



# Manufacturing the PERFECT MORTGAGE: An INNOVATION Challenge

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## Thought Paper on Expanding Integration & Distribution Capabilities

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## Table of Contents

1	Executive Summary .....	1
2	Overview.....	2
2.1	Problem Statement.....	2
2.2	Scope.....	2
3	Value Proposition of the “Perfect Integration” Guide .....	2
3.1	The Case for Change: Current Cost of Integration is Too Great .....	3
4	Methodology .....	7
4.1	Group Paper’s Methodology:.....	7
4.2	Components of Integration and Distribution.....	8
4.2.1	Communication Protocol .....	8
4.2.2	Communication Method .....	8
4.2.3	QoS (Quality of Service) for Reliable Messaging and Transactional Integrity.....	8
4.2.4	Encryption, Message Integrity and Privacy.....	8
4.2.5	Data Format and Definitions.....	8
4.2.6	The Handshake, Events and Statuses .....	8
4.2.7	Best Practices for Integration Components .....	8
4.2.8	Industry – the Mortgage Universe .....	9
4.2.9	Diagram 1 - The Mortgage Life Cycle Diagram.....	10
4.2.10	Appraisal Process Flow.....	11
4.2.11	Diagram 2 - Appraisal Transaction Process Flow .....	11
4.2.12	Authentication and Authorization – Out of Scope.....	11
5	Target Case Study .....	12
5.1	Table 2 - Categories.....	12
5.2	Table 3 - Typical Integration Components in an Appraisal Transaction .....	13
5.2.1	Current System Integrations in the Appraisal Transaction .....	13
5.2.2	Defining the Appraisal Integration Space .....	14
5.2.3	Supported Data Formats in the Appraisal Segment .....	14
5.2.4	Supported Events.....	15
5.2.5	Table 4 - Sample events in an Appraisal Transaction.....	17
5.2.6	Sensitive Data and Appraisal Transactions .....	18

5.2.7	Key elements for an Ideal Appraisal Integration.....	18
6	The “Perfect Integration” Guide.....	20
6.1	The Integration Process Workflow .....	20
6.2	<i>The Guide</i> Contents.....	20
6.2.1	Transaction Type: Define .....	21
6.2.2	Data Format (m): Select an Existing Data Format.....	22
6.2.3	Select Communication Protocol.....	22
6.2.4	Select Communication Method .....	23
6.2.5	Authentication and Authorization .....	23
6.2.6	Handshake.....	24
6.2.7	Encryption type .....	24
6.2.8	Testing.....	25
6.2.9	Table 5 – Example of UAT Test Case for an Appraisal Integration Project .....	26
7	The Third Party Validation and Certification Entity.....	27
7.1	Diagram 3 - Scope of Third Party Validation and Certification .....	28
7.1.1	Scope of Validation .....	27
7.1.2	Scope of Certification.....	27
7.1.3	Out of Scope.....	28
7.2	The Entities .....	28
7.2.1	The Primary Integration Certification and Validation Entity.....	28
7.2.2	The Secondary Integration Certification and Validation Entities.....	29
7.2.3	Diagram 4 - The Validation Process: <i>Service Provider</i> with <i>Third Party Entity</i> .....	29
7.2.4	Diagram 5 - Technical Communication Process: <i>Service Provider</i> with <i>Third Party Entity</i> .....	29
7.2.1	Proposed Process between <i>Service Provider</i> with <i>Third Party Entity</i> .....	30
7.2.2	The Client’s Role.....	30
7.2.3	Diagram 6 - The Validation Process: <i>Service Requestor</i> with <i>Third Party Entity</i> .....	31
7.2.4	Diagram 7 - Technical Communication Process: <i>Service Requestor</i> with <i>Third Party Entity</i> .....	31
7.2.5	Proposed Process between <i>Service Requestor</i> and the <i>Third Party Entity</i> .....	32
7.3	The Certification Process .....	32
7.3.1	Validation in lieu of UAT .....	33

8	Appendix.....	34
8.1	A – Transaction Types and Industry Adopted Data Formats .....	34
8.2	Appendix B – Glossary.....	35

## 1 EXECUTIVE SUMMARY

The mortgage industry uses several different methodologies for business-to-business (B2B) integration of applications with no consistent standards. This has led to the proliferation of multiple proprietary practices. Likewise, there is no enforcement mechanism in the industry today for standard practices, even when those practices exist. The lack of standardization causes many inefficiencies including:

- Increased delivery timelines
- Increased complexity and cost of implementation
- Increased maintenance costs
- Degradation of data integrity
- The need for scaled custom integrations

The focus of this Thought Paper is to discuss the need for standards, identify best practices and processes for implementing integrations, and call for a governing body to manage and enforce the proposals. Our recommendations include the:

- Creation of the “Perfect Integration Guide” (a.k.a., *The Guide*)
- Establishment of a “Certification Authority”
- Issuance of a “Seal of Approval”

The proposed standards and best practices are to be outlined and institutionalized in *The Guide*. The Certification Authority is the governing body that develops *The Guide* and enforces its standards and best practices. Participants who follow *The Guide* earn official recognition from the Certification Authority. This recognition serves as an official “Seal of Approval” to let buyers of their service know that the technology firm complies with industry standards and best practices.

## 2 Overview

### 2.1 Problem Statement

The mortgage industry has hundreds of participants working with each other in a business-to-business (B2B) environment. Although effort has been made to standardize integration policies and procedures, the industry still continues to use several different protocols for B2B integration. And, even when a standard exists, the industry still lacks consistent methods and enforcement mechanisms. This has led to the proliferation and widespread use of multiple industry-based protocols, as well as proprietary non-standard integration protocols and processes. This results in:

- Slower time to market with new integrations or extending existing integrations between participants
- Increased complexity, and higher cost of implementation and maintenance
- Degradation of data integrity due to the absence of, or not following common integration standards
- Cascading effect of any change to a custom integration
- Potential increase in security threat if non-standard practices are followed

### 2.2 Scope

The scope of this paper is to identify a process and a methodology (the Perfect Integration Guide) by which standards and best practices can be enumerated and evangelized to overcome challenges in the integration process. In addition, we also propose the general foundation and concept of a **Third Party Entity** that serves as the **Certification Authority** to focus on testing the integration capabilities of mortgage market participants and providing certifications.

### 2.3 Value Proposition of the “Perfect Integration” Guide

The case for any new implementation of information technology, whether a system, feature or function is often made based on its value to the enterprise. In addition to potential cost savings or increased productivity, adopters often analyze whether or not the change will advance the primary goals or missions of an enterprise or business unit, a.k.a. the “Business Value.”

Integration projects often offer valuable business benefits precisely because an organization has made the following strategic choices:

- Seek a third party for a good or service
- Pursue a digital connection or function from a third-party
- Invest in effect a shared capability.

This paper makes the case for the perfect integration from three perspectives:

- 1) *The value to the technology integrators, i.e., the systems providers*
- 2) *The value to policy makers and those seeking adoption/ compliance from others*
- 3) *Value to the third party purchasing the good or service*

Early in the development of information based technology networks, the ability to integrate digital infrastructures was a strategic advantage. Today it is a requirement for interoperability much like a union card or certification for a certain skill. The benefits of using third parties who integrate with many clients, suppliers, competitors and distribution channels, are substantial and potentially transformative, depending on the business scope and model.

To determine benefits consider:

- The total cost of integrations whether it is time, money, resources, or opportunity costs
- The value of infinite integration - complete interconnectedness to key third party functions
- The value of speed to scale - more integrations, more frequently to more partners, across more platforms
- The Implications for organizational and inter-organizational control posture - the value of systems implementation of policy or practice
- The implications to key business partners and critical members of supply chains – what does this do to the perceptions of quality, capacity, and innovations?

## **2.4 The Case for Change: Current Cost of Integration is Too Great**

Integration costs are widely thought of as expensive to all parties. Costs include:

- The actual cost of the integration – people, systems , and process alterations
- The actual time spent designing, testing and validating that the work achieves the desired exchange
- The cost of managing the integration to a given provider

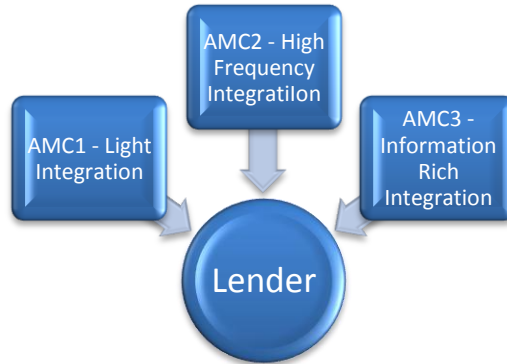


However, the real cost of integration is often more than just the cost of a single integration. It also includes the cost of integrating all partners and functions.

To illustrate, in the following scenario the “Lender” engages three appraisal management companies (AMCs) who are all good business partners/service providers. They must meet the objective service levels and quality standards that are the life blood of being a service provider. The primary difference, to both the lender and each other, is that all three service providers *have different integration assumptions* and business needs embedded within their integration implementations. This created a potentially challenging situation to bring the three applications together, for example:

- **AMC 1** placed a premium on fast integration.  
This approach translated into the bare minimum needed to be certified as integrated by the business and IT protocols at the time. Although this integration was achieved in record time, it consumed a tremendous amount of resources and requires ongoing efforts to stay current. Although expedient, it is costly to maintain over time.
- **AMC 2** placed a premium on real-time communication.  
This service uses the very same data that AMC 1 captures but because of the “stock watch” feature their integration requires more effort to maintain. This “stock watch” interface conveys alert-driven status and information that is now used to make decisions or inform other processes. This is a required capability, but only one system uses it so there is a dilemma about how to move forward with it. This integration has a similar maintenance profile, additional upside, but a different management challenge. How should the system handle the alert information or capitalize on all that the status that is flashing?
- **AMC 3** used the same transaction set and implemented the same thin data file; however, it placed a premium on incremental data.  
This incremental transaction set aids with things like compliance (i.e., Is the license of the appraiser valid? What is the average quality score for the appraiser over the body of work for the AMC versus the body of work for the lender? etc.). This rich information set is not part of the transaction. However, it enhances the status of the information and is delivered in a tabular format outside of the transactional integration. It is also an important part of the “weekly reporting that comes with the Information rich summary” requested by the client.

**Figure 1: What works today is costly to sustain over time**



*Why is this example so costly?*

Each one of these integrations meets the basic requirements of executing the transaction as long as three conditions exist:

1. The organizational processes and people that use these systems use them uniformly; they expect and value the lowest common denominator deliverable from each.
2. The systems themselves all function with the same reliability and availability characteristics – there is not a material difference that creates fewer choices or less redundancy.
3. The systems and processes inside the company do not depend on either the enriched inputs of the AMC2/3 implementations for any mission critical triggers or inputs.

**Table 1 – Cost Drivers of Integrations**

Factor	Explicit or Unrealized?	Impacts
Non-standard Integrations	Both	<ul style="list-style-type: none"> <li>• The maintenance costs of non-standard integrations are well known to be higher and, as a group, (scope of production) takes more time.</li> <li>• The opportunity cost in this case is less explicit. While initial capabilities were paid for by the first two providers; additional cost, time, and effort must be incurred to integrate the whole group.</li> </ul>

Factor	Explicit or Unrealized?	Impacts
Utility Extensibility of the Platform	Unrealized	<ul style="list-style-type: none"> <li>• This type of integration is purely for “connecting and transacting.”</li> <li>• These implementations are often thought of as “Point Solutions,” designed for a specific point in time with clear bounds and usage scenarios.</li> <li>• Seldom are these integrations thought of as a “Point of Leverage” for other systems that may need the data or are considered as the source of information to trigger other processes.</li> </ul>
Compliance	Explicit	<ul style="list-style-type: none"> <li>• Achieving a compliance posture is probably the greatest challenge over time, and with three systems the challenge is amplified. <ul style="list-style-type: none"> <li>➤ The systems need to be compliant.</li> <li>➤ The processes that are employed against each system need to be compliant.</li> <li>➤ The entire platform needs to meet the production requirements for compliance in manner that creates no further exposures.</li> </ul> </li> </ul>
Redundancy	Hidden	<ul style="list-style-type: none"> <li>• One of the underappreciated but often quoted values of multiple integrated partners is redundancy.</li> <li>• The patterns meet the same standards from a production standpoint, but in the example above do not deliver the same product, nor are they really able to replace one another except for the most basic transaction capability.</li> </ul>
Speed to Scale	Hidden	<ul style="list-style-type: none"> <li>• The lack of uniformity is recognized; the maintenance challenge will eventually become evident, over time.</li> <li>• The big cost that is born without clear attribution is the latent and unrealized ability to scale and operate with greater efficiency and effectiveness at the scale of the business.</li> <li>• Most often this cost expresses itself in lower service levels, increased head count and challenges in scaling the function (volume) changes etc., or the scope (new applications/)</li> </ul>

The paradox of “it works but does not scale” is a good way to describe the real cost of non-standard implementations and integrations. As the rate/scope of change grows, and the pressure-on-increased-quality-at-lower costs become more acute, the connective tissue which binds the industry together will be a key lever to drive improvements that are meaningful.

### 3 METHODOLOGY AND COMPONENTS

This paper defines the “Perfect Integration Guide” methodology for establishing or updating integration points between industry participants specific to a target segment. It can be expanded to all segments of the mortgage market.

#### 3.1 Methodology

The following elements need to be defined or identified:

1. Define the components of a typical B2B integration (e.g. transmission protocol, encryption, authentication, data format, etc.)
  - a. Data formats supported
  - b. Validation
  - c. Communication Protocol
  - d. Events and milestones specific to the process being documented
  - e. Workflow of ideal process
  - f. Security elements and sensitive data
2. Define handshake/process
  - a. Validation result handshake
  - b. Change Management
  - c. Version Control
3. Identify best practices for each of the components (driven by the outcome of groups 2 and 3 above)
4. Define the mortgage universe. This will quantify the areas that need to be included in *The Guide*.
5. Select one segment (and possibly one transaction within that segment) to create the outline of *The Guide*. The group picked the appraisal segment to illustrate.
  - a. Define systems and integrations that currently exist specific to the selected transaction, including existing documented policies, procedures, and best practices
  - b. Define and enumerate integration components within the selected segment
  - c. Define handshake/process for the selected segment
6. Based on above, create the initial *The Guide*, specific to the Appraisal segment initially
7. Governance/Adoption – voluntary, incentivized
  - a. Value proposition for adopting *The Guide*
  - b. Proposal for indirect enforcement

## **3.2 Components of Integration and Distribution**

The following components will be discussed in this paper:

### **3.2.1 Communication Protocol**

- SOAP
- ReST
- XIS

### **3.2.2 Communication Method**

- Synchronous
- Asynchronous
- Number of roundtrips?
- Error handling methodology and queuing mechanism

### **3.2.3 QoS (Quality of Service) for Reliable Messaging and Transactional Integrity**

Reliable messaging is critical for message acknowledgement and delivery status awareness for sender and receiver applications and web services.

### **3.2.4 Encryption, Message Integrity and Privacy**

Encryption is used to protect sensitive information so that only the intended recipients are able to decode and read the data.

### **3.2.5 Data Format and Definitions**

- Request
- Response
- Handshake
- Envelope

### **3.2.6 The Handshake, Events and Statuses**

The paper identifies existing handshake, events and status messages exchanged between integrating parties in the target case study. Diagram 2 – Appraisal Transaction Process Flow includes a detailed list of example events between a lender and a data courier platform.

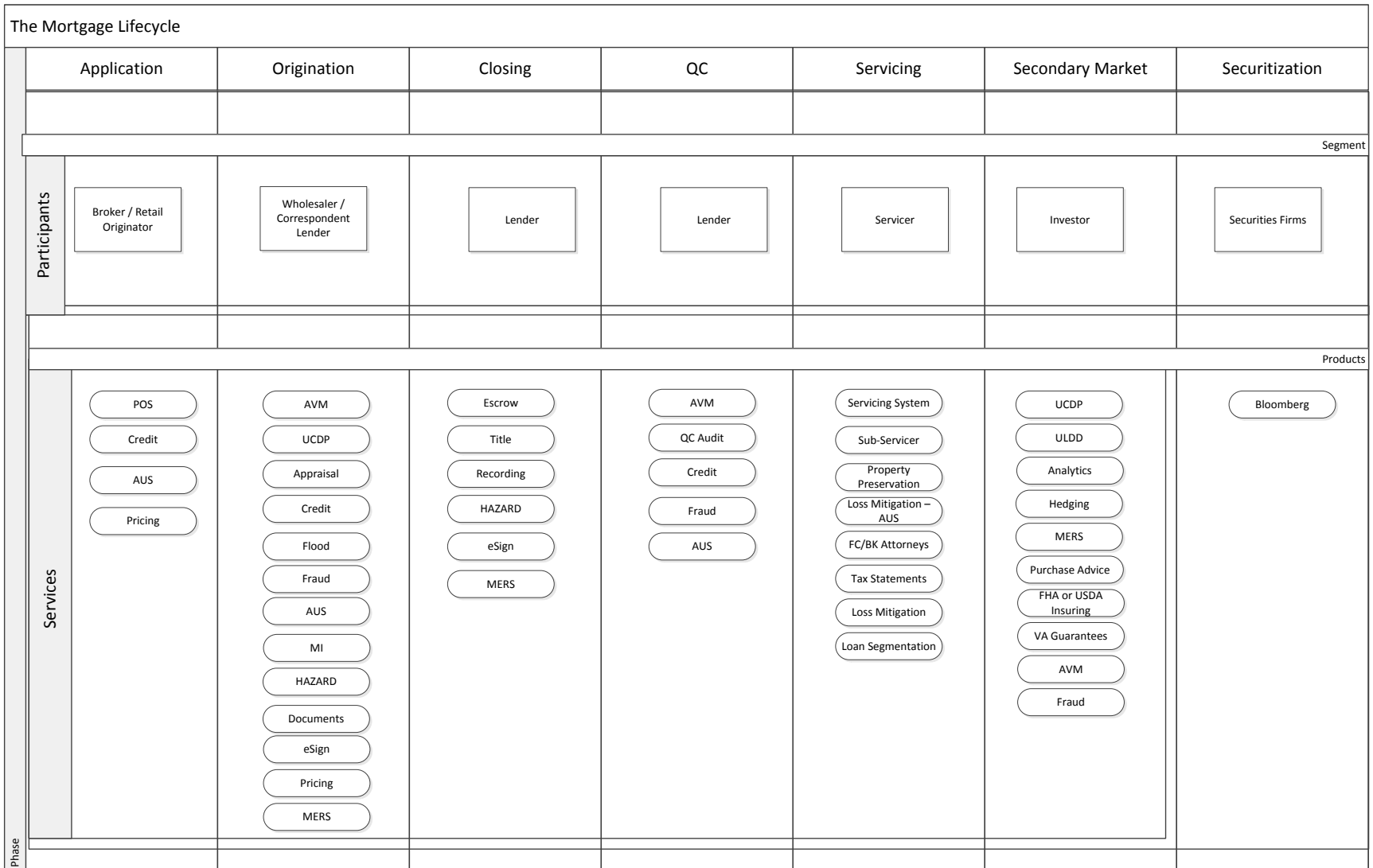
### **3.2.7 Best Practices for Integration Components**

Best practices for the technical components and data standards will be included from industry work as well as other groups within the Fannie Mae Innovation Challenge teams.

### **3.2.8 Industry – the Mortgage Universe**

The diagram on the next page identifies all high-level transactions occurring in the mortgage industry. While it is virtually impossible to identify all transactions, this chart is intended to show a map of the mortgage lifecycle and help integrating parties identify where the transactions occur in the mortgage process. The map was also used to identify the list of transactions that require defining data format standards.

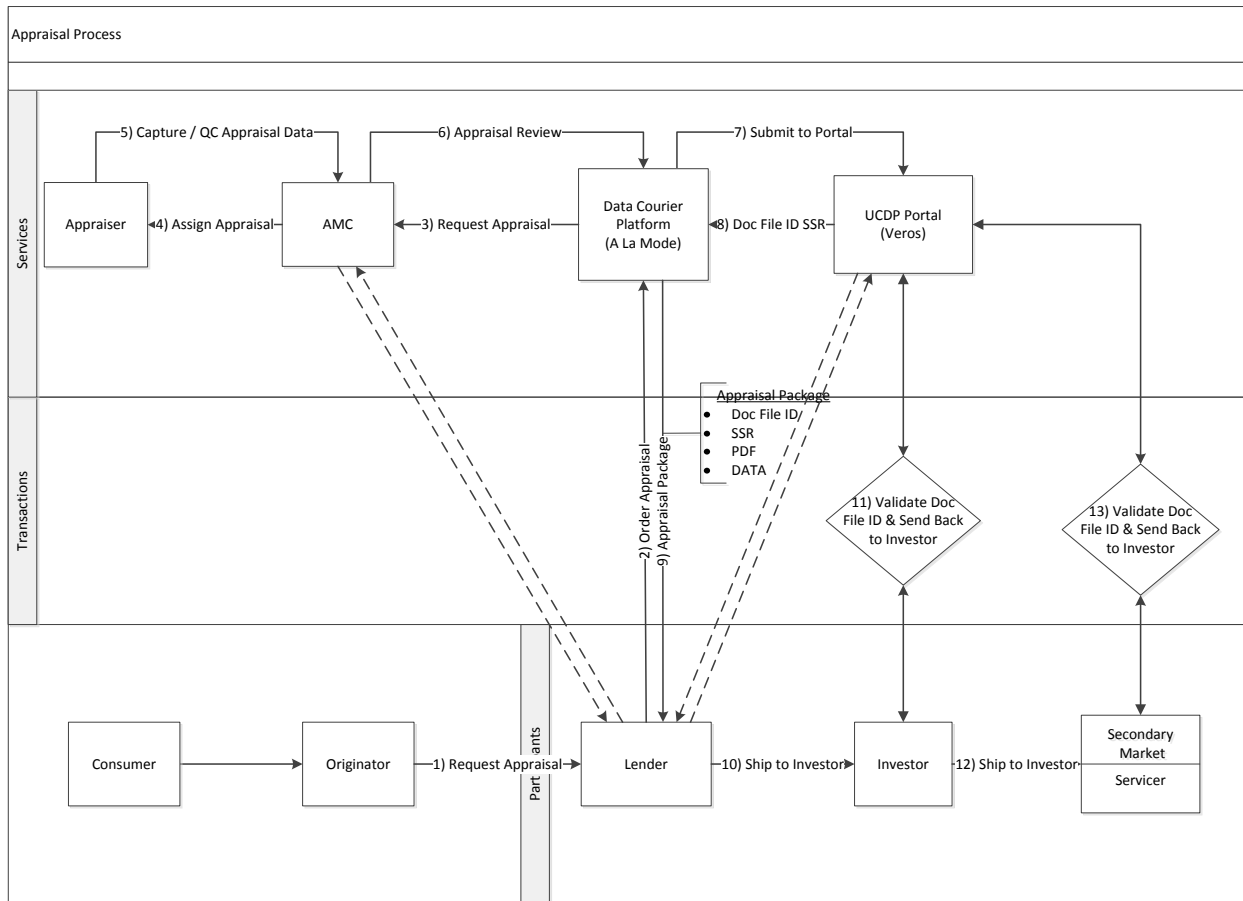
### 3.2.9 Diagram 1 - The Mortgage Life Cycle Diagram



### 3.3 Appraisal Transaction Process Flow

Diagram 2 – Appraisal Process Flow, identifies all primary transactions (products) occurring in the appraisal segment of the mortgage industry. While it is virtually impossible to identify every transaction, this chart is intended to show a high-level map of the appraisal transaction lifecycle and all pertinent integrating parties in the transaction. This map lists most transactions required to define data format standards and should be used to determine where the transactions occur in the appraisal process.

#### 3.3.1 Diagram 2 - Appraisal Transaction Process Flow



### 3.4 Authentication and Authorization – Out of Scope

In the future, the team will explore options for implementing a single security token service for the mortgage industry. Conceptually, upon authentication, the user would get a token to pass on to the subject application, similar to how users login into an application on their iPad using a Gmail or Facebook account. There are proven technologies in place today that can accommodate this. The Integration Certification Authority can play this role, but this item is out of scope for phase 1.



## 4 TARGET CASE STUDY

The case study below includes the appraisal segment and transactions occurring between participants, as outlined in Diagram 2 – Appraisal Transaction Process Flow on the previous page.

The case study targets any direct integration between two parties in the Appraisal Transaction Process Flow. Namely:

- Lender →→ Data Courier Platform
- Data Courier Platform →→ AMC
- AMC →→ Appraiser
- Data Courier Platform →→ UCDP Portal
- Etc.,

### 4.1 Table 2 – Appraisal Segment Categories

<i>Appraisal Segment Participants</i>	<i>Examples</i>	<i>Appraisal Segment Transactions</i>
• Appraisal Management Firms	➤ FNC, LSI, Veros, etc.	• Appraisal Order (1004)
• Appraisal Software Providers	➤ A la Mode, ACI, etc.	• PCR Order
• Data Courier Platform	➤ RealEC, Dorado, A la Mode, FNC, Veros, etc.	• BPO
• Customers	➤ Lenders, Brokers, Secondary Market Investors, Securities firms	• Recertification (1004D)
• Appraisers	➤ Numerous independent firms	• Appraisal Desktop Review
• UCDP Portal Provider	➤ Fannie Mae, Freddie Mac	• Property Inspection Report
		• FHA Inspection
		• Field Review

## 4.2 Table 3 - Typical Integration Formats and Protocols in an Appraisal Transaction

<i>Data Formats Supported</i>	<i>Validation</i>	<i>Communication Protocols</i>
<ul style="list-style-type: none"> <li>MISMO XML 2.6, MISMO XML 2.6 GSE, ACI XML (owned by ACI Software)</li> <li>TOTAL XML (owned by a la mode)</li> <li>AI READY XML (owned by FNC)</li> <li>RealEC XML (owned by RealEC)</li> <li>And many different flavors of XML for one-off integrations.</li> </ul>	<p>Not much validation is going on:</p> <ul style="list-style-type: none"> <li>MISMO XML 2.6 and MISMO XML 2.6 GSE have good DTDs but no real schemas were used by MISMO until version 3.0 so data types are not validated.</li> <li>Appraisals are inherently free form text but with UAD there is a standardization format for specific forms that is validated by the GSEs, and as such, is validated by many companies before sending to the GSEs.</li> <li>However, there's no real standard way to perform the validation.</li> </ul>	<ul style="list-style-type: none"> <li>HTTPS (SSL)</li> <li>FTPS</li> </ul>

- See Diagram 2 – Appraisal Transaction Process Flow (page 11) for events and milestones intrinsic to an appraisal transaction.
- Security elements and sensitive data:
  - Borrower information such as physical address, phone number, e-mail address should be included.
  - However, no borrower financial information such as assets and debts should be provided as part of an appraisal transaction. Social Security numbers aren't required.

### 4.2.1 Current System Integrations in the Appraisal Transaction

There are software companies that compete with each other, yet integrate with each other because of transaction flows.

- The integration methods are different for nearly every one of them.
- There are currently no documented best practices or policies and procedures.

One of the recommendations of this paper is to identify best practices for these types of companies to integrate with each other.

#### 4.2.2 Defining the Appraisal Integration Space

Appraisal integration is a very complicated on many levels:

- There are multiple parties including:
  - broker or loan officer (LO)
  - lender
  - appraisal management company
  - appraiser
  - borrower (appraisals must be delivered to the borrower before closing by the lender or a designated agent).
- Each party likely has their own system that requires at least a portion of the resulting appraisal to be recorded into the system.
- The appraisal as a function of origination is under regulatory scrutiny, meaning that lenders have to set up complex systems to prove compliance and to avoid errors which could result in a lack of purchase eligibility and/or a buy back down the line.
- Appraisal transactions are not synchronous.
- Systems in the chain are often owned by a separate entities; each system often supports a different set of features.

To solve some of these complexities, integration between systems must become a requirement. These integrations need to connect the lender systems to AMC systems to appraisal systems.

#### 4.2.3 Supported Data Formats in the Appraisal Segment

Two types of data comprise appraisal system integration:

- First, there is the actual data format that contains the appraisal – the final deliverable. At this point, it's standard that the appraisal will be represented in MISMO XML 2.6 (with a GSE extension for some forms). The MISMO standard accounts for a very large majority of appraisals being performed. There does remain a gap for appraisal assignments that require forms that aren't frequently used. In these cases, generally only a PDF of the appraisal is delivered.

In addition to MISMO XML 2.6, many software companies have their own XML standards to represent the actual contents of an appraisal. This was happened because

MISMO 2.6 was only formally introduced as a requirement in late 2011. Before that time, the participants needed the appraisal represented in XML format so software companies filled the gap by developing their own XML flavors. Some examples of this are ACI XML (owned by ACI Software), TOTAL XML (owned by a la mode), AI Ready XML (an open XML standard used by FNC), and RealEC XML (owned by RealEC).

- The second type of data relates to the messaging between systems in support of a transaction – a new order request including all the order information, a new order acknowledgement, an inspection scheduled event, a cancellation notice, a completion notice, etc. At this time, there are no standard formats that prevail. Every company/system brings its own format and methodology to messaging and information delivery.

#### 4.2.4 Supported Events

There are many steps to an appraisal order, and the actual assignment generally spans 5-7 days with many possible exceptions that can occur.

- First, there is the order assignment which will usually travel from a broker or loan officer to an appraisal management company or an appraisal management function inside a lender's organization.
  - This order must contain all the needed property information, party information (borrower, co-borrower, inspection contact), the assignment information such as the intended user, the type of appraisal being performed, the date when the report is needed, and the fee being offered for the assignment. New orders will also have documents attached that the appraiser needs to perform the appraisal such as a purchase contract.
- Second, the order information is taken and a search for an appraiser is conducted – generally within a system.
  - Once an appraiser is selected, the order information is transmitted to him or her either via an integration, inside e-mail, via a fax, or over the phone.
  - The appraiser then reviews the assignment and makes a decision to accept or decline the assignment.

- At this point, any number of things will happen and will need to be communicated by the broker/loan officer, the lender, the AMC, or the appraiser.

***An Integration needs to support all of these events and actions***

- Finally, once the appraisal is returned, additional actions must be performed before the appraisal is released to the broker/loan officer.
  - Generally, the AMC or appraisal desk performs a quality control check of the appraisal making sure that it is complete and highlights any investor requirements that have not been met.
  - The report may go back to the appraiser if deficiencies found.
  - Then, the appraisal will be submitted to the GSE UCDP portal where it may have additional changes that need to be made.
  - Lastly, a copy of the appraisal must be delivered to the borrower.

All three of these specific scenarios must be accommodated and documented as part of the history of the order. In addition, many lenders today require proof that the appraisal has been delivered to the borrower and the borrower actually acknowledged receipt.

See next page for table

#### 4.2.5 Table 4 - Sample events in an Appraisal Transaction

Status	Sent By*	Partner Support Required/Optional
Awaiting Acceptance	N/A	N/A
Requires Assignment	Platform	Optional
Vendor Accepted Assignment	Provider	Optional
In Progress	Platform	Required
Conditionally Declined	Provider	Optional
Declined	Provider	Optional
Conditions Accepted by Client	Client	Optional
Inspection Scheduled	Provider	Required
Inspection Complete	Provider	Required
Delayed	Both	Required
On Hold	Both	Required
Reassigned	Client	Optional
Resumed	Both	Required
Document Uploaded	Both	Required
Document Deleted	Both	Optional
Completed Appraisal Deleted	Both	Optional
Order Changed	Provider	Optional
Modification Requested	Provider	Optional
Modification Accepted	Client	Optional
Modification Declined	Client	Optional
Payment Processed	Provider	Required
Payment Failed	Provider	Required
Payment Information Updated	Client	Optional
Cancelled	Both	Required
Pending Quality Review	Provider	Required
Revision Needed	Client	Required
Revision Request Cancelled	Both	Optional
Completed	Both	Required
Copy of completed appraisal e-mailed to borrower	Provider	Optional
Appraisal viewed by borrower	Provider	Optional
Appraisal Submitted to {0} via UCDP	Provider	Optional
Appraisal Submission Accepted by {0} via UCDP	Provider	Optional
Appraisal Submission to {0} Not Successful	Provider	Optional
Appraisal Submission to {0} via UCDP Failed	Provider	Optional
Document File ID Added to Order	Provider	Optional
UCDP Status Removed	Provider	Optional
Message	Both	Required
Appraisal Fee Changed	Provider	Optional
Comment - Action Required	Client	Optional
Update Disclosure Date	Client	Optional

\* Key:

Platform indicates statuses originating from the data courier platform

Provider indicates statuses originating from the provider of the service

Client indicates statuses originating from the client system and posted to data courier platform or the provider

Both indicates that statuses could originate from either provider or the client

Optional events can still be posted by the provider but it's optional for the client to consume them

#### 4.2.6 Sensitive Data and Appraisal Transactions

There is sensitive non-public information that is sent as a part of most phases of the appraisal order process. Most notably, it's going to be specific borrower information (name, address, phone number, e-mail address, etc.) as well as contact information for other parties that are part of the loan. The appraiser usually receives copies of documentation that could contain confidential information so it has to be assumed those documents need to be protected as non-public.

The most sensitive information that is typically transmitted with an appraisal order is credit card information to pay for the order. Generally, in today's market, many lenders and AMCs require payment before engaging a lender and most of them require payment in the form of credit card – from either the broker/loan officer or the borrower. Since this credit card information needs to make it to the ordering party from the broker/loan officer or borrower, many times there is some level of integration around the payment.

There are several different solutions being employed to facilitate this requirement as well as allow all parties to remain Payment Card Industry (PCI) compliant. It is a big consideration and one that isn't widely covered with any sort of standardization. It is also an area where oversight will become more prevalent and changes in security requirements enforced by issuing banks means that the industry must remain nimble to both support the requirement while protecting the card holder.

#### 4.2.7 Key Elements for an Ideal Appraisal Integration

Below are the key factors that contribute to an ideal integration during all phases of an appraisal order:

- ***Real time updates are pushed***

Time is a major factor and information coming from the appraiser can have an impact on the loan. For that reason, an integration needs to support real time updates from the sending party to the receiving party where no action is required on the receiving party's end in order to receive the update.

- ***Asynchronous processing***

Appraisal orders can include large files and sometimes multiple large files that are generally encapsulated as a zip file or encoded into an XML file, therefore, it is imperative that an integration employ the use of asynchronous communication. The receiving party should make sure they have the entire payload and then let the sending party go. Processing of the information can occur after the sending party has disconnected. The sending party should expose an interface to allow processing exceptions to be posted, captured and acted upon either automatically or manually.

- ***Automated Retry:***

To improve the reliability of an integration, an ideal integration should employ the ability to automate the retry failed transmissions while waiting an appropriate time between attempts and limited the total number of attempts. This accounts for environmental anomalies that are likely to occur in connectivity between the two systems.

- ***System and user level authentication***

The end user must be identified and authenticated as well as the sending system. An integration needs to support and validate both levels of authentication.

- And, finally, multiple files packaged in one transmission.

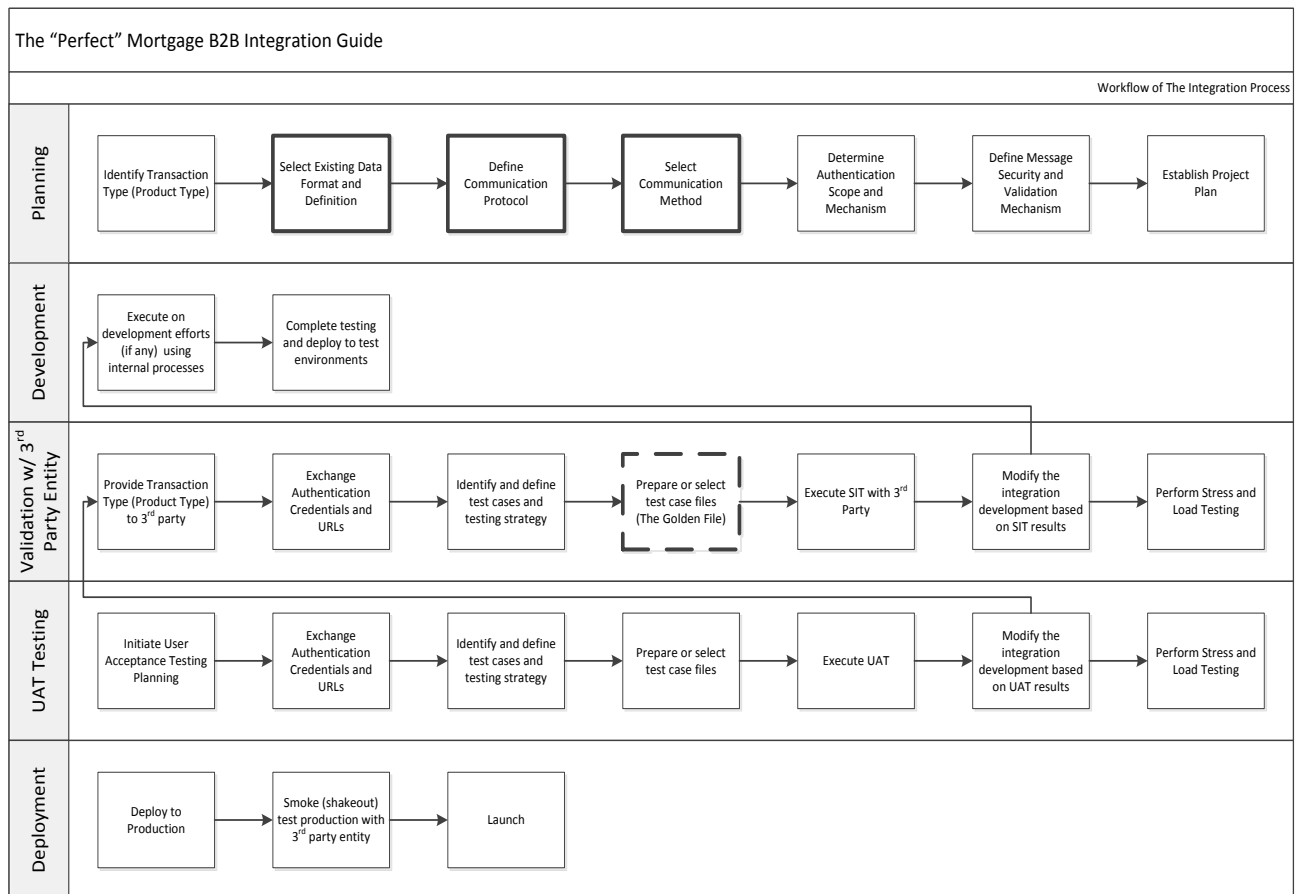


## 5 THE “PERFECT INTEGRATION” GUIDE

The ideal Perfect Integration Guide prescribes best practices and recommends data standards. These best practices are derived from the work of other Innovation Challenge Teams and from the study of existing processes in the selected segment.

References are also made in this section to the Certification Authority; which will be further explained in the following section.

### 5.1 Diagram 3 - The Integration Process Workflow



### 5.2 The Guide Contents

The purpose of the *Perfect Integration Guide* is to outline best practices and to provide a walkthrough of the processes necessary to implement an integration between two transacting parties in the mortgage industry.

It is highly recommended that integrating parties use the workflow identified above during the setup and implementation process of an integration project. The following outlines the recommended steps and components for *The Guide*.

### 5.2.1 Transaction Type Definition

The first step is to determine the transaction type in the select segment of the mortgage lifecycle where the technical integration occurs.

- A transaction is typically a roundtrip one between the requestor and the service provider, whether synchronous or asynchronous.
- A typical, yet complex, example is an appraisal request/response transaction between a Lender and an AMC or a Data Courier Platform. For illustrative purposes, we will use this example going forward.
  - The Request payload contains all necessary information to place an Appraisal Order.
  - The Response payload contains the completed appraisal.
  - Note that any additional roundtrip messages interchanged between the parties after the request sent and before the response is received are referred to as “handshake” messages.

Our focus in this document is on high level Transaction Types, as described by MISMO, which in essence are Products. It does not include the standards for all handshake messages, statuses and events. However, we recommend that subsequent phases of this project should entail an elaboration on all pertinent events and status of the Appraisal segment, and possibly the entire Mortgage Lifecycle.

For reference:

- Diagram 2 – Appraisal Transaction Process Flow illustrates the primary types of transactions
- Appendix A - Lists the specific transaction types in the Appraisal segment , i.e., PCR Order, Appraisal Order, Appraisal QC, Appraisal Re-Order, etc.

### 5.2.2 Data Format (m): Select an Existing Data Format

Select an existing data standard for the request and response components based on the integration's transaction type. (A list of predefined and established data standards is provided in Appendix A.)

- It is highly recommended that the integrating parties adhere to the established standards and do not modify them.
- If the integration requires a data standard that is not defined, or if either integrating party requires modifications to an existing data format, they should contact the **Integration Certification Authority** for recommendation on how to meet the business requirements without modifying the data format.
- Note that a transaction may require several roundtrips to complete a request.
  - Roundtrip exchanges that are not part of the primary request/response payloads of a transaction are identified as handshake messages in the communication.
  - Version 1 of *The Guide* will not include all handshakes, events and/or status messages data standards.

One of the benefits of using an existing industry data format is that mapping of the data to proprietary in-house datasets is already in place.

- If this data mapping is not already done, it is during this step of the integration workflow that the integrating parties perform the data mapping of the selected industry data format to their internal data elements.
- For assistance with mapping data or translating the industry data format, service providers should contact the **Integration Certification Authority**.
  - This is a onetime event that you should be able to re-use for all future integrations on this transaction type, unless the industry data format changes.
  - Any changes to the industry data format should be communicated to participating parties through the **Integration Certification Authority**.

### 5.2.3 Select Communication Protocol

The communication protocol is the technology connection protocol. The recommended communication protocol is SOAP over HTTPS using SSL encryption. A detailed analysis on why SOAP over ReST or XIS was conducted by Group 2 of the Integration and Distribution Challenge team: *Data Format and Transmission Management*.

#### 5.2.4 Select Communication Method

Integrating parties need to determine whether to use a Synchronous or an Asynchronous method of communication. The following criteria should be considered when deciding which communication method to use:

- **Payload size**

This is the size of the request and response payloads.

- **Duration of transaction processing (response time)**

The duration of time it takes the service provider's process to generate a response.

- Synchronous is best if the response time is reasonable and consistent with generally accepted industry standards, for example a response of less than 15-30 seconds may be generally accepted.
- If Asynchronous method is selected, the integrating parties will need to decide whether:
  - The **Service Requestor** will poll the Service Provider's systems for results, or
  - The Provider will post results through a callback mechanism, or post results to a specific URL, FTP site, etc.

#### 5.2.5 Authentication and Authorization

Integrating parties will need to exchange login credentials and URLs of the web applications that provide the services. How this is done depends on the communication method used:

- **For Synchronous**

The **Service Provider** should setup and manage user accounts for the **Service Requestor** to login and request services from the provider.

- **For Asynchronous**

Both parties should establish user accounts. The **Service Requestor** logs in to the **Service Provider's** application (in a b2b fashion) to request the services. The **Service Provider** will return the Response to the Requestor and login to the latter's systems (FTP site, web application) to post the response.

If multiple handshake messages are in play during the transaction processing, it might be necessary for both parties to setup user accounts.

Regarding ***User Management and Authentication***, the parties responsible for setting up user credentials should follow their internal application's processes to setup the authentication engine on their application.

- This process is most likely setup before the integration process starts.
- Any requirements for internal or remote user management would be handled outside of the scope of this guide.

### 5.2.6 Handshake

The number of round trips, and hence handshake messages, depends on the specific integration process between the two parties, and specifically the number of events between the initial Request and the final Response of a transaction.

Generally:

- Handshake messages should follow the same communication links, protocols and methods described above.
- If a handshake message has a pre-selected industry standard data format (see Appendix A), it should be used in the integration.
- Many of the handshake messages will be specific to the integration process between the two parties and the participants will need to select the data elements to be exchanged.

Table 4 – Sample Events in an Appraisal Transaction of this thought paper includes a comprehensive list of events that may be required in the integration communication between the two applications. The table also explains which party is typically responsible for initiating the event.

### 5.2.7 Encryption type

All communication should occur over HTTPS using 128-Bit SSL Encryption or latest industry standard.

It is highly recommended that industry practices for internet transaction encryption are adhered to and followed diligently.

### 5.2.8 Testing

There are two types of testing:

- **System Integration Testing (SIT)**

To be performed between the integrating party and the **Third Party Entity** - Please refer to the Third Party Validation and Certification Entity process in Section 7.

- **User Acceptance Testing,**

To be performed between the two integrating parties.

The User Acceptance Testing is performed by business users from the **Service Requestor's** organization.

Below is the typical list of steps to be followed to plan and execute on the test process.

a) Plan UAT

- Define scope
- Define schedule
- Identify resources

b) Identify UAT test scenarios

- Identify business requirements
- Identify UAT test data requirements and test case files

c) Communication

- Identify and exchange URLs and login credentials to UAT environment(s)
  - If synchronous, only the **Service Provider** will provide this information to the **Service Requestor**
  - If Asynchronous, both parties will exchange this information

d) Execute UAT tests

- Run & Document results
- Log defects

e) Verify UAT defect fixes

- Rerun effected UAT test scenarios

f) Report UAT test results

- Make Go/No Go decision

g) UAT Signoff

h) Evaluate business benefits

i) Ensure requirements were implemented correctly

**5.2.9 Table 5 – Example of UAT Test Case for an Appraisal Integration Project**

Step	Status	Status Code
1	Order Placement event (with attached documents)	101000
2	Vendor accepts assignment (order is moved to In Progress)	201000
3	Client sends Payment Information Updated event	204040
4	Vendor sends a Modification Requested event with a higher fee and modified due date to Client	203010
5	Client sends a Modification Declined event	203030
6	Vendor sends a Modification Requested event with a higher fee and different due date to Client	203010
7	Client sends a Modification Accepted Event	203020
8	Vendor sends a Message to Client	900000
9	Client sends a Message to Vendor	900000
10	Client sets order to Delayed	201060
11	Client sets order to Resumed	201090
12	Client sets order to On Hold	201070
13	Client sets order to Resumed	201090
14	Vendor sends Inspection Scheduled status	201040
15	Vendor sends Inspection Completed status	201050
16	Vendor sends a Document Uploaded status with document	202000
17	Vendor sends Completed status with appraisal and invoice	301000
18	Client sends a Revision Request	301010
19	Vendor sends Completed status with appraisal	301000
20	Vendor sends SSR docs	700005
21	Vendor sends "Copy of Appraisal Emailed to Borrower" status	500004

## 6 THE THIRD PARTY VALIDATION AND CERTIFICATION

The ICID team recommends creating a **Third Party Entity** or **Certification Authority** to acts as the governing authority to validate and certify integration readiness of participants. This body will maintain the Integration Guide and provides the Integration Seal of Approval.

### 6.1 Scope

#### 6.1.1 Scope of Validation

The Validation activity occurs when a **Service Requestor** wants to integrate with a **Service Provider**. How it should work:

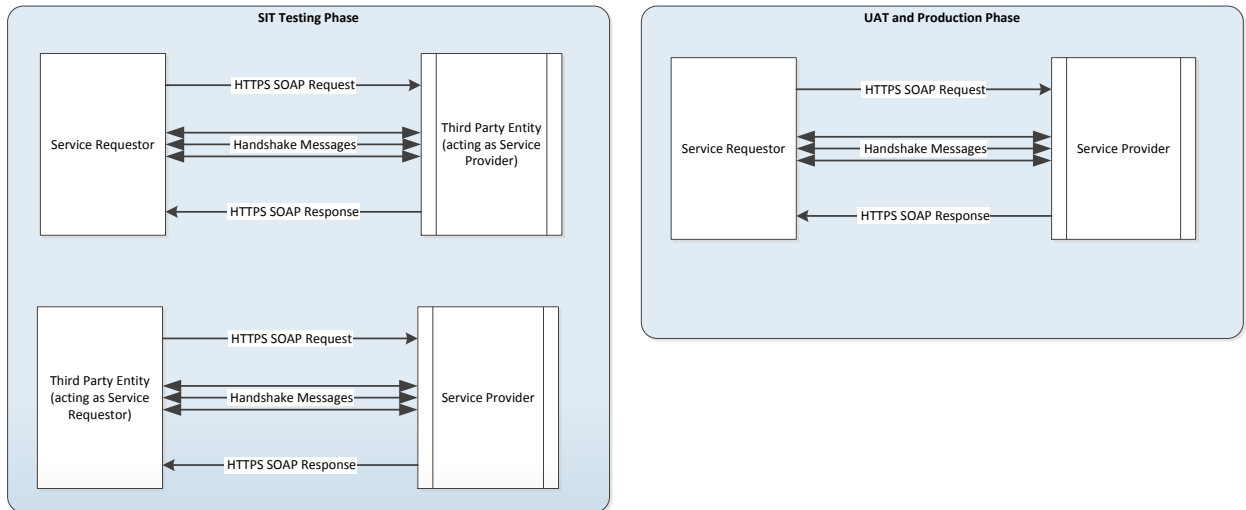
- Both the **Service Provider** and the **Service Requestor** need to have all the integration components set up for the transaction in play.
- Each party validates their integration components each time before an integration project to receive readiness validation.
- The **Third Party Entity** validates that the integration mechanisms are in place and that it is a “plug and play” implementation between with the integrating parties.
- The validation occurs when the integration parties actually connect and communicate via the internet to the **Third Party Entity**.
- The **Third Party Entity** would establish integration capabilities in advance to be able to receive requests and send responses as if they were the service provider.

#### 6.1.2 Scope of Certification

Once a **Service Provider** or a **Service Requestor** validate their integration components and test their integration with the Third Party Authority, they can be certified. This is a onetime event, and certification would only need to be renewed annually.



### 6.1.3 Diagram 3 - Scope of Third Party Validation and Certification



#### 6.1.4 Out of Scope

The scope is not the participants' ability to build integrations, but that the integration they have built works and is following the set standards for the specific transaction in play.

## 6.2 The Entities

The following two types of entities are envisioned:

### 6.2.1 The Primary Integration Certification and Validation Entity

A non-profit organization, this entity is the governing body for the certification and validation process. Responsibilities include:

- Maintaining the **Perfect Integration Guide**
- Holding semi-annual meetings with the participating certifiers and other industry players to ensure the standards are updated and to move the standards forward to meet industry changes.
- Managing the program by which other entities become licensed to certify and validate integrations
- Validating and certifying integrations for participants, although the majority of the validation and certification work will be done by the licensed secondary entities (as in section 7.2.2.)

Potential Candidates include:

- MISMO (under the MBA)

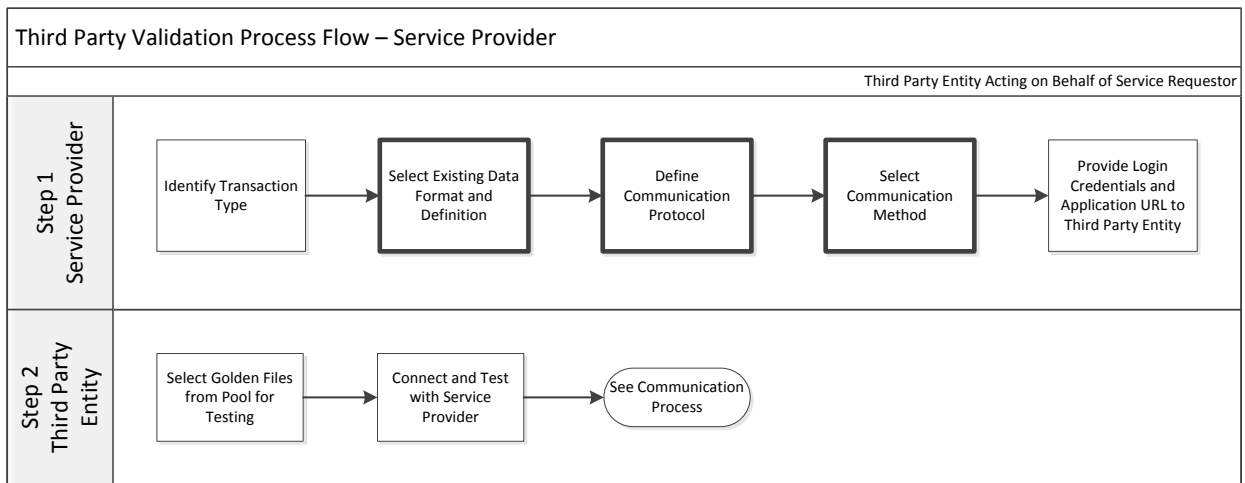
- An existing central utility, such as MERS
- A new industry utility, or an expanded functionality for an already planned industry utility or platform entity

### 6.2.2 The Secondary Integration Certification and Validation Entities

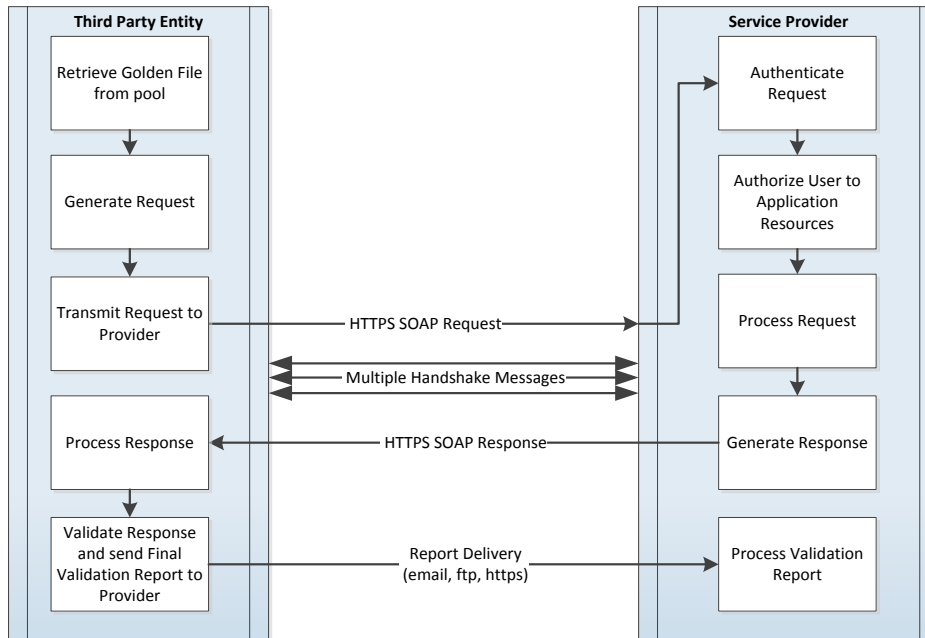
These entities can be any for-profit business. Their role is to:

- Obtain certification (license to do business) from the primary entity
- Execute the validation and certification process with the integrating parties

### 6.2.3 Diagram 4 - The Validation Process: Service Provider with Third Party Entity



### 6.2.4 Diagram 5 - Technical Communication Process: Service Provider with Third Party Entity



### 6.2.1 Proposed Process between *Service Provider* with *Third Party Entity*

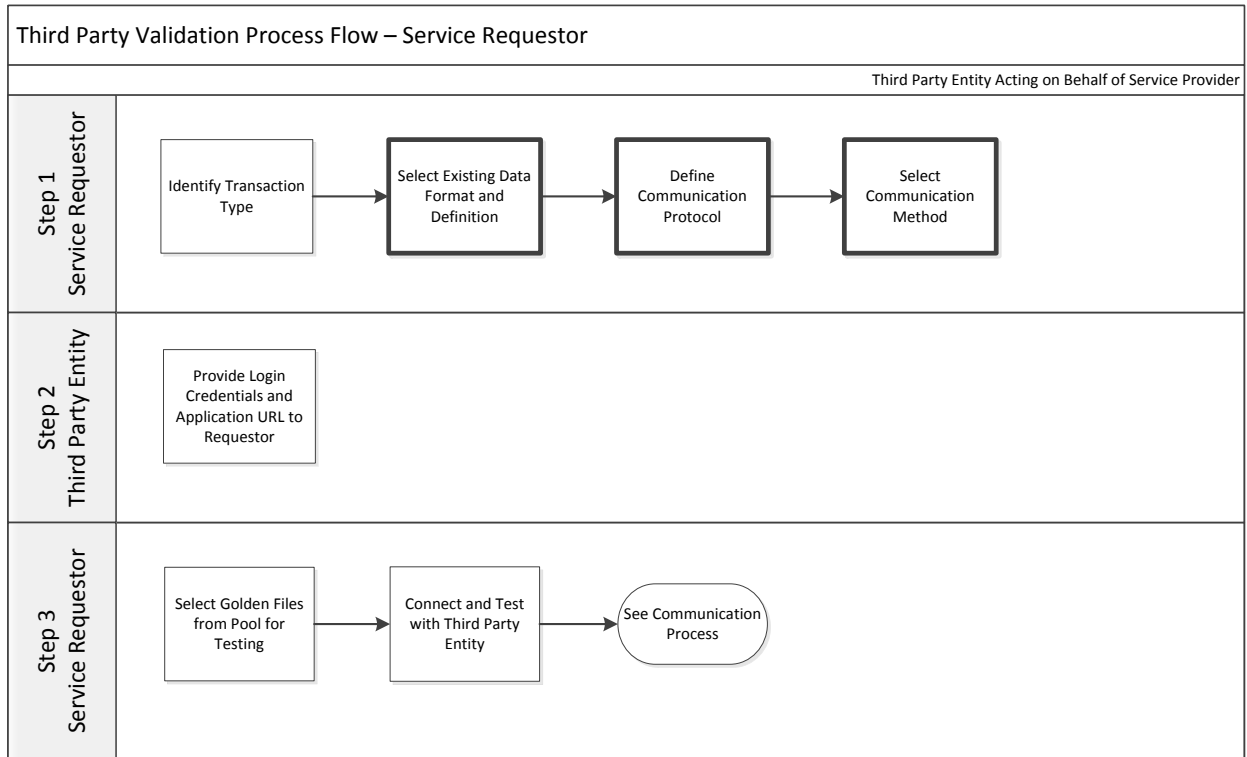
The process flow will work as follows:

- The ***Service Provider*** setups the integration capabilities on their end. This includes all the integration components mentioned above in this Thought Paper.
- The transaction for the integration is identified and the ***Perfect Integration Guide*** outlined above shall be followed to determine the data format, communication protocol, etc.
- The ***Service Provider*** works with the ***Third Party Entity*** to receive a mock request, using the standardized data formats, and send back the necessary handshake messages and the response, again, using the standardized formats and communication methods.
- The Golden File concept can be applied here where the ***Service Provider*** would generate a Golden File dataset to send to the ***Third Party Entity*** for validation.
  - For details on the Golden File concept, please refer to work from the Adapting to Change Innovation Challenge team.
- The ***Third Party Entity*** evaluates the integration based on several (hundreds) test files, potentially selected from the Golden File pool, and ensure the response is processed through the Service Provider's platform and is following the standards of this guide.
- The ***Third Party Entity*** includes positive and negative scenarios in its test files, including use incorrect data standards and communication protocols to validate the behavior of the Service Provider's systems.

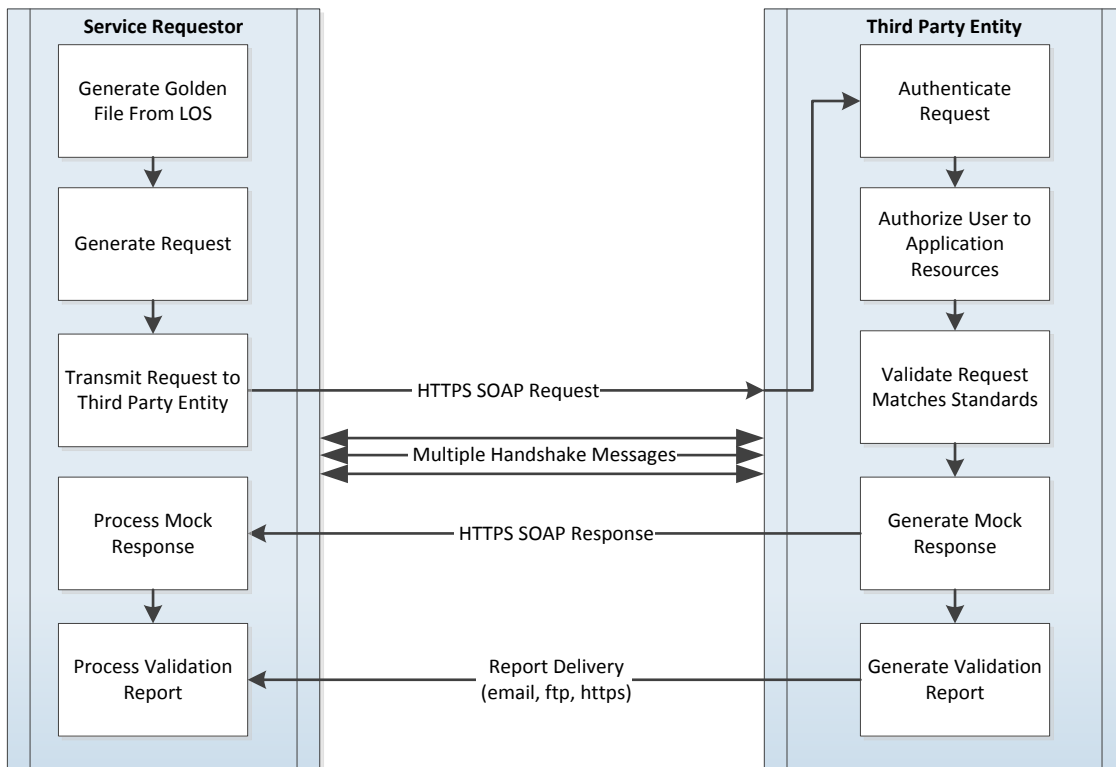
### 6.2.2 The Client's Role

- The client (***Service Requestor***) will use the ***Third Party Entity*** service to validate their transactions and test against the standards.
- The client will build integrations for one type of service only once through the ***Third Party Entity***, and then it can use that same integration with all vendors who are certified (earn the Seal of Approval) for that type of service through the ***Third Party Entity***.
- Clients will need to be validated and certified by the ***Third Party Entity***.

### 6.2.3 Diagram 6 - The Validation Process: Service Requestor with Third Party Entity



### 6.2.4 Diagram 7 - Technical Communication Process: Service Requestor with Third Party Entity



### 6.2.5 Proposed Process between *Service Requestor* and the *Third Party Entity*

The process flow will work similar to the *Service Provider* process as follows:

- The *Service Requestor* shall setup the integration capabilities on their end. This includes all the integration components mentioned above in this Thought Paper.
- The transaction for the integration is identified and the *Perfect Integration Guide* outlined above shall be used to determine the data format, communication protocol, etc.
- The *Service Requestor* shall select the recommended set of Golden Files and generate the request payload to transmit to the *Third Party Entity*
  - Assumption: The *Service Requestor* previously imported the Golden Files data elements into its internal system (e.g. LOS) that it can now use for the purpose of testing.
- Using standardized data formats, the *Third Party Entity* shall work with the *Service Requestor* to receive the Golden File request to validate both the data format as well as the data content of the Request payload received from the *Service Requestors*.
  - For details on the Golden File concept, please refer to work from the Adapting to Change Fannie Mae Innovation Challenge team.
  - The necessary handshake messages and the response in the standardized formats and communication methods shall be exchanged as per process above.
- The *Third Party Entity* will evaluate the request file and validate for data integrity as well as data format, and the other communication components to ensure the *Service Requestor's* compliance with the Integration Guide.

## 6.3 The Certification Process

The certification process should entail all parts of the Validation Process, in addition to a review of the Service Providers' systems and integration processes to ensure the *Perfect Integration Guide* is followed in the development process used by the *Service Provider* or the *Service Requestor*.

Such Certification will entail the mechanism by which the *Service Provider* or the *Service Requestor* select data standards to use for a specific transaction as well as the architecture and development of other integration components. Examples are authentication, authorization, communication protocol, etc.

### 6.3.1 Validation in lieu of UAT

If both the **Service Provider** and the **Service Requestor** have validated their integration component with the **Third Party Entity**, the assumption is that the two companies can proceed with a “plug and play” integration. This positions both companies to quickly implement projects and is a valuable differentiator when selecting a service provider.

However, while a “plug and play” assumption can shorten the time spent on the integration project, it is always necessary to complete UAT testing prior to implementing a change to the Production environment. Consider:

- Despite the hundreds of test scenarios performed by the **Third Party Entity**, invariably there will be unique proprietary processes that require some degree of customized work within the framework of the “Perfect Integration Guide.”
- **Service Requestors** will want to determine test scenarios to run through their entire system (front to back) that exercise any unique data elements or processes used for their proprietary products or workflow of their business.
- Business subject matter experts will need to review the final results and “sign-off” with their approval prior to implementation.

## 7 APPENDIX

### 7.1 A – Transaction Types and Industry Adopted Data Formats

Segment	Transaction Type	Sub-Type*	Data Format
Appraisal	Appraisal Order (1004)	Request	MISMO Valuation Request v2.4
	Appraisal Order (1004)	Response	MISMO Valuation Response v2.6
	PCR Order	Request	N/A
	PCR Order	Response	N/A
	BPO	Request	N/A
	BPO	Response	N/A
	Recertification (1004D)	Request	N/A
	Recertification (1004D)	Response	Mapping in place to MISMO v2.6
	Appraisal Desktop Review	Request	N/A
	Appraisal Desktop Review	Response	Mapping in place to MISMO v2.6
	Property Inspection Report	Request	N/A
	Property Inspection Report	Response	Mapping in place to MISMO v2.6
	FHA Inspection	Request	N/A
	FHA Inspection	Response	Mapping in place to MISMO v2.6
	Field Review	Request	N/A
	Field Review	Response	Mapping in place to MISMO v2.6

*A completed list for the target segment (Appraisal) will be provided in the next phase of this study*

\* Notes:

- A “Request” transaction is sent from the **Service Requestor** to the Service Provider
- A “Response” transaction is sent from the **Service Provider** to the **Service Requestor**

## 7.2 Appendix B – Glossary

Term	Description
<i>Service Provider</i>	The vendor who provides the services. For example, an appraisal management company (AMC) is the provider of appraisal services
<i>Service Requestor</i>	The client requesting the product or service
<i>Third Party Entity</i>	Refers to the new entity that validates and certifies integration capabilities of participants. A primary entity is the governing body that licenses the secondary entities to execute validation and certification activities. The primary entity may also execute validation and certification activities, but generally the secondary entities will take on this responsibility while the primary entity focuses on licensing other entities and providing governance over the process.