly or condor path is immediately distributed via market data interfaces**

  Example: Taking closed match path $\boldsymbol{buy\ SI(A) \oplus sell\ SI(B) \oplus sell\ Spd(B,C) \oplus sell\ But(A,B,C)}$, the synthetic combination $buy\ SI(A) \oplus sell\ SI(B) \oplus sell\ Spd(B,C)$ is representing $\text{syn}buy\ But(A,B,C)$ orderbook side. Any price or quantity update of $\text{syn}buy\ But(A,B,C)$ resulting from a price or quantity update in the orderbook sides $buy\ SI(A)$, $sell\ SI(B)$ or $sell\ Spd(B,C)$ will be published immediately.
- All synthetic paths resulting to a simple instrument or calendar spreads which contain a butterfly or condor orderbook side are treated as synthetic paths of category 2 (implied-out), i.e., **any update of price or quantity of synthetic simple instrument or calendar spread paths derived from condor synthetics is only triggered in case of an incoming simple instrument or calendar spread order** entering the opposite orderbook side

  Example: Taking closed match path $\boldsymbol{buy\ SI(A) \oplus sell\ SI(B) \oplus sell\ Spd(B,C) \oplus sell\ But(A,B,C)}$, the synthetic combination $sell\ SI(B) \oplus sell\ Spd(B,C) \oplus sell\ But(A,B,C)$ is representing $synsell\ SI(A)$. Matching of $synsell\ SI(A)$ against an incoming $buy\ SI(A)$ will prevent display of crossed orderbook $But(A,B,C)$ if incoming $buy\ SI(A)$ would be written to its orderbook instead of matching.
- Synthetic paths of category 1 are used to create additional liquidity but do not support transfer of liquidity and synthetic paths of category 2 are required to prevent crossed orderbook situations in butterflies and condors.

Synthetic Matching Condition for Condors

General matching condition (reminder):

- Sum of sign-adapted price of orderbook sides along a closed synthetic match path (incl. incoming order) must be equal to or larger than zero
- Consequently, the price limit of an incoming buy (sell) order must be equal to or higher (lower) than the price limit of the synthetic path on passive orderbook side opposite to incoming aggressive one

Example 1: Incoming $sell\ Con$ order of closed match path $\boldsymbol{buy\ SI(A)} \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{sell\ Spd(C,D)} \oplus \boldsymbol{sell\ Con(A,B,C,D)}$

- Match price condition: $BP\big(SI(A)\big) - AP\big(SI(B)\big) - AP\big(Spd(C,D)\big) - AP^{inc}\big(Con(A,B,C,D)\big) \geq 0$ resulting to

$$AP^{inc}\big(Con(A,B,C,D)\big) \leq BP\big(SI(A)\big) - AP\big(SI(B)\big) - AP\big(Spd(C,D)\big) =: BP^{syn}\big(Con(A,B,C,D)\big) = TP\big(Con(A,B,C,D)\big)$$

- Match quantity: $TQ = MIN\{BQ\big(SI(A)\big); AQ\big(SI(B)\big); AQ\big(Spd(C,D)\big); AQ^{inc}\big(Con(A,B,C,D)\big)\}$ (no specific match quantity condition)

Example 2: Incoming $buy\ Con$ of closed match path $\boldsymbol{sell\ Spd(A,B)} \oplus \boldsymbol{buy\ Spd(C,D)} \oplus \boldsymbol{buy\ Con(A,B,C,D)}$

- Match price condition: $-AP\big(Spd(A,B)\big) + BP\big(Spd(C,D)\big) + BP^{inc}\big(Con(A,B,C,D)\big) \geq 0$ resulting to

$$BP^{inc}\big(Con(A,B,C,D)\big) \geq AP\big(Spd(A,B)\big) - BP\big(Spd(C,D)\big) =: AP^{syn}\big(Con(A,B,C,D)\big) = TP(Con(A,B,C,D))$$

- Match quantity: $TQ = MIN\{AQ\big(Spd(A,B)\big); BQ\big(Spd(C,D)\big); BQ^{inc}\big(Con(A,B,C,D)\big)\}$ (no specific match quantity condition)

As usual, any price advantage available on closed synthetic match path is given to incoming order, and no specific match quantity condition to be considered

Synthetic Matching Conditions for Butterflies (1)

General matching condition (reminder):

- Sum of sign-adapted price of orderbook sides along a closed synthetic match path (incl. incoming order) must be equal to or larger than zero
- Consequently, the price limit of an incoming buy (sell) order must be equal to or higher (lower) than the price limit of the synthetic path on passive orderbook side opposite to incoming aggressive one
- **Separate handling required for closed butterfly match path of length 4 involving two times inner butterfly leg**

Example 1: Incoming $buy\ SI(C)$ order of closed match path $\boldsymbol{buy\ Spd(A,B)} \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{buy\ SI(C)} \oplus \boldsymbol{sell\ But(A,B,C)}$

- Match price condition: $BP\big(Spd(A,B)\big) - AP\big(SI(B)\big) + BP^{inc}\big(SI(C)\big) - AP\big(But(A,B,C)\big) \geq 0$ resulting to

$$BP^{inc}\big(SI(C)\big) \geq AP\big(SI(B)\big) - BP\big(Spd(A,B)\big) + AP\big(But(A,B,C)\big) =: AP^{syn}\big(SI(C)\big) = TP\big(SI(C)\big)$$

- Match quantity: $TQ = MIN\{AQ\big(SI(B)\big); BQ\big(Spd(A,B)\big); AQ\big(But(A,B,C)\big); BQ^{inc}\big(SI(C)\big)\}$ (no specific match quantity condition)

Example 2: Incoming $sell\ Spd(B,C)$ of closed match path $\boldsymbol{buy\ SI(A)} \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{sell\ Spd(B,C)} \oplus \boldsymbol{sell\ But(A,B,C)}$

- Match price condition: $BP\big(SI(A)\big) - AP\big(SI(B)\big) - AP^{inc}\big(Spd(B,C)\big) - AP\big(But(A,B,C)\big) \geq 0$ resulting to

$$AP^{inc}\big(Spd(B,C)\big) \leq BP\big(SI(A)\big) - AP\big(SI(B)\big) - AP\big(But(A,BC)\big) =: BP^{syn}\big(Spd(B,C)\big) = TP\big(Spd(B,C)\big)$$

- Match quantity condition: $TQ = MIN\{BQ\big(SI(A)\big); AQ\big(SI(B)\big); AQ\big(But(A,B,C)\big); AQ^{inc}\big(Spd(B,C)\big)\}$ (no restrictions)

- Again, any price advantage available on closed synthetic match path is given to incoming order, no deviations to condors

Synthetic Matching Conditions for Butterflies (2)

Matching Condition of incoming Outer Butterfly Leg or of incoming Butterfly in case of closed match path only containing SI

- In line with general matching condition outlined before, **specific handling is required for closed butterfly match path** $buy\ SI(A) \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{sell\ SI(B)} \oplus buy\ SI(C) \oplus sell\ But(A,B,C)$ (and its opposite closed synthetic match path)
  - **Match price condition:** $BP\big(SI(A)\big) - 2 \cdot AP_{+}\big(SI(B)\big) + BP\big(SI(C)\big) - AP\big(But(A,B,C)\big) \geq 0$
  - **Match quantity condition:** $TQ = MIN\left\{BQ\big(SI(A)\big); \Big(AQ_{+}\big(SI(B)\big)\Big)\ DIV\ 2; BQ\big(SI(C)\big); AQ\big(But(A,B,C)\big)\right\} > 0$
  - In case the best price level only contains a 1 lot order, price AP_{+} is considering the second-best price level and the quantity AQ_{+} is the quantity accumulation of both price levels
  - Consequently, when orderbook allocation kicks in, the 1 lot price best order has higher priority than second best orders
- Thus, adapted match conditions do consider the **quantity contribution of inner butterfly leg which must be larger than 1**, i.e., $BQ\big(SI(B)\big) > 1$ or $AQ\big(SI(B)\big) > 1$, otherwise the traded quantity would result to $TQ = 0$
- In case of incoming outer leg order or incoming butterfly order and by considering the adapted match conditions, calculation of synthetic price and matched quantity is straight forward by using AP_{+} and AQ_{+}
- **Example:** Incoming $buy\ SI(C)$ order of closed path $buy\ SI(A) \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{sell\ SI(B)} \oplus buy\ SI(C) \oplus sell\ But(A,B,C)$
  - Match price condition: $BP\big(SI(A)\big) - 2 \cdot AP_{+}\big(SI(B)\big) + BP^{inc}\big(SI(C)\big) - AP\big(But(A,B,C)\big) \geq 0$ is resulting to

$$BP^{inc}\big(SI(C)\big) \geq 2 \cdot AP_{+}\big(SI(B)\big) - BP\big(SI(A)\big) + AP\big(But(A,B,C)\big) =: AP^{syn}\big(SI(C)\big) = TP\big(SI(C)\big)$$

  - Match quantity condition: $TQ = MIN\left\{BQ\big(SI(A)\big); \Big(AP_{+}\big(SI(B)\big)\Big)\ DIV\ 2; BQ^{inc}\big(SI(C)\big); AQ\big(But(A,B,C)\big)\right\} > 0$

Synthetic Matching Conditions for Butterflies (3)

Matching Condition of Inner Butterfly Leg in case of closed match path only containing SI

- Considering **inner butterfly leg $\boldsymbol{B}$** of match path $buy\ SI(A) \oplus \boldsymbol{sell\ SI(B)} \oplus \boldsymbol{sell\ SI(B)} \oplus buy\ SI(C) \oplus sell\ But(A,B,C)$
- Matching condition is given by $BP(SI(A)) - 2 \cdot AP^{inc}(SI(B)) + BP(SI(C)) - AP(But(A,B,C)) \geq 0$ resulting to
  - **Match price condition:** $AP^{inc}(SI(B)) \leq {}^{1}/_{2} \cdot \left(BP(SI(A)) + BP(SI(C)) - AP(But(A,B,C))\right) =: BP^{syn}(SI(B)) = TP(SI(B))$
  - **Match quantity condition:** $TQ = \mathbf{2} \cdot MIN\left\{BQ(SI(A));\ BQ(SI(C));\ AQ(But(A,B,C));\ \left(AQ_{+}^{inc}(SI(B))\right) DIV\ 2\right\} > 0$
  - $AQ_{+}^{inc}(SI(B))$ is considering an additional 1 lot order stored in the orderbook on the same side of the incoming order provided the price $AP^{book}(SI(B))$ of such a 1 lot order is equal to or better than $AP^{inc}(SI(B))$
  - Note that in case of price of passive 1 lot order $AP^{book}(SI(B))$ is better than price of incoming order $AP^{inc}(SI(B))$, the passive 1 lot order receives a match price advantage since matching takes place at price of $AP^{inc}(SI(B))$
  - In any case, passive 1 lot order has higher match priority than incoming order when orderbook allocation kicks in
- Same considerations apply to $sell\ SI(A) \oplus \boldsymbol{buy\ SI(B)} \oplus \boldsymbol{buy\ SI(B)} \oplus sell\ SI(C) \oplus buy\ But(A,B,C)$ for inner butterfly leg B
- Matching condition is given by $-AP(SI(A)) + 2 \cdot BP^{inc}(SI(B)) - AP(SI(C)) + BP(But(A,B,C)) \geq 0$ resulting to
  - **Match price condition:** $BP^{inc}(SI(B)) \geq {}^{1}/_{2} \cdot \left(AP(SI(A)) + AP(SI(C)) - BP(But(A,B,C))\right) =: AP^{syn}(SI(B)) = TP(SI(B))$
  - **Match quantity condition:** $TQ = \mathbf{2} \cdot MIN\left\{AQ(SI(A));\ AQ(SI(C));\ BQ(But(A,B,C));\ \left(BQ_{+}^{inc}(SI(B))\right) DIV\ 2\right\} > 0$ with quantity $BQ_{+}^{inc}(SI(B))$ enlarged by 1 lot book order if its price $BP^{book}(SI(B))$ satisfies the match price condition

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