How to use the VCA Task Script Language
Including examples for several use cases
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1 What is the VCA task script language?

VCA stands for video content analysis. The VCA task script language
- describes every predefined and configured Intelligent Video Analytics, Essential Video Analytics and MOTION+ task and task wizard
- can combine tasks to form more complex ones
- can NOT configure the metadata generation

1.1 When to use the VCA task scripts?

The VCA task scripts are used implicitly whenever an Intelligent Video Analytics, Essential Video Analytics or MOTION+ task is configured via the GUI. However, manual configuration of the VCA task scripts is also possible and advised whenever the predefined tasks are not enough:
- For backup and exchange of the configured tasks, the script can be copied from and pasted into the task script editor.
- When more than 8 alarm tasks are needed: 16 external alarm tasks are configurable via VCA task scripts.
- Fine tuning the position of lines and fields.
- Line combinations for counting with FW < 6.30.
- Don’t touch (museum mode) with FW < 6.10: Alarm needs to be triggered by any part of bounding box, not only by the object center.
- Logical combinations of predefined events are needed.

1.2 How to use VCA task scripts?

(1) Define all tasks via task wizards as far as possible.
(2) Change to the VCA task script editor. The already defined tasks can be found there with all details.
(3) Make your modifications.
(4) Change the defined tasks into task type scripted so accidental use of the task wizards will not overwrite your changes.

1.3 How to access the VCA task script language?

Go to the Intelligent Video Analytics, Essential Video Analytics or MOTION+ configuration and open the task page. Right-click on the video and select Advanced -> VCA Task Editor. A separate popup with the current VCA task script will appear:
1.4 Task & object filter overview

A task consists of
- A task primitive
- An object state or interaction with a task primitive
- A filter on the object properties if task is based on objects

Note that not all tasks and filters are available in every FW version.

**MOTION+:**

<table>
<thead>
<tr>
<th>Task Primitives</th>
<th>Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Motion in Field</td>
</tr>
<tr>
<td>Image</td>
<td></td>
</tr>
</tbody>
</table>

Intelligent Video Analytics & Essential Video Analytics (the latter w/o flow tasks):

<table>
<thead>
<tr>
<th>Task Primitives</th>
<th>Tasks</th>
<th>Flow Tasks</th>
<th>Object Filter</th>
</tr>
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<tr>
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<td>Detect any object</td>
<td>Flow in field</td>
<td>Object area</td>
</tr>
<tr>
<td>Field</td>
<td>Crossing line</td>
<td>Counterflow in field</td>
<td>Aspect ratio</td>
</tr>
<tr>
<td>Route</td>
<td>Object in field</td>
<td>Crowd detection</td>
<td>Speed</td>
</tr>
<tr>
<td>Image</td>
<td>Entering field</td>
<td>Tampering</td>
<td>Direction</td>
</tr>
<tr>
<td></td>
<td>Leaving field</td>
<td></td>
<td>Color</td>
</tr>
<tr>
<td></td>
<td>Following route</td>
<td></td>
<td>Head</td>
</tr>
<tr>
<td></td>
<td>Loitering</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Removed object</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Idle object</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Condition change</td>
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</tr>
<tr>
<td></td>
<td>Similarity search</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Counter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BEV people counter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occupancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crowd detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tampering</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1.5 Object state and event overview

From the task primitives, the tasks and the object filter as defined in the GUI via the task wizards, target object states and events are derived. These can also be defined directly in the VCA task script language.

Events are always temporal relations
- Up to 8 external events can be shown in GUI
- Up to 16 external events can be defined in total
- Up to 32 events can be defined in total

States can be, amongst others, spatial relations, object properties, tamper states, counter values
- Up to 16 external states can be defined
- Up to 32 states in total can be defined

Events and states can be internal or external. Only external events and states are outputted.

Simple states are used whenever a property has no corresponding objects. Examples are Motion+, Flow, counter values and tamper states.
### 1.6 Combining & converting object states and events

The combinations of object states and events listed below are possible. Object states can be also converted into events, but only the onset or leaving of an object state is an actual event, not the actual duration of the object in this state.

<table>
<thead>
<tr>
<th>Object Properties</th>
<th>Object States</th>
<th>Object events</th>
<th>TamperStates</th>
<th>Other SimpleStates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>InsideField</td>
<td>CrossedLine</td>
<td>SignalTooNoisy</td>
<td>DetectedMotion</td>
</tr>
<tr>
<td>Velocity</td>
<td>ObjectsInField</td>
<td>EnteredField</td>
<td>SignalTooDark</td>
<td>DetectedFlow</td>
</tr>
<tr>
<td>AspectRatio</td>
<td>IsLoitering</td>
<td>LeftField</td>
<td>SignalTooBright</td>
<td>EstimatedCrowdDensity</td>
</tr>
<tr>
<td>ObjecSize</td>
<td>SimilarToColor</td>
<td>FollowedRoute</td>
<td>SignalLoss</td>
<td>Counter</td>
</tr>
<tr>
<td>FaceWidth</td>
<td>HasDirection</td>
<td>Appeared</td>
<td>GlobalChange</td>
<td>ObjectsOnScreen</td>
</tr>
<tr>
<td>MaxFaceWidth</td>
<td>HasVelocity</td>
<td>Disappeared</td>
<td>ReftImageCheckFailed</td>
<td>ObjectsInField</td>
</tr>
<tr>
<td></td>
<td>HasAspectRatio</td>
<td>Idle</td>
<td></td>
<td>ObjectsInState</td>
</tr>
<tr>
<td></td>
<td>HasObjectSize</td>
<td>Removed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HasColor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HasFace</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>HadFace</td>
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<td></td>
<td>HasClass</td>
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</tr>
<tr>
<td></td>
<td>HadClass</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Event combination via temporal relations:
- before
- before (<from>,<to>)
- not before

#### Logical combination of states / conditions:
- and
- or

#### Event conditions:
- where

#### State changes as events:
- OnChange
- OnSet
- OnClear

### 1.7 Temporary states for time evaluations

Starting with FW 6.60 and in order to create temporary states triggered by an event, the keyword within can used after an event. This can be used to:
- delay or debounce an alarm based on an object state: `<event> within(0,<time>)`
- to extend an alarm state similarly to the aggregation time: `<event> within(<time>,*)`
- debouncing object properties: By checking the target values is currently met, and has not changed during the debounce time
- temporarily combine an event with other states

### 1.8 Position descriptions

There are two different ways to describe the position information of lines, fields and routes:
- Absolute pixel position, e.g. *Point(103, 30)*. You need to know exactly which resolution is used in the video analytics for that.
- Relative coordinates, e.g. specifying
  ```plaintext
  Resolution := { Min(-1, -1) Max(1, 1) };
  Line #1 := ( Point(-.85, .05) Point(-.6, .4));
  ```
  Here, the coordinates are defined within the specified resolution and transferred automatically to the real resolution used in the video analytics.
2 Examples & Explanations

2.1 Understanding the VCA task script language: Line Crossing, GUI

```plaintext
//Definition of task primitives
Line #1 := { Point(103, 30) Point(159, 77) }
       DebounceTime(0.50) Direction(1) ;

//Definition of alarm task shown in GUI
//@Task T:2 V:0 I:1 "Crossing line 1" {
   //[1.a=s1;1.b=1;1.c=32;1.d=31;4.a=i;1;]
   external Event #1 :={CrossedLine#1};
//@}

//Definition of self-defined task shown in GUI
//@Task T:0 V:0 I:2 "Crossing line 2" {
   external Event #2 :={CrossedLine#2};
//@}

//Definition of alarm task not shown in GUI
external Event #3 :={CrossedLine#2};
```

- **Line**: 2 end points
- **Direction of Line**:
  - any
  - forward
  - backward

- **DebounceTime** of Line/Field is optional

- **CrossedLine #x** is an event that triggers when an object crosses **Line #x** in the specified way

**external** is keyword for alarms / statistics

**Task wizard definition**:
//@Task T:x V:y I:z
T:x describes the task number (Object in Field, Line Crossing,... see icon for correct task!)
T:0 describes a self-defined task. Use this for your own scripts to avoid the task wizards overwriting it
V:0 is the version number, currently always 0
I:z is the slot in the tasks page
i:1 describes the occupied slot in the GUI task list. For the slot to change to red in case of alarms, the external event / state defined in the task needs to have the same number as the task
[1.a=s1;1;...] describes the task wizard values

2.2 Understanding the VCA task script language: Polygonal lines

```plaintext
//Definition of task primitives
Resolution := { Min(-1,-1) Max(1,1) };
Line #1 := { Point(-0.85, 0.95) Point(0.6, 0.4)
          Point(0.6, 0.4) Point(0.85, 0.95)
          DebounceTime(0.50) Direction(2)
          TriggerPoint(FootPoint) };

//Definition of alarm task shown in GUI
//@Task T:2 V:0 I:1 "Crossing line 1" {
   //[1.a=s1;1.b=1;1.c=32;1.d=31;4.a=i;1;]
   external Event #1 :={CrossedLine#1};
//@}
```

- **Polygonal Line**: 2-16 vertices

**Available from FW 6.30 onwards**

**Relative description of line points via Resolution**

**TriggerPoint of Line**:
- center point
- FootPoint //FootPoint from FW 6.30 onwards
2.3 Understanding the VCA task script language: Line crossing with object filters

```vbnet
//Definition of task primitives
Line #1 := { (Point(103, 30) Point(159, 77));

//@Task T:2 V:0 l:1 "Crossing line 1" {
//@}
//@)

//Example for modeling via object state:
ObjectState#1 := Velocity within (30.0, *);

ColorHistogram uses HSV color space with hue (0-360), saturation (0-100), intensity (0-100). In addition, a weight can be specified in the HSV. Similarity (0-100) specifies how similar a color histogram must be in order to be regarded as a match, with higher numbers for closer colors. Outliers (1-100) specifies how much of the object needs to have the target colors, and how much is ignored as outlier, with higher numbers allowing more differences.

//@Task T:2 V:0 l:1 "Crossing line 1" {
//@}
//@)

2.4 Understanding the VCA task script language: Fields

```vbnet
//Definition of task primitives
Field #1 := { Point(56, 24) Point(106, 24)
Point(106, 74));
Field #2 := { Point(56, 24) Point(106, 24)
Point(106, 74) Point(56, 74)
DebounceTime(0.50)
ObjectSet(BoundingBox)
SetRelation(Covering));

//@Task T:1 V:0 l:1 "Object in field 1" {
//@}
//@)

2.5 Understanding the VCA task script language: Routes

```vbnet
//Definition of task primitives
Route #1 := { Point(34, 111) Distance(5)
Point(92, 125) Distance(5)
Point(140, 104) Distance(5)
Point(143, 72) Distance(5)
MinPercentage(80) MaxGap(10) );

//@Task T:6 V:0 l:1 "Follow route 1" {
//@)
```
2.6 Example: Alarm if object enters a field and afterwards crosses the line

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.6, 0.95) Point(-0.25, -0.95)
             Point(0.25, -0.95) Point(0.6, 0.95)
             DebounceTime(0.50) };
Line #1 := { Point(0.0, -0.95) Point(0.0, 0.95)
             DebounceTime(0.50) };
//@Task T:0 V:0 I:1 "Enter Field and Line"
  external Event #1:={ EnteredField #1
                        before (*,30) CrossedLine #1
                        where first.oid == second.oid };
//@

2.7 Example: Alarm if object enters first one field and then the other

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.6, 0.95) Point(-0.25, -0.95)
             Point(-0.1, -0.95) Point(0.1, 0.95)
             DebounceTime(0.50) };
Field #2 := { Point(0.6, 0.95) Point(0.25, -0.95)
             Point(0.1, -0.95) Point(0.1, 0.95)
             DebounceTime(0.50) };
//@Task T:0 V:0 I:1 "Enter Field and Line"
  external Event #1:={ EnteredField #1
                        before (*,30) EnteredField#2
                        where first.oid == second.oid };
//@

2.8 Example: Perimeter protection with two fields

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(0.406, -0.644) Point(0.250, -0.656)
             Point(-0.213, 1.000) Point(0.400, 1.000)
             DebounceTime(0.10) };
Field #2 := { Point(0.181, -0.667) Point(-0.388, 1.000)
             Point(-0.588, 1.000) Point(0.088, -0.678)
             DebounceTime(0.10) };
//@Task T:0 V:0 I:1 "Field combination"
  ObjectState #16 := InsideField #1 and ObjectSize within(0.7,10) ;
  ObjectState #17 := InsideField #2 and ObjectSize within(0.7,10) ;
  external Event #1:={ OnSet ObjectState #16
                       before OnSet ObjectState #17
                       where first.oid==second.oid};
//@

Application: Reduction of false alarms, especially for insects attracted by infrared illumination
before(*,30) means the object needs to cross the line 0-30 seconds after entering the field. As the object needs to enter the field in order to cross the line, the other temporal direction is not checked.
The same object has to trigger both events. Thus using where first.oid==second.oid

Restricting object size to further filter false alarms
The same object has to trigger both events. Thus using where first.oid==second.oid
2.9 Example: Combining lines for counting

//Definition of task primitives
Line #1 := { Point(0, 90) Point(60, 90) DebounceTime(0.10) Direction(1) };
Line #2 := { Point(60, 90) Point(90, 60) DebounceTime(0.10) Direction(1) };
Line #3 := { Point(90, 60) Point(90, 0) DebounceTime(0.10) Direction(1) };

//@Task T:0 V:0 I:1 "Counter 1" {
Event#32 := CrossedLine#1 or CrossedLine#2 or CrossedLine#3;
external Counter#1 := { Event#32 Text("Corner Count1:" TopLeft(4,4) Mode(Wraparound) within(0.999999999) };
//@}

2.10 Example: Crossing line 1 with 60km/h and line 2 with 20km/h

//Definition of task primitives
Line #1 := { Point(50,0) Point(50,144) };
Line #2 := { Point(120,0) Point(120,144) };

//Definition of line crossing events
Event#11 := (CrossedLine#1 where Velocity within(13.89,19.44) ) ;
Event#12 := (CrossedLine#2 where Velocity within(2.778,5.556) ) ;

//@Task T:0 V:0 I:1 "Two Line Speed Check" {
external Event#1 := (Event#11 before Event#12 where first.oid==second.oid);
//@}

2.11 Example: Stopping in area after crossing line

//Definition of task primitives
Line #1 := { Point(130, 0) Point(130, 144) };
Field #2 := { Point(50, 0) Point(115, 0) Point(115, 144) Point(50, 144) };

//@Task T:0 V:0 I:1 "Loitering after Line Crossing" {
Event#11 := {CrossedLine#1};
Loitering #13 := { Radius (15) Time (10) };
ObjectState #14 := InsideField #2 and IsLoitering #13;
external Event #1 := { Event #11 before OnSet ObjectState #14 where first.oid==second.oid };
//@}
2.12 Example: Alarm When Object Touches Area

//Definition of task primitives
Field #1 := { Point(100, 0) Point(175, 0) 
             Point(175, 144) Point(100, 144) 
             ObjectSet(BoundingBox));

//@Task T:0 V:0 I:1 "Object Touches Field" {
ObjectState #1 := InsideField #1;
external Event #1 := OnSet ObjectState #1;
//@}

//Alternative, objects have to come from the outside of the field:
//@Task T:0 V:0 I:2 "Object Touches Field" {
event Event #2 := EnteredField #1;
//@}

2.13 Example: Alarm when object enters an area at least 4 times

//Definition of task primitives
Resolution := { Min(-1,-1) Max(1, 1) };
Field #1 := { Point(-0.244,-0.922) Point(0.325,-0.944) 
             Point(0.350,0.944) Point(-0.231,0.944) 
             DebounceTime(0.50) };

//@Task T:0 V:0 I:1 "Thieve detection" {
Event #11 := { EnteredField #1 before EnteredField #1 
               where first.oid==second.oid};
Event #12 := { Event #11 before EnteredField #1 
               where first.oid==second.oid};
event Event #1 := { Event #12 before EnteredField #1; 
                   where first.oid==second.oid};
//@}

2.14 Example: Alarm when a second object crosses a line within 3 seconds of the first

//Definition of task primitives
Resolution := { Min(-1,-1) Max(1, 1) };
Line #1 := { Point(-0.187,-0.967) Point(-0.156,0.911) 
            DebounceTime(0.50) Direction(2) TriggerPoint(FootPoint) };
//@Task T:0 V:0 I:1 "Tailgating" {
Event #21:= {CrossedLine#1};
Event #22:= {CrossedLine#1};
event Event #1 := { Event #21 before(0,3) Event #22 
                   where first.oid!=second.oid};
//@}
2.15 Example: Alarm when at least 2 object are in an area

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.656, -0.700) Point(0.350, -0.767)
            Point(0.469, 0.644) Point(-0.694, 0.644)
            DebounceTime(0.10) };
//@Task T:0 V:0 I:1 "Alarm on more than two objects" {
    external ObjectState #1 := ObjectsInField#1 within (2,*)
//@}

2.16 Example: Count the number of objects in an area

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.656, -0.700) Point(0.350, -0.767)
            Point(0.469, 0.644) Point(-0.694, 0.644)
            DebounceTime(0.10) };
//@Task T:0 V:0 I:1 "Count objects in field " {
    external Counter #1 := { ObjectsInField#1 Text("Counter:")
            TopLeft(-0.975, -0.844) }
//@}
//@Task T:18 V:0 I:2 "Count of objects in field " {
    //[1.a=1;1.b=1;1.c=32;2.a=(,b3:1);]
    ObjectState #32 := InsideField #1;
    external Counter #2 := { ObjectsInState#32 Text("Occupancy:")
            TopLeft(-0.975, -0.744) }
//@}

2.17 Example: Alarm on empty reception desk

//Definition of task primitives
Resolution := { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.150, -0.700) Point(0.250, -0.700)
            Point(0.250, 0.600) Point(-0.150, 0.600)
            DebounceTime(0.10) };
Field #2 := { Point(-0.600, -0.700) Point(-0.200, -0.700)
            Point(-0.200, 0.600) Point(-0.600, 0.600)
            DebounceTime(0.10) };
//@Task T:0 V:0 I:1 "Unmanned reception" {
    external SimpleState #1 := ObjectsInField#1 within (1,*)
        and ObjectsInField#2 within (0,);
//@}
2.18 Example: Alarm if one queue is empty and the other has at least 3 persons

//Definition of task primitives
Resolution:= \{ \text{Min}(-1,-1) \text{Max}(1,1) \};
Field #1:= \{ \text{Point}(-0.150,-0.700) \text{Point}(0.250,-0.700) \text{Point}(0.250,0.600) \text{Point}(-0.150,0.600) \text{DebounceTime}(0.10) \};
Field #2:= \{ \text{Point}(-0.600,-0.700) \text{Point}(-0.200,-0.700) \text{Point}(-0.200,0.600) \text{Point}(0.600,0.600) \text{DebounceTime}(0.10) \};
//@Task T:0 V:0 l:1 "Only one queue"{
ObjectState #1:= ObjectsInField#1 within (3,*); external Event #1:= \{ OnSet ObjectState #1 where ObjectsInField#2 within (0,0) \};
//@}

// To see the results of the no object check, use the following:
//@Task T:0 V:0 l:2 "No object"{
e external SimpleState #2:= ObjectsInField#2 within (0,0);
//@}

2.19 Example: Virtual room for counting with one in and one out line

//@Task T:0 V:0 l:1 "Virtual Room"{
Event#31=\{\text{CrossedLine#1} \}; Event#30=\{\text{CrossedLine#2} \};
external Counter#1 := \{ \text{Event#31} \text{Text} ("Linie 1") \text{TopLeft}(4,4) \};
external Counter#2 := \{ \text{Event#30} \text{Text} ("Linie 2") \text{TopLeft}(4,14) \};
external Counter#4 := \{ \text{Counter#1} + \text{Counter#2} \text{Text} ("Virtual Room") \text{TopLeft}(4,34) \};
//@

2.20 Example: Virtual room for counting with two in and one out line

//@Task T:0 V:0 l:1 "Virtual Room"{
Event#31=\{\text{CrossedLine#1} \}; Event#30=\{\text{CrossedLine#2} \};
Event#29=\{\text{CrossedLine#3} \};
external Counter#1 := \{ \text{Event#31} \text{Text} ("Linie 1") \text{TopLeft}(4,4) \};
external Counter#2 := \{ \text{Event#30} \text{Text} ("Linie 2") \text{TopLeft}(4,14) \};
external Counter#3 := \{ \text{Event#29} \text{Text} ("Linie 3") \text{TopLeft}(4,24) \};
Counter#32 := \{ \text{Counter#1} + \text{Counter#2} \};
external Counter#4 := \{ \text{Counter#32} - \text{Counter#3} \text{Text} ("Virtual Room") \text{TopLeft}(-0.9,-0.9) \};
//@

By using an event for the alarm, it will only be active shortly at the onset of that situation. For an example with an ongoing alarm see 2.17.

ObjectsInField#2 within (0,0) is a simple state as it refers to an amount of objects, not to an object itself.

Counters can be added and subtracted.

Counters can be added and subtracted.
2.21 Example: Alarm on any object that is not yellow

```plaintext
//@ Task T:0 V:0 l:1 "No yellow object" {
  ColorHistogram #1 := { HSV(60,100,100,20) HSV(60,100,60,20)
    HSV(60,100,30,20)
   Similarity(75) Outlier(55) }
  external ObjectState #1 := not SimilarToColor #1;
  external Event #1 := OnSet ObjectState #1;
//@}
```

**ColorHistogram** uses HSV color space with hue (0-360), saturation (0-100), intensity (0-100). In addition, a weight can be specified in the HSV. **Similarity** (0-100) specifies how similar a color histogram must be in order to be regarded as a match, with higher numbers for closer colors. **Outliers** (1-100) specifies how much of the object needs to have the target colors, and how much is ignored as outlier, with higher numbers allowing more differences.

**SimilarToColor** \(x\) compares the color histogram of the object to the specified **ColorHistogram** \(x\).

2.22 Example: Count all red objects

```plaintext
//@ Definition of task primitives
Resolution:= { Min(-1, -1) Max(1, 1) };
Line #1 := ( Point(-0.1, -0.8) Point(-0.1, 0.8) DebounceTime(0.10) Direction(1) );
//@ Task T:0 V:0 l:1 "Count red objects" {
  ColorHistogram #1 := { HSV(0,100,100,20) HSV(0,100,60,20) HSV(0,100,30,20)
    Similarity(75) Outlier(55) }
  Event#31 :=(CrossedLine#1 where SimilarToColor #1);
  external Counter #1 := { Event#31 Text("Linie 1") TopLeft (-0.9,-0.9) };
//@}
```

**Color description see 2.21**

2.23 Example: Debouncing object size by 5 seconds

```plaintext
//@ Definition of task primitives
Resolution:= { Min(-1, -1) Max(1, 1) };
Field #1 := { Point(-0.7,-0.7) Point(0.7,-0.7) Point(0.7, 0.7) Point(-0.7, 0.7)
  DebounceTime(5.00) ObjectSet(FootPoint) };
//@ Task T:0 V:0 l:1 "Debounce Size" {
  ObjectState#21 := ObjectSize within(5,500);
  ObjectState#22 := OnChange ObjectState#21 within (0,5);
  external ObjectState#1 := InsideField#1 and ObjectState#21 and !ObjectState#22;
//@}
```

**OnChange ... within**: Checking whether **ObjectState** #21 changed within the last 5 seconds. Available in this combination from FW 6.60 onwards.

2.24 Example: Give 30 sec alarm on any object (aggregation time)

```plaintext
Resolution:= { Min(-1, -1) Max(1, 1) };
//@ Task T:0 V:0 l:1 "30 sec alarm" {
  external SimpleState #1 := Appeared within(0,30);
//@}
```

Available from FW 6.60 onwards.