

Change Request form

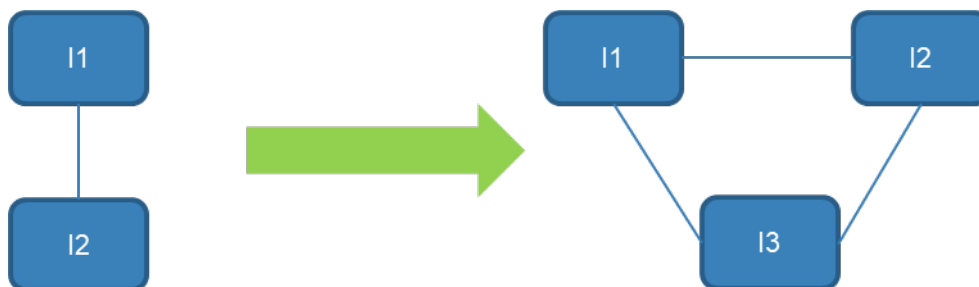
General Information (Origin of Request)		
<input checked="" type="checkbox"/> User Requirements Document (URD) <input checked="" type="checkbox"/> Other User Functional or Technical Documentation (SYS) <input type="checkbox"/> Other TIPS Documentation (OTD) <i>(to be filled in by CoG)</i>		
Request raised by: Eurosystem	Date raised: 24/11/2020	
Request title: TIPS RACE	Name of Central Bank: ECB	Request ref. no: TIPS 0042 SYS
Categorisation of changes		
1. Functional/technical importance parameter: Low	4. Legal importance parameter: Low	
2. Operational importance parameter: High	5. Financial importance parameter: Medium	
3. Stakeholder importance parameter: High		
Status: DA Approved by MIB		

Description of requested change:

The purpose of this change request aims at enhancing the TIPS platform resilience by adding a third TIPS installation, in the following TIPS Resilience And Continuity Enhancement (RACE), in addition to the current two already deployed. The main objective of the initiative is to lower the current RTO (Recovery Time Objective) from 15 minutes to zero in case of unavailability of a single site.

Moreover, the requested change must allow maintenance activities affecting an entire site and periodical recovery tests performed on T2 and T2S to be performed without any planned outages.

The third TIPS installation will not imply any changes to the ESMIG connectivity footprint, but it would just add a third instance (within the same region and in a different site) on top of the two already existing sites/instances (as illustrated in the following diagram).



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Reason for change and expected benefits/business motivation:

The provision of one additional installation enables a seamless automatic failover, without any human intervention in case of a single site failure. No time is allotted for human decision before starting the failover procedure. The automatic failover is possible, leveraging the capabilities of distributed middleware used in TIPS, only when an odd number of locations is provided, as this allows for implementing automatic decision protocols that avoid by design the so-called split-brain problem (i.e. a scenario in which two separate partitions of a distributed system operate in parallel, each of them under the assumption the other partition is down, thereby creating data inconsistencies). TIPS community will benefit of an improved SLA and continuous availability of the service even in case of loss of an entire site or in case of planned activities requiring such an outage.

Submitted annexes / related documents:

Proposed wording update to the documentation to address the requested change:

High-level description of Impact:

TIPS is currently hosted in two data centers, both in the Italian region, i.e. Italy Main (IM) site and Italy Secondary (IS) site. Scope of this CR is to analyze the drivers for and the feasibility of adding a so-called "TIPS RACE" – to be located in the metro area of Rome – already hosting the TIPS services. The third processing center – in addition to IM and IS – will be in Via Nazionale (nickname IN).

Outcome/Decisions:

L3 analysis - General Information	
Impact on TIPS	
Business Interface	
	A2A Interface
	U2A Interface
Settlement Engine	
	Payment Transaction
	Liquidity Transfer
	Recall
Queries and Reports	
	Queries
	Reports
Other functions	
	Local Reference Data Management
	Statistics
	Complex Queries and Reports
	Mobile Proxy Look-up
Common Components	
	ESMIG
	CRDM
	Archiving
	Billing
	DMT
Operational Tools	
	SLA Reporting
	TMS

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	Technical Monitoring	
	Change Management	
	Capacity Management	
Infrastructure request		
X	Application components impacted	
	Application components not impacted	
Operational activities		
	Business activities impacted	
	Technical activities impacted	
New functionalities		
Impact on documentation		
Document	Chapter	Change
Training documentation	FN.010_TIPS overview	Business continuity slides
Other documents		

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Summary of functional, operational, development, infrastructure and security impacts

Summary of functional impact:

A minor impact is detected on the TIPS User training material. The Business Continuity part included in the TIPS Overview presentation has to be updated.

Summary of operational impact:

Interruption of service during the change

Summary of application development impact:

- 1) The components of the TIPS application (Message Router, Settlement Core and Additional services) have to be properly reconfigured in order to extend their replication, allowing to add new nodes across multiple processing centers.
- 2) The database used by the GUI will be moved to a different technology (Cockroachdb).

Summary of infrastructure impact:

TIPS is currently hosted in two data centers located in the Italian region, namely Italy Main (IM) and Italy Secondary (IS). Scope of this CR is to assess the cost of adding a third TIPS instance located in the metro area of Rome. The third processing site – in addition to IM and IS – will be located in Via Nazionale thus the nickname IN.

The new TIPS platform will be composed by Open Systems, TIPSnet (a 4CBnet-NG extension), Aerospike, Kafka and Zookeeper, ELK Stack (Elasticsearch, Logstash, Kibana), WebSphere MQ, application and Cockroach DB, PostgreSQL, Technical Monitoring, Chaos Monkey, DNS, a remote access to TIPS from the Banca d'Italia domestic LAN, system automation (Ansible) and Active Directory and Identity Management system. Network Service Provider (NSP) connectivity is intentionally left out of the scope (no changes on the ESMIG footprint). The key drivers for implementing TIPS RACE are:

- i. In case of single site failure TIPS has an RTO=15 min (after the decision time) - the goal achieved with the TIPS RACE is to reset the RTO value (**RTO=0**) by enabling a fully transparent failover architecture moving from an Active/Active topology to an Active/Active/Active topology (where at least two out of the three TIPS installations would ensure the continuity of the TIPS service towards the user community);
- ii. Improve the timeliness and efficiency of **vulnerability and patch management process** (both system software and application software updates) by ensuring full operational and maintenance independence between the three processing centers;
- iii. Increase the overall resilience of the system infrastructures through the three-site setup thus always allowing the use of the “rolling update” technique to carry out **change management process** activities, resulting in an improved service continuity (e.g. no need for planned maintenance windows).
- iv. Make **TIPS platform independent from T2/T2S business continuity test plan**; Target2 and T2S have the contractual obligation to periodically perform site recovery and regional recovery tests during which it is necessary, among other things, to isolate the network (on a single site or on an entire region) thus

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inducing disturbances on the provision of the TIPS service. The introduction of the TIPS RACE would address that addition, avoiding disturbances on TIPS during the T2/T2S business continuity tests.

The third instance will have predefined capabilities in terms of self-sufficiency. It is important to point out that the third instance will not have the ability to provide the service in the event of unavailability of both the IM and the IS (e.g. the ESMIG connections that will continue to be attested only on the two main sites). To run the TIPS service at any time, at least one of the two main data centers has to be available. The TIPS RACE goal is to allow the automatic recovery in case of single site failure without any service interruption. The third instance (IN) and the Main Land (i.e. both existing sites in the Italian region, IM and IS).

The service dependency between the TIPS RACE and the Main Land is clarified in the following table:

Service	Main land vs. TIPS RACE
Network Service Providers (NSP)	Main Land
IAM (Identity and Access Management)	Main Land
IAM ESMIG portal	Main Land
Deploy (Banca d'Italia domestic)	Main Land
CRDM / Billing	Main Land
Legal archiving	Main Land
Satellite	Main Land
Trouble ticketing	Main Land
DHCP	Main Land
SIEM	Main Land
Load balancing	Main Land
Oracle informational DB for U2A GUI	Main Land
IBM Tivoli Storage Manager (TSM)	Main Land
DNS	Main Land
IAM proxy	Main Land
Ascertia ADSS	Main Land
Secure GTW / SSL VPN	IN and Main Land
System Automation (Ansible)	IN and Main Land
Active Directory	IN and Main Land
IPA Server	IN and Main Land
DAC (Directly Attached Consoles)	IN and Main Land

Service impacts:

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The TIPS RACE implementation, i.e. the transition from the current two-site architecture to a three-site one, will necessarily involve interventions requiring to stop the TIPS service for a limited period of time. The number and the magnitude of the TIPS service interruptions that will be (absolutely) necessary are yet to be sketched in detail, nevertheless an order of magnitude of a dozen of non-contiguous hours of outage have to be taken into account. There will be the need to plan and agree on such “windows” during the TIPS RACE implementation plan.

Summary of security impact:

See Change Request analysis.