

SOMA Capability Pattern:
SOMA Process Modeling and Decomposition
Technique Paper

Draft

Version 1.0

07/25/08

SOMA Core Team

Document History

Document Location

Revision History

Date of this revision:	Date of next revision (date)
------------------------	------------------------------

Revision Number	Revision Date	Summary of Changes	Author
1	7/23/08	Initial Draft	Sella Ganapathy

Table of Content

1.	Introduction.....	5
2.	Purpose.....	5
3.	Description.....	5
3.1	Need to do Goal Service Modeling before Process Modeling and Decomposition	5
3.2	Process Modeling.....	6
3.3	Process Decomposition	6
4.	Usage.....	6
4.1	When to Use It	6
4.2	How to Use It - Steps	6
4.2.1	Process Modeling.....	6
4.2.2	Process Decomposition	8
4.2.2.1	Process decomposition workshop	11
4.2.3	Process Modeling and Decomposition Work products.....	12
4.2.3.1	Analyzing the Level 1 process model	13
4.2.3.2	Creating a service hierarchy from the service portfolio.....	14
4.2.3.3	Decomposing the process model to lower levels	15
4.2.3.4	Identifying Services	16
4.3	Recommendations/ Best Practices	17
5.	Key Considerations	17
6.	Estimation Considerations	18
7.	Impact of Not Using This Technique.....	18
8.	Related Techniques	18
9.	Roles, Input & Output Work Products.....	18
10.	Resources	18

Figure

Figure 4-1 Process Decomposition Steps	9
Figure 4-2 Process Decomposition Example.....	10
Figure 4-3 Process Decomposition Work products	12
Figure 4-4 Level 1 Process Example	13
Figure 4-5 Process Hierarchy Example	14
Figure 4-6 Money Mover Example Process Decomposition.....	15
Figure 4-7 Additional services and Service Hierarchy after Process Decomposition.....	16

1. Introduction

This technique paper is to provide guidance to practitioners in the field who are required to use the Process Modeling and Decomposition technique as one of the techniques for identification of services.

After completing this technique, we will have business processes that reflect how Business wants to run their processes and a set of candidate services. Business Analysts are expected to play a lead role in executing this technique with assistance from SOA Architect and SOMA Method Exponent.

2. Purpose

Process Modeling and Decomposition (PMD) is a technique used in SOMA to arrive at 'to-be' business processes and identify candidate services.

This technique should be used as one of the identification techniques under Domain Modeling and Decomposition. The other two identification techniques are Goal Service Modeling and Existing Asset Analysis.

Tip: Ideally all three of the SOMA service identification techniques should be applied. The interrelated techniques used by SOMA work together to establish a complete understanding of the context of a SOA initiative. A detail or issue that was not discovered by one technique is far less likely to be overlooked when the other techniques are applied.

3. Description

3.1 Need to do Goal Service Modeling before Process Modeling and Decomposition

SOMA uses three complementary techniques to identify candidate services, and Domain Decomposition (PMD is part of this) is just one of those techniques. The other two techniques are Goal Service Modeling and Existing Asset Analysis.

SOMA strongly recommends doing the Goal Service modeling as the first identification techniques as it will provide scope guidance as to what business processes are to be studied during process modeling and decomposition. Goals identified during goal service modeling are based on the scope or area of study (business domains) indicated by the business owners. Once these goals are defined during goal service modeling, they can be

used as a basis for identifying relevant business processes that are required to fulfill those goals.

3.2 Process Modeling

Process models describe the work that an organization is involved in and the behavior of systems the organization uses. These models are especially useful in identifying inefficiencies in current processes, leading to identification of opportunities for automation and business transformation.

3.3 Process Decomposition

Process decomposition analyzes the activities associated with a process, without the need to understand the role or organization executing the activities. These activities will provide a candidate list of services.

4. Usage

4.1 When to Use It

Process Modeling and Decomposition should be used during SOMA Identification phase. It is observed from practical experience that this identification technique in fact yields majority of candidate services and should not be missed.

4.2 How to Use It - Steps

4.2.1 Process Modeling

Process models describe the work that an organization is involved in and the behavior of systems the organization uses. These models are especially useful in identifying inefficiencies in current processes, leading to identification of opportunities for automation and business transformation.

Process modeling typically is approached from two perspectives:

- **Modeling process flows** – this is perhaps the most common form of process modeling, and often takes the form of a swim lane diagram that shows the step by step sequence of tasks in a process, identifying the actors who carry out each of the tasks. This form of process modeling closely aligns with service choreography and composition that will be analyzed further in later SOMA activities. Another technique for modeling processes is Business Use-Case Modeling as defined in RUP^{Error! Bookmark not defined.}.
- **Modeling events** – event analysis is an equally important aspect of process modeling. Event analysis identifies the key business events that trigger or are triggered by business processes or tasks. Events signal that an important business milestone has

been reached which may be of interest to some other party. Event analysis is important to SOMA for service choreography and composition. Event analysis also has a unique aspect in that events are often good candidates for a “publish and subscribe” style of service interaction that will be considered in SOMA specification activities. An event publisher does not need to know who is interested in the event – just that the event should be published. As various interested parties are identified, they can be added to the list of event subscribers and take whatever action they need to when an event is published.

Tip: A *process name* should be singular, and consist of an active verb + the name of an object - preferably a data object. Examples: transfer funds, open account, create reservation; create rental agreement. A process name should focus on what work is being done (rather than how it is performed, which change over time).

For the SOA engagement to yield significant improvements for the business, it is important to use to-be process models as input to Process Decomposition. As-is models are often affected by current IT system restrictions. Therefore, it is important to identify services based on to-be process models.

As-is process models are important inputs to Process Decomposition to capture the current state and identify inefficiencies as well as opportunities for automation and business transformation. If existing process models are unavailable, document as-is process models with the help of business analysts.

We need to focus on to-be process models during Process Decomposition. One of the purposes of an SOA engagement is to streamline the business. For candidate service identification, we will therefore need a process model capturing the envisioned future state of the business (To-Be processes).

Given below are some of the tips that can be followed to arrive at to-be processes.

- Define to-be process models - process hierarchy and process flows
- Organize business processes in sub-processes to ensure reusability
- Document key actors (users or systems), business significant milestones and events, activities, task sequence and dependencies, and business entities in the process models.
- Identify what needs to take place in the process models, not how tasks are carried out since that is an aspect of business process that can change over time, especially in response to changes in business environment or technology.
- Use As-Is, Industry Standards and Best Practices, Goal Service Model and Process Re-Design to Develop To-Be Process Models

- Follow the following guiding principle to develop the to-be process models

To-Be = As-Is + Best Practices + Industry and/or Reference Models + Goal Service Model + Process Re-design and Optimization

- Industry models include standard processes for an industry based on best practices. In the absence of industry models, other reference models and proven patterns may also be used.
- The goal-service model pinpoints the focal interests of the business identifying necessary transformations or enhancements to alleviate pain points.
- Refactoring consists of identifying commonalities and variations by doing a variation oriented analysis to eliminate redundancy and create flexible processes.

4.2.2 Process Decomposition

Process decomposition analyzes the activities associated with a process, without the need to understand the role or organization executing the activities. These activities will provide a candidate list of services.

Process Decomposition analyzes business processes and sub-processes to a level of detail where candidate services, service dependencies and opportunities for service composition can be identified. Input to process decomposition can come from Level 1 business process models if present, and/or from information about interactions between a partitioning of the business such as business components in the CBM Component Model. Process Decomposition results in a set of documented processes captured in the Process Definition work product, a list of candidate services that are added to the Service Portfolio and Service Hierarchy and a list of initial use cases.

A *process* is a group of logically related activities that use the resources of the organization to provide defined results in support of the organization's objectivesⁱ. One can think of a process as a specific defined response to a business event that produces a product or delivers a service of interest to someone within or outside of the enterprise.

Figure 4-1 below depicts key work products created/updated during SOMA Process Decomposition.

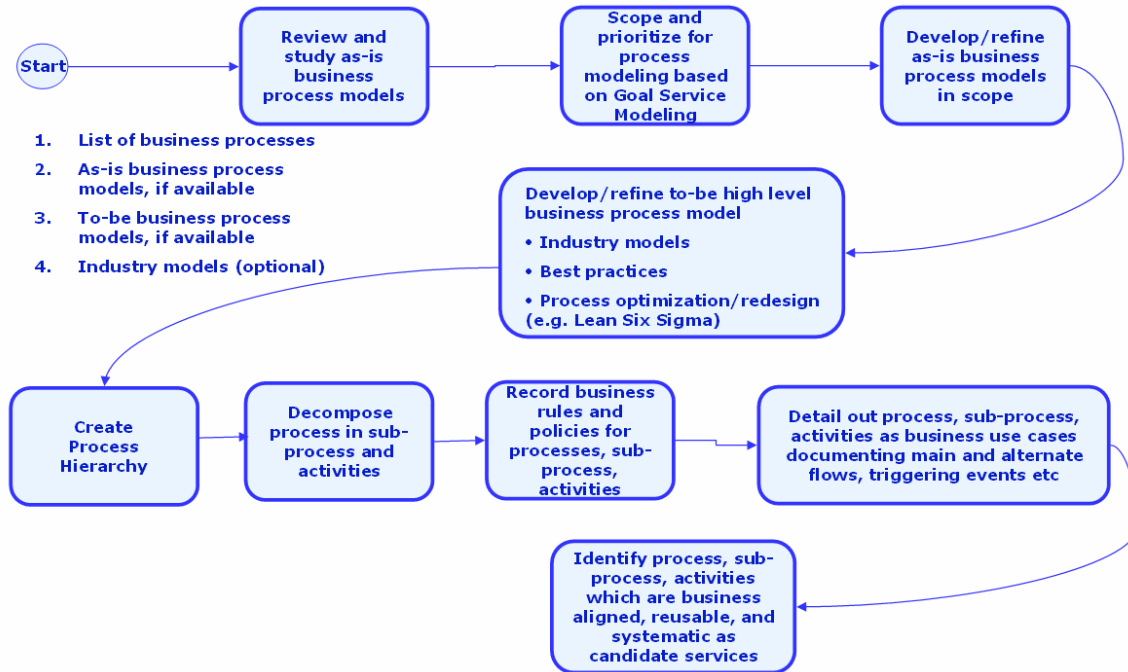


Figure 4-1 Process Decomposition Steps

Process models identify key actors, business significant milestones and events, task sequences and dependencies, task inputs and outputs, and interactions within and between organizations. A process model should identify “what” needs to take place, not “how” tasks are carried out, since that is an aspect of business process that can change over time, especially in response to changes in business environment or technology. Business Transformation typically uses high level process models, whereas activities that realize and implement services typically require much more detailed models. SOMA focuses on process decomposition to identify candidate services and flows. Process models are not necessary for SOMA but they can be leveraged if available.

Tip: Decomposition can continue to the point at which the processes being identified are the smallest activities meaningful to a user and which when completed leave related information in a consistent state (either updated, or returned to its original state). This may be more detailed than is needed for SOMA. As each level of decomposition is completed, check to see if it is sufficiently detailed to identify elementary candidate services. If so, decomposition has proceeded far enough for the time being.

Error! Reference source not found. shows process decomposition into sub-processes and use cases. The notion of a sub-process is a convenient construct used to denote further levels of refinement of a process, into its constituent parts (sub-processes), recursively. Sub-processes are used to identify candidate services while the list of use cases provides the initial scope for system design (“business as usual”).

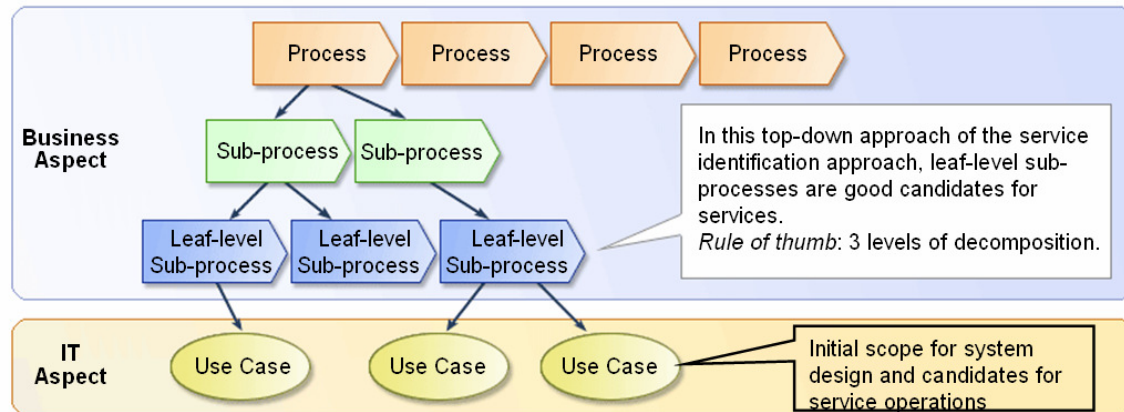


Figure 4-2 Process Decomposition Example

Once we get to the point where we begin to look at user-system interactions, we should stop process decomposition. This last level of sub-processes can be labeled a leaf-level sub-process. A leaf-level sub-process is a composite of system use cases, for example, a leaf-level sub-process of “Process Order” would have use-cases of “Get Customer Name”, “Get Customer Address” and “Get Order Items”.

As we decompose each process into sub-processes, there are several elements to consider and document in the process model:

- **Actors** – Process modeling traditionally identifies the users and automated systems that participate in a process or sub-process. This includes noting the user and electronic interfaces that are involved in supporting execution of tasks in the process. Functional Area Analysis can uncover important information about organizational units and roles. This information can be very useful as processes are decomposed and individual tasks are studied. Note that SOMA and SOA are mainly interested in interactions between system actors. Depending on the level of decomposition, an actor could represent an enterprise (e.g. a business partner), an organizational unit, an individual, a system or a component.

Note: Actors in use cases that initiate them are often human actors. In the case of SOA systems, programmatic access to functionality is the primary focus and thus the actors of interest are other systems.

- **Events** – We need to identify the events that trigger a process to be carried out or are the result of a process. These are especially important to SOMA, since they typically represent key business milestones that are often of interest from a business performance management standpoint.
- **Business work products that are involved with or are affected by the process** – tasks in a process typically have inputs and outputs, or act on some business work products, changing its state. For SOMA, it is important to capture these inputs and outputs. It becomes important for service message specification and for parallel activity of Information or Data architecture.
- **What is manual and not well suited for automation** – As processes and sub-processes are analyzed, it is important to distinguish tasks that are candidates for automation from those that are not well suited for automation. There is a caveat with

this point: the primary focus of process modeling is the “what”, not the “how” aspect of processes and tasks. Nevertheless, it is worth considering both business and technical issues such as what benefits the business as a human touch point or what is reasonably within the art of the possible for automation, and identifying which tasks should be carried manually. Note that this aspect may only be valid at a point in time – what is manual today could be automated tomorrow. From a SOMA standpoint, this will be very useful information during service composition analysis and for realization decisions.

- **Geographic distribution of the organization and process steps** – these factors capture aspects of processes where physical location can affect how actors interact. While this is typically captured as part of traditional process definition, it can be de-emphasized during SOMA, since it does not significantly influence the modeling of services.

Note: Here is a good example of a case where SOMA activities can be integrated with other engagement activities. It is worth remembering that location information is important to capture in the Operational Model. If the same practitioner is performing SOMA activities as well as other architect role activities, it would be natural to add location information to the Operational Model at this time. If different people are carrying out these activities, then it would improve the efficiency of the project for the SOMA practitioner to communicate location information to the person carrying out operational modeling so that duplication or work could be avoided.

4.2.2.1 Process decomposition workshop

To gather and validate information of business processes and sub-processes that are in scope, conduct a workshop with the appropriate business users and subject matter experts (SME).

To prepare for the workshop, execute the following where appropriate:

- Obtain and review any screen flows and demos
- Obtain and review user guides
- Obtain and review any function feature narratives / matrices
- Obtain and review user training materials
- Obtain and review process models
- Obtain input from previous engagements
- Obtain and review business policies
- Obtain business rules and data model
- Based on the information collected, create a business context diagram and process decompositions to review with business users and SMEs

During the workshop:

- Review workshop objectives
- Review process decomposition for accuracy

- During process decomposition, identify any existing systems used in current processes and document in the BUS 309 Process Definition (Services-to-Application matrix) work product
- Identify any plans to obsolesce any relevant existing systems
- Identify new systems that are planned or work in progress that would replace the to-be obsolesced systems
- Document any new processes that were not earlier discovered. Document services that may not have surfaced in the processes.
- Document action items, respective owners and due dates
- Document any issues and risks

Wrap up workshop:

- Summarize findings of workshop
- Review action items list and issues/risks

4.2.3 Process Modeling and Decomposition Work products

Figure 4-3 gives a pictorial view of work products produced from process modeling and decomposition technique.

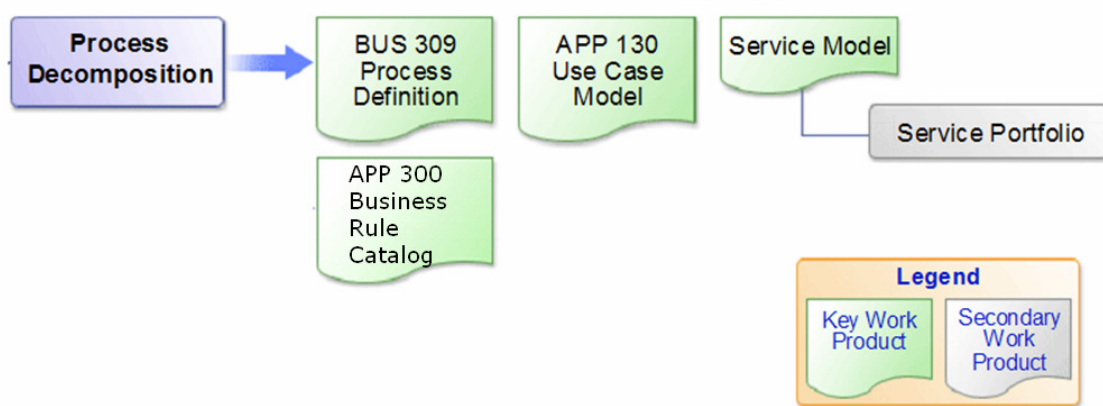


Figure 4-3 Process Decomposition Work products

4.2.3.1 Analyzing the Level 1 process model

SOMA Process Decomposition starts with Level 1 business process models provided by a CBM or similar business analysis activity. A Level 1 process model is a very high level view of a business process that has not yet been decomposed into sub-processes. A level 1 model typically provides a structure for process decomposition as illustrated in 4-4.

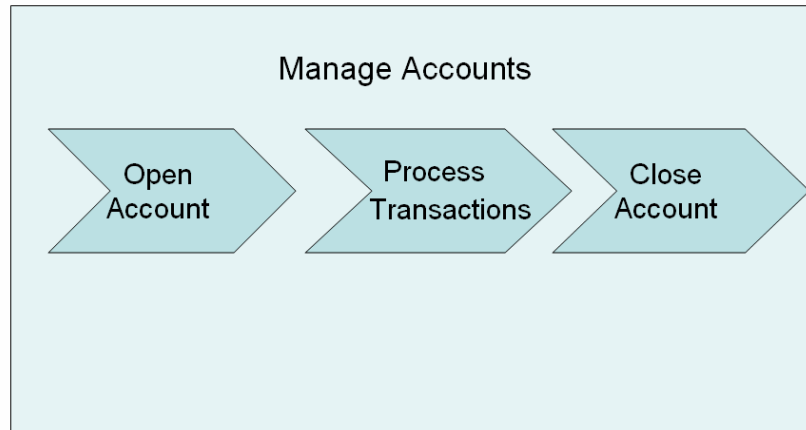


Figure 4-4 Level 1 Process Example

Processes decompose into sub-processes, eventually reaching a level where we find elementary processes that are the smallest activity that is meaningful to a user at a business level of significance instead of IT. *Figure 4-5* is an example of next level of decomposition.

Money Mover: Process hierarchy is defined to begin the process decomposition

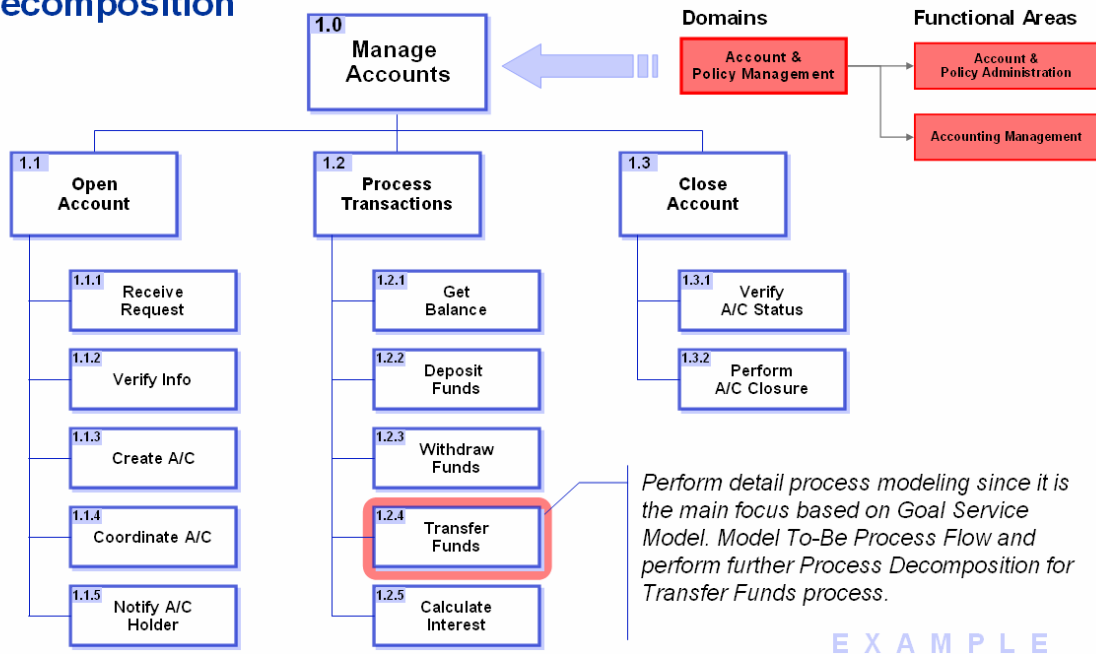


Figure 4-5 Process Hierarchy Example

4.2.3.2 Creating a service hierarchy from the service portfolio

Each of the three SOMA identification techniques can potentially add more candidate services to the Service Portfolio, resulting in what could potentially be a rather long list which is not well suited for further analysis. To support further analysis, the service candidates in the Service Portfolio can be categorized by applying a classification scheme that is meaningful to the SOA initiative.

Functional areas that were identified during Functional Area Analysis (part of Domain Decomposition technique) provide a useful business context for developing a classification scheme. In later steps, the relationship among candidate services associated with a functional area also supports a subsystem view which is likely to prove useful when SOMA specification activities are being carried out and SOMA realization decisions are being made.

Let us assume that the functional area analysis has been done and a list of functions is available. We can now create the Service Hierarchy.

4.2.3.3 Decomposing the process model to lower levels

Applying process decomposition to the running example leads to the process model shown in *Figure 4-6*. The process called ‘Transfer Fund’ which is shown in the decomposition of level 1 diagram in *Error! Reference source not found.* is decomposed into subsequent levels of sub-processes. For example, the “Create Transfer” process decomposes into four sub-processes which are in turn broken up into sub level processes and activities.

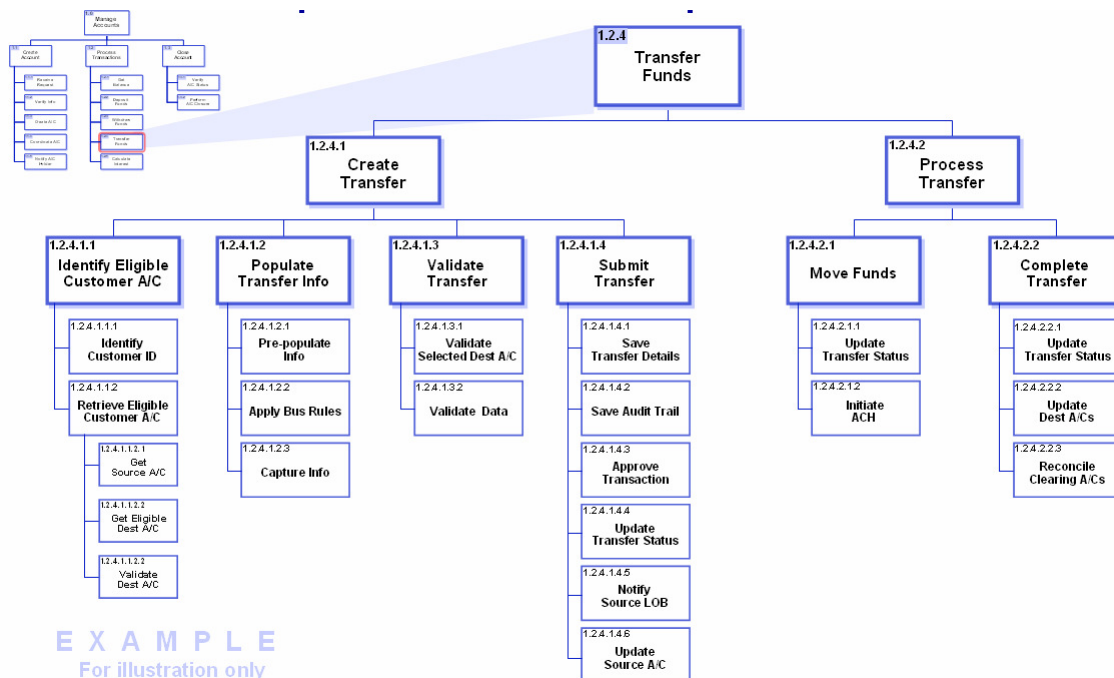


Figure 4-6 Money Mover Example Process Decomposition

Note: What is not shown in *Error! Reference source not found.*, but which needs to be documented, is additional detail that describes things such as the actors, events, rules, policies, exception handling and other significant characteristics.

For example, a process may reach a decision point where two flow alternatives are possible. In this case, it is important to describe the decision criteria and implications for taking one path versus the other. This is an example of how business rules can be gathered and documented. When business rules and policies are encountered, they should be documented in the APP300 Business Rules Catalog work product. It is also important to look at processes for both the normal path and alternative paths that result from applying business rules or encountering exceptions. Take the time to discuss

how exception conditions need to be handled. Exceptions may need special process steps and also may represent events that need to be made visible for Business Performance Management (BPM) purposes.

4.2.3.4 Identifying Services

When process decomposition is carried out, from SOMA point of view, which level of processes or activities should we consider defining them as services? When we closely examine, each activity, sub-process or process all provide some business function. Of course the granularity varies from one level to another. Since we are only identifying services here and not making service exposure decision, we should keep our mind open. SOMA recommends considering activities in *all* levels of a process to be candidate services. In other words, all of the processes and sub-processes have potential value as services and will be added to the *Service Portfolio* list of candidate services. Keep in mind that this is a preliminary decision that identifies service candidates, not a final decision on service exposure. Service exposure decisions will be made during the SOMA specification step where a more complete picture of all the candidate services that have been discovered for an initiative will be considered.

Although Service Portfolio is being introduced during the discussion of Domain Decomposition, other SOMA identification activities such as Goal-Service Modeling and Existing Asset Analysis are likely to add more candidate services to the Service Portfolio.



Figure 4-7 Additional services and Service Hierarchy after Process Decomposition

The service hierarchy in *Error! Reference source not found.* results in more easily analyzed groups of candidate services. Note that the numbering scheme used is arbitrary and is intended simply to provide a unique identifier for each candidate service. Sequence of the numbers is therefore not relevant. As more and more candidate services are added to the service portfolio, it will become increasingly important to identify gaps and redundancies. That would be very difficult to accomplish without using the classification scheme provided by the service hierarchy. Service exposure and service composition decisions will also be far easier to make as a result of having the service hierarchy, since the classification scheme narrows the area of the service portfolio that needs to be considered for any single exposure or composition decision.

4.3 Recommendations/ Best Practices

The following are recommended best practices:

- Verify to-be processes with a subject matter expert before starting.
- Always consider activities in all levels of a process including the parent process, sub-processes, and activities as candidate services.
- A rule of thumb is to break down a process to 3 levels to reach the left-level activities. However, the depth of decomposition will also depend on how high in the business function we starting the process on and how complex it is.
- Look for business rules and polices, and variations in processes and document them.
- After identifying candidate services, check back with the subject matter expert if they make sense. If he/she does not understand a candidate services, may be you have identified a technical services.

5. Key Considerations

- As explained in section 3.1 do the Goal-Service Modeling technique before doing process modeling and decomposition in order to select the right set of processes and do a scope binding.
- To the extent possible, try to obtain to-be processes.
- In categorizing candidate services you may have to create new functional areas to house a few related services. This is perfectly alright as processes cut-across many functional areas. Consult the CBM maps (if done already) or the SME for rightly defining these functional areas.
- A business analyst who is familiar with the process should lead the efforts.

6. Estimation Considerations

Consider the following factors while estimating the efforts required doing a PMD:

- Number of parent level processes.
- Availability of subject matter experts.
- Availability of business analysts.
- Extent of current documentation.

7. Impact of Not Using This Technique

If this technique is not used, a good number of services will not be identified.

8. Related Techniques

The following are the related techniques to PMD:

- Goal Service Modeling
- Domain Decomposition: Functional Area Analysis, Variation Oriented Analysis, Rules and Policy analysis, Information Analysis.
- Existing Asset Analysis

9. Roles, Input & Output Work Products

Roles: The primary role should be played by a Business Analyst with support from a SOA Architect and SOMA Method Exponent.

Inputs: Existing process models, industry models.

Outputs: Process Definition, Rules Catalog, Variation Oriented Model

10. Resources
