T2S CHANGE REQUEST FORM		
General Information (Origin of Request) ☐ User Requirements (URD) or GUI Business Functionality Document (BFD) ☒ Other User Functional or Technical Documentation (SYS)		
Request raised by: 4CB	**Institute:** 4CB	**Date raised:** 29/03/2021
Request title: Enhance optimisation during RTS to maximise transaction throughput on the same resource		**Request ref. no:** T2S-761-SYS
Request type: Common	**Classification:** Scope enhancement	**Urgency:** Fast-track
1. Legal/business importance parameter[1]: High		**2. Market implementation efforts parameter[2]:** Medium
3. Operational/Technical risk parameter[3]: Medium		**4. Financial impact parameter[4]:** Very high
Requestor Category: Eurosystem		**Status:** Implemented

Reason for change and expected benefits/business motivation:

T2S is designed to support settlement of high volumes of transactions [e.g. Corporate Actions (CA)] during the NTS period which is tailored for the sequencing and the processing of those high volumes using specific mechanisms (NTS algorithms, batch settlement under NTS cycles and sequences).

T2S also settles continuous flows of transactions during RTS in compliance with the ceilings and KPI defined in the SLA[5] relying on a settlement processing capacity of 8000 transactions per minute without concentration of resources and 1200 transactions per minute otherwise[6].

An analysis conducted by the ECB/4CB in the context of the upcoming migration of Euroclear Finland (EFi) to T2S, as end-investor market, has identified the possibility of infrequent massive volumes of transactions that would be submitted instantaneously to a settlement attempt, e.g.:

- For CA processing related transactions: (i) concentrated on the same security or cash resource, (ii) put under Intraday restriction and (iii) then released and massively recycled upon receipt of new resources (up to circa 350 000 CA related transactions in the EFi scenario).
- Under extreme contingency cases where peak volumes of transactions (up to circa 850 000 for EFi CA scenario) remain unsettled at the end of NTS period. In this situation, this massive volume of unsettled transactions are submitted to the RTS processes for settlement.

Under these conditions, massive volumes of transactions would be submitted to a settlement attempt *concurrently*[7] , in addition to the regular flow of injected settlement instructions.

Such scenario could cause strong side-effects on settlement in RTS, and change requests shall be considered to support the following objectives:

- Objective 1: Enhance the RTS settlement processing in order to keep the Real-time settlement time co
- mpliant with the SLA despite any possible massive volume of transactions submitted concurrently to a settlement attempt. These enhancements aim to handle such exceptional massive concurrent settlement attempts for one CSD without impact on the other CSDs.
- Objective 2: Enhance the processing capacity of 1200 transactions per minute in case of concentration of resources in order to reach an improved timeframe for the recycling and settlement of up to circa 350.000

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[1] Legal/business importance: High because it will improve the stability of T2S in case of peaks in settlement volume
[2] Market implementation efforts: Medium as it would require implementation efforts only for a minority of T2S actors
[3] Operational/technical risk: Medium because even if the changes are made on the T2S settlement module, they apply only in very specific scenarios (exceptionally high volumes of settlement instructions).
[4] Financial impact parameter was set to Very High according to the following scale: 700kEUR < Very high
[5] See FA Schedule 6 KPI for Real-time settlement time
[6] Currently the maximum throughput in Settlement booking does not exceed 1 200 collections updates/minute in case the collection involves the same debited cash or securities account or the same credited securities account. This limit is due to a technical constraint (database simultaneously update limit).
[7] **Concurrently** means at the same time, in addition to instructions that are injected and submitted to a settlement attempt for which the Real-time settlement time KPI applies

transactions during RTS.

Description of requested change:

This change request CR-761 is mainly addressing the second objective above, together with a limited improvement of the Optimization process in relation to the first objective[8].

- ➤ **In order to contribute to the first objective** the settlement process shall be enhanced by removing transactions with no chance of success in RTS Optimization processes, considered as "useless" (as opposed to "useful transactions" which have some chance of success in the RTS Optimization processes):

    - A transaction is considered as "useless" if:
        - o It is in lack of securities
        - o no "useful" transaction credits the position in lack.

    - An unsettled transaction in RTS evaluated as "useless" will not trigger optimization processes as no solution can be found.

    - However, if a new incoming unsettled transaction can be optimized with a useless transaction, the optimization will process them without any delay

    - "Useless" and 'usefull' transactions are re-evaluated every N minutes[9]. In case a "useless" transaction becomes "useful", it will be sent to the Optimization functions.

    - Filtering of useless transactions is deactivated before the first cut-off (IDVP), in order to make sure not to miss any optimization attempt before the cut-off period[10].

    - Recycling and Partial Settlement Processes are not affected by the "useless" concept,

        - o Useless transactions are still eligible to recycling in Real Time

        - o During Partial Settlement Windows, all transactions eligible to partial settlement are considered useful

    .

- ➤ **For the second objective a mechanism is created** to improve VPB (Validation Provisioning and Booking) collections throughput for concentrated resources.

In case of high concentration of transactions on the same resource (i.e. debiting or crediting the same DCA, SAC or CMB and not allowed to be negative) and in order to avoid facing a VPB congestion due to the current throughput, this mechanism groups transactions without any business links between each other into a single collection. The grouping allows then to embed several Settlement transactions for each update on resource and thus to increase the throughput in total number of transactions/minutes/resources

The grouping aims at circumventing the technical limit of 1200 collections updates per minutes involving the same resource. It has no impact on the booking functional model nor it affects the definition of the existing interfaces with LCMM.

Such a mechanism shall improve the settlement efficiency in terms of booking duration and will benefit all CSDs regarding the existing business activities as well as T2S performance. The aim with the implementation of the CR-761 is to reach a throughput of up to 8000 transactions per minute

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[8] A second change request CR-770 is fully dedicated to the first objective.

[9] Each failing transaction is flagged as "useful" or "useless" in real time just after the first settlement attempt. Useful and useless transactions are then regularly re-assessed with a periodicity in the range of 10 minutes, which may be reviewed by the T2S Last Level support Team (LLS) upon observation on a temporary basis. In case the parameter needs to be reviewed on a permanent basis, the T2S Settlement Managers will be informed about the new proposed value.

[10] The deactivation time is set at one hour before IDVP cut-off time at launch.

Submitted annexes / related documents:

Outcome/Decisions:

* CRG on 2 September 2021: the CRG agreed to recommend CR-0761 for authorization by the T2S Steering Level, following a fast-tracked approach.
* AMI-SeCo on 10 September 2021: the AMI-SeCo advised to authorise CR-0761.
* CSG on 10 September 2021: the CSG agreed to authorise CR-0761.
* NECSG on 10 September 2021: the NECSG agreed to authorise CR-0761.
* PMG on 13 September 2021: the PMG proposed to allocate the CR to R7.0 and launched its detailed assessment.
* MIB on 15 September 2021: the MIB agreed to authorise CR-0761.
*CRG on 07 January 2022: The CRG agrees to recommend to the PMG the inclusion of CR-761 in scope of R7.0
*PMG and OMG on 3 February 2022: The PMG and OMG agreed to recommend to the T2S Steering level the allocation of CR-0761 in R7.0 taking into account that the operational impact is not yet completed.
*CSG on 10 February 2022: the CSG approved the inclusion of CR-761 in the scope of R7.0
*NECSG on 10 February 2022: the NECSG approved the inclusion of CR-761 in the scope of R7.0
*MIB on 10 February 2022: the MIB approved the inclusion of CR-761 in the scope of R7.0

Documentation to be updated:

Detailed assessment

EUROSYSTEM ANALYSIS – GENERAL INFORMATION	

T2S Specific Components		Common Components	
LCMM			
	Instructions validation		
X	Status management		
	Instruction matching		
	Instructions maintenance		
	Penalty Mechanism		
Settlement			
	Standardisation and preparation to settlement		
	Night-time Settlement		
X	Daytime Recycling and optimisation		
X	Daytime Validation, provisioning & booking		
	Auto-collateralisation		
Liquidity Management			
	Outbound Information Management		
	NCB Business Procedures		
	Liquidity Operations		
T2S Interface *(as of June 2022 without Static Data Management, Communication for SDMG, Scheduler, Billing)*			
	Communication		
	Outbound Processing		
	Inbound Processing		
Static Data Management *(until June 2022)*		**Common Reference Data Management** *(from R6.0 June 2022)*	
	Party data management		Party data management
	Securities data management		Securities data management
	Cash account data management		Cash account data management
	Securities account data management		Securities account data management
	Rules and parameters data management		Rules and parameters data management
Statistics and archive		**Statistics and archive**	
	Statistical information (until June 2022)		Short term statistical information
	Legal archiving (until June 2022)		Legal archiving (from R6.0)
			Data Warehouse (from R6.0)
Information *(until June 2022 containing reference data)*		**CRDM business interface** *(from R6.0 June 2022)*	
	Report management		Report management
	Query management		Query management
			Communication
			Outbound Processing
			Inbound Processing
Operational Services			
	Data Migration (T2S DMT)		Data Migration (CRDM DMT, from R6.0)
	Scheduling (until June 2022)		Business Day Management (from R6.0)
			Business Day Management business interface (from R6.0)
	Billing (until June 2022)		Billing (from R6.0)
			Billing business interface (from R6.0)

	Operational Monitoring		Operational and Business Monitoring
	MOP Contingency Templates		

Impact on major documentation		
Document	**Chapter**	**Change**
Impacted GFS chapter		
Impacted UDFS chapter	1.6.1.8.1 Concept	Add: "*In case of high concentration of Settlement Instructions on the same resource (i.e. debiting the same DCA, debiting or crediting the same SAC not allowed to be negative), the Settlement Instructions could be grouped without any business links between one another*"
	1.6.1.8.2 Overview	Add "*In case of high concentration of Settlement Instructions, Settlement instructions on the same resource (i.e. debiting the same DCA, debiting or crediting the same SAC not allowed to be negative), the Settlement Instructions could be grouped without any business links between one another.*
	1.6.1.9 Optimising	Add "*All pending Settlement Instructions, Settlement restrictions with no chance of success are removed from the selection of the optimization algorithms. They are considered again as soon as they can successfully take part in the optimization processes* "
Additional deliveries for Message Specification (UDFS, MyStandards, MOP contingency templates)		
UHB		
Impacted GDPR message/ screen fields		No impact
External training materials		
Links with other requests		
Links	Reference	Title

Summary of functional, development, infrastructure and migration impacts

The CR aims at:

- Improving optimization by removing "useless" transactions, that is to say pending transactions flagged as useless after their first settlement attempt if they cannot settle due to a lack of securities and cannot be optimized with any other pending transaction in the stock crediting their delivering position. The exact definition is the following one: a transaction is considered as "useless" if:
    - It is in lack of securities
    - No "useful" transaction credits the position in lack.

For that purpose, the Daytime Optimization Manager (DSO) function as well as the Massive Recycling sub-function of the recycling function (REC) should call a new "Eligibility To Optimization" (ETO)

function, which will check periodically[11] on a time basis the stock of unsettled or partially settled transactions, in order to flag transactions as useful or useless according as they have a chance to successfully take part in the optimization processes or not.

In case a "useless" transaction becomes "useful", it is sent immediately to the optimization process.

An unsettled transaction in RTS evaluated as "useless" will not trigger optimization processes as no solution can be found.

However, if a new incoming unsettled transaction can be optimized with a useless transaction, the optimization will process them without any delay

Filtering of useless transactions is deactivated before the first cut-off (IDVP), in order to make sure not to miss any optimization attempt before the cut-off period[12].

Recycling and Partial Settlement Processes are not affected by the "useless" concept:
- o   Useless transactions are still eligible to recycling in Real Time

- o   During Partial Settlement Windows, all transactions eligible to partial settlement are considered useful

- Improving VPB throughput:

  A new sub-function of the Failure Management and Settlement Outcome (VPB-FMS) function will be defined to perform an analysis of the "RTS Settlement Time" SLA: if a breach in the SLA is detected, that is, if the elapsed time between the collection creation timestamp and the settlement attempt timestamp is higher than the maximum duration specified in the SLA, then the sub-function identifies whether a concentration on a given resource (cash balance or securities position) is responsible for the breach.
  If such is the case, the resource is then flagged for grouping purpose.

  Once the resource is flagged as responsible for a SLA breach, a new sub-function of the Booking (VPB) function takes over, merging several collections impacting the flagged resources into a single unit of work in order to increase the throughput of the booking processes.

  If all collections from Intraday Restriction Check (VPB-IRC) function impacting the flagged resource are processed, the function will un-flag the resource, thus de-activating the merging process.

Main cost drivers:
- **Improving optimization by removing "useless" transactions**
  Major impact is caused by the specification and implementation of the concept of useless transaction and the creation of a new treatment for update of R&O eligibility flags. Furthermore, there will be technical impact (db2 tables etc.).

  The Removing of useless transactions requires the following developments
- -   Analyze new transaction entering in optimization and flag them 'useless' when they are in lack of securities and no useful transaction crediting the lack
- -   No triggering optimization for transaction flagged useless
- -   Change RTS algorithms:
  - o   No attempt to solve a lack with useless transactions
  - o   Refresh useless flag for all R&O unsettled transactions and send a new optimization for all transactions moving from useless to useful
  - o   Take into account new transactions entering in R&O
  - o   Take into account the change of lack (from lack of securities to lack of cash and vice versa)

- **Improving VPB throughput**
  The purpose of the grouping mechanism is to increase the VPB throughput, by grouping several

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[11] Each failing transaction is flagged as "useful" or "useless" in real time just after the first settlement attempt. Useful and useless transactions are then regularly re-assessed with a periodicity in the range of 10 minutes, which may be reviewed by the T2S Last Level support Team (LLS) upon observation on a temporary basis. In case that the parameter needs to be reviewed on a permanent basis, the T2S Settlement Managers will be informed about the new proposed value.
[12] The deactivation time is set at one hour before IDVP cut-off time at launch,

collections in the same unit of group. This requires new treatment of detection of resources to flag/unflag for grouping and the creation of a new process of grouping in VPB. Furthermore, there will be technical impact (db2 tables etc.).
Impact on other TARGET Services and projects
No impact has been identified.
Summary of project risk
Security analysis
No adverse effect has been identified during security assessment.

target | T2S

25 November 2021

Cost assessment on Change Requests

T2S-761-SYS – Enhance optimisation during RTS to maximise transaction throughput on the same resource			
One-off	Assessment costs* - Preliminary - Detailed	2,000.00 10,000.00	Euro Euro
One-off	Development costs	710,955.21	Euro
Annual	Operational costs - Maintenance costs - Running costs	 68,876.18 0.00	 Euro Euro

*The relevant assessment costs will be charged regardless of whether the CR is implemented (Cf. T2S Framework Agreement, Schedule 7, par. 5.2.3).