



One polygon at a time trying to manage a graffiti-scape's spatio- tem ⌚ po ⌚ ra ⌚ li ⌚ ty

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Jona Schlegel

projectindigo.eu

*The INDIGO graffiti project is funded by the Heritage Science Austria
programme of the Austrian Academy of Sciences (ÖAW)*





UNIVERSE **4-dimensional**



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe

“event” = location + time



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe

“event” = location + time
3D 1D
(x, y, z) t

~~dimensional order~~
more dimensions



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe

"event" =

location	+	time
3D		1D
(x, y, z)		t

GIS
2D/2.5D



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe

"event" =

location
3D
(x, y, z)

 + time

1D
t

GIS
2D / 2.5D
3D



UNIVERSE

4-dimensional

NEWTONIAN PHYSICS



4D universe

$$\text{"event"} = \begin{array}{|c|} \hline \text{location} \\ \hline 3\text{D} \\ (x, y, z) \\ \hline \end{array} + \begin{array}{|c|} \hline \text{time} \\ \hline 1\text{D} \\ t \\ \hline \end{array}$$

GIS
2D/2.5D

3D

time



UNIVERSE

spatio-temporal

NEWTONIAN PHYSICS



4D universe

"event" =

location 3D (x, y, z)

 +

time 1D t

GIS
2D/2.5D

INDIGO / UrbanChameleon

3D	time
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MOMENTS of creation

16 June 2023 @ 10:25 CET

MOMENTS of creation



16 June 2023 @ 10:25 CET

MOMENTS of creation



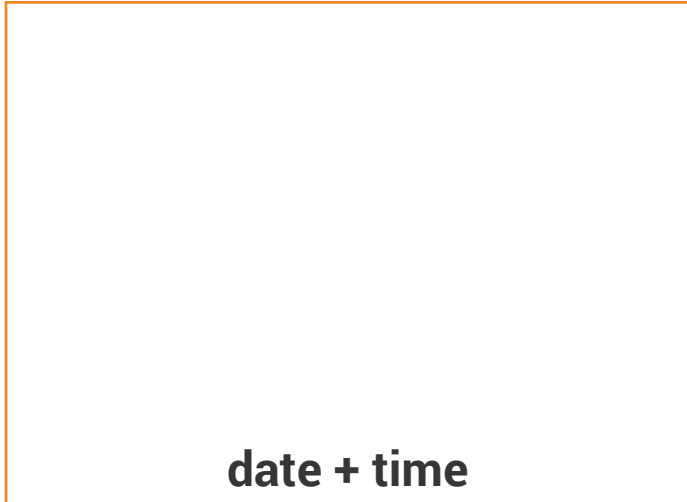
16 June 2023 @ 10:25 CET



© Sophie Hay



MOMENTS of creation



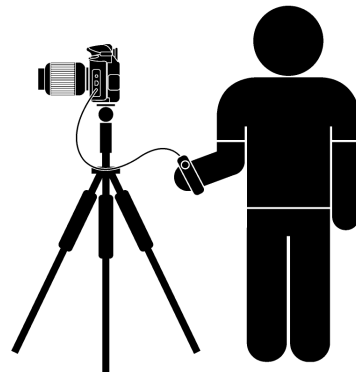
date + time



© Sophie Hay



16 June 2023 @ 10:25 CET



date + time

MOMENTS of creation

creation event
date + time



© Sophie Hay



16 June 2023 @ 10:25 CET



date + time
creation event

MOMENTS of creation

photo | graffiti
creation event
date + time



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16 June 2023 @ 10:25 CET



date + time
creation event
photo | graffiti

MOMENTS of creation

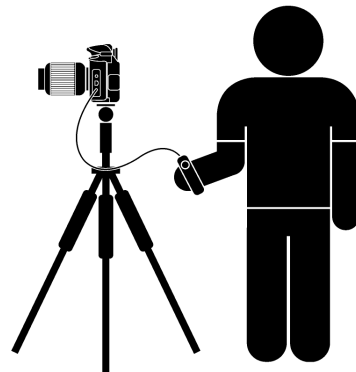
photo | graffiti
creation event
date + time



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16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti

MOMENTS of creation

photo | graffiti
creation event
date + time



between AD 41 & AD 79



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti

MOMENTS of creation

photo | graffiti
creation event
date + time

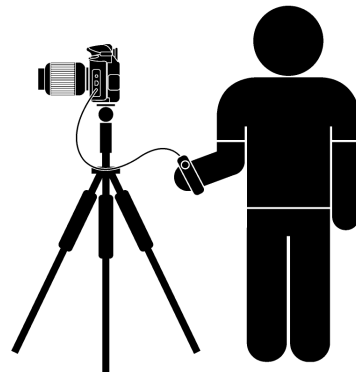


between AD 41 & AD 79



12 days ± 2 days

16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti

MOMENTS of creation

photo | graffiti
creation event
date + time



between AD 41 & AD 79

1963 years ± 19 years



12 days ± 2 days

16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti

MOMENTS of creation

related to temporal fuzziness
photo | *graffito*
creation event
date + time



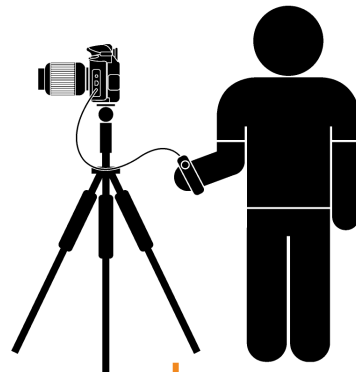
between AD 41 & AD 79

1963 years \pm 19 years



12 days \pm 2 days

16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | *graffito*
related to temporal fuzziness

MOMENTS of creation

*extended
temporal uncertainty*

related to temporal fuzziness

photo | graffiti

creation event

date + time



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between AD 41 & AD 79

1963 years ± 19 years

12 days ± 2 days



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time

creation event

photo | graffiti

related to temporal fuzziness

temporal uncertainty

narrow

MOMENTS of creation

graffito creation
extended
temporal uncertainty

~~*related to temporal fuzziness*~~
photo | graffiti
creation event
date + time



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between AD 41 & AD 79

1963 years ± 19 years

12 days ± 2 days



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti
~~*related to temporal fuzziness*~~

temporal uncertainty
narrow
graffito creation

MOMENTS of creation

visibility (interrupted)
graffito creation
extended
temporal uncertainty

~~*related to temporal fuzziness*~~
photo | graffiti
creation event
date + time



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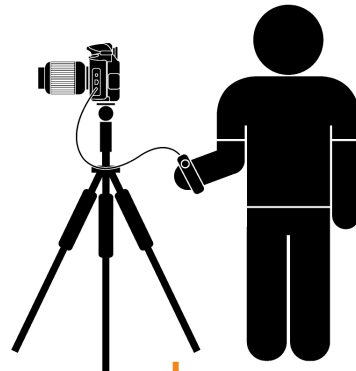
between AD 41 & AD 79

1963 years ± 19 years

12 days ± 2 days



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti
~~*related to temporal fuzziness*~~

temporal uncertainty
narrow
graffito creation
visibility

INDIGO METADATA

real graffiti
vs
digital derivatives

MOMENTS of creation

visibility (interrupted)
graffito creation
extended
temporal uncertainty

~~related to temporal fuzziness~~
photo | graffiti
creation event
date + time



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between AD 41 & AD 79

1963 years ± 19 years

12 days ± 2 days



16 June 2023 @ 10:25 CET



between 02 & 06 June 2023



date + time
creation event
photo | graffiti
~~related to temporal fuzziness~~

temporal uncertainty
narrow
graffito creation
visibility

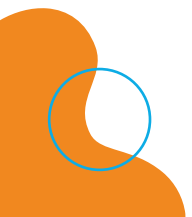
GRAFFITO observations

1
visibility
certainty

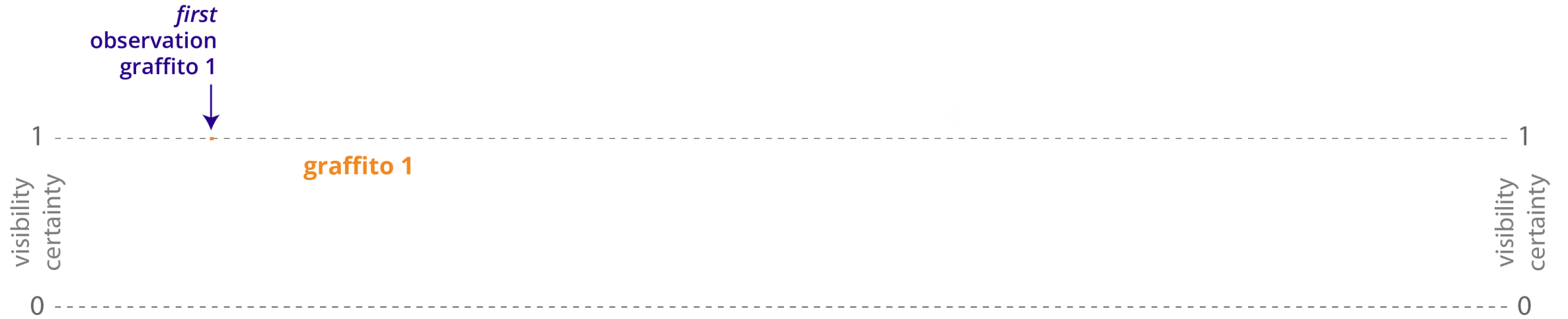
0

1
visibility
certainty

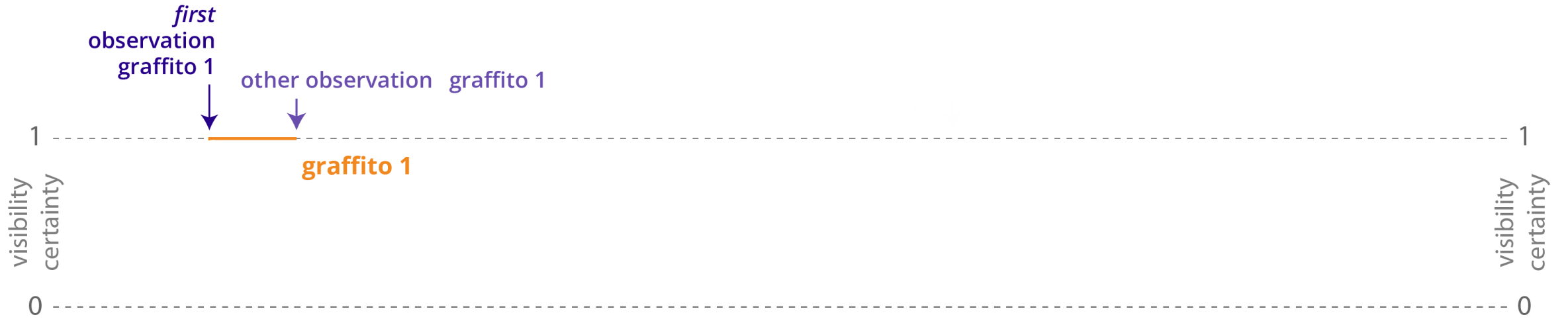
0



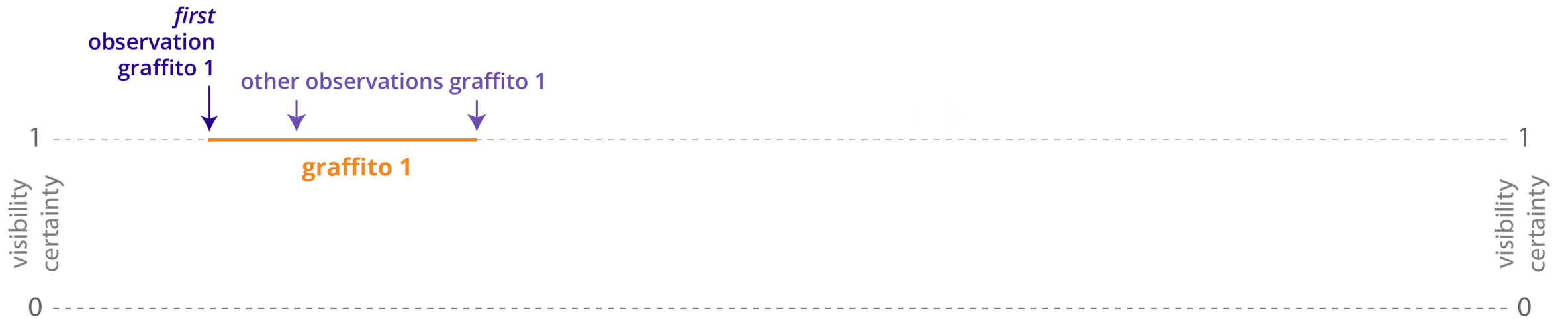
GRAFFITO observations



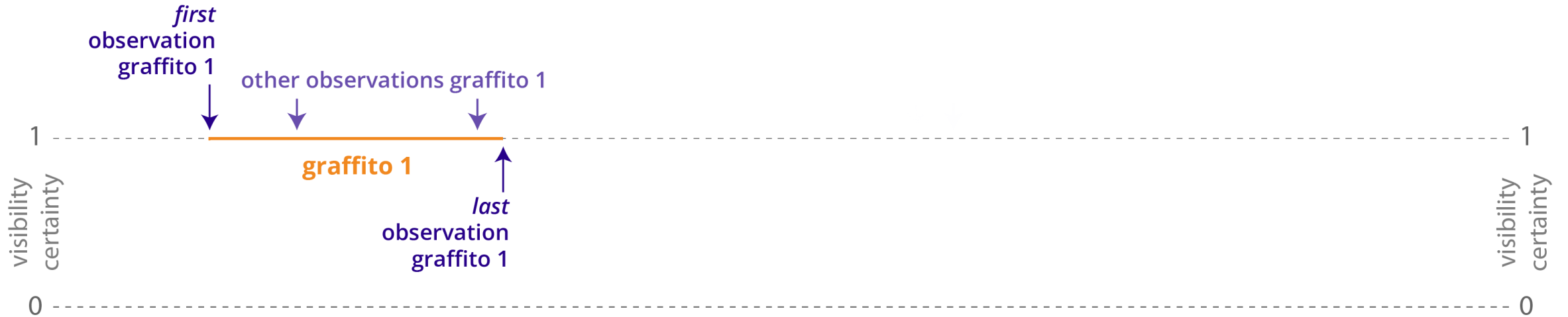
GRAFFITO observations



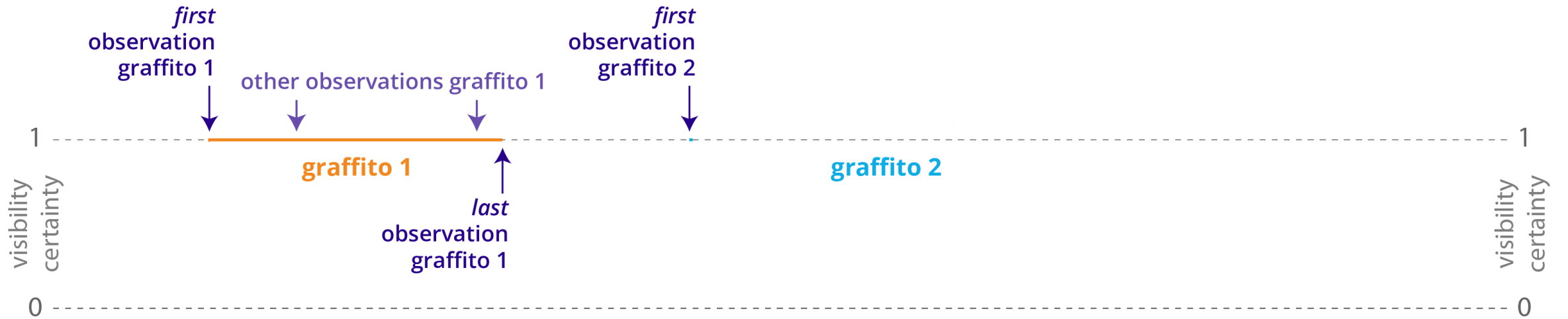
GRAFFITO observations



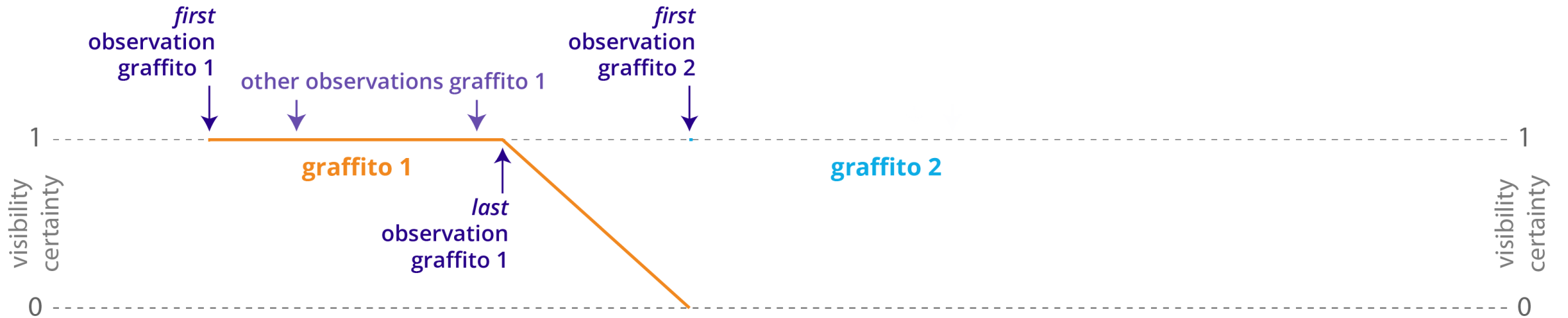
GRAFFITO observations



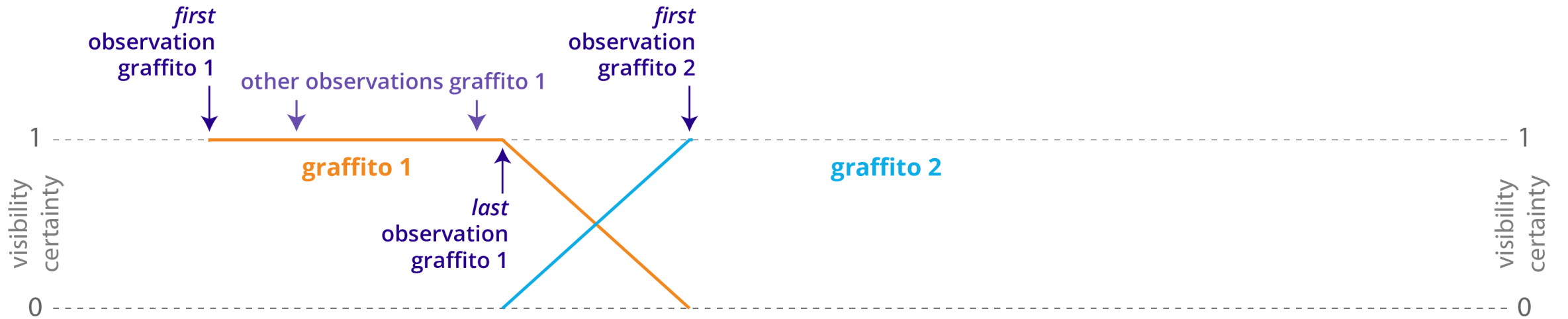
GRAFFITO observations



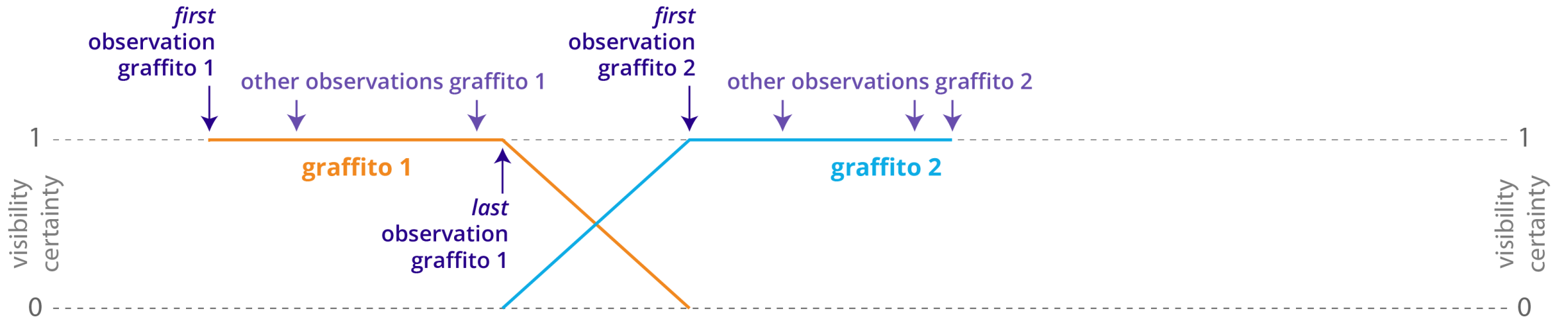
GRAFFITO observations



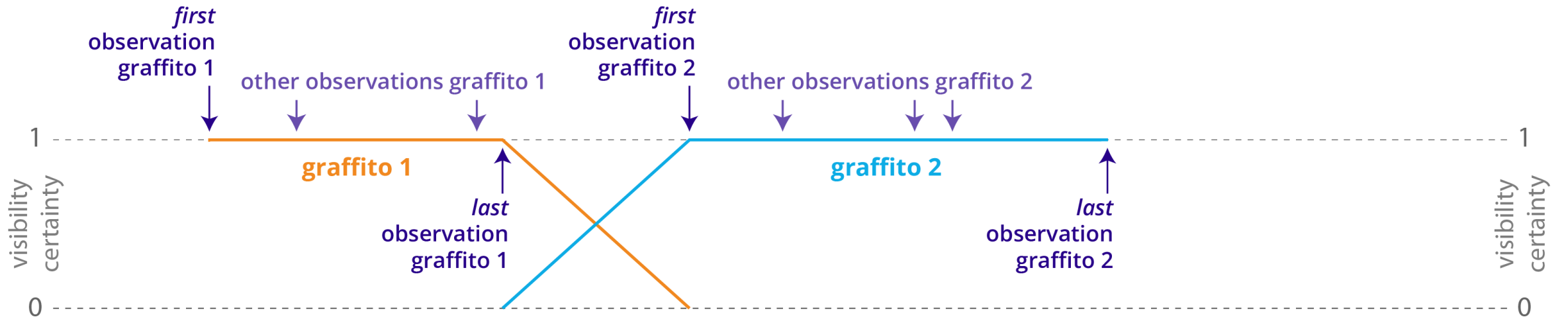
GRAFFITO observations



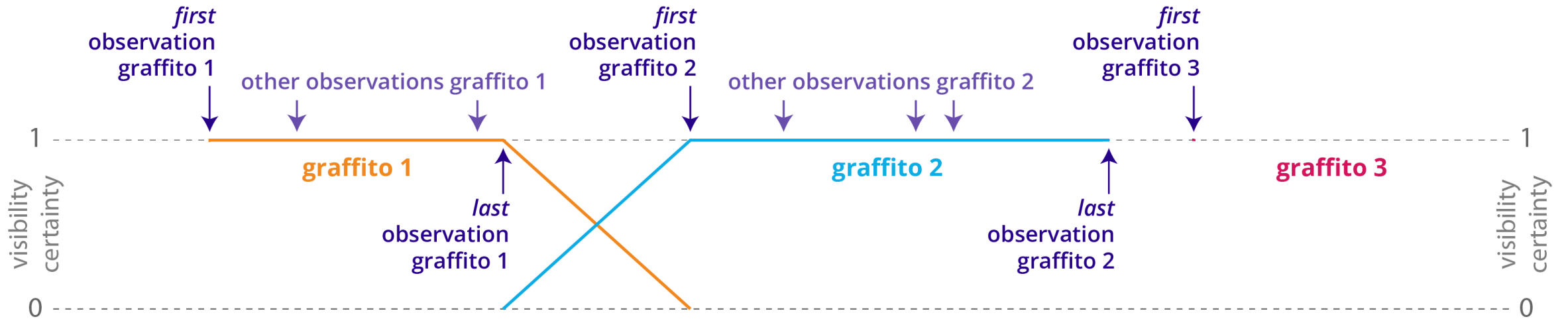
GRAFFITO observations



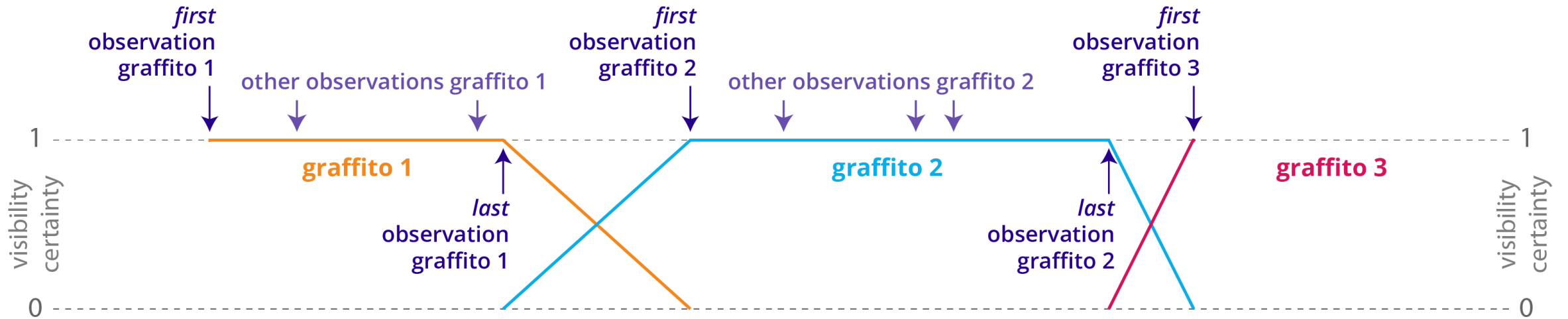
GRAFFITO observations



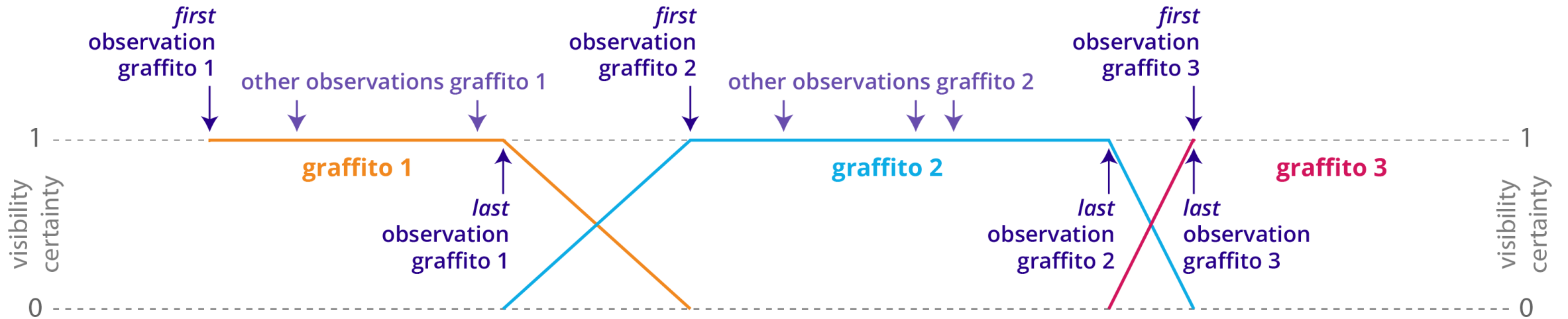
GRAFFITO observations



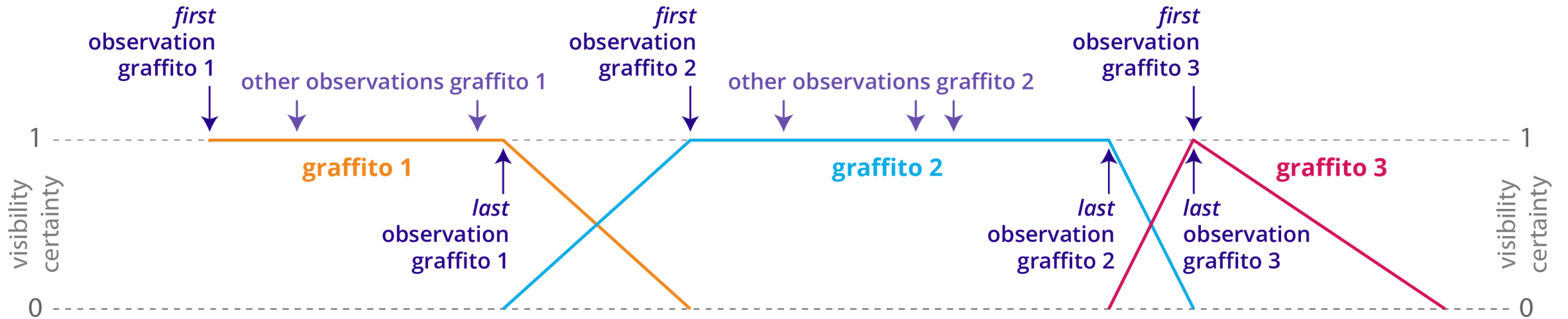
GRAFFITO observations



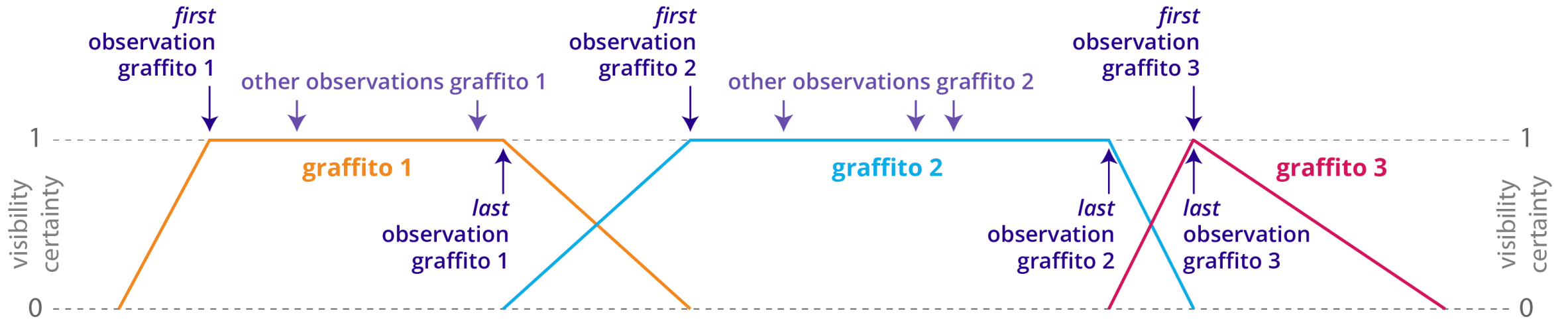
GRAFFITO observations



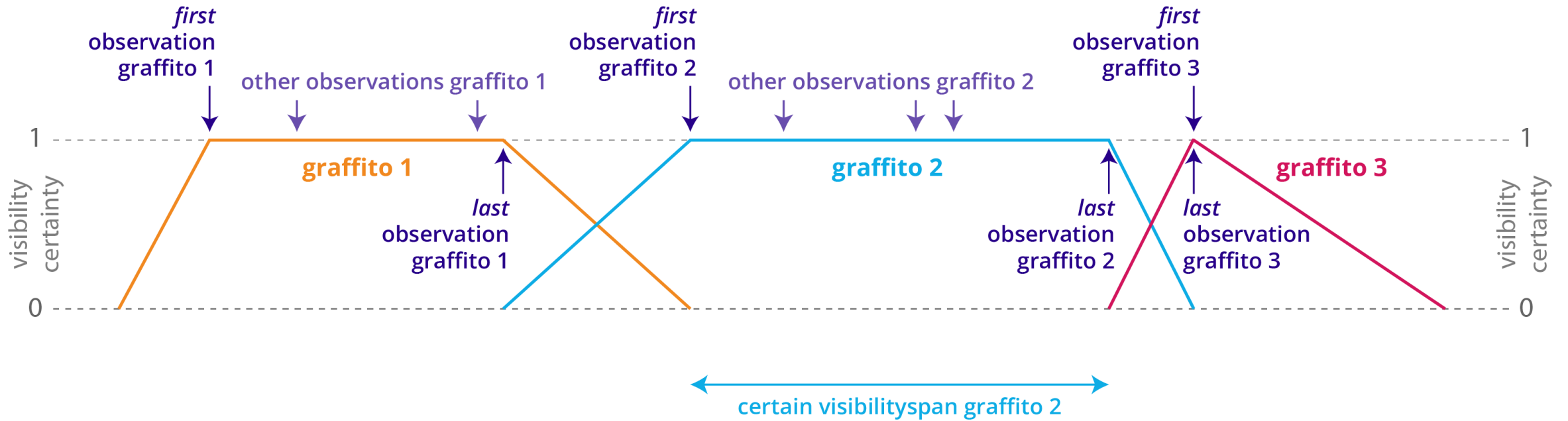
GRAFFITO observations



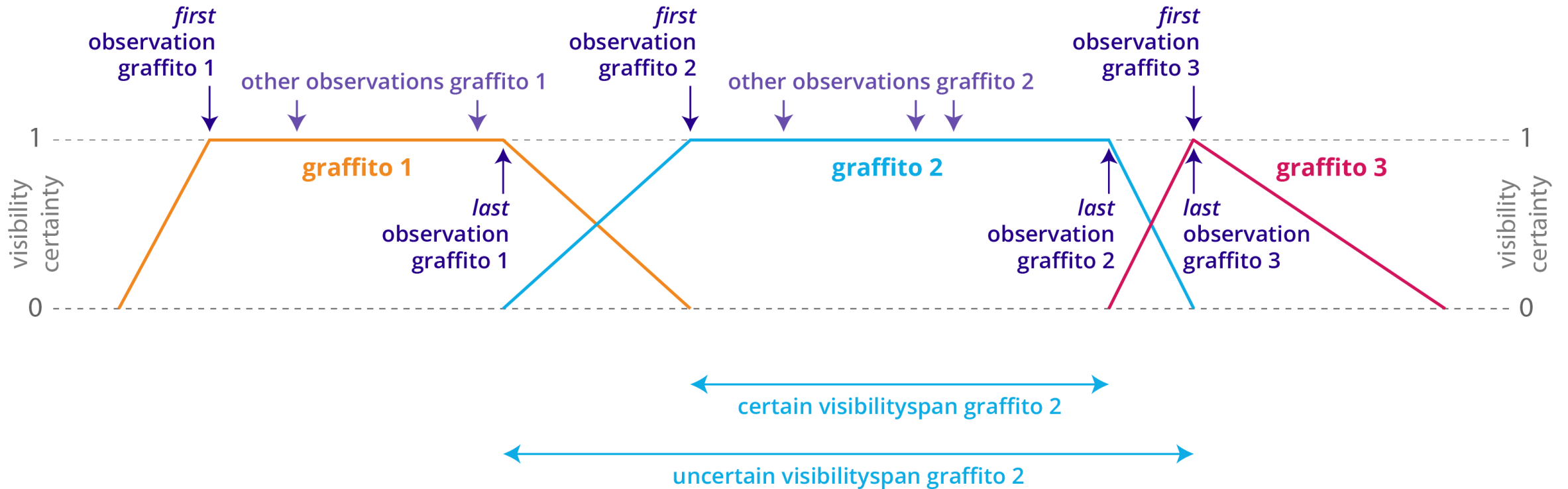
GRAFFITO observations



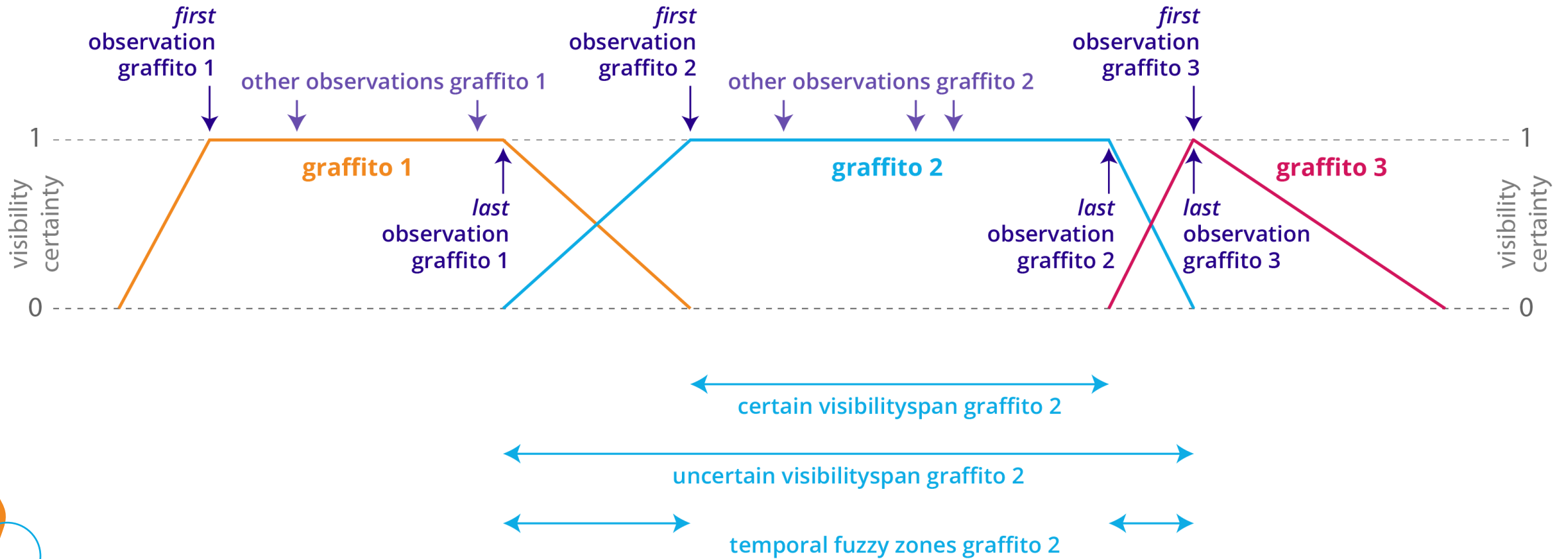
GRAFFITO observations



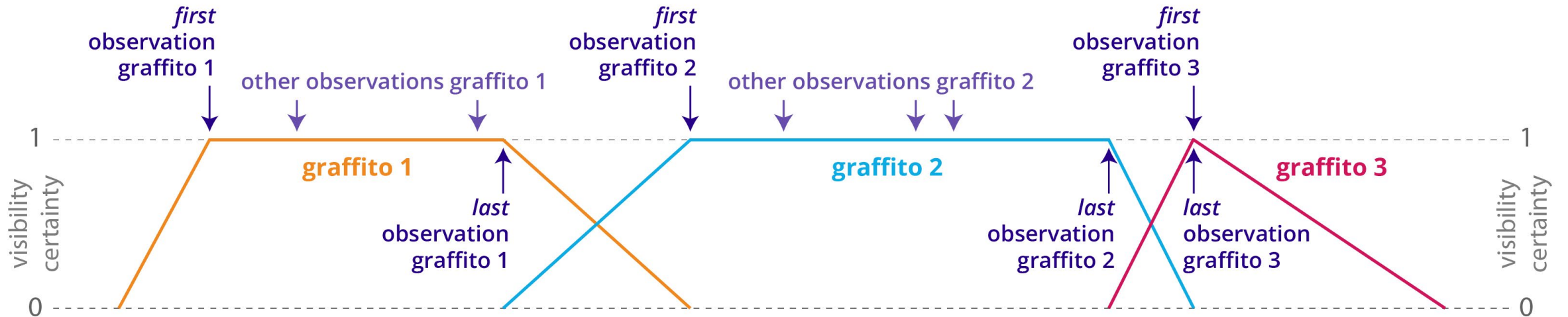
GRAFFITO observations



GRAFFITO observations



GRAFFITO observations



less observations

reduce visibilityspan certainty

← certain visibilityspan graffito 2 →

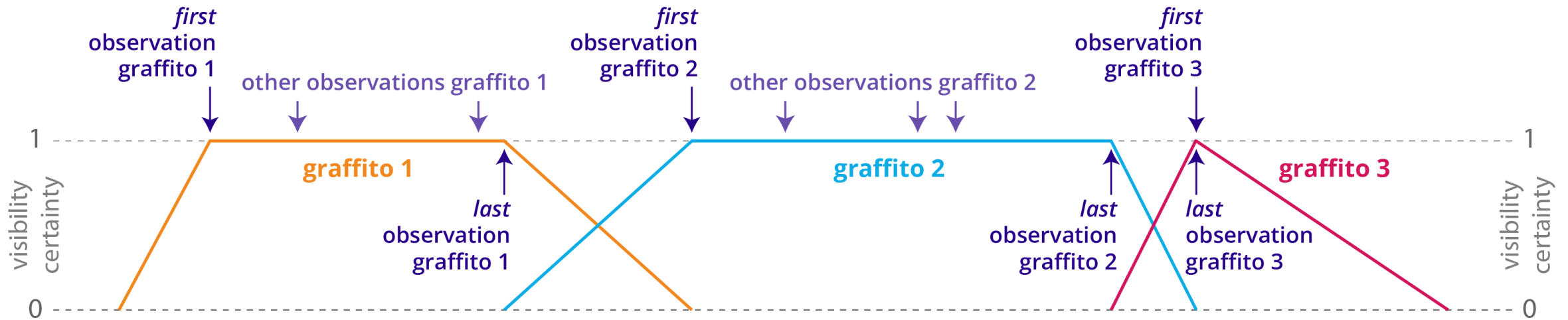
increase visibilityspan uncertainty

← uncertain visibilityspan graffito 2 →

increase temporal fuzzyness

← temporal fuzzy zones graffito 2 →

GRAFFITO observations



less observations

reduce visibilityspan certainty

increase visibilityspan uncertainty

increase temporal fuzzyness

← certain visibilityspan graffito 2 →

← uncertain visibilityspan graffito 2 →

← temporal fuzzy zones graffito 2 →

more observations

increase visibilityspan certainty

reduce visibilityspan uncertainty

reduce temporal fuzzyness

GRAFFITO observations



less observations

reduce visibilityspan certainty

increase visibilityspan uncertainty

increase temporal fuzzyness

← certain visibilityspan graffiti 2 →

← uncertain visibilityspan graffiti 2 →

← temporal fuzzy zones graffiti 2 →

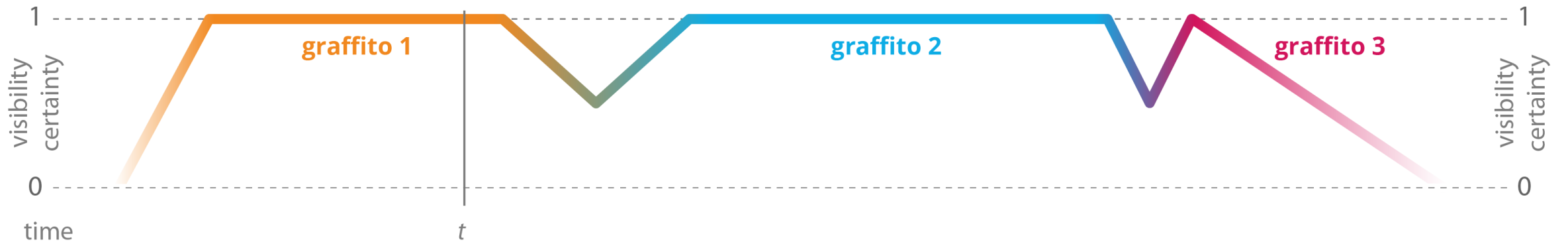
more observations

increase visibilityspan certainty

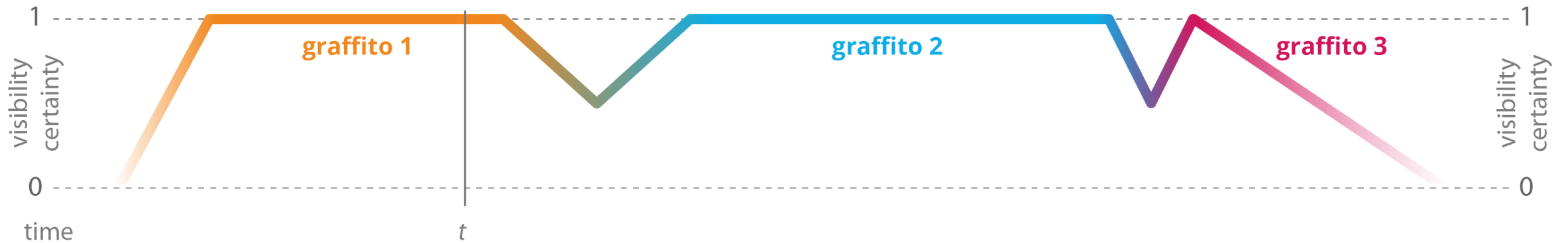
reduce visibilityspan uncertainty

reduce temporal fuzzyness

GRAFFITO observations



GRAFFITO observations

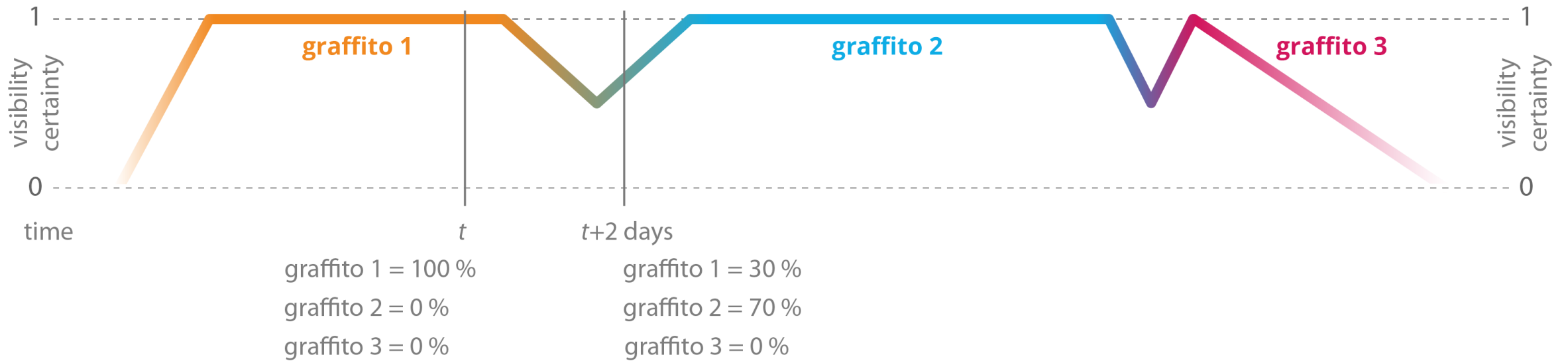


graffito 1 = 100 %

graffito 2 = 0 %

graffito 3 = 0 %

GRAFFITO observations



GRAFFITO observations



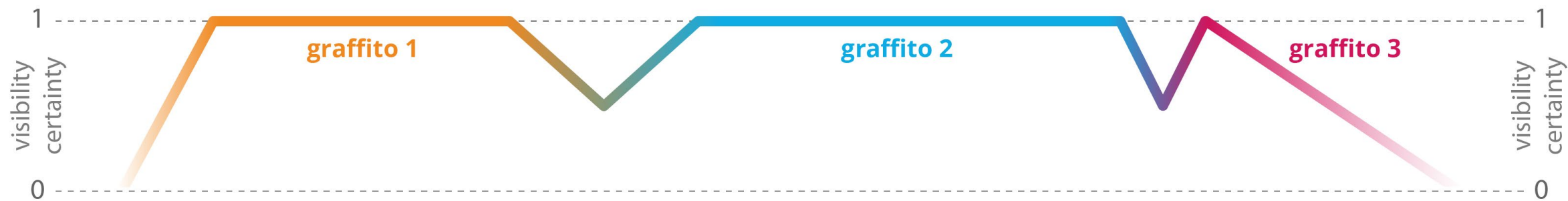
GRAFFITO observations



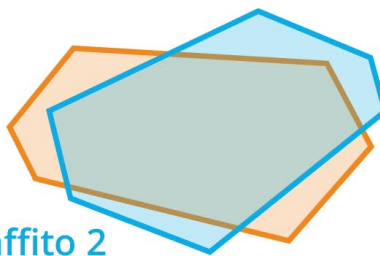
graffito 1



GRAFFITO observations



graffito 1



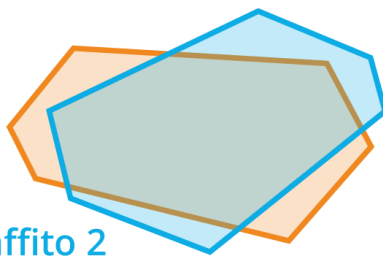
graffito 2



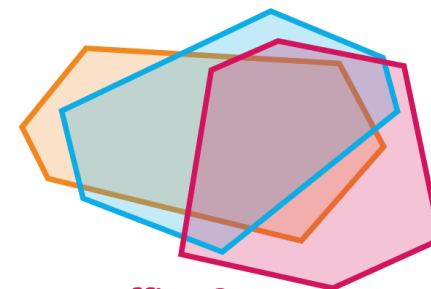
GRAFFITO observations



graffito 1

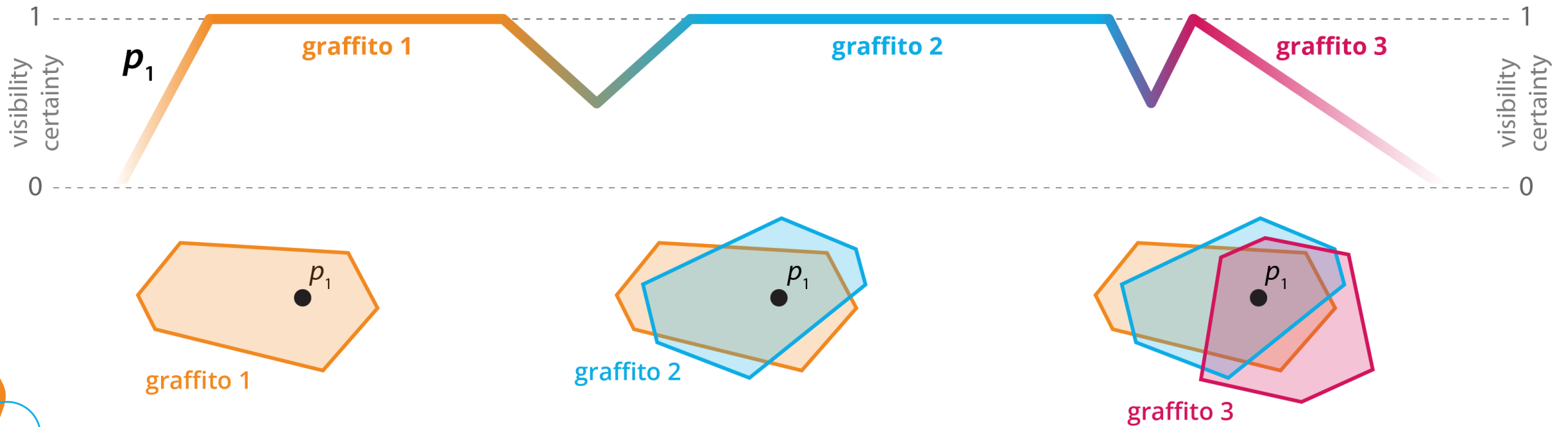


graffito 2

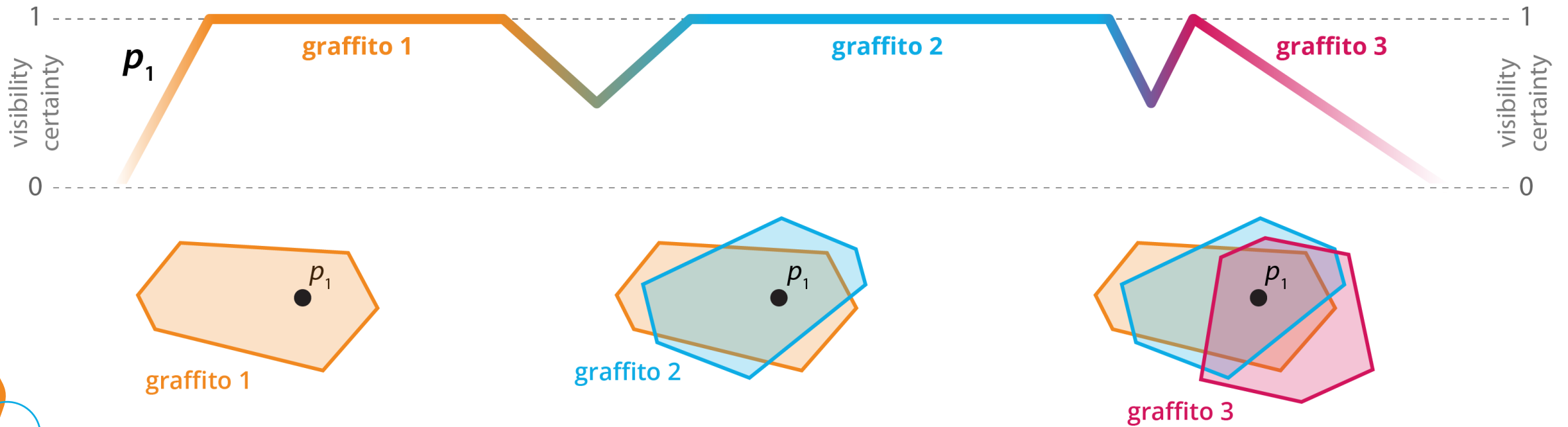


graffito 3

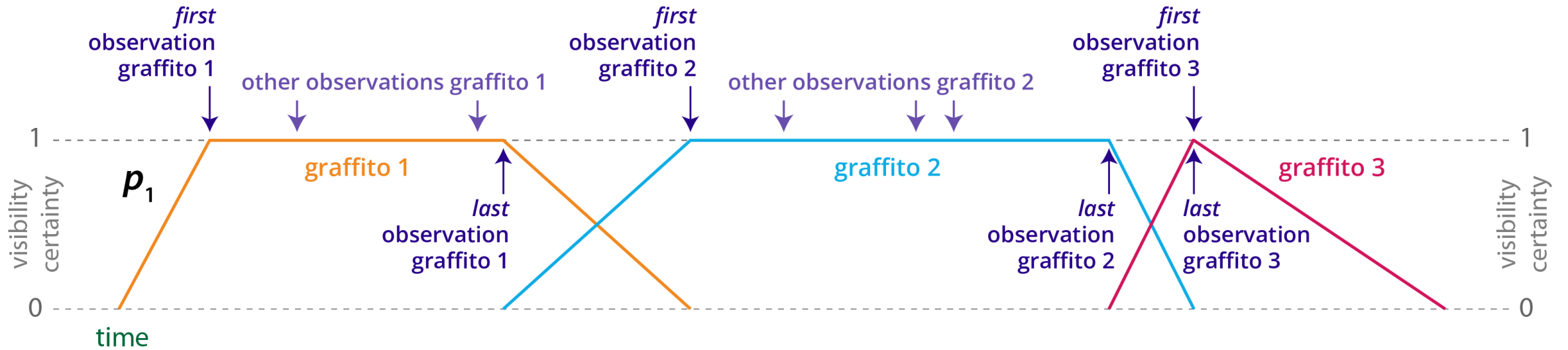
GRAFFITO observations



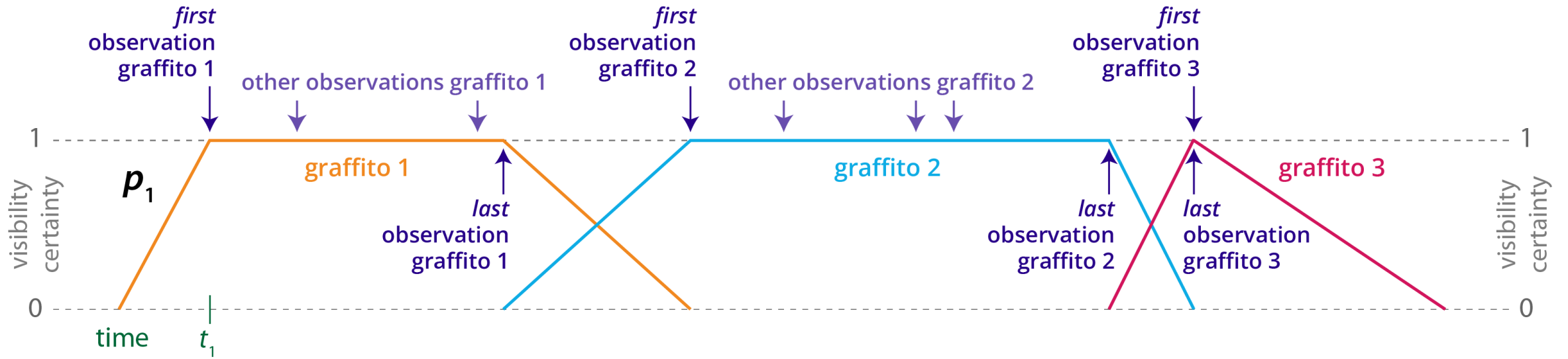
TOWARDS polygons



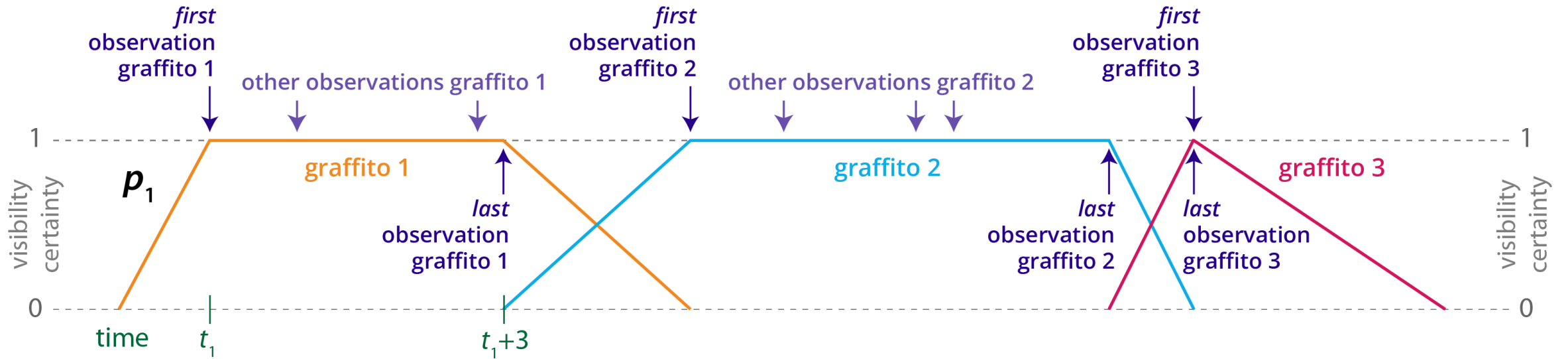
TOWARDS polygons



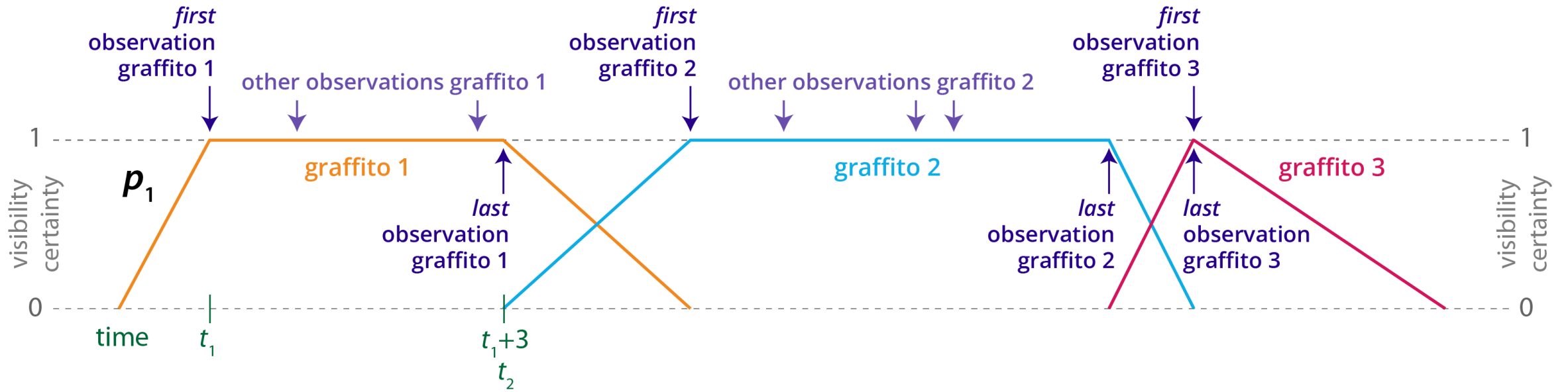
TOWARDS polygons



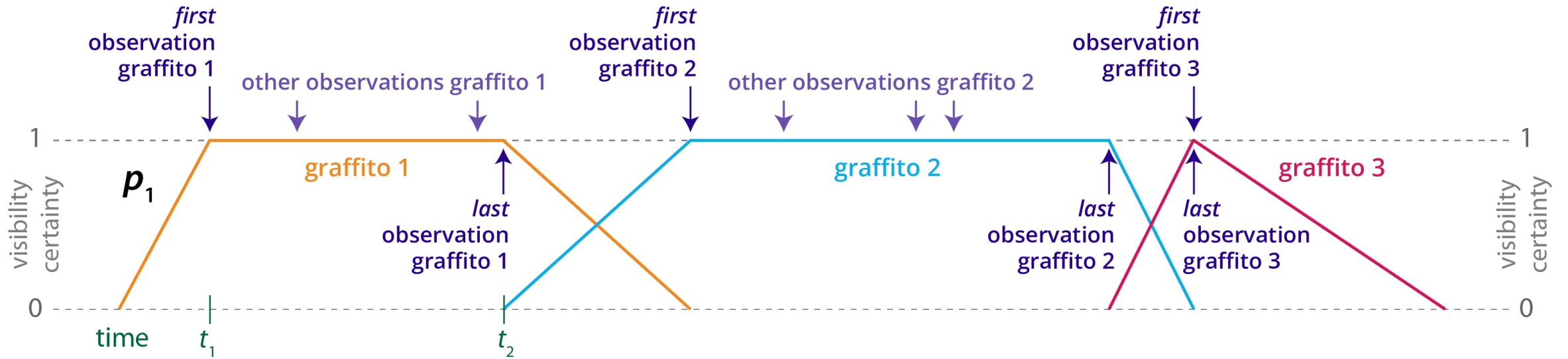
TOWARDS polygons



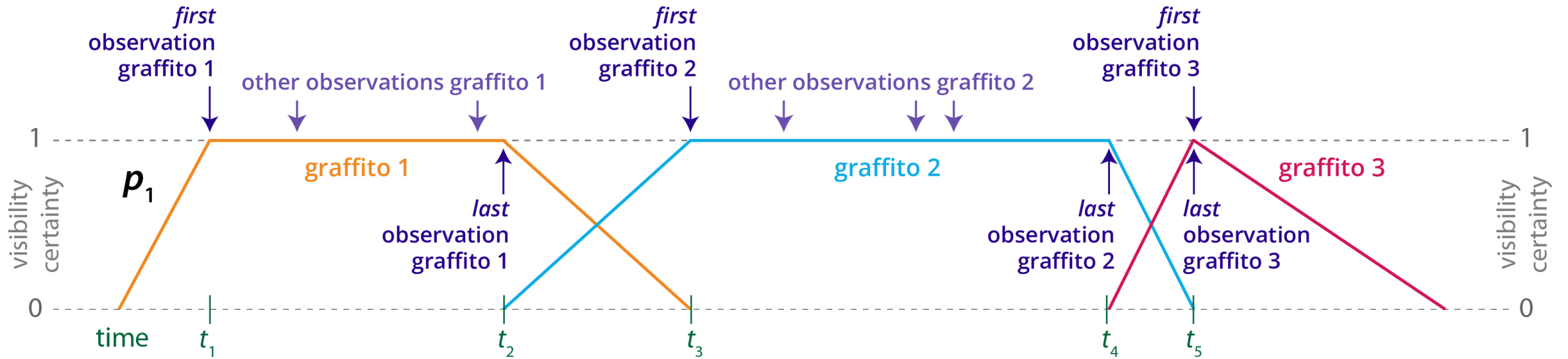
TOWARDS polygons



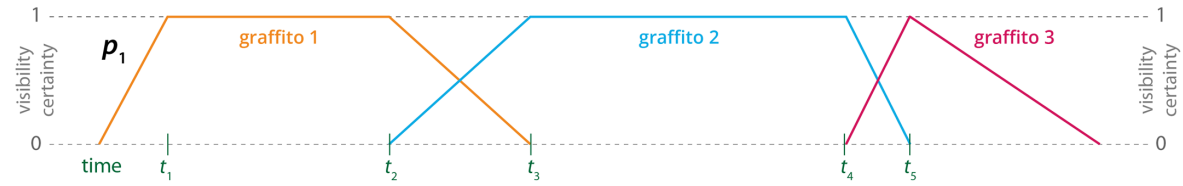
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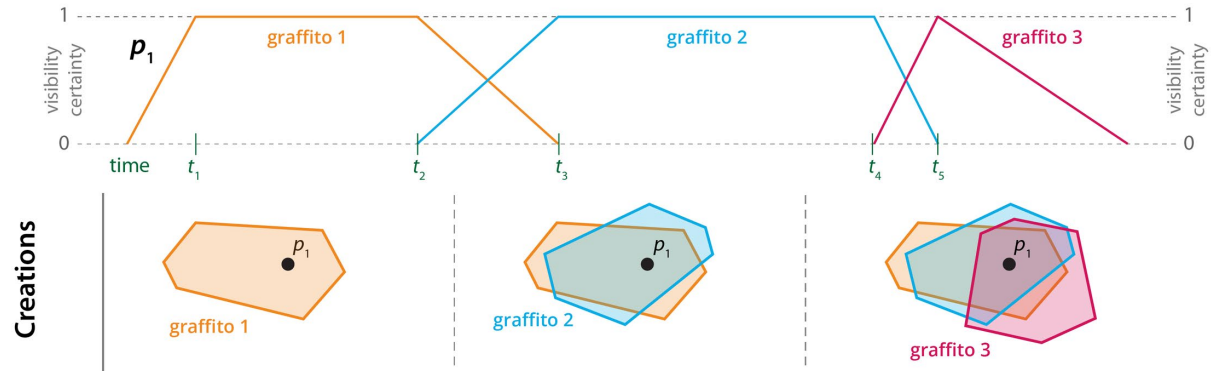
TOWARDS polygons



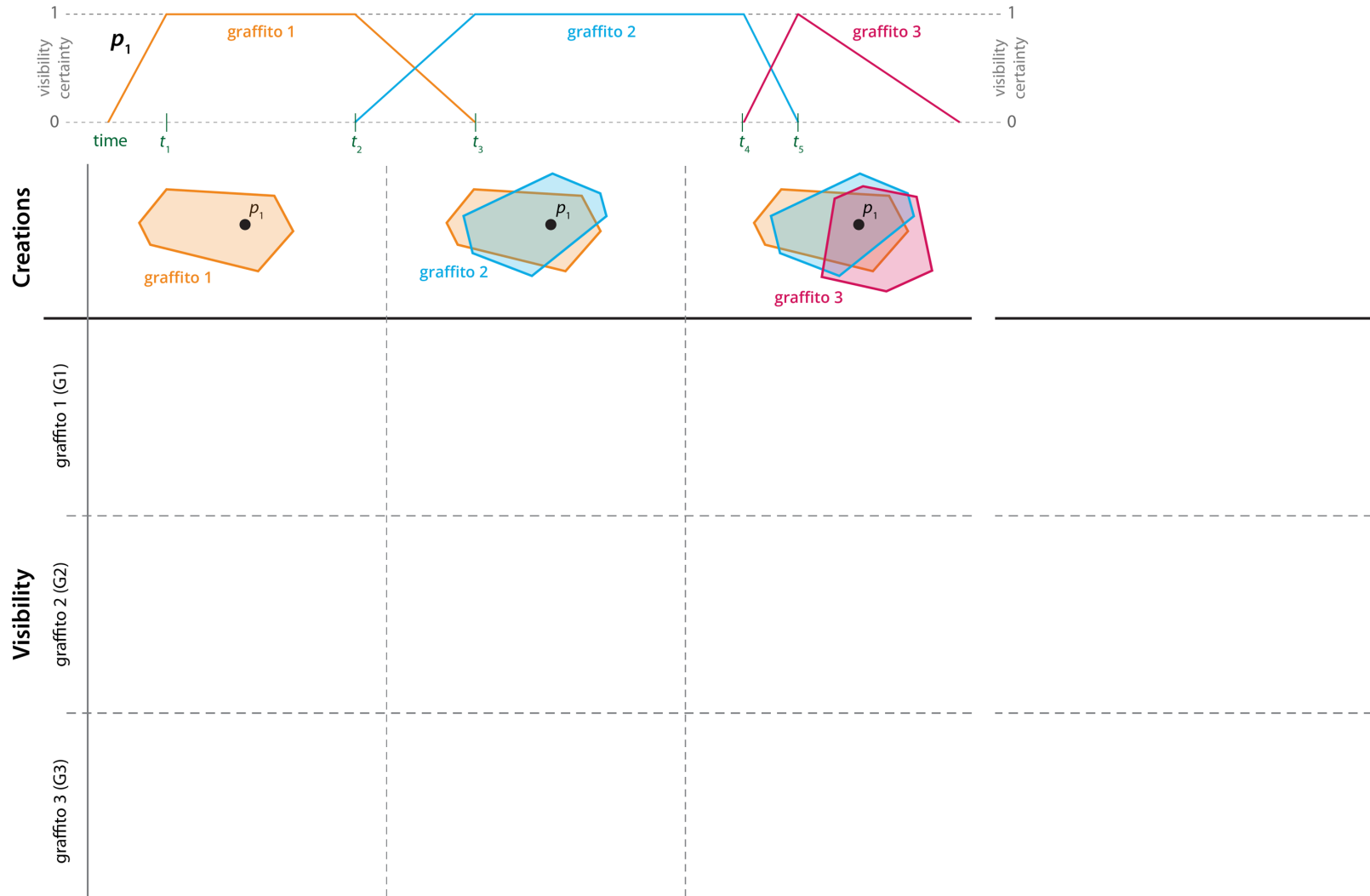
TOWARDS polygons



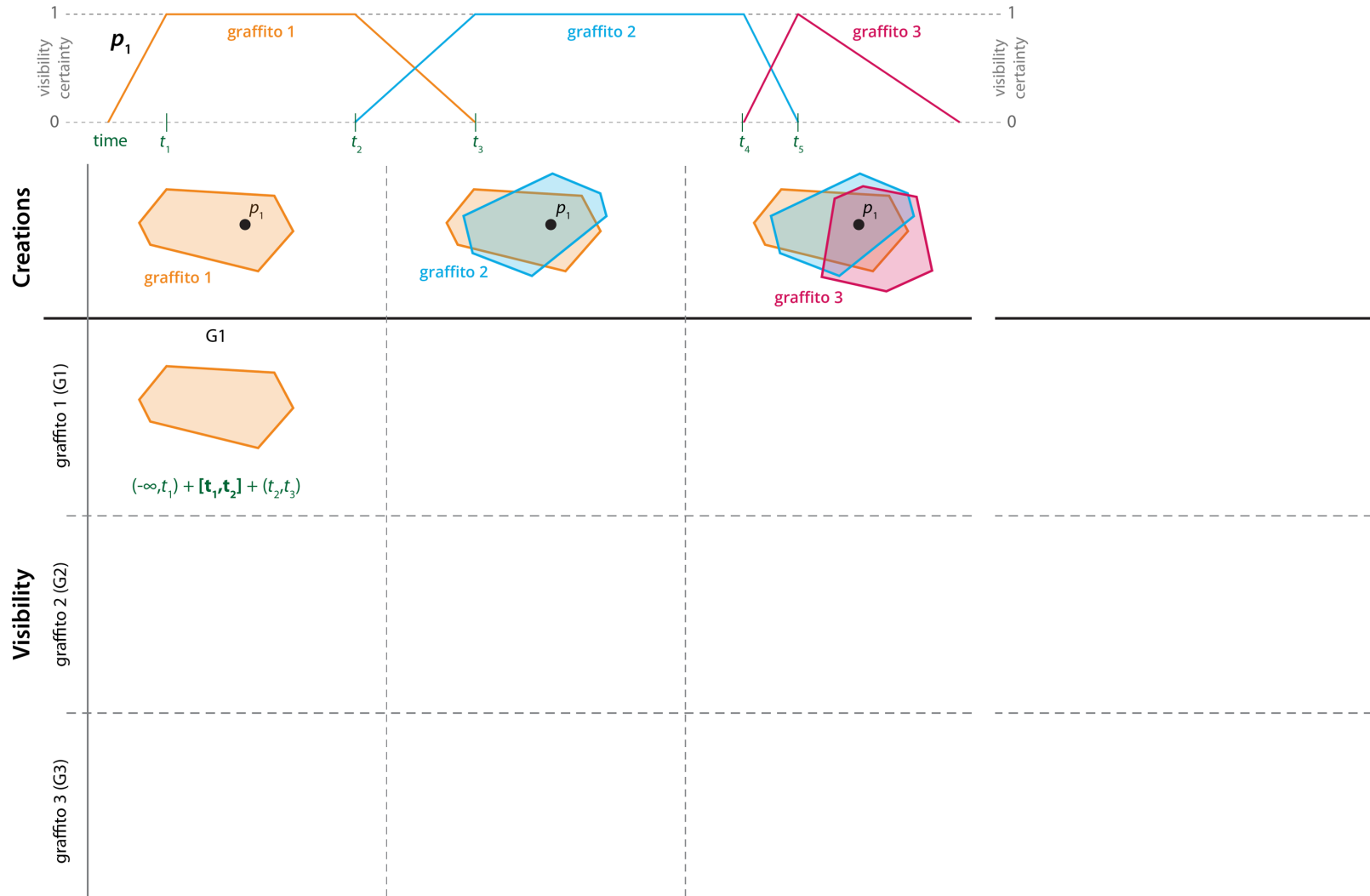
TOWARDS polygons



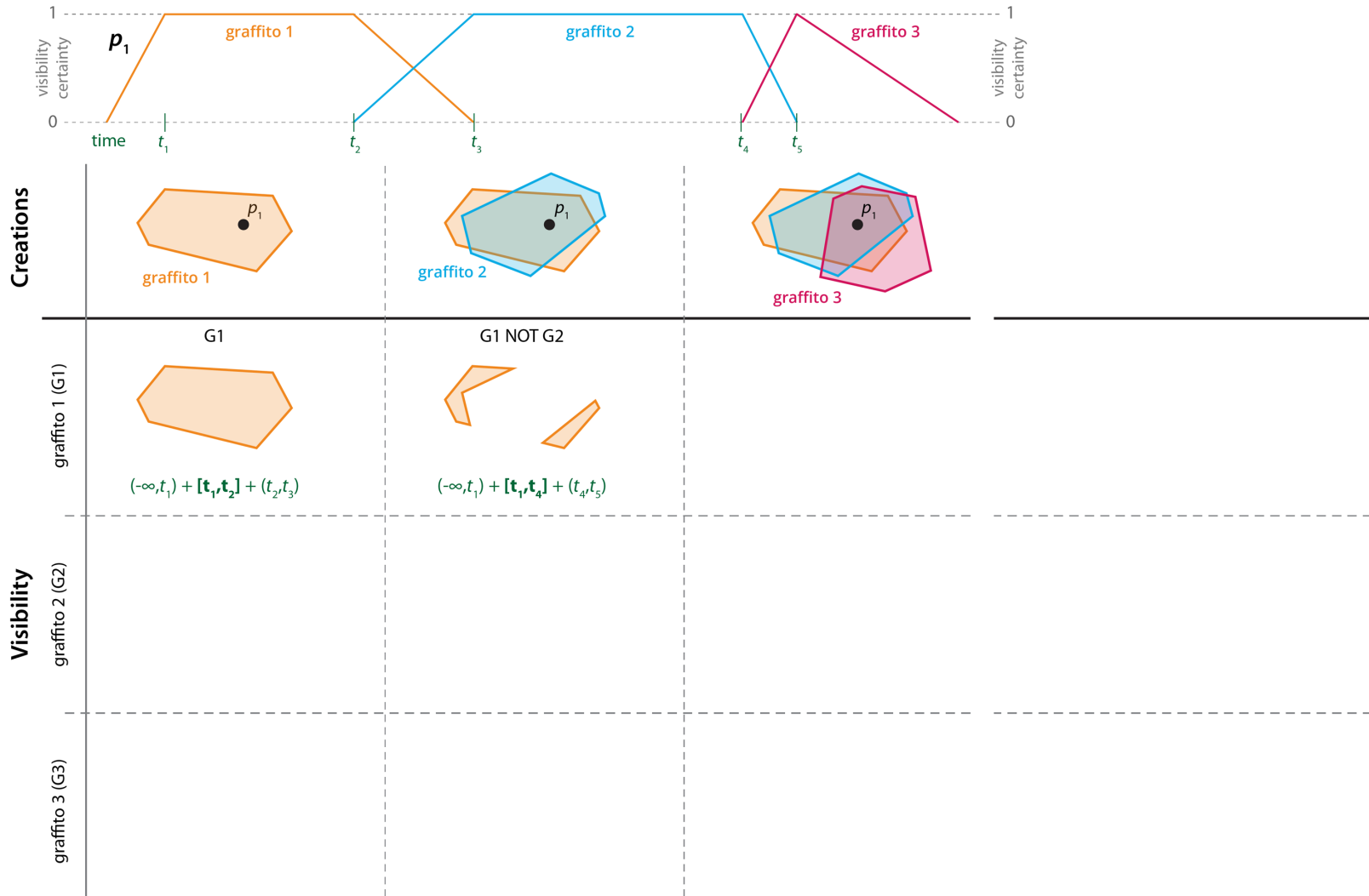
TOWARDS polygons



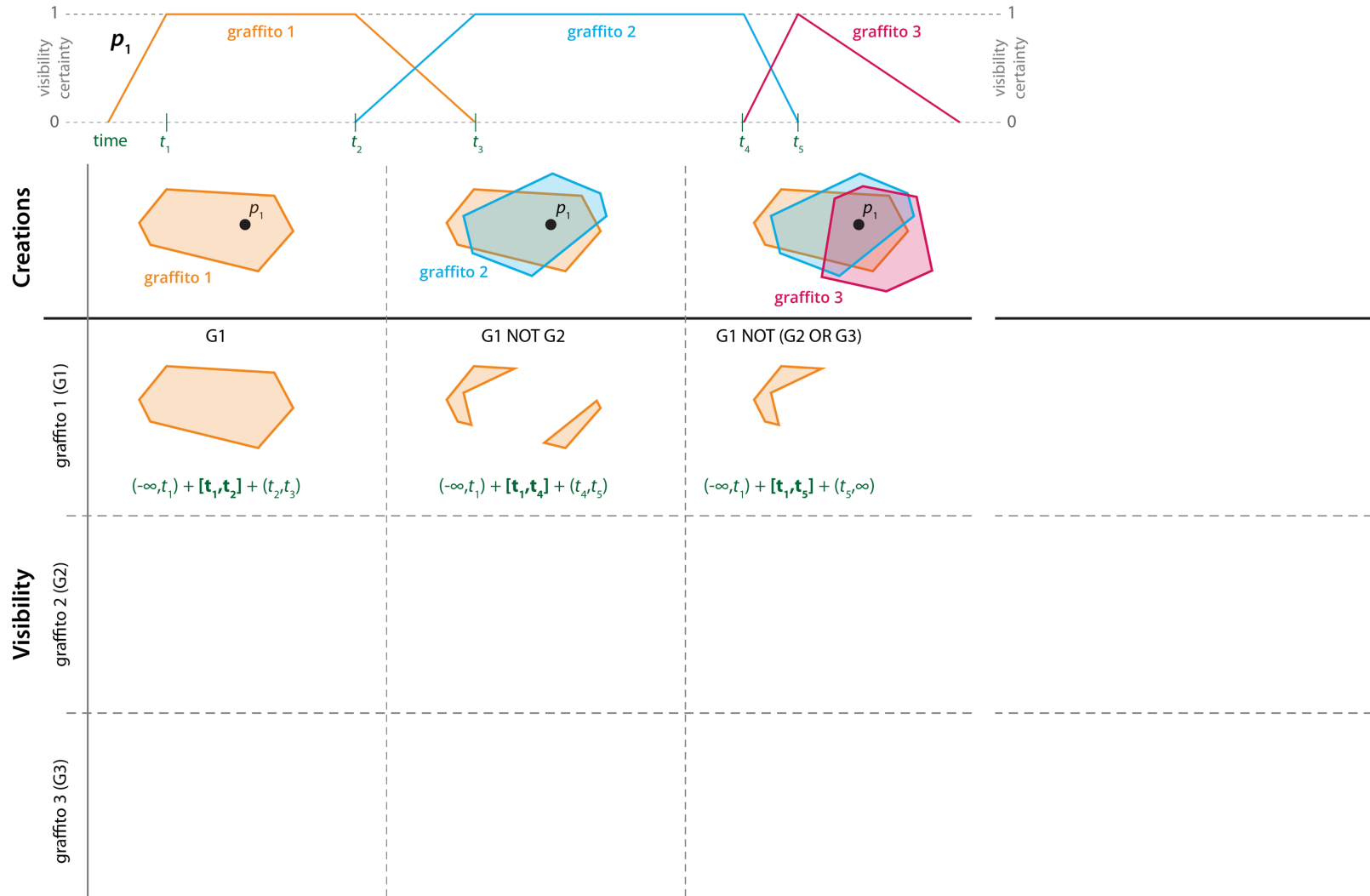
TOWARDS polygons



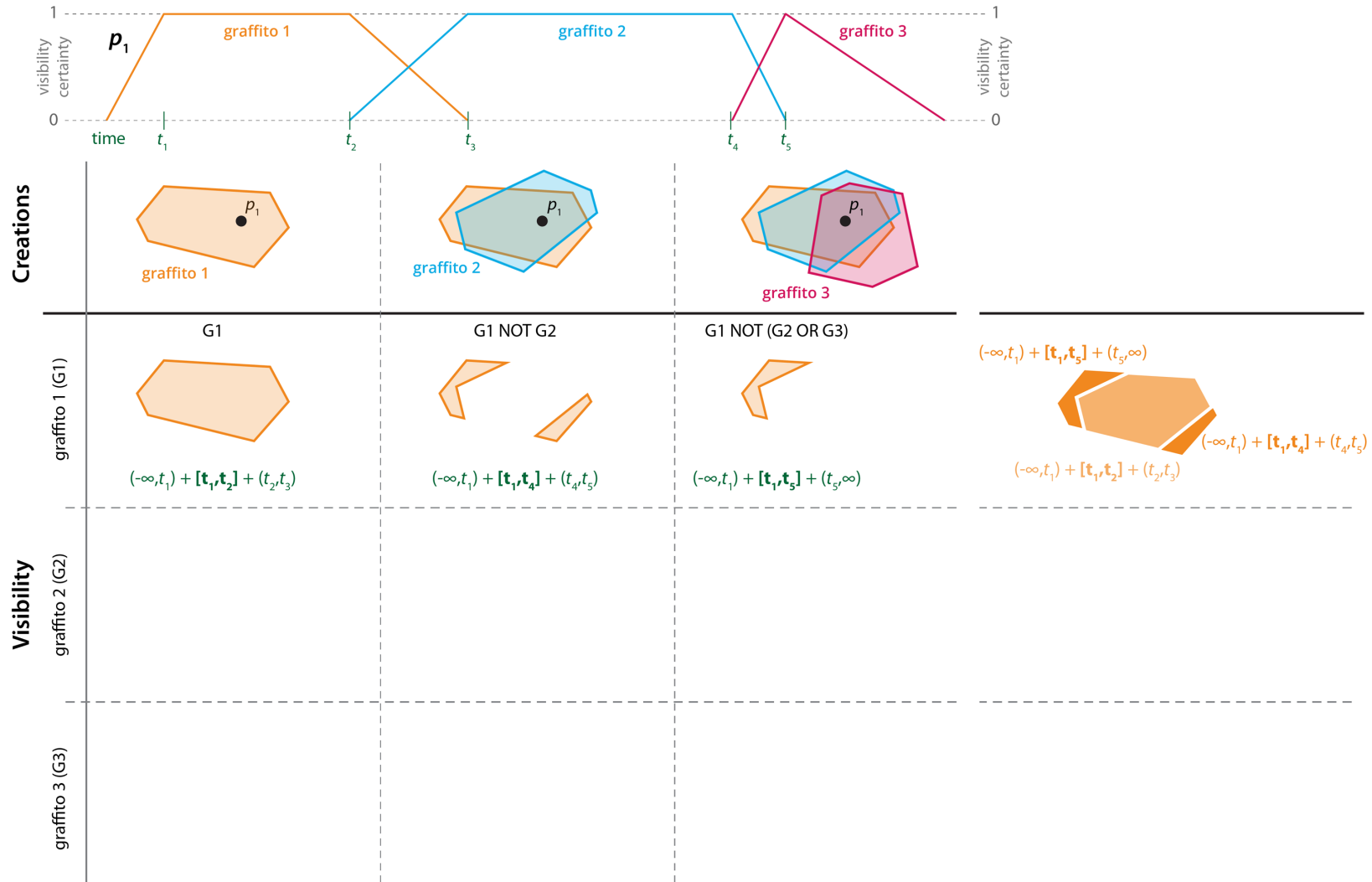
TOWARDS polygons



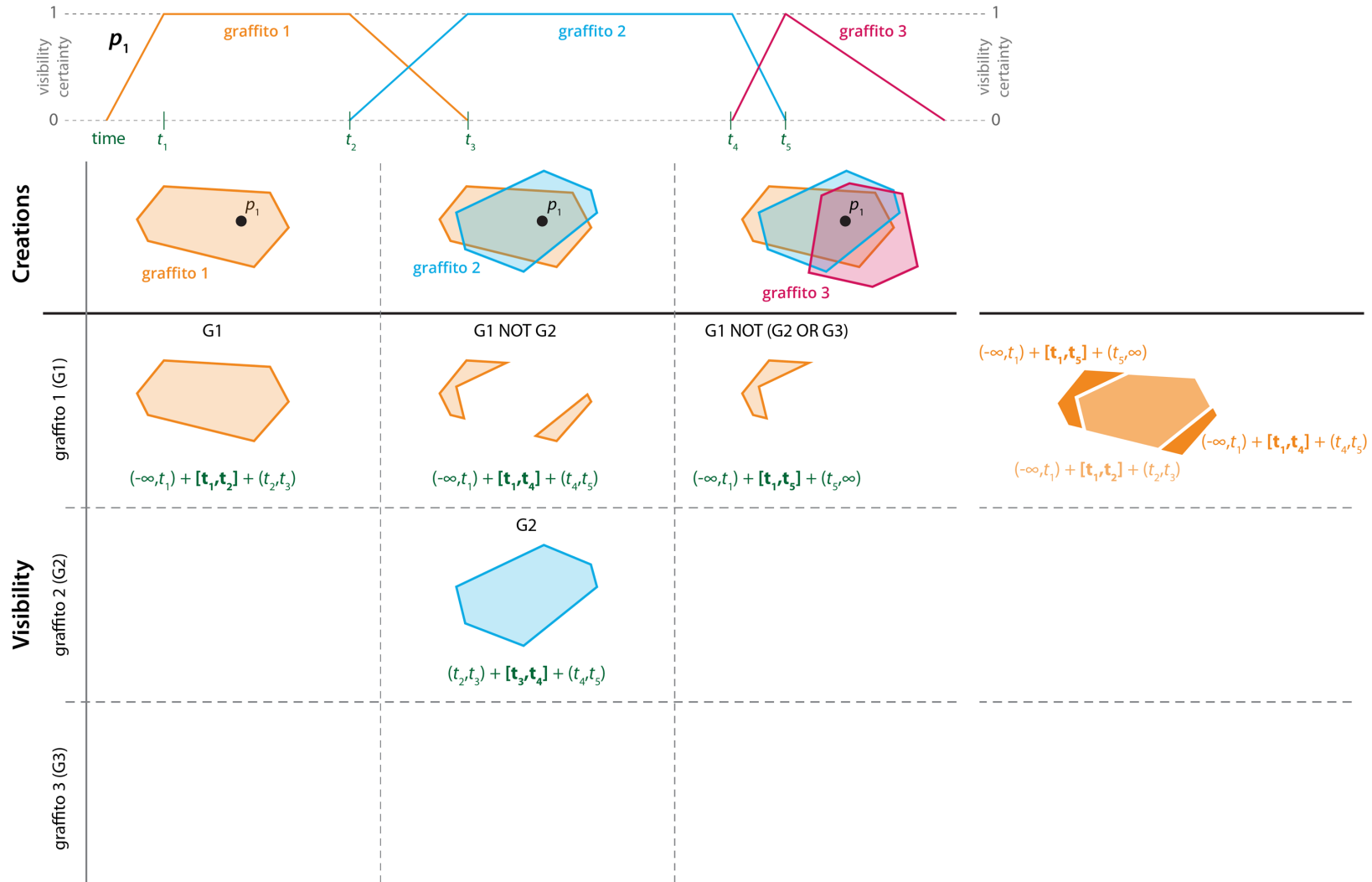
TOWARDS polygons



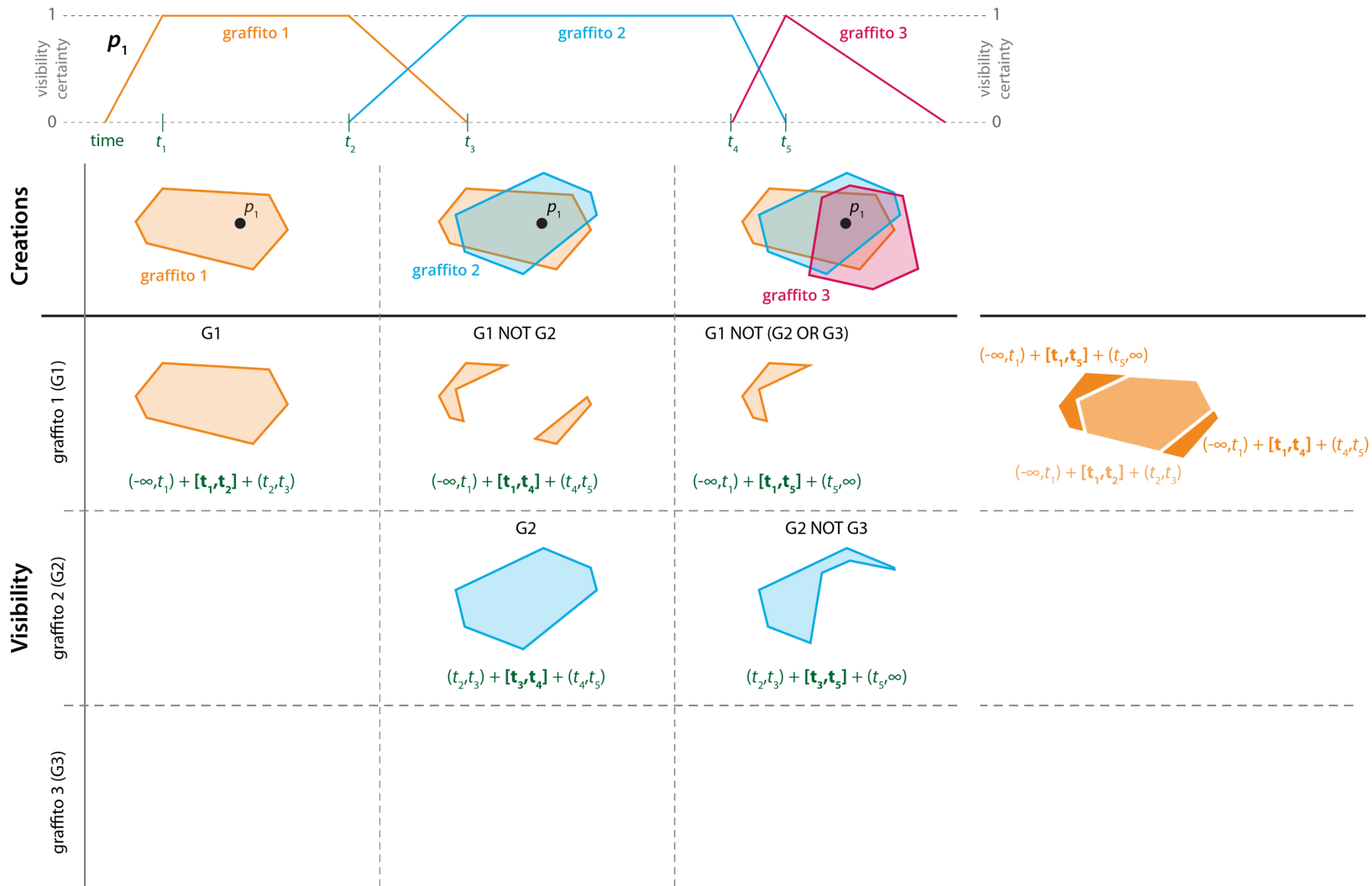
TOWARDS polygons



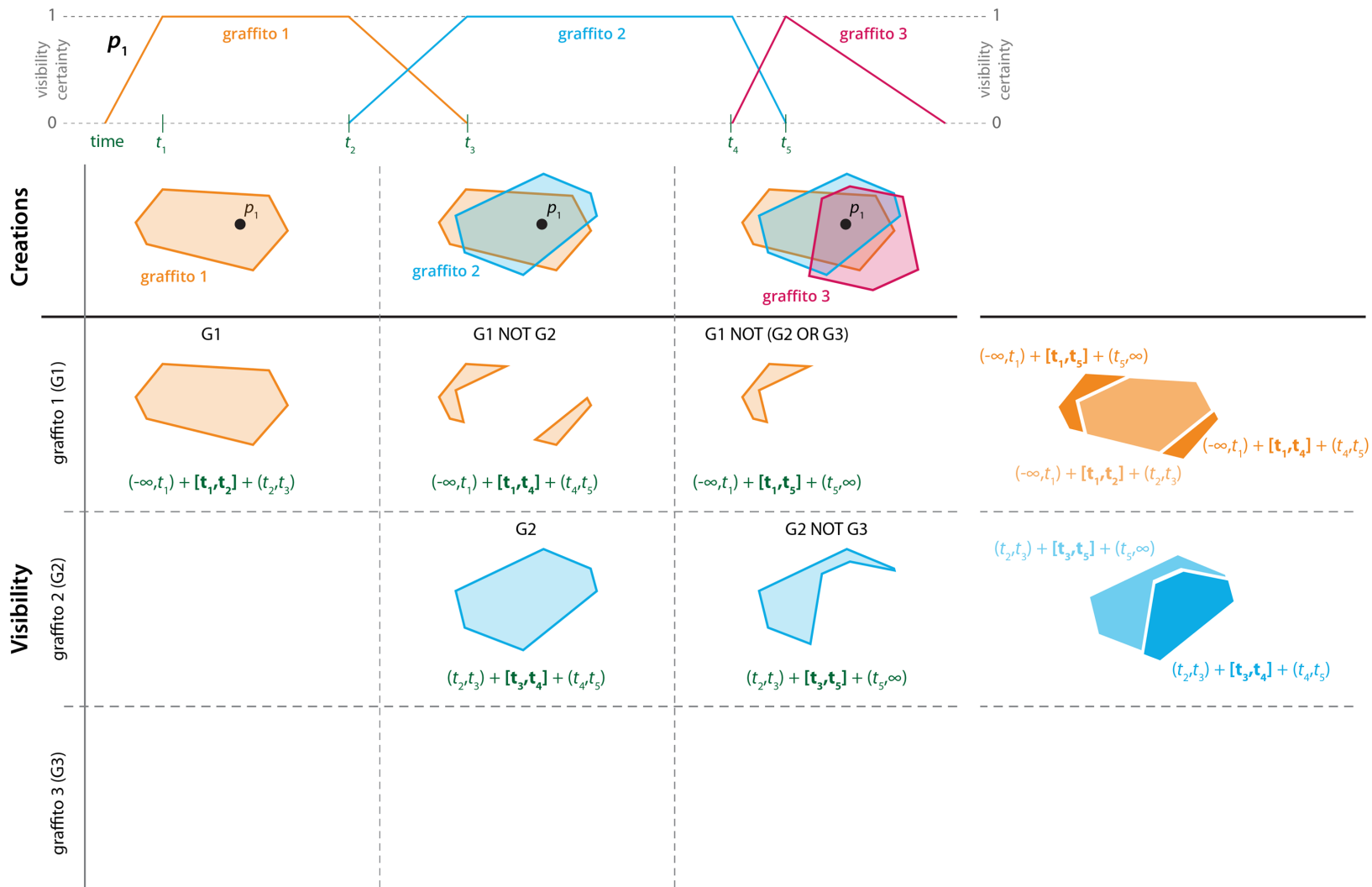
TOWARDS polygons



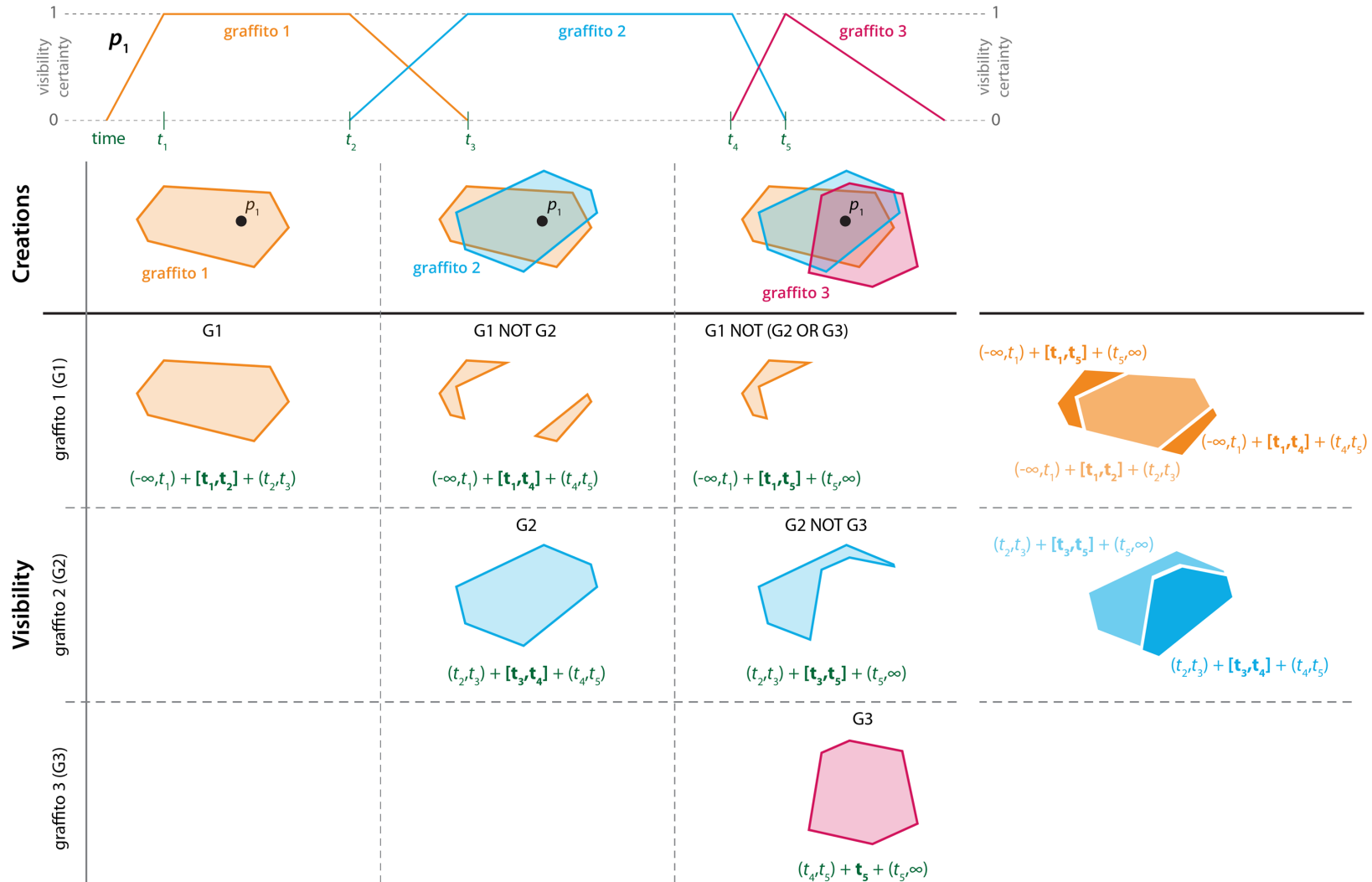
TOWARDS polygons



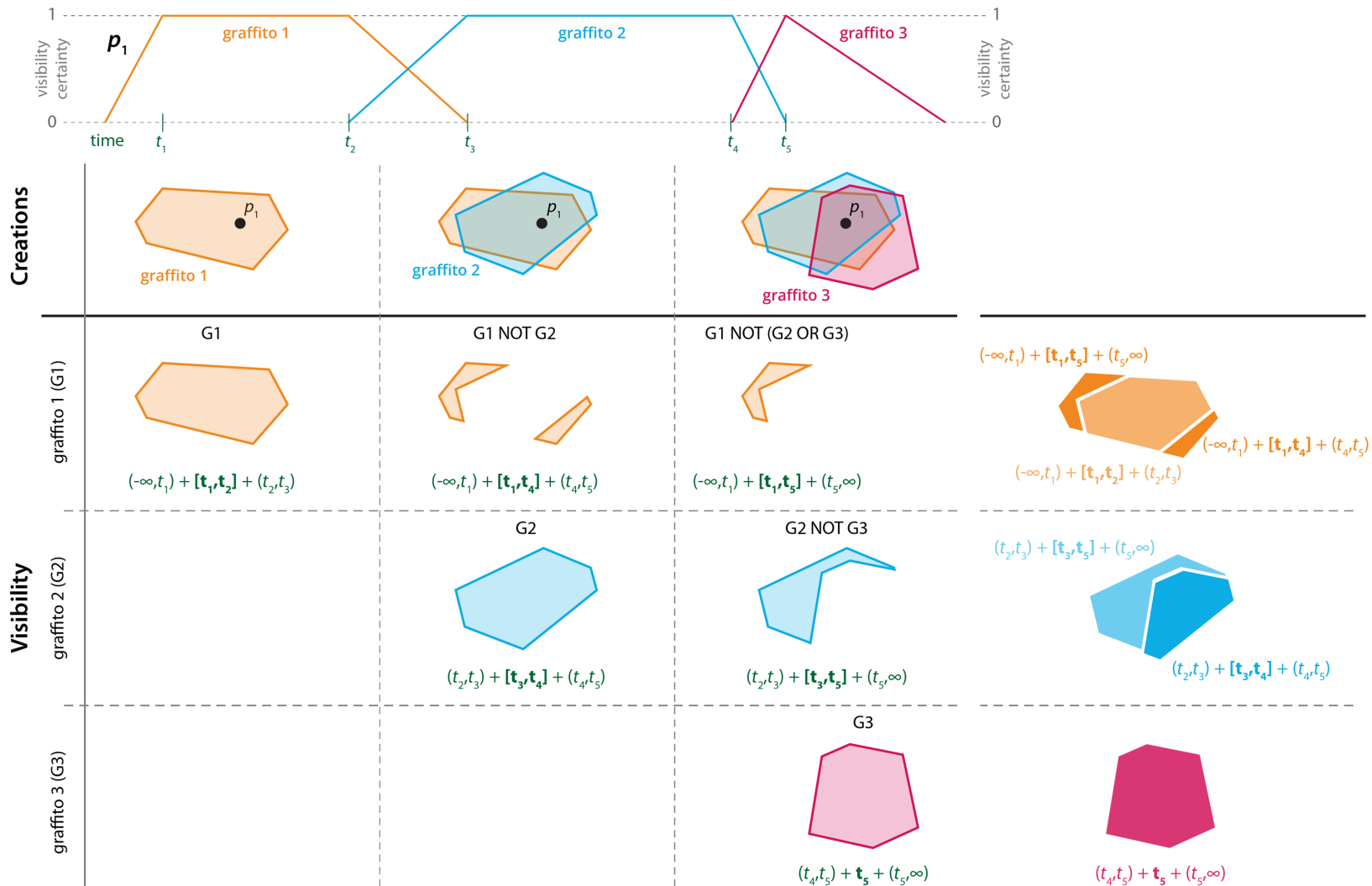
TOWARDS polygons



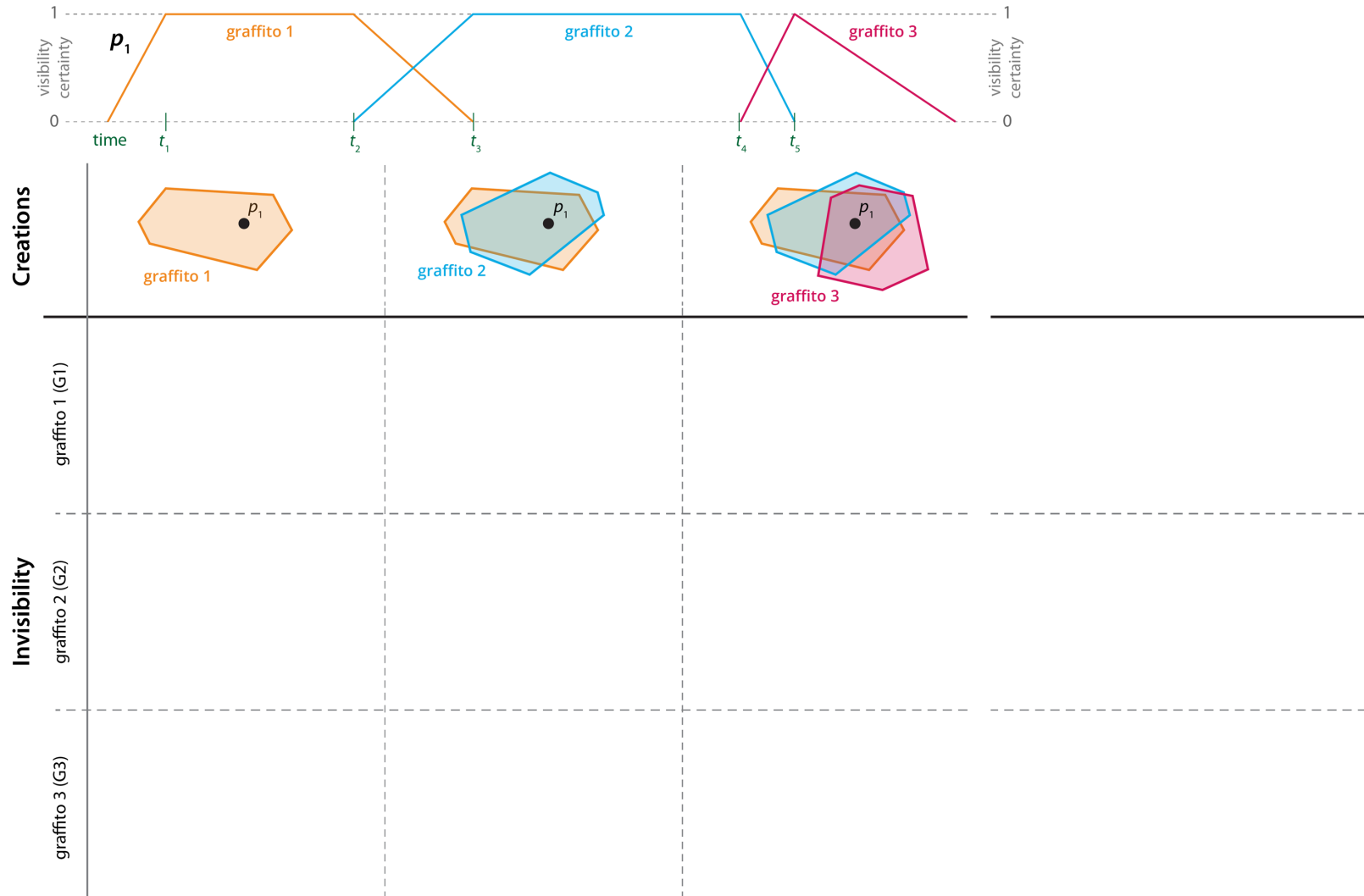
TOWARDS polygons



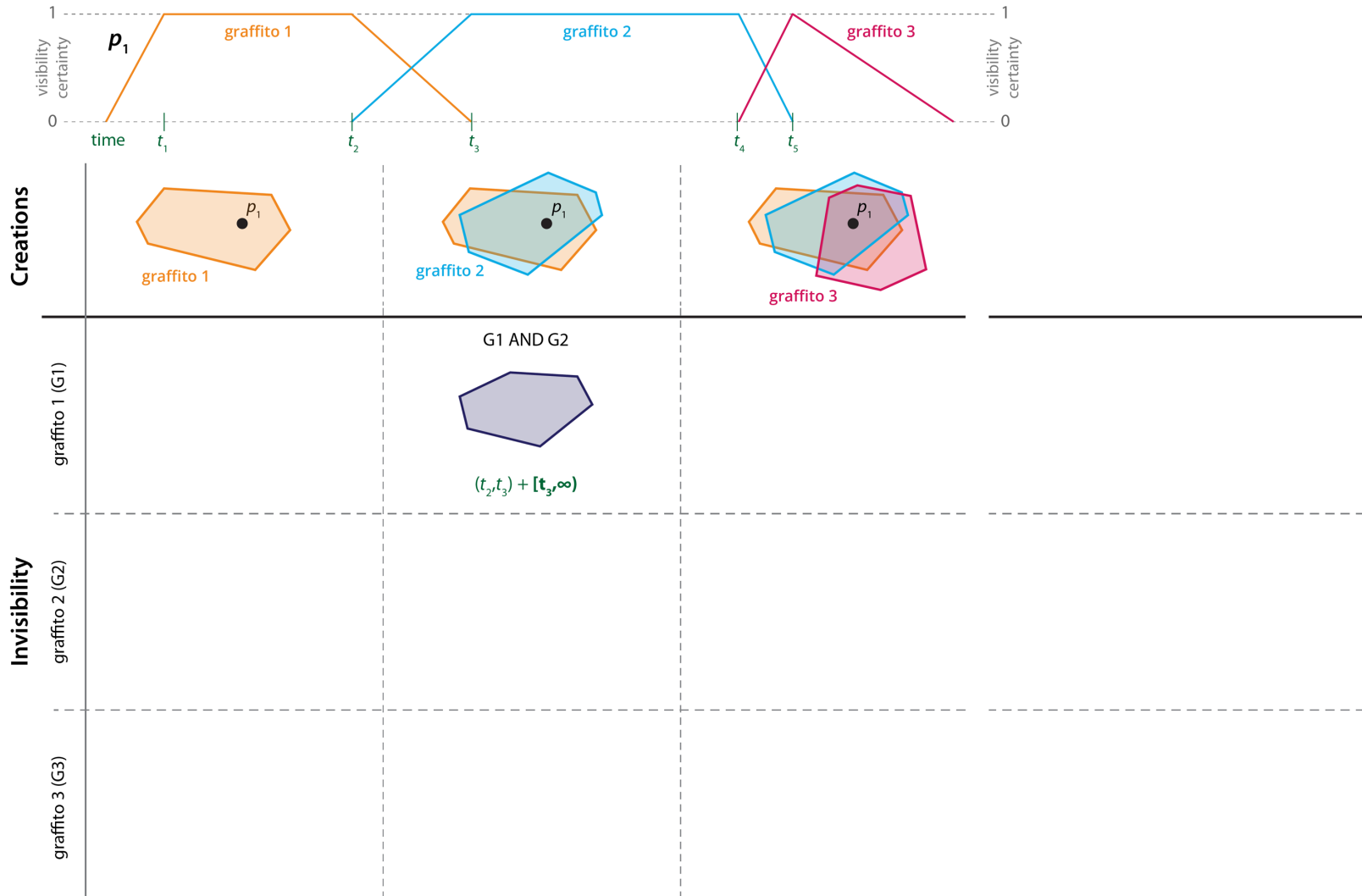
TOWARDS polygons



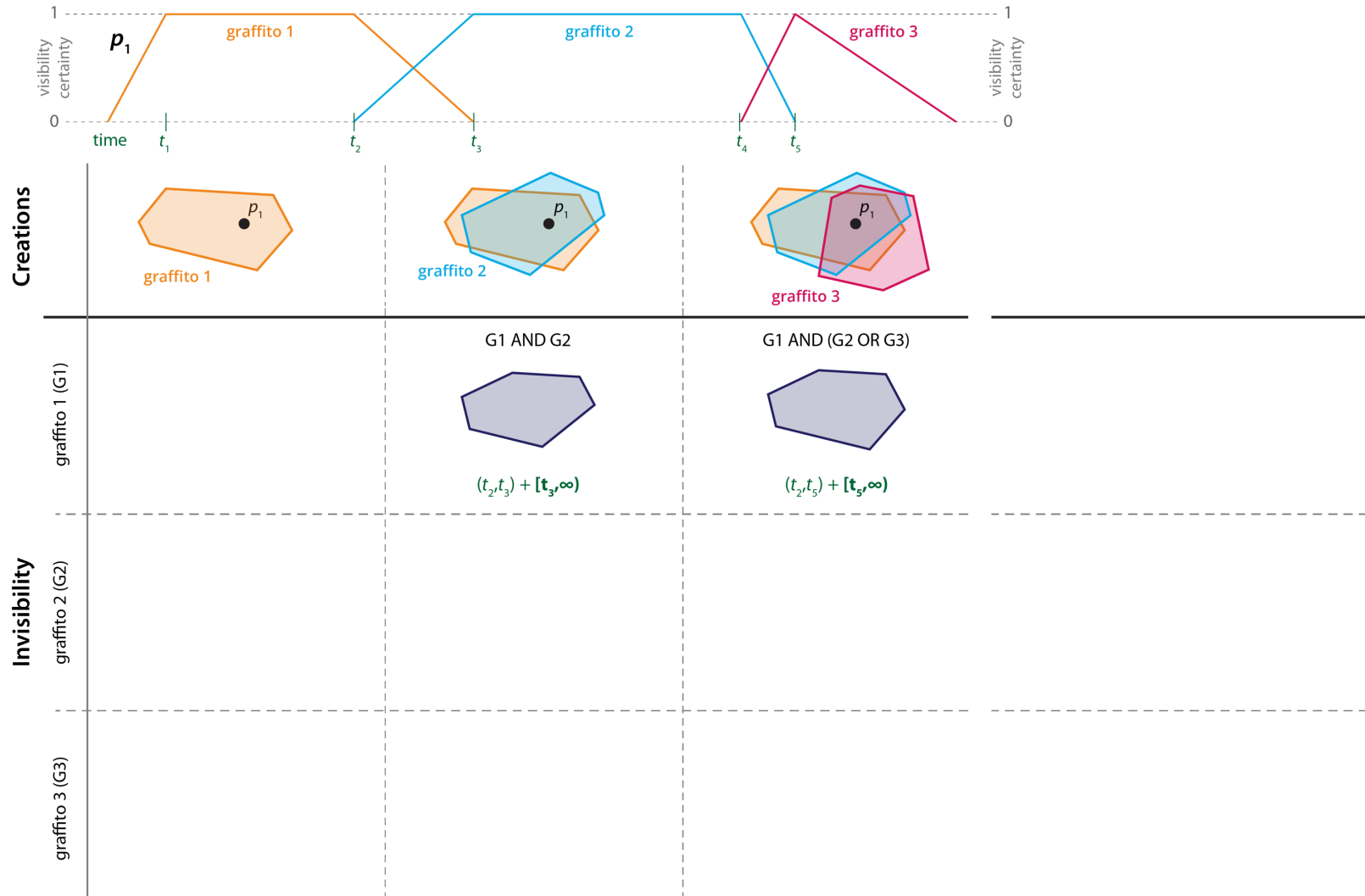
TOWARDS polygons



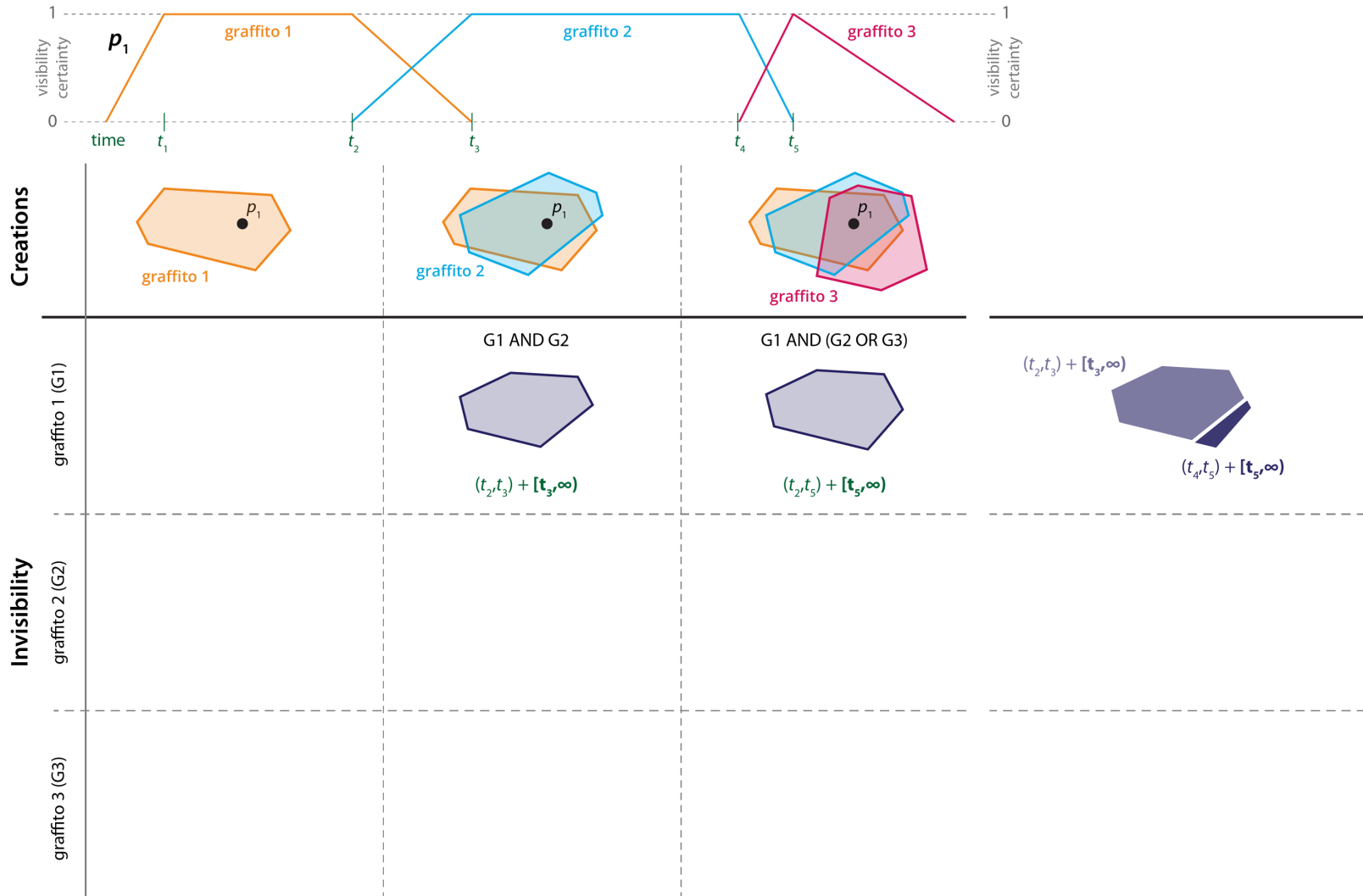
TOWARDS polygons



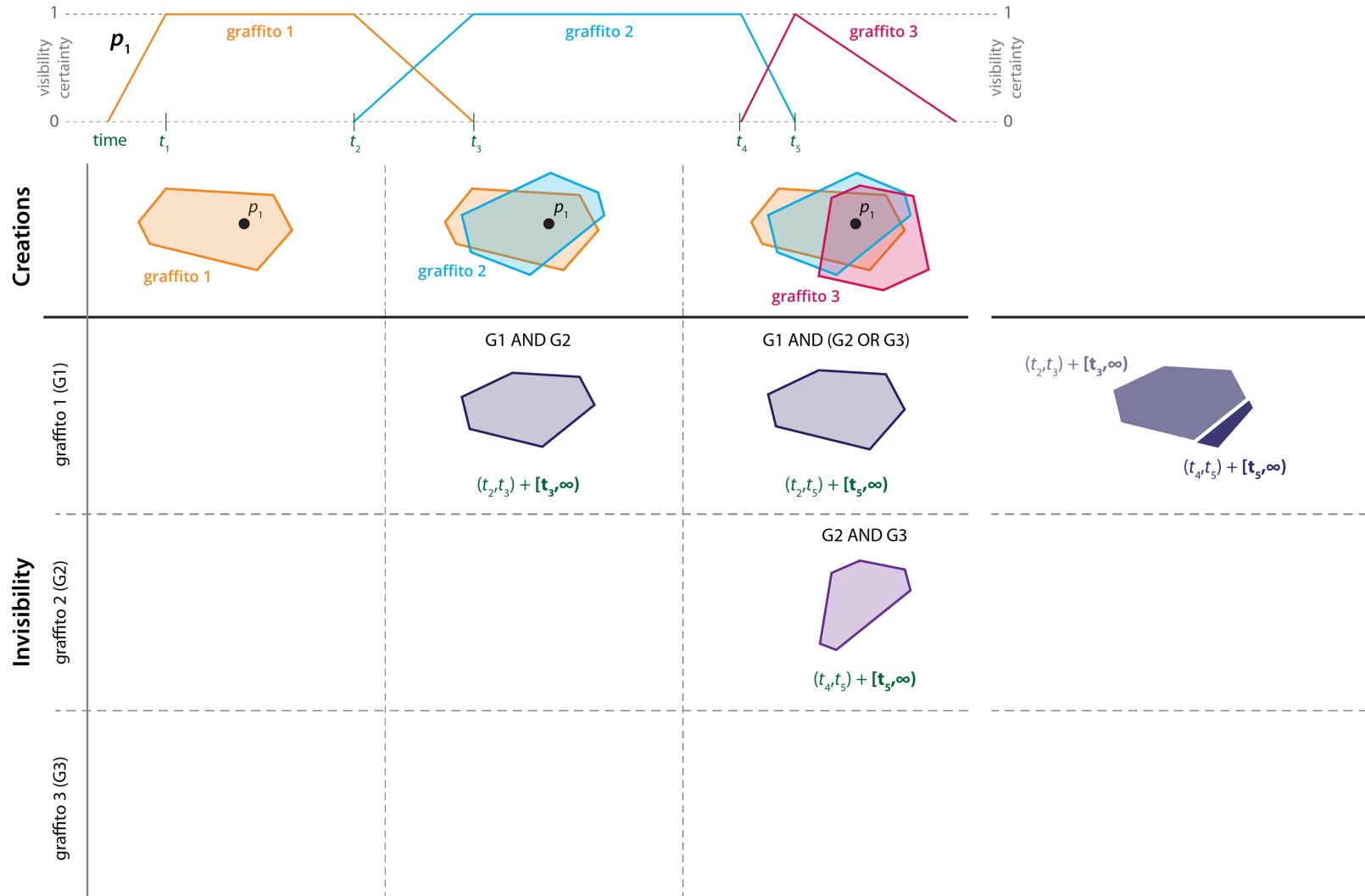
TOWARDS polygons



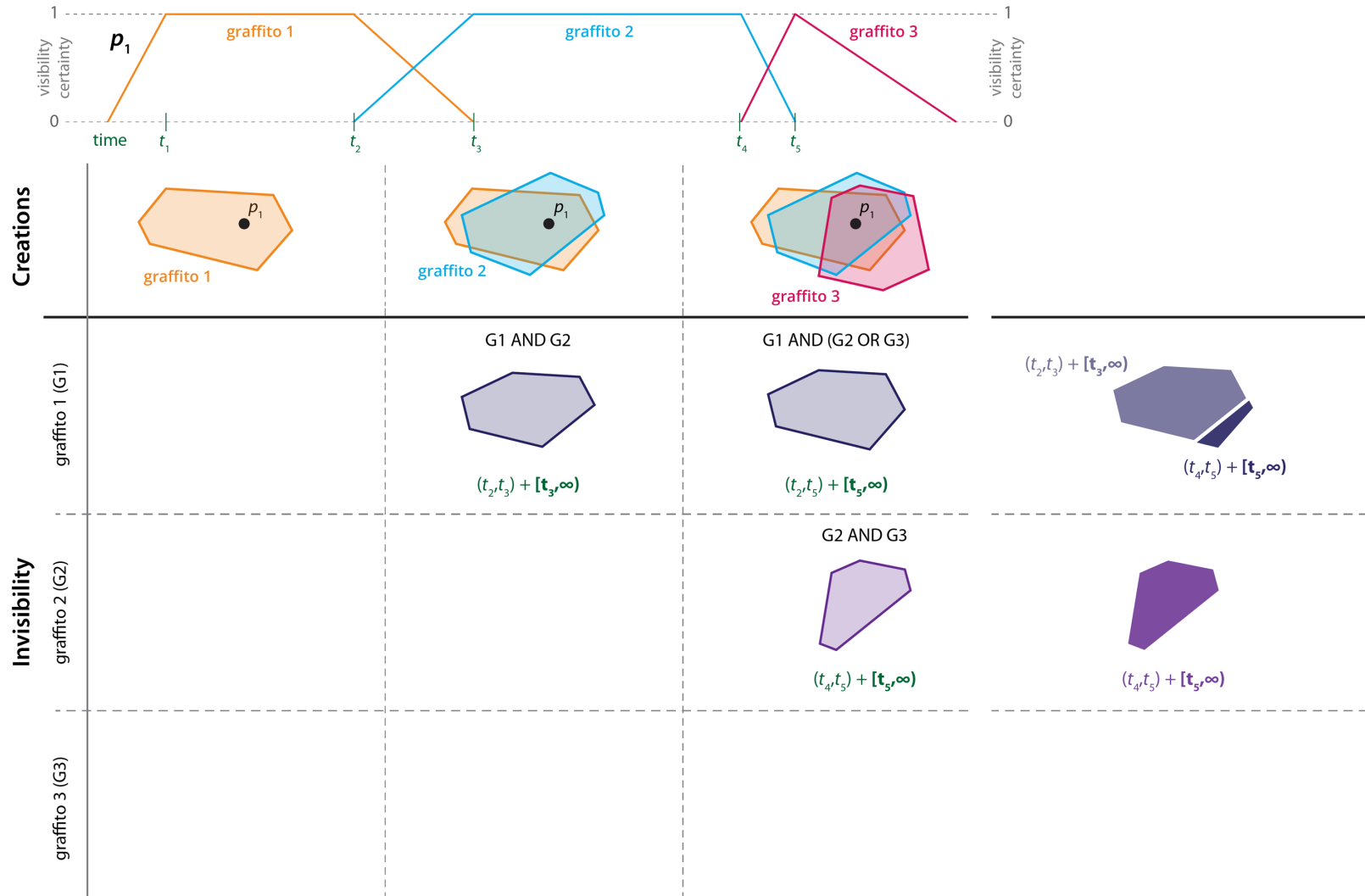
TOWARDS polygons

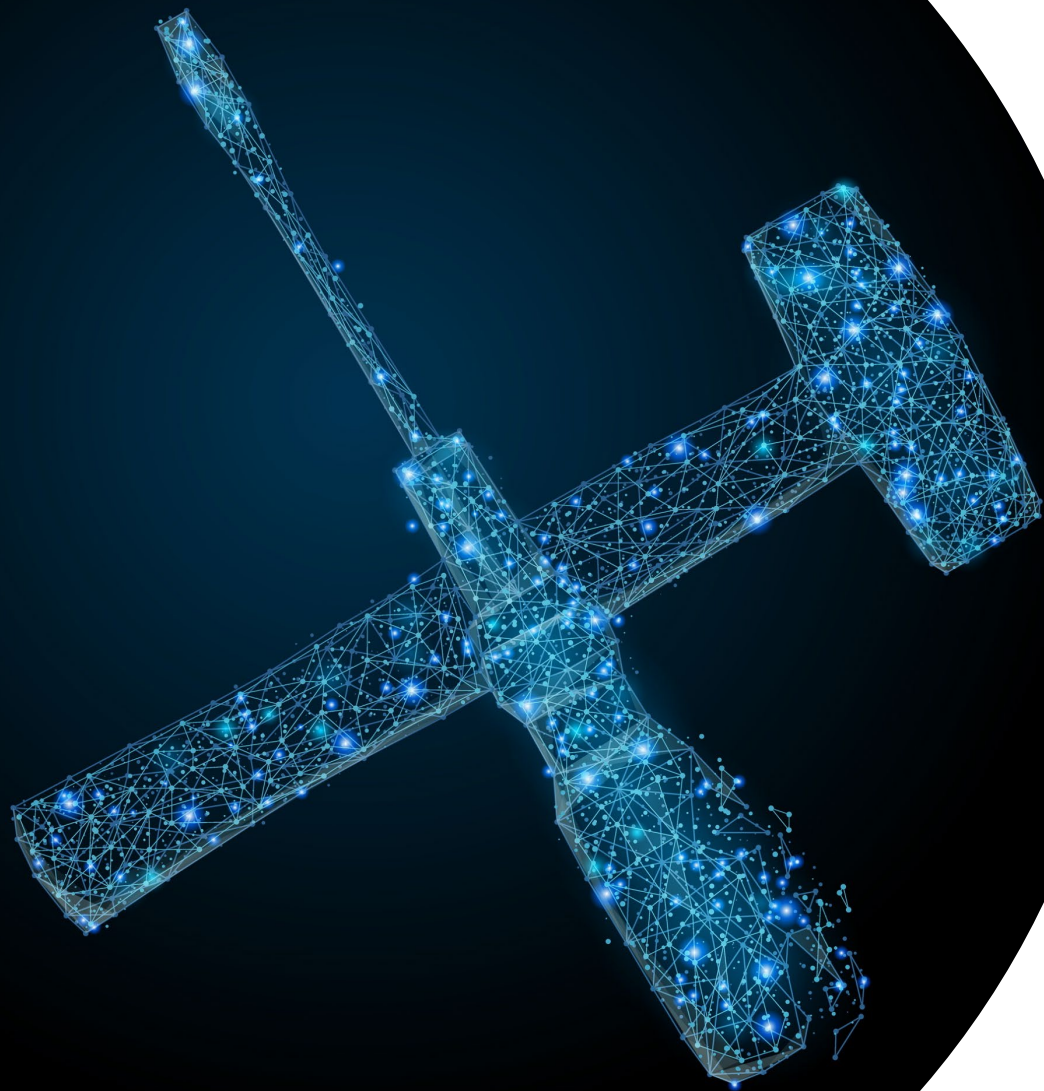


TOWARDS polygons



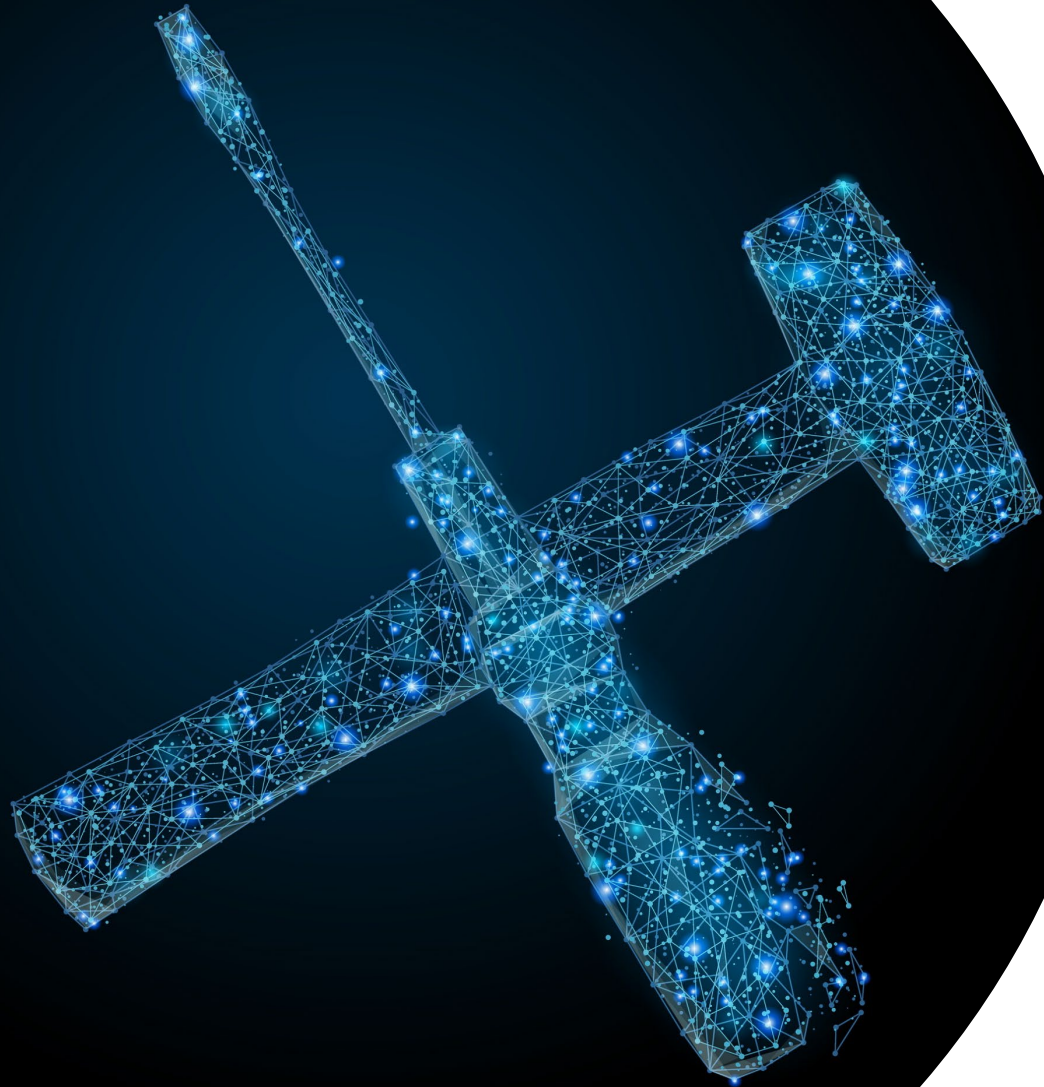
TOWARDS polygons





POLYGON

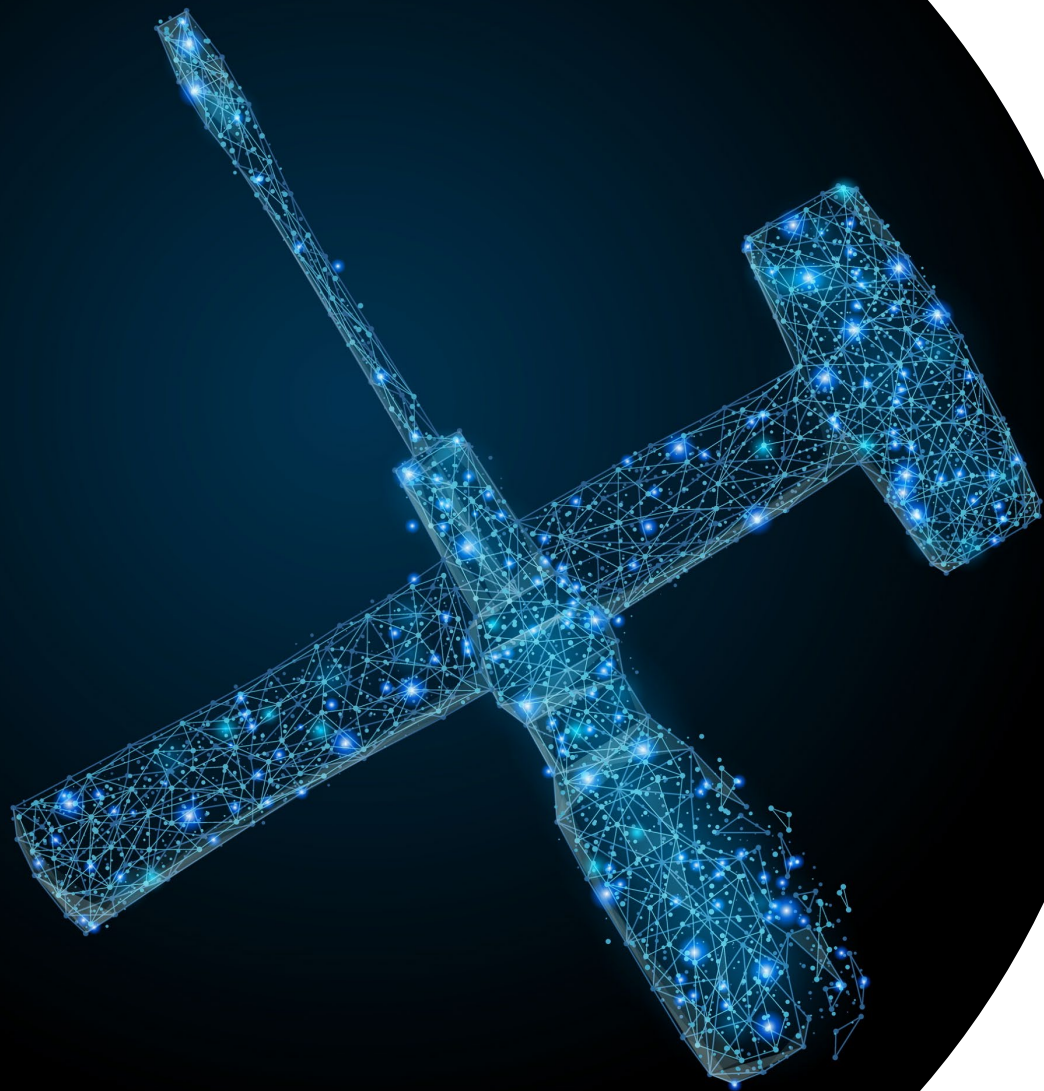
tools



POLYGON

tools

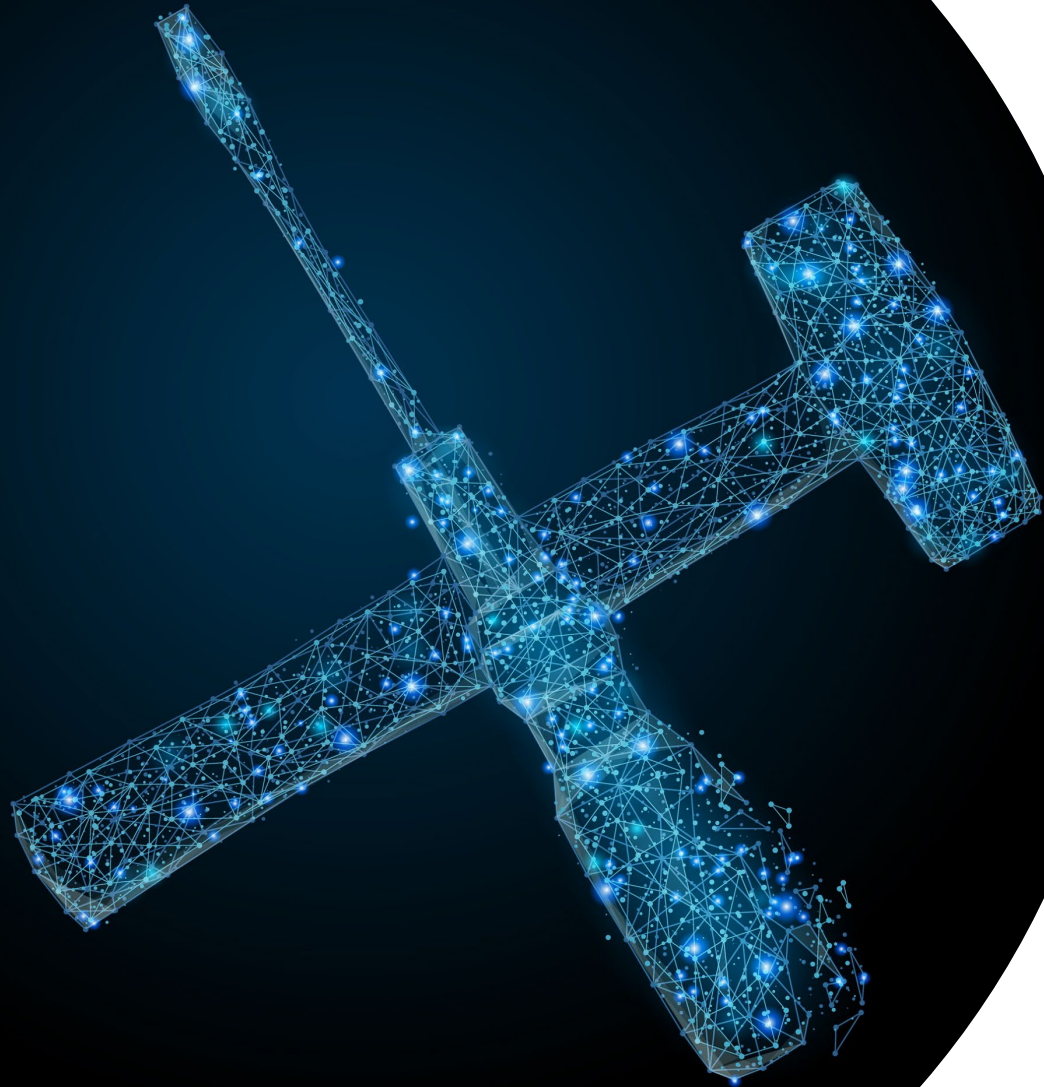
“event” = location + time



POLYGON tools

“event” = location + time

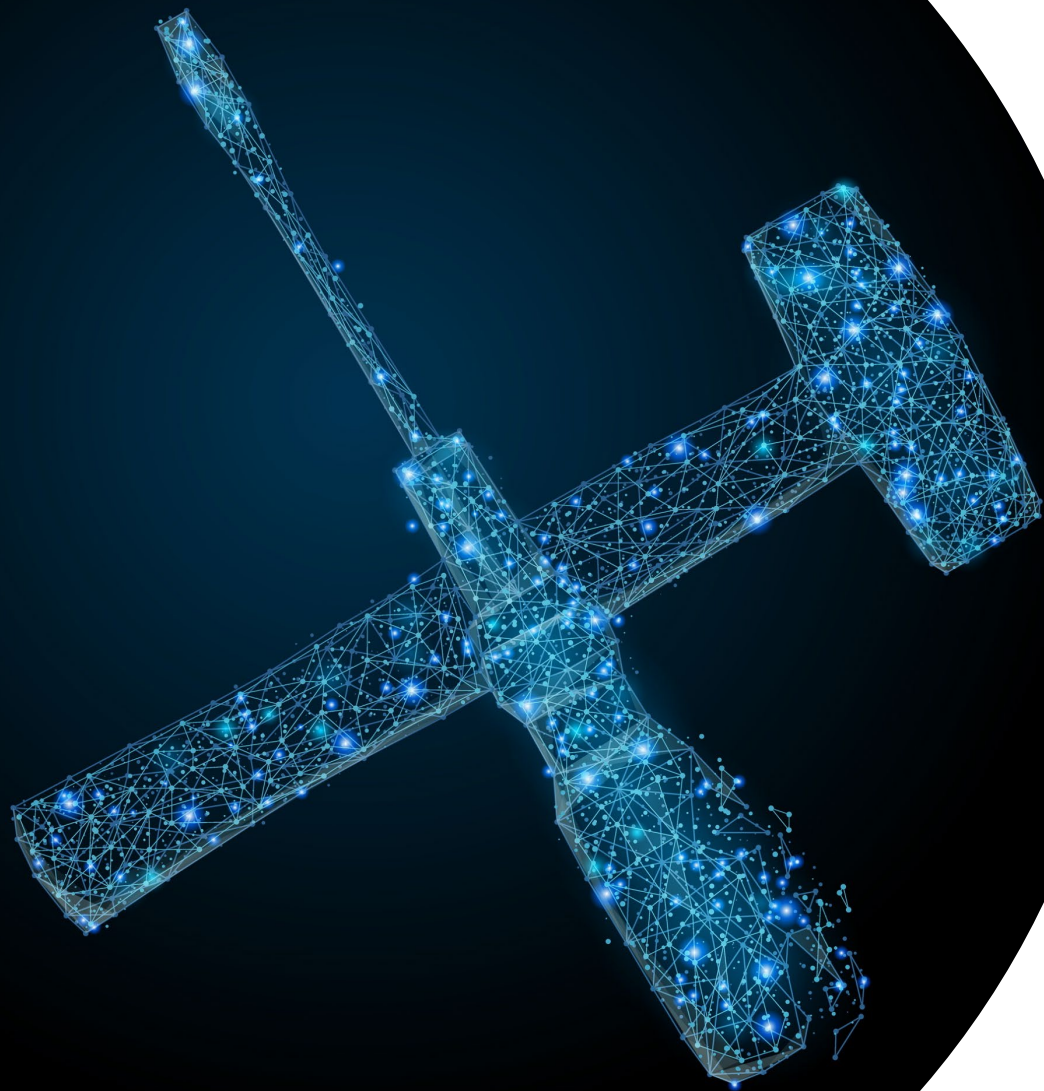
GRAPHIS
AUTOGRAF



POLYGON

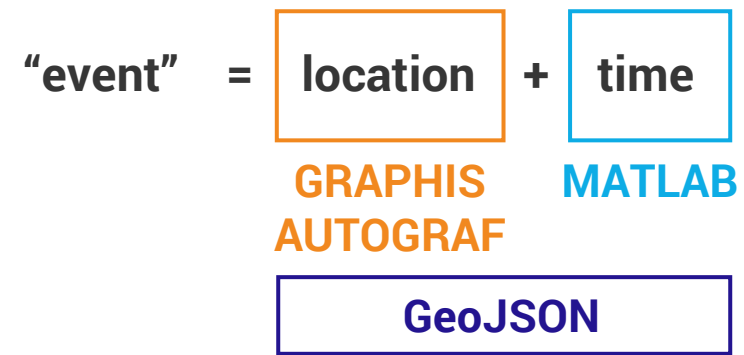
tools

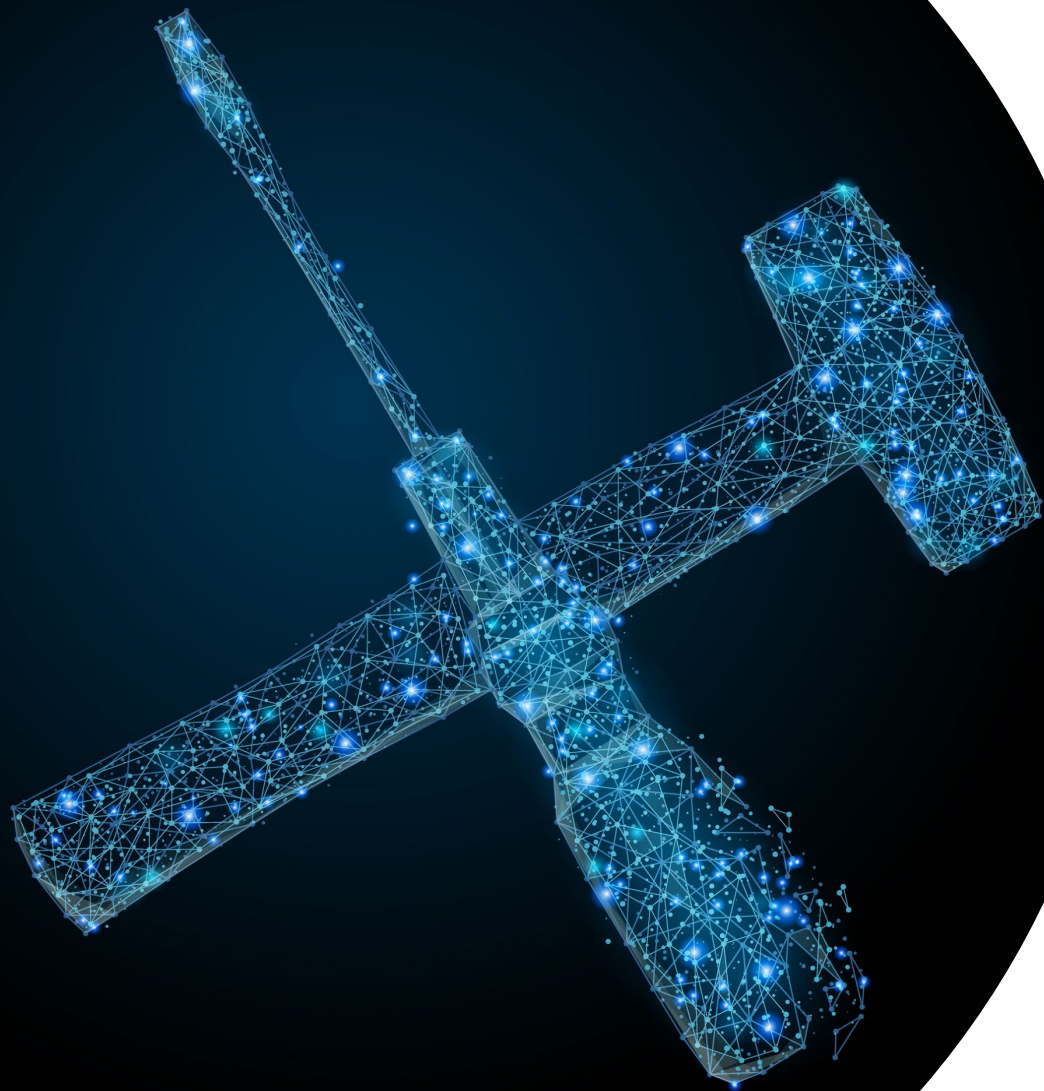
"event" = location + time
GRAPHIS
AUTOGRAF MATLAB



POLYGON

tools





POLYGON

tools

“event” = location + time

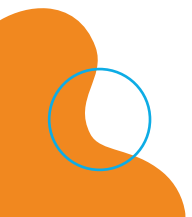
GRAPHIS
AUTOGRAF

MATLAB

UrbanChameleon

GeoJSON

CREATING location



CREATING location

GRAPHIS

The screenshot displays the GRAPHIS web application interface. At the top, the title bar shows 'MENU' on the left and 'GRAPHIS' on the right. The main content area features a large image of a graffiti wall with a central figure holding a gun, surrounded by various tags and text like 'INGUTI WE TRUST'. To the left of the image are three panels: 'Database statistics' showing 1 image, 0 circles, 0 rectangles, and 0 polygons; 'Region appearance' with icons for different shapes and colors; and 'Region operations' with icons for selection and deletion. Below these is a welcome message for Geert Verhoeven. On the right side, there is a 'User information' panel with fields for Name and Identifier, and a 'Region' panel with fields for Region Identifier, Region Name, Region Role, and Region Content Type. At the bottom right, there are fields for Identifier, Name, and Role. The bottom of the interface shows a small thumbnail of the main image and a footer with the text 'GRAPHIS © INDIGO 2023 - https://projectindigo.eu'.

CREATING location

GRAPHIS

The screenshot displays the GRAPHIS web application interface. The main area shows a photograph of a graffiti-covered wall with a yellow polygonal region highlighting a specific piece of graffiti. The interface includes a left sidebar with navigation and tool options, a top header with the application name and logo, and a right sidebar with a configuration panel for the selected region.

Database statistics

- Nr. of images: 1
- Circles: 0
- Rectangles: 0
- Polygons: 1

Region appearance

- Color: Orange, Green, Blue
- Stroke: Solid, Dashed, Dotted

Region operations

- Tools: Circle, Square, Polygon, Move, Rotate, Delete

User information

- Name: Geert Verhoeven
- Identifier: 0000-0003-4825-9604

Region

- Region Identifier: INDIGO_2023-04-12_Z7ii-B_0685_230613T12:56:50
- Region Name: graffito
- Region Role
 - Identifier: https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/mainSubjectArea
 - Name: main subject area
- Region Content Type
 - Identifier: https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/graffiti
 - Name: graffito

Region Creator

- Identifier: 0000-0003-4825-9604
- Name: Geert Verhoeven
- Role: https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/imgRegCreator

Welcome GEERT VERHOEVEN.
Enjoy working with GRAPHIS
New database was created:
PolygonTest.sqlite
Importing images
Start to import 1 images

CREATING location

GRAPHIS

The screenshot displays the GRAPHIS web application interface. At the top, the title bar shows 'MENU' on the left and 'GRAPHIS' on the right. The main content area features a large image of a graffiti wall with a yellow polygonal region highlighted around a central figure. The file name 'INDIGO_2023-04-12_Z7ii-B_0685.jpg' is visible above the image. Below the image is a smaller thumbnail of the same image with a blue '1' in the corner.

On the left side, there are three toolbars:

- Database statistics:** Shows 'Nr. of images' as 1, 'Circles' as 0, 'Rectangles' as 0, and 'Polygons' as 1.
- Region appearance:** Includes icons for different shapes (circle, square, pentagon) and checkboxes for each.
- Region operations:** Includes icons for selection, zoom, and deletion.

At the bottom left, a welcome message reads: 'Welcome GEERT VERHOEVEN. Enjoy working with GRAPHIS. New database was created: PolygonTest.sqlite. Importing images. Start to import 1 images.' Below this are help and chat icons.

On the right side, there are several panels:

- User information:** Shows 'Name' as Geert Verhoeven and 'Identifier' as 0000-0003-4825-9604.
- Region:** Shows 'Region Identifier' as INDIGO_2023-04-12_Z7ii-B_0685_230613T12:56:50, 'Region Name' as graffito, and 'Region Role' as main subject area.
- Region Content Type:** Shows 'Identifier' and 'Name' as graffito.
- Region Creator:** Shows 'Identifier' as 0000-0003-4825-9604, 'Name' as Geert Verhoeven, and 'Role' as https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/imgRegCreator.

CREATING location

GRAPHIS

The screenshot displays the GRAPHIS web application interface. At the top, the title bar shows 'MENU' on the left and 'GRAPHIS' on the right. The main content area features a central image of a graffiti wall with a yellow polygonal region highlighted around a central figure. The file name 'INDIGO_2023-04-12_Z7ii-B_0685.jpg' is visible above the image. To the left of the image is a sidebar with several panels: 'Database statistics' showing 1 image, 0 circles, 0 rectangles, and 1 polygon; 'Region appearance' with color and shape selection options; 'Region operations' with icons for selection and deletion; and a welcome message for Geert Verhoeven. To the right of the image is a 'User information' panel with fields for Name and Identifier. Below that is a 'Region' configuration panel with fields for Region Identifier, Region Name, Region Role, and Region Content Type. At the bottom right, there are tabs for 'Region Creator', 'Description', and 'Transcription', with the 'Region Creator' tab active, showing fields for Identifier, Name, and Role. A small thumbnail of the image with the region is shown at the bottom center.

CREATING location

GRAPHIS
2D polygon (pixel coordinates)

The screenshot displays the GRAPHIS web application interface. At the top, the title bar shows 'MENU' on the left and 'GRAPHIS' on the right. The main content area features a central image of a graffiti wall with a yellow polygon region drawn over a central figure. The file name 'INDIGO_2023-04-12_Z7ii-B_0685.jpg' is displayed above the image. Below the image is a thumbnail of the same image with a blue '1' icon.

On the left side, there are three toolbars:

- Database statistics:** Shows 'Nr. of images' as 1, 'Circles' as 0, 'Rectangles' as 0, and 'Polygons' as 1.
- Region appearance:** Includes icons for circle, square, and pentagon shapes, each with a green checkmark.
- Region operations:** Includes icons for a circle, square, and pentagon, a crosshair, a selection tool, and a red 'X' icon.

At the bottom left, a welcome message reads: 'Welcome GEERT VERHOEVEN. Enjoy working with GRAPHIS. New database was created: PolygonTest.sqlite. Importing images. Start to import 1 images.' Below this are icons for help and chat.

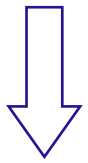
On the right side, there are several panels:

- User information:** Shows 'Name' as Geert Verhoeven and 'Identifier' as 0000-0003-4825-9604. It includes buttons for 'Change region info', 'View region info', and 'All region info'.
- Region:** Shows 'Region Identifier' as INDIGO_20230412_G0001, 'Region Name' as graffito, and 'Region Role' as main subject area.
- Region Content Type:** Shows 'Identifier' as https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/graffiti and 'Name' as graffito.
- Region Creator:** Shows 'Identifier' as 0000-0003-4825-9604, 'Name' as Geert Verhoeven, and 'Role' as https://vocabs.acdh.oeaw.ac.at/graphis-imgreg/imgRegCreator.

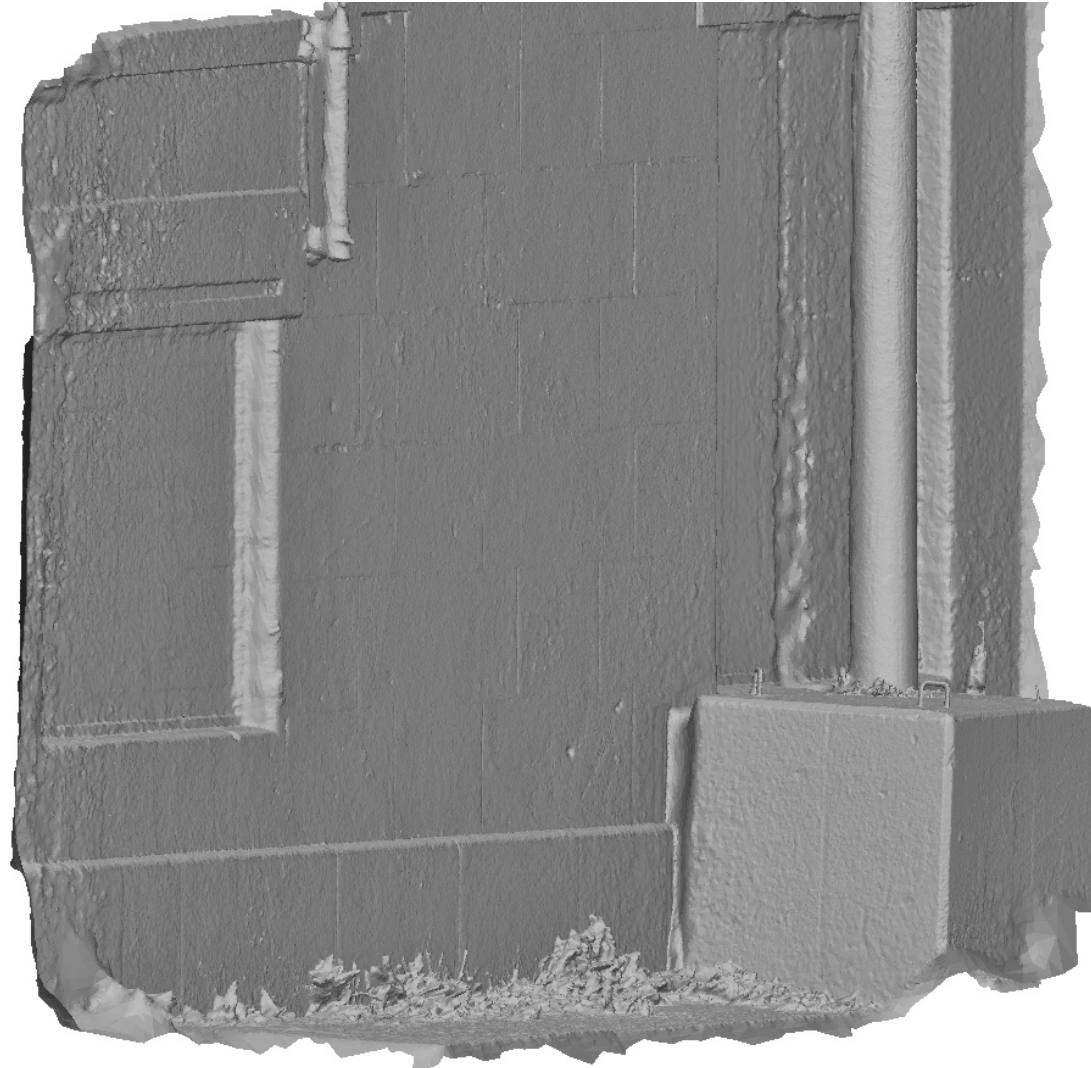
CREATING location

GRAPHIS

2D polygon (pixel coordinates)



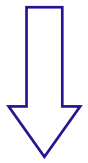
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



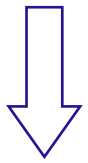
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



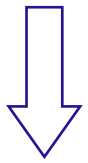
AUTOGRAF



CREATING location

GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

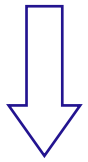
3D polygon (real-world coordinates)



CREATING location

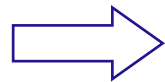
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polygon (real-world coordinates)

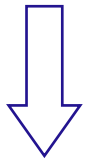


2D polygon (real-world coordinates)

CREATING location

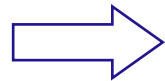
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polygon (real-world coordinates)



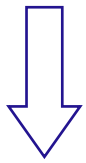
2D polygon (real-world coordinates)

?

CREATING **location**

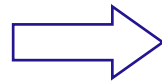
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polygon (real-world coordinates)



2D polygon (real-world coordinates)

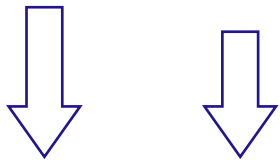
?



CREATING location

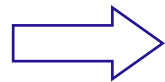
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polygon (real-world coordinates)



2D polygon (real-world coordinates)

?

CREATING location

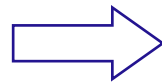
GRAPHIS

2D polygon (pixel coordinates)



AUTOGRAF

3D polygon (real-world coordinates)



2D polygon (real-world coordinates)

?



STORING location

GRAPHIS

2D polygon (pixel coordinates)

AUTOGRAF

3D polygon (real-world coordinates)

2D polygon (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

AUTOGRAF

3D polygon (real-world coordinates)

2D polygon (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polygon (real-world coordinates)

2D polygon (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polygon (real-world coordinates)

```
"type": "FeatureCollection",
"features": [
  {
    "type": "Feature",
    "properties": {
    },
    "geometry": {
      "type": "Polygon",
      "coordinates": [
        [
          [16.369211789142078, 48.220322928177943, 47.592282951099342],
          [16.369218883807932, 48.220332028088414, 49.952191243997014],
          [16.369262616499576, 48.220260963475802, 49.899587087985907],
          [16.369256646544585, 48.220262672660212, 47.281441048933353],
          [16.369211789142078, 48.220322928177943, 47.592282951099342]
        ]
      ]
    }
  }
]
```

2D polygon (real-world coordinates)

STORING location

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polygon (real-world coordinates)

```
"type": "FeatureCollection",
"features": [
  {
    "type": "Feature",
    "properties": {
    },
    "geometry": {
      "type": "Polygon",
      "coordinates": [
        [
          [16.369211789142078, 48.220322928177943, 47.592282951099342],
          [16.369218883807932, 48.220332028088414, 49.952191243997014],
          [16.369262616499576, 48.220260963475802, 49.899587087985907],
          [16.369256646544585, 48.220262672660212, 47.281441048933353],
          [16.369211789142078, 48.220322928177943, 47.592282951099342]
        ]
      ]
    }
  }
]
```

2D polygon (real-world coordinates)

GeoJSON

STORING **time**

XMP metadata

GRAPHIS

2D polygon (pixel coordinates)

GeoJSON

AUTOGRAF

3D polygon (real-world coordinates)

```
"type": "FeatureCollection",
"features": [
  {
    "type": "Feature",
    "properties": {
    },
    "geometry": {
      "type": "Polygon",
      "coordinates": [
        [
          [16.369211789142078, 48.220322928177943, 47.592282951099342],
          [16.369218883807932, 48.220332028088414, 49.952191243997014],
          [16.369262616499576, 48.220260963475802, 49.899587087985907],
          [16.369256646544585, 48.220262672660212, 47.281441048933353],
          [16.369211789142078, 48.220322928177943, 47.592282951099342]
        ]
      ]
    }
  }
]
```

2D polygon (real-world coordinates)

GeoJSON

STORING time

GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

STORING **time**

in-situ graffiti event

GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

STORING **time**

in-situ graffiti event

Production

GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

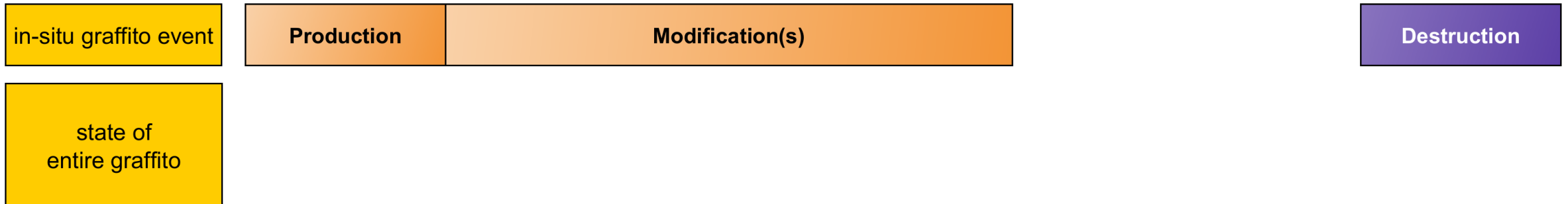
STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

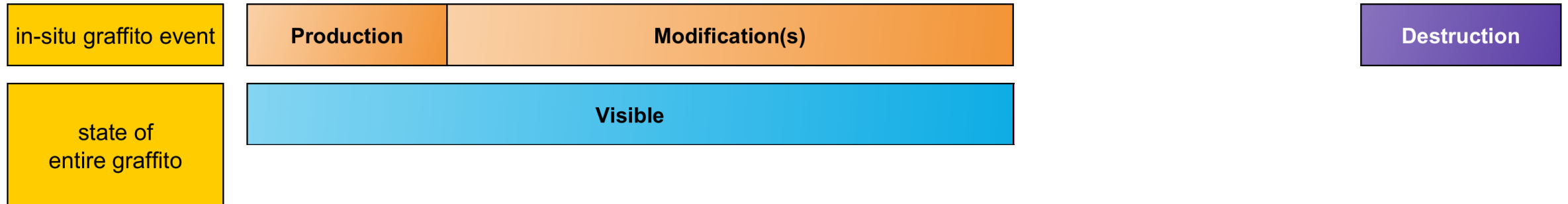
STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

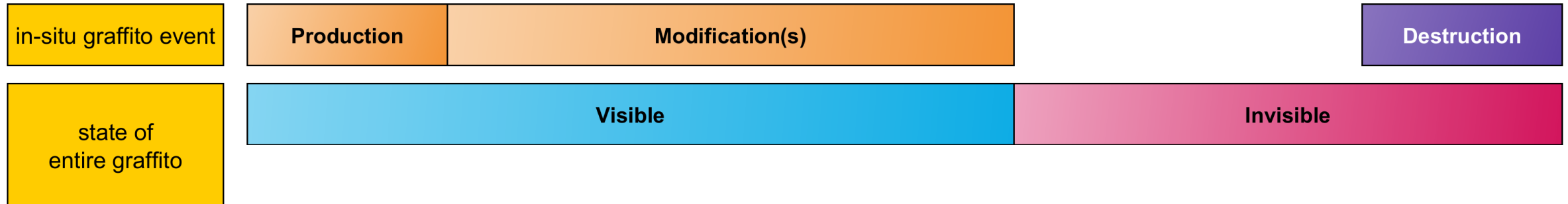
STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

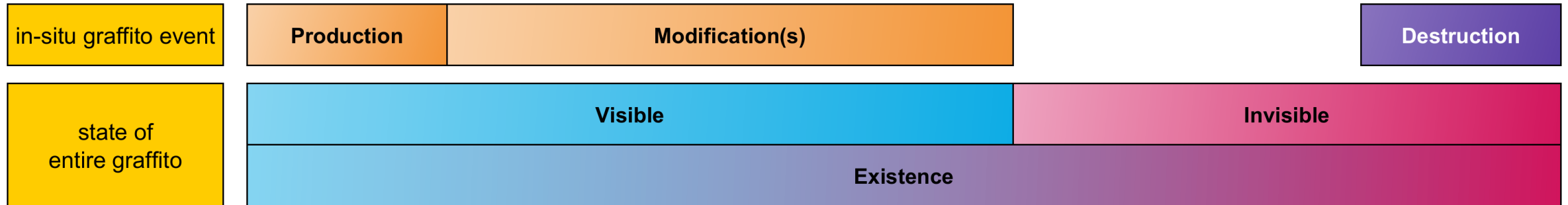
STORING time



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

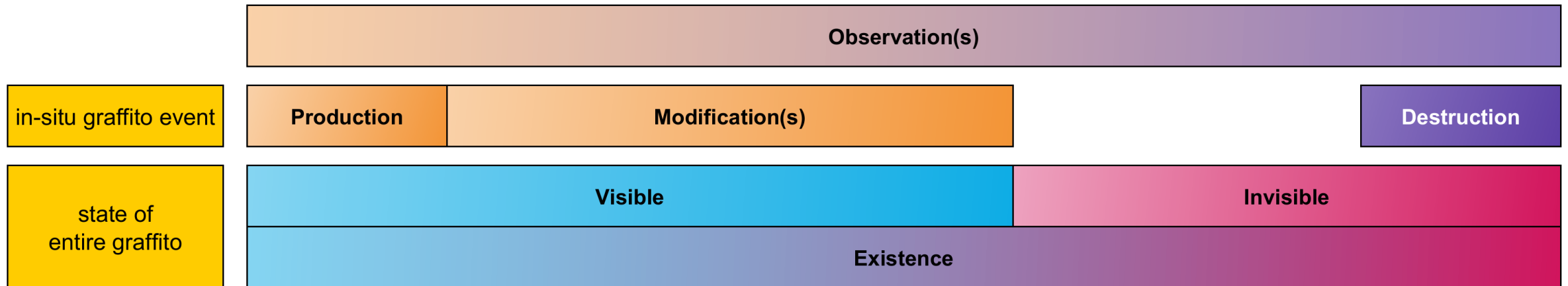
STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

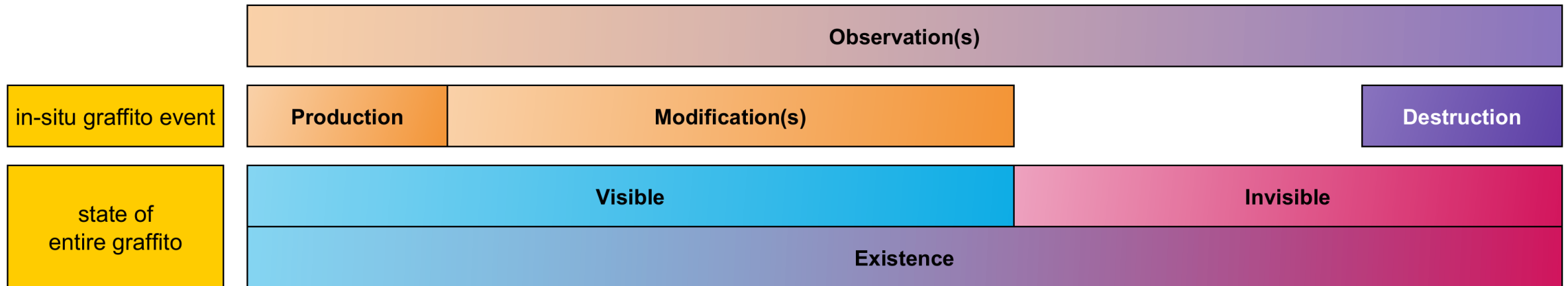
STORING **time**



GeoJSON structure

- make sense
- CIDOC CRM
- mathematically derivable

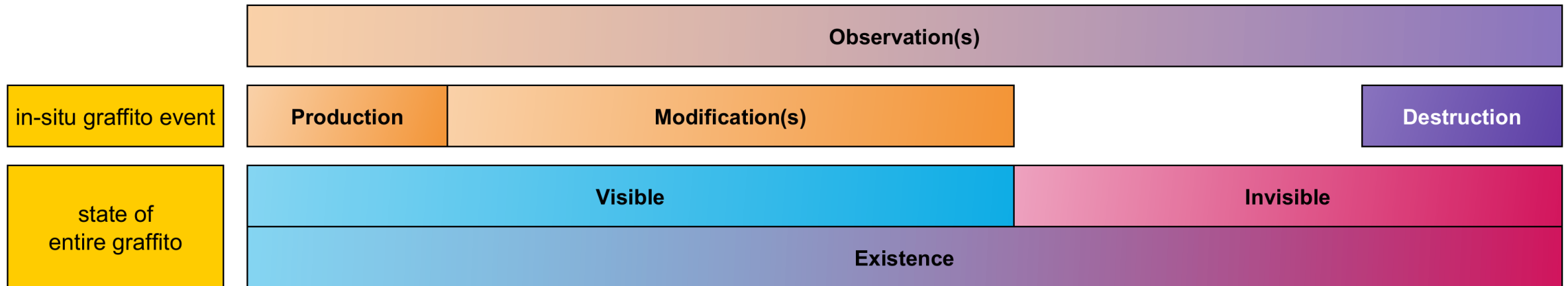
STORING **time**



```
"type": "Feature",
"properties": {
  "polygon_ID": "INDIGO_2023-03-16_Z7ii_0016 + string made by GRAPHIS",
  "polygon_state": "initial or derived",
  "polygon_creation": "manual, semi-automatic or automatic",
  "graffito_ID": "INDIGO_20230316_G0016",
  "observation": { ...
},
  "production": { ...
},
```

```
"modification": [ ...
],
  "destruction": { ...
},
  "visible": { ...
},
  "invisible": { ...
},
  "existence": { ...
}
```

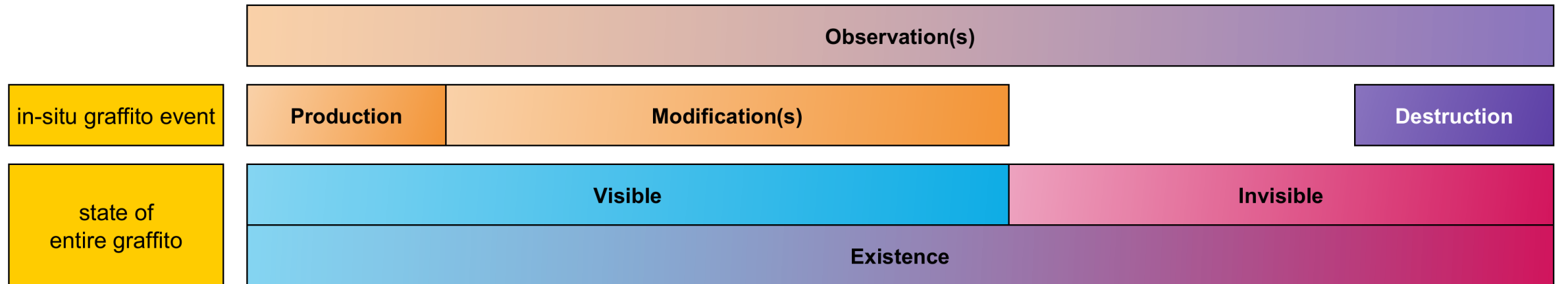
STORING **time**



```
"type": "Feature",
"properties": {
  "polygon_ID": "INDIGO_2023-03-16_Z7ii_0016 + string made by GRAPHIS",
  "polygon_state": "initial or derived",
  "polygon_creation": "manual, semi-automatic or automatic",
  "graffito_ID": "INDIGO_20230316_G0016",
  "observation": { ... },
  "production": { ... },
```

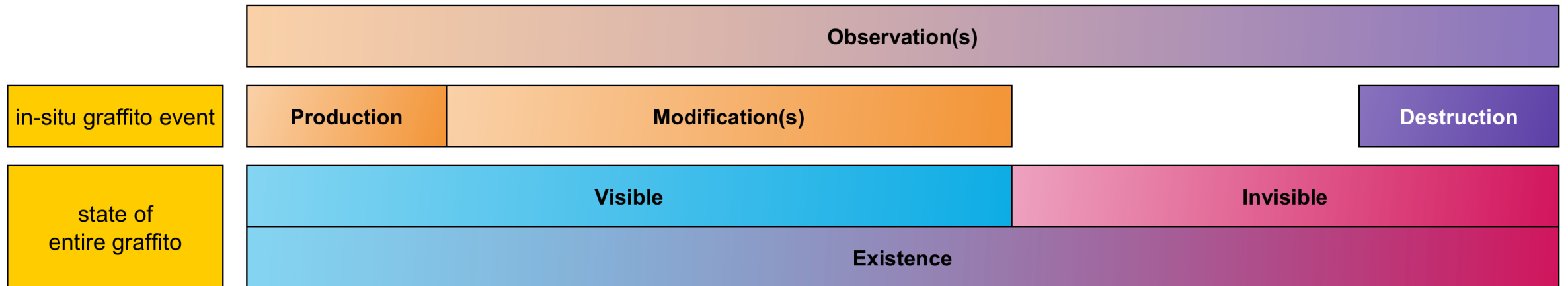
```
"modification": [ ... ],
"destruction": { ... },
"visible": { ... },
"invisible": { ... },
"existence": { ... }
```

STORING **time**



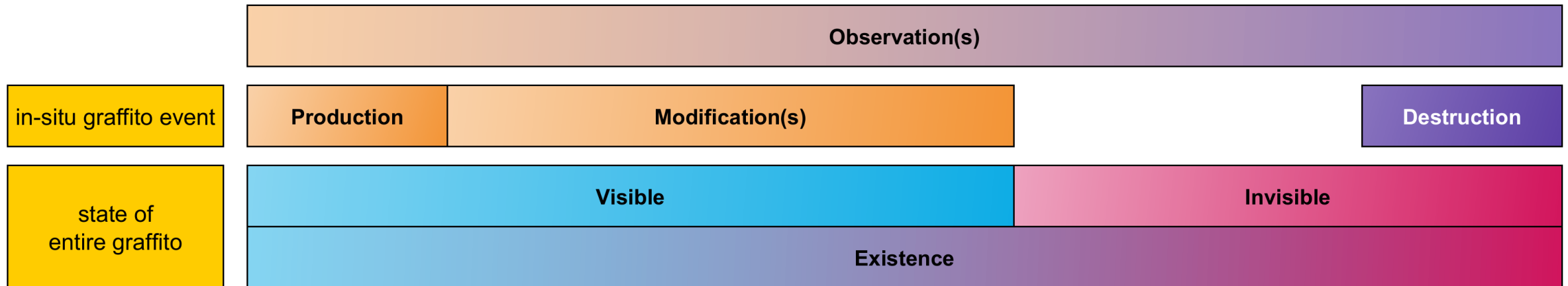
```
"visible": {  
  "start": {  
    "end": {  
      "span": {
```

STORING **time**



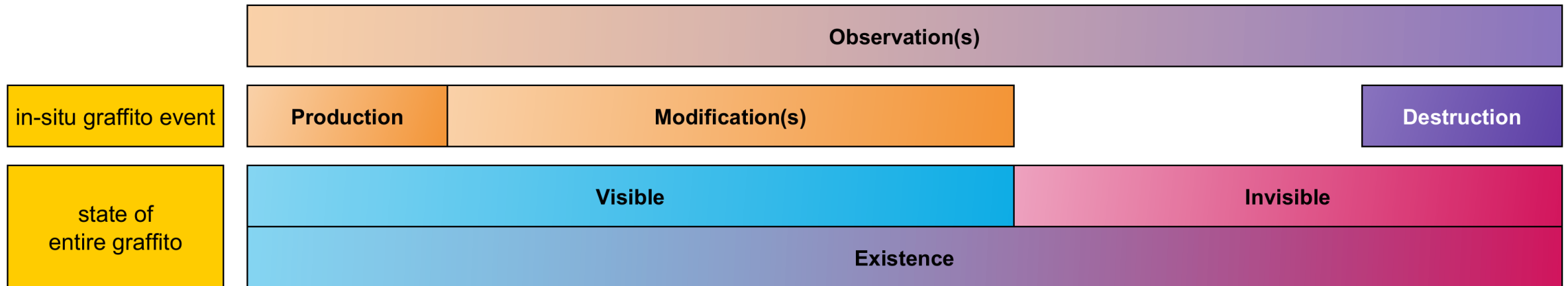
```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "span": {
```

STORING **time**



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {
```


STORING time



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING **time**



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING **time**



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING time



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```


STORING time



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING time



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```


STORING time



```
"visible": {  
  "start": {  
    "earliest":  
    "earliest_source":  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING time



```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest":  
    "earliest_source":  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```


STORING time



```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest": "2022-09-14T09:45",  
    "earliest_source": "photoTour",  
    "latest":  
    "latest_source":  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```

STORING time



```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest": "2022-09-14T09:45",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-21T17:05",  
    "latest_source": "photoTour"  
  },  
  "span": {  
    "minimum":  
    "maximum":  
  }  
}
```


STORING time



```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest": "2022-09-14T09:45",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-21T17:05",  
    "latest_source": "photoTour"  
  },  
  "span": {  
    "minimum": "PT45H9M",  
    "maximum":  
  }  
}
```


STORING time



```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest": "2022-09-14T09:45",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-21T17:05",  
    "latest_source": "photoTour"  
  },  
  "span": {  
    "minimum": "PT45H9M",  
    "maximum": "PT390H45M"  
  }  
}
```

COMPUTING time

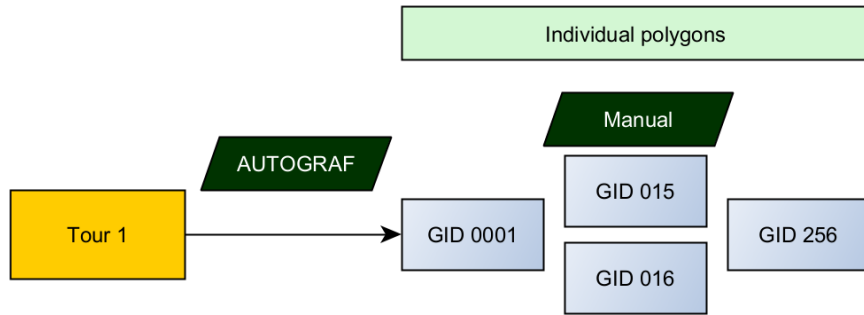


```
"visible": {  
  "start": {  
    "earliest": "2022-09-05T10:20",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-12T12:36",  
    "latest_source": "photoTour"  
  },  
  "end": {  
    "earliest": "2022-09-14T09:45",  
    "earliest_source": "photoTour",  
    "latest": "2022-09-21T17:05",  
    "latest_source": "photoTour"  
  },  
  "span": {  
    "minimum": "PT45H9M",  
    "maximum": "PT390H45M"  
  }  
}
```

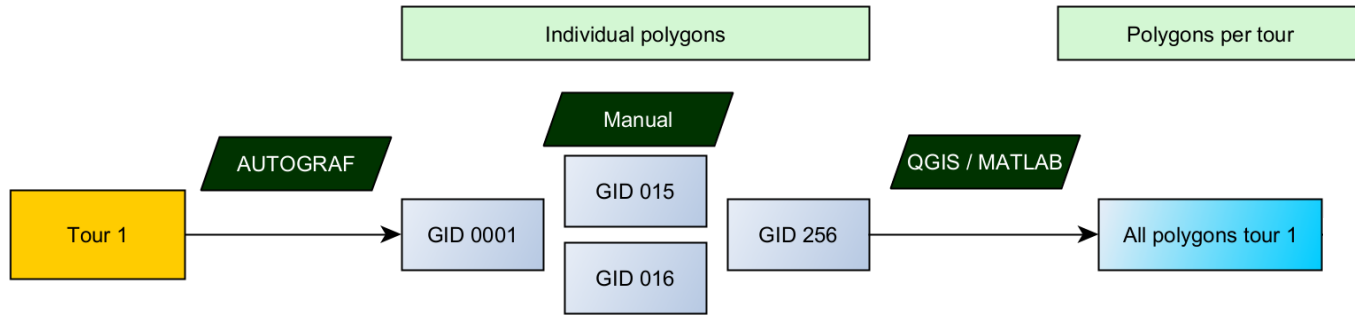
COMPUTING **time**

Tour 1

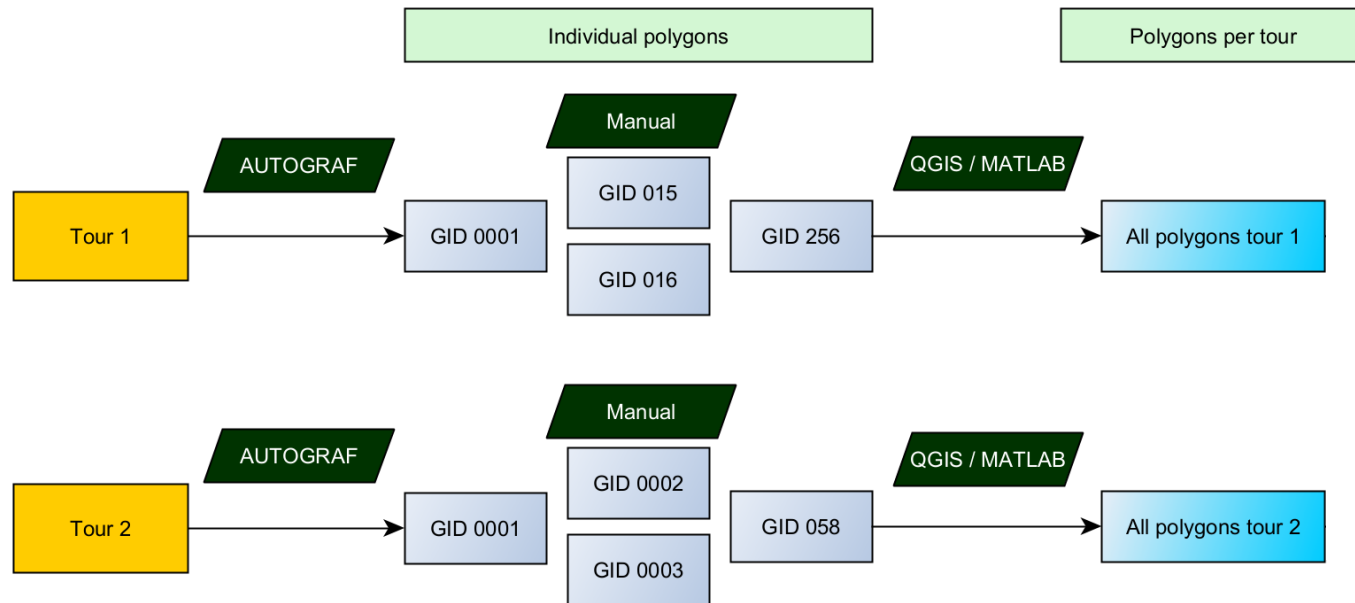
COMPUTING time



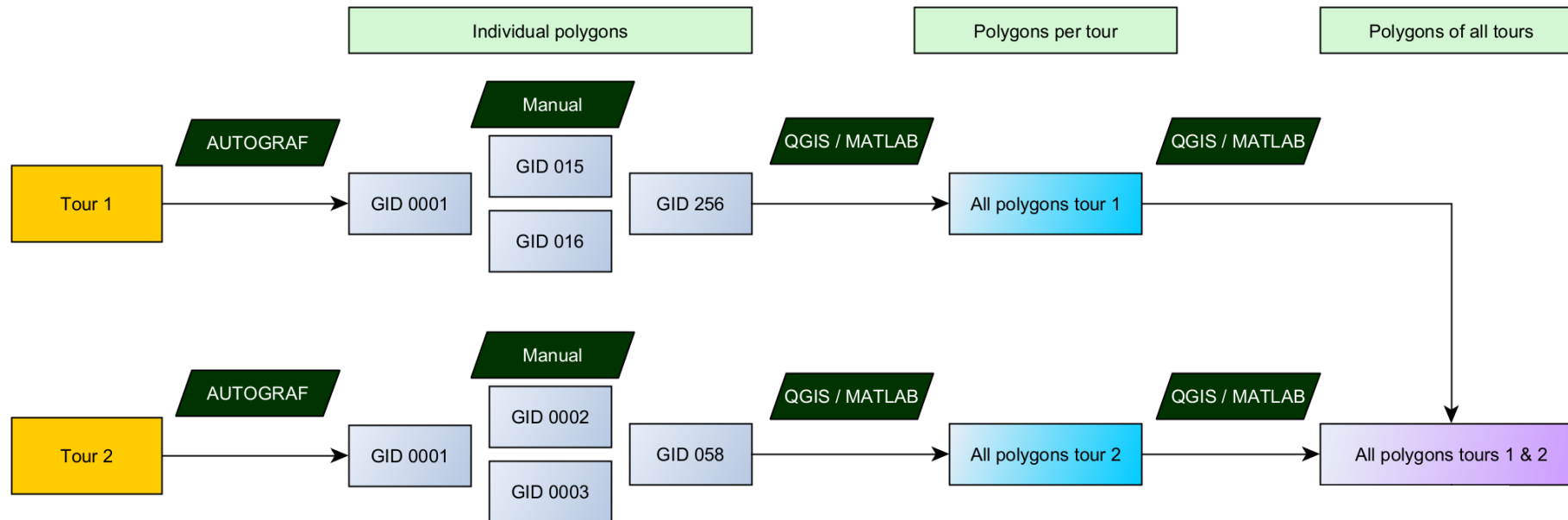
COMPUTING time



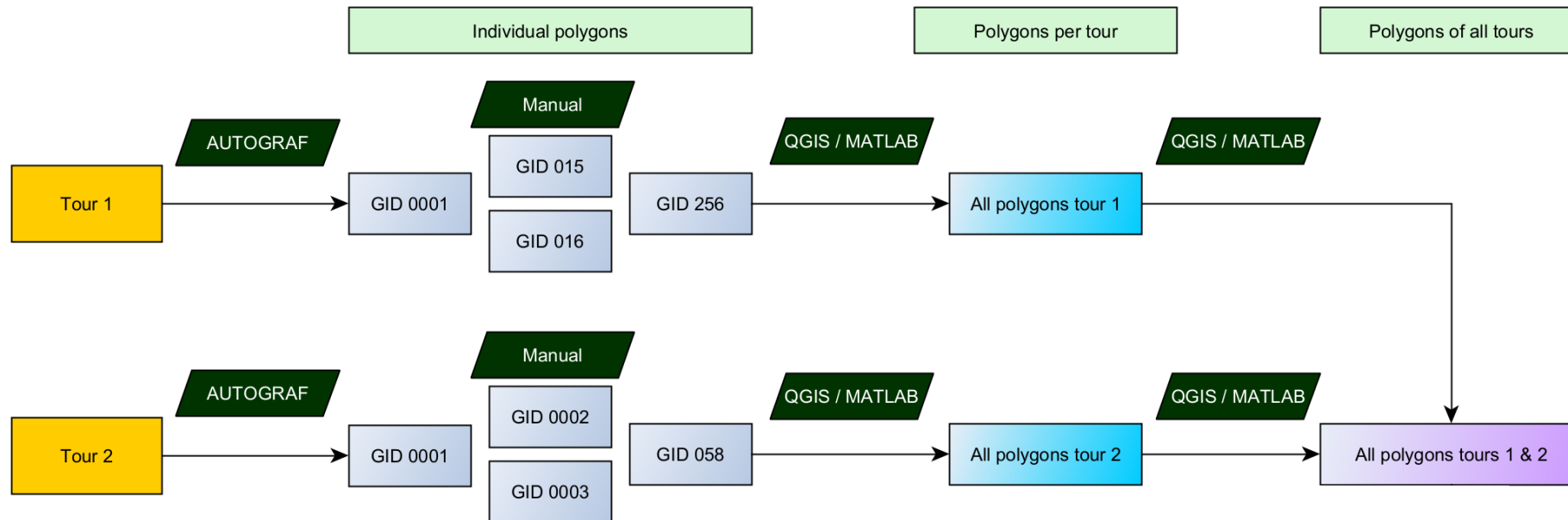
COMPUTING time



COMPUTING time



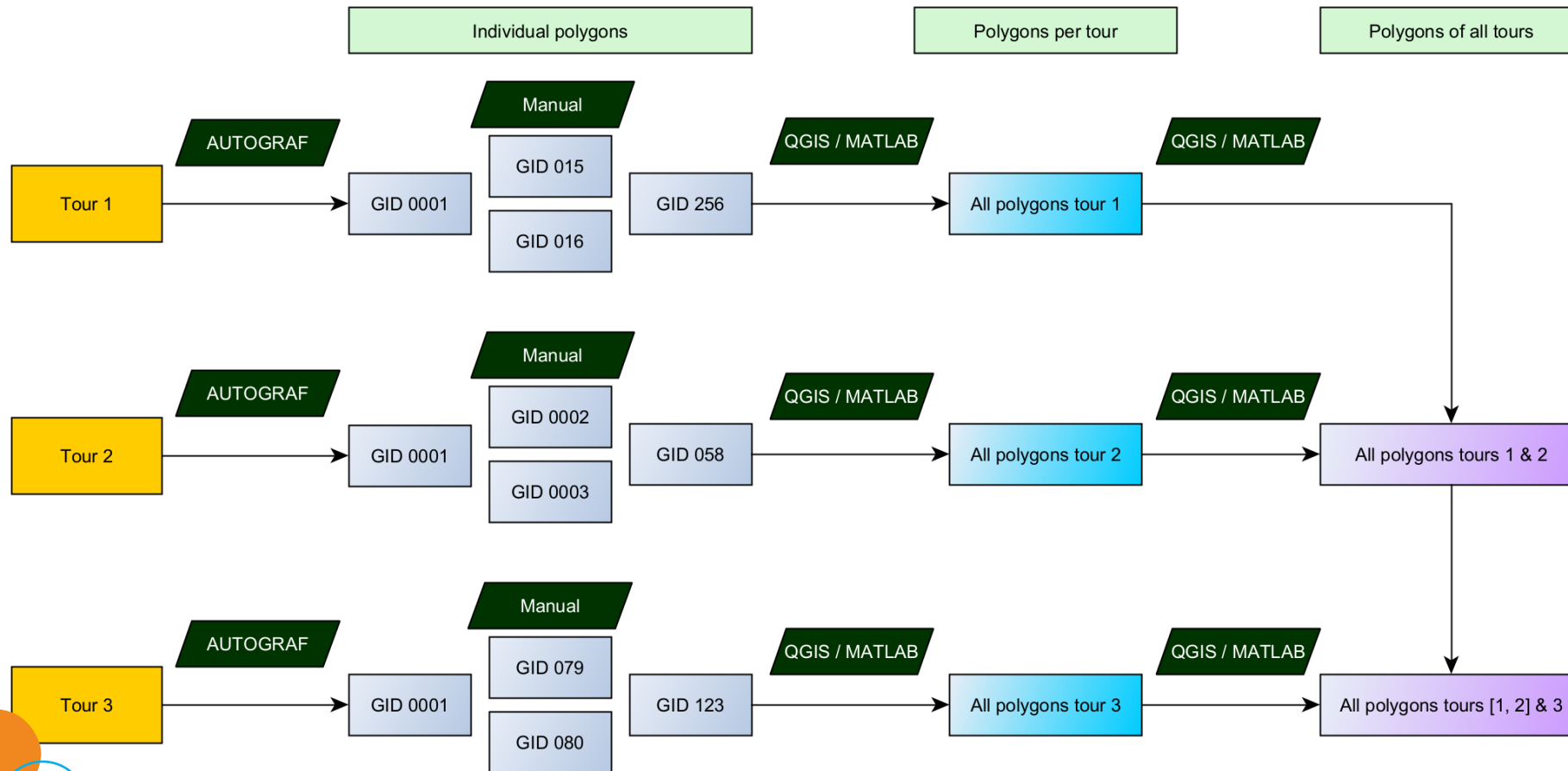
COMPUTING time



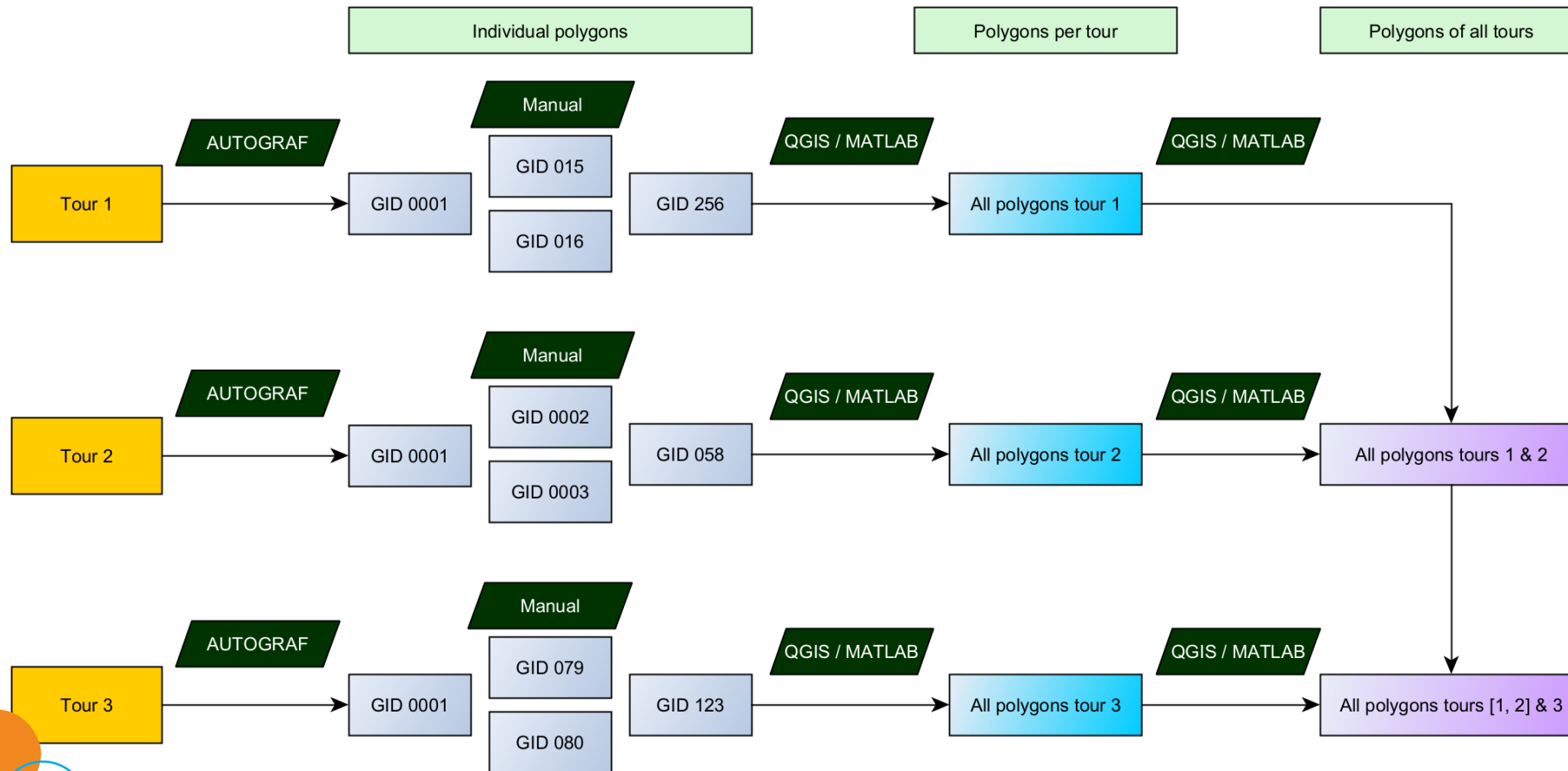
processing



COMPUTING time



COMPUTING time



processing





STILL **puzzling**

trial and error

3D → 2D

polygons are subjective thresholds



STILL **puzzling**

real graffiti
physical resource

derivatives
digital resources



STILL **puzzling**

real graffito
physical resource

derivatives
digital resources

polygons



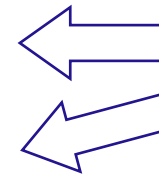


STILL puzzling

real graffiti
physical resource

derivatives
digital resources

location
temporality



polygons



One polygon at a time trying to manage a graffiti-scape's spatio- tem ⌚ po ⌚ ra ⌚ li ⌚ ty

Geert Verhoeven
Jona Schlegel

projectindigo.eu

*The INDIGO graffiti project is funded by the Heritage Science Austria
programme of the Austrian Academy of Sciences (ÖAW)*

