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| **OWNER:**  DG TAXUD | **ISSUE DATE:**  18/12/2024 | **VERSION:**  6.4.0-v2.00 |
| **Taxation and Customs Union DG**  SUBJECT:  DDNTA FOR NCTS-P6  Appendix B: Transitional Analysis  (DDNTA\_RFC-List.42) | | |
| FRAMEWORK CONTRACT TAXUD/2021/CC/162  SPECIFIC CONTRACT 11 | | |

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# Introduction

The purpose of this Appendix is to provide the approach followed for the transitional analysis.

The transitional analysis has been performed by analysing each message exchange protocol/scenarios (section III of the DDNTA Main Document) and state transition diagrams (Sub-Section III.VI of the DDNTA Main Document) of NCTS-P6 against the NCTS-P5. Therefore, the transitional analysis is a compatibility and gap analysis (comparison) between “NCTS-P6” (TO-BE) and “NCTS-P5” (AS-IS) message exchange protocol & state transition diagrams (Figure 1). Consequently, the message exchange protocol & state transition diagrams are the key two elements for the compatibility analysis.



Figure 1: Transitional Analysis concept

The transitional analysis approach is further described below in Section 2 and the State Machine Transition Analysis in Section 3.

# Scenarios Transition Analysis

All the DDNTA message exchange protocols or scenarios (hereafter scenarios) defined in NCTS-P6 and NCTS-P5 have been consolidated and a mapping has been performed during this activity.

The output of Scenarios Transition Analysis is provided in the Appendix M excel file which accompanies DDNTA.

The Scenarios Transition Analysis defines the following three Compatibility Indicators to designate potential compatibility issues between “NCTS-P6” and “NCTS-P5” scenarios:



Figure 2: Scenarios Transition Analysis compatibility indicators

Each indicator has a different range of values and meaning. Further information is provided below in Sub-Sections 2.1, 2.2 and 2.3 respectively.

Apart from the above three (3) indicators, the following information is defined for each analysed scenario in Scenarios Transition Analysis file:

* ***Transition Conflict Explanation***: brief explanation of the conflict during Transitional Period (if any);
* ***Transition Analysis Outcome (TAO)*:** analysis result for the feasibility of a particular scenario during Transitional Period. This is further explained and defined in Sub-Section 2.4**.**
* ***Precondition for use in NCTS-P6*:** defines any precondition for executing the particular scenario in new phase. For instance, it might require one or more Roles to be in new phase so as its usage to be feasible during Transitional Period
* ***Resolution for State Machine or for Common Domain exchanges***: provides how it is expected to resolve a particular conflict (if Transition Analysis Outcome (TAO) = 1 or 2).
* ***Remark for ED exchanges*:** additional information for spotted discrepancies in External Domain exchanges during the analysis of particular scenario between “NCTS-P6” and “NCTS-P5”.
* ***Reference to Transitional Scenario***: a Transitional Scenario is required to resolve a conflict (if Transition Analysis Outcome (TAO) = 2). Those scenarios will be defined in Sub-Section IV.III.3 of the DDNTA Main Document.

## Gap Analysis indicator (GAI)

One of the activities of transition analysis is to identify whether the “NCTS-P6” message exchange protocols exist or are new (Phase-In) compared to “NCTS-P5”. In addition, it is to identify which message exchange protocol of “NCTS-P5” is not anymore applicable in “NCTS-P6” (Phase-Out). Therefore, a gap analysis between the “NCTS-P6” and “NCTS-P5” in terms of message exchange protocols is performed.

The purpose of the Gap Analysis indicator (GAI) is to depict the outcome of the assessment of the aforementioned analysis.

The possible value of Gap Analysis indicator (GAI) and their meaning are shown in Table 1:

|  |  |
| --- | --- |
| **Value** | **Description** |
| **1** | **Continuity**: A message exchange protocol of previous phase also exists in new phase. |
| **2** | **Phase In**: Particular functionality of the message exchange protocol introduced in new phase and has no previous equivalent in previous phase |
| **3** | **Phase Out**: Particular functionality of the message exchange protocol of previous phase is discontinued. |

Table 1: Gap Analysis indicator (GAI) values

## IE Compatibility Indicator (IECI)

Each scenario is assessed from IE compatibility point of view. Figure 3 visualises the concept of IE compatibility analysis.



Figure 3: IE compatibility analysis concept

The purpose is to analyse the IEs involved in common domain exchanges for a scenario. The comparison is done between the NCTS-P6 scenario and its mapped NCTS-P5 scenario.

The analysis concerns whether the CD IEs exists in both phases

* If yes (Continuity), a further analysis is performed in order to identify the type of continuity (e.g. continuity is ensured via conversion), i.e. whether it has:
  + the same message version,
  + different message version and same IE number, or
  + different IE number
* If not (Discontinuity), a further analysis is performed in order to identify the type of discontinuity since different resolution might be different per case, i.e. whether:
  + a new CD IE has been added in NCTS-P6 (Phase In) or
  + a CD IE has been removed in NCTS-P6 (Phase Out), or
  + sequence of CD IEs exchanges is not the same, or
  + a combination of above cases exists (Phase In & Phase Out).

This analysis use as reference the Table 2 which is the Information Exchange Reference Table (NCTS-P6 and NCTS-P5) (Sub-section 4).

The outcome of the analysis in terms of IE compatibility is reflected in IE Compatibility Indicator (IECI). The possible values of IECI and their meaning are shown in Table 2 below:

|  |  |
| --- | --- |
| **CD IE compatibility Assessment for specific message exchange protocol** | |
| **Continuity**: Not Applicable / No impact on Common Domain | **0** |
| **Continuity**: One or more CD IEs are present both in new and previous phase with the same structure (message version) in the particular message exchange protocol | **1** |
| **Continuity**: One or more CD IE are present in both phases but with different structure (message version) in the particular message exchange protocol- Conversion is needed | **2** |
| **Continuity**: One or more CD IE are present in both phases but different structure/IE number (message type) - Conversion is needed | **3** |
| **Discontinuity, Phase In**: One or more CD IE appears in the message exchange protocol of new phase and has no previous equivalent in previous phase | **4** |
| **Discontinuity, Phase Out**: One or more CD IE in the message exchange protocol of previous phase is discontinued from the corresponding message exchange protocol of new phase | **5** |
| **Discontinuity, sequencing or no conversion:**   * CD IEs are present in message exchange protocol in both new phase and previous phase but with different sequence OR * CD IEs exist in both phases, but no conversion is possible. | **6** |
| **Discontinuity, Phase In & Phase Out**: In one message exchange protocol, one or more CD IE of previous phase are discontinued from the corresponding message exchange protocol of new phase AND One or more CD IE appears in the message exchange protocol of new phase and has no previous equivalent in previous phase | **7** |

Table 2: IE Compatibility Indicator (IECI) values

## State Machine Compatibility Indicator (SMCI)

Each scenario is assessed from State Machine (CD states and transitions) compatibility point of view. Figure 4 visualises the concept of State Machine compatibility analysis.



Figure 4: State Machine compatibility analysis concept

The purpose is to analyse the states involved in common domain exchanges for a particular scenario. The comparison is done between the NCTS-P6 scenario and its mapped NCTS-P5 scenario and is also based on corresponding state machines per phase.

The analysis concern whether there is a conflict in terms of movement state following CD IEs between two systems in different phases:

* Continuity is considered for the scenario during transition:
  + If particular scenario does not involve any CD IEs and therefore has no impact on CD states
  + If one or more required CD states are present in both phases but possibly with different state name in the particular scenario - State mapping
* Discontinuity is considered for the scenario during transition, if:
  + one or more CD (Required) states or state transition are introduced in new phase and has no previous equivalent in previous phase (Phase In), or
  + one or more CD (Required) states or state transition of previous phase is discontinued from the corresponding scenario of new phase (Phase Out), or
  + a combination of above cases exists (Phase In & Phase Out).

This analysis uses as reference the Appendix N excel file (Sub-section 3).

The outcome of the analysis in terms of state machine compatibility is reflected in State Machine Compatibility Indicator (SMCI). The possible value of SMCI and their meaning is shown in Table 3 below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **State Machine compatibility Assessment for specific message exchange protocol** | | | | |
| **Continuity**: No Changes on State Machine (CD States) | **Continuity**: One or more CD (Required) states are present in both phases but with different state name in the particular message exchange protocol - State mapping | **Discontinuity, Phase In:** One or more CD (Required) states or state transition appears in new phase and has no previous equivalent in previous phase | **Discontinuity, Phase Out:** One or more CD (Required) states or state transition in the message exchange protocol of previous phase is discontinued from the corresponding message exchange protocol of new phase | **Discontinuity, Phase-In & Phase-Out:** Discontinuity, Phase In AND AT THE SAME TIME Discontinuity, Phase Out |
| **0** | **1** | **2** | **3** | **4** |

Table 3: State Machine Compatibility Indicator (SMCI) values

## Transition Analysis Outcome

The Transition Analysis Outcome (TAO) is the analysis result for the feasibility of a particular scenario during Transitional Period.

The TAO can have one of the following values:

|  |  |
| --- | --- |
| Value | Description |
| 1 | **Feasible:** Transition is feasible based on IE and STD continuity indicators |
| 2 | **Feasible with resolution**: a special resolution/transitional message exchange protocol is necessary for resolving discontinuity. |
| 3 | **Blocking/Not Feasible**: there is no resolution with transitional message exchange protocol for the particular scenario. |

Table 4: Transition Analysis Outcome values

If TAO has value 1, then the matching of the State Machine or Common Domain exchanges is provided.

If TAO has value 2, then a special resolution/transitional scenario is necessary for resolving discontinuity. The transitional scenarios are defined in Sub-Section IV.II of the DDNTA Main Document.

In case of TAO value 3, then the particular scenario/functionality must be excluded from the Transitional Period (i.e. can be used only after the end of transition)

# State Machine Transition Analysis

The State machines defined in NCTS-P6 (Sub-Section III.VI of the DDNTA Main Document) and NCTS-P5 have been consolidated and a mapping has been performed during this activity.

Table 5 presents a reference table for the mapping of state machines between phases.

The output of State Machine Transition Analysis is provided in the Appendix NExcelfile that accompanies the DDNTA.

A column “*Appendix N Worksheet Ref*” has been added to Table 5 to indicate the worksheet where the pertinent comparison of state machine is located.

| **Customs Office** | **NCTS-P6** | **NCTS-P5** | **Appendix N Worksheet Ref** |
| --- | --- | --- | --- |
| **Customs Office of Departure** | State Transition Diagram for Office of Departure (until release of movement) | State Transition Diagram for Office of Departure (until release of movement) | NCTS-OoDep |
| State Transition Diagram for Office of Departure after the movement is released | State Transition Diagram for Office of Departure after the movement is released | NCTS-OoDep |
| State Transition Diagram of the recovery states at Departure | State Transition Diagram of the recovery states in the Departure in the NCTS Phase 5 | NCTS-OoDep |
| Invalidation at Office of Departure | Invalidation at Office of Departure in NCTS Phase 5 | NCTS-OoDep |
| **Customs Office of Destination** | State Transition Diagram for Office of Destination without Recovery States | State Transition Diagram for Office of Destination in NCTS Phase 5 without Recovery States | NCTS-OoDes |
| State Transition Diagram with Recovery States at Destination | State Transition Diagram of the recovery states in the Destination in the NCTS Phase 5 | NCTS-OoDes |
| Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination | Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination in the NCTS Phase 5 | NCTS-OoDes |
| **Customs Office of Exit for Transit** | State Transition at Office of Exit for Transit | State Transition at Office of Exit for Transit in the NCTS Phase 5 | NCTS-OoExtTra |
| State Transition at Office of Exit for Transit with Recovery States | State Transition at Office of Exit for Transit with Recovery States in the NCTS Phase 5 | NCTS-OoExtTra |
| Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination | Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination in the NCTS Phase 5 | NCTS-OoExtTra |
| **Customs Office of Transit** | State Transition Diagram for Office of Transit without Recovery States | State Transition Diagram for Office of Transit in NCTS Phase 5 without Recovery States | NCTS-OoTra |
| State Transition Diagram of the recovery states at Office of Transit | State Transition Diagram of the recovery states at Office of Transit in the NCTS Phase 5 | NCTS-OoTra |
| Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination | Invalidation at Office of Transit, at Office of Exit for Transit and Office of Destination in the NCTS Phase 5 | NCTS-OoTra |
| **Customs Office of Incident Registration** | State Transition in Office of Incident Registration | State Transition in Office of Incident Registration in the NCTS Phase 5 | NCTS-OoInc |
| State Transition at Office of Incident Registration with Recovery States | State Transition at Office of Incident Registration with Recovery States in the NCTS Phase 5 | NCTS-OoInc |
| **Other Country** | State Transition Diagram for Other Country | State Transition Diagram for Other Country in the NCTS Phase 5 | NCTS-Other |

Table 5: State Machines reference mapping table

A side-by-side gap analysis performed per state machine to identify differences at the level of state transitions. The state transition attributes are:

* the state from which transition occurred (state before state transition)
* the state to which transition resulted (state after state transition)
* the triggers of state transition, which are events or actions, as well as conditions that must be fulfilled so as to activate state transition
* Receiving IE(s) causing state transition
* Sending IE(s) because of state transition

The comparison per state transition considered all state transition attributes.

* If at least one of above state transition attributes are not the same for a particular state transition between two phases, then the particular attribute is highlighted with orange colour
  + If difference does not cause any problem in transitional period (e.g. state name difference, SMCI with value 1 (Table 3) is expected in Scenarios Transition Analysis (section 1) on scenarios having such CD state transition (unless there is a CD state transition causing greater discontinuity - value > 1).
* If NCTS-P5 information is empty for a specific state transition in Appendix N file, then it shall be understood that the corresponding NCTS-P6 state transition is new.
  + Appendix N file shows those new state transitions with green colour that are applicable for both the Opt-In and the Opt-Out NAs;
  + Appendix N file shows those new state transitions with yellow colour that are applicable only for the Opt-In NAs;
  + In Scenarios Transition Analysis (section 1), SMCI with value 2 (Table 3) is expected on scenarios having at least one of such CD state transition (unless there is a CD state transition causing greater discontinuity - value > 2).
* If NCTS-P6 information is empty for a specific state transition in Appendix N file, then it shall be understood that NCTS-P5 state transition is no more applicable in NCTS-P6.
  + Appendix N file shows those removed state transitions with red colour;
  + In Scenarios Transition Analysis (Section 1), SMCI with value 3 (Table 3) is expected on scenarios having at least one of such CD state transition (unless there is a CD state transition causing greater discontinuity - value > 3).

Figure 5 presents an example of State Machine Transition Analysis.



Figure 5: State Machine Transition Analysis example

# Information Exchange Reference Table (NCTS-P6 and NCTS-P5)

Appendix A shall be used as a reference table providing per IE (IE No) the mapping of each IE version (message type) applicable to NCTS-P5 and NCTS-P6. Therefore, it shall be used by the convertors (ieCA or national convertor) or NTAs for conversion purpose. Appendix A was used as input to perform the Scenarios Transition Analysis (section 2) and to build the IE Compatibility Indicator (IECI) (section 2.2).

* In most of the scenarios, same IE number exists in both phases with different message version. Therefore, scenarios in Scenarios Transition Analysis (Section 1) involving only such CD IEs must have IECI with value 2 (Table 2). It means that the CD IEs conversion shall be performed (e.g. upgrade from CD001C to CD001D).
* In some cases, IE number has changed from NCTS-P5 to NCTS-P6 and therefore a reference/link to the New or Previous IE Number is provided in Appendix A. In Scenarios Transition Analysis (Section 1), scenarios involving such CD IEs shall have IECI with value 3 (Table 2) unless there is a case causing greater discontinuity (value > 3). It means that the CD IEs conversion shall be performed.
* If NCTS-P5 message version is empty for a specific IE in Appendix A, then it shall be understood that the corresponding NCTS-P6 message version is new. In Scenarios Transition Analysis (1), IECI with value 4 (Table 2) is expected on scenarios having at least one of such CD IE is involved (unless there is a CD IE causing greater discontinuity - value > 4).
* If NCTS-P6 message version is empty for a specific IE in Appendix A, then it shall be understood that NCTS-P5 message is no more exchanged in NCTS-P6. In Scenarios Transition Analysis (1), IECI with value 5 (Table 2) is expected on scenarios having at least one of such CD IE is involved (unless there is a case causing greater discontinuity - value > 5).