Open Security Controls Assessment Language (OSCAL)

Leveraged Authorizations

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National Institute of Standards and Technology

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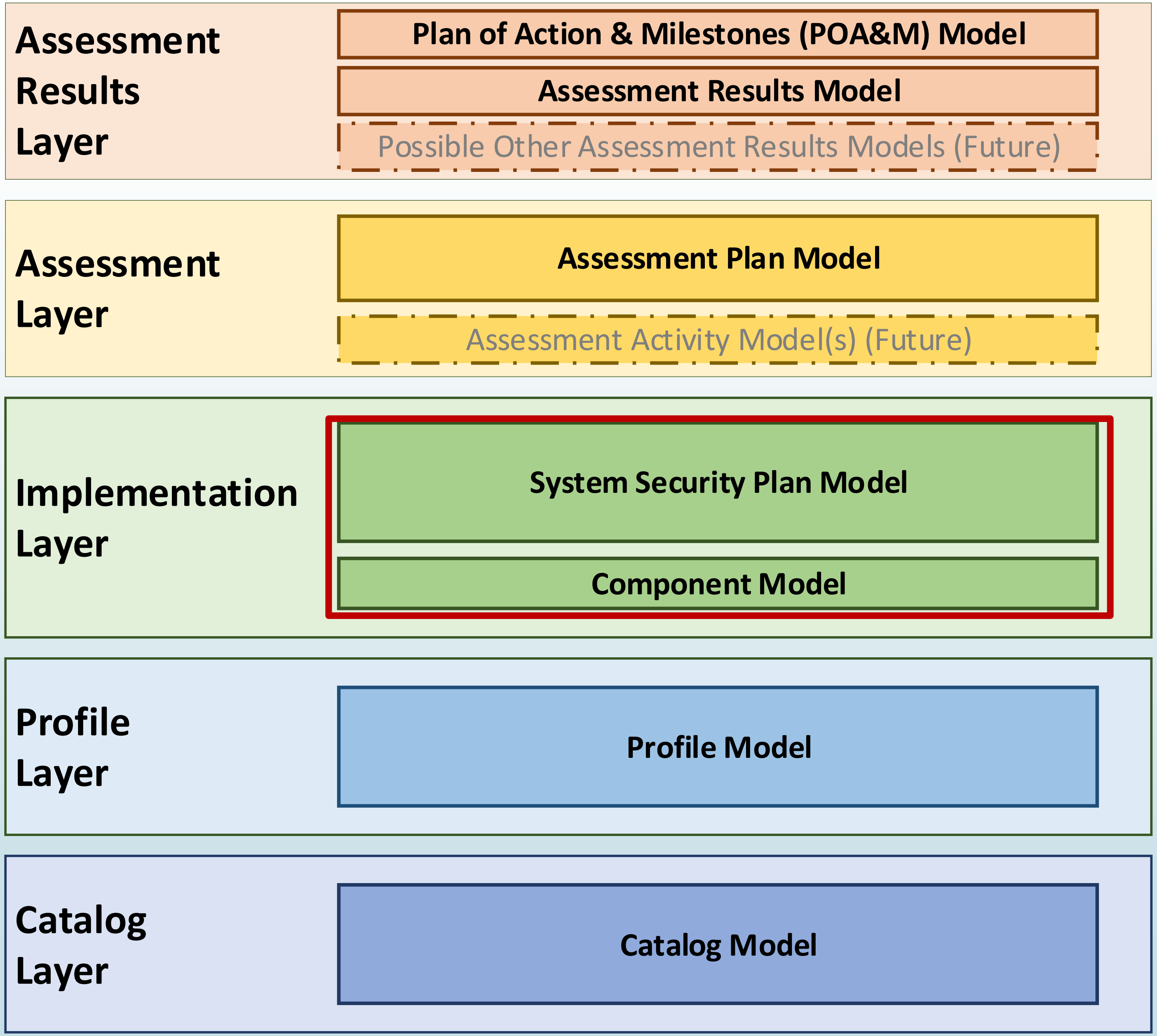
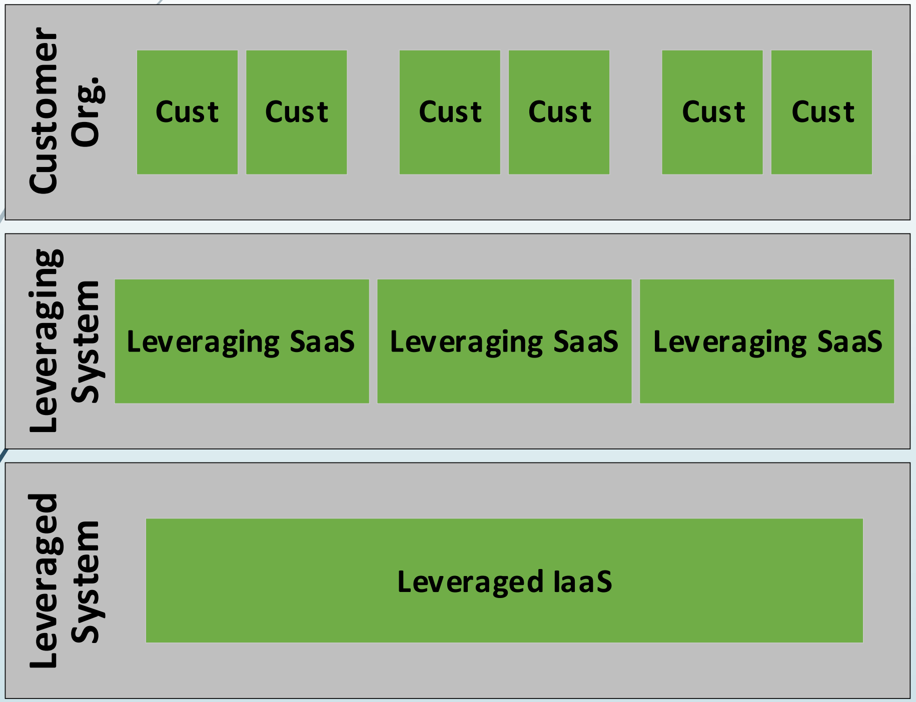
Overview

Leveraged Authorizations:

- Primarily the SSP Model
- Also the Component Model in some instances



What is a Leveraged Authorization (LA)?



Customer Org.: Cust | Cust | Cust | Cust | Cust | Cust

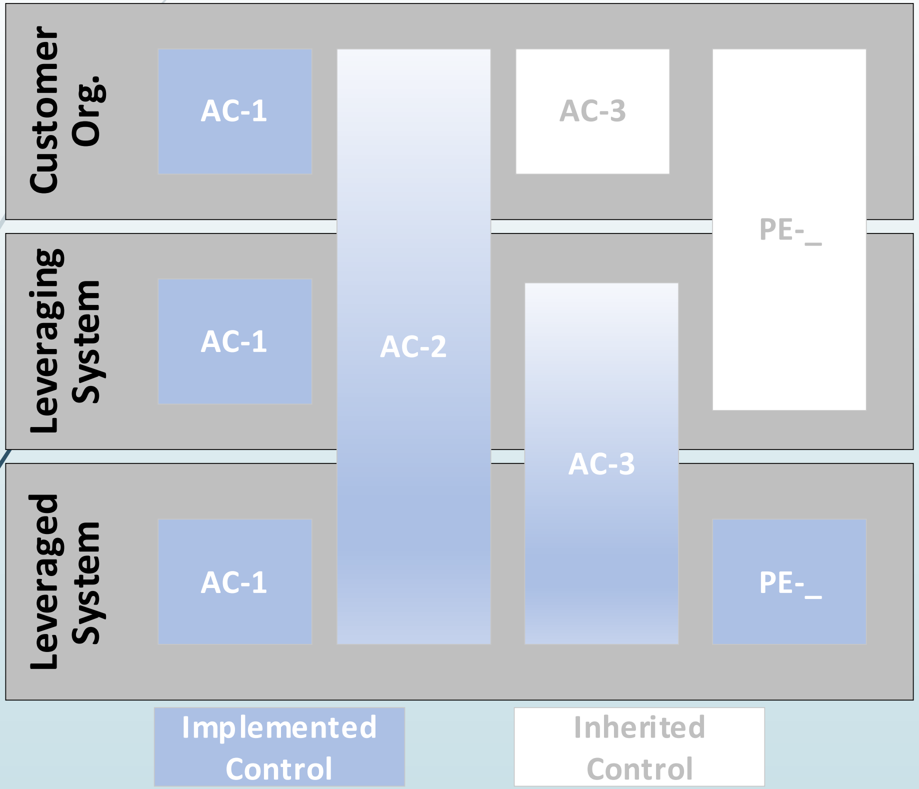
Leveraging System: Leveraging SaaS | Leveraging SaaS | Leveraging SaaS

Leveraged System: Leveraged IaaS

- **A leveraged authorization exists where:**
  - a leverage**d** system passes responsibility for control satisfaction to one or more leverag**ing** systems (Customer Responsibility);

    and/or
  - a leverag**ing** system inherits security control satisfaction from a separately leverag**ed** system. (Inherited Control)
- Common examples:
  - **Cloud**: Several SaaS systems running on a separately authorized IaaS.
  - **Legacy**: Several systems relying on a separately authorized storage array or other general support system (GSS)

Control Satisfaction: Responsibilities and Inheritance



Customer Org.

Leveraging System

Leveraged System

AC-1

AC-1

AC-1

AC-2

AC-3

AC-3

PE-_

PE-_

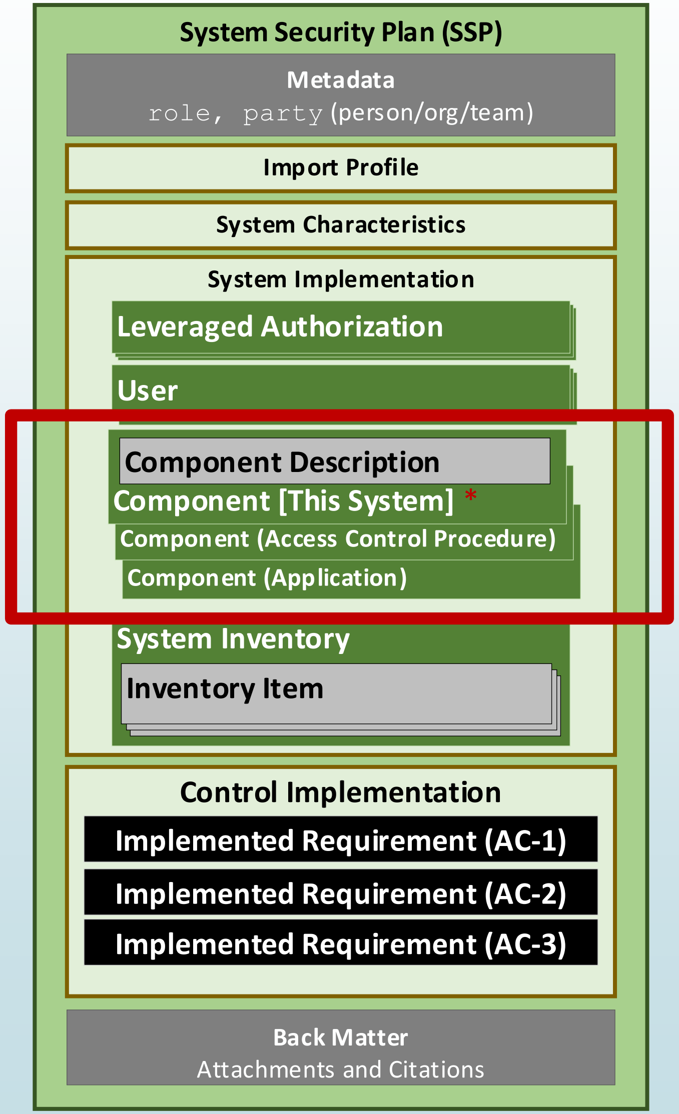
Implemented Control

Inherited Control

- **In fully satisfying a given control:**
  - Some controls must be satisfied independently by each system
    - Example: FedRAMP does not allow policies to be inherited. Each system owner must satisfy policy requirements independently.
  - Some controls are only fully satisfied if individual each system does their part.
    - Example: Logical access control must be implemented on all components in “the stack”.
  - Some controls are fully satisfied at a lower level, thus fully inherited higher in the stack.
    - Example: Usually an IaaS takes care of all physical controls. Each SaaS has no ability to implement physical controls and fully inherits those controls from the IaaS.

Responding to Controls in the SSP: Define Components

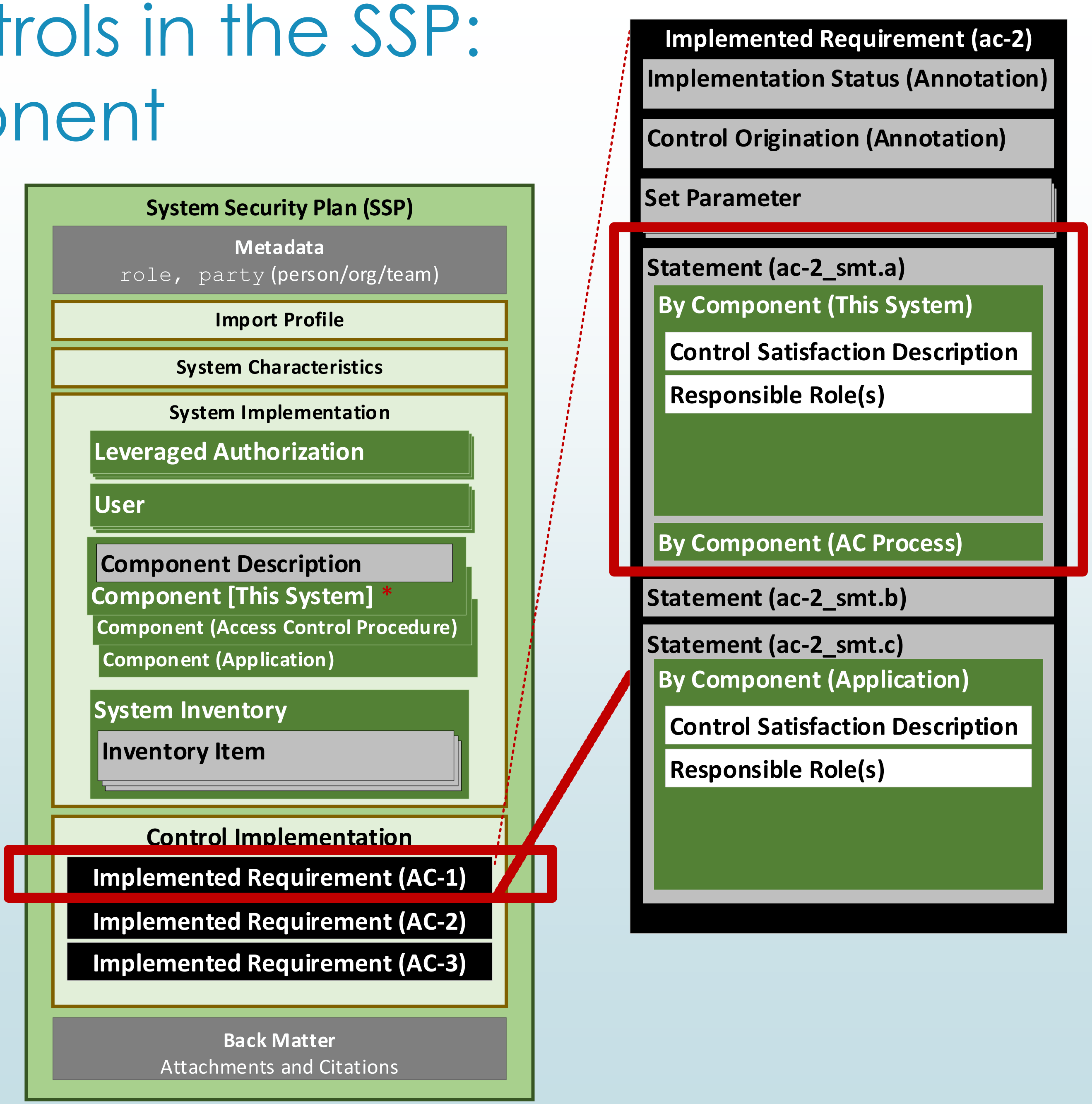
- Each control response is broken down to the individual components involved.
- Enables a more robust response to controls
- Example: The access control implementation that satisfies AC-2, *part a* is described separately for:
  - This System
  - The Access Control Procedure
  - A shared Application


System Security Plan (SSP)
Metadata
role, party (person/org/team)
Import Profile
System Characteristics
System Implementation
Leveraged Authorization
User
Component Description
Component [This System] *
Component (Access Control Procedure)
Component (Application)
System Inventory
Inventory Item
Control Implementation
Implemented Requirement (AC-1)
Implemented Requirement (AC-2)
Implemented Requirement (AC-3)
Back Matter
Attachments and Citations

- There must always be a "This System" component defined.
- Other components are defined as appropriate.
- Components are defined in the `system-implementation` assembly. One `component` assembly for each component.
- SSP authors have flexibility in how granular they define components.

Responding to Controls in the SSP: Respond By Component

- For each control there is an `implemented-requirement` assembly.
- Within each `implemented-requirement` assembly, there are one or more `statement` assemblies.
- Each `statement` assembly has one or more `by-component` assemblies. Each references a component involved with control satisfaction.
- Control satisfaction responses are provided in the `description` field within each `by-component` assembly.
- NOTE: Use the "This System" component for any control satisfaction explanation that does not fit cleanly with a more specific component, or to describe how the components work together.



System Security Plan (SSP)

Metadata
`role, party` (person/org/team)

Import Profile

System Characteristics

System Implementation

Leveraged Authorization

User

Component Description

Component [This System] *

Component (Access Control Procedure)

Component (Application)

System Inventory

Inventory Item

Control Implementation

Implemented Requirement (AC-1)

Implemented Requirement (AC-2)

Implemented Requirement (AC-3)

Back Matter
Attachments and Citations

Implemented Requirement (ac-2)

Implementation Status (Annotation)

Control Origination (Annotation)

Set Parameter

Statement (ac-2_smt.a)

By Component (This System)

Control Satisfaction Description

Responsible Role(s)

By Component (AC Process)

Statement (ac-2_smt.b)

Statement (ac-2_smt.c)

By Component (Application)

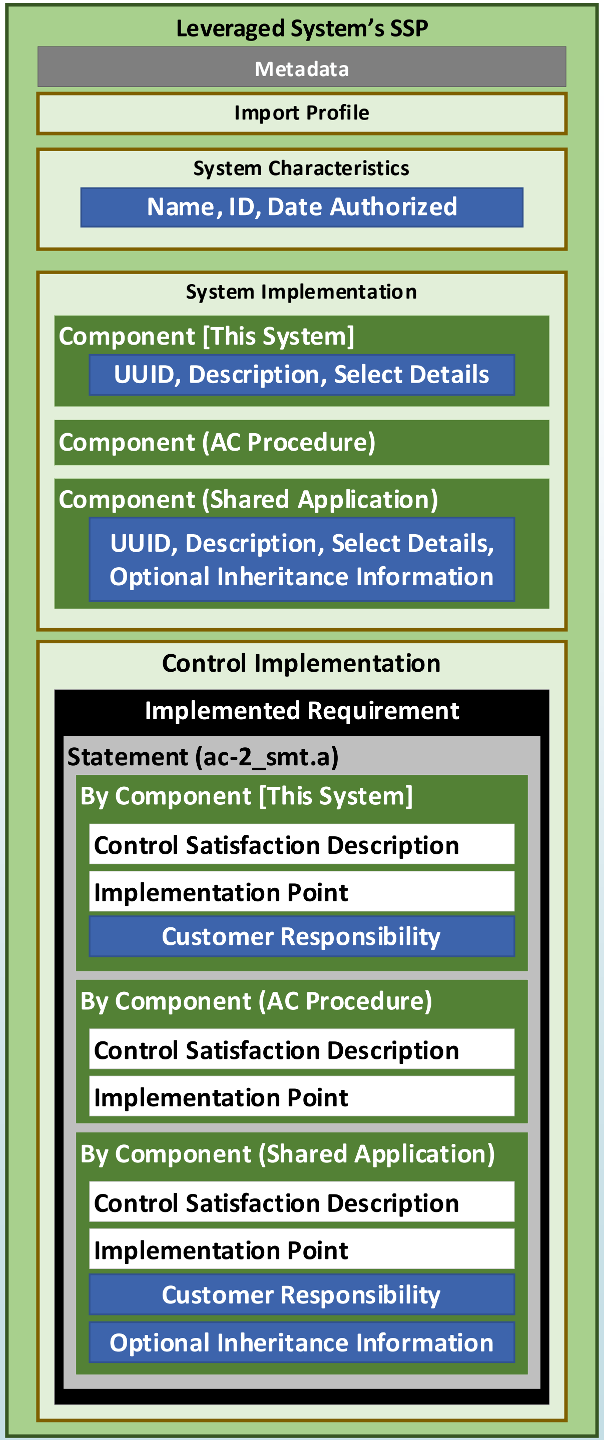
Control Satisfaction Description

Responsible Role(s)

Leveraged System

A leveraged system must communicate the following to a leveraging system:

- Information about the Leveraged System's authorization (date, system ID, etc.)
- Consumer (Customer) responsibility statements
  - In the by-component response to a specific control/part
    - System-wide statements - associated with the by-component statement for "This System"
    - Component-specific statements
- Statements about what the leveraging system could inherited
  - In the component definition; and/or
  - In the by-component response to a specific control/part
- Certain information about any component associated with consumer responsibility or inheritance statements



Leveraged System's SSP

Metadata

Import Profile

System Characteristics

Name, ID, Date Authorized

System Implementation

Component [This System]

UUID, Description, Select Details

Component (AC Procedure)

Component (Shared Application)

UUID, Description, Select Details, Optional Inheritance Information

Control Implementation

Implemented Requirement

Statement (ac-2_smt.a)

By Component [This System]

Control Satisfaction Description

Implementation Point

Customer Responsibility

By Component (AC Procedure)

Control Satisfaction Description

Implementation Point

By Component (Shared Application)

Control Satisfaction Description

Implementation Point

Customer Responsibility

Optional Inheritance Information

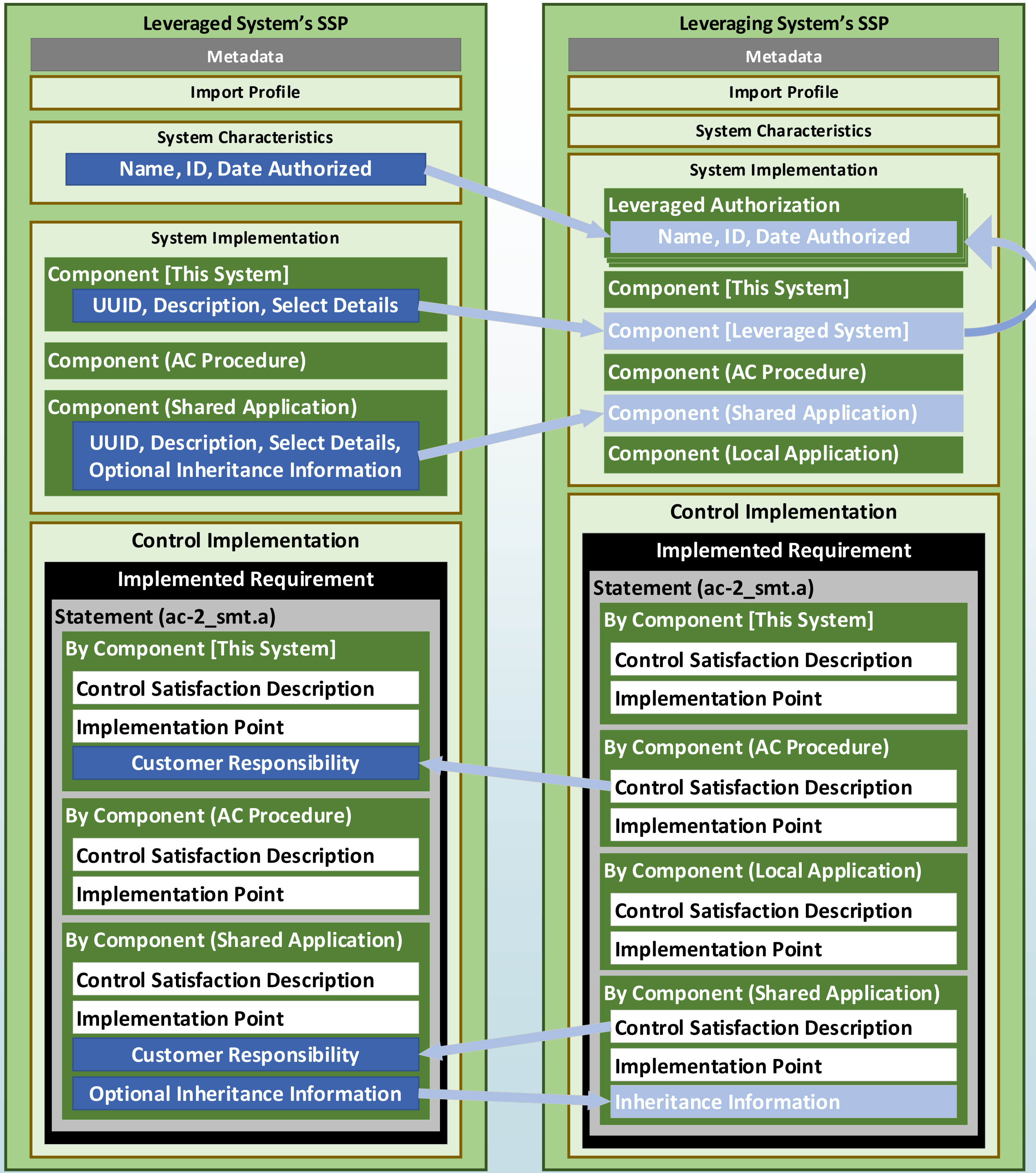
Leveraged System -> Leveraging System Use Cases

- The Leveraged System has an application exposed to the Leveraging System
  - The customer configuration responsibilities are defined within *AC-2, part a*; within a by-component assembly associated with the application
  - An optional inheritance statement is defined within *AC-2, part a*; within a by-component assembly associated with the application. It describes additional aspects of *AC-2, part a* addressed by the application with no customer requirement.
  - The component definition for the application is communicated to the leveraging system
- The Leveraged System has an access control procedure
  - The procedure is only for the leveraged system. The leveraging system requires its own procedure to satisfy AC-2, part a.
  - A customer responsibility statement is made with within *AC-2, part a*; within a by-component assembly associated with "This System" describing the need for the customer to create their own access control procedure.
  - In this instance it does not make sense to include the component representing the leveraged system's access control procedure.

Leveraging System

A leveraging system must communicate the following to customers and AOs:

- Information about the authorizations for both the Leveraging and Leveraged Systems (dates, system IDs, etc.)
- Control Satisfaction Descriptions that satisfy a customer responsibility statement
- Statements about what the leveraging system has inherited from the leveraged system
  - In the component definition; and/or
  - In the by-component response to a specific control/part
- Component information from the leveraged system must be referenced in the leveraging system
- End Consumer (Customer) responsibility statements may also be defined the same way the leveraged system defines them



Leveraged System's SSP

Metadata

Import Profile

System Characteristics

Name, ID, Date Authorized

System Implementation

Component [This System]

UUID, Description, Select Details

Component (AC Procedure)

Component (Shared Application)

UUID, Description, Select Details, Optional Inheritance Information

Control Implementation

Implemented Requirement

Statement (ac-2_smt.a)

By Component [This System]

Control Satisfaction Description

Implementation Point

Customer Responsibility

By Component (AC Procedure)

Control Satisfaction Description

Implementation Point

By Component (Shared Application)

Control Satisfaction Description

Implementation Point

Customer Responsibility

Optional Inheritance Information

Leveraging System's SSP

Metadata

Import Profile

System Characteristics

System Implementation

Leveraged Authorization

Name, ID, Date Authorized

Component [This System]

Component [Leveraged System]

Component (AC Procedure)

Component (Shared Application)

Component (Local Application)

Control Implementation

Implemented Requirement

Statement (ac-2_smt.a)

By Component [This System]

Control Satisfaction Description

Implementation Point

By Component (AC Procedure)

Control Satisfaction Description

Implementation Point

By Component (Local Application)

Control Satisfaction Description

Implementation Point

By Component (Shared Application)

Control Satisfaction Description

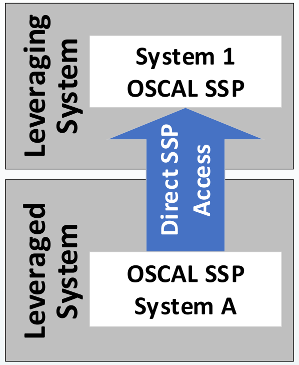
Implementation Point

Inheritance Information

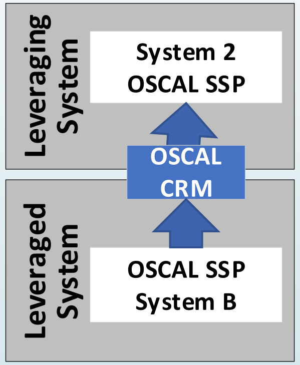
Three Scenarios

- **Scenario 1**: OSCAL SSP / With Access
  - The leveraged system is using an OSCAL SSP; and the leveraging system is permitted to access it.
  - No CRM is needed.
  - **Preferred approach!**
- **Scenario 2**: OSCAL SSP / No Access
  - The leveraged system is using an OSCAL SSP; however, the leveraging system is not permitted access it.
  - An OSCAL CRM is used.
- **Scenario 3**: Legacy SSP
  - A leveraged system is still using a legacy SSP.
  - A legacy Customer Responsibility Matrix (CRM) is used.

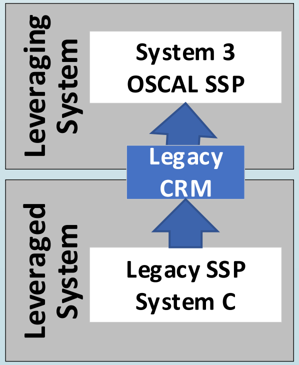
Scenario 1



Scenario 2

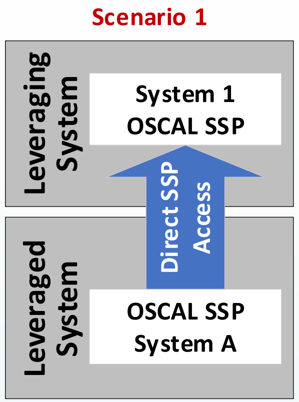


Scenario 3

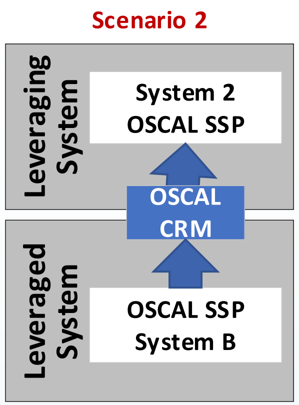


Scenario 1: OSCAL SSP With Access

- Preferred scenario
- The SSP of the leveraging system can "see" the leveraged system's SSP
- Tools can identify which statements in the leveraged system's SSP have a customer responsibility
- Tools can further identify the leveraged system's components associated with these customer responsibility statements.
- The leveraging system's ISSO must determine if fulfillment of their customer responsibility involves the component from the leveraged system, or a new component that must be supplied by the leveraging system's organization.

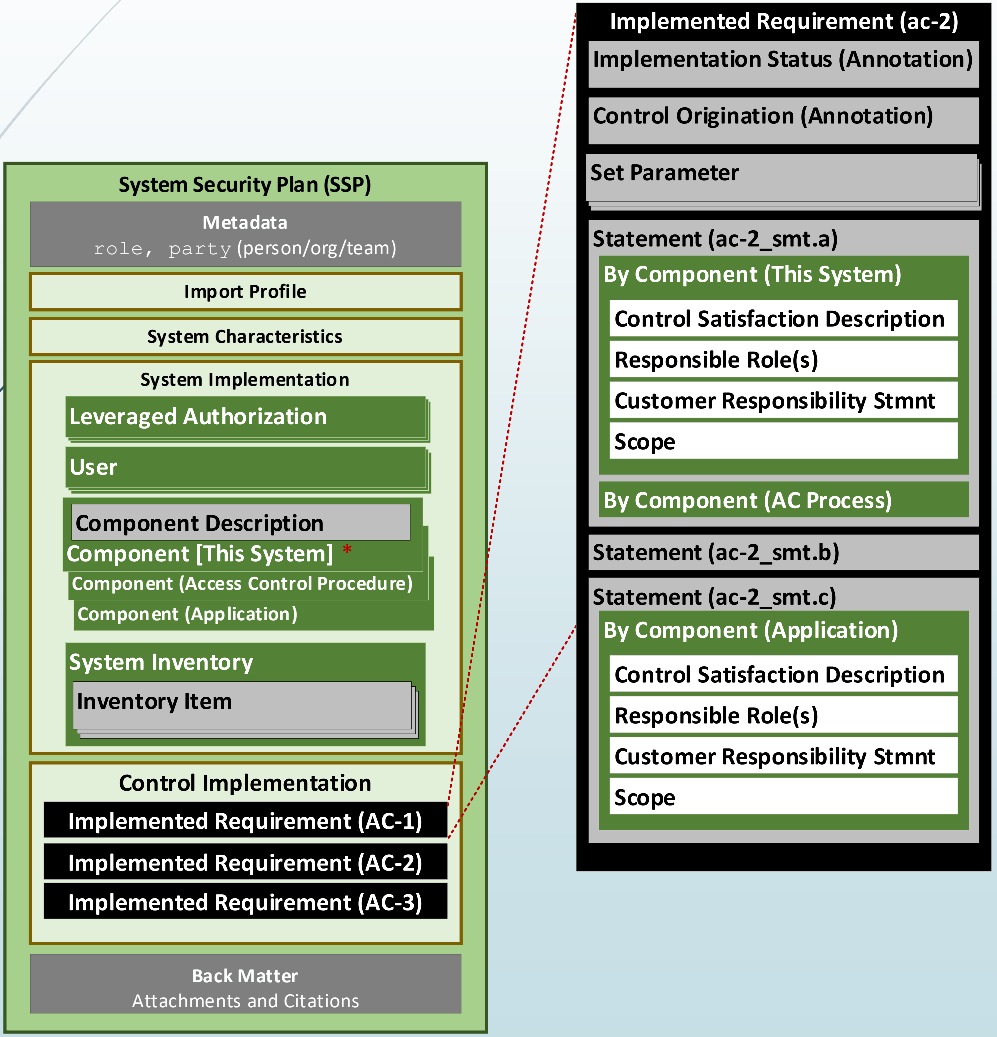


Scenario 2: OSCAL SSP - No Access



- The SSP of the leveraging system is not permitted to "see" the full leveraged system's SSP.
- The leveraged system's owner, creates an OSCAL customer responsibility matrix (CRM), using the OSCAL Component model.
- Every component in the leveraged system's SSP, with a customer responsibility annotation is created in the OSCAL CRM with only basic information, such as the component title and general description.
  - The exact level of detail is a situation-specific decision.
  - The original Component UUID value from the leveraged system's SSP must be duplicated.
  - Every control, which cites that component AND associates it with a customer responsibility statement is cited in the control-implementation assembly within the component.
  - The entire "responsibility" annotation is duplicated from the SSP model by-component entry to the Component model statement-id assembly.
- The leveraging system's ISSO must determine if fulfillment of their customer responsibility involves the component from the leveraged system, or a new component that must be supplied by the leveraging system's organization.
  - If the leveraged system's component is used, the leveraging system's SSP must import the component detail from the CRM into the leveraging system's SSP.
  - The original UUID must be maintained.
  - The leveraging system's SSP must ensure they fully satisfy every customer responsibility statement in the CRM, which requires at least one entry within the cited statement.

Scenario 2: OSCAL SSP: No Access



System Security Plan (SSP)

Metadata
role, party (person/org/team)

Import Profile

System Characteristics

System Implementation

Leveraged Authorization

User

Component Description

Component [This System] *

Component (Access Control Procedure)

Component (Application)

System Inventory

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Implemented Requirement (AC-1)

Implemented Requirement (AC-2)

Implemented Requirement (AC-3)

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Implementation Status (Annotation)

Control Origination (Annotation)

Set Parameter

Statement (ac-2_smt.a)

By Component (This System)

Control Satisfaction Description

Responsible Role(s)

Customer Responsibility Stmnt

Scope

By Component (AC Process)

Statement (ac-2_smt.b)

Statement (ac-2_smt.c)

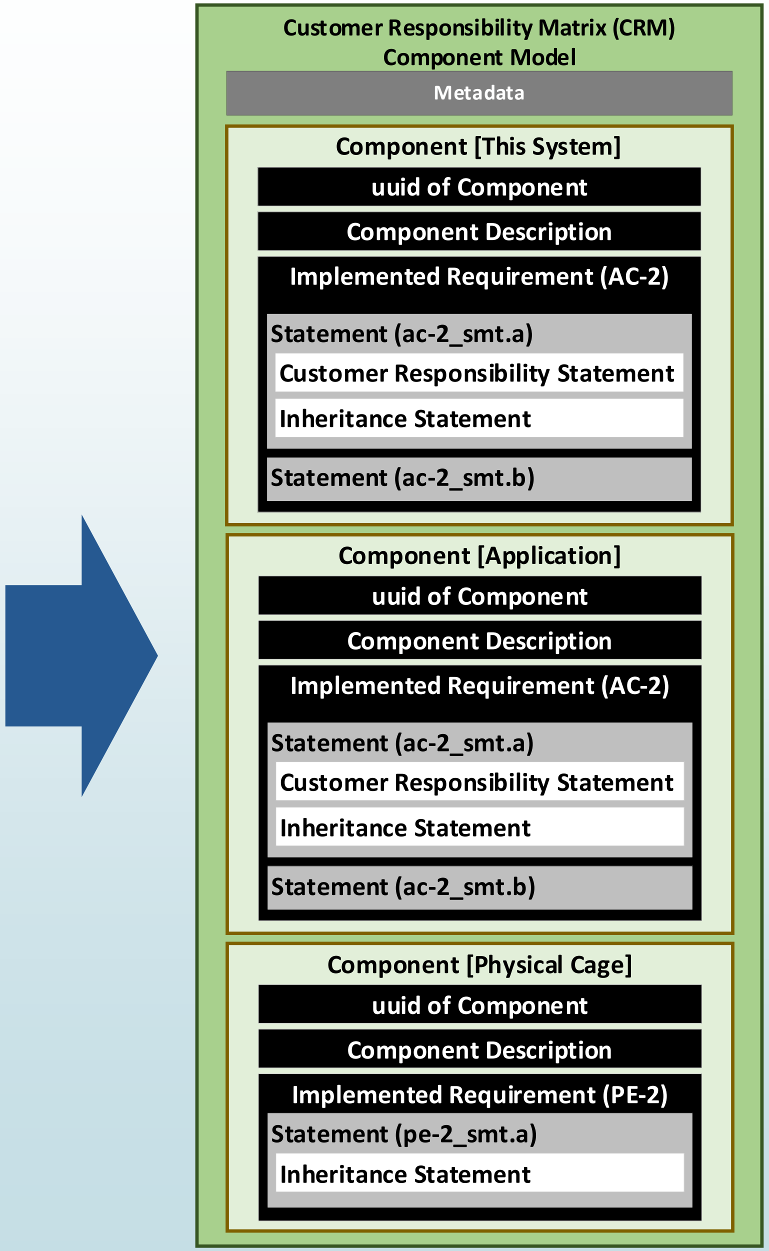
By Component (Application)

Control Satisfaction Description

Responsible Role(s)

Customer Responsibility Stmnt

Scope



Customer Responsibility Matrix (CRM)
Component Model

Metadata

Component [This System]

uuid of Component

Component Description

Implemented Requirement (AC-2)

Statement (ac-2_smt.a)

Customer Responsibility Statement

Inheritance Statement

Statement (ac-2_smt.b)

Component [Application]

uuid of Component

Component Description

Implemented Requirement (AC-2)

Statement (ac-2_smt.a)

Customer Responsibility Statement

Inheritance Statement

Statement (ac-2_smt.b)

Component [Physical Cage]

uuid of Component

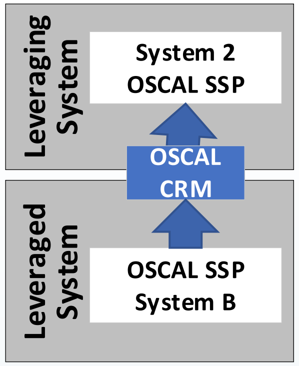
Component Description

Implemented Requirement (PE-2)

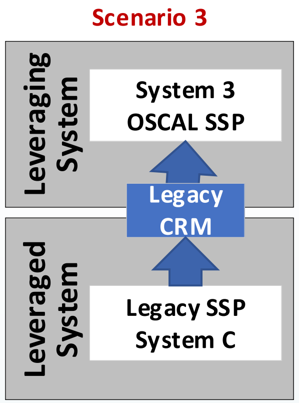
Statement (pe-2_smt.a)

Inheritance Statement

Scenario 2

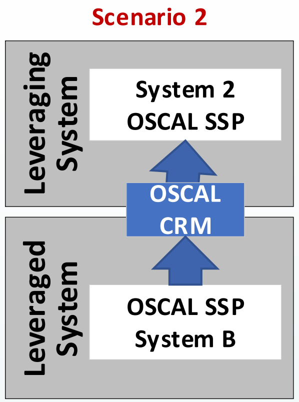


Scenario 3: Legacy SSP or CRM



- The leveraged system's SSP is not expressed in OSCAL, or its CRM is not.
- The leveraging system SSP must define an additional component representing the leveraged system itself.
- Every responsibility statement in the leveraged system's legacy SSP/CRM must be addressed by the leveraging system's SSP within the cited control statement.
- If the responsibility is addressed by customer action in the leveraged system, the leveraging system's statement should cite that component. Otherwise, it should cite the appropriate component.

Inheritance in an OSCAL CRM



- The leveraged system's CRM can represent components from the system even if there is no customer responsibility.
- While individual component references are preferred, if the leveraged system's owner or ISSO does not wish to expose individual components, they may still provide a CRM with a "this system" component.
- Whether individual components or simply a "this system" component, the leveraged system's CRM can cite each control satisfied by the component, and provide a customer-appropriate description of the satisfaction.
  - For example, FedRAMP requires the leveraging system to only describe what is being inherited from a leveraged system in satisfaction of a control, but does not require a description of "how" in this case. The CRM can provide a control-statement-specific description of what is being inherited.

Questions?
Thank you!

We want your feedback!

OSCAL Repository:
https://github.com/usnistgov/OSCAL

Project Website:
https://www.nist.gov/oscal

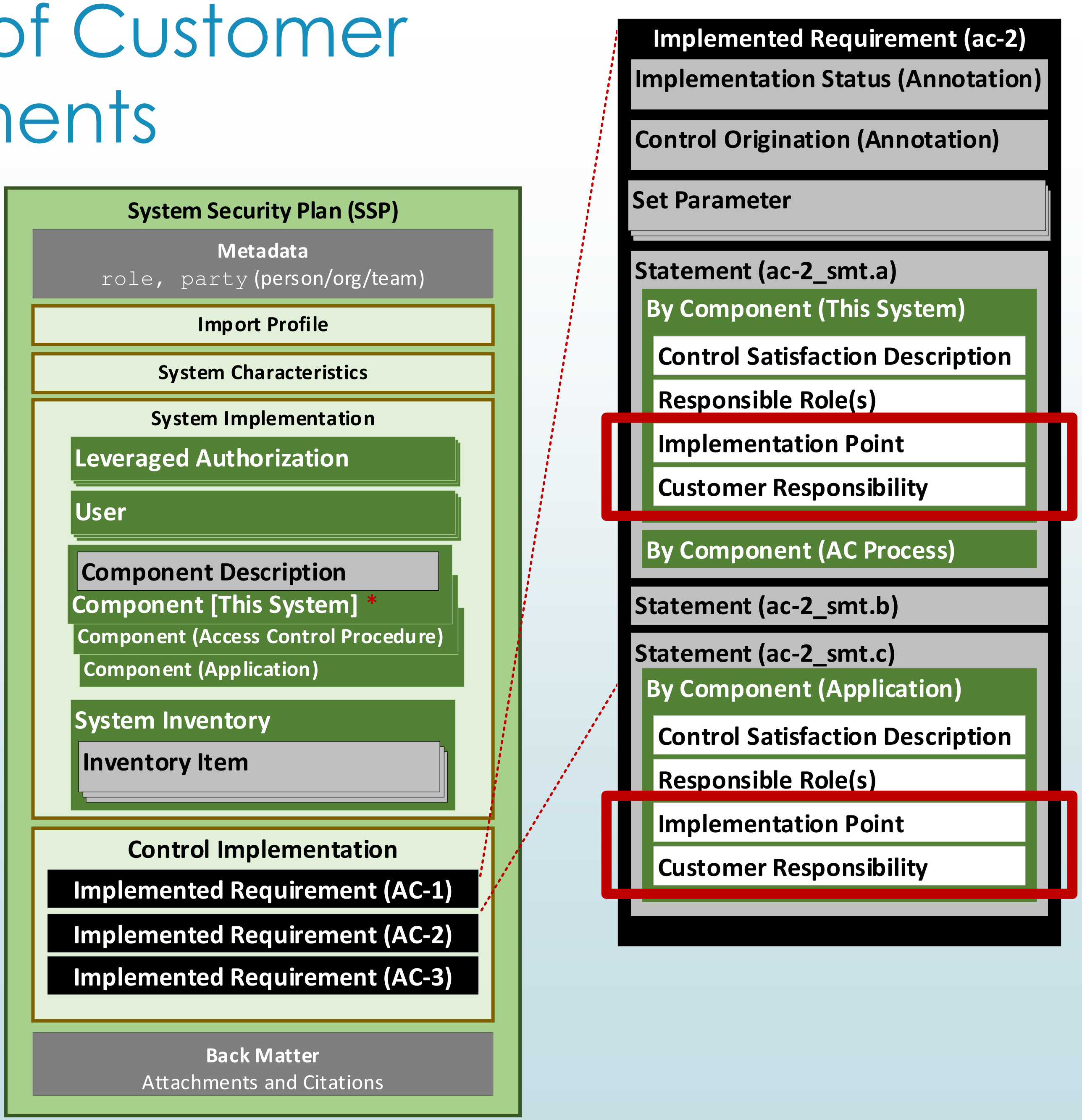
How to Contribute:
https://pages.nist.gov/OSCAL/contribute/

FedRAMP Implementation Guides
https://github.com/gsa/fedramp-automation **(Available in July)**

BACKUP SLIDE(S)

Correct Placement of Customer Responsibility Statements

- Customer responsibility statements are placed within applicable `by-component` assembly using an `annotation`.
- If the customer has a responsibility within the application, there should be a `by-component` assembly in the `statement` assembly, which identifies the application and includes the customer responsibility `annotation`.
- If a customer responsibility statement does not fit any specific component, place it in the "This System" component.



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Implemented Requirement (AC-3)

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Implementation Status (Annotation)

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Statement (ac-2_smt.a)

By Component (This System)

Control Satisfaction Description

Responsible Role(s)

Implementation Point

Customer Responsibility

By Component (AC Process)

Statement (ac-2_smt.b)

Statement (ac-2_smt.c)

By Component (Application)

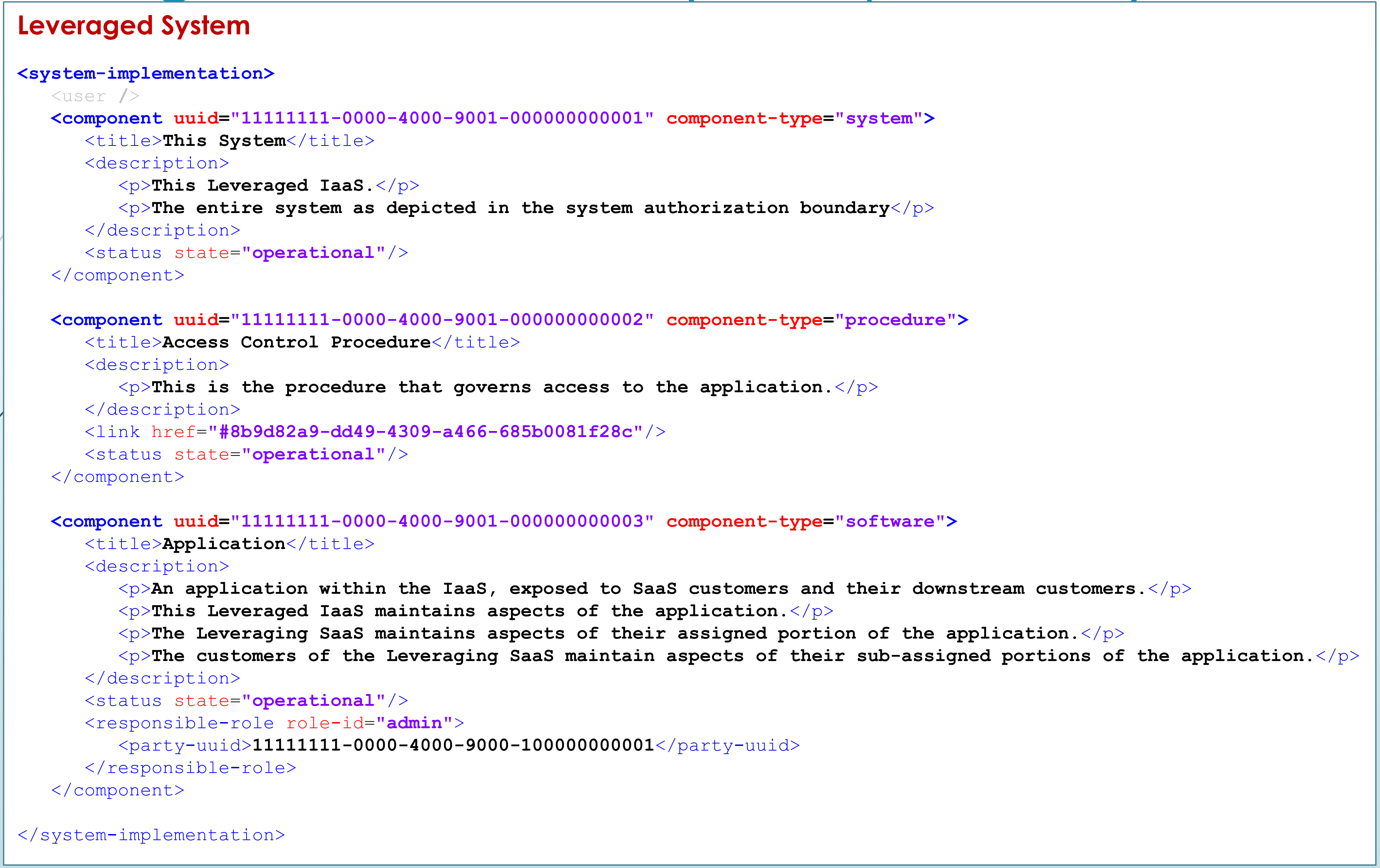
Control Satisfaction Description

Responsible Role(s)

Implementation Point

Customer Responsibility

Looking at the OSCAL (Components)



Leveraged System

```xml
<system-implementation>
   <user />
   <component uuid="11111111-0000-4000-9001-000000000001" component-type="system">
      <title>This System</title>
      <description>
         <p>This Leveraged IaaS.</p>
         <p>The entire system as depicted in the system authorization boundary</p>
      </description>
      <status state="operational"/>
   </component>

   <component uuid="11111111-0000-4000-9001-000000000002" component-type="procedure">
      <title>Access Control Procedure</title>
      <description>
         <p>This is the procedure that governs access to the application.</p>
      </description>
      <link href="#8b9d82a9-dd49-4309-a466-685b0081f28c"/>
      <status state="operational"/>
   </component>

   <component uuid="11111111-0000-4000-9001-000000000003" component-type="software">
      <title>Application</title>
      <description>
         <p>An application within the IaaS, exposed to SaaS customers and their downstream customers.</p>
         <p>This Leveraged IaaS maintains aspects of the application.</p>
         <p>The Leveraging SaaS maintains aspects of their assigned portion of the application.</p>
         <p>The customers of the Leveraging SaaS maintain aspects of their sub-assigned portions of the application.</p>
      </description>
      <status state="operational"/>
      <responsible-role role-id="admin">
         <party-uuid>11111111-0000-4000-9000-100000000001</party-uuid>
      </responsible-role>
   </component>

</system-implementation>
```

Looking at the OSCAL (Customer Responsibilities)

Leveraged System

```
<control-implementation>
   <implemented-requirement control-id="ac-1" uuid="eee8697a-bc39-45aa-accc-d3e534932efb" />
   <implemented-requirement control-id="ac-2" uuid="uuid-value">
      <annotation name="implementation-status" ns="https://fedramp.gov/ns/oscal" value="implemented" />
      <responsible-role role-id="admin-unix"/>
      <responsible-role role-id="program-director"/>
      <set-parameter param-id="ac-2_prm_1"><value>[SAMPLE]privileged, non-privileged</value></set-parameter>

      <statement statement-id="ac-2_stmt.a" uuid="uuid-value">

         <by-component component-uuid="uuid-of-component-this-system" uuid="uuid-value">
            <description>
               <p>For the portion of the control satisfied by this system or its owning organization, describe
                       how the control is satisfied.</p>
            </description>
            <annotation name="responsibility" value="customer">
               <remarks>
                  <p>General customer responsibility description.</p>
               </remarks>
            </annotation>
         </by-component>

         <by-component component-uuid="uuid-of-component-application" uuid="uuid-value">
            <description>
               <p>For the portion of the control satisfied application, describe how the control is satisfied.</p>
            </description>
            <annotation name="responsibility" value="customer">
               <remarks>
                  <p>Describe the customer's responsibility within the application to satisfy this AC-2, part a.</p>
               </remarks>
            </annotation>
         </by-component>

      </statement>
   </implemented-requirement>
```