

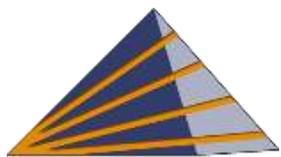
Cards Stakeholders Group

CSG 153-15
(v1.0)

Euro Retail Payment Board

Acquirer to Issuer Processing Study

13 June 2016



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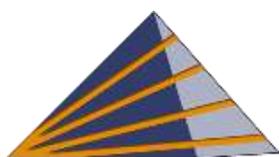
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1. Executive Summary

During its June 29 2015 meeting, the ERPB invited the CSG to evaluate the opportunity of migrating to a single standard in the Acquirer-to-Issuer domain, to address a widespread concern about the slow progress of SEPA for cards in this domain.

With reference to the Eurosystem's view, the use of multiple diverse standards results in having a fragmented market and that is widely recognised as the main cause of that slow progress. In their publications, the Eurosystem often identify the lack of standardisation in the Acquirer-to-Issuer card processing domain as one of the main reasons for fragmentation. The ERPB also validated the results of a previous CSG report on the Acquirer-to-Issuer domain.

This report constitutes the response of the CSG to the ERPB invitation, by addressing the Inter-PSP card processing domain in SEPA, i.e. the processing which takes place between the acquiring side and the issuing side.

Objective and requirements

Its objective is an opportunity study (evaluating interests and benefits) on:

- Migration to a single common standard of message set
- Migration to a single common standard of clearing and settlement practices

Currently, most of the protocols used in the market in the Acquirer-to-Issuer domain are based on flavours of the ISO 8583 standard in its different versions. There are initiatives to define a standard based on the new ISO 20022 messages.

The study investigates both ISO 8583 and ISO 20022 migration options.

Requirements for the success of this migration and proposals for the organisation of the project are also defined in the report.

Migration scenarios

Three scenarios are identified and analysed:

- Scenario 1: "Baseline Scenario", let the market evolve
- Scenario 2: migration to a common ISO 8583 implementation
- Scenario 3: migration to a common ISO 20022 implementation

For Scenarios 2 and 3 the set-up of **one Specification Provider** producing one single set of Implementation Specifications (MUG) is an expected requirement for success.

Based on the MUG produced by the Specification Provider, each Scheme will produce a Message Implementation Guide (MIG) which is implemented by the default Switch and Clearing and Settlement Solution Providers of that Scheme.

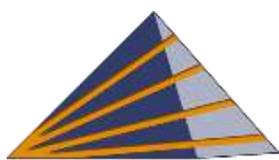
The requirements for the organisation of the migration processes are also defined in the report.

The proposed organisation of the migration process is defined into four different phases:

- Set-up of the Specification Provider
- Requirements gathering and issuance of the common specifications
- Migration at Scheme level
- Decommissioning of the old platforms (when applicable)

An estimated duration for the migration, from the moment that the Specification Provider completes the specification(s) and the Solution Providers have completed the implementation, could be from 4 to 8 years.

Business Rationale



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In order to determine which of the three scenarios should be recommended, the study has analysed two kinds of aspects:

- Quantifiable aspects (i.e. assumption of costs and benefits)
- Unquantifiable aspects (i.e. pros and cons)

The quantifiable aspects analyse 3 situations – low, medium and high estimates, which does not allow for very precise numbers because they are based on high level assumptions. The uncertainty also derives from the impossibility to get real data due to reasons of confidentiality.

The financial results for Scenario 2 & 3 in comparison with Scenario 1 are the following:

- There is no business case for the low and medium estimates for both Scenario 2 (ISO 8583) and Scenario 3 (ISO 20022)
- The payback period is extremely long for the medium estimate, e.g. after 50 years the deficit still amounts to more than:
 - € 500 million for Scenario 2
 - € 1 billion for Scenario 3
- The payback periods in the high estimate situation is 11 years for Scenario 2 (ISO 8583) and 18 years for Scenario 3 (ISO 20022)

The main unquantifiable aspects of Scenario 2 & 3 (migration to a common standard) are:

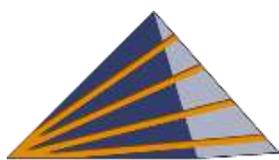
- Pros
 - Easier and faster switch development
 - Creation of a Level playing field reducing barriers to entry
 - More efficient use of resources from more efficient platforms
- Cons
 - No clear innovative functionality compared to the as-is situation
 - Schemes that have 'one leg out' still need to maintain the old standard
 - High implementation and migration costs, long time-frame for the project, may distract resources from business initiatives and hinder innovation

If Scenario 2 (ISO 8583) or Scenario 3 (ISO 20022) were envisaged, it would appear indispensable to mandate the migration to all the SEPA Schemes through their Default Solution Providers in order to achieve the initial goals set for the adoption of a common standard (e.g. reduce fragmentation). However there is the risk some actors (Schemes or Processors) would decide not to make the investment and perhaps step out of the market. Other actors may have a negative business case and hence incur higher costs that may lead to higher prices charged to the merchants and/or cardholders.

Conclusions and recommendations

The result of the Business Rationale analysis can be summarised as follows:

- A fair number of advantages but also of drawbacks in migrating to a common standard
- No business case for the low and medium estimates
- A payback period in the high estimate situation of 11 years for Scenario 2 (ISO 8583) and 18 years for Scenario 3
- A mandate, with all the derived issues, would be the only way to achieve the expected results
- The need to ensure nearly complete homogeneity of the standard coverage, at the



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risk of hindering innovation

All that considered, the CSG is unable to recommend mandatory migration to Scenario 2 or 3. The CSG is also unable to recommend Scenario 1 because it would perpetuate the current situation.

The CSG also recognises a potential in the adoption of ISO 20022 compared to ISO 8583, particularly considering the advantages identified in the study in terms of support for evolution, and therefore considers the following recommendation:

Issue / recommendation	Addressees / relevant stakeholders	Remark
CSG recommendations on the ERPB's request to evaluate the interest and benefit of the migration to a single standard of messages and standardised clearing/settlement practices in the issuer-to-acquirer domain		
<p>The CSG recognises a potential in the adoption of ISO 20022 compared to ISO 8583, for the following reasons:</p> <ul style="list-style-type: none"> • It could provide interesting advantages in terms of support for evolution • Although there is no business case for the whole ecosystem some individual entities might find a positive business case in the migration <p>The CSG thus recommends the adoption of a market driven approach to migration to ISO 20022 where such a migration is decided based on business considerations.</p> <p>In order to optimise the market driven approach and make sure that those entities who decide to migrate to ISO 20022 choose the same commonly agreed specification, the CSG proposes to carry out the following activities:</p> <ol style="list-style-type: none"> 1. Refine and advocate the framework proposed in this document 2. Establish a liaison between the CSG and the relevant ISO committees so that SEPA requirements in this domain are taken into account 3. Consider alternative migration strategies (clearing only, specific geographical domains, groups of Schemes etc.) 4. Monitor the evolution and adoption of the standard 	CSG	



2. Introduction - ERPB Mandate

During its June 29 2015 meeting, the ERPB invited the CSG to evaluate the opportunity of migrating to a single standard in the Acquirer-to-Issuer domain, to address a widespread concern about the slow progress of SEPA for cards. With reference to the Eurosystem's view, the use of multiple diverse standards results in having a fragmented market and that is widely recognised as the main cause of that slow progress. In their publications, the Eurosystem often identify the lack of standardisation as one of the main reasons for fragmentation.

The ERPB also validated the results of a previous CSG report on the domain. This report constitutes the response of the CSG to the ERPB invitation.

2.1. Card Acquirer-to-Issuer domain analysis

During its June 29 2015 meeting, the ERPB agreed on the following:

Number	Issue / recommendation
ERP/2015/sta3	The ERPB invited the CSG to perform a study at the European level to evaluate any interest and benefit of the migration to a single message standard and standardised clearing/settlement practices in the issuer-to-acquirer domain

This report constitutes the response of the CSG to the ERPB invitation.

2.2. Report elements on Acquirer to Issuer Card Processing domain

The ERPB members also validated the following Acquirer-to-Issuer domain elements of the previous CSG report to the ERPB, on which this new report is building.

“This domain refers to the communication between the PSP of the Payer (the card issuer) and the PSP of the Payee (the acquirer). In card systems it is usually composed of 3 distinct phases:

1. *A real-time authorisation where the issuer is requested to authorise a transaction.*
2. *A financial presentment of the amount of the transaction usually done in batch mode in a clearing phase.*
3. *A final settlement phase corresponding to the financial transfer from the issuer to the acquirer corresponding to the performed transactions.”*

The detailed elements of that report are provided in Annex A.6, *Detailed report elements on Acquirer to Issuer Card Processing domain*.



The report concluded with the following recommendation:

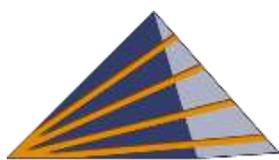
- *So far the CSG has not fully analysed this domain, it was only included in the published Data Element requirements (Book 3) and in the future processing framework requirements (Book 7).*
- *Given the stability of this domain, it is proposed to undertake a study, at European level, to evaluate any interest and benefit of a migration to a given standard of messages set and clearing & settlement practices. The CSG offers to organise this study.*

2.3. Nature of the problem to be solved

The reason the ERPB invited the CSG to carry out this study derives from a widespread concern about the slow progress of SEPA for cards. In particular, with reference to the Eurosystem's view, the use of multiple diverse standards results in having a fragmented market and that is widely recognised as the main cause of that slow progress.

In their publications, the Eurosystem often identify the lack of standardisation as one of the main reasons for fragmentation:

- [ECB 1] (the ECB report Cards Payment in Europe published in April 2014) recalled in paragraph 8.1 *Implementing the objectives* that
 - *"In its 6th SEPA Progress Report published in November 2008, the Eurosystem asked the European payment industry to ensure an adequate influence over the SEPA cards standards, stressing that such standards should preferably be non-proprietary (such as ISO standards). To address this key message, the EPC developed the SEPA cards standardisation programme and ecosystem, aiming to deliver consistent cardholder experience through harmonised "SEPA Standards", as explained above. Steps were also taken to provide additional clarity regarding the distribution of responsibilities in card standardisation and the involvement of relevant stakeholders, as shown by the creation of the Cards Stakeholders Group (CSG – a multi-stakeholder body representing retailers, vendors/manufacturers, processors, card schemes and the banking industry/EPC). Nevertheless, the Eurosystem's recommendations for integrating the newest developments in the context of ISO 20022 and, additionally, for more active involvement in the relevant global standardisation initiatives **were not received with the same enthusiasm by the European card payment industry.***
 - *Against that backdrop, the Eurosystem's views on card standardisation were once again outlined in the 7th SEPA Progress Report (2010). In the 7th SEPA Progress Report, the Eurosystem encouraged the direct and coordinated involvement of the European payment industry, ideally represented by the EPC, in the work of global standardisation initiatives, e.g. EMVCo and PCI*



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- SSC, and recalled that efficiency in the processing of card payments could be enhanced by the use of ISO 20022.”
- And in the conclusion box of paragraph 8.2 “*The Eurosystem recognises the appropriateness of ISO 20022 for card messages in the terminal-to-acquirer domain and sees the work carried out to date as an undisputable basis for the development of non-proprietary specifications. Moreover, the Eurosystem welcomes ISO’s efforts to deliver ISO 20022 for acquirer-to-issuer messages and will further analyse the potential adoption at the European level of the ISO 20022 standard for all steps of the card payment transaction chain after the final endorsement of ISO 20022 acquirer-to-issuer card messages.*”

3. Strategic Scoping and Objectives of the Analysis

This study addresses the Inter-PSP domain processing in SEPA, i.e. the processing which takes place between the acquiring side and the issuing side, as analysed in [SCS B7].

Its objective is an opportunity study (evaluating interests and benefits) on:

- Migration to a single common standard of message set
- Migration to a single common standard of clearing and settlement practices

Requirements and out of scope areas are defined.

3.1. Definitions

The recent [IFR] defines the processing and processors in the following way:

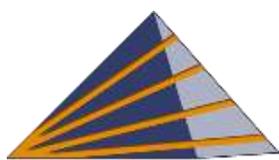
(24) *'processing' means the performance of payment transaction processing services in terms of the*

actions required for the handling of a payment instruction between the acquirer and the issuer;

(25) *'processing entity' means any natural or legal person providing payment transaction processing*

services;

In this study we will address the Inter-PSP domain processing, i.e. the processing taking place between the acquiring side and the issuing side, as defined in the chart below (extracted from [SCS B7]):



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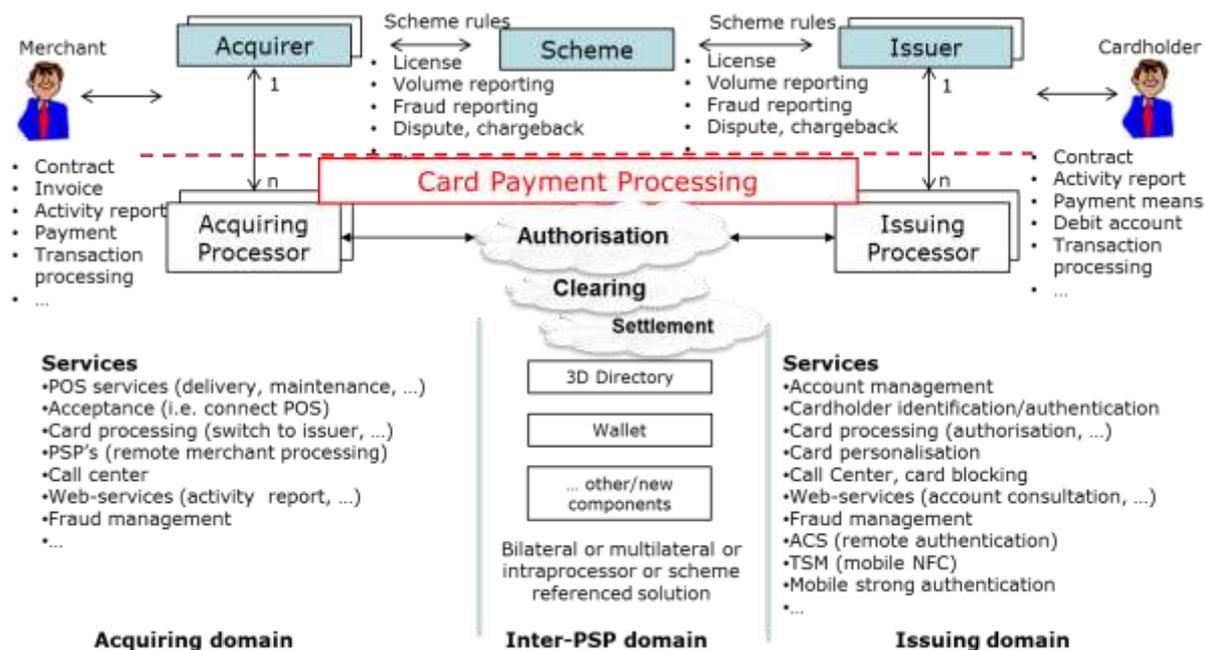


Diagram 1: Inter-PSP domain processing

Reminder: General principles expressed in [SCS B7]:

The Standardisation and conformance ecosystem developed by CSG within this SCS Volume aims to ease the development of 'brand independent' Implementation Specifications (e.g. EMV, POI-acquirer protocol ...) and solutions for the benefit of all stakeholders.

The description of the context and environment highlights some key characteristics of card payment services:

- Clear separation of roles between the actors : schemes, acquirers, issuers, processors
- Several services by different suppliers for one acquirer/issuer illustrate that competition already exists
- Most services are 'brand independent' and instead are specific to the card product type
- Cooperation already exists, as demonstrated by the use of common technical and security standards (e.g. EMV, 3D Secure for remote payment) in a competitive context (e.g. specific scheme rules).

In addition to the books related to requirements (functional, security) and the conformance verification process, this book defines additional business principles and requirements for market access and participation with the main objective of further facilitating an open and transparent market, which

- maintains competition
- improves efficiency
- fosters interoperability

and are based on scheme independent standards developed by Specification Providers in cooperation with relevant actors in the cards' payment landscape (e.g. schemes, processors, vendors ...).

3.2. Card Acquirer-to-Issuer Processing current situation

The current acquirer-to-issuer processing situation is characterised by the use of multiple message sets and processing practices in Europe. This fragmentation can be either country-based or scheme-based.

This diagram illustrates the current situation where different standards are used.

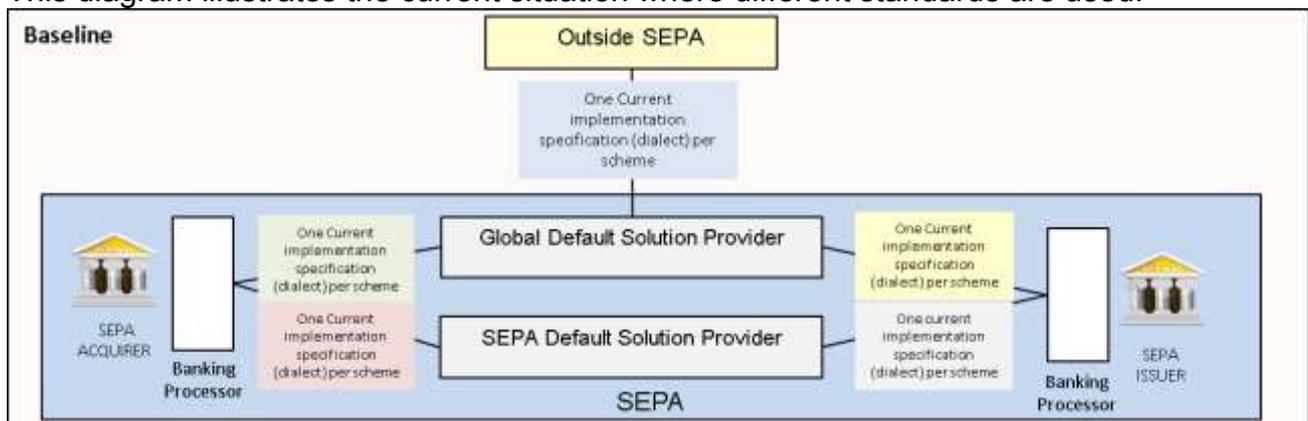


Diagram 2: Card Acquirer-to-Issuer Processing – Current Situation

A description on the main differences and practices can be found in Annex A.1.

3.3. Objective & Scope of the study

The objective of this study is an opportunity study (evaluating interests and benefits) on:

- Migration to a single common standard message set
- Migration to a single common standard of clearing and settlement practices

Currently, most of the protocols used in the market in the Acquirer-to-Issuer domain are based on flavours of ISO standard 8583 in its different versions. There are initiatives to define a standard based on the new ISO 20022 messages. Annex A.2 (for ATICA) and A.3 (for the Berlin Group and SCC) provide information on those standards.

The objective of this study is to analyse if the Card Stakeholders in SEPA have an interest to progressively evolve in the Acquirer to Issuer domain from a currently fragmented situation, where many standards and practices are defined per Scheme (domestic or international), to a more pan-European approach of the acquirer to issuer processing ecosystem.

The study will investigate the evolution to a common standard for SEPA based on either ISO standard (8583 and 20022).



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The geographical area where this study should apply is SEPA as defined by EPC's document [EPC 1].

The scope is therefore to analyse the interest and benefits for a common framework which enables the use of several Authorisation and Clearing infrastructures at a pan-European scale using a single set of common standards.

The main expected advantages results of such a migration to a common message set and processing practices framework are the following:

- Economies of scale, with one single technical standard for each actor to implement and to maintain
- More efficient processing infrastructures
- Less barriers to entry for new actors leading to more competition

This diagram illustrates how the situation would be after migrating to a common standard.

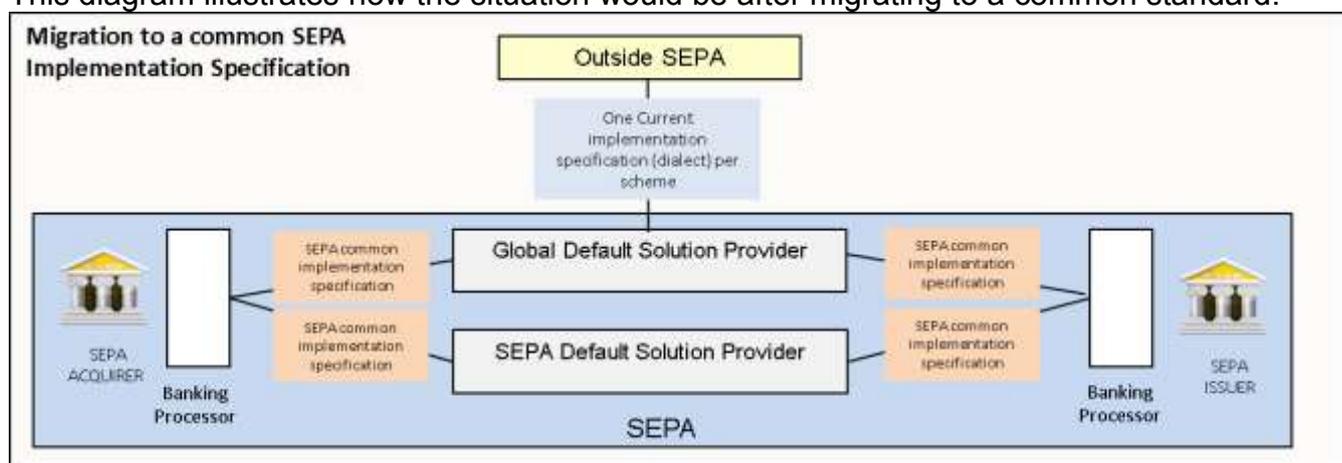


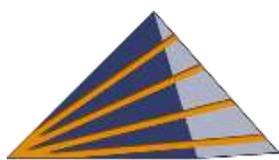
Diagram 3: Card Acquirer-to-Issuer Processing – Post Migration to Common Standard

3.4. Requirements

This paragraph identifies the requirements for the implementation of the previously defined scope.

A common message set and processing practices framework must:

- Ensure the governance of the standard in line with ISO
- Guarantee conformance to the Volume requirements
- Include the Schemes requirements covered by the current standards
- Safeguard the possibility for Schemes to implement competitive services within the standard
- Guarantee a performance level similar to that of the current infrastructures
- Ensure adoption by all SEPA Card schemes



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The adoption of the standard shall not hinder the interoperability of each scheme, including globally, and it shall not have downstream effects in other domains (e.g. on POS terminals).

The following functions must be catered for in a common format in order to be sure that the proposed standards cover ALL of them:

- Authorisation
- Financial (For Presentments, Re-presentments for both on-line and batch clearing)
- Reversal
- Reconciliation
- File Action
- Chargebacks
- Administrative (Retrieval request, Copy fulfilment etc.)
- Verification
- Network Management
- Batch Transfer
- Fee Collection
- Industry specific data
- Tokenisation and Token Processing native to ISO messaging

A more detailed description of those services is present in Annex A.2, in particular in A.2.2 ATICA and ISO 20022. The coverage of the services for ATICA and SCC is described in the table in annex A.2.1

3.5. Out-of-Scope

The following aspects are not part of the analysis:

- Transactional exchange
 - Terminal-to-acquirer domain processing (as well as other domains such as terminal security or card-to-terminal domains)
 - Migration to common Scheme rules or interactions between schemes
 - Aim for a single infrastructure in Europe (e.g. a single Settlement system, a single ACH and/or a single Authorisation Switching Network)
 - Aim for a single default infrastructure in Europe to be designated by all card schemes as their default solution to achieve the reachability of their members
 - Any aspect of transaction exchange/interoperability between Processing Entities of different Schemes
- Additional management services
 - Supporting access to information (e.g. product code tables etc.)
 - Processing for wallets, HCE, tokens etc. except impacts on authorisation and clearing, and aspects native to the ISO standard
 - Funds exchange methods and interfaces, as various methods of funds exchange may be considered and adopted



- Other aspects
 - Legal or regulatory aspects (since these are covered in the [IFR], [PSD2], EBA Regulations, competition regulations etc.)
 - How to enforce the recommendations of this report

The following are examples of aspects that are Scheme specific and not covered by existing standards:

- Format for electronically sharing data related to exception processing between customers and schemes
- Format for electronically sharing report related data (e.g. volume reports, settlement reports, operational reports, fraud reports) between customers and schemes
- Format for electronically sharing fraud alerts between customers and schemes
- Format for electronically sharing card lists between customers and schemes (e.g. negative lists, stand-in lists)
- Format for electronically reporting fraud between customers and schemes
- Format for online authentication (3D-Secure), however, this is being addressed by EMVCo
- Formats of additional services APIs
- Formats of BIN/IIN tables and associated parameters
- Risk Scoring as it depends on used tool, which could be different per scheme

4. Migration scenarios

Three scenarios are identified and analysed:

- Scenario 1: “Baseline Scenario”, let the market evolve
- Scenario 2: migration to a common ISO 8583 implementation
- Scenario 3: migration to a common ISO 20022 implementation

For Scenarios 2 and 3 the set-up of **one Specification Provider** producing one single set of Implementation Specifications (MUG) is an expected requirement.

Based on the MUG produced by the Specification Provider, each Scheme will produce a Message Implementation Guide (MIG) to be implemented by the default Switch and Clearing and Settlement Service Providers of each Scheme.

For Scenario 3, the implementation of ISO 20022 should take into account the existing initiatives, i.e. ATICA and SCC.

The requirements of the migration processes are also defined.



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4.1. Proposed scenarios to achieve the expected benefits

In order to analyse the potential interest and benefits of common message standard and common processing practices recognised by all schemes and shared by all processors, this section describes in detail the scenarios and assumptions made.

Scenario 1: “Baseline Scenario”, let the market evolve with different A2I implementations

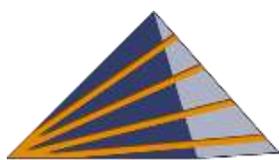
- This scenario corresponds to the existing landscape
- Several schemes use a solution based on ISO 8583, but
 - o Different versions are used (1987, 1993 and 2003)
 - o Each scheme has introduced its own flavours by adapting and/or implementing the standard according to their needs
- Each processor supporting a card scheme has to support the default solution of that card scheme and therefore specific implementations. Support of a new scheme usually results in the support of its specific default switch, clearing & settlement solution at issuing processor, inter-PSP processor and acquiring processor sites
- Each scheme may introduce innovation at its own pace; by managing on its default solution the required changes for the innovation
- Cooperation exists in the industry to evolve common technical and security standards (e.g. tokenisation and 3D-Secure 2.0)

Scenario 2: migration to a common ISO 8583 implementation:

- As explained in scenario 1, most existing A2I solutions are based on ISO 8583, but each with specific flavours
- Scenario 2 aims to ensure the migration of all existing default switch, clearing & settlement solutions referenced by schemes to a new set of messages and common set of procedures; the specificity of this scenario 2 is that the common set of messages is based on one of the existing ISO 8583 standard
- The new common set of messages should be defined and maintained in line with ISO by an independent Specification Provider (see below)
- A common and open governance and maintenance of the implementation specification is defined
- Clear rationale, an accepted transition and a common migration plan for all stakeholders shall be defined.

Scenario 3: migration to a common ISO 20022 implementation

- As for scenario 2, schemes and processors agree to migrate all existing default switch, clearing & settlement solutions to a new set of messages and common set of procedures;
- the specificity of this scenario 3 is that the common set of messages is based on the new ISO 20022 standard
- The main difference with scenario 2 is the use of ISO 20022, also used by SCT and SDD and by one Specification Provider in the Terminal to Acquirer domain
- In the Acquirer to Issuer domain, ISO 20022 is currently only being implemented as SEPA Card Clearing (SCC) for the German girocard Scheme as an ISO 20022 A2I



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- mechanism for cards clearing and settlement
- The new common set of messages should be defined and maintained in line with ISO by an independent Specification Provider (see below); some initiatives are already active
 - o SCC (Clearing and Settlement only, extension based on SDD messages) as an already available and implemented option
 - o ATICA Messages for authorisation and clearing is an ongoing initiative
- A common and open governance and maintenance of the implementation specification is defined
- Clear rationale, an accepted transition and a common migration plan for all stakeholders shall be defined.

Other scenarios

- For the time being, no other standard with a comparable scope as ISO 8583, ATICA and SCC are known in the acquirer to issuer domain, so no other candidate has been considered
- Variants of those scenarios could be envisaged, like having a mix of standards, e.g. ISO 8583 for authorisation and ISO 20022 for Clearing

4.2. The target ecosystem for Scenarios 2 and 3

4.2.1 Proposed ecosystem

The picture below describes the proposed ecosystem in the context of the adoption of one common protocol and set of messages for services in the acquiring to issuing domain (switch, clearing etc.). It is only an example of how the ecosystem could be organised. It should be further analysed and refined if a decision to migrate to a common standard should be taken.

Two main activities are involved: the production of specifications and the delivery of A2I services.

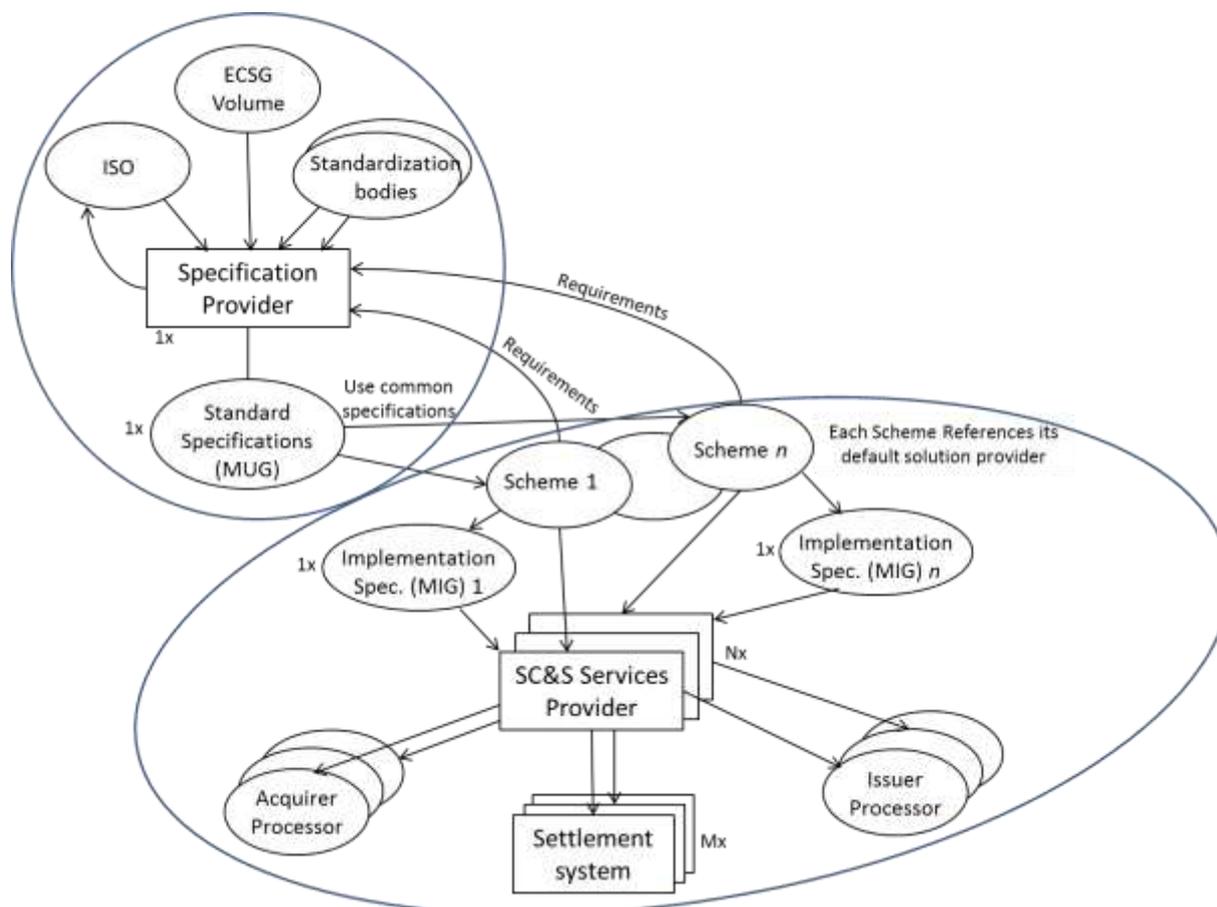


Diagram 4: *The Proposed Ecosystem*

4.2.2 Production of the specifications

4.2.2.1 Production of the MUG by the Specification Provider

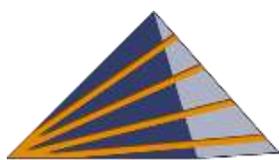
There is **only one Specification Provider** producing one single set of Implementation Specifications, the Message Usage Guide (MUG), based on the ISO messages. This is to ensure the coherence of the common single standard, however there will be several Implementation Providers.

The way the Specification Provider will work and how it will interact with the other actors of the ecosystem would be defined in the first step of the implementation of the standard. A possible organisation is described in the following paragraphs.

The Specification Provider:

- Shall develop and maintain the Implementation Specifications for the new common set of messages and of procedures.
- Ensures all interested parties may contribute to the definition and evolution of the needs

The Specification Provider takes into account the needs and requirements coming from:



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- The CSG Volume for the various services of the acquirer to issuer domain
- The various SEPA Schemes, for instance in the context of innovation or specific needs not already covered by the Volume and not in contradiction with similar aspects covered by the Volume
- Processors as they have to implement the resulting specifications

In principle every interested party needs will be welcomed and no one should be excluded.

The Specification Provider will have to consider:

- The deliverables of standardisation bodies operating in this field (e.g. the SCC Specification Provider for Scenario 3)
- The existing basic message set
- The ISO defined Message Usage Guide where it exists

The Specification Provider will:

- Produce the SEPA Message Usage Guide (MUG, common to all schemes & processors active in SEPA)
- Produce the implementations or more specific parts of the MUG (per groups of schemes & processors, based on the main options they choose)
- Envisage specific use / extensions (additional features for a given service in a given scheme; for instance real-time clearing)

Responsibility of the Schemes

- The Schemes are fundamental actors as it is their responsibility to ensure the availability of default solutions implementing this new set of common messages and procedures. Schemes will ensure that the specificities of their card brands services and features are supported by the new solution. This concerns also possible evolutions they envisage, for instance in terms of innovation.
- The proposed way forward is that schemes supply their requirements (functional, operational, security) to the Specification Provider; which will then make the synthesis of the requirements and propose implementation specifications.

The Solution Providers will develop solutions (e.g. switch, clearing processing services) and propose them to acquirer and issuer processors.

Acquirers, Issuers and Processors will also have the option to develop their own in-house solutions.

4.2.2.2 Production of the MIGs

Based on the MUG produced by the Specification Provider, each Scheme will produce a Message Implementation Guide (MIG). That is because although there is only one single set of Implementation Specifications and all the services in the acquirer to issuer domain are covered by those specifications, some of those services may be mandatory or optional per Scheme, e.g. on-line clearing versus batch clearing may be an option.



Such deviations from the standard may remain limited to very specific aspects (e.g. Scheme-specific values for identifiers), or, driven by innovation and uncontrolled, they can lead back to different flavours and fragmentation.

Avoiding deviations requires every new feature to be specified in the common format by the central Specification Provider, which could have a significant impact on the time to market, thus hindering innovation.

4.2.2.3 Hierarchical levels of specifications

The following diagram illustrates the hierarchical levels of the standard definition as previously proposed:

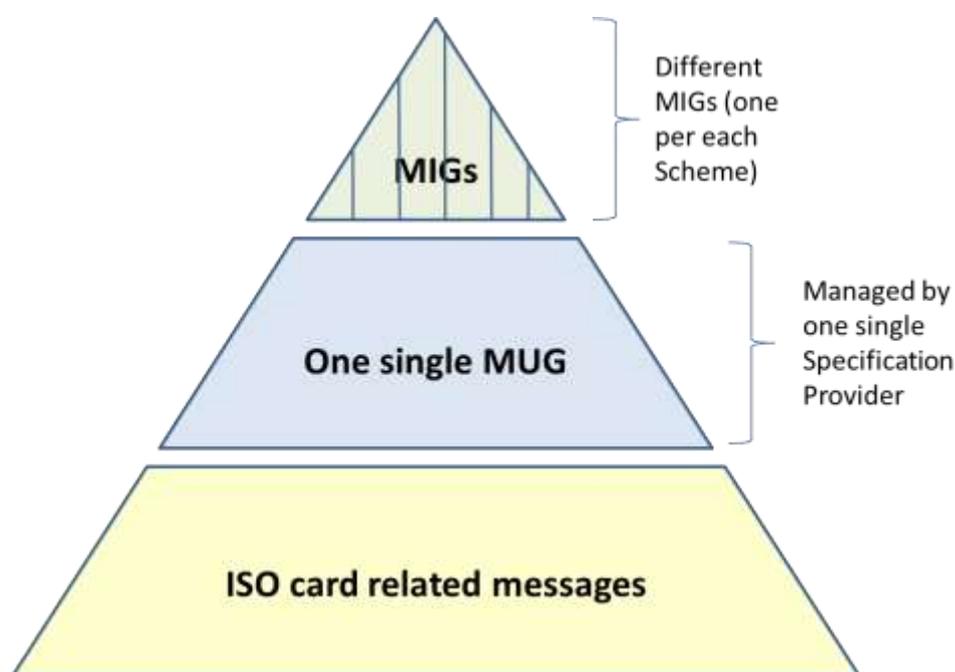


Diagram 5: Hierarchical levels of specifications

It is fundamental that the single MUG managed by the Specification Provider be always compliant with the ISO messages to ensure the consistency of the standard in all its implementations.

4.2.3 Implementation

In an open market there may be several Service Providers of Switch, Clearing and Settlement services (in the diagram, the box SC&S Services Provider). When a Service Provider is referenced by a Scheme as being its default Switch, Clearing and Settlement solution to ensure full reachability, such Service Provider must implement the mandatory part of the common Implementation Specifications and the optional part according to the requirements of the Scheme for which services are rendered (e.g. on-line clearing).



When a Scheme selects and references a Service Provider as default Switch, Clearing and Settlement solution, it may also define the specificities of the settlement solution to be supported between its Members through the use of a Settlement System.

Acquirer and Issuer processor(s) must be connected to the Service Provider(s) of Switch, Clearing and Settlement services referenced by the Scheme(s) they decide to support either directly or through Gateways which may also include protocol conversion services.

In an open market, it may be expected that some Schemes select the same SC&S Service Provider.

4.2.4 Settlement considerations

The funds exchange Settlement methods and the interface between the SC&S Services Provider and the Settlement system are not subject to standardisation, as various methods of settlement may be considered.

The added value of this approach is that the introduction of a new Implementation Specifications Standard will not affect the settlement part and thus the Scheme Members. It will mainly impact the processors (acquirer, issuer, Switch and Clearing services).

Currently there exists in the market two ways of organising clearing and settlement.

The first one is based on the traditional card payments business modelling with dedicated cards standardised messages in the clearing step, and with settlement as a separate step, either in Commercial Bank money at a designated settlement bank where transfers are effected between debtors' and creditors' accounts, or in Central Bank money. This is the model used by ATICA.

The second one is based on the conventional payments business modelling as currently used in SEPA with combined clearing and settlement based on existing SEPA schemes (SCT or SDD). This is the model used by SCC (SEPA Card Clearing) of the Berlin Group.

For other areas of the card payment (notably authorisation, dispute messaging or non-transactional exchanges) there is only one model that needs to be standardised. A large part of those areas is currently in the scope of ATICA.

It appears therefore that for Scenario 3 (ISO 20022), to allow the market to choose the model of clearing and settlement that best fits the needs, the target standard shall result of the combination of ATICA and SCC. A harmonisation is necessary though, to avoid the duplication e.g. of data-element definition.

In case Scenario 3 is adopted, the Specification Provider will have to:

1. Establish a collaboration with the Berlin Group to co-ordinate the inclusion of SCC in the standard



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2. Define which functionality/area shall be covered by ATICA and/or by SCC
3. Co-ordinate the harmonisation of the card related data elements of SCC and ATICA.

5. Implementation and Migration aspects

The organisation of the migration process is defined into different phases:

- Set-up of the Specification Provider
- Requirements gathering and issuance of the common specifications
- Migration at Scheme level
- Decommissioning of the old platforms (when applicable)

An estimated duration for the migration, from the moment that the Specification Provider completes the specification(s) and the Service Providers have completed the implementation, could be from 4 to 8 years.

5.1. Migration processes

Implementing Scenario 2 or Scenario 3 with the appropriate governance would need to be organised at ecosystem level.

A first phase would see the definition of the scope of the migration and the following decisions:

1. Choosing Scenario 2 or Scenario 3
2. Agree on the governance framework
3. Select the Specification Provider who will be responsible for creating and maintaining the Implementation Specifications

The selected Specification Provider would then gather all the requirements as illustrated in the diagram in paragraph 4.2 and issue the Implementation Specifications.

Afterwards, the migration process should be organised by each Scheme.

The following tasks would need to be performed. They are identical for the two scenarios and do not depend on the type of protocol chosen.

1. The Schemes publish the new compliance documentation and produces the rules for the migration to the new protocol. In particular, they fix the date(s) by which all Acquirers and Issuers must have migrated
2. A2I processors (independent and scheme default alike) implement the new protocol
3. Acquirers and Issuers (directly or through their processors) implement the new protocol
4. Acquirers and Issuers progressively migrate their transaction flows to the new protocol

As Acquirers and Issuers cannot migrate all at once, A2I processors need to maintain a double platform. It is also very likely that conversion engines between the old and new protocols will need to be implemented and maintained during the whole migration period.



For those schemes who are active out of SEPA, those conversion engines will need to remain active after the last SEPA Acquirers and Issuers complete the migration, as it is very unlikely that the new protocol will also be adopted by all actors outside SEPA, at least in the short term.

Those switching processors who also process transactions with one leg out need to keep the current standard to reach the area outside SEPA.

The following table lists the different situations according to the location of the Acquirer and Issuer (IN or OUT of SEPA):

Acquirer	Acquirer-to-Default Service Provider	Default Service Provider-to-Issuer	Issuer
IN	New Format	New Format	IN
IN	New Format	Old Format	OUT
OUT	Old Format	New Format	IN
OUT	Old Format	Old Format	OUT

5.2. Scoping of the scenarios

This section defines the general requirements to be taken into consideration regardless of the protocol chosen for the migration; in other words they are valid for both scenario 2 and scenario 3.

The following aspects need to be analysed to define the target standard:

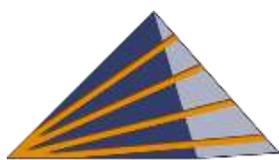
- Support of different processing practices
- Number of messages (dual message, single message, use of advices...)
- Definition of messages
 - o Authorisation
 - o Clearing
 - o Settlement
- Architecture (centralised, fully decentralised, mixed)
- Processing options (cycles...)
- Security
 - o In particular scheme requirements

The following topics shall be addressed regarding the organisation of the migration:

- Question of the coexistence of different options in a single platform
 - o Assumptions to be fixed on the above
- What are the prerequisites/conditions to make this scenario viable
- How it should be organised and/or optimised
- How scheme specific additional services may be supported allowing open competition
- How global interoperability is ensured

The governance of the ecosystem shall be organised. Groups to be involved shall include:

- CSG



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- ISO
- Specifications Providers (e.g. Berlin Group)
- Schemes

The role of each group shall be defined, and the participation of other groups, to the governance may be envisaged. In particular the input of the ERPB will be relevant.

The way the Specification Provider will be financed shall also be defined.

5.3. Migration principles

Schemes ensure a default Switch, Clearing and Settlement solution is available to all their Participants in order to ensure the full acceptance of their cards at any merchant having an acquiring contract for their card brand.

Acquirers and Issuers accepting card brands of a scheme must ensure that

- Their processors (acquiring and issuing side) have implemented the appropriate solution in order to interconnect with the default scheme Switch and Clearing solution for the exchange of the transactional data (authorisation, clearing)
- As Members they support the settlement solutions defined by the Scheme for the financial flow (e.g. debit issuer and credit acquirer for a Sales transaction on a POI) and receive from their processors the information allowing control over those financial flows.

Before a Scheme migrates from an existing default Switch, Clearing and Settlement solution to a new one, it must check all conditions are met to use this new solution, e.g.

- The documentation of the new solution is available
- The new solution is supported by at least one Service Provider and is up and running
- The process for on-boarding of a processor (acquiring or issuing) is available

The migration from an existing Switch, Clearing and Settlement solution to a new one will take place in phases, for example

- Scheme phase: Scheme to check its referenced default Switch, Clearing and Settlement solution services are provided by a Switch provider and are operational
- Issuing phase: Scheme to ensure all Issuers (and their processors) are connected to the new solution, certified and operational; during this phase Issuers and their processors must support the two solutions (the 'old' one and the 'new' one)
- Acquiring phase: in parallel with the Issuing phase, ensure all Acquirers (and their processors) progressively migrate from the existing solution to the new one; in this phase the transactional volume is progressively migrating from the existing solution to the new one.
- Decommissioning phase: once all Acquirers and Issuers are operational with the new solution, the existing 'old' solution may be deactivated by their processors.



The figure below depicts the different migration phases.

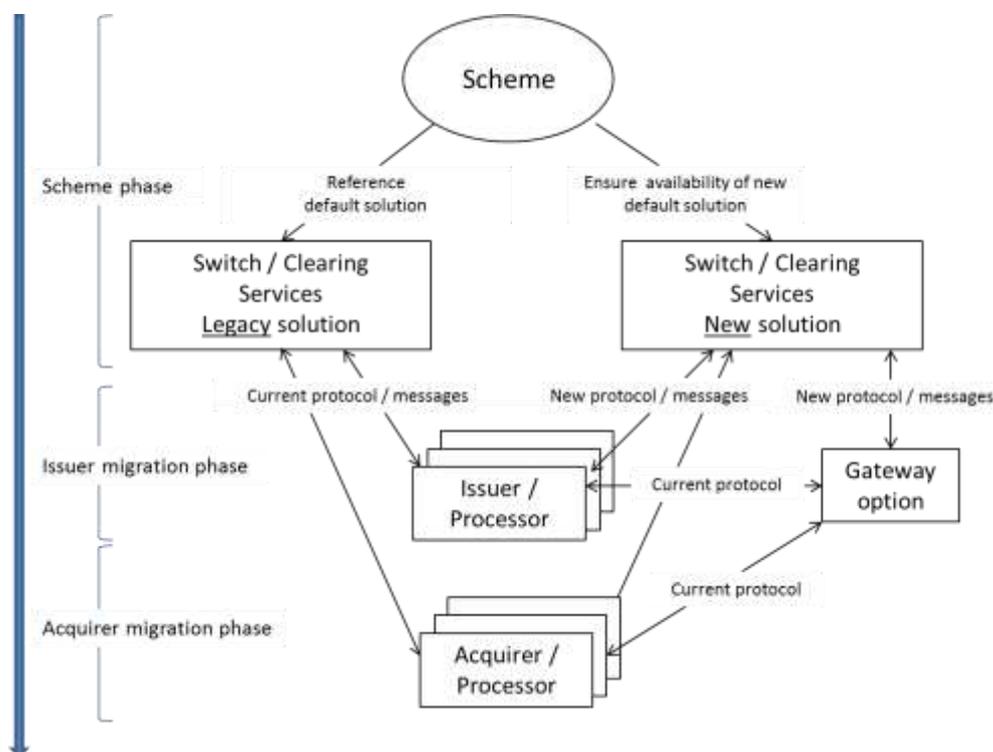


Diagram 6: Different Migration Phases

During the migration period, the processor of the new Switch, Clearing and Settlement solution must ensure enough resources are available to conduct the on-boarding project of all concerned processors.

It is worth mentioning that a scheme may decide to migrate its default Switch and Clearing solution while maintaining its existing Settlement solution, provided that the latter can be integrated in the context of the new Switch and Clearing solution. In this case, the impacts on issuers and acquirers may be reduced.

The processors providing the Switch and Clearing services may also envisage proposing gateway/convertor services between new and old protocols and message formats in order to reduce the impacts for the acquiring and issuing processors.

Further analysis must happen to confirm any above principles.

5.4. Migration triggers

Schemes are responsible for identifying their default Switch, Clearing and Settlement solution and reflect their decisions through the publication of their respective scheme rules. Scheme Members (Acquirers, Issuers and their processors) have to follow the scheme rules of the scheme(s) they support. However, the migration should be made mandatory only to the Default Switch, Clearing and Settlement Service Provider of the Scheme, as it is the one that ensures full interoperability. On-us business is not in scope of the mandate as it is



irrelevant for interoperability.

In this context, Schemes are in the driving seat for the migration from an existing to a new solution, via their scheme rules (after having ensured the new solution is operational and ready for the on-boarding of processors).

5.5. Migration duration

The duration of the migration phase may be quite long (i.e. some years) depending on the number of concerned actors that have to migrate (the processors); the more actors the longer it requires.

An estimated duration for the migration could be from 4 to 8 years, starting from the moment that the Specification Provider completes the specification(s), Schemes have issued their MIGs and the Service Providers have completed the implementation. This preparation phase could last up to 4 years and a half

A coordination should be established in order to ensure that all Schemes migrate during the same period of time.

The following high-level plan illustrates a possible migration schedule based on the best case scenario, with the assumption that the full migration lasts 4 years, from the moment that the Specification Provider completes the specification(s) and the Service Providers have completed the implementation.

For Scenario 3, that date depends also on the availability of ATICA v2, in particular its MUG. According to the ISO this is forecast to be ready by the end of 2016.

A number of conditions must be verified before Scenario 3 can start but ATICA v2 release date means the plan below cannot start before 2017.

	Y1				Y2				Y3				Y4				Y5				Y6				Y7				Y8				Y9							
	Q1	Q2	Q3	Q4																																				
Specification Provider establishes new standard	█				█				█				█				█				█				█				█				█							
Schemes reference default solution	█				█				█				█				█				█				█				█				█				█			
Schemes ensure availability of new default solution	█				█				█				█				█				█				█				█				█				█			
Issuers certification and migration	█				█				█				█				█				█				█				█				█				█			
Acquirers certification and migration	█				█				█				█				█				█				█				█				█				█			
Decommissioning phase	█				█				█				█				█				█				█				█				█				█			

Diagram 7: Migration Duration: Simplified Plan



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6. Business Rationale

In order to determine which of the three scenarios should be recommended, the study has analysed two kinds of aspects:

- Quantifiable aspects (i.e. costs and benefits)
- Unquantifiable aspects (i.e. pros and cons)

The quantifiable analysis takes into account a range of estimates – low, medium and high. The results are:

- There is no business case for the low and medium estimates for both Scenario 2 (ISO 8583) and Scenario 3 (ISO 20022)
- The payback periods in the high estimate situation is 11 years for Scenario 2 (ISO 8583) and 18 years for Scenario 3 (ISO 20022)

The main unquantifiable aspects are:

- Pros
 - Easier and faster switch development
 - Creation of a level playing field reducing barriers to entry
 - More efficient use of resources from more efficient platforms
- Cons
 - No clear innovative functionality compared to the as-is situation
 - Schemes that have 'one leg out' still need to maintain the old standard
 - High implementation and migration costs, long time-frame for the project, may distract resources from business initiatives and hinder innovation

If Scenario 2 (ISO 8583) or Scenario 3 (ISO 20022) were envisaged, it would appear indispensable to mandate the migration to all the SEPA Schemes through their Default Solution Providers in order to achieve the initial goals set for the adoption of a common standard (e.g. reduce fragmentation). However there is the risk some actors (Schemes or Processors) will decide not to make the investment and perhaps step out of the market.

Other actors may have a negative business case and hence incur higher costs that may lead to higher prices charged to the merchants and/or cardholders.

6.1. Methodology

In order to determine which of the three scenarios should be recommended, the study has analysed two kinds of aspects:

- Quantifiable aspects, described in paragraph 6.2 Cost / Benefit Analysis
- Unquantifiable aspects, described in paragraph 6.3 Pros and cons



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6.1.1. Quantifiable aspects

The quantifiable aspects entail determining the monetary **costs and benefits** incurred in implementing Scenario 2 or Scenario 3 compared to Scenario 1 (baseline).

The methodology uses estimates provided by similar projects or studies (e.g. a Nexo white paper [NEXO]).

The different types of costs and benefits are summarised in the following table:

One-off costs	Annual costs and benefits
Development/Testing/Certification/Migration costs (including people costs)	Software Maintenance costs variation
Hardware update costs	Hardware costs variation
	Operational (people) costs variation

The one-off costs take into account the initial investment costs required for the implementation of Scenarios 2 and 3 compared to Scenario 1 where the market continues to evolve as today without migrating to a single standard. The cost of the current ecosystem setup (Scenario 1) was not estimated as it is not possible to do it without access to confidential cost information from the actors.

The annual cost or benefit is established through calculating *new recurring costs in running a single standard minus savings generated by the single standard*.

Both one-off and annual costs include the costs of setting up and operating the Specification Provider.

Only direct costs are considered in this study (e.g. overhead costs are ignored).

6.1.2. Unquantifiable aspects

The unquantifiable aspects consists in a list of pros and cons of the adoption of a single standard which are not characterised by a monetary value but must be taken into consideration in the decision whether to pursue Scenario 2 or Scenario 3.

For a greater ease in the decision-making, each pro and each con could be associated with a weight which would support calculating a score at scenario level.

The choice of a weighting model was considered out of scope for this study.

6.2. Cost / Benefit Analysis

As explained in Section 6.1, the cost and benefit analysis is based on quantifiable aspects only and is carried out with reference to the baseline scenario (Scenario 1 - which lets the market evolve with different A2I implementations).



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6.2.1. Assumptions

Although quantifiable, the aspects considered do not allow for very precise numbers for the following reasons:

1. The aggregate monetary costs and benefits are obtained by attributing the costs and benefits to the ecosystem of actors making up the Acquiring-to-Issuing landscape. The size of this universe does not benefit from clear demarcation lines regarding entities connected to switches. The number of international switches (6) and the number of domestic switches (25) can be ascertained with reasonable certainty but the number of entities connected to switches (processors, banks and PSPs with connections to switches) is not readily available from a standard industry source such as might be the case in other sectors, hence the analysis assumes an average of 1,500 entities
2. At the same time an assumption has to be made regarding the number of connections that such an entity supports. Here, a range of values is needed with a low end number that assumes 2 switch connections per entity and a high-end number that assumes 5 switch connections
3. It is impossible to get real data due to reasons of confidentiality

A medium-range scenario which assumes intermediate values is also considered.

For that reason the exercise only considers the migration of the full functionality identified in the scope, and does not address 'intermediate scenarios' such as migrating only clearing to a new standard and not authorisation, or vice-versa. That could be examined in a further study.

The amounts used for estimating financial cost and benefits derive from:

- Internal estimates from participants
- Similar projects carried out in the past
- Studies (such as [NEXO]) that can provide benchmark values

Working with low and high estimates in this regard also allows for the sharing of confidential information to be incorporated.

The details of the Business Case calculations are in Annex A.5.

The following table lists the assumptions for the parameters used in the calculations. The last two columns indicate whether the parameters were used to calculate costs, benefits or both.

	Low Estimate	Medium Estimate	High Estimate	Used for costs	Used for benefits
Number of entities connected to switches (processors, banks and PSPs with connections to switches)	1,500			✓	✓
Number of international switches	6			✓	
Number of domestic switches in EEA	25			✓	



Average number of switch connections	2	3.5	5	✓	
Annual cost as percentage of one-time cost	19%	22%	25%	✓	
Percentage of annual maintenance savings per switch connection (switch specifics still remain e.g. Bulletins to read, rules and values of data elements)	25%	38%	50%		✓
Cost savings ISO 8583 for one-time and recurring development cost vs ISO 20022	33%				✓
Cost savings ISO 8583 for one-time migration cost vs ISO 20022	10%				✓
Cost savings ISO 8583 for maintenance cost vs ISO 20022	25%				✓
Discount/Hurdle rate	8%				

The following table lists the general assumptions considered in the study, which were used to define the parameters of the previous table:

Benefits are the same for ISO 8583 and ISO 20022
New authorisation and clearing formats allow flexibility to accommodate each scheme's products and services, which generates maintenance savings.
Switches will need to offer new format bridging to allow connection with entities using old formats (no big-bang migration, migration will take 4 to 8 years), as well as non-EEA entities that will continue with existing formats
Number of switches is not affected by new authorisation and clearing format
Bridging includes format conversion, routing and adding/removing data elements as per differences in formats to be bridged, which diminishes theoretical savings
Ranges are provided to avoid sharing of confidential data, as well as to factor in uncertainty regarding the nature of estimates
Use single amount for one time and single amount for annual cost/benefit
Current topology will not change (i.e. current banks behind processor will stay behind processor in current format)
Connections between switches are too few and out of scope
Migration period of 6 years (i.e. halfway between the estimated 4-8 year range) for the calculation of the payback period
The one time cost of Default Service Providers is happening in year 0 (the high-level plan shown in paragraph 5.5 suggest this could happen 4,5 years after the start of the project)
It is assumed that all Default Service Providers support the common format year 1 of the business case, and 1/6 of processors develop the common format each year
The one time cost of processors is spread over 6 years
Annual benefits and processor annual cost are spread over 6 years, but growing each year

6.2.2. Summary

Taking the above assumptions for the two scenarios, the results are summarised in the tables below. In the tables, results are calculated as the difference between benefit and cost. Negative numbers are shown in parentheses.



For **Scenario 2, common format based on ISO 8583**, the net annual results (excluding setup costs) are:

- A loss at the low end of the range
- A very low benefit representing 4% of the setup cost for the medium estimate
- A higher benefit representing 19% of the setup cost for the high estimate

Summary	Low estimate	Medium estimate	High estimate
All One-time Cost	€ (474.350.000)	€ (1.186.795.000)	€ (2.101.740.000)
Net Annual Result After Migration	€ (28.712.500)	€ 50.647.500	€ 389.125.000
Ratio Annual Result/All One-time Cost	N/A	4%	19%
Payback period (years)	N/A	Extremely long	11

For **Scenario 3, common format based on ISO 20022**, the net annual results are lower than that of Scenario 2 while the contrary could be expected considering that there are already initiatives on the market to develop and deploy ISO 20022.

Actually, as mentioned in paragraph 4.1, ISO 20022 is currently only being implemented as SEPA Card Clearing (SCC) for the German girocard Scheme as an ISO 20022 A2I mechanism for cards clearing and settlement. Even taking it into account, the impact is insignificant on the one-time cost for Scenario 3 ISO 20022 which is very high.

Therefore, the net annual results (excluding setup costs) are:

- A higher loss than for Scenario 2 for the low estimate
- A much lower benefit representing only 1% of the setup cost for the medium estimate
- And a lower benefit compared to Scenario 2 representing 12% of the setup cost for the high estimate

Summary	Low estimate	Medium estimate	High estimate
All One-time Cost	€ (605.000.000)	€ (1.501.000.000)	€ (2.622.000.000)
Net Annual Result After Migration	€ (43.200.000)	€ 11.405.000	€ 319.000.000
Ratio Annual Result/All One-time Cost	N/A	1%	12%
Payback period (years)	N/A	Extremely long	18

In terms of return on investment, the conventional approach here would be to take those costs and discount the future cash flows to arrive at a comparison for the payback periods.

One of the key variables in this respect is the discount or hurdle rate, which can vary between organisations. Given that this number can be 18% or higher for private equity funded businesses while it is very low for banks given their low cost of capital, the prudent approach would consist in adopting a benchmark rate that is the one prevalent at conventional private businesses and commonly accepted in the market, which is currently around 8%.

Considering that there is a loss for the low estimate and a very low benefit compared to the setup cost for the medium estimate for both scenarios, the only situation where the initial



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investment will be paid back is if all the conditions assumed for the high estimate are realised.

In that situation, a discount rate of 8% applied to the number referenced above translates into the following results:

Payback Period	ISO 8583	ISO 20022
Low estimate	Negative Business Case	Negative Business Case
Medium estimate	Extremely long payback period	Extremely long payback period
Payback Period	11 years	18 years

Given that Scenario 2 (the ISO 8583 scenario) at the high end requires a lower up-front investment and has higher annual savings, it is not surprising that the payback period calculation results in a more rapid payback for the ISO 8583 than for the ISO 20022 scenario.

It is worth mentioning that a scheme may decide to migrate its default Switch and Clearing solution while maintaining its existing Settlement solution, provided that this latter can be integrated in the context of the new Switch and Clearing solution. In this case, the impacts on issuers and acquirers may be reduced.

6.3. Pros and cons

The following paragraphs provide a list of pros and cons of implementing a single standard in the Acquirer to Issuer domain.

6.3.1. Common to Scenarios 2 and 3

Pros	Cons
Level playing field resulting in less barriers to entry (new players can enter the market more easily)	No obvious immediate functional benefit (same services performed)
More efficient platform allows reallocation of resources to more profitable business possible	Schemes that have 'one leg out' still need to maintain the old standard
Multibrand issuing and acquiring made easier	High implementation and migration costs, long time-frame for the project <ul style="list-style-type: none"> • May distract resources from business initiatives • May hinder innovation
New Schemes could take advantage of existing processing facilities for their default switch	Some actors (including Schemes and Processors) may decide not to make the investment and perhaps step out of the market
Merchants and other aggregators (e.g. TPP) may find it cheaper to become an acquirer	

6.3.2. Specific to Scenario 2, common format based on ISO 8583

Pros	Cons
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ISO 8583 is a common set of messages for card payment that already exists and has proven to be well adapted to the ecosystem (even if modified by all SEPA schemes to answer their specific needs)	Although well established and still enhanced with new features (e.g. tokenisation) its ability to effectively support technological evolution is sometimes questioned
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6.3.3. Specific to Scenario 3, common format based on ISO 20022

Pros	Cons
The use of ISO 20022 instead of ISO 8583 seems more future proof and based on new emerging standards	The ISO 20022 ATICA implementation specification is not mature enough in comparison to ISO 8583 implementations specifications
The support of new additional card services and technologies may be met more easily than for ISO 8583	
Current initiatives based on ISO 20022 (e.g. Nexo in the Terminal to Acquirer domain) could make implementation easier	
It would ensure continuity of standard where ISO 20022 is already used in the Terminal to Acquirer domain	

6.3.4. Actors' point of view

In this context there are few discernible benefits of moving to a single message-standard and standardised clearing/settlement practices in the issuer-to-acquirer domain.

ENTITY	PROS
Existing Schemes	Fewer barriers for entry into new markets. See pros for 'Existing Acquirers and Issuers'.
New Schemes	<ul style="list-style-type: none"> Reduced setup costs and time to market through reuse of common message standards Option to use services of processor(s) already providing Switch, Clearing and Settlement services to other, thereby negating the need to develop and maintain a default Switch and Clearing and Settlement solution according to their own specifications and procedures).
Existing Processor View	<ul style="list-style-type: none"> If all SEPA schemes migrate to a homogenous new common standard, there will be reduced complexity and possible cost saving associated with decommissioning existing scheme specific solutions.
Existing Acquirers and Issuers	<ul style="list-style-type: none"> The annual cost to support a new SEPA brand could be lower as the processing costs could be lower

There are many disadvantages to ecosystem participants and some risks to the diversity and innovation in the ecosystem.

ENTITY	CONS
Existing Scheme View	<ul style="list-style-type: none"> Cost to develop and deploy a new default Switch and Clearing and Settlement solution



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	<ul style="list-style-type: none"> • Cost to migrate to new solution and manage the migration of scheme participants (acquirers, issuers and their processors). • Existing schemes will derive no functional benefit from migration as the same services will be provided using different message formats and protocols. • Existing schemes risk negative functional impact if the new common standard does not support all current functionality (e.g. will real-time clearing be supported by new common standard). • Cost to global schemes to develop and maintain gateways to convert between the 'old' and 'new' standards for transactions which have 'one leg out'. As it is highly unlikely that the new standard will be adopted worldwide, this bridging capability would need to be in place indefinitely. As such there can be no cost benefit for phasing out of 'old' infrastructure • RISK to innovation: Existing Schemes are used to innovating by introducing new features or new services; adapting their scheme rules and developing their default Switch Clearing and Settlement solution accordingly. Innovation must remain feasible in a competitive market when using common standard. • RISK to ecosystem diversity: These costs will represent a risk for some smaller SEPA Schemes and Processors • RISK to ecosystem diversity: Issuers/Acquirers may choose not to migrate to a new solution for a smaller scheme, instead opting to merge all business to larger international schemes
Existing Processor View	<ul style="list-style-type: none"> • Cost to develop their host system to support the new standard • Cost to migrate participants to the new solution. <ul style="list-style-type: none"> ◦ Cost will be lower if all schemes migrate to a homogenous solution and do not introduce their own versions. • Cost to develop and maintain gateways to convert between the 'old' and 'new' standards for transactions which have 'one leg out', if international schemes do not provide this service. • Reduced cost and complexity to support a new Scheme making use of the new standard. This is an unusual occurrence.
Existing Issuer/Acquirer View	<ul style="list-style-type: none"> • Cost and effort to migrate to new settlement procedures if the schemes change to align to new common procedures • Existing Issuers and Acquirers may derive no benefit from migration • Cost to develop and maintain 'old' and 'new' settlement procedures, if international schemes do not operate a single service for 'one leg out' and 'two leg in' transactions.

6.4. Considerations, risks and issues

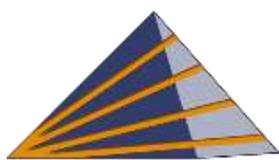
There are several considerations, some of which bear risk or present issues at different levels.

The two most important considerations are exposed first, these relate to

1. The question of whether or not to mandate a standard
2. The level of coverage by the standard

6.4.1. Mandate question

The impact on the ecosystem will be very different depending on whether the adoption of a common standard is mandated throughout the whole ecosystem or not, whatever the scenario chosen (2 or 3). As seen in paragraph 5.2 Migration triggers, each Scheme that



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decides to implement the common standard will mandate its Default Switch, Clearing and Settlement Solution Provider to ensure interoperability.

The question is here to highlight the impact of mandating or not the migration to *all SEPA Schemes*.

If **no mandate is imposed on Schemes** to migrate to the new format then:

- The main purpose of the adoption of the common standard as defined in paragraph 3.3, namely the removal of the fragmentation of the market, will not be achieved, as some actors will introduce a new standard while others will go on using the current formats. This will lead to even more fragmentation with the introduction of another standard alongside the others
- The actors who will not be implementing the new standard will get a competitive advantage against those who will choose to implement it. In fact, the actors who choose to migrate:
 - will need to allocate to the migration project funds they will no longer be able to use to invest in new products or services
 - will need to allocate to the migration project resources that otherwise would work on direct business projects

Conversely, the actors who do not migrate will have these funds and resources to spend on business projects.

- As not all actors will migrate it will not be possible to discontinue the processing of many (if not all) of the current formats, thus removing a large part of the savings identified in paragraph 6.2 Cost / Benefit Analysis.

Therefore, **mandating the move to the new format to the Default Service Providers of all the Schemes appears indispensable to achieve the goal identified in paragraph 3.3**. On the other hand, it is nearly impossible to enforce such a mandate in the whole market on a sustainable period, which means that even mandating its use, there is a high risk of a return of an increasing fragmentation in the medium term.

In the meantime, the imposition of such a mandate is likely to force some actors (Schemes or Processors) to decide not to make the investment (see paragraph 6.2 Cost / Benefit Analysis) requested to adapt their operations to the new format and perhaps step out of the market. In that case they are likely to move towards large international schemes for which they also probably have to perform a similar migration project

It should be noted that even though this report recognises that the only way for the adoption of a common format to be successful is to mandate its adoption, the CSG has no power to enforce such a mandate.

6.4.2. Coverage of the standard

There are two ways of managing the common format:

1. Complete homogeneity
2. Baseline homogeneity

The pros and cons of each way are displayed in the table below.



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Option	Description	Pros	Cons
Complete homogeneity	The standard covers all functionality and strict uniformity is maintained. The common message set is developed for any new inter-PSP service.	Uniform implementation and universal coverage by the new standard	Schemes and Inter-PSP processors must disclose proprietary innovation which would be delayed as new ideas will have to go through the specification provider.
Baseline homogeneity	The standard covers only the functionality that is not proprietary or in the competitive domain	Better protection on the competitive aspects, inter-PSP processors may introduce quickly new service innovations	Risk of fragmentation with different implementations and 'flavours' as in the current situation

It should be noted that imposing homogeneity is likely to increase the effort needed to maintain the solutions. Currently to process international schemes it is necessary to implement all updates required. If it is also required to implement all SEPA scheme changes, then the number of required updates grows proportionally. Whether the changes are used or not, solutions must be adapted.

To avoid penalising innovation by imposing complete homogeneity, temporary deviations from the standard should be accepted in case of new functionality, as long as they are subsequently added to the standard.

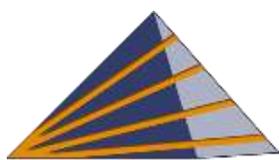
That is similar to Requirement S33 of [SCS B7] on volume conformance:

Schemes shall ensure that their Rules are in line with the requirements of the Volume for products or services in a mature stage. If some requirements of the Volume are considered as not aligned with the latest market needs or with emerging solutions that ensure secure services, Schemes shall propose an update of the requirements of the Volume. For emerging solutions (e.g. new wallet solutions) it is expected that a Scheme will define its own specific rules until such solutions are covered by the requirements within the SCS Volume.

6.4.3. General considerations, risks and issues

From a functional point of view there is little interest for a scheme to perform such a migration; the same services continue to be provided using different message formats and protocols. For some scheme it could even have a negative functional impact if the new common standard does not support some of their current functionality/behaviours (e.g. will real-time clearing be supported by new common standard).

Some SEPA schemes have a worldwide dimension. It is highly unlikely that such international schemes will migrate at worldwide level their Switch, Clearing and Settlement solution to a new standard. They would thus need to implement the conversion between the 'old' and 'new' standards for transactions which have 'one leg out'. They would also need to keep this conversion functionality indefinitely. The phasing out of the 'old' infrastructure is impossible in this case, resulting in increasing maintenance costs with no potential saving. This reduces significantly the interest of the project for large international brands.



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An existing Scheme may expect an operational benefit (lower operational costs) if the transactional volume of the default solution used by this Scheme is also used by other Schemes (concept of 1 processor of the Switch Clearing and Settlement solution offering services to several schemes; this is a market-driven option and as such it is not in scope within the present study which is limited to the potential adoption of a common standard of messages and settlement procedures).

If the business case is negative, the cost will need to be supported by merchants and cardholders. This could lead to a move to other means of payment (in particular cash). This is despite the fact that neither merchants nor cardholders are impacted by a move to a single standard.

Should 3-party Schemes be excluded from the scope, they would have an initial competitive benefit compared to other Schemes during the migration period as they would have no investment project to support.

6.4.4. Considerations

The main and global **conditions for success** are the following:

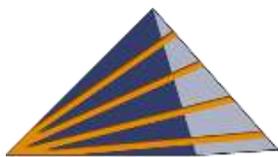
- **The commitment** of all players: Card Schemes (international and national), processors (switches and on-behalf of acquirers and issuers) and (PSPs) acquirers and issuers to the new ecosystem based on a central role of the Specification Provider (See diagram in chapter 3).
It particularly means that the various Card Schemes have to recognise the Specification Provider as such and delegate to that body the design of the SEPA A2I standard from the requirements they will provide.
- The standard needs to be **mandated** as seen in paragraph 6.4.1 Mandate question
- The standard needs to **cover all functionality** as seen in paragraph 6.4.2 Coverage of the standard

The views from each player are the following:

Scheme view

- Each existing Scheme already has its default Switch and Clearing and Settlement solution
- Cooperation exists in the industry to evolve existing ISO 8583 standards for certain requirements such as tokenisation requirements and to develop common standards e.g. 3D Secure 2.0
- New Schemes on the market (if that event happened) could take benefit of the common standard of messages and of the existence of processor(s) providing Switch, Clearing and Settlement services to other schemes (see par. 6.3 Pros and cons)

Processor view



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Processors that currently support one or several card schemes have already ensured that their host solutions (on acquiring or issuing side) are connected to the default Switch, Clearing and Settlement solutions of those schemes. Such processors may have one common host system to support all card schemes or several distinct systems depending on their technical choices and on the evolution of the market offer.

Acquirer/Issuer view

Acquirers and Issuers are concerned by the settlement procedures related to the card brands they support (open settlement account, control financial flows...).

Specification Provider

The new common set of messages and settlement procedures must be managed by a Specification Provider who is responsible for the production and maintenance of the MUG (implementation specifications). Governance rules will ensure each scheme may request evolutions to support its innovative solutions.



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7. Conclusions & Recommendation

7.1. Conclusions

The present report analysed two scenarios considering the migration to a single common standard of message set:

- Scenario 2 migration to a common standard based on the ISO 8583 protocol
- Scenario 3 migration to a common standard based on the ISO 20022 protocol

Compared to a baseline scenario, Scenario 1, where the market would evolve with different A2I implementations.

The Business Rationale of pursuing Scenarios 2 and 3 was analysed along a number of qualitative and quantitative criteria.

There are qualitative advantages and drawbacks in implementing those scenarios, the main ones being:

Pros	Cons
Easier development (hence shorter timeframes) in the development of switches	No clear innovative functionality provided by the single standard compared to the as-is situation
Creation of a Level playing field resulting in less barriers to entry	Some actors may estimate they cannot afford such a project and may be forced to exit the market (in particular some Schemes could disappear)
More efficient use of resources towards more profitable business from more efficient platforms	High implementation and migration costs, long time-frame for the project, may distract resources from business initiatives and hinder innovation

It appears that the economic ratios for Scenarios 2 and 3 are the following:

- A negative business case for both scenarios when the worst case (low estimate) is considered

Low Estimate Summary	Scenario 2	Scenario 3
	ISO 8583	ISO 20022
All One-time Cost (m€)	(474)	(605)
Net Annual Result After Migration (m€)	(29)	(43)
Ratio Annual Result/All One-time Cost	N/A	N/A
Payback period (years)	N/A	N/A

- An extremely long payback period for the entire community for both scenarios when the medium estimate is considered (e.g. after 50 years the deficit is still over € 500 million for Scenario 2 and over € 1 billion for Scenario 3)

Medium Estimate Summary	Scenario 2	Scenario 3
	ISO 8583	ISO 20022
All One-time Cost (m€)	(1,187)	(1,501)
Net Annual Result After Migration (m€)	51	11
Ratio Annual Result/All One-time Cost	4%	1%
Payback period (years)	Extremely long	Extremely long



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- A long payback period in the best case (high estimate) scenario
 - 11 years for Scenario 2 and 18 years for Scenario 3

High Estimate Summary	Scenario 2	Scenario 3
	ISO 8583	ISO 20022
All One-time Cost (m€)	(2,102)	(2,622)
Net Annual Result After Migration (m€)	389	319
Ratio Annual Result/All One-time Cost	19%	12%
Payback period (years)	11	18

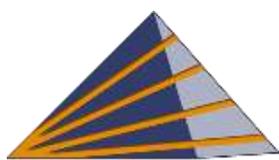
Within the community, the impact will differ depending on the type of actor

Area	Pros	Cons
New entrants (including schemes, processing entities and PSPs)	Will definitely benefit if they connect to more than one switch	
Entities connected with at least 2 switches	May benefit from cost and efficiency optimisation	
Schemes		<ul style="list-style-type: none"> • Will have higher costs to develop • Some may decide not to make the investment and perhaps step out of the market
Switches and Processors		<ul style="list-style-type: none"> • Will have a higher cost of operation during migration • Some may decide not to make the investment and perhaps step out of the market
Merchants	May benefit from more harmonised reporting if they operate in several countries	Are likely to suffer from an increase of prices to compensate the deficit of the business case
Cardholders		Are likely to suffer from an increase of prices to compensate the deficit of the business case
General consumers		Price increase on merchant will be passed to consumers
Innovation	New standard may provide new innovation opportunities	<ul style="list-style-type: none"> • Innovation may become more complex from the need to centralise the specifications • Huge investment to implement the standard would distract resources from innovation
Global business		Any issue occurring during the migration period would have a highly negative impact on the business

It is important to remember that the key point for success is that all participating schemes and their default service providers migrate in the same timeframe.

The adoption of Scenario 2 or Scenario 3 can be organised in two ways:

- The migration to the new standard is mandated to the schemes (through their chosen Default Processor) by the Regulator



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- The decision for a Scheme to mandate the migration is left to the Scheme

A mandate is the only way to guarantee the success of the migration, since it will mean that the adoption of the new standard will be complete in SEPA. On the other hand, it is likely to provoke the demise of the Schemes who would not be able to financially support the migration.

No mandate will incur higher costs and the current fragmentation will remain. It reduces the risk for a Scheme to be forced to close down but it makes little sense as the benefits of the adoption of a common scheme will be on a limited scale.

Regarding the scope of the application of the new standard, there are two options as well:

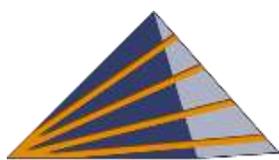
- **Complete homogeneity:** the standard covers all functionality
- **Baseline homogeneity:** The standard covers only the functionality that is not proprietary or in the competitive domain

Complete homogeneity has the advantage of providing a universal coverage by the new standard but forces the Schemes to disclose proprietary functionality and risks to greatly undermining their competitiveness.

Baseline homogeneity provides a much better protection on the competitive aspects but the risk of having a fragmented situation similar to that identified with Scenario 1 is very high.

That is why freedom should be left to temporary deviate from the standard for innovative implementations provided they are subsequently reintegrated into the standard.

All that considered, the CSG is unable to recommend mandatory migration to Scenario 2 or 3. The CSG is also unable to recommend Scenario 1 because it would perpetuate the current situation.



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7.2. Recommendations

The CSG however recognises a future potential in the adoption of ISO 20022 compared to ISO 8583, for the following reasons:

- It provides interesting advantages in terms of support for evolution
- Although there is no business case for the whole ecosystem some individual entities might find a positive business case in the migration

The CSG thus recommends the adoption of a market driven approach to migration to ISO 20022 where such a migration is decided based on business considerations.

In order to optimise the market driven approach and make sure that those entities who decide to migrate to ISO 20022 choose the same commonly agreed specification, the CSG proposes to carry out the following activities:

1. Refine and advocate the framework proposed in this document
2. Establish a liaison between the CSG and the relevant ISO committees so that SEPA requirements in this domain are taken into account
3. Consider alternative migration strategies (clearing only, specific geographical domains, groups of Schemes etc.)
4. Monitor the evolution and adoption of the standard



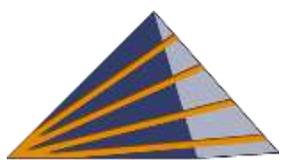
8. References and Glossary

8.1. References

[ECB 1]	Cards Payment in Europe, April 2014
[ECB 2]	Assessment of follow-up on ERPB statements, positions and recommendations, ERPB/2015/013, 26 November 2015
[IFR]	Regulation (EU) 2015/751 of the European Parliament and of the Council of 29 April 2015 on interchange fees for card-based payment transactions
[SCS B7]	SEPA Cards Standardisation Volume v7.1 – Book 7 “Card Processing Framework”
[EPC 1]	EPC409-09 EPC List of SEPA Scheme Countries v2.3 - February 2016
[EPC 2]	Acquirer-to-Issuer Domain Comparison of ISO 8583 and ISO 20002, 21 October 2008
[NEXO]	Understanding the benefits of adopting nexo standards
[PSD2]	Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market

8.2. Glossary

Acronym	Definition
A2I	Acquirer to Issuer
ACH	Automated Clearing House
API	Application Programming Interface
BIN	Bank Identification Number
CSG	Cards Stakeholders Group
EBA	European Banking Authority
ECB	European Central Bank
EMV	A standard specification for chip-based payment instruments
EMVCo	The association that manages the EMV standard
EPC	European Payment Council
ERP/2016/008	Euro Retail Payment Board
HCE	Host Card Emulation
IIN	Issuer Identification Number
ISO	International Organisation for Standardisation
MIG	Message Implementation Guide
MUG	Message User Guide



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Acronym	Definition
PCI	Security standards managed by PCI SSC
PCI SSC	Payment Card Industry Security Standards Council
POI	Point of interaction, a device that enables a consumer to make a payment
PSP	Payment Service Provider
SCC	SEPA Card Clearing
SCT	SEPA Credit Transfer
SDD	SEPA Direct Debit
SEPA	Single Euro Payment Area



Annexes

Annex 1: Description of the Card Acquirer-to-Issuer Processing current situation

Annex 2: Description of existing protocols standardisation initiatives (SCC, ATICA, etc.)

Annex 3: Description of the Berlin Group

Annex 4: Terminal-to-Acquirer domain

Annex 5: Cost / Benefit Analysis Details

Annex 6: Detailed report elements on Acquirer to Issuer Card Processing domain



A.1. Description of the Card Acquirer-to-Issuer Processing current situation

A.1.1. General comments

Reminders: Some Scheme Requirements from Book 7 (3.1.1):

Req S4: Schemes shall make publicly available the list of Implementation Specifications they support (e.g. POI application and POI to Acquirer protocol).

Req S5: In order to promote deployment of brand independent SEPA Implementation Specifications, Schemes shall not

- *Impose their own Implementation Specifications as the only possible solution,*
- *Refuse Implementation Specifications, which have been proven to be Volume conformant, without objective reasons (e.g. specific functionality within the Scheme rules not supported by this specification),*
- *Impose amendments to Volume conformant Implementation Specifications.*

Req S7: Schemes shall ensure full reachability (of all Issuers by all Acquirers) by identifying the default infrastructure components required to achieve this (e.g. Connectivity for authorisation, clearing, settlement).

ReqS8: Schemes shall not provide their Participants more favourable services and terms when these Participants are using default inter-PSP processing infrastructure identified by the Scheme. For instance, card schemes shall not discriminate when pricing services or charging fees, between banks and payment institutions who use additional services offered by the said card scheme and banks and payment institutions who do not, or only partially do so.

The processing is often specific for each scheme. This situation is due to the fact that each scheme has to provide to its members a way to reach all the other members. This is usually done by specifying a default infrastructure, with default processing practices, default message standards, etc. Without these default infrastructures, processing practices and message standards, schemes could not ensure reachability to their members (see Req S7 of Book 7 above).

Due to legacy evolution of the different card schemes in Europe (and in the world) these default infrastructures, processing practices and message standards are all different.

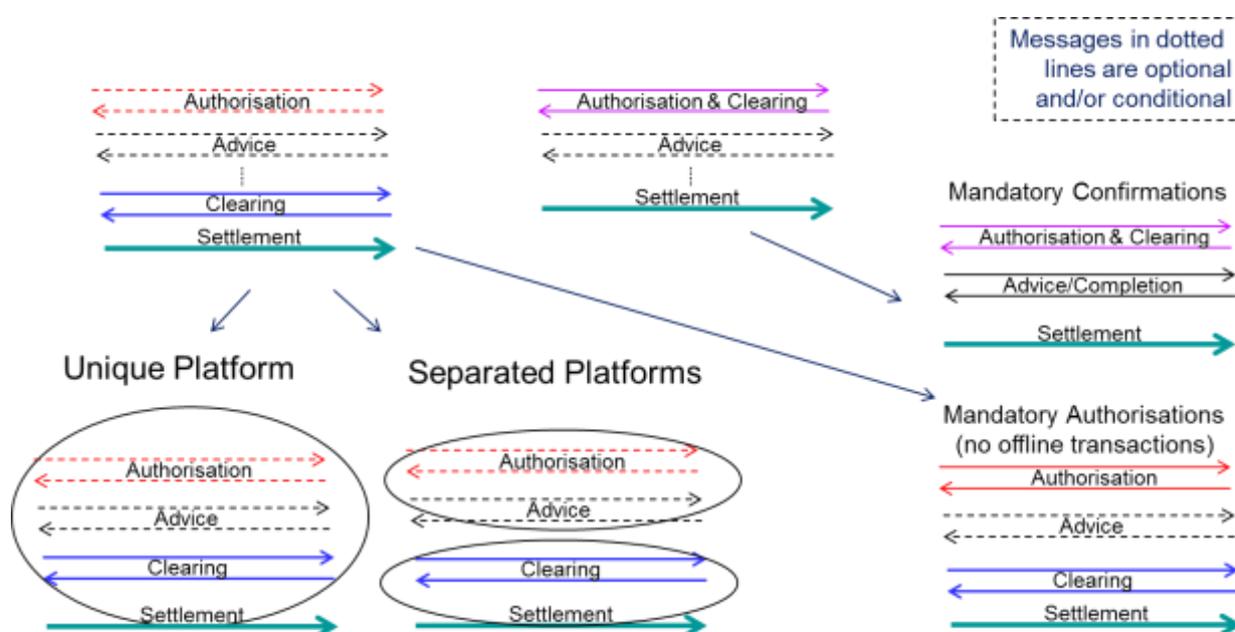
The following sections describe the differences in authorisation/clearing/settlement practices (3.2) and then in the message standards (3.3) used in Europe today.



A.1.2. Use of different clearing/settlement practices

A.1.2.1. Different number of messages (dual message systems vs single message systems)

The different Acquirer-to-Issuer card processing flows can be summarised as follow:



Note: Product rules or service supported can have an impact on the type of Messages to be supported, ex.: contact-less, e-com, pre-auth, deferred-payments...

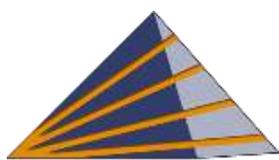
Diagram 8: Acquirer-to-Issuer Card Processing Flows

The 2 main categories of processing flows are:

- the dual message systems, where authorisation and clearing functions take place in different messages
- the single message systems, where authorisation and clearing functions take place in the same single message

Advice messages are most of the time optional messages, but in some single message systems they are mandatory.

Authorisation messages in dual message systems are optional, but in this case the authorisation function is handled by the chip card as specified by the issuer of the card.



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There might typically be different sub-categories of messages depending on the type of card processing (dual message with magstripe cards, dual message with chip cards, single message with magstripe cards, single message with chip cards).

But in some systems, the authorisation message is however mandatory, even if a chip card is used.

When the authorisation message and the clearing messages are separated, they can be exchanged on the same platform or on different platforms.

A.1.2.2. Different processing system architectures: centralised, bilateral or mixed.

In order to interconnect an acquirer and an issuer in a given scheme, several architectures can be used:

- “hub & spike” connections (all parties are connected to a central platform)
- bilateral connections (all parties connected to all other parties)
- a mix of the above

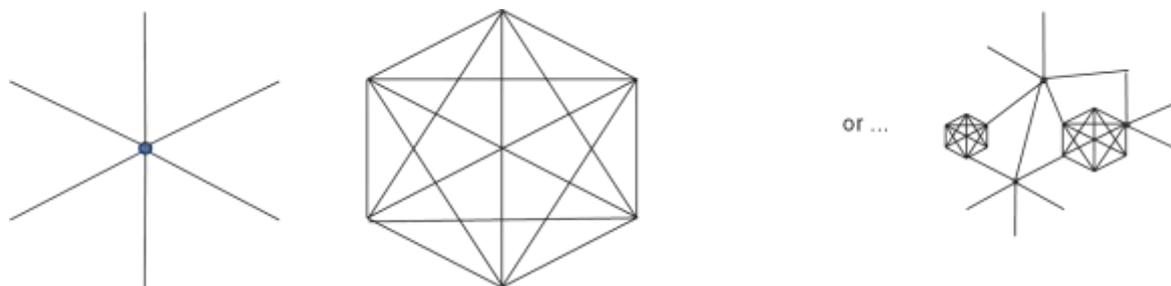


Diagram 9: *Hub and Spike Connections*

A.1.2.3. Cross-brand nature of the authorisation platforms

The different authorisation platforms used in Europe can work with:

- A. Only one brand or one type of cards
- B. All brands, all type of cards (brand independent)

Looking at the objective of this study, it seems that it is preferable that authorisation platforms have the possibility to work on all brands and all types of cards.

A.1.2.4. Level of Integration of the Clearing

The different clearing platforms or methods used in Europe can work with:



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- A. Only one brand of cards
- B. Only cards (several brands)
- C. All payment means in successive concentrations
- D. All payment means in one go

Looking at the objective of this study, it seems that it is preferable that clearing platforms or methods have the possibility to work on all brands and all types of cards and, if possible, also on other payment means (SDD, SCT notably, but also Instant Payments, P2P Payments, etc.).

The organisation of the clearing concentration (in successive concentration or in one go) will depend on the infrastructure used.

A.1.2.5. Differences in Settlement

Following the clearing phase, settlement can take place on:

- A. RTGS (incl. Target 2)
- B. Other options.

RTGS seems to be the leading option today.

A.1.2.6. Other identified differences

Other differences exist in the processing of card transactions such as:

- A. Gateways to other platforms or not (mainly in authorisation services)
- B. Net or gross clearing (interchange immediately deducted or after)
- C. Delegation of certain functions to the central platforms (e.g. Stand-in for authorisation platforms, preparation of accounting files, etc.)
- D. Number of clearing cycles per day and cut-off times (or continuous)

A.1.3. Use of message sets

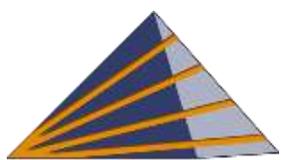
Reminder: Book 7 requirements on implementation specifications (3.1.5):

Note: The following principles as defined in Book 5 are highlighted here with the objective of fostering the continuation of an open market.

The standardisation and conformance ecosystem described in the SCS Volume envisage the existence of several Implementation Specifications for each part of the card payment value chain, with some exceptions, such as for the contact card-POI interface (EMV).

Migration/Convergence to a smaller set of Implementation Specifications per domain of the card payment value chain will be market driven.

Req IS1: The Specification Providers are responsible to develop the Implementation Specifications (e.g. description of functionalities, interfaces, protocols), to ensure Products



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implementing those Implementation Specifications may be certified, and once certified can be smoothly deployed in the field (e.g. solving potential interoperability issues between parties implementing the same implementation standard).

Req IS2: Specification Providers shall ensure their Implementation Standard and their Governance is conformant with the requirements of the SCS Volume.

Req IS3: Specification Providers shall make the Implementation Specifications available to the Service Providers candidates to implement them, without discrimination and at the same time.

Req IS4: Specification Providers and Certification Bodies involved in the certification processes shall not discriminate between Service Providers applying for certification.

The above principles apply both on Terminal-to-Acquirer domain and on the Acquirer-to-Issuer domain (although Book 5 was obviously more written with the T2A domain in mind and the Book 7 more with the A2I domain in mind).

Today there are several types of message standards in use for authorisation and clearing:

- A. Pre-ISO 8583 versions
- B. ISO 8583 different versions as the basis + Proprietary implementations
- C. New ISO 20022 SCC implementation

Most of the market is now using ISO 8583 versions and their proprietary implementations. Pre-ISO 8583 message sets or new ISO 20022 implementations (based on SDD message set + extension) are however used in some important markets for clearing.

In the use of ISO 8583 message sets, there are different versions and different implementations.

- Different versions of the standard: 1987, 1993, 2003 (this last version is not used in volumes)
- Different proprietary implementations by card schemes (all card schemes had to define their own proprietary usage and implementation guidelines, which are today all different)
- Common implementations (one notable example of common implementation of ISO 8583 was done by the Berlin Group, but it is unfortunately not massively used in Europe)
- Differences between geographical regional market practices (Europe, US, Asia, Global schemes (3 & 4 party))

Explanations on ISO 20022 message sets:

- Messages
- Message Definition Report (MDR)
- Message Usage Guide (MUG)
- Implementations based on the above

Current situation in standardisation of Acquirer to Issuer domain message sets

- SEPA Card Clearing (SCC): ISO 20022 Card extension on SDD messages



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- ATICA work within the ISO/TC68/SC7/TG1

First implementations of ISO 20022 message sets

- SCC implementation by the girocard Scheme.



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A.2. Description of existing protocols standardisation initiatives (SCC, ATICA, etc.)

A.2.1. Functionality covered

The following table lists the functionality covered by the existing standards:

- ATICA (both versions 1 and 2)
- ISO 8583
- SCC

	ATICA v1	ATICA v2	ISO 8583	SCC
Functions with financial impact				
Authorisation	X	X	X	
Financial	X	X	X	X
Reversal	X	X	X	X
Chargebacks		X	X	X
Fee Collection		X	X	X
Funds disbursement		X	X	SCC 2.1
Batch Transfer		X	X	X
File Transfer		X	X	X
Management functions				
Reconciliation	X	X	X	X
File Action		X	X	X
Retrieval request		X	X	X
Copy fulfilment		X	X	X
Verification		X	X	
Network Management	X	X	X	NA
Key Management	X	X	X	NA
PIN management		X	X	NA
Tokenisation and Token Processing		X	X	SCC 2.1
Settlement Details		X		X
Industry specific data		X	X	X

A.2.2. ATICA and ISO 20022

ISO's subcommittee SC7 created TG1, which is a new Working Group to carry out the following activities:

- Capture the business processes currently addressed by the card environment, (including that which is currently addressed by ISO 8583), using ISO 20022 methodology.
- Identify any security issues and refer to the relevant subcommittee.



- Analyse the existing implementations of ISO 8583 in order to define and contribute harmonised Business and Message components to the ISO 20022 repository.

ATICA has produced an initial version of the standard (version 1 December 2014), which includes a first set of functionality which has been considered incomplete. An appeal has been presented to include a disclaimer, which was accepted by RMG during its meeting in December 2015. Finally version 1 was published on 3 February 2016 with the following disclaimer text:

Successful transition from the existing card industry ISO 8583 standard to ISO 20022 Acquirer-To-Issuer Cards Messages (ATICA) depends on a standard that can be used by a broad spectrum of stakeholders in the global card networks environment. This version 1 set of ISO 20022 ATICA message definitions are the first ATICA messages approved by the Cards SEG and published as a proof of concept. It is a result of an ongoing work effort to create interoperability within the global cards transaction space as a replacement for the industry standard that is currently extensively used by networks and other industry stakeholders for card transaction processing worldwide. The main objective of publication of the messages is to raise awareness among the card payment industry stakeholders about the availability of preliminary and, at this stage, to-be-further-completed series of common specifications to be used in an acquirer-to-issuer card payment environment.

These messages will be updated with new and/or modified data elements and additional message sets to cover all acquirer-to-issuer card messages. A dedicated Message Usage Guide (MUG) will be released with the second version of the messages, and a security review will be conducted to fully document what is required for an operational card payment environment. The aspiration is that the publication of version 2 will be developed by the end of 2016 and the publication of the MUG will follow. In parallel a version 2 of ATICA is being produced. This version will include the missing functionality and some corrections that TG1 have made to version 1. Version 2 is intended to be published at the end of 2016. A Message Usage Guide MUG is being developed as well to assist in implementing the new standard.

The ATICA MUG will contain a generic set of rules to make the standard implementable. It would be possible to produce regional or country MUGs as well, in order to tailor the standard to regional or domestic requirements. Finally, every scheme may produce their own MUG or MIG in order to be sure that the standard is used at scheme level to cover their business needs. All the MUGs should be aligned from top to bottom in order to assure technical compatibility, but functional compatibility would not be assured. A set of specific messages could be different among the different schemes.

Scheme specific data have been included as well to facilitate scheme business specific needs (messages will not be 'plug and play').

A.2.2.1. Overview of version 1

A.2.2.1.1. Payment messages



A.2.2.1.1.1. Authorisation

The authorisation is the approval of funds given by the card issuer to the acquirer. The acquirer seeks authorisation from the card issuer or advises the card issuer of an already given authorisation. The authorisation has no financial impact and does not stand for clearing approval.

Messages:

AcquirerAuthorisationInitiation (cain.001.001.01)

AcquirerAuthorisationResponse (cain.002.001.01)

Covered by ATICA	Usage
Authorisation Request and Response	The initiator requests an authorisation without financial impact to complete the transaction.
Authorisation Advice and Response	The initiator advises the recipient about the result of an authorisation already performed.
Authorisation Notification	Information about an authorisation.

A.2.2.1.1.2. Financial Presentment

The financial presentment messages are used to manage the approval and the clearing of a card transaction.

The financial presentment can be made in three different ways:

- The initiator requests both authorisation and clearing: the transaction will be completed only if the authorisation succeeds
- Only clearing after an approved authorisation
- Only clearing for a transaction that was approved offline

Messages :

AcquirerFinancialInitiation (cain.003.001.01)

AcquirerFinancialResponse (cain.004.001.01)

Covered by ATICA	Usage
Financial Request and Response	The initiator requests both the authorisation and the clearing of the transaction.
Financial Advice and Response	The initiator advises the receptor that an authorisation has been successfully delivered or completed with a final amount, and requests the clearing of the transaction.
Financial Notification	The initiator requests the clearing of the transaction.



A.2.2.1.1.3. Reversal

The reversal messages are used to manage the reversal of a card transaction.

The reversal can take place:

- After an approved authorisation which is not been processed successfully

Messages:

AcquirerReversalInitiation (cain.005.001.01)

AcquirerReversalResponse (cain.006.001.01)

Covered by ATICA	Usage
Reversal Request and Response	Reversal request.
Reversal Notification	Reversal notification.
Reversal Advice and Response	Reversal advice.

A.2.2.1.2. Reconciliation

The Reconciliation messages are used to exchange totals to be reconciled for debits, credits, chargebacks and other transactions between two entities.

This process is carried out between both entities for a given reconciliation period. It could be initiated by an Acquirer, an Issuer or an intermediate agent.

Reconciliation is not mandatory.

If reconciliation is required, each transaction contains an identification of the reconciliation it belongs to.

If the entities detect a difference in totals, the discrepancy will then be resolved by other means and are outside the scope of this protocol.

Messages:

ReconciliationInitiation (cain.007.001.01)

ReconciliationResponse (cain.008.001.01)

Covered by ATICA	Usage
Reconciliation Request and Response for Acquirer, Issuer or Agent	Request of transaction totals
Reconciliation Advice for Acquirer, Issuer or Agent	Advice of transaction totals
Reconciliation Notification for Acquirer, Issuer or Agent	Notification of transaction totals



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A.2.2.1.3. Network management

The Network Management messages cover the range of activities to control the operating condition of the network and may be initiated by any party to an acquirer, an issuer or an agent.

The functions covered are:

- SignOn/Sign off
- Enable and Disable Store and Forward
- Echo-Test

Messages:

NetworkManagementInitiation (cain.009.001.01)

NetworkManagementResponse (cain.010.001.01)

Covered by ATICA	Usage
Network Management Request and Response	Request of a network management service.
Network Management Advice and Response	Advise of a performed network management service.

A.2.2.1.4. Key Exchange

The Key Exchange messages are used to initiate a cryptographic key exchange.

Messages:

KeyExchangeInitiation (cain.011.001.01)

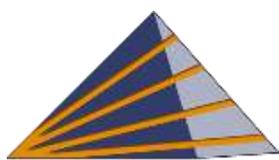
KeyExchangeResponse (cain.012.001.01)

Covered by ATICA	Usage
Key Exchange Request and Response	Request of a key exchange.
Key Exchange Advice and Response	Advice of a performed key update.

A.2.2.1.5. Rejection

The Rejection messages are used to reject an Acquirer to Issuer message.

Messages:



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AcquirerRejection (cain.013.001.01)

Covered by ATICA	Usage
Rejection of a message by an Acquirer, an Issuer or an Agent	Rejection of a message.

A.2.2.2. Additional functionalities that will be present in version 2

A.2.2.2.1. Batch management

Messages:

BatchManagementInitiation (cain.014.001.01)

Batch Management which permits transactions to be sent within a series of Batches (i.e. a set of Notification messages) or a Batch Collection (i.e. a set of batches) without requiring a response message for every message sent.

The initiator could optionally request an acknowledgement.

Batches could be sent in an isolated way or grouped in a Batch Collection.

A.2.2.2.2. Batch Transfer

Batch Transfer will permit a batch of transactions to be sent as a unique transaction.

Messages:

BatchTransferInitiation (cain.015.001.01)

BatchTransferResponse (cain.016.001.01)

A.2.2.2.3. ChargeBack

The chargeback messages cover the range of activities to fully or partially Charge Back a previous financial transaction. Typically ChargeBacks have a financial impact and as such should be computed within reconciliation totals.

It could be initiated by the Issuer or the intermediate Agent.

Messages:

IssuerChargeBackInitiation (cain.017.001.01)

IssuerChargebackResponse (cain.018.001.01)



A.2.2.2.4. File Action

File action messages are used to add, change, delete or replace a file or record or inquire into a file or perform card administration, merchant maintenance, BINs parameters, etc. (e.g. report lost or stolen cards). A specific data element shall be used to convey specific file action record or file information.

Messages:

FileActionInitiation (cain.019.001.01)

FileActionResponse (cain.020.001.01)

A.2.2.2.5. Industry specific Data.

It is previewed to include within ATICA the different specific data elements that several industries eventually need like:

- Airlines
- Car rental
- Logging
- Purchasing Card
- Petrol
- Etc.

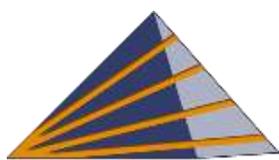
A.2.2.2.6. Other subjects

- Retrieval Request
- Fee collection
- SettlementNotification
- InstantIssuance
- Arbitration

A.2.2.2.7. The Message usage guide (MUG)

This document will describe how to use all the possibilities and options of the ISO 20022 Message Definition. There is only one MUG per Message Definition Report.

The document specifies:



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- the different use-cases of payment covered by the documentation
- the conditions of presence of the different data
- the values that the data can use depending on the use-case
- which is the entity in charge of valuing the data
- the process that has to be implemented to treat some error cases
- the correspondence between ATICA and ISO 8583 messages

A.2.3. ISO 8583

A.2.3.1. ISO 8583 Maintenance group

ISO 8583 RMMG group is working under TC68/SC7/TG1, as per SC7 statements and it was included as such within TG1 kick off meeting

It was created to address needs that can be standardised under ISO 8583, avoiding market fragmentation. The intention of the group is to standardise any new or existing functionality, permitting ISO 8583 to support the existing payment industry as likely all the A2I implementations in the world are based in this standard (International Card Schemes, Domestic Schemes, Bilateral Agreements, etc.)

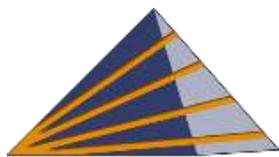
The idea is to discuss the topics within the group assuring that the 3 versions (1987, 1993 and 2003) of the standard can benefit.

The group takes also into account the last Data elements structure stated by version 2003, which permits flexible implementations with no or minimal impacts. This structure is based in TLV Constructed Data Elements, which could contain one or several Datasets, and TLV structure for sub data elements. Example DE 55 has allocated EMV data within the 3 versions in the same way.

A.2.3.2. Overview of maintenance work

The group is being formed by the following companies, which have a very active role:

- SRC, representing Germany
- Nexo
- Visa Inc
- Visa Europe, Convenor
- Discover, representing US
- Amex
- MasterCard
- X9
- Nets, representing Denmark
- Equens, representing the Netherlands
- CB, representing France
- Payments UK, representing UK, Editor



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- Wexinc

The group started its activities in June 2015 and at the moment is focused in the following topics:

- AES PIN encryption, which has been extended to cover all security aspects related to transactions (PINBlock, MAC, Sensitive Data encryption, Key exchange etc.)
- Tokenisation
- PAR as per the latest EMVco bulletin
- Full revision of existing codes among the different schemes in order to harmonise them

The approach is version-agnostic, so the outcomes should be valid for the 3 existing versions (1987, 1993 and 2003).

There are no plans at the moment to produce a new version of ISO 8583.



A.3. Description of the Berlin Group

A.3.1. About the Berlin Group

The "Berlin Group" is an open interoperability standards and harmonisation initiative created by major European card payment systems with the primary objective of defining open and scheme-independent message standards for card processing interfaces in the Acquirer-to-Issuer domain. As such, the Berlin Group has been established as a pure technical standardisation body, focusing on technical and organisational requirements to achieve this primary objective. Throughout their work, the Berlin Group acknowledges the broad diversity of already existing and competing payment schemes and infrastructures, grown from different historical backgrounds, with different business models and stakeholders, and often diverging governance arrangements and functionality for payments throughout Europe already in place.

The Berlin Group first met in Berlin, hence its name, in October 2004 and currently has participation of 28 major players in the card industry from 12 different euro-zone countries and from the UK, Sweden, Denmark, Norway, Iceland, Latvia, Estonia, Lithuania, Turkey, Croatia, Bulgaria, Hungary and Serbia, together representing more than 18 billion card transactions annually within SEPA. The participants are national and international card schemes, banking associations and card payment processors (see www.berlin-group.org for an updated list of participants).

The Berlin Group shares the ambitions and vision of the European Central Bank, the European Commission and the European Payments Council (EPC) on card payments in a Single Euro Payments Area (SEPA). The Berlin Group is open for participation by any party active in the European payment industry and has been created in the spirit of an "open source"-initiative with the intention to contribute its achievements freely to any interested party. The standards specifications issued via the Berlin Group website are provided free for use.

The Berlin Group is governed by a Plenary which is the decision making body and several Task Forces, all of which report to the Plenary. The Authorisation Task Force, and the Clearing Task Force respectively, is working on standardisation of the authorisation application layer, and on clearing and settlement matters respectively. These Task Forces meet on a regular basis to work on new features and change requests to the standards. Further Task Forces are the VPN Task Force and the Security Task Force which have defined functional and security requirements on the connections. Research items that could impact the Acquirer-to-Issuer domain (new developments in e.g. customer authentication, tokenisation, instant payments, mobile payments) are being discussed in a dedicated NextGen Task Force.

Although the Berlin Group has no formal means and mandate to foster implementation of the standards within or between schemes, it has established an Implementation Task Force (user group) which is open for implementers of the standard only and has the task to support implementers with questions, to identify and manage interoperability or technical implementation issues relating to the specification standards and to keep the standards in line with the requirements of real implementations. The Implementation Task Force enables implementers to support migration planning, and to initiate change requests based on their practical experience. For inter-scheme connections, implementers have to meet the Berlin Group defined minimum requirements on



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certification in order to assure a solid and reliable level of interoperability and security to exchange messages and perform the corresponding processing procedures according to the Berlin Group standards.



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A.3.2. About the Berlin Group standards

The main focus of the Berlin Group is to enable a true unbundling of card schemes and processing activities, as required for providing efficient SEPA card payment services to the market. To enable a card scheme-independent processing of transactions between issuers and acquirers, the development of scheme-independent message standards for this interface is required. Based on these considerations the group has defined a functional and technical architecture with a common set of authorisation and clearing standards for the interface between the acquirer host and the issuer host, which is independent of a specific card scheme, and takes into account the requirements of the SEPA for card processing as identified by the EPC. Once established in the market, these standards will also allow an easy entry of new payment schemes into the European market, thus contributing to competition in the field of payment systems.

The Berlin Group authorisation and clearing specifications describe the acquirer to issuer interface for debit and credit card processing services at POS, ATM, e-payments and MOTO as identified within the EPC Cards Standardisation Volume.

The Berlin Group standards are available in two flavours: ISO 8583-based and ISO 20022-based.

A.3.2.1. ISO 8583-based Berlin Group standards

The Berlin Group has published ISO 8583:1993-based specifications for authorisation and clearing.

In detail, the ISO 8583-based specifications support the following EPC Cards Standardisation Volume services: ATM Cash Withdrawal, Balance Inquiry, Cancellation, Card Validity Check, Cash Advance (attended), Combined Funds Request/Top-up, Deferred Payment, Funds Request for Top-up, Issuer initiated referral, No Show, Original Credit, Payment, Payment with Cashback, Payment with deferred Clearing, Payment with Increased Amount, Payment with purchasing or corporate card data, Pre-Authorisation Services (Multi Step Payment), Quasi Cash Payment, Recurring Payment, Remote Payments, Refund and Unsolicited Balance Information. The clearing interface supports presentments, charge backs, fee collection for services, reconciliations, message rejections and file rejections. The settlement of Interchange Fees is integrated within the presentments. For the clearing, rules have been defined for the technical processing, for example d+0 settlement and rejection rights. Other aspects of the clearing processing such as presentment periods or charge back reasons, are defined as default rules like presentment periods or charge back reasons. Moreover, procedures between back offices like additional information for dispute management are also standardized. The settlement is performed once a day, normally using Target 2. Settlement is performed between the gateways, on behalf of their respective acquirers and issuers. The detailed processing rules can be found in a dedicated clearing and settlement rule book.

Implementation levels vary throughout the years, due to alternating business conditions. Seven European processors consistently support gateway implementations based on the Berlin Group ISO 8583:1993 standards.

The actual version 3.1 of the specifications is freely available from <http://www.berlin-group.org/documents.html>.



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A.3.2.2. ISO 20022-based Berlin Group standards (SCC Framework)

The Berlin Group has published ISO 20022-based specifications for cards clearing in the SEPA Card Clearing (SCC) Framework.

Background

In many payment systems in Europe, the clearing of card originated transactions is performed analogously to the clearing of credit transfers and direct debits within an ACH infrastructure. The SEPA definition of credit transfers (SCT) and direct debits (SDD) enables mass volume clearing of card originated transactions within the SEPA Payments infrastructure. The Berlin Group has developed a SEPA Card Clearing (SCC) Framework that offers a simple message extension to the SEPA Direct Debit definition for including additional card originated data in ISO 20022 payment messages. The message extension mechanism has been facilitated since the ISO 20022:2013 release (enabling 'Supplementary Data Fields') and allows specific user communities to offer a functional expansion by providing supplementary data in a message without affecting the main ISO 20022 messages. Hence, users that do not need the supplementary data will not be impacted. Therefore, this important evolution of the ISO 20022 standard enables individual user communities to generate synergies on standards and infrastructure level and define the use of additional data without impacting already existing ISO 20022 payment functionalities (these data are only relevant for the end-users, not for the ACH or other parties inbetween of the process chain). The advantage of such a solution is that the development/release management of the payment messages and the development/release management of the application data within the supplementary data fields are separated, yielding two different XML schema. Any kind of changes or additions can be made to the specifics of a community without impacting the master message or the other supplementary data extensions, hence without impacting the other communities of users. The ISO 20022 message extension is structured as an ISO 20022 compliant XML subschema that can be linked into the payment XML schemata and offers the advantage of full straightforward XML parsing and processing.

The SCC Framework leads to a full Straight Through Processing (STP) for card clearing by using the same processes and formats between different banks and between banks and Clearing & Settlement Mechanisms (CSMs) as already available for SDD. Banks are then enabled to switch easily between different market solutions for clearing, be it a solution using a European ACH or a bilateral clearing solution between banks. The SCC Framework does not mandate a specific CSM solution for clearing and settlement. In theory, clearing and settlement could also take place via card processors and their settlement banks. However, the power of the SCC Framework allows to reuse the cost-efficient SDD infrastructure for conventional payments. Prices for SCC-based card clearing services are comparable to those for the SEPA Direct Debit scheme, which is why the use of SDD CSM solutions is current practice.

With the SCC Framework, the Berlin Group offers a clear opportunity to leverage investments in ISO 20022 payments infrastructures. Governance and change management of the main payment message resides with the ISO Payments SEG and governance and change management of the SCC Framework extension resides with the Berlin Group. As owners (at ISO level) of the SCC Framework extension, the Berlin Group will continuously work on support of all card related services within the supplementary data field approach for payment messages.



Specifications

The Berlin Group SCC Framework has been detailed in

- an Operational Rules document for the interbank sphere including Clearing & Settlement Mechanisms (CSM) with a detailed process flow definition and exception processing for the clearing of card transactions, and
- detailed Implementation Guidelines with ISO 20022 format descriptions for Payment Instructions, Payment Clearing & Settlement Messages and corresponding R-Transactions.
- ISO 20022 PaymentSupplementaryData (PaymentSD17V1)
- ISO 20022 Cards Supplementary Data Message Definition Report / ISO 20022 XML Schema Definition

As part of the SCC Framework, each scheme defines its own Implementation Guideline which defines a functional subset and scheme-specific requirements on how to set specific ID fields or codes within the message.

In the clearing process, the SCC extension field is used to transport card transaction related data from the Acquirer to the Issuer. The SCC extension field data are used for the end-to-end clearing (incl. booking and reconciliation) of the card-based transaction and for downstream processes like e.g. reporting via the cardholder account statement or for dispute management (the SCC Framework offers all required data for scheme reporting, via the ISO 20022 camt-messages and reports, and supports full exception/dispute handling via the Return and Reversal messages). As such, the SCC extension field data are only relevant end-to-end and are fully transparent for intermediate CSM mechanisms (once SCC is implemented on the central ACH services for one cardscheme, no further ACH effort is required to support clearing and settlement of other cardschemes). The data element entries in the SCC card extension describe card data, the card acceptance environment and additional dynamic transaction data such as e.g. tip amount, card related fees and EMV-related data. These entries are all taken from the existing card related data elements within the ISO 20022 dictionary.

The following picture shows the related agreements and process steps:

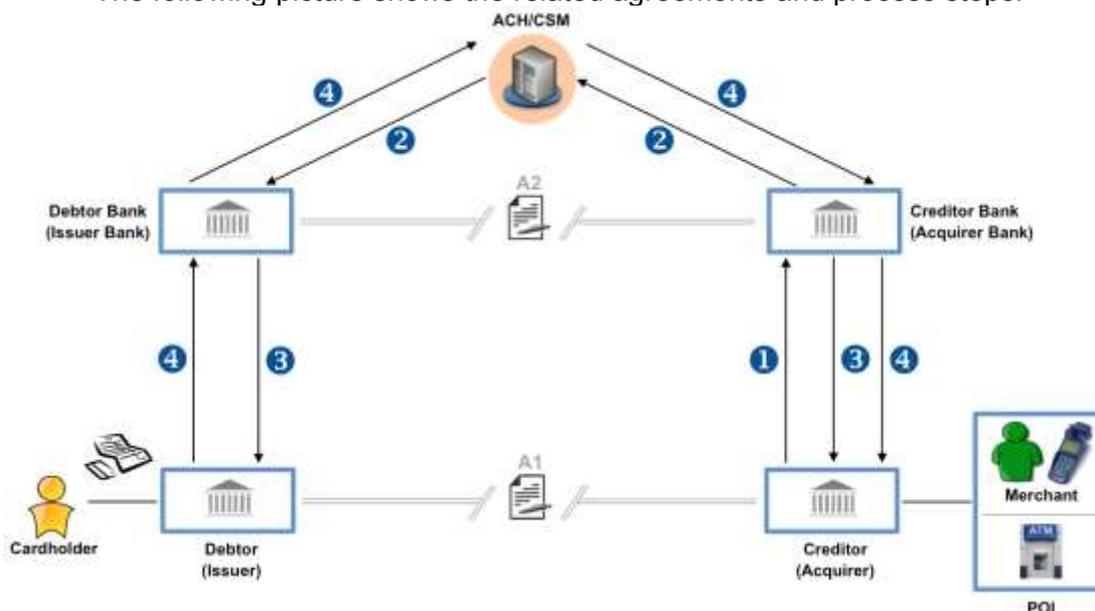


Diagram 10: SCC: Agreements and Process Steps



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Clarification of picture:

Agreements:

- A1: Card payment scheme clearing rules describe e.g. payment guarantee, business liabilities, presentment periods, dispute processes, etc. Within card payment scheme rules, the Issuer (Debtor) mandates the Acquirer (Creditor) to debit his account on the basis of positive authorisation messages.
- A2: Contracts (via card scheme or bilaterally/multilaterally) describe e.g. settlement dates, timelines (cut definitions), settlement risks (operational rights and obligations of banks), liabilities, etc.

Process steps:

1. The Acquirer (Creditor) initiates collections using SDD pain.008+SCC extension field
2. The Acquirer Bank (Creditor Bank) debits the Issuer Bank (Debtor Bank) via ACH/CSM mechanism using SDD pacs.003+SCC extension field
3. The Issuer Bank (Debtor Bank) resp. Acquirer Bank (Creditor Bank) informs the Issuer (Debtor) resp. Acquirer (Creditor) via Account Statement messages (like e.g. camt.05x)
4. In the end of day net settlement by ACH/CSM, money flows in the opposite direction from the Debtor to the Creditor

Note 1: In most cases, the Debtor Bank (Issuer Bank) and the Debtor (Issuer) will coincide, and analogously, the same is valid for the Creditor Bank (Acquirer Bank) and Creditor (Acquirer).

Note 2: In 3-party schemes, the Creditor can be mapped to the Merchant.

The full set of SEPA Card Clearing documents can be downloaded from <http://www.berlin-group.org/documents.html>.

Benefits

The SEPA Card Clearing Framework is aligned with:

- Eurosystem demand for reuse of SCT/SDD standards and infrastructures in card processing
- Standardised (ISO 20022) UNIFI Messages according to ISO 20022:2013
- EPC SEPA Direct Debit Core Rulebook
- EPC SEPA Direct Debit Core Scheme Inter-Bank Implementation Guidelines
- EPC PE-ACH/CSM Framework (currently withdrawn by EPC)
- EPC SEPA Cards Framework
- EPC SEPA Cards Standardisation Volume
- EU Payment Services Directive
- TARGET2 as the common settlement platform (after netting by the ACHs)

The benefits of the SEPA Card Clearing Framework for Debtors and Creditors can be characterised as:

- Processes are highly automated and cost-effective in clear, transparent and reliable processing cycles
- Enables the proper management of liabilities and risks
- A simple and cost-efficient way to collect funds
- The opportunity to optimise cash-flow and treasury management
- Fully automated reconciliation of payments
- The ability to automate exception handling
- Full STP of all transactions, including Rejects, Returns, Refunds and Reversals
- Ease of implementation
- Highly efficient: pricing comparable to SDD-levels
- Interoperability that unbundles card payment schemes from processing
- Leveraging of Payment Business Models instead of Card Payment Business Models
- Increases competition: banks have the option to participate in any CSM(s) of choice
- Based on open standards, publicly available, royalty free



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- Strong coverage of card services, functions and acceptance environments
- Reusage of SEPA formats, data models, processes and infrastructures
- European reachability independent of the underlying card scheme
- Support of many different clearing scenarios: bilateral, multilateral, intra- or inter-community

SCC-based card clearing can be aligned with any authorisation specification that is based on the ISO 20022 CAPE (CArd Payment Exchanges) definitions since the basis for the description of the SCC data elements have been the Acceptor to Acquirer messages as defined in ISO 20022 CAPE version 2.0. The EPC Volume Book 3 provides a cross reference mapping between data elements used in CAPE, SCC, EMV and the different versions of ISO 8583.

SCC-based card clearing has seen strong adoption by large European ACHs who have started to offer their services to the European market which is especially in the interest of large pan-European banks. The German market of ACHs/CSMs, payment engines, core banking systems, ATM providers, POS acquirers and network providers has fully migrated to SCC-based card clearing for the girocard scheme and starting from Q4 2015 more than 4 bn card-originated transactions are already cleared on an annual basis via SCC. These transactions originate from Germany and other countries abroad, where banks have started to implement SCC in connecting to SCC ACHs.

Reference implementation

As a reference, from 2013-2015 the girocard scheme has implemented SCC-based card clearing in a common effort of ACHs/CSMs, payment engines, core banking systems, ATM providers and POS Acquirers. The project involved directly around 40 payment initiation institutions and 20 payment receiving institutions, where the latter were banks or computing centers of banks.

Defining the scheme-specific Implementation Guidelines required 2 man-years of work during 1 year (mainly a coordination effort between all participants on the technical details). Banks and ACHs needed 6 months for the implementation of the SCC service (which included detailed internal technical definitions). Within banks, the following IT systems had to be adapted for SCC:

- Authorisation process: The disposition interfaces from card authorisation systems towards the account management systems had to be migrated.
- Clearing systems incl. ACH: New SEPA clearing services had to be introduced. The major delta to existing SEPA services was the D-0 settlement and the transport of the supplementary data in the extension field.
- Backoffice systems banks: Dispute and internal information systems had to be adapted for new formats, codes and processes.
- Customer interface: The account statements had to be adapted to SEPA-style for cards.
- Corporates which initiate payments had to migrate there e-banking clients, banks the corresponding e-banking server software.

No change was needed for Payment authorisation processes. These processes were re-used from the SEPA processes.

Testing (including end-to-end testing) took 6 months and the pilot and rollout phase lasted 9 months.

The synergies to the implemented SDD service were estimated to be between 60% and 80%, dependent on the role of the corresponding bank.

The major success factors of the project were:



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- Central coordination through a Project Office, responsible for the coordination of all task forces, providing secretariat support of the Steering Committee and general contact point for all issues and questions of project participants.
- Project communication: a strong inter-personal relationship between the different project members has been established via on-site meetings, taskforce kick-offs and workshop sessions, allowing for bilateral and direct communication within and between project members.
- A thorough end-to-end test with all major participants during the testing phase lead to a flawless piloting phase with only minor obstacles.
- In the onboarding process of banks to their central SCC services, the ACHs installed a quality gate by certifying connecting banks with bilateral functional tests. This ensured flawless booking processes during the rollout.
- Steering volumes by a coordinated rollout: a 6 weeks pilot and slow volumes during the first months of the rollout allowed change implementations after first lessons learned. Changes within banks were needed for cardholder account statements and dispute process management.
- Successful implementation of SCC requires card and payment knowhow and cooperation of card and payment business lines within the banks.

All these success factors finally enabled the banks to face the challenge of migrating business processes with high STP rates in a short period from legacy systems into a modern IT system infrastructure.

The following synergy factors to other SEPA payment instruments have been identified by participating banks.

- Format and payment instrument synergies: the automated SDD transaction lifecycle can be leveraged: A full set of ISO messages is available for transaction status report, R-transactions as well as account information.
- Since the process flow of SCC is analogous to SDD, process control implemented for the introduction of SDD can be re-used. For example, the high overlap of SDD Return Reason Codes and corresponding interfaces to dispute management yields high synergies.
- Bank internal system synergies: SDD investigations- and input GUI could be replicated for SCC, a separate tab for card container details had to be implemented. The SDD validation logic for IBAN, BIC etc. could be fully re-used for SCC.
- Entry channels, routing and clearing connections that had been implemented for SDD were fully re-used by only being enhanced with an additional XML schema definition for SCC.



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A.4. Terminal-to-Acquirer domain

A.4.1.1. Previous ERPB Recommendations related to technical standards for payment cards:

The table below is an extract of document [ECB 2]

Number	Issue / recommendation	Addressee s / relevant stakehold ers	Remark	Assess ment of follow- up
ERPB recommendations and invitations on technical standards for payment cards made in June 2015				
ERP/2015/rec5	The ERPB recommends that, for newly installed payment card terminals, the choice of protocol specification should be market driven and conform to the SEPA Cards Standardisation Volume (SCS Volume). Acquirers and processors should recognise and work with at least one protocol that conforms to the SCS Volume	Acquirers Processors of payment payment cards	The SCS Volume requirements for card-present transactions are expected to be met for new cards and terminals being introduced in the market as from 2017.	Green
ERP/2015/rec6	The ERPB recommends that, for newly installed payment card terminals, the choice of terminal payment application should be market driven and conform to the SCS Volume. Acquirers and processors should recognise and work with at least one terminal payment application that conforms to the SCS Volume.	Acquirers Processors of payment payment cards	The SCS Volume requirements for card-present transactions are expected to be met for new cards and terminals being introduced in the market as from 2017.	Green



A.5. Cost / Benefit Analysis Details

A.5.1. Benefits

A common format results in incremental benefits to any processor, bank or PSP as of the second format they currently support.

Therefore, the calculation of benefits assumes an unchanged current cost per entity connected to an interbank processor or switch for the first format they currently support.

This annual base cost per entity connected can vary widely but is assumed to be in the following range:

	Low	Medium	High
Cost per entity connected to interbank processor	40,000	120,000	200,000

By avoiding the maintenance of the old authorisation and clearing formats to support periodical Scheme releases, the benefit from the second format supported translates into a percentage of annual maintenance savings per switch connection. This percentage varies between entities but is below 100% as certain switch specifics will still remain for each scheme, e.g. bulletins need to be read, rules vary, data elements differ etc. It is assumed that this percentage will be at least 25% but is unlikely to exceed 50%.

	Low	Medium	High
Percentage of annual maintenance savings	25%	38%	50%

Given the adopted methodology of analysing savings with reference to the baseline scenario, the benefits for both Scenario 2 and Scenario 3 are the same and comprise the incremental benefits of using a future versus a current format. For an entity with only one incremental format to be supported the benefit would be 25% of 40,000 Euro at the low end, i.e. a saving of 10,000 Euro.

For an entity with 5 connections, i.e. 4 incremental formats, the benefit would be a saving of 100,000 Euro (namely 50% of 200,000 Euro) for each of the 4 formats resulting in a saving of 400,000 Euros:

	Low	Medium	High
Benefit per entity in Euros	10,000	112,500	400,000

Therefore, the total benefit to all entities amounts to a value ranging from 10 million to 800 million Euros.

	Low	Medium	High
Total benefit for all entities	10,000,000	168,750,000	800,000,000



A.5.2. Scenario 2: Migration to a common ISO 8583 implementation

Under this scenario all 31 switches and 1,500 other entities would incur the following one-off and recurring costs:

One-Off Costs:

The 1,500 entities would incur a cost to:

- Build or buy the software to manage the new authorisation format
- Test, certify and implement this format with each switch
- Build or buy the software to manage the new clearing format
- Test, certify and implement the new clearing format with each switch
- Manage the project of the migration to the new format

The cost in Euros for these deliverables is assumed to be:

	Low	Medium	High
One-Off Cost per entity	67,000	201,000	335,000

The cost for all 1,500 entities with between 2 and 5 connections per entity therefore is:

	Low	Medium	High
One-Off Cost for all entities	100,500,000	301,500,000	502,500,000

Interbank Processors/Switches would incur a cost to:

- Build or buy a new authorisation format bridging software
- Test, certify and implement this new authorisation format bridging
- Build or buy a new clearing format bridging software
- Test, certify and implement the new clearing format bridging
- Increase hardware to handle bridging function
- Project manage the implementation of the bridging function

The cost in Euros for these deliverables is assumed to be:

	Low	Medium	High
One-Off Cost per entity	3,350,000	5,695,000	8,040,000

The cost for all 31 entities therefore is:

	Low	Medium	High
One-Off Cost for all 31 entities:	103,850,000	176,545,000	249,240,000



For one-time migration testing including hardware and telecoms upgrade, PMO, testing and certification, the costs are assumed to be:

	Low	Medium	High
One-Off Cost per entity	90,000	135,000	180,000

The cost for all 1,500 entities with between 2 and 5 connections per entity therefore is:

	Low	Medium	High
One-Off Cost for all 3,000 to 7,500 connections	270,000,000	708,750,000	1,350,000,000

Summing up the 3 components above, the total cost in Euros for the One-Off Costs for all entities is:

	Low	Medium	High
Total One-Off Costs	474,350,000	1,186,795,000	2,101,740,000

Annual Costs:

The 1,500 entities would incur an annual cost to:

- Maintain the new authorisation format and support bi-annual scheme releases
- Maintain the new clearing format to support bi-annual scheme releases

The cost in Euros for these tasks is assumed to be:

	Low	Medium	High
Annual Cost per entity	14,250	49,500	93,750

The cost for all 1,000 to 2,000 with between 2 and 5 connections per entity therefore is:

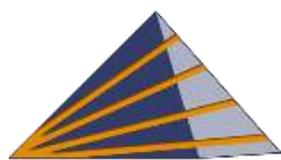
	Low	Medium	High
Annual Cost for all entities	21,375,000	74,250,000	140,625,000

Interbank Processors/Switches would incur an annual cost to:

- Maintain new authorisation format bridging to support periodical Scheme releases
- Maintain new clearing format to support periodical Scheme releases
- Ensure co-ordination with the Specification Provider to support new features in the periodical Scheme releases

The cost in Euros for these tasks is assumed to be:

	Low	Medium	High
Recurring Cost per entity	712,500	1,402,500	2,250,000



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The cost for all 31 entities therefore is:

	Low	Medium	High
Annual Cost for all 31 entities	22,087,500	43,477,500	69,750,000

In addition, there would be the annual cost for a Specifications Provider.

	Low	Medium	High
Annual Cost	250,000	375,000	500,000

In Summary the Total Annual Cost for Scenario 2 would be as follows:

	Low	Medium	High
Total Annual Cost	43,712,500	118,102,500	210,875,000

A.5.3. Scenario 2 – ISO 8583 – Summary

The following are the summary of all costs and benefits for Scenario 2:

Entities connected to Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 370.500.000	€ 1.010.250.000	€ 1.852.500.000
All One-time Benefits			
Net One-time Result	€ (370.500.000)	€ (1.010.250.000)	€ (1.852.500.000)

Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 103.850.000	€ 176.545.000	€ 249.240.000
All One-time Benefits			
Net One-time Result	€ (103.850.000)	€ (176.545.000)	€ (249.240.000)

Entities connected to Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All Annual Cost	€ 21.375.000	€ 74.250.000	€ 140.625.000
All Annual Benefits	€ 15.000.000	€ 168.750.000	€ 600.000.000
Net Annual Result	€ (6.375.000)	€ 94.500.000	€ 459.375.000

Interbank Processor/Switch plus Specifications Provider	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 22.337.500	€ 43.852.500	€ 70.250.000
All Annual Benefits			
Net Annual Result	€ (22.337.500)	€ (43.852.500)	€ (70.250.000)

Summary	Low estimate	Medium estimate	High estimate
All One-time Cost	€ (474.350.000)	€ (1.186.795.000)	€ (2.101.740.000)
Net Annual Result After Migration	€ (28.712.500)	€ 50.647.500	€ 389.125.000
Ratio Annual Result/All One-time Cost	N/A	4%	19%
Payback period (years)	N/A	Extremely long	11

A.5.4. Scenario 3: Migration to a common ISO 20022 implementation



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Under this scenario all 31 switches and 1,500 other entities would incur the following one-off and annual costs:

One-Off Costs:

The 1,500 to entities would incur a cost to:

- Build or buy the software to manage the new authorisation format
- Test, certify and implement this format with each switch
- Build or buy the software to manage the new clearing format
- Test, certify and implement the new clearing format with each switch
- Increase hardware capacity and disk space to handle ISO 20022 vs ISO 8583
- Manage the project of the migration to the new format.

The cost in Euros for these deliverables is assumed to be:

	Low	Medium	High
One-Off Cost per entity	100,000	300,000	500,000

These costs are assumed approximately 50% higher than under Scenario 2 given that ISO 8583 is not unknown territory for the entities and given the differences in hardware/disk space capacity.

The cost for all 1,500 entities with between 2 and 5 connections per entity therefore is:

	Low	Medium	High
One-Off Cost for all entities	150,000,000	450,500,000	750,000,000

Interbank Processors/Switches would incur a cost to:

- Build or buy a new authorisation format bridging software
- Test, certify and implement this new authorisation format bridging
- Build or buy a new clearing format bridging or software to support it
- Test, certify and implement the new clearing format bridging
- Increase hardware to handle bridging function
- Increase hardware capacity and disk space to handle ISO 20022 vs ISO 8583
- Project manage the implementation of the bridging function

The cost in Euros for these deliverables is assumed to be:

	Low	Medium	High
One-Off Cost per entity	5,000,000	8,500,000	12,000,000

These costs are assumed approximately 50% higher than under Scenario 2 given that ISO 8583 is not unknown territory for the entities and given the differences in hardware/disk space capacity.



The cost for all 31 entities therefore is:

	Low	Medium	High
One-Off Cost for all 31 entities:	155,000,000	263,500,000	372,000,000

For one-time migration testing including hardware and telecoms upgrade, PMO, testing and certification, the costs are assumed to be:

	Low	Medium	High
One-Off Cost per entity	100,000	150,000	200,000

These costs are assumed 11% higher than under Scenario 2 given that ISO 8583 is not unknown territory for the entities whereas ISO 20022 is.

The cost for all 1,500 entities with between 2 and 5 connections per entity therefore is:

	Low	Medium	High
One-Off Cost for all 3,000 to 7,500 connections	300,000,000	787,500,000	1,500,000,000

Summing up the 3 components above, the total cost in Euros for the One-Off Costs for all entities is:

	Low	Medium	High
Total One-Off Cost	605,000,000	1.501.000.000	2,622,000,000

Annual Cost:

The 1,500 entities would incur an annual cost to:

- Maintain the new authorisation format and support bi-annual scheme releases
- Maintain the new clearing format to support bi-annual scheme releases
- Increase bandwidth to handle ISO 20022 vs ISO 8583.

The cost in Euros for these tasks is assumed to be:

	Low	Medium	High
Annual Cost per entity	19,000	66,000	125,000

The cost for all 1,500 to 2,000 with between 2 and 5 connections per entity therefore is:

	Low	Medium	High
Annual Cost for all entities	28,500,000	99,000,000	187,500,000

Interbank Processors/Switches would incur an annual cost to:

- Maintain new authorisation format bridging to support periodical Scheme releases
- Maintain new clearing format to support periodical Scheme releases



- Ensure co-ordination with the Specification Provider to support new features in the periodical Scheme releases
- Increase bandwidth to handle ISO 20022 vs ISO 8583.

The cost in Euros for these tasks is assumed to be:

	Low	Medium	High
Annual Cost per entity	950,000	1,870,000	3,000,000

The cost for all 31 entities therefore is:

	Low	Medium	High
Annual Cost for all 31 entities	29,450,000	57,970,000	93,000,000

In addition, there would be the annual cost for a Specifications Provider.

	Low	Medium	High
Annual Cost	250,000	375,000	500,000

In Summary the Total Annual Cost for Scenario 3 would be as follows:

	Low	Medium	High
Total Annual cost	58,200,000	157,345,000	281,000,000

A.5.5. Scenario 3 – ISO 20022 – Summary

The following are the summary of all costs and benefits for Scenario 3:

Entities connected to Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 450.000.000	€ 1.237.500.000	€ 2.250.000.000
All One-time Benefits			
Net One-time Result	€ (450.000.000)	€ (1.237.500.000)	€ (2.250.000.000)

Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 155.000.000	€ 263.500.000	€ 372.000.000
All One-time Benefits			
Net One-time Result	€ (155.000.000)	€ (263.500.000)	€ (372.000.000)

Entities connected to Interbank Processor/Switch	Low estimate	Medium estimate	High estimate
All Annual Cost	€ 28.500.000	€ 99.000.000	€ 187.500.000
All Annual Benefits	€ 15.000.000	€ 168.750.000	€ 600.000.000
Net Annual Result	€ (13.500.000)	€ 69.750.000	€ 412.500.000

Interbank Processor/Switch plus Specifications Provider	Low estimate	Medium estimate	High estimate
All One-time Cost	€ 29.700.000	€ 58.345.000	€ 93.500.000
All Annual Benefits			
Net Annual Result	€ (29.700.000)	€ (58.345.000)	€ (93.500.000)



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Summary	Low estimate	Medium estimate	High estimate
All One-time Cost	€ (605.000.000)	€ (1.501.000.000)	€ (2.622.000.000)
Net Annual Result After Migration	€ (43.200.000)	€ 11.405.000	€ 319.000.000
Ratio Annual Result/All One-time Cost	N/A		1% 12%
Payback period (years)	N/A	Extremely long	18

A.6. Detailed report elements on Acquirer to Issuer Card Processing domain

A.6.1. Introductory remarks

- *Card Schemes usually ensure a default solution (switch, infrastructure, platform, etc.) that is available to allow a full reachability of issuers by acquirers for the acceptance of all cards of a given brand; this Scheme default solution provides services for:*
 - *Optional online authorisation if the card or the terminal requires it;*
 - *Clearing of transactions details;*
 - *Settlement between parties, i.e. issuers and acquirers.*
- *Several models exist for the exchange of messages between parties, the use of same or distinct platforms for each service, the settlement models are organised between acquirers and issuers, the latter being actors for the execution and the control of the financial flows.*
- *Beside the default Authorisation Switch and Clearing & Settlement solution referenced by schemes, other solutions are also used by acquirers and issuers, such as:*
 - *Bilateral or multilateral solutions established between some acquirers and issuers;*
 - *Intra-processor solutions when the acquirer and the issuer processor is the same;*
 - *Domestic/regional networks providing gateway services to acquirers and issuers to access Scheme default solution;*
 - *Alternative centralized Switch and Clearing & Settlement solution provided by third party service providers.*



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						Today	Today	Today	Today	Expected Evolution	Expected Evolution	Expected Evolution	Expected Evolution
Schemes or Approval Body	Transaction Volume of Scheme or Approved Solutions (B)	% of trx going through the default central switch	Origin (Domestic or International)	Main Place of Activities in EU	Schemes or Approval Body	A2I Architecture	A2I Type	A2I Auth MF (8583 variant)	A2I C&S MF	A2 Architecture	A2I Type	A2I Auth MF	A2I C&S MF
Visa Europe		37	45%	EU	All EU	Visa	Centr. Dual	Prop.	DMSA	DMSC	Centr. Dual	?	?
MC	Confid.			Int.	All EU	MC	Centr. Dual	Prop.	CIS	IPM	Centr. Dual	?	?
Amex	Confid.			Int.	All EU	Amex	Centr. Dual	Prop.	?	?	Centr. Dual	?	?
JCB	Confid.			Int.	All EU	JCB	Centr. Dual	Prop.	?	?	Centr. Dual	?	?
Discover	Confid.			Int.	All EU	Discover	Centr. Dual	Prop.	?	?	Centr. Dual	?	?
CUP	Confid.			Int.	All EU	CUP	Centr. Dual	Prop.	?	?	Centr. Dual	?	?
CB		10,2	71%	Dom.	FR	CB	Centr. Dual	Prop.	CBAE / 8583	CB2C	Centr. Dual	Public	ATICA (20022)
Girocard		4,9	N/A	Dom.	DE	girocard	Not Centr. Dual	Public	GBIC / 8583	SCC (20022)	Not Centr. Dual	Public	GBIC / 8583
Servired				Dom.	ES	Servired	Centr. Singl.	Prop.	8583	8583	Centr. Single	Public	20022 & 8583
4B		3		Dom.	ES	4B	Centr. Singl.	Prop.	8583	8583	Centr. Single	Public	20022 & 8583
Euro6000				Dom.	ES	Euro6000	Centr. Singl.	Prop.	8583	8583	Centr. Single	Public	20022 & 8583
Bancomat		2		Dom.	IT	Bancomat	Centr. Singl.	Prop.	8583	8583	Centr. Single	Public	20022 & 8583
Dankort		1,5		Dom.	DK	Dankort							8583
BCMC		1,5	<5%	Dom.	BE	BCMC	Centr. Singl. & Completion	Prop.	8583	8583			
MultiBanco		1,7		Dom.	PT	MultiBanco	Centr. Singl / Dual	Prop.	SRTP / 8583	SRTP / 8583	Centr. Singl/Dual	Prop./Public	SRTP / 20022
Notes:													
1- The % of transactions going through the default central switch are below 100% since some transactions are processed in on-us mode and some transactions are processed by other processors.													
2- N/A in the % of transactions going through means Non-Applicable. This means there is no default central switch but only a central infrastructure.													

A.6.2. Analysis

- This domain is subject to oversight, is technically robust and has been stable over time. It has proven it can adapt to the different evolutions that have occurred (e.g. chip technology, remote payment).
- Each scheme references its own default switch solution to allow reachability, even if based on similar standards (e.g. ISO 8583).
- There are different architecture/solutions in place for transaction processing (e.g. scheme default, intra processor, bilateral between acquirers and issuers).
- Acquirers and Issuers supporting several card schemes have to support several financial flows (settlement) specific to the individual card schemes.
- ISO 8583 messages are still the standard in this domain, although many variants exist.
- There two initiatives to develop new standards based on ISO 20022:
 - First implementation of ISO 20022 started with SEPA Card Clearing (SCC), which has emerged as a mature standard currently fully implemented for the German girocard Scheme as an ISO 20022 A2I mechanism for cards clearing and settlement:
 - First version of specifications available in 2011
 - Implementation started in 2013
 - Migration in Germany started in 2014 and ended in 2015
 - The full set of messages is progressing at ISO level (ISO 20022-ATICA message drafts exist)