

EOC Construction Rules

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About this document

This document contains functional specifications for the construction of Episodes of Care (EOC), the way they are implemented in the software *EOC Construction Tool* provided by The Norwegian Directorate of Health.

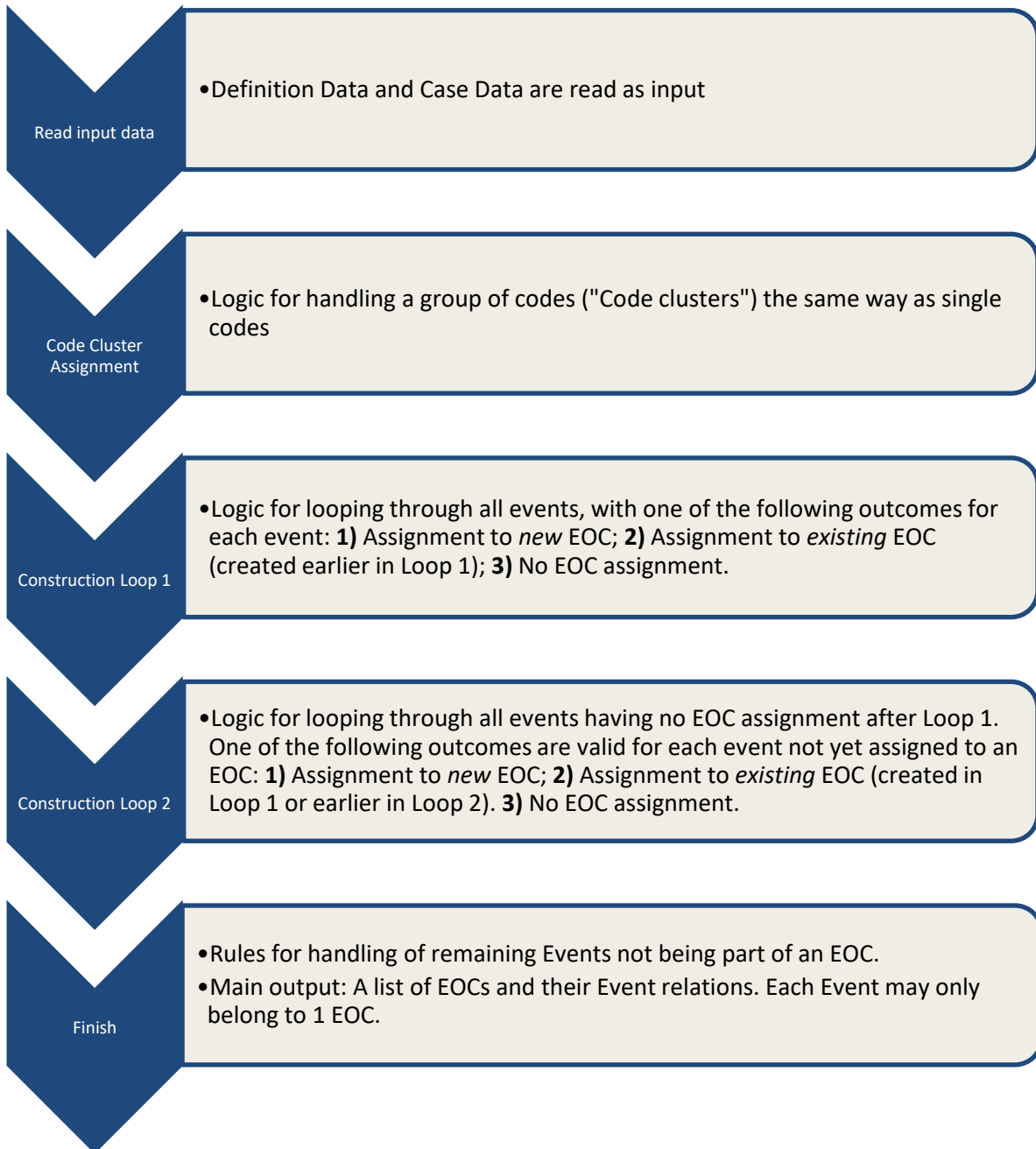
The first version of the document was created together with the software during an agile development process Nov 18 – Mar 19.

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Glossary

Term	Definition
Case	A set of Events. Technical term: EOCEventData
Event	A period of time during which healthcare, of any kind, has been provided to a patient.
Case Data	One of two input data types for the EOCConstructionTool. All data elements describing each case, consisting of a list of Events, called EOCEventData.
Definition Data	One of two input data types for the grouper. All data used to configure the EOC Construction Tool, enabling the user to obtain different grouping results for the same Case Data by making changes to the dynamic rules.
EOC	Episode of Care. An entity covering a period of time, containing one or more Events. Through adjustments of the Definition Data, the user can decide what kind of Events belong to the same EOCs.

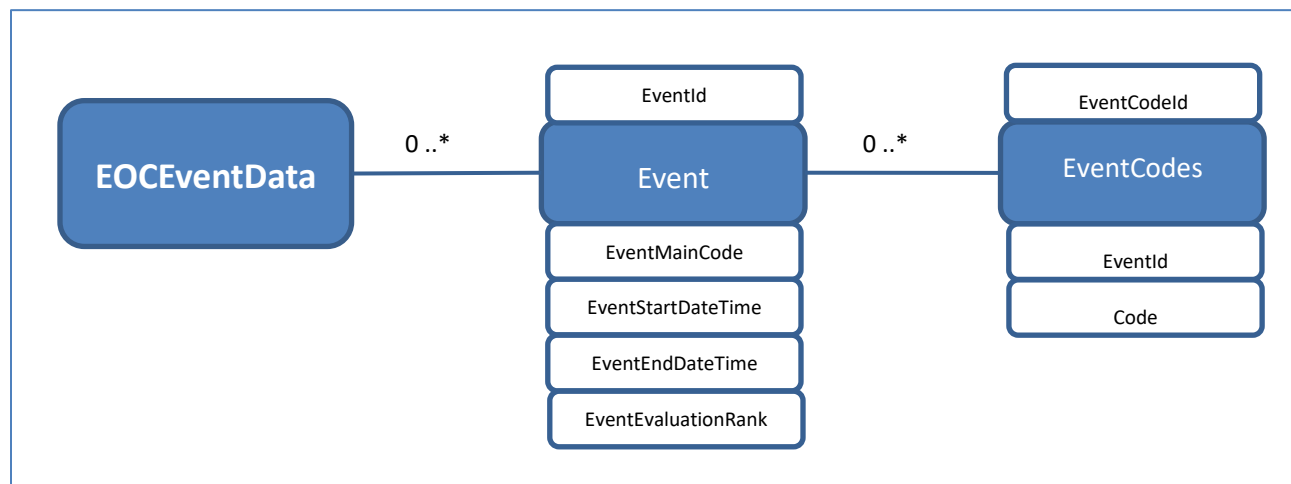
General workflow



1 Input Data Specifications

1.1 Case Data

The Case consists of a set of *Events*. This data set is called *EOCEventData*. The data model is illustrated below.



In addition to the basic features, including the EventMainCode, each event may be described by list of other codes (EventCodes). This list may be empty.

1.2 Definition Data

1.2.1 Main structure

The Definition Data necessary for the construction process consists of information in 3 tables:

Table Name	Comment
EOCTriggerRules	Rules for triggering of new EOCs.
EOCInclusionRules	Rules for inclusion of Events into existing EOCs.
EOCCodeClusters	Rules for defining code clusters and codes belonging to those clusters.

1.2.2 EOCTriggerRules

Column	Data Type	Comment
ExecutionOrder	Integer	Defines the order in which the rules are evaluated
EventCode	String	Any code value, including Code Cluster, or blank
EventCode2	String	Any code value, including Code Cluster, or blank
EOCUnitType	String	Year; Tertile; Month; [Blank]
IsValid1stLoop	Boolean	1=Yes; 0=No

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1.2.3 EOCInclusionRules

Column	Data Type	Comment
ExecutionOrder	Integer	Defines the order in which the rules are evaluated
EventCodeTriggeringCurrentEOC	String	Any code value, including Code Cluster, or blank
CandidateEventCode	String	Any code value, including Code Cluster, or blank
CandidateEventCode2	String	Any code value, including Code Cluster, or blank
DaysAllowedBefore	Integer	Integer greater than or equal to 0, or blank
DaysAllowedAfter	Integer	Integer greater than or equal to 0, or blank

1.2.4 EOCCodeClusters

Column	Data Type	Comment
Code	String	Any code value
CodeCluster	String	Any string not used as code elsewhere in the definition data
CodeClusterText	String	Optional. Not parsed by the EOC Construction Tool. Helps the user in the maintenance of Code Clusters..

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2 Result Data Specifications

2.1 EOResults

Column	Data Type	Comment
EOCId	Integer	Created by the system. Starting with 1. Not unique across different run times.
EOCMainEventCode	String	<i>EventMainCode</i> of the Event that has been pointed out as the Main Event of the EOC.
EOCStartDate	Date	
EOCEndDate	Date	
Year	Integer	The calendar year in which the main Event of the EOC ends.
EOCUnitType	Constant	A period type, limiting the length of an EOC (Year, Tertile, Month, Open)
EOCUnitNumber	Integer	
EventIds	List	List of the <i>EventIds</i> of the Events included in the EOC. The first item in the list is the <i>EventId</i> of the Main Event.

2.2 EOCAndEventCombinations

Column	Data Type	Comment
EOCId	Integer	Created by the system, starting with 1 at each run time
EventId	Integer	Corresponding to EventId in input data
IsMainEvent	Boolean	1 if the Event is the Main Event of the EOC
RuleType	Constant	"TriggerRule"; "InclusionRule"; "Other". Added for traceability.
RuleNumber	Integer	Reflecting the <i>ExecutionOrder</i> of the definition data rule by which the Event has become a part of the EOC. Always 0 if RuleType="Other". Added for traceability.
LoopNumber	Integer	Reflecting the construction loop in which the Event has been assigned to the EOC (1: Loop 1; 2: Loop2; 99: Finishing Actions). Added for traceability.
AssignmentOrder	Integer	A number reflecting in which order the Events have been assigned to EOCs (across all EOCs). Always starting with 1 for the first Event. Added for traceability.

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3 Code Cluster Rules

3.1 General interpretation of the Code Cluster Rules

The Code Cluster Rules are optional. The table must exist but may contain zero rows.

Each row represents a single rule for the assignment of a code to a Code Cluster.

3.2 Assignment Rules

A Code is assigned to a Code Cluster if a data row in EOCCodeClusters contains the Code value in question in the column "Code".

The corresponding value in the data column "CodeCluster" determines which Code Cluster the Code is assigned to.

3.3 Special Rules

One Code may be assigned to several Code Clusters.

One Code Cluster may contain several Codes.

A Code Cluster may not be assigned to another Code Cluster.

Empty/blank values in the "Code" column lead to no Code Cluster assignment, regardless of the corresponding "CodeCluster" value.

The values in the "CodeClusterText" column are for information only and do not inflict on the EOC construction process.

3.4 The use of Code Clusters

The CodeCluster-codes may be used the same way as other Code values in the

- EOCTriggerRules
- EOCInclusionRules

When a CodeCluster-code is used instead of an ordinary Code value in such a rule, the interpretation is as follows: All Codes assigned to the Code Cluster in question are valid, as if the CodeCluster-code were replaced by any of the Codes included in the Code Cluster.

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4 EOC Trigger Rules

The purpose of EOC Trigger Rules is to regulate the creation of new EOCs.

The following sections define how the EOCTriggerRules are applied on each Event. The same rules are used both during Loop 1 and Loop 2.

The EOCTriggerRules is a set of individual rules (one rule per row). Each rule should be understood as a set of criteria, and actions/results if the criteria are met.

4.1 Execution Order

The rules are evaluated according to the value in EOCTriggerRules.ExecutionOrder (ascending order).

For an Event to trigger the creation of a new EOC based on a rule, it is required that all individual criteria within that rule are met. If one or more criteria are not met, the next rule is evaluated.

4.2 Criteria specifications

The following criteria are supported:

Criterion	Corresponding Definition Data Field
Event Code Criterion	EOCTriggerRules. EventCode
Event Code Criterion 2	EOCTriggerRules. EventCode2
Loop Criterion	EOCTriggerRules. IsValid1stLoop

The following sections specify what it takes for each criterion type to be met.

4.2.1 Evaluation of the Event Code Criterion

The Event Code Criterion is evaluated by comparing the EOCTriggerRules.EventCode with properties of the Event. The criterion is met if:

- There is an exact match between EventData.EventMainCode and the EventCode of the rule.
- or
- There is an exact match between a Code Cluster assigned to the Event and the EventCode of the rule.
- or
- The EventCode of the rule is blank/empty/NULL (regardless of the EventMainCode in question).

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4.2.2 Evaluation of the Event Code Criterion 2

The Event Code Criterion 2 is evaluated by comparing the EOCTriggerRules.EventCode2 with properties of the Event. The criterion is met if:

- There is an exact match between at least one of the Code values of the Event.*EventCodes* of the Event in question and the EventCode2 of the rule.

or

- There is an exact match between a Code Cluster which the Code values of the Event.*EventCodes* is part of and the EventCode2 of the rule.

or

- The EventCode2 of the rule is blank/empty/NULL (regardless of the Event.*EventCodes* in question).

4.2.3 Loop Criterion

The Loop Criterion is evaluated based on

- information in the field EOCTriggerRules.IsValid1stLoop

and

- information about the current Construction Loop

The Loop Criterion is fulfilled in any of the following circumstances:

- The current rule evaluation takes place during the 2nd Construction Loop

or

- The current rule evaluation takes place during the 1st Construction Loop

AND

EOCTriggerRules.IsValid1stLoop=1

4.3 Actions when all the criteria of a rule are met

4.3.1 Main action rule: Create new EOC, assign Main Event and EOCTriggerRules.MainEventCode

When all the criteria are met, a new EOC is created.

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After creation, the new EOC contains of only one Event (the Event that has been evaluated against the EOCTriggerRules, leading to the creation of the EOC. This Event is regarded as the EOC.MainEvent.

The *EOCMainEventCode* is defined as the EventCode of the MainEvent.

4.3.2 Rule for setting EOCUnitType and EOCUnitNumber

The EOC.EOCUnitType is set upon the creation of a new EOC based on the definition data rule triggering the new EOC (EOCTriggerRules.EOCUnitType).

The supported EOCUnitTypes and the rules for assignment of EOC.EOCUnitNumber are defined in the table below.

Supported EOCUnitType	Comment	EOCUnitNumber Rules
Year	One whole calendar year	The year value extracted from the <i>EventEndTime</i> of the EOC.MainEvent (e.g. '2018', '2019', '2045')
Tertile	One of three tertiles, obtained by splitting the calendar year into groups of consecutive four-month periods	The tertile number extracted from the <i>EventEndTime</i> of the EOC.MainEvent (Valid values: 1, 2 or 3)
Month	One of twelve calendar months	The month number extracted from the <i>EventEndTime</i> of the EOC.MainEvent (Valid values: 1-12)
Open	No time limit	Fixed value: 0

For all rules above: *EventStartTime* is used if *EventEndTime* is not valid.

4.3.3 Rule for setting EOC.Year when a new EOC is created

When a new EOC is created, EOC.Year is calculated. The parameter is meant to reflect which calendar year the EOC is mostly related to, based on when the main event has ended.

EOC.Year is set as the year extracted from *EventEndTime* of the EOC.MainEvent. *EventStartTime* is used if *EventEndTime* is not valid.

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4.3.4 Rule for initial setting of *EOCStartDate* and *EOCEndDate* when a new EOC is created

When a new EOC is created, the *EOCStartDate* and *EOCEndDate* are set with initial, temporary values according to the following specifications. The date values are updated when new Events are included in the EOC.

The *EOCStartDate* is set to the *EventStartDateTime* of the Event Triggering the EOC.

The *EOCEndDate* is set to the *EventEndDateTime* of the Event Triggering the EOC. *EventStartDateTime* is used if *EventEndDateTime* is not valid.

4.3.5 Updating of *EOCAndEventCombinations*

The *EOCAndEventCombinations* table is updated with a new row as follows.

Column	Value
EOCId	The EOCId of the newly created EOC
EventId	The EventId of the Event that has triggered the EOC
IsMainEvent	1 (since this is a row for the Main Event of the EOC)
RuleType	"TriggerRule"
RuleNumber	The <i>ExecutionOrder</i> of the rule in <i>EOCTriggerRules</i> that has triggered the new EOC.

5 EOC Event Inclusion Rules

The purpose of the EOC Event Inclusion Rules is to regulate the inclusion of Events into already existing EOCs.

The following sections define how the EOCInclusionRules are applied on *combinations of Events and existing EOCs*. The same rules are used both during Loop 1 and Loop 2.

The EOCInclusionRules is a set of individual rules (one rule per row). Each rule should be understood as a set of criteria, and actions/results if the criteria are met.

5.1 Execution Order

The rules are evaluated according to the value in EOCInclusionRules.ExecutionOrder (ascending order).

For an Event to be included into an existing EOC based on a rule, it is required that all individual criteria within that rule are met. If one or more criteria are not met, the next rule is evaluated.

5.2 Criteria specifications

The following criteria are supported. All criteria within a rule must be fulfilled.

Criterion	Corresponding Definition Data Field
Current EOC Main Code Criterion	EOCInclusionRules.EventCodeTriggeringCurrentEOC
Candidate Event Code Criterion	EOCInclusionRules.CandidateEventCode
Period Criterion	[None]
Time Window Criterion	EOCInclusionRules.DaysAllowedBefore EOCInclusionRules.DaysAllowedAfter
Candidate Event Code Criterion 2	EOCInclusionRules.CandidateEventCode2

5.2.1 Evaluation of the *Current EOC Main Code Criterion*

The criterion is met in any of the following circumstances:

- There is an exact match between *EOCMainEventCode* of the EOC in question and the *EventCodeTriggeringCurrentEOC* of the rule.
- or
- There is an exact match between a Code Cluster which the *EOCMainEventCode* is part of and the *EventCodeTriggeringCurrentEOC* of the rule.
- or

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- The *EventCodeTriggeringCurrentEOC* of the rule is blank/empty/NULL (regardless of the *EOCMainEventCode* of the EOC in question).

5.2.2 Evaluation of the *Candidate Event Code Criterion*

The criterion is met in any of the following circumstances:

- There is an exact match between *Event.EventMainCode* of the Event in question and the *CandidateEventCode* of the rule.

or

- There is an exact match between a Code Cluster which the *Event.EventMainCode* is part of and the *CandidateEventCode* of the rule.

or

- The *CandidateEventCode* of the rule is blank/empty/NULL (regardless of the *EventMainCode* of the Event in question).

5.2.3 Evaluation of the *Candidate Event Code Criterion 2*

The criterion is met in any of the following circumstances:

- There is an exact match between at least one of the Code values of the *Event.EventCodes* of the Event in question and the *CandidateEventCode2* of the rule.

or

- There is an exact match between a Code Cluster which the Code values of the *Event.EventCodes* is part of and the *CandidateEventCode2* of the rule.

or

- The *CandidateEventCode2* of the rule is blank/empty/NULL (regardless of the *EventCodes* of the Event in question).

5.2.4 Evaluation of the *Period Criterion*

The evaluation of the criterion is dependent on the *EOC.EOCUnitType* of the EOC in question. The evaluation rules for the different *EOCUnitTypes* are as follows:

EOCUnitType	Period Criterion evaluation rule
Year	True if:

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	Event.EventEndTime is within EOC.Year
Tertile	True if: Event.EventEndTime is within EOC.Year and the tertile reflected by EOC.UnitNumber
Month	True if: Event.EventEndTime is within EOC.Year and the month reflected by EOC.UnitNumber
Open	Always true

For all rules above: *EventStartDateTime* is used if *EventEndTime* is not valid.

5.2.5 Time Window Criterion

The criterion allows the user to configure inclusion rules for Events so that inclusion only takes place if an Event occurs within a specified time window relative to the EOC Main Event.

The evaluation of the criterion is dependent on the time span of the Main Event of the EOC in question (*EventStartDateTime* and *EventEndTime*), as well as the *time window parameters* from the definition data:

- EOCInclusionRules.DaysAllowedBefore
- EOCInclusionRules.DaysAllowedAfter

There are four possible combinations of empty or non-empty *time window parameters*. The criterion evaluation rules are defined according to these combination types.

1. Both time window parameters are empty

→ The criterion is always evaluated as true.

2. DaysAllowedBefore is empty, DaysAllowedAfter is non-empty

→ The criterion is evaluated as true if the candidate Event begins no later than the date defined by the end date of the EOC.MainEvent plus the number of days defined by *DaysAllowedAfter*.

3. DaysAllowedAfter is empty, DaysAllowedBefore is non-empty

→ The criterion is evaluated as true if the candidate Event ends no earlier than the date defined by the start date of the EOC.MainEvent minus the number of days defined by *DaysAllowedBefore*.

4. Both time window parameters are non-empty

→ The criterion is evaluated as true if

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- the candidate Event begins no later than the date defined by the end date of the EOC.MainEvent plus the number of days defined by *DaysAllowedAfter*

AND

- the candidate Event ends no earlier than the date defined by the start date of the EOC.MainEvent minus the number of days defined by *DaysAllowedBefore*.

For all rules above: *EventStartDateTime* is used for both start and end date if *EventEndDateTime* is not valid.

5.3 Actions when all the criteria of a rule are met

5.3.1 Main action rule: Include Event in the EOC

When all the criteria are met, the Event in question is included in the EOC in question.

5.3.2 Rule for adjustment of *EOCStartDate* and *EOCEndDate*

The *EOCStartDate* is set to the earliest date among all *EventStartDateTime* and *EventEndDateTime* values within the Events of the EOC.

The *EOCEndDate* is set to the latest date among all *EventStartDateTime* and *EventEndDateTime* values within the Events of the EOC.

5.3.3 Updating of *EOCAndEventCombinations*

The *EOCAndEventCombinations* table is updated with a new row as follows.

Column	Value
EOCId	The EOCId of the EOC in which the Event has been included
EventId	The EventId of the Event that has been included in the EOC
IsMainEvent	0 (since this, by definition, is not a row for the Main Event of the EOC)
RuleType	"InclusionRule"
RuleNumber	The <i>ExecutionOrder</i> of the rule in <i>EOCInclusionRules</i> that has led to the inclusion of the Event into the EOC

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6 Construction Loop 1 Rules

6.1 Event selection and evaluation order in Construction Loop 1

All Events within the Case are included in the process.

The Events are evaluated one by one, according to `EOCEventData.EventEvaluationRank` in ascending order.

6.2 Step 1 – Check for existing EOCs and evaluate the Event against the EOC Inclusion Rules

If there are no preexisting EOCs, further actions within Step 1 is skipped, and the Event evaluation goes on to Step 2.

If there are one or more preexisting EOCs, the Events are checked for inclusion in one of those EOCs according to EOC Event Inclusion Rules.

The EOCs are checked in the same order they have been created.

6.3 Step 2 – Create new EOCs

Remaining Events after Step 1 are candidates for triggering new EOCs. Each Event are checked against the EOC Trigger Rules.

Events still not being part of an EOC after Step 2, are passed on to Construction Loop 2.

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7 Construction Loop 2 Rules

7.1 Event selection and execution order in Construction Loop 2

All Events within the Case not already assigned to an EOC during Construction Loop1 are included in the process.

The Events are evaluated one by one, according to `EOCEventData.EventEvaluationRank` in ascending order.

7.2 Step 1 – Check for existing EOCs and evaluate the Event against the EOC Inclusion Rules

If there are no preexisting EOCs, further actions within Step 1 is skipped, and the Event evaluation goes on to Step 2.

If there are one or more preexisting EOCs, the Events are checked for inclusion in one of those EOCs according to EOC Event Inclusion Rules.

The EOCs are checked in the same order they have been created.

7.3 Step 2 – Create new EOCs

Remaining Events after Step 1 are candidates for triggering new EOCs. Each Event are checked against the EOC Trigger Rules. (The major change from Loop 1 is that all rules are valid for triggering of new EOCs)

7.4 Step 3 – Check for existing EOCs and evaluate the Event against the EOC Inclusion Rules

If there are one or more preexisting EOCs (created in Loop 1 or 2), the remaining Events are checked for inclusion in one of those EOCs according to EOC Event Inclusion Rules.

The EOCs are checked in the same order they have been created.

Events still not being part of an EOC after Step 3, are handled according to *Exception Handling* rules during *Finishing Actions*.

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8 Finishing actions

Finishing actions take place after Construction Loop 2.

8.1 Exception Handling for Remaining Events

Events which after Construction Loop 2 still are not part of an EOC, trigger new EOCs with one EOC per year (based on the Event.EventEndTime).

The **EOCResult** for such EOCs is set according to the following:

Column	Value
EOCId	Next available integer value
EOCMainEventCode	<i>EventMainCode</i> of the Event with the lowest EventEvaluationRank.
EOCStartDate	Based on the earliest <i>EventStartDateTime</i> of the Events in question
EOCEndDate	Based on the latest <i>EventEndTime</i> of the Events in question (<i>EventStartDateTime</i> if <i>EventEndTime</i> is not valid)
EOCUnitType	Fixed value: "Year"
Year	The Year value corresponding to the <i>EOCEndDate</i> of the EOC
EOCUnitNumber	Corresponding to the EOC.Year
EventIds	List consisting only of the <i>EventId</i> of the Events in question

The **EOCAndEventCombinations** for such EOCs is set according to the following:

Column	Value
EOCId	Next available integer value
EventId	The <i>EventId</i> of the Event in question
IsMainEvent	1 for the Event with the lowest EventEvaluationRank; 0 for all other Events within the EOC
RuleType	Fixed value: "Other"
RuleNumber	Fixed value: 0